



Public Works and Government Services Canada

Requisition No. EZ899-140423

MERX I.D. No. _____

SPECIFICATIONS
for

**Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia**

Project No. R.017173.031

May 2013

APPROVED BY:

for KM. J. Tal

Program Manager, Alaska Highway

June 04 2013

Date

[Signature]

Construction Safety Coordinator

2013.06.04

Date

TENDER:

J. Tal

Project Manager

June 04 2013

Date

PWGCSC

Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia



SPECIFICATION INDEX

Page 1 of 2

Specification

Division Sections

of Pages

FRONT MATERIAL

Cover Page	1
Specification Index & Drawings List	2

DIVISION 1 – GENERAL REQUIREMENTS

01 11 55	General Instructions	10
01 25 20	Mobilization and Demobilization	1
01 29 01	Method of Measurement and Payment	5
01 31 19	Project Management	3
01 32 17	Construction Progress and Reporting	13
01 33 00	Submittal Procedures	3
01 35 00	Special Procedures for Traffic Control	4
01 35 33	Health and Safety Requirements	9
01 35 43	Environmental Protection	3
01 45 00	Quality Control	3
01 51 00	Temporary Utilities	2
01 52 00	Construction Facilities	2
01 56 00	Temporary Barriers and Enclosures	1
01 59 10	Construction Camp	1
01 61 10	Product Requirements	5
01 74 11	Site Cleaning	1
01 74 19	Waste Management and Disposal	3
01 77 00	Closeout Procedures	1

DIVISION 2 – EXISTING CONDITIONS

02 41 99	Demolition for Minor Works	3
02 81 01	Hazardous Materials	4

DIVISION 3 – CONCRETE

03 10 00	Concrete Forming and Accessories	4
03 20 00	Concrete Reinforcing	4
03 30 00	Cast-In-Place Concrete	9
03 37 26	Underwater Placed Concrete	5

DIVISION 5 – METALS

05 12 33	Structural Steel for Bridges	7
05 50 00	Metal Fabrication	4

DIVISION 35 – WATERWAY AND MARINE CONSTRUCTION

35 42 19	Preservation of Water Courses	3
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LIST OF DRAWINGS

Steamboat Creek Bridge Deck Joint Replacement – General Layout	Sheet 1 of 3
Steamboat Creek Bridge Deck Joint Replacement – Section and Details – Sheet 1	Sheet 2 of 3
Steamboat Creek Bridge Deck Joint Replacement – Section and Details – Sheet 2	Sheet 3 of 3
Lower Liard River Bridge – Underwater Concrete Repair at Pier 2 (North)	Sheet 1 of 1
Hyland River Bridge Deck Joint Repairs and Truss Support Blocking Installation – General Layout	Sheet 1 of 2
Hyland River Bridge Deck Joint Repairs and Truss Support Blocking Installation – Sections and Details	Sheet 2 of 2

APPENDICES

1. Drawing S10 of 2003 “Hyland River Bridge Reconstruction and Widen Bridge Deck”
2. Bridge Inspection Reports and Site Photographs

REFERENCE DOCUMENTS

1. DFO Bridge Maintenance Standard Operating Procedures
Available on-line at http://www.pac.dfo-mpo.gc.ca/habitat/os-eo/pdfs/bridge_maintenance_e.pdf
2. MOE Standards and Best Practices for In-Stream Work
Available on-line at <http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf>

END OF SECTION

PART 1 - GENERAL

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| 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) 2005, the Canadian Highway Bridge Design Code CAN/CSA S6-06, and other indicated Codes, Construction Standards, and/or any other Code or Bylaw of local application. |
| | | .3 | Comply with applicable local bylaws, rules and regulations enforced at the location concerned. |
| | | .4 | Meet or exceed requirements of Contract documents, specified standards, codes and referenced documents. |
| | | .5 | In any case of conflict or discrepancy, the most stringent requirements shall apply. |
| 1.2 | Contract Documents | .1 | The Contract documents, drawings and specifications are intended to complement each other, and to provide for and include everything necessary for the completion of the Work. |
| | | .2 | Drawings are, in general, diagrammatic and are intended to indicate the scope and general arrangement of the work. |
| 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. |
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- 1.4 Division of Specifications .1 The specifications are subdivided in accordance with the current 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 **September 30, 2013**.
- 1.6 Summary of Work .1 The work should be represented as:
Steamboat, Lower Liard and Hyland Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3, Alaska Highway, British Columbia
- .2 Work under this contract consists of:
- .1 Lower Liard River Bridge Km 763.3: Underwater Concrete repairs to halt deterioration at the north pier.
- .2 Hyland River Bridge Km 937.3:
- .1 Replacement of Deck Joint seals over Piers 1 and 4,
- .2 Replacement of foam in Abutment Deck Joints with "Beram 195" Hot Applied Modified Asphalt (HAMA) Joint Sealant, and
- .3 Installation of a truss support blocking system.
- .3 Steamboat Creek Bridge at Km 515.3: Replacement of deck joints. This is an OPTIONAL item.
- .3 Other requirements:
- .1 Identification and removal of delaminated and damaged concrete sections prior to repairs. Exposed concrete surfaces should also be cleaned prior to repairs.
- .2 Cleaning of all exposed and rusted reinforcing steel. Should steel section less be severe, new reinforcing bars may be spliced into the existing steel.
- .3 Coordination and communication with other Contractors and agencies involved with Project, if applicable.
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- .4 Management of Environment.
 - .5 Use only environmentally responsible green materials/ products with no VOC emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality - subject to Departmental Representative's approval of submitted MSDS Product Data.
 - .6 Use materials/products containing highest percentage of recycled and recovered materials practicable - consistent with maintaining cost effective satisfactory levels of competition.
 - .7 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 **September 30, 2013**.
 - .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:
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- .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 and schedule updated by Contractor in conjunction with and 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.
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| | .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 | Assume responsibility for assigned premises for performance of this work. |
| | .2 | 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. |
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| 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. |
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- 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.
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- .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 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 2 weeks for the following:
 - .1 Review of product data.
 - .2 Review of re-submission.
 - .3 Ordering of approved material and/or products.
 - 1.22 Relics and Antiques
 - .1 Relics and antiquities and items of historical or scientific interest shall remain property of Department. Protect such articles and request directives from Departmental Representative.
 - .2 Give immediate notice to Departmental Representative if evidence of archeological finds are encountered during excavation/ construction, and await Departmental Representative's written instructions before proceeding with work in this area.
 - 1.23 Project Meetings
 - .1 Departmental Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.
 - 1.24 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:
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- .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.
- 1.25 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.
- 1.26 Cleaning
- .1 Conduct daily cleaning and disposal operations. Comply with local ordinances and anti-pollution laws.
 - .2 Ensure cleanup of the work areas each day after completion of work.
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- .3 In preparation for inspections:
 - .1 Examine all sight-exposed interior and exterior surfaced and concealed spaces.
 - .2 Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces.
- .4 Use cleaning materials and methods in accordance with instructions of the manufacturer of the surface to be cleaned.
- 1.27 Environmental Protection
 - .1 Refer to section 01 35 43 – Environmental Protection.
 - .2 Prevent extraneous materials from contaminating air beyond construction area by providing temporary enclosures during work.
 - .3 Do not dispose of waste or volatile materials into water courses, storm or sanitary sewers.
 - .4 Ensure proper disposal procedures in accordance with all applicable territorial regulations.
- 1.28 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. Additional sets of documents be provided them at additional cost.
- 1.29 System of Measurement
 - .1 The metric system of measurement (SI) will be employed on this Contract.
- 1.30 Familiarization with Site
 - .1 Before submitting tender, visit bridge site to become familiar with all conditions likely to affect the cost of the Work.
- 1.31 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

PWGSC

Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

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MOBILIZATION & DEMOBILIZATION

Page 1 of 1

PART 1 - GENERAL

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| 1.1 | Section Includes | .1 | Mobilization and Demobilization |
| 1.2 | Related Sections | .1 | Construction Facilities – Section 01 52 00 |
| 1.3 | Description | .1 | Consists of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, camp, buildings, shops, offices, supplies and incidentals to and from the project site. |
| 1.4 | Measurement Procedures | .1 | 50 percent of Lump Sum Contract Price for Mobilization and Demobilization, to be paid when mobilization to site is complete. |
| | | .2 | Remainder of Lump Sum Contract Price for Mobilization and Demobilization to be paid when work is complete and all materials, equipment, camp, buildings, shops, offices, and other facilities have been removed from site and site cleaned and left in condition to the satisfaction of the Departmental Representative and all other agencies having jurisdiction. |
| | | .3 | 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 up. |

PART 2 - PRODUCTS

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| 2.1 | Not Used | .1 | Not used. |
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PART 3 - EXECUTION

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| 3.1 | Not Used | .1 | Not used. |
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END OF SECTION

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| Section Includes | .1 | This section provides the descriptions of scope of work for each item included in this tender and outlined on 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, plant, 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. |
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PART 1 - GENERAL

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| 1.1 Mobilization and Demobilization | .1 | Tendered unit price for "Mobilization and Demobilization" shall be full compensation for the contractor's forces and the equipment necessary for performing the work required under the contract. Mobilization will not be considered as work in fulfilling the contract requirements for commencement of work. |
| | .2 | Mobilization shall include all activities and costs for transportation of personnel, equipment and supplies/ material to the site, establishment of office if required and other facilities for the contractor's operations at site. |
| | .3 | Demobilization shall include all activities and costs for transportation of personnel, equipment and supplies/ materials not used in the contract, including the disassembly, removal and site clean up of any offices if constructed or other facilities assembled on the site for the contract. |

Measurement: In accordance with Section 01 25 20 – Mobilization and Demobilization.

Payment: In accordance with Section 01 25 20 – Mobilization and Demobilization.

PART 2 – LOWER LIARD RIVER BRIDGE AT KM 763.3

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| 2.1 Concrete Supply and Placement | .1 | Tendered price for the “Concrete Supply and Placement” shall include full compensation for the cost of furnishing all material, tools, equipment, labour, curing, heating and all other items and expenses required to complete the work shown on the drawings and as outlined in the specifications. |
| | .2 | Tendered Price shall include supply and placement of concrete in accordance with the drawings and Section 03 37 26 – Underwater Placed Concrete. |
| | .3 | Tendered Price shall include all preparation work necessary to prepare the site for repairs made to the structure. |
| | .4 | Tendered Price shall include cleaning, clearing and disposal of all deteriorated and damaged concrete from the repair area. |
| | .5 | Tendered Price shall include cleanup and restoration works to the site once repairs are completed. |

Measurement: This item is paid on a lump sum basis, no measurements or calculations required.

Payment: One time Lump Sum payment.

PART 3 – HYLAND RIVER BRIDGE AT KM 973.3

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| 3.1 Supply and Installation of Truss Support Blocking System | .1 | Tendered price for the “Supply and Installation of Truss Support Blocking System” shall include full compensation for the cost of furnishing all labour, material, equipment, tools and incidentals necessary to complete the work as described in the drawings and specifications. |
| | .2 | Tendered Price shall include all supply and installation of a truss support blocking system in accordance with drawings and Section 05 12 33 – Structural Steel for Bridges. |
| | .3 | Tendered Price shall include all preparation work necessary to prepare the site for repairs made to the structure. |
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| | | .4 | Tendered Price shall include cleanup and restoration works to the site once repairs are completed. |
| | | | <u>Measurement:</u> This item is on a lump sum basis, no measurements or calculations required. |
| | | | <u>Payment:</u> One time Lump Sum payment, to be made once work has been approved by Departmental Representative. |
| 3.2 | Supply and Replacement of Deck Joint Seal | .1 | Tendered price for the "Supply and Replacement of Deck Joint Seal" shall include full compensation for the cost of furnishing all labour, material, equipment, tools and incidentals necessary to complete the work as described in the drawings and specifications. |
| | | .2 | Tendered Price shall include removal and disposal of existing deck joint seals in Piers 1 and 4. |
| | | .3 | Tendered Price shall include supply and installation of new deck seals of the same type as existing seals in Piers 1 and 4 in accordance with drawings. |
| | | .4 | Tendered Price shall include all preparation work necessary to prepare the site for repairs made to the structure. |
| | | | <u>Measurement:</u> This item is on a lump sum basis, no measurements or calculations required. |
| | | | <u>Payment:</u> One time Lump Sum payment, to be made once work has been approved by Departmental Representative. |
| 3.3 | Supply and Installation of Abutment Deck Joint Sealant | .1 | Tendered price for the "Supply and Installation of Abutment Deck Joint Sealant" shall include full compensation for the cost of furnishing all labour, material, equipment, tools and incidentals necessary to complete the work as described in the drawings and specifications. |
| | | .2 | Tendered Price shall include removal and disposal of existing foam strips in abutment deck joints. |
| | | .3 | Tendered Price shall include supply and installation of "Beram 195" hot pour asphalt or an approved equivalent in accordance with drawings. |
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- .4 Tendered Price shall include all preparation work necessary to prepare the site for repairs made to the structure.

Measurement: This item is on a lump sum basis, no measurements or calculations required.

Payment: One time Lump Sum payment, to be made once work has been approved by Departmental Representative.

PART 4 – STEAMBOAT CREEK BRIDGE AT KM 515.3

- 4.1 Structural Demolition .1 Tendered price for “Structural Demolition” shall include full compensation for the cost of furnishing all labour, material, equipment, tools and incidentals necessary to complete the work as described in the drawings and specifications.
- .2 Tendered Price shall include removal and disposal of concrete, existing deck joint assemblies and other material in accordance with the Drawings and Section 02 41 99 – Demolition of Minor Works.
- .3 Tendered price shall include all preparation work necessary to prepare the site for repairs made to the structure.
- 4.2 Supply and Delivery of Deck Joint Assemblies .1 Tendered price for “Supply and Delivery of Deck Joint Assemblies” shall include full compensation for the cost of furnishing all labour, material, equipment, tools and incidentals necessary to complete the work as described in the drawings and specifications.
- .2 Tendered price shall include supply and delivery of Deck Joint Assemblies in accordance with drawings and Section 05 12 33 - Structural Steel for Bridges.
- .3 Tendered Price shall include all preparation work necessary to prepare the site for repairs made to the structure.

Measurement: This item is on a lump sum basis, no measurements or calculations required.

Payment: One time Lump Sum payment.

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| 4.3 | Installation of Deck Joint Assemblies | .1 | Tendered price for "Installation of Deck Joint Assemblies" shall include full compensation for the cost of furnishing all labour, material, equipment, tools and incidentals necessary to complete the work as described in the drawings and specifications. |
| | | .2 | Tendered price shall include installation of Deck Joint Assemblies in accordance with drawings and Section 05 12 33 – Structural Steel for Bridges. |
| | | .3 | Tendered Price Shall include supply, placement, curing and finishing of Type 1 concrete surrounding the deck joint in accordance with drawings, Section 03 10 00 – Concrete Forming and Accessories and Section 03 20 00 – Cast-in-Place Concrete |

Measurement: This item is on a lump sum basis, no measurements or calculations required.

Payment: One time Lump Sum payment, to be made once work has been approved by Departmental Representative.

END OF SECTION

PART 1 - GENERAL

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| 1.1 | Section Includes | .1 | Coordination of Work with others under Departmental Representative administration. |
| | | .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: <ul style="list-style-type: none">.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 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 effect 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. |
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- 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 Appointing official representatives 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 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.
- .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.
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| 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 schedule 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. |

END OF SECTION

PART 1 - GENERAL

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| 1.1 | Section Includes | .1 | Schedule, form, and content. |
| | | .2 | Staged construction. |
| | | .3 | Scheduled revisions. |
| | | .4 | Critical path scheduling. |
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| 1.2 | Definitions | .1 | Activity: element of Work performed during course of Project. Activity normally has expected duration, cost and resource requirements. Activities can be subdivided into tasks. |
| | | .2 | Actual Finish Date (AF): time that Work actually ended on activity. |
| | | .3 | Actual Start Date (AS): 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). |
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- .12 Data Date (DD): date at which, or up to which, Project's reporting system has provided actual status and accomplishments.
 - .13 Duration (DU): number of work periods (not including holidays or other non-working periods) required to complete activity or other Project element. Usually expressed as workdays or work weeks.
 - .14 Early Finish Date (EF): in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints. Early finish dates can change as Project progresses and changes are made to Project plan.
 - .15 Early Start Date (ES): in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can start, based on network logic and schedule constraints. Early start dates can change as Project progresses and changes are made to Project Plan.
 - .16 Finish Date: point in time associated with activity's completion. Usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.
 - .17 Float: amount of time that activity may be delayed from its early start without delaying Project finish date. Float is mathematical calculation, and can change as Project progresses and changes are made to Project plan. This resource is available to both PWGSC and Contractor.
 - .18 Lag: modification of logical relationship that directs delay in successor task.
 - .19 Late Finish Date (LF): in critical path method, latest possible point in time that activity may be completed without delaying specified milestone (usually Project finish date).
 - .20 Late Start Date (LS): in critical path method, latest possible point in time that activity may begin without delaying specified milestone (usually Project finish date).
 - .21 Lead: modification of logical relationship that allows acceleration of successor task.
 - .22 Logic Diagram: see Project network diagram.
 - .23 Master Plan: summary-level schedule that identifies major activities and key milestones.
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- .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 stakeholder communication, and document approved scope, cost, and schedule baselines. Project plan may be summary or detailed.
 - .31 Project Planning: development and maintenance of Project Plan.
 - .32 Project Planning, Monitoring, and Control System: overall system operated by Departmental Representative to enable monitoring of Project Work in relation to established milestones.
 - .33 Project Schedule: planned dates for performing activities and planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy project objectives. Monitoring and control process involves using project schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
 - .34 Quantified Days Duration: working days based on 5 day work week, discounting statutory holidays.
 - .35 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.
 - .36 Scheduled Finish Date (SF): point in time that Work was scheduled to finish on activity. Scheduled finish date is normally within range of dates delimited by early finish date and late finish date.
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- .37 Scheduled Start Date (SS): point in time that Work was scheduled to start on activity. Scheduled start date is normally within range of dates delimited by early start date and late start date.
 - .38 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.
 - .39 Work Breakdown Structure (WBS): deliverable-oriented grouping of project elements that organizes and defines total Work scope of Project. Each descending level represents increasingly detailed definition of Project Work.
- 1.3 System Description
- .1 Construction Progress Schedule (Project Time Management): describes processes required to ensure timely completion of Project. These processes ensure that various elements of Project are properly coordinated. It consists of planning, time estimating, scheduling, progress monitoring, and control.
 - .2 Planning: this is most basic function of management, that of determining presentation of action, and is essential.
 - .1 It integrates forward thinking with analysis. Implicit assumptions are made in an objective consideration of the future to determine courses of action.
 - .2 Planning and scheduling facilitates accomplishment of objectives and should be considered as a continuous and 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 progressive 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.
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- .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.
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- .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 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 Project Control System to Departmental Representative 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 coordination with major Subcontractors, if applicable.
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- .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 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 on 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.
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| 1.7 | Project Meeting | .1 | Meet with Departmental Representative within 15 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: <ul style="list-style-type: none">.1 Set-up of sites..2 Completion of work on each site..3 Final Certificate of completion. |
| 1.10 | Master Plan | .1 | Structure and base CPM construction networks system on WBS coding in order to ensure consistency throughout Project. |
| | | .2 | Within 15 work days of finalizing Agreement, prepare comprehensive construction Master Plan (CPM logic diagram) and dependent Cash Flow Projection to confirm valid or identify alternate milestones. <ul style="list-style-type: none">.1 Master Plan will be used as baseline.<ul style="list-style-type: none">.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: <ul style="list-style-type: none">.1 CD with schedule and cash flow information. Clearly label 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 monthly cash flow: expressed monthly and shown in both graphical and numerical form. |
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- 1.11 Detail Schedule
- .1 Structure and base CPM construction networks system on WBS coding in order to ensure consistency throughout Project.
 - .2 Within 15 work days of finalizing Agreement, prepare comprehensive construction Master Plan (CPM logic diagram) and dependent Cash Flow Projection to confirm valid or identify alternate 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 with schedule and cash flow information. Clearly label 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 work days of Award of Contract date showing interdependencies, activity sequencing and duration estimates. Include listed activities as follows:
 - .1 Shop drawings
 - .2 Samples
 - .3 Approvals
 - .4 Procurement
 - .5 Construction
 - .6 Installation
 - .7 Site works
 - .8 Testing
 - .9 Shutdown or closure activity
 - .10 Commissioning and acceptance
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- .6 Detail CPM schedule to cover, in detail, a minimum period of 6 months beginning from the Award of Contract date. Each activity duration should span 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 Procurement/construction activity interdependencies.
 - .3 Include sufficient detail to assure adequate planning and execution of Work. Activities should generally range in duration from 3 to 15 workdays each.
 - .9 Provide level of detail for project activities demonstrating sequence and interdependency of Contract tasks and allow co-ordination and control of said 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 appropriately and logically in Detail Schedule. Clearly review, analyze and report to Departmental Representative any effects created by the insertion of any new Change Orders.
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| 1.12 | Review of the Construction Detail Schedule | .1 | Allow 10 work days for review by Departmental Representative of proposed construction Detail Schedule. |
| | | .2 | Make necessary revisions to reviewed Detail Schedule 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. |
| | | .2 | Increase in materials and equipment. |
| | | .3 | Overtime work and additional work shifts. |
| | | .4 | Submit to Departmental Representative, justification, project schedule data, and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. Include as part of supporting evidence: |
| | | .1 | Written submission of proof of delay based on revised activity logic, duration and costs, showing time impact analysis illustrating influence of each change or delay relative to approved contract schedule. |
| | | .2 | Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of occurrence of change and include status of construction at that time. |
| | | .3 | Other evidence requested by Departmental Representative. |
| | | .4 | Do not assume approval of Contract extension prior to receipt of written approval from Departmental Representative. |
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- .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 are not justification for extension of contract completion date.
 - 1.14 Process Monitoring and Reporting
 - .1 Detail Schedule on job site must show "Progress to Date" on ongoing basis. 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.
 - .4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.
 - .5 Submit updated Detail Schedule to Departmental Representative.
 - .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. Show Work to date, comparison to planned Work and current forecasts. Report must summarize progress, define 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 and possible time extensions.
 - .3 Status of Contract completion date and milestones.
 - .4 Current/anticipated problems, delays and corrective measures.
 - .5 Review of progress and status of Critical Path activities.
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PWGSC

Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

01 32 17

CONSTRUCTION PROGRESS AND REPORTING

Page 13 of 13

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| 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 milestone reached in schedule of work. |
| | .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

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| 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 Control of Operations Plan |
| | | .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. |
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| | .9 | Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review. |
| | .10 | Keep one reviewed copy of each submission on site. |
| 1.3 Product Data | .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 approval a Quality Control Plan including, but not limited to: |
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- .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, reinforcing steel bars, bolts, concrete and aggregate.
- .6 Dimension checks of pre-fabricated and site-fabricated elements.

END OF SECTION

PART 1 - GENERAL

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| 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 | This item is on a lump sum basis. |
| 1.3 | References | .1 | "Traffic Control Manual for Work on Roadways" (distributed by Province of British Columbia, Ministry of Transportation and Highways). |
| 1.4 | Traffic Accommodation Strategy | .1 | The Contractor shall prepare a Traffic Accommodation Strategy detailing his proposed methods for accommodating traffic throughout the work zone. |
| | | .2 | The Traffic Accommodation Strategy shall consist of drawings detailing the configuration of temporary construction signs and other traffic control devices in the work area. |
| | | .1 | Specific traffic safely related or situations at the work zone should also be addressed with written confirmation of the methods or procedures being used. |
| | | .3 | Unless otherwise specified, the Contractor shall submit the Traffic Accommodation Strategy to the Departmental Representative a minimum of 14 days prior to the pre-construction meeting for the Project. |
| | | .4 | The Contractor shall have no claim resulting from the Department Representative's failure to accept the Contractor's Traffic Accommodation Strategy submission, nor any costs incurred by the Contractor to address concerns raised by either the Departmental Representative during the review of the Contractor's Traffic Accommodation Strategy submission. |
| | | .5 | Public traffic shall be accommodated, without interruption, on a 24 hour per day basis. The contractor shall designate competent personnel to monitor traffic accommodation on a continuous 24 hour basis until the bridge is opened to the uninterrupted flow of traffic. |
| | | .6 | Provide a minimum 3.7 m clear roadway width to accommodate single lane alternating traffic. |
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- 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, 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 alert motorists to construction activities and temporary/ unusual conditions resulting from Project Work 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.
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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 as needed 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 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
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PWGSC

Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

01 35 00

SPECIAL PROCEDURES FOR TRAFFIC CONTROL

Page 4 of 4

- 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 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

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| 1.1 | References | .1 | Government of Canada: |
| | | .1 | Canada Labour Code - Part II |
| | | .2 | Canada Occupational Health and Safety Regulations. |
| | | .2 | National Building Code of Canada (NBC): |
| | | .1 | Part 8, Safety Measures at Construction and Demolition Sites. |
| | | .3 | Canadian Standards Association (CSA): |
| | | .1 | CSA Z797-2009, Code of Practice for Access Scaffold. |
| | | .2 | CSA S269.1-1975 (2003), Falsework for Construction Purposes. |
| | | .3 | CSA-S350-M1980(2003), Code of Practice for Safety in Demolition of Structures. |
| | | .4 | Fire Protection Engineering Services, HRSDC: |
| | | .1 | FCC No. 301, Standard for Construction Operations. |
| | | .2 | FCC No. 302, Standard for Welding and Cutting. |
| | | .5 | American National Standards Institute (ANSI): |
| | | .1 | ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems. |
| | | .6 | Province of British Columbia: |
| | | .1 | Workers Compensation Act, Part 3, Occupational Health and Safety. |
| | | .2 | Occupational Health and Safety Regulation. |
| 1.2 | Related Sections | .1 | Refer to the following current Specification sections as required: |
| | | .1 | Project Management: Section 01 31 19 |
| | | .2 | Construction Progress and Reporting: Section 01 32 17 |
| | | .3 | Submittal Procedures: Section 01 33 00 |
| | | .4 | Special Procedures for Traffic Control: Section 01 35 00 |
| | | .5 | Temporary Utilities: Section 01 51 00 |
| | | .6 | Construction Facilities: Section 01 52 00 |
| | | .7 | Temporary Barriers and Enclosures: Section 01 56 00 |
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PWGSC

Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

01 35 33

HEALTH AND SAFETY REQUIREMENTS

Page 2 of 9

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| 1.3 WorkSafe BC | .1 | Comply fully with the Workers' Compensation Act, regulations, coverage and orders made pursuant thereto, and any amendments up to the completion of the work. |
| | .2 | Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued. |
| 1.4 Compliance with Regulations | .1 | PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations. |
| | .2 | It is the Contractor's responsibility to ensure that all workers are qualified, competent, and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations. |
| 1.5 Submittals | .1 | Submit to Departmental Representative for review all submittals listed. |
| | .2 | Work affected by submittals shall not proceed until review(s) by Departmental representative is/are complete. |
| | .3 | Submit the following: |
| | .1 | Site Specific Health and Safety Plan within 7 days after date of Notice to Proceed and prior to commencement of Work. |
| | .2 | Copies of reports or directions issued by federal and provincial health and safety inspectors. |
| | .3 | Copies of incident and accident reports. |
| | .4 | Complete set of Material Safety Data Sheets (MSDS) and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements. |
| | .5 | On site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations. |
| | .4 | The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 7 days after receipt of the plan. Revise the plan as appropriate and resubmit to |
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Departmental Representative for review upon request.

- .5 Medical surveillance: where prescribed by legislation, regulation, or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.
 - .6 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
 - .1 Be construed to imply approval by the Departmental Representative.
 - .2 Be interpreted as a warranty of being complete, accurate, and legislatively compliant.
 - .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.
 - 1.6 Responsibility
 - .1 Assume responsibility as the Prime Contractor for Work under this contract.
 - .2 Be responsible for health and safety of persons on site, safety of property on site, and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
 - .3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable federal, provincial, territorial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
 - 1.7 Health and Safety Coordinator
 - .1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. The Health and Safety Coordinator must:
 - .1 Have site-related working experience.
 - .2 Have working knowledge of occupational health and safety regulations.
 - .3 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform Work.
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| | | .4 | Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan. |
| | | .5 | Be on site during execution of work. |
| 1.8 | General Conditions | .1 | Provide safety barricades and lights around Work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic. |
| | | .2 | Secure Work site before leaving each day as deemed necessary to protect site against entry from non-authorized persons / entry by animals overnight. |
| | | .3 | Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the Work site. |
| | | .1 | Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required. |
| 1.9 | Project/Site Conditions | .1 | Potential work hazards onsite include: working over water, working in remote locations, highway traffic, bears, and extreme weather. |
| 1.10 | Regulatory Requirements | .1 | Comply with specified codes, acts, bylaws, standards, and regulations to ensure safe operations at site. |
| | | .2 | In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed. |
| 1.11 | Work Permits | .1 | Obtain building permit(s) related to project before start of work. |
| 1.12 | Filing of Notice | .1 | The Contractor is to file Notice of Project with Provincial authorities prior to beginning of Work. |
| | | .2 | Provide copies of all notices to the Department Representative. |
| 1.13 | Site Specific Health and Safety Plan | .1 | Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards. |
| | | .2 | Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following: |
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- .1 Primary requirements:
 - .1 Contractor's safety policy.
 - .2 Identification of applicable compliance obligations.
 - .3 Definition of responsibilities for project safety/organization chart for project.
 - .4 General safety rules for project.
 - .5 Job-specific safe work procedures.
 - .6 Inspection policy and procedures.
 - .7 Incident reporting and investigation policy and procedures.
 - .8 Occupational Health and Safety Committee/Representative procedures.
 - .9 Occupational Health and Safety meetings.
 - .10 Occupational Health and Safety communications and record keeping procedures.
 - .11 Confined space policy and procedures
 - .2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
 - .3 List hazardous materials to be brought on site as required by work.
 - .4 Indicate engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
 - .5 Identify personal protective equipment (PPE) to be used by workers.
 - .6 Identify personnel and alternates responsible for site safety and health.
 - .7 Identify personnel training requirements and training plan, including site orientation for new workers.
 - .3 Develop the plan in collaboration with all Subcontractors. Ensure that work/activities of Subcontractors are included in the hazard assessment and are reflected in the plan.
 - .4 Revise and update Site Specific Health and Safety Plan as required, and re-submit to the Departmental Representative.
 - .5 Departmental Representative's review: the review of Site Specific
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Health and Safety Plan by PWGSC shall not relieve the Contractor of responsibility for errors or omissions in final Site Specific Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

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| 1.14 | Confined Space Entry Program | .1 | Carry out work in confined spaces in accordance with provincial regulations |
| | | .2 | Prepare and comply with a site-specific Confined Space Entry Program based on the methods and materials contractor will use for the construction and to enter the confined space. Confined space Entry Program, including, but not limited to, the following: |
| | | .1 | An assignment of responsibilities. |
| | | .2 | A list of each confined space or group of similar spaces, and a written hazard assessment of those spaces prepared by a qualified person. |
| | | .3 | Written safe program procedures for entry into and work in each of the confined space. Each procedure must be written specifically for each of the hazard that exist in each space during each entry. |
| | | .4 | The equipment necessary for each entry must also be provided, including testing devices, and personal proactive equipment. |
| | | .5 | A signed permit where required. |
| | | .6 | Training of employees. |
| | | .7 | A Rescue Plan. |
| 1.15 | Emergency Procedures | .1 | List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of: |
| | | .1 | Designated personnel from own company. |
| | | .2 | Regulatory agencies applicable to work and as per legislated regulations. |
| | | .3 | Local emergency resources. |
| | | .4 | Departmental Representative. |
| | | .2 | Include the following provisions in the emergency procedures: |
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- .1 Notify workers and the first-aid attendant, of the nature and location of the emergency.
 - .2 Evacuate all workers safely.
 - .3 Check and confirm the safe evacuation of all workers.
 - .4 Notify the fire department or other emergency responders.
 - .5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
 - .6 Notify Departmental Representative.
 - .3 Provide written rescue/evacuation procedures as required for, but not limited to:
 - .1 Work at high angles.
 - .2 Work in confined spaces or where there is a risk of entrapment.
 - .3 Work with hazardous substances.
 - .4 Underground work.
 - .5 Work on, over, under, and adjacent to water.
 - .6 Workplaces where there are persons who require physical assistance to be moved.
 - .4 Design and mark emergency exit routes to provide quick and unimpeded exit.
 - .5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.
 - 1.16 Hazardous Products
 - .1 Comply with requirements of WHMIS regarding use, handling, storage, and disposal of hazardous materials, and regarding labelling and provision of MSDSs acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
 - .2 Where use of hazardous and toxic products cannot be avoided:
 - .1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 33 00 – Submittal Procedures.
 - 1.17 Overloading
 - .1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.
 - 1.18 Falsework
 - .1 Design and construct falsework in accordance with CSA-S269.1.-1975 (2003) false work for construction purposes.
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| 1.19 Scaffolding | .1 | Design, construct, and maintain scaffolding in a rigid, secure, and safe manner, in accordance with CSA-Z797-2009 Code of Practice for Access Scaffold and the British Columbia Occupational Health and Safety Regulations. |
| 1.20 Blasting | .1 | Blasting or other use of explosives is not permitted. |
| 1.21 Powder Actuated Devices | .1 | Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative. |
| 1.22 Fire Safety and Hot Work | .1 | Obtain Departmental Representative's authorization before any welding, cutting, straightening, or any other hot work operations can be carried out onsite. |
| | .2 | Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks. |
| 1.23 Fire Safety Requirements | .1 | Store oily/paint-soaked rags, waste products, empty containers, and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis. |
| | .2 | Handle, store, use, and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada. |
| 1.24 Unforeseen Hazards | .1 | Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing. |
| 1.25 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 the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions |
| | .5 | Notice of Project |
| | .6 | Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers |
| | .7 | WHMIS documents |
| | .8 | MSDSs |
| | .9 | List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable. |
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- .2 Post all MSDSs onsite, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
 - .3 Postings should be protected from the weather and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.
- 1.26 Meetings
 - .1 Schedule and administer a Health and Safety meeting with Departmental Representative prior to commencement of Work.
 - .2 Attend the health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.
- 1.27 Correction of Non-Compliance
 - .1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.
 - .2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.
 - .3 The Departmental Representative may issue a "stop work order" if non-compliance with health and safety regulations is not corrected immediately or within posted time. The General Contractor/Subcontractors will be responsible for any costs arising from such a "stop work order".

END OF SECTION

PART 1 - GENERAL

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| 1.1 | Environmental Control of Operations (ECO) Plan | .1 | Prepare and submit to Departmental Representative for review a site specific Environmental Control of Operations (ECO) Plan in accordance with Section 01 33 00 – Submittal Procedures, prior to project startup. |
| | | .2 | Maintain a copy of the ECO Plan onsite at all times. |
| | | .3 | The Departmental Representative may request the ECO Plan be updated and resubmitted any time, and may require all work to cease until the update has been submitted and accepted. |
| | | .4 | The ECO Plan includes (as a minimum): |
| | | .1 | Protection of trees/shrubs from equipment and damage. Replace in kind if they are damaged during construction. |
| | | .2 | Control of fire. |
| | | .3 | Fuel handling, storage, and refueling. |
| | | .4 | Parking locations and equipment servicing. |
| | | .5 | In-stream work |
| | | .6 | Re-vegetation. |
| | | .7 | Emergency response and spill contingency plans. |
| | | .8 | Construction timing windows. |
| | | .9 | Possible environmental impacts including (as a minimum): potential for small volume fuel spills near watercourse, harmful alterations, destruction of bird nests during nesting season. |
| | | .10 | Compliance with Department of Fisheries and Oceans (DFO) and Ministry of Environment (MOE) regulations (i.e.: 'DFO Bridge Maintenance Standard Operating Procedures' and 'MOE Standards and Best Practices for In-stream Work'). |
| 1.2 | Definitions | .1 | Wetted Perimeter: area of stream where water is currently running or pooled. |
| | | .2 | In-stream Work: any work performed below the high water mark, either within or above the Wetted Perimeter of any Fisheries Sensitive Zone. |
| | | .3 | Fisheries Sensitive Zones: in-stream aquatic habitats and out of stream habitat features such as side channels, wetlands, and riparian areas. |
| 1.3 | Contractor's Environmental Representative | .1 | Retain an Environmental Representative who must be a qualified fisheries biologist. |
| | | .1 | Environmental Representative must have post-secondary training in biological sciences, or a technical diploma in biological sciences, or educational equivalent. |
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| | .2 | Environmental Representative must be suitably experienced in: environmental monitoring for construction projects including fish and fish habitat monitoring, erosion and sediment management, and general natural resources monitoring. |
| | .2 | Make available the Environmental Representative throughout the duration of the Work to represent the Contractor in all matters related to the protection of the environment. |
| | .3 | The Contractor's Environmental Representative shall prepare and sign the initial ECO Plan and all subsequent updated Plans. |
| 1.4 Fires | .1 | Fires, burning of rubbish, and burning onsite for clearing and grubbing are not permitted. |
| 1.5 Disposal of Wastes | .1 | Do not bury rubbish and waste materials onsite. |
| | .2 | Dispose of wastes off-site in conformance with the Waste Management Plan (BC). |
| | .3 | Do not dispose of waste or volatile materials, such as mineral spirits, oil, paint thinner, etc. into waterways. |
| 1.6 Drainage | .1 | Provide temporary drainage measures such as grading, ditches, culverts, pipes, pumps, or other measures that may be necessary to control flow from existing drainage courses disrupted by excavation or other work, and to keep the work site free from water. |
| | .2 | Ensure that the existing drainage pattern is not changed except where required in the Contract Documents. |
| 1.7 Site Clearing, Plant Protection, and Nesting Bird Protection | .1 | Protect trees and plants on site and adjacent properties where indicated. |
| | .2 | Minimize stripping of topsoil and vegetation. |
| | .3 | Restrict tree removal to areas indicated or designated by Departmental Representative. Trees to be protected within the construction zone will be marked with survey tape within 2 m of the base of the tree. Any of the protected trees that are damaged or felled will require replacement of a similar size and species of tree. |
| | .4 | Any clearing done during nesting season must have a bird survey completed first and approved by the Departmental Representative. |
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| 1.8 Work Adjacent
to Waterways | .1 Do not operate construction equipment in waterways.
.2 Do not dump excavated fill, waste material, or debris in waterways.
.3 Abide by all conditions of permits obtained from Provincial and Federal Government environmental agencies.
.4 Do not skid logs or construction materials across waterways.
.5 Obtain a license from Ministry of Environment (British Columbia) Water Division Branch for any domestic water intakes.
.6 Provide a buffer area of at least 50 metres between the construction camp and the waterway.
.7 Provide a buffer area of at least 50 metres between storage and handling of fuels, lubricants or other deleterious substances and the waterway.
.8 Keep all activities within wetted perimeters to an absolute minimum.
.8 Do not store construction materials, debris, waste, etc. within 50 metres of any waterbody.
.9 Do not carry out any in-stream activities that involve machinery.
.10 Upon completion of the Project, restore, stabilize, and re-vegetate the banks to prevent erosion. |
| 1.9 In-stream Work | .1 Every reasonable effort shall be made to minimize the duration of in-stream work.
.2 All spoil material and debris shall be disposed of above the water line in a location where there would be no re-entry into any watercourse.
.3 Equipment shall be refueled and serviced to ensure that deleterious substances do not enter any watercourse.
.4 Equipment operating in-stream should be free of external grease, oil, mud or fluid leaks.
.5 An emergency spill response kit shall be kept on-site at all times during construction. |

END OF SECTION

PWGSC

Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

01 45 00

QUALITY
CONTROL

Page 1 of 3

PART 1 - GENERAL

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| 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 | Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress. |
| | | .2 | Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work. |
| | | .3 | If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work. |
| | | .4 | Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement. |
| 1.4 | Independent Inspection Agencies | .1 | Appoint and pay for services of third-party Independent Quality Assurance testing laboratory and field staff including as follows: |
| | | .1 | Where specified in the text of these specifications, including but not limited to: |
| | | .1 | Onsite and laboratory testing. |
| | | .2 | Inspection and testing required by laws, ordinances, rules, regulations, or orders of public authorities. |
| | | .3 | Inspection and testing performed exclusively for Contractor's convenience. |
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- .4 Tests specified to be carried out by Contractor under the supervision of Departmental Representative.
 - .5 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 re-inspection.
 - 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.
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Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

01 45 00

**QUALITY
CONTROL**

Page 3 of 3

- .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.

END OF SECTION

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Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

01 51 00

TEMPORARY
UTILITIES

Page 1 of 2

PART 1 - GENERAL

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| 1.1 | Section Includes | .1 | Temporary utilities. |
| 1.2 | Installation and Removal | .1 | Provide temporary utilities in order to execute Work expeditiously. |
| | | .2 | Remove from site all such work after use. |
| 1.3 | Water Supply | .1 | Provide continuous temporary supply of potable water for construction use, if applicable. |
| | | .2 | Remove or decommission temporary water supply facilities upon completion of project. |
| 1.4 | Sanitary Facilities | .1 | Provide sanitary facilities for construction use. |
| | | .2 | Remove or decommission temporary sanitary facilities upon completion of project. |
| 1.5 | Temporary Heating and Ventilation of Work | .1 | Provide temporary heating required during construction period, including attendance, maintenance, and fuel. |
| | | .2 | Construction heaters used inside buildings must be vented to outside or be flameless type. Solid fuel salamanders are not permitted. |
| | | .3 | Provide temporary heat and ventilation in enclosed areas as required to: |
| | | .1 | Facilitate progress of Work. |
| | | .2 | Protect Work and products against dampness and cold. |
| | | .3 | Prevent moisture condensation on surfaces. |
| | | .4 | Provide ambient temperatures and humidity levels for storage and installation of materials. |
| | | .5 | Provide adequate ventilation to meet health regulations for safe working environments. |
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- .4 Ventilation:
 - .1 Prevent accumulations of dust, fumes, mists, vapours, or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied area.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons or the environment.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of Work process to assure removal of harmful contaminants.
- .5 Be responsible for damage to Work due to failure in providing adequate heat, ventilation, and protection during construction.
- 1.6 Temporary Power and Light
 - .1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools and for construction use.
 - .2 Arrange for connection with appropriate utility company. Pay all costs for installation maintenance and removal.
 - .3 Provide and maintain temporary lighting throughout project, if applicable.
- 1.7 Temporary Communication Facilities
 - .1 Provide and pay for temporary telephone necessary for own use.
- 1.8 Fire Protection
 - .1 Provide and maintain temporary fire protection equipment required by governing codes, regulations and bylaws during performance of Work.
 - .2 Burning rubbish and construction waste is not permitted onsite.

END OF SECTION

PWGSC

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Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
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British Columbia

01 52 00
CONSTRUCTION
FACILITIES

Page 1 of 2

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. |
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PWGSC

Hyland, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

01 52 00

CONSTRUCTION FACILITIES

Page 2 of 2

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| 1.7 Sanitary Facilities | <ul style="list-style-type: none">.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances..2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition. |
| 1.8 Construction Signage | <ul style="list-style-type: none">.1 Locate project identification signs if and when directed by Departmental Representative..2 Direct requests for approval to erect a Departmental Representative/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

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Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

01 56 00 TEMPORARY BARRIERS AND ENCLOSURES

Page 1 of 1

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 activity 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 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 Private and Public Property | .1 | Protect surrounding 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/improper protection. |

END OF SECTION

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Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

01 59 10
CONSTRUCTION
CAMP

Page 1 of 1

PART 1 - EXECUTION

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

END OF SECTION

PART 1 - GENERAL

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| 1.1 Products/Material and Equipment | <ul style="list-style-type: none">.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 infrastructure at own expense and to satisfaction of Departmental Representative..5 Notify Departmental Representative in writing of any conflict between specifications and manufacturer's instructions. Departmental Representative will designate which document is to be followed..6 Metal fastenings:<ul style="list-style-type: none">.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. |
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| 1.4 | Manufacturer's Instructions | .1 | Unless otherwise indicated in Specifications, install or erect products in accordance with manufacturer's instructions. |
| | | .1 | Do not rely on labels or enclosures provided with products. |
| | | .2 | Obtain written instructions directly from manufacturers. |
| | | .2 | Notify Departmental Representative in writing, of conflicts between Specifications and manufacturer's instructions, so that Departmental Representative may establish course of action. |
| | | .3 | Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time. |
| 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 products specified. 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. |
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- .3 Proposals will be considered by the Departmental Representative if:
 - .1 specified products selected by tenderer are not available,
 - .2 delivery date of products selected from those specified would unduly delay completion of Contract, or
 - .3 alternative product to that specified, which is brought to the attention of and considered by Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount.
 - .4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the Project. Pay for design or drawing changes required as result of substitution.
 - .5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative, and the Contract price will be reduced accordingly.
- 1.7 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 Final decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative
- 1.8 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.
- 1.9 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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Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

01 61 10

PRODUCT REQUIREMENTS

Page 5 of 5

PART 2 - PRODUCTS

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| 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

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| 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

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| 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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Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
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British Columbia

01 74 19

WASTE MANAGEMENT AND DISPOSAL

Page 2 of 3

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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 recycling of materials. |
| | | .4 | Post workplan or summary where workers at site are able to review its content. |
| 1.7 | 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

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| 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

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| 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 indicating: |
| | | .1 | Work has been completed and inspected for compliance with Contract Documents. |
| | | .2 | Defects and deficiencies have been corrected. |
| | | .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 | Commencement of Warranty Periods: date of Departmental Representative's acceptance of submitted declaration of Substantial Performance shall be date of commencement for warranty period. |
| | | .6 | Final Payment: When Departmental Representative considers final deficiencies and defects have been corrected and it appears requirements of Contract have been totally performed, make application for final payment. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request final review. |

END OF SECTION

PART 1 - GENERAL

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| 1.1 | Section Includes | .1 | This section specifies methods and procedures for demolishing, salvaging, recycling and removing items designated to be removed in whole or in part. |
| 1.2 | Methods of Measurement and Payment | .1 | In accordance with Section 01 29 01 – Methods of Measurement and Payment. |
| 1.3 | Related Sections | .1 | Section 01 74 19 – Waste management and Disposal |
| | | .2 | Section 01 35 43 – Environmental Procedures |
| | | .3 | Section 01 29 01 – Methods of Measurement and Payment |
| 1.4 | References | .1 | Canadian Federal Legislation |
| | | .1 | Canadian Environmental Protection Act (CEPA), 1999, c. 33. |
| | | .2 | Canadian Environmental Assessment Act (CEAA), 1995, c. 97. |
| | | .3 | Transportation of Dangerous Goods Act (TDGA), 1992, c. 34. |
| | | .4 | Motor Vehicle Safety Act (MVSA), 1995. |
| | | .5 | CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures. |
| 1.5 | Action and Informational Submittals | .1 | Prior to beginning work on site, submit detailed Waste Reduction Workplan in accordance with Sections 07 14 19 – Waste Management and Disposal and indicate: |
| | | .1 | Descriptions and anticipated quantities of materials to be salvaged, reused, recycled and landfilled, |
| | | .2 | Schedule of selective demolition |
| | | .3 | Location of dumpsters |
| 1.6 | Waste Management and Disposal | .1 | Separate materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management and Disposal. |
| 1.7 | Site Conditions | .1 | Review Hazardous Materials management Plan and take precautions to protect environment. |
| | | .2 | Notify Departmental Representative before disrupting site access or services. |
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.3 Site Environmental Requirements:

- .1 Ensure that demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- .2 Do not dispose of waste volatile materials such as mineral spirits, oil, petroleum based lubricants or toxic cleaning substances into watercourses, storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout the project.
- .3 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.
- .4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.

PART 2 – EXECUTION

2.1 Preparation

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
 - .2 Locate and protect utilities.
 - .3 Disconnect, cap, plug or divert, as required, existing utilities within the property where they interfere with the execution of work as directed by departmental representative. Mark the locations of these and previously capped or plugged services on the site and indicate the location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.
 - .1 Immediately notify Departmental Representative and utility company concerned in case of damage to any utility or service designated to remain in place.
 - .2 Immediately notify Departmental Representative and utility company should uncharted utility and service be encountered and await instruction in writing regarding remedial action.
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| 2.2 | Protection | .1 | Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative. |
| | | .2 | Prevent movement, settlement or damage to adjacent structure and utilities to remain in place. Provide bracing and shoring as required. |
| | | .3 | Protect site services and equipment. |
| | | .4 | Do work in accordance with Section 01 35 33 – Health and Safety Requirements. |
| 2.3 | Salvage | .1 | Remove items to be reused, store as directed by Departmental Representative and reinstall where specified. |
| 2.4 | Site Removals | .1 | Remove items as indicated. |
| | | .2 | Removal of concrete approach slab: |
| | | .1 | Square up adjacent surfaces to remain in place by saw cutting or other method approved by Departmental Representative. Saw cutting of existing surfaces requiring saw cutting for removal shall be cut in a neat line to a minimum of 76 mm with a power driven saw as needed. |
| | | .2 | Protect adjacent joints and load transfer devices. |
| | | .3 | Protect underlying and adjacent granular materials. |
| 2.5 | Partial Demolition | .1 | Remove parts of existing concrete to permit installation of new deck joints. Sort removed materials into appropriate piles for disposal. |
| | | .2 | Remove demolished concrete as indicated. |
| 2.6 | Disposal | .1 | Dispose of removed materials to appropriate recycling facilities, except where specified otherwise, in accordance with authority having jurisdiction. |

END OF SECTION

PART 1 - GENERAL

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| 1.1 References | .1 Canadian Environmental Protection Act, 1999 (CEPA 1999). |
| | .1 Export and Import of Hazardous Waste Regulations (ETHW Regulations), SOR/2002-200. |
| | .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS). |
| | .1 Material Safety Data Sheets (MSDS) |
| | .3 National Fire Code of Canada 2005. |
| | .4 Transportation of Dangerous Goods Act (TDG Act) 1999, (c.34). |
| | .5 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2003-400). |
| 1.2 Definitions | .1 Dangerous Goods: Product, substance, or organism that is specifically listed or meets the hazard criteria established in Transportation of Dangerous Goods Regulations. |
| | .2 Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment. |
| | .3 Hazardous Waste: Any hazardous material that is no longer used for its original purpose and intended for recycling, treatment, or disposal. |
| 1.3 Submittals | .1 Submit product data in accordance with Section 01 33 00, Submittal Procedures. |
| | .2 Submit to Departmental Representative current MSDSs for each hazardous material required prior to bringing it/them onsite. |
| | .3 Submit a hazardous materials management plan to Departmental Representative that identifies all hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements. |
| 1.4 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. |
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- .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 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene, and naphtha for ready use. Store all flammable and combustible liquids in approved safety cans bearing the Underwriter's Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.
 - .5 Transfer of flammable and combustible liquids will not be carried out in the vicinity of open flames or any type of heat-producing devices.
 - .6 Flammable liquids having a flash point below 38 degrees Celsius, such as naphtha or gasoline will not be used as solvents or cleaning agents.
 - .7 Store flammable and combustible waste liquids for disposal in approved containers located in a safe, ventilated area. Keep quantities to an absolute minimum.
 - .8 Observe smoking regulations at all times. Smoking is prohibited in any area where hazardous materials are stored, used, or handled.
 - .9 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 which are in good condition.
 - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
 - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
 - .4 Segregate incompatible materials and wastes.
 - .5 Ensure that different hazardous materials or hazardous wastes are not mixed.
 - .6 Store hazardous materials and wastes in a secure storage area with controlled access.
 - .7 Maintain a clear egress from storage area.
 - .8 Store hazardous materials and wastes in a manner and location which will prevent them from spilling into the environment.
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- .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.
 - .10 Ensure personnel are trained in accordance with WHMIS requirements.
 - .11 Report spills or accidents involving toxic wastes immediately to Departmental Representative and to appropriate regulatory authorities within 24 hours of incident. Take all reasonable measures to contain the release while ensuring health and safety is protected.
 - 1.5 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 onsite:
 - .1 Coordinate transportation/disposal with Departmental Representative.
 - .2 Ensure compliance with applicable municipal, provincial and federal laws and regulations for generators of hazardous waste.
 - .3 Use 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 trained personnel handle, offer for transport, or transport dangerous goods.
 - .7 Provide photocopy of 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 discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.
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PART 2 - PRODUCTS

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| 2.1 Materials | .1 | Only bring onsite 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

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| 3.1 Disposal | .1 | Dispose of hazardous waste materials off site 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 or treatment facilities. |
| | .4 | Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited. |
| | .5 | Disposal of hazardous materials in waterways, storm or sanitary sewers, the environment in general, 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

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| 1.1 | Related Sections | .1 | Concrete Reinforcing – Section 03 20 00 |
| | | .2 | Cast-In-Place Concrete – Section 03 30 00 |
| 1.2 | References | .1 | Canadian Standards Association (CSA International) |
| | | .1 | CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete. |
| | | .2 | CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood. |
| | | .3 | CSA O121-M1978(R2003), Douglas Fir Plywood. |
| | | .4 | CSA O153-M1980(R2003), Poplar Plywood. |
| | | .5 | CAN/CSA-O325.0-92(R2003), Construction Sheathing. |
| | | .6 | CSA O437 Series-93(R2006), Standards for OSB and Waferboard.CSA S269.1-1975(R2003), Falsework for Construction Purposes. |
| | | .7 | CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada. |
| 1.4 | Action and Informational Submittals | .1 | Submit in accordance with Section 01 33 00 - Submittal Procedures. |
| | | | Submit shop drawings for formwork and falsework. |
| | | .2 | |
| | | .1 | Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada. |
| 1.5 | Delivery, Storage and Handling | .1 | Store and manage hazardous materials in accordance with Section 02 81 01 – Hazardous materials. |
| | | | Waste Management and Disposal: |
| | | .1 | Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal. |
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- .2 Divert wood materials from landfill to an appropriate facility as approved by Departmental Representative.
- .3 Divert plastic materials from landfill to a recycling facility as approved by Departmental Representative.
- .4 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

PART 2 – PRODUCTS

2.1 Materials

- .1 Materials and resources in accordance with Section 01 61 10 –Product Requirements.
- .2 Formwork materials: use HDPE formwork materials or equivalent.
- .3 Form ties:
 - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
 - .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs.
- .4 Form release agent: non-toxic, biodegradable, low VOC.
- .5 Form stripping agent: colourless mineral oil, low VOC, 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.
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- .4 Fabricate and erect falsework in accordance with CSA S269.1.
 - .5 Do not place shores and mud sills on frozen ground.
 - .6 Provide site drainage to prevent washout of soil supporting mud sills and shores.
 - .7 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 CSA-A23.1/A23.2.

Align form joints and make watertight.
 - .8
 - .1 Keep form joints to minimum.
 - .9 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.
 - .10 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
 - .11 Construct forms for architectural concrete, and place ties as indicated.
 - .1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
 - .12 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.
 - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.Line forms for following surfaces:
 - .13
 - .1 Outer face of outside pier caps.
 - .2 Secure lining taut to formwork to prevent folds.
 - .3 Pull down lining over edges of formwork panels.
 - .4 Ensure lining is new and not reused material.
 - .5 Ensure lining is dry and free of oil when concrete is poured.
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.6 Application of form release agents on formwork surface is prohibited where drainage lining is used.

.7 If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.

.8 Cost of textile lining is included in price of concrete for corresponding portion of Work.

Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 Removal and Reshoring

.1 Leave formwork in place for following minimum periods of time after placing concrete.

.1 5 days for pier caps and beams.

.2 5 days for decks and slabs.

.2 Remove formwork when concrete has reached 50% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

PART 1 - GENERAL

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|-----|------------------------------|----|---|
| 1.1 | Related Sections | .1 | Concrete Forming and Accessories – Section 03 10 00 |
| | | .2 | Cast-In-Place Concrete – Section 03 30 00 |
| 1.2 | Price and Payment Procedures | .1 | Measurement Procedures: in accordance with Section 01 29 01 – Method of Measurement and Payment. |
| | | .1 | Measure reinforcing steel in kilograms of steel incorporated into Work, computed from theoretical unit mass specified in CSA-G30.18 for lengths and sizes of bars as indicated or authorized in writing by Departmental Representative. |
| 1.3 | References | .1 | American Concrete Institute (ACI) |
| | | .1 | SP-66-04, ACI Detailing Manual 2004. |
| | | .2 | ASTM International |
| | | .1 | ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement. |
| | | .2 | ASTM A775/A775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars. |
| | | .3 | CSA International |
| | | .1 | CSA-A23.1-04/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete. |
| | | .2 | CAN/CSA-A23.3-04(R2010), Design of Concrete Structures. |
| | | .3 | CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement. |
| | | .4 | CSA-G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel. |
| | | .5 | CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction. |
| | | .4 | Reinforcing Steel Institute of Canada (RSIC) |
| | | .1 | RSIC-2004, Reinforcing Steel Manual of Standard Practice. |
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| 1.4 | Action and Informational Submittals | .1 | In accordance with Section 01 33 00 - Submittal Procedures. |
| | | .2 | Shop Drawings: |
| | | .1 | Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada. |
| | | .1 | Indicate the following: |
| | | .1 | Placing of reinforcement. |
| | | .1 | Bar bending details. |
| | | .2 | Lists. |
| | | .3 | Quantities of reinforcement. |
| | | .4 | Sizes, spacings and locations of reinforcement. |
| | | .5 | Locations of mechanical splices. |
| | | .2 | Identifying code marks should be used to permit correct placement without reference to structural drawings. |
| | | .3 | Detail lap lengths and bar development lengths to CAN/CSA-A23.3 unless otherwise indicated. |
| 1.5 | Quality Assurance | .1 | Submit in accordance with Section 01 45 00 – Quality Control. |
| | | .1 | Mill Test Report of Reinforcing Steel: Upon request, provide Departmental Representative with certified copy. |
| | | .2 | Supply sources of reinforcing material: Upon request, submit to Departmental Representative in writing. |
| 1.6 | Delivery, Storage and Handling | .1 | In accordance with Section 01 61 00 – Common Product Requirements and manufacturer's written specifications. |
| | | .2 | Delivery and Acceptance Requirements: deliver materials to site in original factory packaging with manufacturer's name and address. |
| | | .3 | Storage and Handling Requirements: |
| | | .1 | Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area. |
| | | .2 | Replace defective and damaged materials with new. |
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PART 2 - PRODUCTS

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| 2.1 Materials | <ul style="list-style-type: none">.1 Substitute different size bars only if permitted in writing by Departmental Representative..2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise..3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18..4 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2..5 Mechanical splices: subject to approval of Departmental Representative..6 Plain round bars: to CSA-G40.20/G40.21..7 Rebar hooks: 15M bars to be installed in damaged areas exceeding 150 mm in depth. Refer to drawings for details..8 Hook anchors: Must have an allowable tensile load of at least 60 kN with concurrent shear load of 100 kN. Install and set according to manufacturer's specifications. |
| 2.2 Fabrication | <ul style="list-style-type: none">.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada..2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings..3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186..4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists. |
| 2.3 Quality Source Control | <ul style="list-style-type: none">.1 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis 3 weeks prior to commencement of work..2 Inform Departmental Representative of proposed source of material to be supplied 3 weeks prior to commencement of work. |
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PART 3 - EXECUTION

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| 3.1 | Field Bending | .1 | Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative. |
| | | .2 | Where field bending is authorized, bend without heat, applying slow and steady pressure. |
| | | .3 | Replace bars which develop cracks or splits. |
| 3.2 | Placing Reinforcement | .1 | Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2. |
| | | .2 | Use plain round bars as slip dowels in concrete. |
| | | .1 | Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. |
| | | .2 | When paint is dry, apply thick, even film of mineral lubricating grease. |
| | | .3 | Prior to placing concrete, obtain Departmental Representative approval regarding reinforcing material and placement. |
| | | .4 | Ensure cover to reinforcement is maintained during concrete pour. Paint coated portions of bars with covering during transportation and handling. |
| 3.3 | Field Touchups | .1 | Touch up damaged and cut ends of reinforcing steel with compatible finish to provide continuous coating. |
| 3.4 | Cleaning | .1 | Clean in accordance with Section 01 74 11 – Site Cleaning |
| | | .1 | Leave work area clean at the end of each day. |
| | | .2 | Final Cleaning: upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Site Cleaning. |
| | | .3 | Waste Management: separate waste for reuse/recycling in accordance with Section 01 74 19 – Waste Management and Disposal. |

END OF SECTION

PART 1 - GENERAL

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| 1.1 | Section Includes | .1 | Cast-in-place Concrete |
| 1.2 | Related Sections | .1 | Concrete Forming and Accessories – Section 03 10 00 |
| | | .2 | Concrete Reinforcing – Section 03 20 00 |
| 1.3 | Price and Payment Procedures | .1 | Measurement Procedures: in accordance with Section 01 29 01 – Method of Measurement and Payment. |
| 1.4 | References | .1 | Abbreviations and Acronyms: |
| | | .1 | Portland Cement: Type GU - General use cement. |
| | | .2 | Fly ash: Type F - with CaO content less than 15%. |
| | | .3 | GGBFS – Ground, granulated blast-furnace slag. |
| | | .2 | Reference Standards |
| | | .1 | CSA International |
| | | .1 | CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete. |
| | | .2 | CSA A283-06, Qualification Code for Concrete Testing Laboratories. |
| | | .3 | CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005). |
| 1.4 | Administrative Requirements | .1 | Pre-installation Meetings: in accordance with Section 01 32 17 – Construction Progress and Reporting. |
| | | .2 | Convene pre-installation meeting one week prior to beginning concrete works. |
| | | .1 | Ensure key personnel, site supervisor, Departmental Representative, Consultant, concrete producer and testing laboratories attend. |
| | | .1 | Verify project requirements. |
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| 1.5 Action and Informational Submittals | .1 | Provide in accordance with Section 01 33 00 - Submittal Procedures. |
| | .2 | At least 4 weeks prior to beginning Work, the Contractor must provide Departmental Representative with samples of materials proposed for use as follows: |
| | .1 | 5 L of curing compound. |
| | .2 | 3 kg of each type of supplementary cementing material. |
| | .3 | 5 kg of each admixture. |
| 1.6 Quality Assurance | .4 | 10 kg of each fine and coarse aggregate. |
| | .3 | Provide test results and inspection reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found. |
| | .4 | Concrete pours: provide accurate records of all poured items indicating date, location, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL. |
| | .1 | Provide in accordance with Section 01 45 00 - Quality Control. |
| | .2 | Provide a valid and recognized certificate from plant delivering concrete to Departmental Representative a minimum of 4 weeks prior to starting concrete work. |
| | .1 | Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements. |
| | .3 | Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items: |
| | .1 | Falsework erection. |
| | .2 | Hot weather concrete. |
| | .3 | Cold weather concrete. |
| .4 | Curing. | |
| .5 | Finishes. | |
| .6 | Formwork removal joints. | |
| .4 | Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements established in PART 2 – PRODUCTS. | |
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| 1.7 Delivery, Storage and Handling | .1 | Delivery and Acceptance Requirements |
| | .1 | Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching. |
| | .1 | Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2. |
| | .2 | Deviations to be submitted for review by Departmental Representative. |
| | .2 | Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2. |

PART 2 - PRODUCTS

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| 2.1 Design Criteria | .1 | Performance: to CSA A23.1/A23.2 and as described in MIXES of PART 2 – PRODUCTS. |
| 2.2 Performance Criteria | .1 | Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE. |
| | .1 | Portland Cement: to CSA A3001, Type GU. |
| | .2 | Water: to CSA A23.1/A23.2 |
| | .3 | Aggregates: to CSA A23.1/A23.2. |
| | .4 | Admixtures: |
| | .1 | Air entraining admixture: to ASTM C260. |
| | .2 | Chemical admixture: to ASTM C494. |
| | .3 | Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing. |
| 2.3 Mixes | .1 | Concrete mixes shall be proportioned to provide a workable mix suitable for the complexity of that class of work without segregation or bleeding. |
| | .2 | Proportion normal density concrete in accordance with CSA A23.1 |
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- .3 Slump shall be measured at time and point of discharge. Slump indicated is without superplasticizer. Concrete shall be placed at the lowest possible slump possible with conditions of placement.
- .4 Preparation of normal density concrete in accordance with CSA A23.1 to following requirements:
 - .1 Cement: Type GU
 - .2 Minimum compressive strength at 28 days: 45 MPa
 - .3 Fly ash: 20% of cementitious materials
 - .4 Class of exposure: C-1
 - .5 Nominal size of coarse aggregate: 20 mm
 - .6 Slump at time and point of discharge: 90 – 150 mm
 - .7 Air content: 5 – 8%
 - .8 Chemical admixtures: To manufacturer's recommended dosages in accordance with ASTM C494.
 - .9 Air-dry density: 2300 kg/m³
 - .10 Maximum water/cement ratio: 0.38
 - .11 Chloride ion penetration requirements and age of test: >1500 Coulombs within 56 days.
- .5 Special requirements for normal density concrete:
 - .1 Mix Design and curing for concrete shall comply with CSA A23.1-09, Clause 8.7 for HVSC-2 Concrete.
 - .2 The concrete mix shall be proportioned to minimize drying shrinkage. Measures shall include appropriate aggregate gradation, proportioning and use of admixtures to reduce the water content of the mix as approved by the Departmental Representative.
 - .3 Concrete thermal gradients shall be controlled to prevent cracking in accordance with CSA A23.1-09, Clause 7.4.1.3.

PART 3 - EXECUTION

- 3.1 Preparation
 - .1 Provide Departmental 24 hours minimum notice before each concrete pour.
 - .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
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- .3 Concrete mix design, initial concrete temperature, placing procedure, formwork and insulation shall be employed to ensure that the maximum temperature differential over the cross-section of any reinforced concrete element does not exceed 20°C.
 - .4 During concreting operations:
 - .1 Development of cold joints not allowed unless approved by Departmental Representative.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
 - .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
 - .4 Prior to placing of concrete, obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.
 - .5 Protect previous Work from staining, and remove existing stains prior to application of concrete finishes.
 - .6 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
 - 3.2 Installation/Application
 - .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
 - .2 Cast in sleeves, anchors, reinforcement, bolts, joint fillers and other inserts are required to be built in.
 - .3 Adhesive set anchor rods:
 - .1 Drill holes are to be drilled with percussion drill using a template to locate hole and guide alignment. Hole diameters to match anchor manufacturer's recommendations.
 - .2 Ream holes with a wire brush and blow clean with compressed air immediately before grouting. Ensure compressed air is free of oil or other deleterious material detrimental to the bonding of the epoxy. Install anchor dowels in accordance with manufacturer's instructions.
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- .3 Inject adhesive into the prepared holes from a nozzle-mix injection tube. Fill each hole with adhesive before inserting the anchor dowel.
- .4 Twist the anchor after inserting it into the epoxy and “bottom” it in the hole in accordance with the manufacturer’s instructions.
- .5 Take appropriate measures to prevent excess epoxy material from contaminating adjacent surfaces.

.4

Drainage holes and weep holes:

- .1 Form weep holes and drainage holes in accordance with Section 03 10 00 – Concrete forming and Accessories. If wood forms are used, remove them after concrete has set.
- .2 Install weep hole tubes and drains as indicated.
- .3 Weep holes in existing concrete walls installed as detailed on drawings.

3.3 Finishes

- .1 Formed surfaces exposed to view: smooth form finish in accordance with CSA A23.1/A23.2.
- .2 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.
- .3 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.
- .4 Provide broom finish unless otherwise indicated.
- .5 Supply and apply high performance penetrating sealers on new concrete surface in accordance with manufacturer’s recommendations.

3.4 Curing

- .1 Leave forms in place for 7 days and cover the top of wall with wet burlap and polyethylene and cure in accordance with CSA A23.1/A23.2.
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| 3.5 | Site Tolerances | .1 | Concrete finishing tolerance in accordance with CSA A23.1/A23.2. |
| 3.4 | Field Quality Control | .1 | Site tests: conduct tests as follows and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.1 Concrete pours.
.2 Slump.
.3 Air content.
.4 Compressive strength at 7 and 28 days.
.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.

.1 Ensure testing laboratory is certified to CSA A283.

.3 Contractor will pay for costs of tests.

.4 Contractor will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.5 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

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

.7 A Quality Control plan approved by the Departmental Representative shall be implemented throughout the concrete production in accordance with the requirements of CSA A23.1.

The Quality Control Plan shall include, but is not limited to, the following:

.1 Based on mix design, determine by lab testing the adiabatic heat generation for concrete mix to be used.

.2 Provide information on temperature sensing and recording equipment to be used. Include details of installation locations of the temperature probes for each planned mass concrete placement. |
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- .3 Provide Monitoring Plan to control temperature gradient. Include proposed methods for early identification of trends in concrete properties and for taking corrective actions. This includes identifying internal and external concrete temperatures during the curing process to ensure temperatures are within limits set by CSA A23.1-09.
- .4 Details of proposed protective systems and procedures for placing and curing concrete, including situations where ambient temperatures are less than 5°C or over 25°C, and the influences of tide levels on the underside of the foundation.
- .5 Identify how corrective actions will be performed to maintain acceptable differential temperatures in accordance with CSA A23.1-09.
- .6 Proposed Quality Control Plan to be certified by a qualified Professional Engineer registered in the Province of British Columbia, Canada.

3.5 Cleaning

- .1 Clean in accordance with Section 01 74 11 – Site Cleaning
 - .2 Designate cleaning area for tools to manage water use and runoff in accordance with Section 01 35 43 – Environmental Protection.
 - .3 Coordinate appropriate area on site where concrete trucks can be safely washed with Departmental Representative.
 - .4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Divert unused concrete materials from landfill to local facility after receipt of written approval from Departmental Representative.
 - .2 Divert unused admixtures and additive materials from landfill to official hazardous material collections site after receipt of written approval from Departmental Representative.
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PWGSC

Steamboat, Lower Liard And Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

03 30 00

**CAST-IN-PLACE
CONCRETE**

Page 9 of 9

- .3 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose a health or environmental hazard.
- .4 Prevent admixtures and additive materials from entering drinking water supplies or streams.
- .5 Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

END OF SECTION

PART 1 - GENERAL

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| 1.1 | Section Includes | .1 | Underwater Placed Concrete |
| 1.2 | References | .1 | Reference Standards: |
| | | .1 | American Concrete Institute (ACI) |
| | | .1 | ACI 304R-00, Guide for Measuring, Mixing, Transporting and Placing Concrete. |
| | | .2 | CSA International |
| | | .2 | CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete. |
| 1.3 | Administrative Requirements | .1 | Concrete pre-placement meeting: conduct pre-placement meeting 2 weeks minimum before placement of concrete. |
| | | .1 | Ensure meeting includes as minimum attendees as follows: |
| | | .1 | General contractor. |
| | | .2 | Placing/formwork sub-contractor. |
| | | .3 | Structural engineer. |
| | | .4 | Departmental Representative. |
| | | .2 | Distribute minutes to attendees including copies of concrete mix designs, aggregate physical properties, placing schedule, rate of delivery, testing program, and contingency plan for delay and breakdown. |
| 1.4 | Delivery, Storage and handling | .1 | Deliver, store and handle materials in accordance with Section 01 61 10 – Product Requirements and manufacturer's written instructions. |
| | | .2 | Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address. |
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- .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store/protect concrete from nicks, scratches and blemishes.
 - .3 Replace defective or damaged materials with new.
- .4 Develop Waste Management Plan related to Work of this Section.
- .5 Packaging Waste Management: Pallets, crates, padding and packaging materials should be removed for reuse/return by manufacturer in accordance with Waste Management Plan and Section 01 74 19 – Waste Management and Disposal.

PART 2 - PRODUCTS

- 2.1 Materials
 - .1 Refer to Section 03 30 00 – Cast-In-Place Concrete
 - 2.2 Performance Specifications
 - .1 The concrete repair material shall be an underwater, hand-applied, prepackaged or dry mix cement-based mortar suitable for hand placement underwater requiring only the addition of potable water.
 - .2 The material shall not contain any chlorides or lime other than amounts contained within the hydraulic cement composition.
 - .3 The manufacturer shall be ISO 9110 certified and have at least ten years experience in the manufacture of concrete repair materials.
 - .4 If the Contractor so desires and at the Contractor's expense, the manufacturer shall offer technical services and provide a representative at the jobsite for product training prior to product installation upon five days advance notice.
 - .5 The concrete repair material shall meet all the following typical performance criteria when cured at 23°C:
 - .1 Compressive strength, ASTM C109:
 - .1 20.7 MPa at 3 Hours
 - .2 27.6 MPa at 1 Day
 - .3 34.5 MPa at 7 Days
 - .4 37.0 MPa at 28 Days
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- .2 Underwater bond strength, ASTM C882:
 - .1 7.9 MPa at 7 Days
- .3 Coefficient of thermal expansion, ASTM C531:
 - .1 9.6×10^{-6} mm/mm/°C
- .6 Field Quality Control: Refer to PART 3 – FIELD QUALITY CONTROL of Section 03 30 00 – Cast-in-Place Concrete .
- .7 An acceptable product which meets these criteria is:

Five Star Structural Concrete® Underwater HP

As manufactured by Five Star Products, Inc., Fairfield, CT 06825
(203) 336-7900.

Or other acceptable product approved by the Departmental Representative.

PART 3 - EXECUTION

3.1 Examination

- .1 Verify that conditions of substructure previously installed under other Sections or Contracts are acceptable for concrete placement installation in accordance with manufacturer's written instructions.
 - .2 Submittals: In accordance with PART 15 – PROGRESS PHOTOGRAPHS of Section 01 32 17 – Construction Progress and Reporting.
 - .3 Contractor is to immediately inform Departmental Representative upon discovery of conditions prohibiting concrete placement installation
 - .4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.
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| 3.2 | Preparation | .1 | Where concrete must bond to existing surfaces, clean surfaces before starting concrete placement. |
| | | .1 | Use water jet, mechanical scrapers or other means. |
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| 3.3 | Installation | .1 | Place concrete in one continuous operation to full depth required. |
| | | .1 | Supply complete equipment for every phase of operation. |
| | | .2 | Provide sufficient supply of concrete to complete pour without interruption. |
| | | .3 | Collect and dispose of any concrete leaking from the vent ports. No concrete is to be deposited into the river. |
| | | .2 | Concrete Reinforcing: Refer to the drawings and Section 03 20 00 – Concrete Reinforcing. |
| | | .1 | The Contractor is not to remove existing rebar unless severe rusting with loss of section has occurred. |
| | | .3 | Tremie method: |
| | | .1 | Provide water-tight tremie pipe sized to allow free flow of concrete. The pipe diameter is to be the higher of the two: |
| | | .1 | 200 mm, or. |
| | | .2 | 8 times the maximum size of coarse aggregate used. |
| | | .2 | Provide hopper at top of tremie pipe and means to raise and lower tremie pipe. |
| | | .3 | Provide plug or foot valve at bottom of tremie pipe to permit filling pipe with concrete initially. |
| | | .4 | Provide minimum of one tremie pipe for every 30 m ³ of plan area and to maximum spacing of 6 m centre to centre. Do not move tremie pipes laterally through concrete. |
| | | .5 | Start placement with full tremie pipe. Keep bottom of pipe |
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buried at least 300 mm in freshly placed concrete.

- .6 If seal is lost and water enters pipe, withdraw pipe immediately. Refill and continue placing as specified.
- .7 If tremie operation is interrupted so that horizontal construction joint has to be made, cut surface laitance by jetting, within 24 hours and remove loose material by pumping or air lifting before placing next lift.
- .8 Do not place concrete in flowing water when current exceeds 3 m/min. Do not vibrate, disturb or puddle concrete after placement.

.4 Pumped concrete method:

- .1 Follow procedures as for tremie method in placing concrete using discharge line from concrete pump.
- .2 Pump discharge line diameter: 125 mm minimum.

3.4 Cleaning

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Site Cleaning. Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Site Cleaning.
- .3 Waste Management: separate waste materials for reuse/recycling in accordance with Section 01 74 – Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PWGSC

Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

05 12 33
STRUCTURAL STEEL
FOR BRIDGES

Page 1 of 7

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. |
| | | .2 | Supply and installation of anchor bolts, nuts, washers and bolt grout will be considered incidental to work |
| 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. |
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| 1.3 Shop Drawings | <ul style="list-style-type: none">.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..4 Prepare and submit all drawings and documents necessary to describe the following:<ul style="list-style-type: none">.1 Type and capacity of equipment to be used..2 Sequence of operation: position of cranes, snooper vehicles, and trucks with members..3 Position of cranes and snooper vehicles with details of load distribution of wheels and outriggers..4 Lifting devices and lifting points..5 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..6 Details of temporary works: method of providing temporary supports for stability..7 Bolt torquing sequence and method..8 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. |
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| 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 CWB in their particular category shall be permitted to perform weldments. Their qualifications shall be current and available for examination by the Departmental Representative. |
| 1.5 | Delivery, Storage, and Handling | .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

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| 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. |
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- .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.
 - .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.
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PART 3 - EXECUTION

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| 3.1 Erection | <ul style="list-style-type: none">.1 Do not commence steel erection until approval of shop drawings and procedure 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 The Contractor shall confirm, on site, all dimensions required for fabrication and dimensions shown on the Contract Drawings prior to any fabrication. |
| 3.2 Installation | <ul style="list-style-type: none">.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:<ul style="list-style-type: none">.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 Do falsework in accordance with CSA S269.1, except where specified otherwise..4 Welding: do welding in accordance with CSA W59, except where specified otherwise.<ul style="list-style-type: none">.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, absolutely no welding is allowed without the written authorization of the Departmental Representative, and then, 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. |
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- .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 bolt diameter 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 mispunched 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.
 - .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.
-

PWGSC

Steamboat, Lower Liard and Hyland
Bridge Repairs at Km 515.3, Km 763.3 and Km 937.3
Alaska Highway
British Columbia

05 12 33

STRUCTURAL STEEL FOR BRIDGES

Page 7 of 7

- .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

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| 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). |
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| 1.2 Submittals | <div style="margin-left: 20px;">1. Product Data:<div style="margin-left: 20px;"><div style="margin-left: 20px;">1. Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.</div><div style="margin-left: 20px;">2. Submit three copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:<div style="margin-left: 20px;">1. For finishes, coatings, primers and paints.</div></div></div></div> <div style="margin-left: 20px;">2. Shop Drawings<div style="margin-left: 20px;"><div style="margin-left: 20px;">1. Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.</div><div style="margin-left: 20px;">2. Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.</div></div></div> |
| 1.3 Quality Assurance | <div style="margin-left: 20px;">1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.</div> <div style="margin-left: 20px;">2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.</div> <div style="margin-left: 20px;">3. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Section 01 45 00 – Quality Control.</div> |
| 1.4 Delivery, Storage and Handling | <div style="margin-left: 20px;">1. Packing, Shipping, Handling and Unloading:<div style="margin-left: 20px;"><div style="margin-left: 20px;">1. Deliver, store, handle and protect materials in accordance with Section 01 61 10 - Product Requirements.</div></div></div> <div style="margin-left: 20px;">2. Storage and Protection:<div style="margin-left: 20px;"><div style="margin-left: 20px;">1. Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.</div></div></div> |
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2. Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

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| 1.5 | Waster Management and Disposal | .1 | Separate and recycle waste materials in accordance with Section 01 74 19 - Waste Management and Disposal. |
| | | .2 | Remove from site and dispose of packaging materials at appropriate recycling facilities. |
| | | .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

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|-----|-------------------|----|---|
| 2.1 | Materials | .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: 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. Wood. |
| 2.4 | Steel Angles | 1. | Steel angles: as shown on drawings. |
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PART 3 - EXECUTION

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| 3.1 Erection | .1 | Do welding work in accordance with CSA W59 unless specified otherwise. |
| | .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. |
| 3.2 Cleaning | .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. |

END OF SECTION

PART 1 - GENERAL

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| 1.1 | Related Requirements | .1 | Section 01 13 00 -- Submittal Procedures |
| 1.2 | Environmental Requirements | .1 | Operation of construction equipment in water is prohibited. |
| | | .2 | Use borrow material from watercourse beds only after receipt of written approval from Departmental Representative and authority having jurisdiction. |
| | | .3 | Design and construct temporary crossings to minimize environmental impact to watercourse. |
| | | .4 | Constructing temporary crossings of watercourses where spawning beds are indicated is prohibited. |
| | | .5 | Dumping excavated fill, waste material, or debris in watercourse or wetland is prohibited. |
| 1.3 | References | .1 | U.S. Environmental Protection Agency (EPA) / Office of Water |
| | | .1 | EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices. |
| 1.4 | Action and Informational Submittals | .1 | Submit in accordance with Section 01 33 00 - Submittal Procedures. |
| | | .2 | Erosion and Sedimentation Control: submit copy of erosion and sedimentation control plan in accordance with EPA 832/R-92-2005 and authorities having jurisdiction. |

PART 2 - PRODUCTS

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| 2.1 | Not Used | .1 | Not used. |
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PART 3 - EXECUTION

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| 3.1 | Existing Conditions | .1 | Maintain existing flow in natural watercourse systems. |
| | | .2 | In natural systems retain existing riffle pool and step pool systems. |
| | | .3 | In wetland systems, maintain existing hydrological conditions. |
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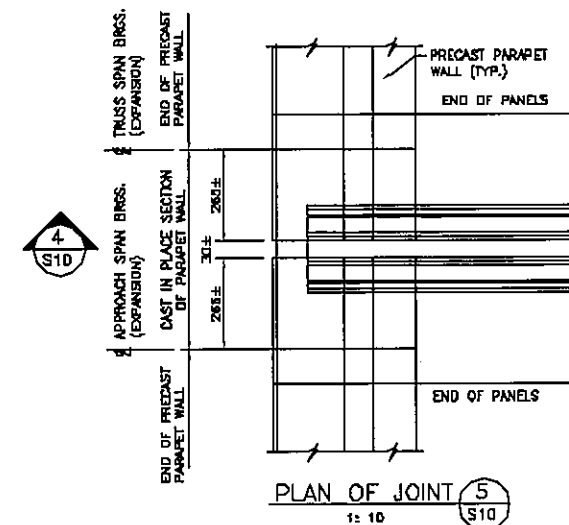
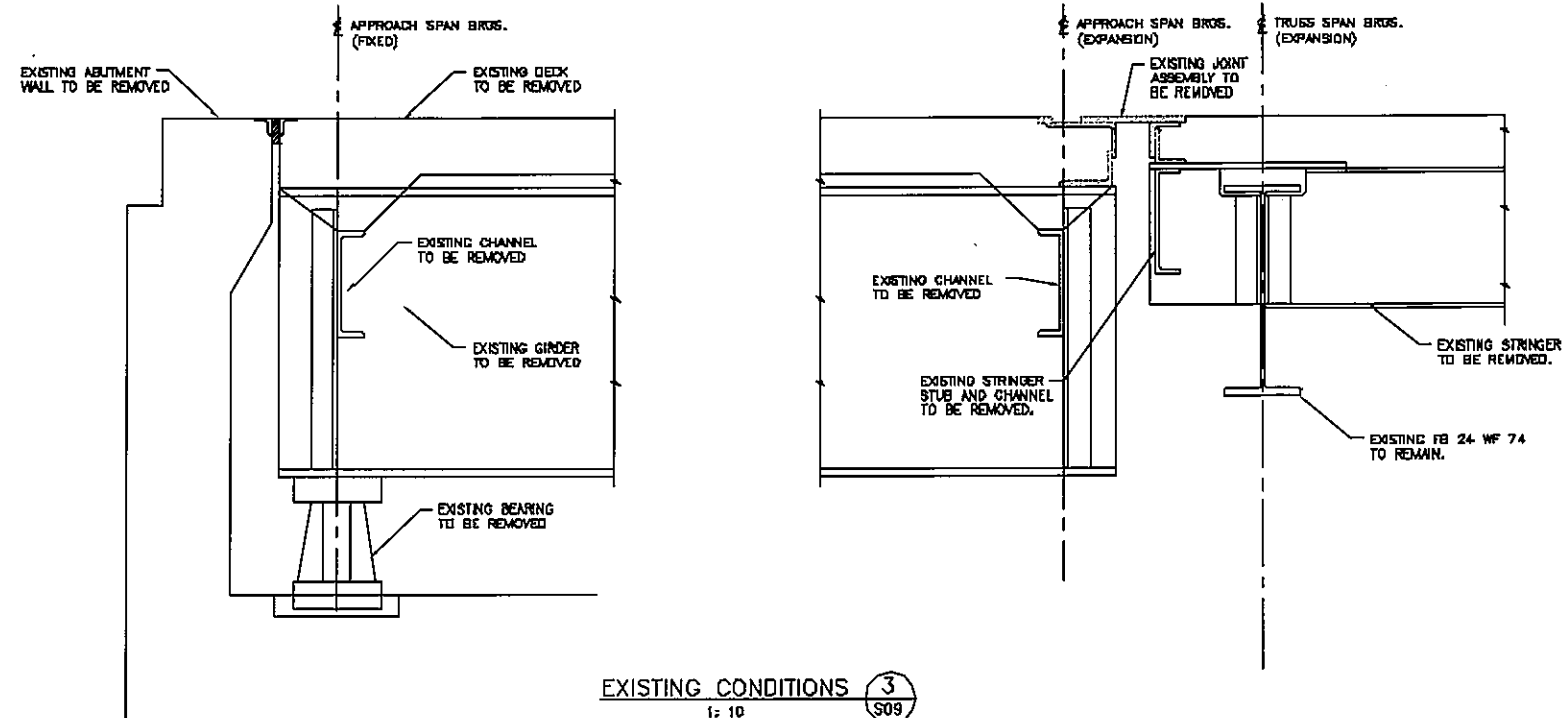
**3.2 Site Clearing and Plant
Protection**

- .1 Temporary Erosion and Sedimentation Control:
 - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings, site-specific sediment and erosion control plan complying with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
 - .2 Minimize disturbance to vegetated buffer zones and protect trees and plants on site and adjacent properties where indicated.
 - .3 Wrap trees and shrubs adjacent to construction work, storage areas and trucking lanes in burlap.
 - .4 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
 - .1 Avoid unnecessary traffic, dumping and storage of materials over root zones.
 - .5 Leave cuttings from trees and other vegetation on site as brush piles to allow for natural degradation.
 - .1 Secure large piles with degradable materials to prevent interference with watercourse.
 - .6 Remove only trees that may offer future blockage problems as instructed by Departmental Representative.
 - .7 Leave root mass and stumps in place.
 - .8 Maintain temporary erosion and pollution control features installed under this contract.
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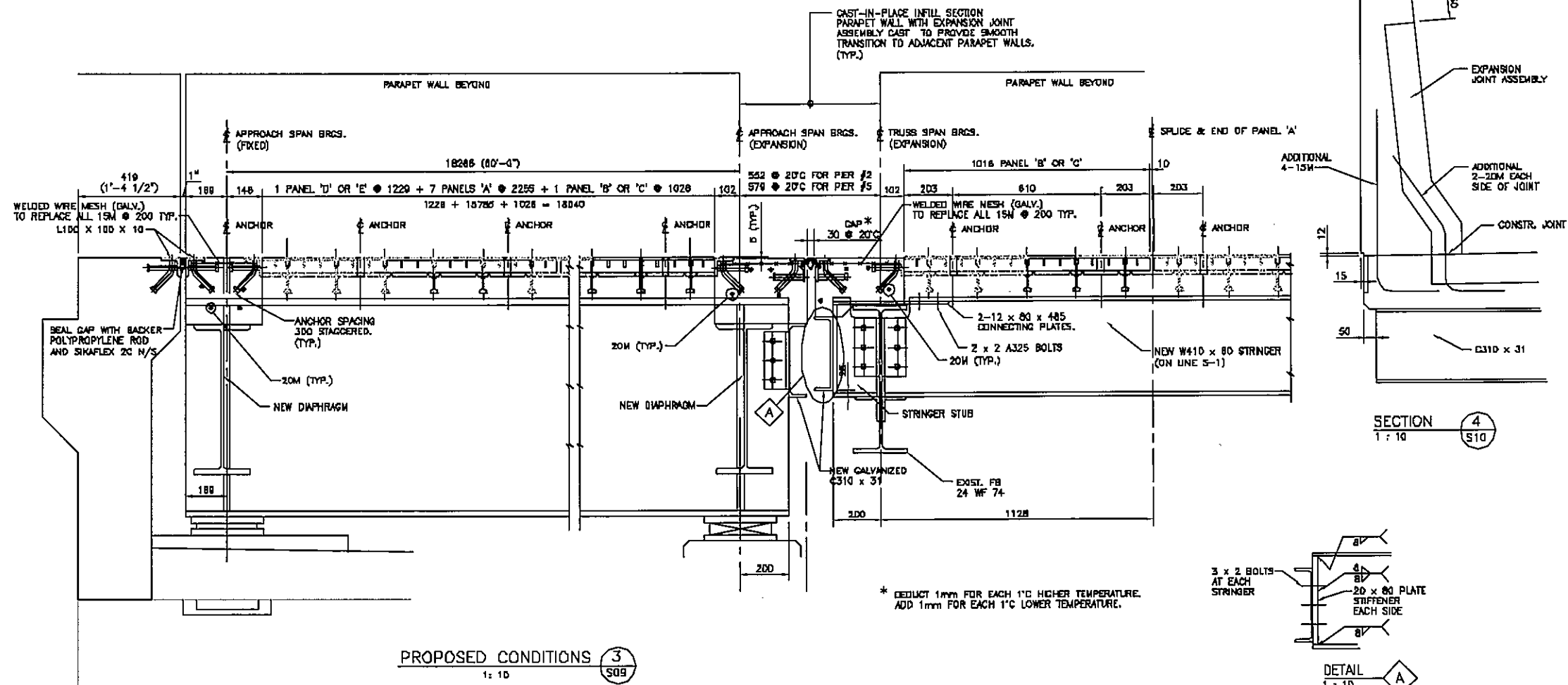
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| 3.3 Drainage | .1 | Pumping of water containing suspended materials into watercourse is prohibited. |
| | .2 | Establish rock chute spillways to accommodate safe surface water entry to watercourse as directed by Departmental Representative. |
| | .3 | Install drop pipe inlet system as directed by Departmental Representative. |
| 3.4 Site Restoration | .1 | Establish vegetated buffer zones with suitable vegetation to minimum 3 m along edge of watercourse banks as determined by Departmental Representative. |
| | .2 | Plant vegetation natural to area, suitable for application without requirement of fertilizers, pesticides or other chemicals. |
| | .3 | Control stream bank erosion in lower section of watercourse with irregular shaped riprap underlain with nontoxic filter cloth of size determined by Departmental Representative. |
| | .4 | Control stream bank erosion in upper section of watercourse by planting suitable vegetation as directed by Departmental Representative. |
| | .1 | Ensure planting occurs within 14 days after work on watercourse is complete. |

END OF SECTION

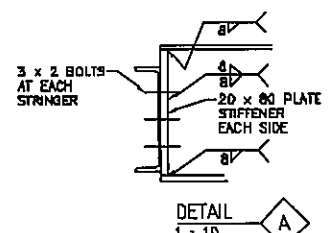
DELCAN



NOTE:
FOR TYPICAL PARAPET WALL
DIMENSIONS AND REINFORCING
SEE PARAPET WALL DRAWING S17.



* DEDUCT 1mm FOR EACH 1°C HIGHER TEMPERATURE.
ADD 1mm FOR EACH 1°C LOWER TEMPERATURE.



AS BUILT	AS BUILT
Issued for distribution	14/02/02
DESCRIPTION	AS BUILT
A detail number number de détail	A
B source drawing no. de dessin no.	B/C
C detail on drawing no. dessin sur dessin no.	C

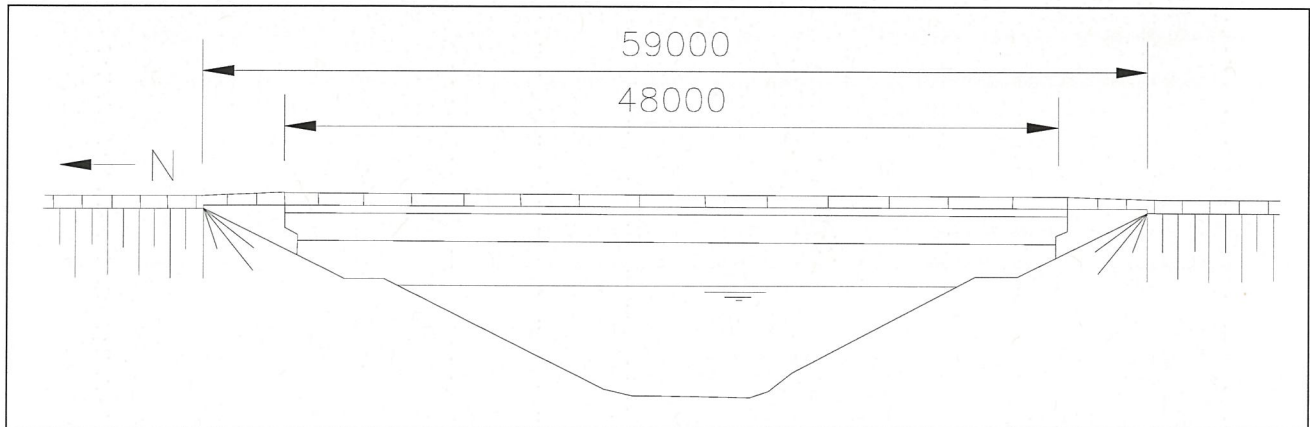
HYLAND RIVER BRIDGE
RECONSTRUCT AND WIDEN
BRIDGE DECK
ALASKA HIGHWAY km 937.3
BRITISH COLUMBIA

STRUCTURAL STEEL - 1 OF 2
AS BUILT

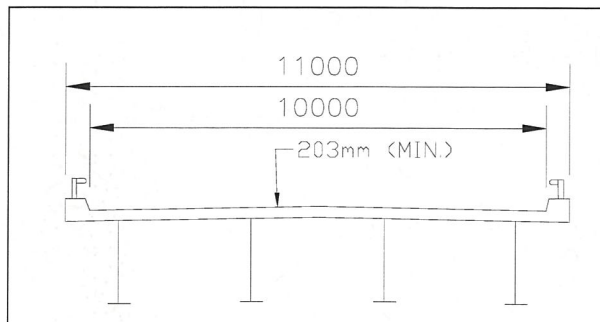
designed by	checked by
drawn by	checked by
approved by	approved by
Project Manager	Administrateur de Projets
scale	scale
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date	date
	S10

Steamboat Creek Bridge

Alaska Highway km 515.3



ELEVATION

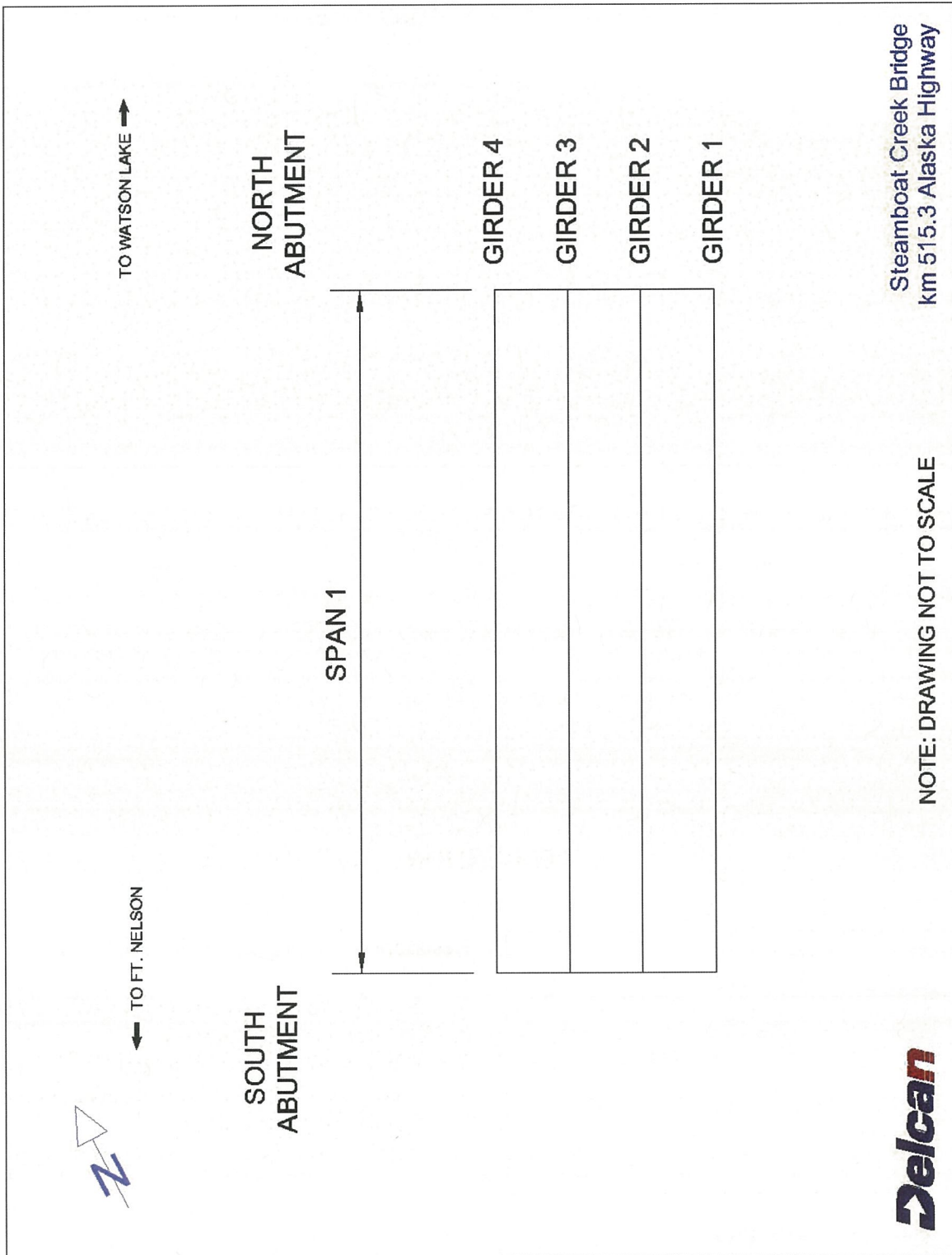


SECTION

Description:

1. Simply supported weathering steel I-girders
2. Reinforced concrete deck
3. Reinforced concrete abutments
4. Steel pipe piled foundations under abutments
5. Gabion slope protection

Steamboat Creek Bridge Alaska Highway km 515.3



Steamboat Creek Bridge Alaska Highway km 515.3

Year Constructed: 1979
 Original Design: PWGSC
 Last Load Rating: 2010 – Meets CHBDC Live Load Requirements
 Drawings Available: Yes
 Last Underwater Inspection: n/a
 Previous C Inspection Report for 2009: Delcan – Stan Reimer, P.Eng.
 Previous G Inspection Report for 2010: PWGSC – Alex Taheri, P.Eng., Pei-Chin Tsai, E.I.T. and Jeff Downing, P.Eng.
 Current Inspection Date: August 13, 2011
 Inspectors: Delcan Corporation
 Stan Reimer, P.Eng.
 Grant Waldie, E.I.T.
 Temperature: 17°C
 Weather: Sunny with occasional showers
 Equipment: Standard Inspection Equipment, Ladder
 2009 Structural Condition Rating: 5
 2009 Functional Rating: 4
 2010 Structural Condition Rating: 5
 2010 Functional Rating: 4
2011 Structural Condition Rating: 5
2011 Functional Rating: 4 (bridge width low by 4% and bridge barriers do not meet current standards)
 Watercourse Flow Direction: East to West (Girder 1 is on East Side)
 Estimated Replacement Cost: \$5.4 million (2011 dollars)
 GPS Coordinates: N58°-46'-55.8", W 123°-34'57.9"

Ten Year Plan - Cost Estimate (2011 dollars)									
Recommended Work	Priority Code	Units	Qty	Unit Cost	Within 1 Yr	Within 3 Yrs	Within 5 Yrs	Within 10 Yrs	Maint.
1. Replace expansion joints	B	m	22	\$4,000		\$88,000			
2. Upgrade barriers to current code standard	C	m	118	\$1,000			\$118,000		
3. Replace bearings	C	lump	1	\$40,000			\$40,000		
4. Deck repairs	10	lump	1	\$20,000				\$20,000	
5. Monitor approach slab settlement	Monitor								
Construction/Maintenance Cost Subtotals:					\$0	\$88,000	\$158,000	\$20,000	\$0
Engineering Costs (20% of construction cost):					\$0	\$17,600	\$31,600	\$4,000	
20% Contingency:					\$0	\$17,600	\$31,600	\$4,000	\$0
Note: Costs do not include: mobilization or flagging					Subtotals:				
					\$0	\$123,200	\$221,200	\$28,000	\$0
Total Cost Estimate:					\$372,400				

Steamboat Creek Bridge

Alaska Highway km 515.3

Significant Inspection Concerns	<ol style="list-style-type: none"> Both joints are leaking full length due to deteriorated/detached strip seals. The north expansion joint is partially covered with BST and both cover plates have been welded on one side due to missing bolts. Leakage at these joints has been a problem for the last 10 years. Both joints need to be waterproofed to protect the girders, abutment and bearings below from accelerated deterioration. One option is to replace the joint seals. Another is to replace the joints entirely. The neoprene pads in these pot bearings are worn out – expansion bearings are working fine. Continue to monitor.
--	---

Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
Primary Components								
Watercourse	5	5	D	5	5	D	Watercourse is gently curved and stable with no scour evident near the bridge. Water flows from east to west.	3-5
Foundations	5	5	D	5	5	D	No visible defects.	
South Abutment	5	5	D	5	5	D	South abutment concrete is generally in good condition with 4 leaching narrow vertical cracks in the ballast wall and 1 narrow vertical crack in the abutment wall between girders 1 and 2. The abutment is moisture stained full width.	10, 21-25
North Abutment	5	5	D	5	5	D	North abutment concrete is generally in good condition with 1 leaching narrow vertical crack in the ballast wall between girders 1 and 2. The abutment is moisture stained full width.	27-30
Beams/Girders	5	5	D	5	5	D	The weathering steel I-girders in good condition. There is some uneven weathering with minor scaling to bottom flanges of exterior girders. See individual member ratings on following table.	16-19, 21, 22, 28
Connections of Primary Components	5	5	D	5	5	D	No visible defects	18, 19
Deck	5	5	D	5	5	10	The deck is in good condition with only 3 m ² delamination found on the deck near the south deck joint (up from 2 m ² in 2009). There are narrow (0.1 to 0.3 mm) transverse shrinkage cracks in the deck concrete spaced every few metres, particularly in the west lane, that are visible both on the deck surface and in the cantilever soffits below (see Photo P20).	6-14, 16, 19, 20, 22
Secondary Components								

Steamboat Creek Bridge Alaska Highway km 515.3

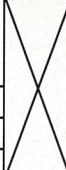
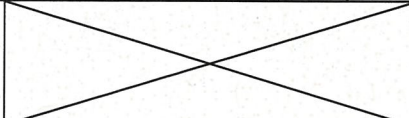
Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
Embankments	5	5	M	5	5	D	The embankments are in good condition with gabion slope protection near the abutments and well established vegetation closer to the watercourse. Trees have been recently trimmed below the bridge and are not longer growing into the girders. No erosion gullies were identified at the ends of the barriers.	21, 27
Ballast Walls	5	5	D	5	5	D	The ballast wall concrete is generally in good condition. The south ballast wall has 4 narrow leaching vertical cracks and the north ballast wall has one leaching vertical crack between girders 1 and 2. There is moisture staining throughout both ballast walls due to leakage from both expansion joints.	22-24, 28-30
Wingwalls	5	5	D	5	5	D	No visible defects.	
Bearing Seats	5	5	D	5	5	D	Bearing seats are clean and in good condition. However, they are both wet and moisture stained from leakage below both expansion joints.	22, 23, 25, 26, 28-32
Bearings	4	4	C	4	4	C	The neoprene pads in these pot bearings are worn out – expansion bearings working fine. Continue to monitor.	22, 23, 25, 26, 28-32
Joints	4	4	B	4	4	B	Both joints are leaking full length. The cover plates are welded on one side. Both expansion joint are leaking due to deteriorated/detached strip seals (see Photo P10). The north expansion joint is partially covered with BST.	9-12
Diaphragms	5	5	D	5	5	D	Diaphragms are in good condition. Scaling is starting to form on end diaphragms.	16, 17, 23, 29
Connections of secondary components	5	5	D	5	5	D	No visible defects.	16, 17, 23, 29
Curbs	5	5	D	5	5	D	The curb concrete is generally in good condition with minor shrinkage cracks and scaling.	11, 13, 14
Approach Slabs	5	5	D	4	4	D	Approach slab are covered in BST and appear to have settled. Monitor during annual bridge inspections. They may require jacking in the future. There are wide transverse cracks visible where not covered by BST, particularly at the SW corner of the bridge (see Photo P11).	7-9, 11-14
Approaches	4	4	D	4	4	D	Both approaches have settled slightly and are uneven causing slight bumps in the ride over	1, 2, 7, 8

Steamboat Creek Bridge Alaska Highway km 515.3

Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
							both abutments. Monitor approaches for further settlement.	
Approach Barriers	5	5	D	5	5	D	Concrete approach barriers were installed in 2004. They have some minor collision damage. The concrete approach barriers are properly transitioned to the galvanized steel HSS bridge railing.	1, 2
Bridge Barriers	5	5	D	5	5	C	The galvanized steel box bridge railing is generally in good condition. The railing does not meet current code requirements.	13, 14
Coatings on Primary Components	5	5	D	5	5	D	Weathering steel has minor scaling where subject to leaking deck joints at the abutments and on the bottom flanges of exterior girders.	23, 28, 29
Auxiliary Components								
Slope Protection	5	5	M	5	5	D	Slope protection consists of gabion baskets near the abutments and well established vegetation closer to the watercourse. Gabions are in good condition.	21, 27
Deck Drains and Drainage Systems	5	5	D	5	5	D	Deck drains are clear and unobstructed.	15
Signs	5	5	D	5	5	D	All 4 hazard markers are correctly installed at the ends of the approach barriers. Both bridge ID signs are in place.	1, 2
Coatings on Secondary Components	5	5	D	5	5	D	Scaling is starting to form on end diaphragms.	29

Individual Girder Ratings								
Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
Span 1 Girders								
Girder 1	5	5	D	5	5	D	Minor scaling of weather steel patina on bottom flange	16,18,22,28
Girder 2	5	5	D	5	5	D	No visible defects	16,17,22,28
Girder 3	5	5	D	5	5	D	No visible defects	16,17,22,28
Girder 4	5	5	D	5	5	D	Minor scaling of weather steel patina on bottom flange	16,19,22,28

Steamboat Creek Bridge Alaska Highway km 515.3

Bearing Measurements													
Span	End	Girder	Fixity	Type	Temp °C	Measured (mm)	Design Setting	Difference	Room to Move	Slot Size	Dirty (Y/N)	Corrosion	Comments
1	S	G1	E	Pot	17	64	12	52	65		N	None	Neoprene pads need replacement in all bearings – neoprene pads squeezing out
		G2			17	59	12	47	65		N	None	Photos 25,26
		G3			17	56	12	44	65		N	None	Photo 25
		G4			17	54	12	42	65		N	None	Photo 25
1	N	G1	F	Pot							N	None	Photos 28
		G2									N	None	Photos 28,29,32
		G3									N	None	Photos 28,29,30,31
		G4									N	None	Photos 28

RN=Roller Next, NR=Reinforced Neoprene Pads, NT=NR+Teflon and Stainless Steel, RK=Rocker, RL=Roller, DD=Disk and Dome, SP=Sliding Plates, PF=Pinned (used for all fixed bearings)
Design Setting = $.000011 \times (\text{temp}+5) \times (\text{bridge length})$, Measurements are in mm

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P01 - South Approach - Looking North - All 4 Delineators and Stream Name Sign in Place



P02 - North Approach - Looking South - All 4 Delineators and Stream Name Sign in Place

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P03 - Upstream Watercourse to the East



P04 - Downstream Watercourse to the West

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P05 - East Side



P06 - Overall Bridge Deck - Looking North

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P07 - South Approach Uneven at Bridge



P08 - North Approach Uneven at Bridge

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P09 - South Expansion Joint and South Approach Slab - Approach Slab Covered in BST - Wide Transverse Crack Exposed in Approach Slab



P10 - South Abutment - Bearing Seal - From Below - Torn in Several Locations - Leaking Full Length

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P11 - South Approach Slab - Wide Transverse Cracks in Approach Slab where Exposed at Both Curbs



P12 - North Deck Joint - Partially Covered in BST - North Approach Slab Covered in BST

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P13 - East HSS Railing Transition to SE Concrete Approach Barrier - Minor Snow Plow Abrasion on Concrete Curb



P14 - Curb at NW Corner - Minor Snow Plow Abrasion on Concrete Curb - Narrow Shrinkage Cracks at ~2 m Spacing

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P15 - All 6 Deck Drains Clear and Functioning Properly - Typical



P16 - Soffit and 4 Weathering Steel I Girders - No Staining on Soffit - Looking North

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P17 - Typical Diaphragm



P18 - Exterior Girder 1 - Minor Scaling of Patina on Bottom Flange

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P19 - Girder 4 and Cantilever Soffit



P20 - Cantilever Soffits have Hairline Transverse Shrinkage Cracks with Efflorescence at ~500 mm Spacing

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P21 - South Abutment and Embankment - Gabion Slope Protection



P22 - South Abutment - Moisture Staining from Leaking Deck Expansion Joint

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P23 - South Abutment - Backwall - 4 Leaching Narrow Vertical Cracks



P24 - South Abutment Wall - Narrow Vertical Crack between Girders 1 and 2

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P25 - South Abutment - Bearing Seat Wet - Expansion Pot Bearings



P26 - South Abutment - Expansion Pot Bearing 2 - Water Ponding on Bearing Seat

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P27 - North Abutment and Embankment - Slope Protected with Gabions



P28 - North Abutment

**Steamboat Creek Bridge
Alaska Highway km 515.3**



P29 - North Abutment - Backwall - Narrow Vertical Crack Leaching Efflorescence between Girders 1 and 2



P30 - North Abutment - Bearing Seats Wet

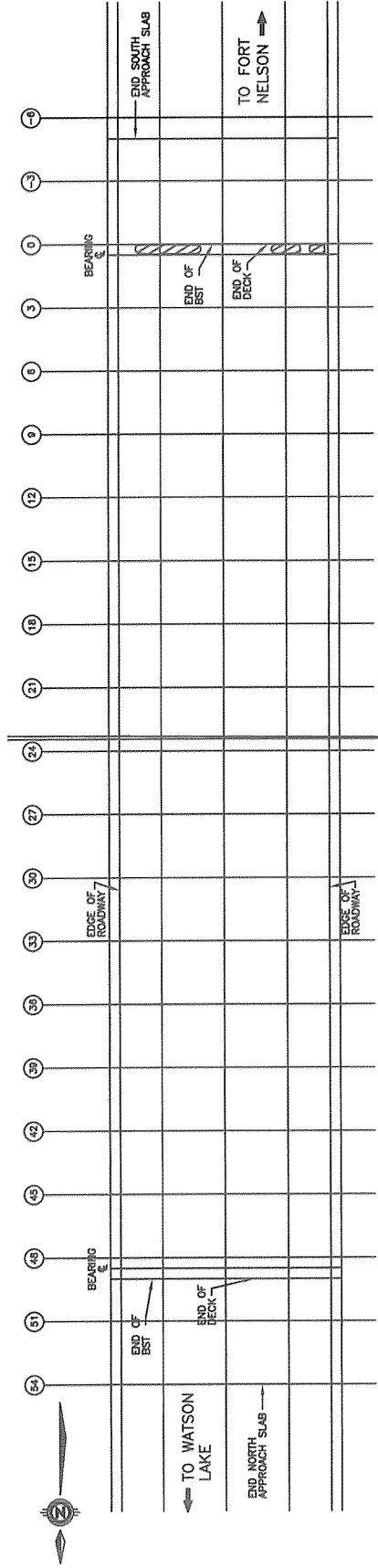
**Steamboat Creek Bridge
Alaska Highway km 515.3**



P31 - North Abutment - Fixed Pot Bearing 3 - Neoprene Pads Squeezing Out

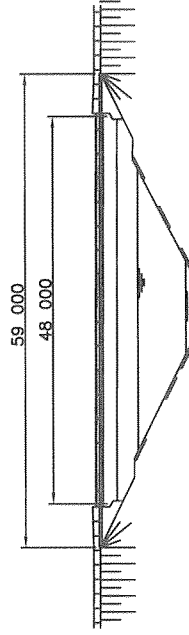


P32 - North Abutment - Fixed Pot Bearing 2 - Neoprene Pads Squeezing Out

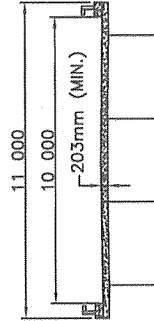


PLAN VIEW
NOTE: GRID LINES AT 3.0m CENTRES

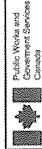
LEGEND
DELAMINATED



ELEVATION



SECTION

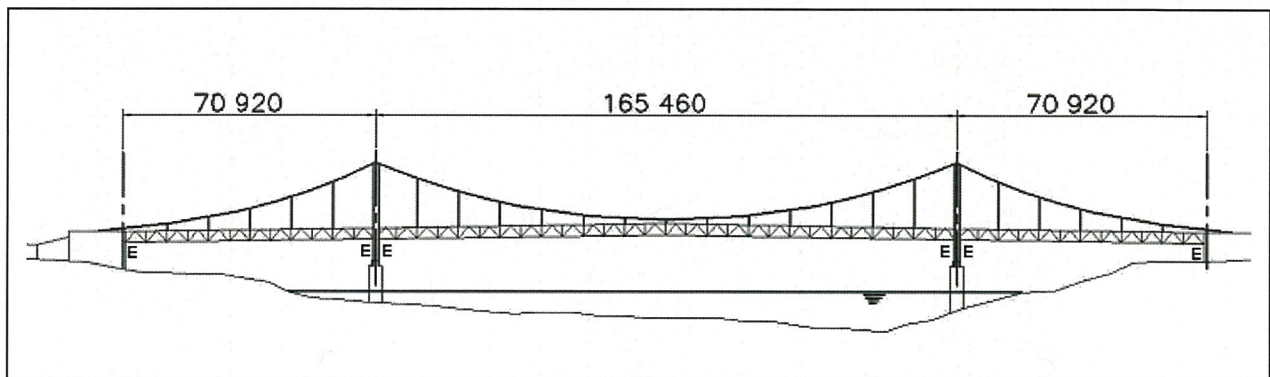


2011 ALASKA HIGHWAY BRIDGE INSPECTIONS
KM 232 TO KM 938
DECK DELAMINATION SURVEY

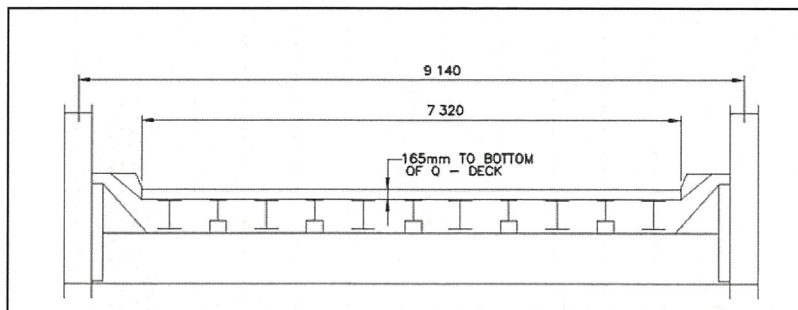
STEAMBOAT CREEK - km 515.3

SHEET 1 OF 1

Lower Liard River Bridge Alaska Highway km 763.3



ELEVATION

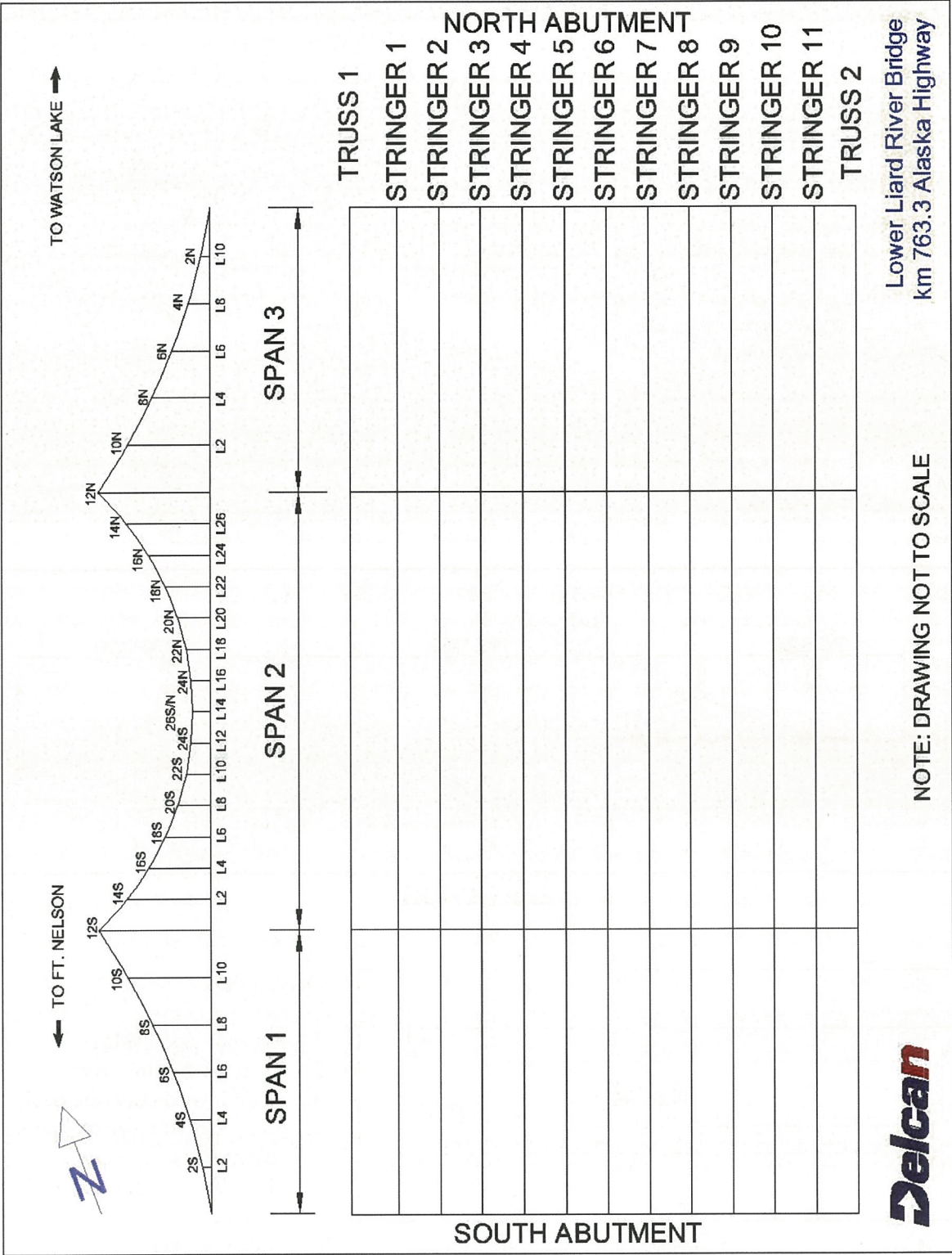


SECTION

Description:

1. Suspension bridge
2. Steel stiffening truss
3. Reinforced concrete deck
4. Reinforced concrete piers and abutments
5. Reinforced concrete anchor blocks
6. Steel towers

Lower Liard River Bridge Alaska Highway km 763.3



Lower Liard River Bridge Alaska Highway km 763.3

Year Constructed:	1943
Original Design:	PWGSC
Last Load Rating:	2001 – Meets CHBDC Live Load Requirements with minor exception for top chord of deck truss
Drawings Available:	Yes
Last Underwater Inspection:	2011 – Included in this report
Previous C Inspection Report for 2009:	Delcan – Stan Reimer, P.Eng.
Previous G Inspection Report for 2010:	PWGSC – Alex Taheri, P.Eng., Pei-Chin Tsai, E.I.T. and Jeff Downing, P.Eng.
Current Inspection Date:	August 19, 23 and 24, 2011
Inspectors:	Delcan Corporation Stan Reimer, P.Eng., Grant Waldie, E.I.T.
Temperature:	17°C on August 19 th
Weather:	Sunny with cloudy periods
Equipment:	Standard Inspection Equipment, Crane with Man Bucket, Snooper
2009 Structural Condition Rating:	4
2009 Functional Rating:	2
2010 Structural Condition Rating:	4
2010 Functional Rating:	2
2011 Structural Condition Rating:	4 (north pier underwater damage governs)
2011 Functional Rating:	2 (clear width low by 30%)
Watercourse Flow Direction:	West to East (Truss 1 is on West Side)
Estimated Replacement Cost:	\$35 million (2011 dollars)
GPS Coordinates:	N 59°-24'-42.2", W 126°-5'-47.4"

Ten Year Plan - Cost Estimate (2011 dollars)									
Recommended Work	Priority Code	Units	Qty	Unit Cost	Within 1 Yr	Within 3 Yrs	Within 5 Yrs	Within 10 Yrs	Maint.
1. Realign north tower finger joint plates	B	lump	1	\$30,000		\$30,000			
2. Repair underwater north pier deterioration	B	lump	1	\$100,000		\$100,000			
3. Repair asphalt curb terminations at abutments	M	lump	4	\$200					\$800
4. Deck repairs	10	lump	1	\$200,000				\$200,000	
Construction/Maintenance Cost Subtotals:					\$0	\$130,000	\$0	\$200,000	\$800
Engineering Costs (20% of construction cost):					\$0	\$26,000	\$0	\$40,000	
20% Contingency:					\$0	\$26,000	\$0	\$40,000	\$160
Note: Costs do not include: mobilization or flagging Subtotals:					\$0	\$182,000	\$0	\$280,000	\$960
Total Cost Estimate:					\$462,960				

Lower Liard River Bridge Alaska Highway km 763.3

Significant Inspection Concerns	<ol style="list-style-type: none"> 1. An underwater inspection of the north pier revealed that the erosion or spalling on the north side of the pier stem concrete adjacent to the footing continues to develop from where it was repaired several years ago. There are 3 sections to this spall totaling 6.3 m in length. The worst (middle) section measures 406 mm deep x 200 mm high x 1800 mm long. Repairs are recommended within 3 years using the same repair methodology that was used for the previous repairs. 2. The north pier finger joint is failing and in poor condition with rotation of the fingers downward and separation of the finger joint plates from mounts. This finger joint makes loud clanking noises every time a truck drives over it. 3. The main cables are in good condition. There are some broken wires but no change since last inspections in 1998, 2001, 2005, 2007 and 2009. 4. The overall functional rating for this bridge is 2 (inadequate) due to clear width of only 7.23m versus the required TAC clear width of 10.4m.
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Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
Primary Components								
Watercourse	5	5	D	5	5	D	The Lower Liard River is a wide straight and stable waterway flowing east under all 3 spans of the bridge. Both piers are in the water. An underwater inspection was carried out on both piers this year.	3,4
Foundations	5	5	D	5	5	D	No visible defects.	
South Abutment	4	4	S A	5	5	D	The abutments for this suspension bridge anchor the main cables in large concrete anchor blocks. The south abutment concrete appears to be generally in good condition despite the large number of cracks. There is some bulging in the sidewalls, adjacent to the anchor cables. Some concern has been expressed that the concrete may be swelling due to reactive aggregates. It is our opinion that this is a construction defect. There has been some concern about the cracks near the anchor blocks and some crack monitoring has taken place with no movement reported. At some point in the past 8 soil tie-backs were installed in the ballast walls of each abutment.	73-75
North Abutment	4	4	S A	5	5	D	The south abutment concrete appears to be generally in good condition despite the large number of cracks. The north bearing seat has been repaired since the 2009 inspections.	86-89
South Pier (#1)	5	5	D	5	5	D	South pier concrete is in good general	76-79

Lower Liard River Bridge Alaska Highway km 763.3

Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
							<p>condition. Extensive crack repairs were carried out in 2008. The scope of work included numerous crack and spall repairs above and below water.</p> <p><u>Underwater Inspections</u></p> <p>No significant underwater damage found.</p> <ul style="list-style-type: none"> - Due to strong current and resulting high sediment content, no underwater photos were possible this year. - Most defects identified in earlier underwater inspection reports have been repaired - Spalls have been repaired with grout and steel or plastic grout patches. - In one case, the plastic grout patch is peeling off of the pier and in another the grout patch is missing but in both cases the grout remains intact - Seven minor unrepaired spalls up to 38 mm deep and one 900 mm long crack remain - water depth around the pier ranges from 1.9 m near the upstream nose to 4.8 m near the downstream nose, similar to previous years, with no scour holes - See underwater sketches and photos that follow 	
North Pier (#2)	5	5	D	4	5	B	<p>South pier concrete is in good general condition. Extensive crack repairs were carried out in 2008. The scope of work included numerous crack and spall repairs above and below water.</p> <p><u>Underwater Inspection Results</u></p> <p>Significant underwater erosion or spall found on the north side of pier 2 in the pier stem at the footing. There are 3 sections to this spall that measure 6.3 m in total length and are identified as spalls l), m) and n) on the attached underwater sketch. The worst (middle) section identified as m) measures 406 mm deep x 200 mm high x 1800 mm long. This damage is an extension of the nose erosion repaired several years ago (see underwater sketch that follows). This spall damage should be repaired within 3 years.</p> <ul style="list-style-type: none"> - Due to strong current and resulting high 	81-84

Lower Liard River Bridge Alaska Highway km 763.3

Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
							sediment content, no underwater photos were possible this year. - Most defects identified in earlier underwater inspection reports have been repaired - Spalls have been repaired with grout and steel or plastic grout patches. - In some cases, the plastic grout patches are peeling off of the pier but the grout remains intact. - In addition to the spall mentioned above, there are 10 other minor unrepaired underwater spalls up to 75 mm deep that should be repaired or monitored in subsequent underwater inspections. - water depth around the pier ranges from 2.0 m near the high chainage (north or shoreline) side of the pier to 5.3 m near the low chainage (south) side, similar to previous years, with no scour holes - See underwater sketches and photos that follow	
Towers	5	5	D	5	5	D	Towers are plumb and in good condition. All members in the spray zone received a new coating system in 2008.	76-85
Stringers	5	5	D	5	5	D	Stringers received a new paint system in 2008 and are generally in good condition with negligible section loss. See individual member ratings on following table.	21,23, 24,32, 33,42
Floor Beams	5	5	D	5	5	D	Floor beams received a new painting system in 2008 and are generally in good condition with negligible section loss. It was not possible to paint the interior sides of side-by-side floor beams located at both towers. There is some rust staining leaking from these locations. There is some paint peeling on floorbeam 28 at the north tower. See individual member ratings on following table.	21, 23-25, 27,30, 33,34, 36,39, 42
Trusses	5	5	D	5	5	D	The stiffening trusses are generally in good condition with a new painting system completed in 2008. The two end verticals at the north abutment have webs that are bowed up to 25 mm with no associated cracks. This deformation likely occurred during original construction. Expansion guide plates have	11,15, 18,29, 31,40, 91,92

Lower Liard River Bridge Alaska Highway km 763.3

Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
							been installed on the top flanges of both stiffening trusses across the north pier expansion joint to help control movement of the north span. See individual member ratings on following table.	
Main Cables	5	5	D	5	5	D	The main cables are in good condition. There are some broken wires but no change since last inspections in 1998, 2001, 2005, 2007 and 2009. All loose ends have been clamped off with a round clamp except 1. See individual member ratings on following table.	44-72
Hangers and Connectors	5	5	D	5	5	D	The hangers are in good condition with some normal slippage in the anchor pots and some nicks and scrapes. Several hangers have slipped down the main cables in the past but no further slipping since 2001 inspections. They are listed as follows: 10S West – 5 mm, 14N West – 5 mm, and 10N West – 25 mm. No action is necessary.	46,49, 52,68, 71
Connections of Primary Components	5	5	D	5	5	D	Hanger connections are in good connection with no visible defects.	15,18, 21-34, 40,49, 69-72
Deck	4	4	A	5	5	D	Measured deck delamination was 77 m ² (3% deck area) this year. Most delaminations are adjacent to recent patches. No recent patches are delaminated. There are several pot holes developing near the centre of the bridge (see Photo P09). The soffit is concealed with permanent formwork. There is some ponding occurring at midspan after rain. This is due to the flattening of the deck profile at midspan after the concrete deck was installed. There is some paint peeling off of the permanent soffit formwork adjacent to the north tower expansion joint. There is some localized rust staining in the soffit formwork below the sidewalks (see Photo P26).	10, 12-14, 22,26, 37
Secondary Components								
Embankments	5	5	D	5	5	D	The embankments are all well vegetated and in good condition. Some trees are quite large and close to but not directly below the bridge. The north shore embankment is protected by bedrock outcrops.	73,86

Lower Liard River Bridge Alaska Highway km 763.3

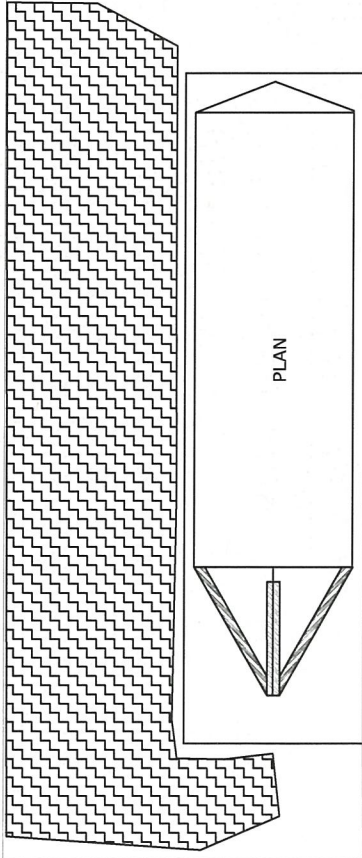
Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
Ballast Walls	5	5	D	5	5	D	Ballast walls are in generally in good condition with some scaling. There are 8 soil anchors in each ballast wall.	73,86
Wingwalls	5	5	D	5	5	D	Wingwalls have numerous shrinkage cracks but are nevertheless in good condition.	74
Bearing Seats	4	5	B	5	5	D	Pier cap bearing seats are clean and in good condition. Abutment bearing seats are dirty. The north abutment bearing seat has been repaired since 2009 inspections.	73,75, 77-79, 82-84, 88,89
Bearings	4	4	D	5	5	D	There are several sets of bearings for this bridge and they include: 4 abutment bearings, 2 at each abutment, 4 tower bearings, 2 on each tower and 8 deck-to-tower bearings, 4 at each tower. All bearings allow for horizontal movement but prevent vertical movement including lift. The abutment bearings connect the deck truss to the abutments and allow for longitudinal expansion with a double pin and arm assembly. These bearings are generally in good condition with light to medium rust evident. There are keeper bars mounted to the ballast walls on the north bearings that are meant to limit the movement of the bridge away from the north abutment. The tower bearings are fixed bearing that sit on the concrete pier caps. The deck to tower bearings are provided for each of 8 deck-to-tower connections and are comprised of a double pin and arm connection that allows for longitudinal expansion. These bearings are hidden within the deck truss and tower members so access for inspection was limited.	82-84, 88,89
Joints	4	4	B	4	4	B	The 4 intermediate deck joints (located away from towers and abutments) and abutment joints are in fair condition but leaking slightly onto the floor system and soffit below. The south tower finger joint is in good condition. The north tower finger joint is failing and in poor condition with rotation of one finger joint plate downward and separation of the plate from mounts. This finger joint plate makes loud clanking noises every time a truck drives over it. Expansion guide plates have been installed on the top flanges of both	6-9,11

Lower Liard River Bridge Alaska Highway km 763.3

Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
							stiffening trusses across the north pier expansion joint to help control movement of the north span.	
Bracing	5	5	D	5	5	D	Floor system cross bracing is generally in good condition with new paint.	21,27
Connections of secondary components	5	5	D	5	5	D	No defects noted.	21,27
Curbs	5	5	A	5	5	M	The steel curbs and sidewalks are generally in fair condition with new paint. Runoff is leaking into the floor system through gaps in the curbs. There is some localized rust staining and paint peeling below the sidewalk (see Photo P26). The asphalt taper at the NW curb termination at the north abutment has been abraded away by traffic (see Photo P19).	10,20, 22,26, 38
Approach Slabs	3	4	D	4	5	D	Deck repairs carried out on the approach slabs since the 2009 inspections have significantly improved approach slab condition. Several delaminations and wide transverse and longitudinal cracks remain.	6,9,12
Approaches	4	3	A	5	5	D	The approach roadways are in good condition. The width restrictions between the massive concrete anchor blocks at both abutments have been improved with tapered concrete barriers since the 2009 inspections to mitigate collision concerns.	1,2
Approach Barriers	5	5	D	5	5	D	Concrete approach barriers at both ends of the bridge.	1,2
Bridge Barriers	4	4	A	5	5	D	The railing for this bridge is comprised of a steel channel connected to the deck truss and was repainted in 2008. The railing has minor collision damage in several locations on both sides but no damage has occurred to trusses. There has been concern for several years that the steel channel railing is inadequate. However, it would not be possible for a vehicle to go off the bridge with the high and heavy stiffening truss behind the railing.	15-18
Coatings on Primary Components	6	6	D	6	6	D	The bridge was repainting in and below the splash zone in 2007/2008. In general, the new coating is in good condition. There are some localized paint defects adjacent to the north tower where some paint is peeling on	21, 23-25, 27,30, 33,34, 36,39,

Lower Liard River Bridge Alaska Highway km 763.3

Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
							floorbeam 28 and on the permanent soffit formwork below the tower joints and sidewalks.	42
Auxiliary Components								
Slope Protection	5	5	D	5	5	D	The north embankment below the bridge is protected by an outcrop of bedrock. The south embankment and approach embankments are well covered with vegetation.	73,86
Deck Drains and Drainage Systems	5	5	D	5	5	D	The deck drains are open and functioning well. Drain pipes were repainted in 2007/2008.	19,21
Signs	5	5	D	5	5	D	There are 4 delineators and a bridge ID sign at both approaches.	1,2
Utilities	5	5	D	5	5	D	There is a fibre optic conduit attached to the bottom west chord of the stiffening truss.	90
Coatings on Secondary Components	6	6	D	6	6	D	All coatings on secondary members have been replaced in 2007/2008. There is some rust staining leaking from connection surfaces that were not accessible for painting.	21,26,27



UP STREAM

DOWN STREAM

LC

Scale 1:250

Debris around Pier No. 2

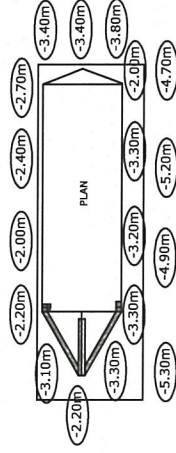
DRAWING LEGEND

- Depth Measurement
- High Chainage Side of Pier
- Low Chainage Side of Pier
- Steel Armour
- Rock Debris (bedrock & boulders)

UP STREAM

LOG
HC

DOWN STREAM



LC

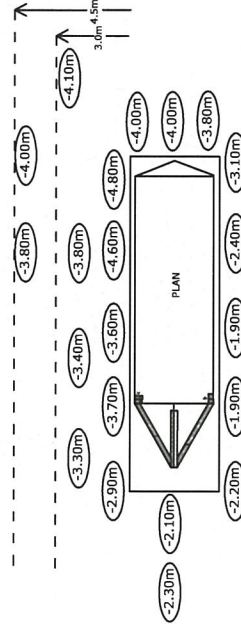
Scale 1:500

Depth Profile around Pier No. 2

UP STREAM

DOWN STREAM

HC



LC

Scale 1:500

Depth Profile around Pier No. 1

Client:

Drawn by:

Title:

Lower Liard Bridge Piers 1 & 2
Depth & Debris

Draftsman:

Date: Nov 19, 11

Scale:

As Noted

Delcan
CONSULTANTS LTD.



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
Page: 3/3

No: 1254-11

DRAWING NOTES

- Inspection date August 21 - 22, 2011.
- Pier No.1 elevations from top of deck are 9.2m to top of pier and 18.2m to water line (at time of inspection)
- a Plastic grout patch (lifting up at upstream end) - 305mm x upstream nose length
- b Plastic grout patch - 200mm x 1000mm
- c Spall with 230mm vertical x 356mm horizontal x 25mm penetration
- d Plastic grout patch - 610mm x 610mm
- e Spall with 100 vertical x 100mm horizontal x 25mm penetration
- f Surface crack 900mm vertical x 12mm penetration (150mm above water line)
- g Spall with 381mm vertical x 50mm horizontal x 25mm penetration
- h Plastic grout patch - 305mm x upstream nose width
- i Plastic grout patch - 305mm x 457mm
- j 2 Spalls with 75mm vertical x 75mm horizontal x 50mm penetration
- k Spall with 100mm vertical x 230mm horizontal x 25mm penetration
- l Plastic grout patch - 305mm x 1800mm
- m Spall with 300mm vertical x 152mm horizontal x 38mm penetration
- n Plastic grout patch - 381mm x 457mm
- o Spall with 150mm vertical x 305mm horizontal x 19mm penetration
- p Plastic grout patch - 230mm x HC downstream nose
- q Missing plastic grout patch (grout intact) - 230mm x LC downstream nose

DRAWING LEGEND

	Spall Damage Identification Number		Steel Armour
	High Chain Side of Pier		Plastic Grout Patch
	High Chain Side of Pier		Vertical Crack

Lower Liard Bridge Concrete Pier
No. 1 Inspection Drawing

Title:

Rev 2019
Sched: B.C. VON 3AO
604.885.3552 Tel.
604.885.3552 Fax
info@pelagic.ca



Drawn by:



Client:

Scale: 1:300

Draftsman: GH

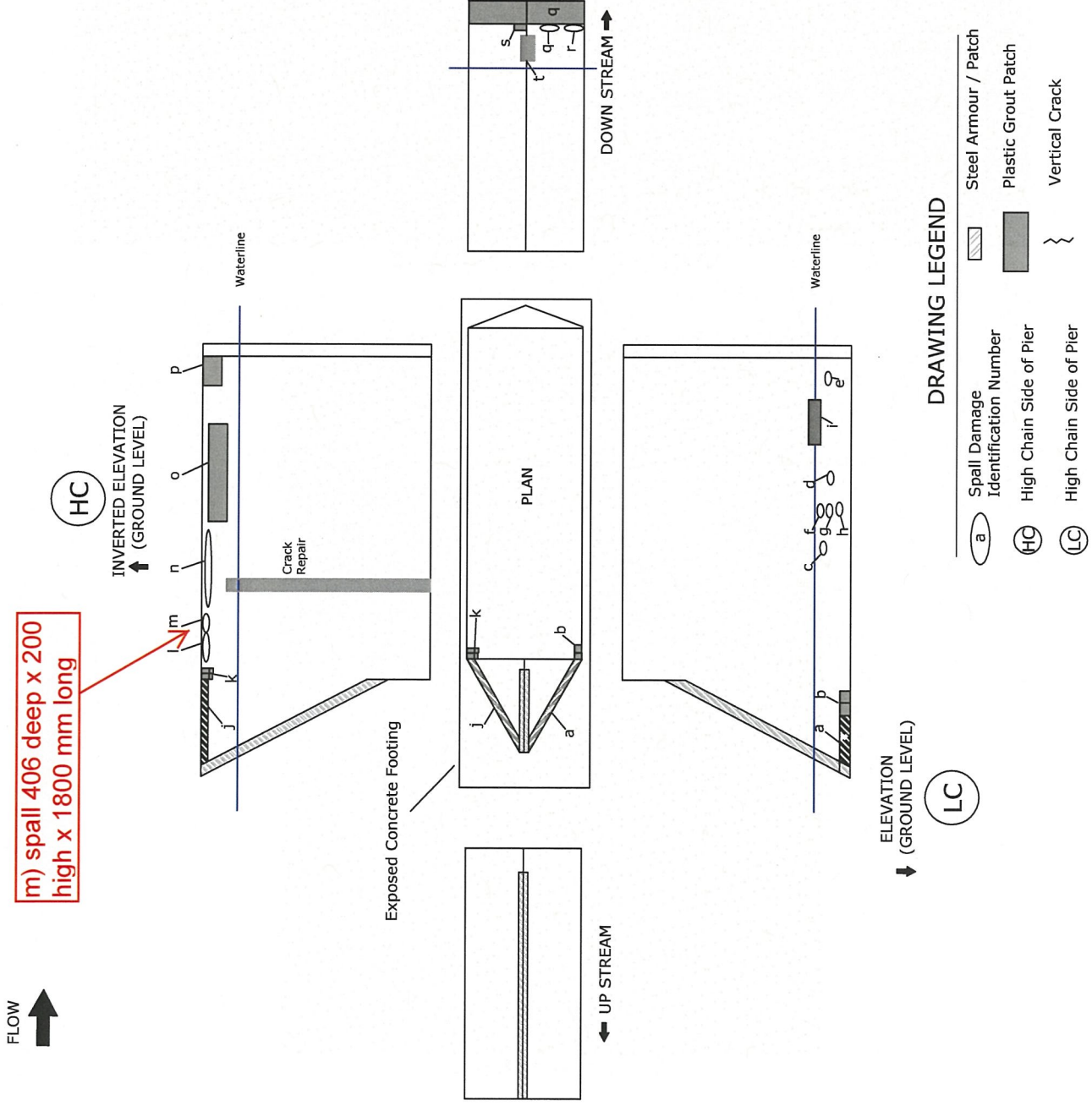
Date: Nov. 15, '11

No: 1254-11

Page: 1/3

DRAWING NOTES

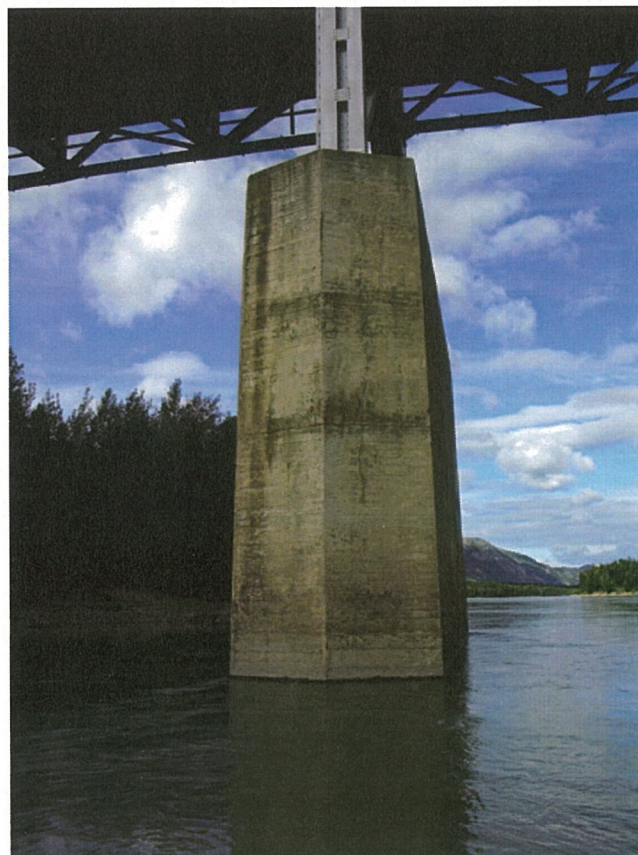
- Inspection date August 21 - 22, 2011.
- Pier No.1 elevations from top of deck are 9.15m to top of pier and 18.1m to water line (at time of inspection)
- Do to extreme currents at time of inspection, some areas were not able to be inspected in detail such as the upstream nose and areas along the low chainage face.
- Steel grout patch repair from upstream nose
- Plastic grout patches - dimensions not measured
- Small spall - dimensions and penetration not measured
- Small spall - dimensions and penetration not measured
- Small spall - dimensions and penetration not measured
- Spall with 230mm vertical x 457mm horizontal x 50mm penetration
- Spall with 255mm vertical x 305mm horizontal x 75mm penetration
- Spall with 255mm vertical x 510mm horizontal x 50mm penetration
- Grout repair with failing plastic cover (grout intact)
- Steel grout repair - width of High Chainage nose
- Multiple grout patches 460mm x 460mm
- Spall with 75mm vertical x 1500mm horizontal x 75mm penetration
- **Spall with 200mm vertical x 1800mm horizontal x 406mm penetration**
- Spall with 127mm vertical x 3000mm horizontal x 75mm penetration
- Plastic grout patch 900mm vertical x 4600mm horizontal
- Plastic grout patch 900mm vertical x 1400mm horizontal
- Spall with 600mm vertical across Low Chainage nose x 30mm penetration
- Spall with 100mm vertical x 150mm horizontal x 62mm penetration
- Missing plastic grout patch 300mm vertical x 610mm horizontal (grout intact)
- Plastic grout patch 305mm vertical x 305mm horizontal



Lower Liard River Bridge - Alaska Highway km 763.3
Underwater Inspection Photos



UW01 - Pier 2 DS nose looking US



UW02 - Pier 1 DS nose 2

Lower Liard River Bridge - Alaska Highway km 763.3
Underwater Inspection Photos



UW03 - Pier 1 HC face 2

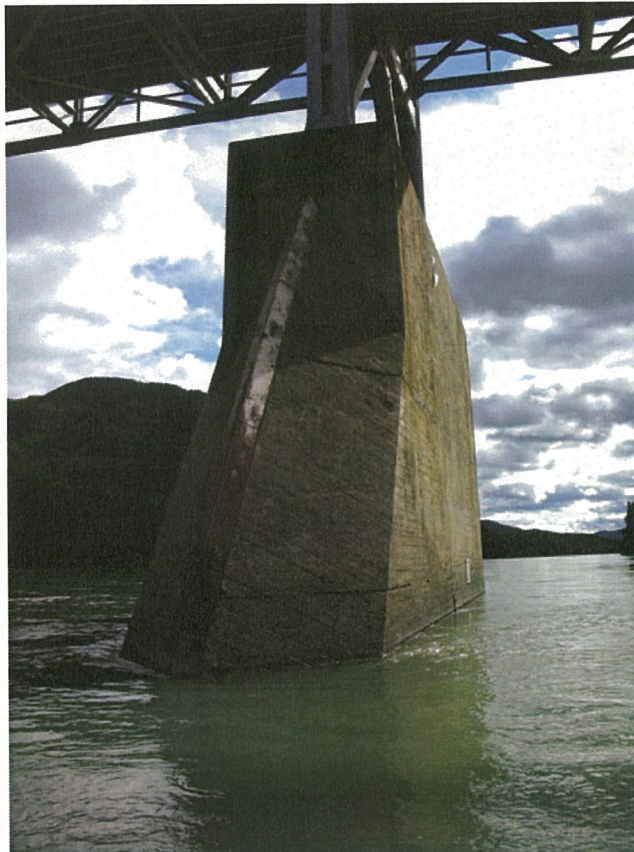


UW04 - Pier 1 Spall repair HC face

Lower Liard River Bridge - Alaska Highway km 763.3
Underwater Inspection Photos



UW05 - Pier 1 US nose HC side

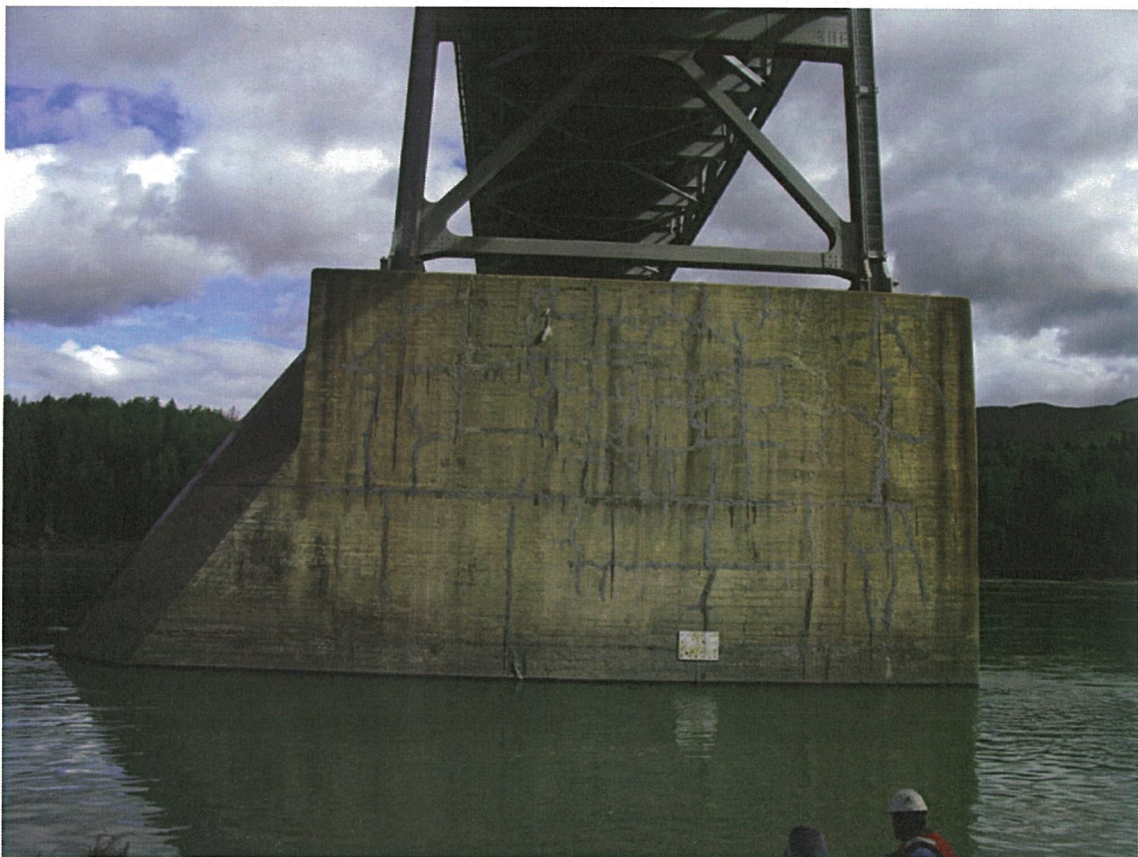


UW06 - Pier 1 US nose LC side

Lower Liard River Bridge - Alaska Highway km 763.3
Underwater Inspection Photos



UW07 - Pier 1 LC face spall at cold joint 5m long



UW08 - Pier 1 LC face

Lower Liard River Bridge - Alaska Highway km 763.3
Underwater Inspection Photos

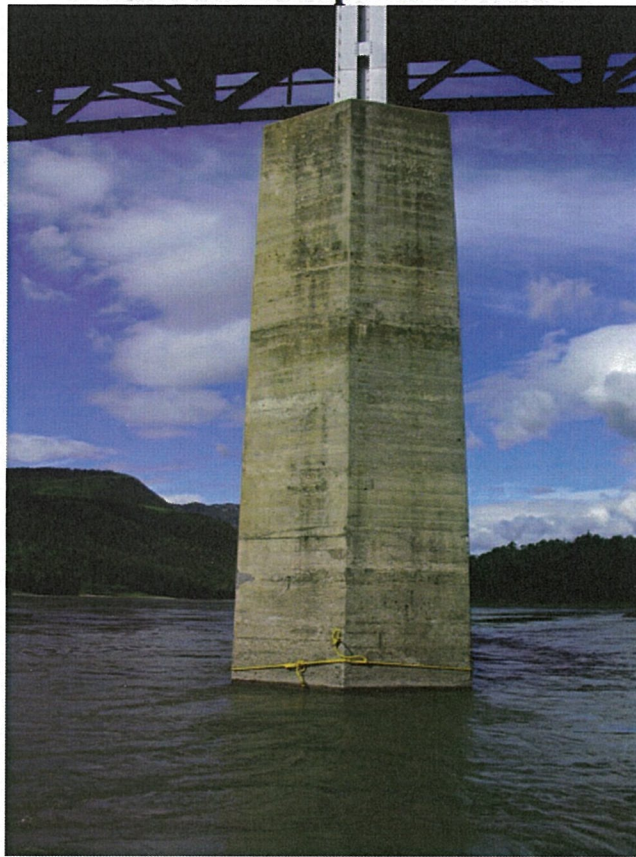


UW09 - Pier 1 Spall repair LC face 1.5' above water 2



UW10 - Pier 1 Typical crack repair with grout - Pier 1 LC face

Lower Liard River Bridge - Alaska Highway km 763.3
Underwater Inspection Photos

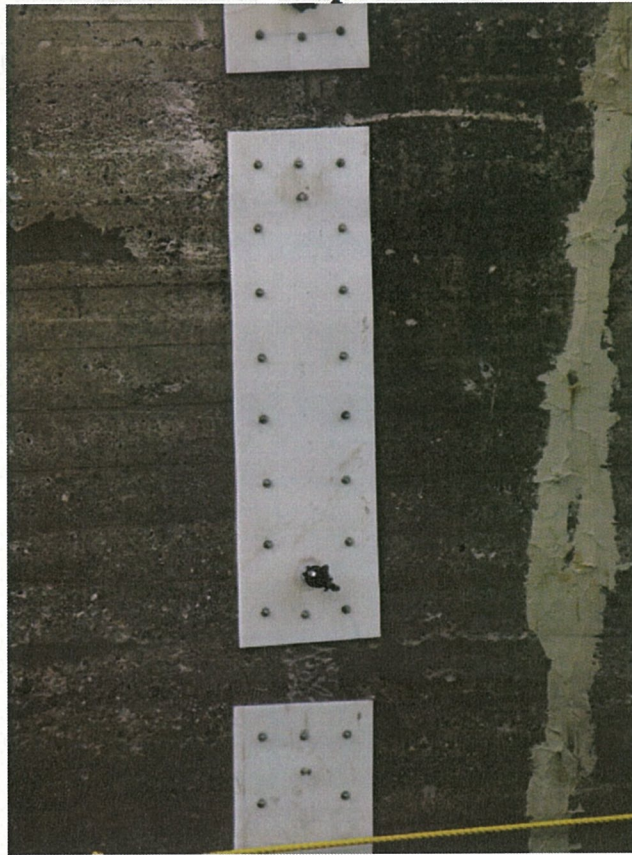


UW11 - Pier 2 DS nose 2



UW12 - Pier 2 HC face 2

Lower Liard River Bridge - Alaska Highway km 763.3
Underwater Inspection Photos

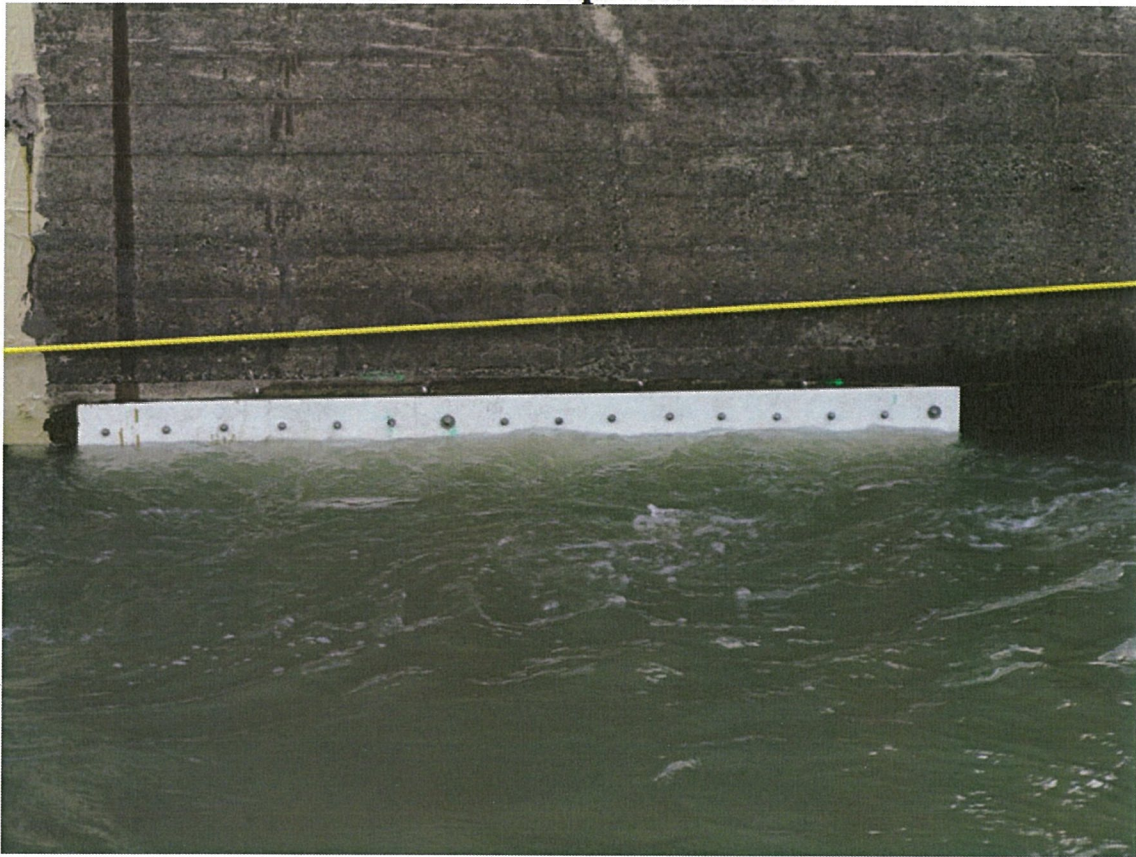


UW13 - Pier 2 HC face close up of vertical repairs 16' from US

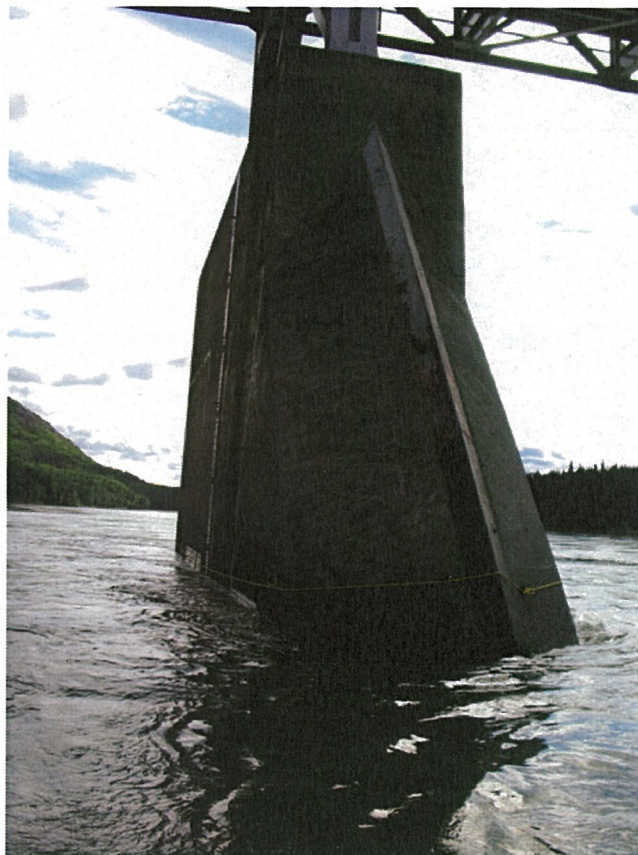


UW14 - Pier 2 HC face close up horz repair 33' from US

Lower Liard River Bridge - Alaska Highway km 763.3
Underwater Inspection Photos



UW15 - Pier 2 HC face repair horz. 16' from US



UW16 - Pier 2 US nose HC face

Lower Liard River Bridge - Alaska Highway km 763.3
Underwater Inspection Photos



UW17 - Pier 2 US nose LC face 2

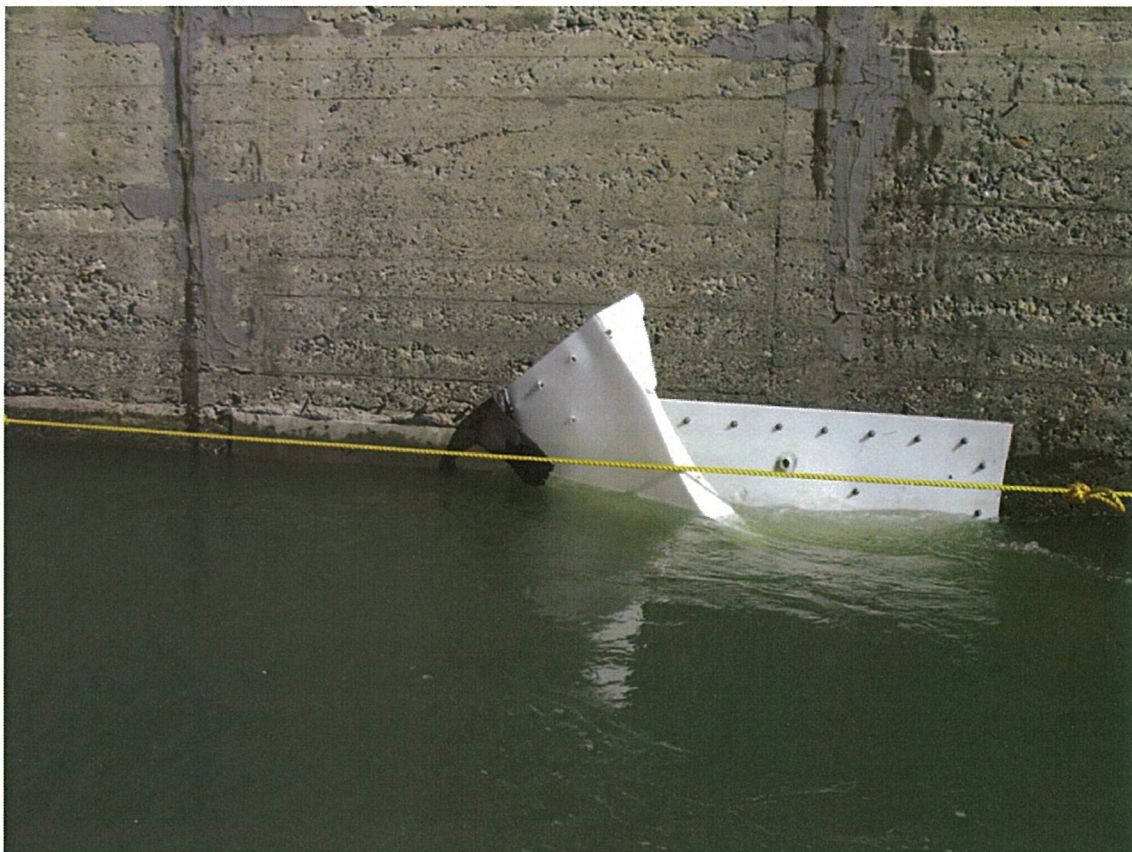


UW18 - Pier 2 US nose LC face repair on nose

Lower Liard River Bridge - Alaska Highway km 763.3
Underwater Inspection Photos



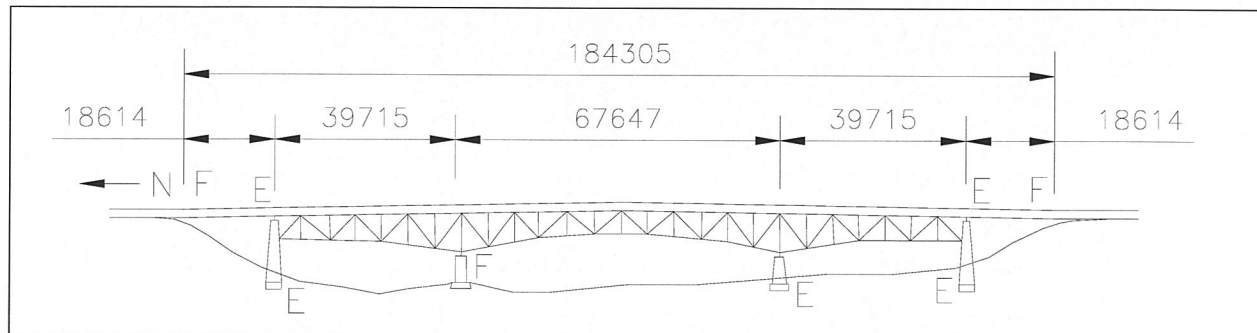
UW19 - Pier 2 LC face genera 2



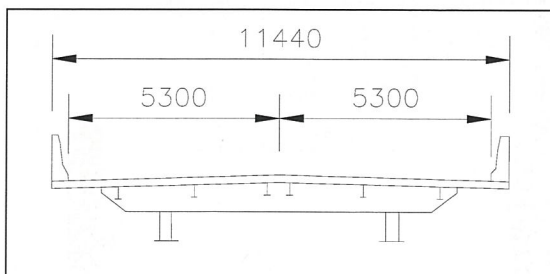
UW20 - Pier 2 LC face 16' from DS damage repair

Hyland River Bridge

Alaska Highway km 937.3



ELEVATION

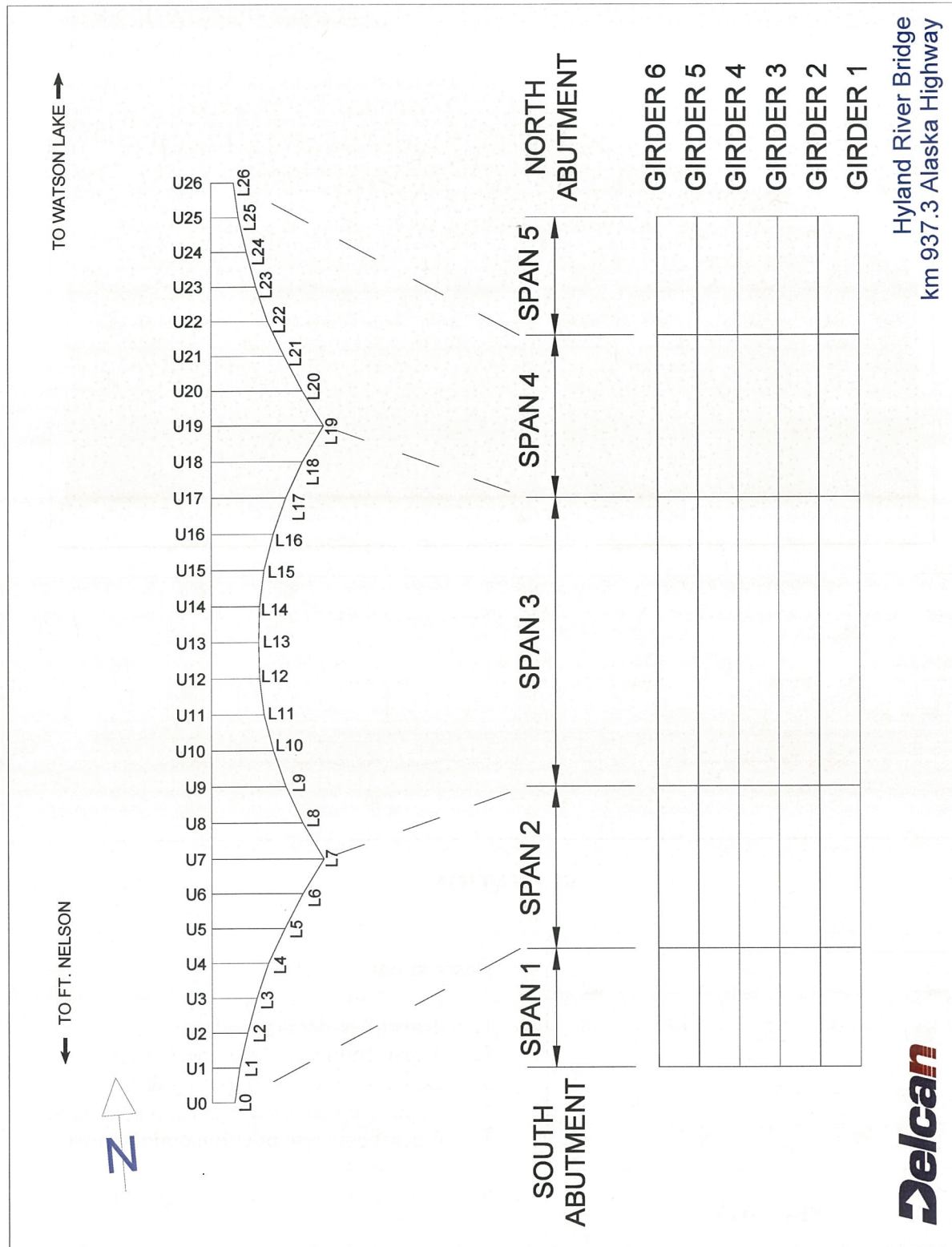


SECTION

Description:

1. 2 steel I-girder approaches
2. 3 span continuous steel deck truss
3. Concrete filled steel grating deck
4. Reinforced concrete piers and abutments
5. Precast concrete pile foundation under abutments
6. Timber pile foundation under piers

Hyland River Bridge Alaska Highway km 937.3



Hyland River Bridge Alaska Highway km 937.3

Year Constructed:	1943 (Major Rehabilitation in 2004)
Original Design:	PWGSC
Last Load Rating:	2004 – Meets CHBDC Live Load Requirements
Drawings Available:	Yes
Last Underwater Inspection:	2009 (no significant underwater defects)
Previous C Inspection Report for 2009:	Delcan – Stan Reimer, P.Eng.
Previous G Inspection Report for 2010:	PWGSC – Alex Taheri, P.Eng., Pei-Chin Tsai, E.I.T. and Jeff Downing, P.Eng.
Current Inspection Date:	August 21 and 24, 2011
Inspectors:	Delcan Corporation Stan Reimer, P.Eng. Grant Waldie, E.I.T.
Temperature:	17°C on August 21 st
Weather:	Sunny with occasional rain
Equipment:	Standard Inspection Equipment, Snooper
2009 Structural Condition Rating:	5
2009 Functional Rating:	6
2010 Structural Condition Rating:	5
2010 Functional Rating:	6
2011 Structural Condition Rating:	5
2011 Functional Rating:	6
Watercourse Flow Direction:	East to West (Girder 1 is on East Side)
Estimated Replacement Cost:	\$19 million (2011 dollars)
GPS Coordinates:	N 59-57'-31.8", 128-8'-40.2"

Ten Year Plan - Cost Estimate (2011 dollars)								
Recommended Work	Priority Code	Units	Qty	Unit Cost	Within 1 Yr	Within 3 Yrs	Within 5 to 10 Yrs	Maint./ Studies
1. Repaint truss members near piers 1 and 4	B	lump	1	\$1,300,000		\$1,300,000		
2. Repair bearing seat spalls on piers 1 and 4	B	each	2	\$10,000		\$20,000		
3. Repair joint seals at both abutments	M	each	2	\$2,000				\$4,000
4. Install both missing river name signs	M	each	2	\$770				\$1,540
5. Patch pot hole in south approach west lane	M	each	1	\$300				\$300
Long range plan - in 10 years								
- River training works - \$1,000,000								
Construction/Maintenance Cost Subtotals:					\$0	\$1,320,000	\$0	\$5,840
Engineering Costs (20% of construction cost):					\$0	\$264,000	\$0	
20% Contingency:					\$0	\$264,000	\$0	\$1,168
Note: Costs do not include: mobilization or flagging Subtotals:					\$0	\$1,848,000	\$0	\$7,008
Total Cost Estimate:					\$1,855,008			

Hyland River Bridge

Alaska Highway km 937.3

Significant Inspection Concerns	<ol style="list-style-type: none"> 1. The Hyland River is a fast moving meandering river that is scouring the SE embankment immediately upstream of the bridge. Trees on the shoreline are being undermined and falling into the river. Until 2005, Pier 3 was the only pier in the water. Due to the scour of the SE embankment, pier 2 is now entirely in the water as well. At some point in the future, scouring of the south embankment and south approach will likely become an issue. A hydraulic study is reportedly under way to address this scour. 2. Some truss members at pier 1 and pier 4 are showing light to medium corrosion. These members were previously exposed to leakage below the old expansion joints. The new deck joints should protect these members from further moisture. Touch up painting at these locations is recommended.
--	---

Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
Primary Components								
Watercourse	5	5	D	5	5	D	The Hyland River is a fast moving meandering river that flows west under spans 2, 3 and 4 on a slight skew. The river is scouring the SE embankment immediately upstream of the bridge where trees on the shoreline are being undermined and falling into the river (see Photos P04 and P74). Until 2005, Pier 3 was the only pier in the water. Due to the scour of the SE embankment, pier 2 is now entirely in the water as well. At some point in the future, scouring of the south embankment and south approach will likely become an issue. A hydraulic study reportedly under way to address scour.	3-6
Foundations	5	5	D	5	5	D	No visible defects.	
South Abutment	5	5	D	5	5	D	The south abutment was widened in 2004 to accommodate a wider deck and is in good condition. There is one hairline vertical crack in the south abutment stem wall.	46-50
North Abutment	5	5	D	5	5	D	The north abutment was widened in 2004 to accommodate a wider deck and is in good condition.	71-73
Pier 1	5	5	D	5	5	B	Pier concrete is generally in good condition. Pier 1 cap was widened in 2004 to accommodate the wider new deck. Pier 1 has a spall on the lip of the bearing seat near the SW bearing of span 2.	51-56
Pier 2	5	5	D	5	5	D	Pier concrete is generally in good condition. Pier 2 cap was chipped back and rebuilt in	57-60

Hyland River Bridge Alaska Highway km 937.3

Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
							2004. There are 2 wide vertical cracks in pier 2 stem on both north and south faces.	
Pier 3	5	5	D	5	5	D	Pier concrete is generally in good condition. Pier 3 cap was chipped back and rebuilt in 2004. At that time, the above water cracks of pier 3 were sealed and transverse post tensioning bars were installed through the pier. A riprap apron was installed around pier 3 pile cap in 2003 due to a scour hole that had developed.	61-64
Pier 4	5	5	D	5	5	B	Pier concrete is generally in good condition. Pier 4 cap was widened in 2004 to accommodate the wider new deck.. Pier 4 has a spall near the lip of the bearing seat at the NW bearing of span 4.	65-70
Beams/Girders	6	6	D	6	6	D	The beams of both approach spans were replaced with new galvanized steel I girders in 2004 and they are in excellent condition.	18, 42, 47
Stringers	6	6	D	6	6	D	All stringers were replaced with galvanized steel stringers in 2004 and they are in excellent condition.	18, 21, 42
Floor Beams	5	5	D	5	5	D	The floor beams are generally in good condition. Floor beams at the expansion joints of piers 1 and 4 are the only floor beams that are showing some light corrosion.	18, 21, 42
Trusses	5	5	D	5	5	D	The 3 span deck trusses are in good condition with some light corrosion showing through at the bottom chords, on bracing and end floorbeams (below deck joints at pier 1 and 4) but negligible section loss. Recent truss strengthening included strengthening some lower chord members and addition of some new braces to stabilize some diagonals.	6, 22-23, 25-30, 32-36
Connections of Primary Components	5	5	D	5	5	D	No visible defects.	
Deck	6	6	D	6	6	D	The new deck installed in 2004 is generally in excellent condition. The crack in the 12 mm thick concrete cover between the grillage panels in span 1 has been filled.	7-15, 17, 18, 37, 42, 43
Secondary Components								
Embankments	5	5	D	5	5	D	Both headslopes are covered with small rip-rap to protect from erosion. Large rip-rap is in place at the NE corner of the bridge along the	46, 47, 71

Hyland River Bridge Alaska Highway km 937.3

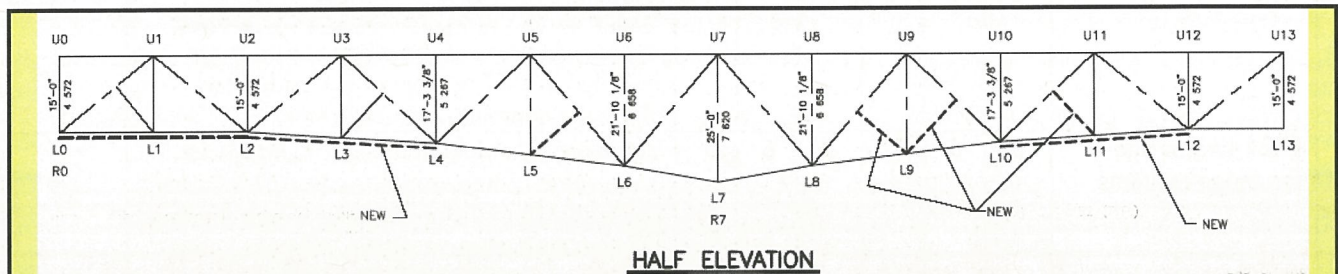
Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
							river shoreline. Embankment drains are installed at all 4 corners of the bridge and along the approach embankments.	
Ballast Walls	5	5	D	5	5	D	Ballast walls are in good condition.	48, 49, 72
Wingwalls	5	5	D	5	5	D	Wingwalls are in good condition.	
Bearing Seats	4	4	B	4	4	B	Most bearing seats are clean and in excellent condition. The deck truss bearing seats on piers 1 and 4 are covered in debris and spalled. The SW truss bearing on pier 1 and the NW truss bearing on pier 4 are both spalled near the bearings at the edge of the bearing seat.	48, 50, 52, 53, 55, 56, 58-61, 64, 66, 68-70, 73
Bearings	5	5	D	5	5	D	All approach span bearings have been replaced with reinforced neoprene pads bearings and these are in excellent condition. The truss expansion rocker bearings and fixed bearings are in good condition, functioning properly with some light surface corrosion.	48, 50, 52, 53, 55, 56, 58-61, 64, 66, 68-70, 73
Joints	5	5	D	5	5	M	All expansion joints were replaced in 2004 and are in excellent condition; however the seals at both abutments are leaking. The pier 1 expansion joint is leaking at the west end.	9-15
Diaphragms	6	6	D	6	6	D	The galvanized steel diaphragms between the approach span girders are in excellent condition.	18, 42
Bracing	5	5	D	5	5	D	Truss bracing is in good condition with light corrosion showing through on some members.	23, 24, 31, 33
Curbs	-	-	-	-	-	-	No curbs on new deck.	
Connections of secondary components							No visible defects.	
Approach Slabs	6	6	D	6	6	D	Approach slabs were added at both abutment and are in excellent condition.	15, 17
Approaches	5	5	D	5	5	M	The south approach is at the bottom of a long hill. The approach roadways are in good condition with good visibility. There is a pot hole in the west lane of the south approach.	1, 2, 17
Approach Barriers	6	6	D	6	6	D	New concrete approach barriers are in excellent condition with some light scaling on some surfaces. There are signs of some erosion between some approach barriers on the SE approach.	1, 2

Hyland River Bridge Alaska Highway km 937.3

Element	2009			2011			Observations	Photo References
	MCR	PCR	Priority	MCR	PCR	Priority		
Bridge Barriers	6	6	D	6	6	D	The new concrete bridge barriers are in excellent condition with light scaling on approximately 12 barriers. The transition parapet at the NE corner was recently repaired. A few seals between the barriers have opened up.	16
Coatings on Primary Components	5	5	C	4	4	B	Some truss members at pier 1 and pier 3 are showing light to medium corrosion. These members were previously exposed to leakage below the old expansion joints. The new deck joints should protect these members from further moisture. Touch up painting at these locations should be considered.	22, 25, 26, 30, 40
Auxiliary Components								
Slope Protection	5	5	D	5	5	D	Both headslopes are covered with small rip-rap to protect from erosion. Large rip-rap was recently installed at the NE corner of the bridge along the river shoreline and around the base of pier 3. Embankment drains are installed at all 4 corners of the bridge and along the approach embankments.	19, 46, 47
Deck Drains and Drainage Systems	6	6	D	6	6	D	There are no drains in the new bridge deck. The bridge is on a crown. Runoff flows from the bridge onto the approaches where it drains through embankment drains. There is some erosion on the SE approach embankment from drainage between some concrete barriers that indicate that more embankment drains may be necessary. The old drain pipes from previous deck drains remain attached to the truss below deck.	
Signs	4	4	M	4	4	M	All 7 delineators are in place at the ends of approach barriers. Both river name signs are missing.	1, 2
Coatings on Secondary Components	4	4	B	4	4	B	The truss bearings and bracing have some light to medium surface corrosion.	23, 34, 38, 40

Hyland River Bridge Alaska Highway km 937.3

Individual Girder Ratings						
Element	Previous MCR	Previous PCR	Current MCR	Current PCR	Observations	Photo References
Span 1 Girders						
Girder 1	6	6	6	6	Galvanized steel girders installed in 2004 – in excellent condition – typical	18,47
Girder 2	6	6	6	6		18,47
Girder 3	6	6	6	6		18,47
Girder 4	6	6	6	6		18,47
Girder 5	6	6	6	6		18,47
Span 5 Girders						
Girder 1	6	6	6	6	Galvanized steel girders installed in 2004 – in excellent condition – typical	42
Girder 2	6	6	6	6		42,44
Girder 3	6	6	6	6		42,44
Girder 4	6	6	6	6		42
Girder 5	6	6	6	6		42



Element	Previous MCR	Previous PCR	Current MCR	Current PCR	Observations	Photo References
Spans 2 to 4 – West Truss						
Top Chord - West Truss						
U0-U1W	5	5	5	5	Surface corrosion due to previous leaking expansion joint	23
U1-U2W	5	5	5	5		21
U2-U3W	5	5	5	5		21
U3-U4W	5	5	5	5		21
U4-U5W	5	5	5	5		
U5-U6W	5	5	5	5		
U6-U7W	5	5	5	5		
U7-U8W	5	5	5	5		29
U8-U9W	5	5	5	5		29

**Hyland River Bridge
Alaska Highway km 937.3**



P03 - Upstream Watercourse to the East



P04 - NE Shoreline - Active Scour - Shoreline has Moved South by ~10 m Since 2009 Inspections - South Approach Embankment will soon be Threatened

**Hyland River Bridge
Alaska Highway km 937.3**



P05 - Downstream Watercourse to the West



P06 - East Side - Looking South

**Hyland River Bridge
Alaska Highway km 937.3**



P07 - Overall Deck - Looking North

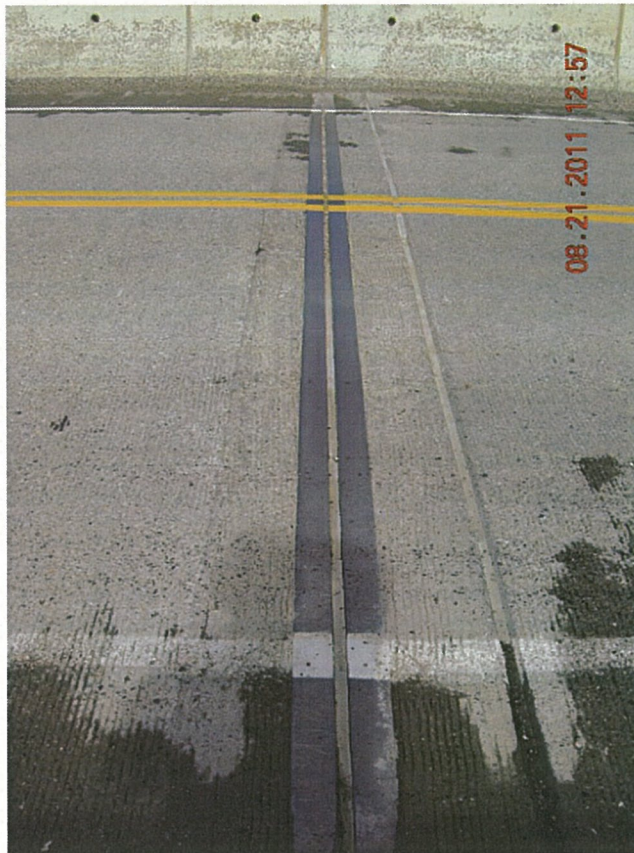


P08 - Span 1 - Longitudinal Crack in Deck at Centreline between Deck Panels - Present Since 2004 Deck Replacement

**Hyland River Bridge
Alaska Highway km 937.3**

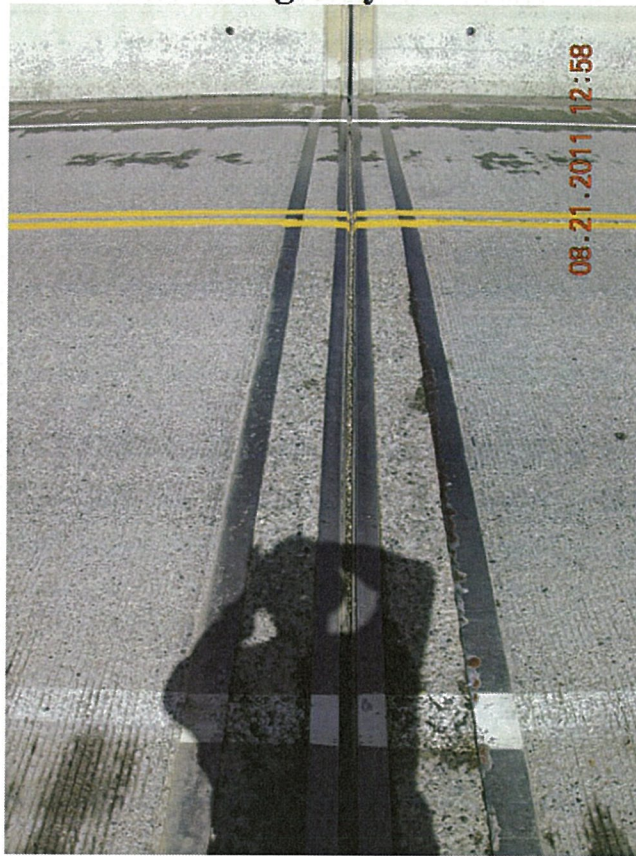


P09 - South Approach Slab

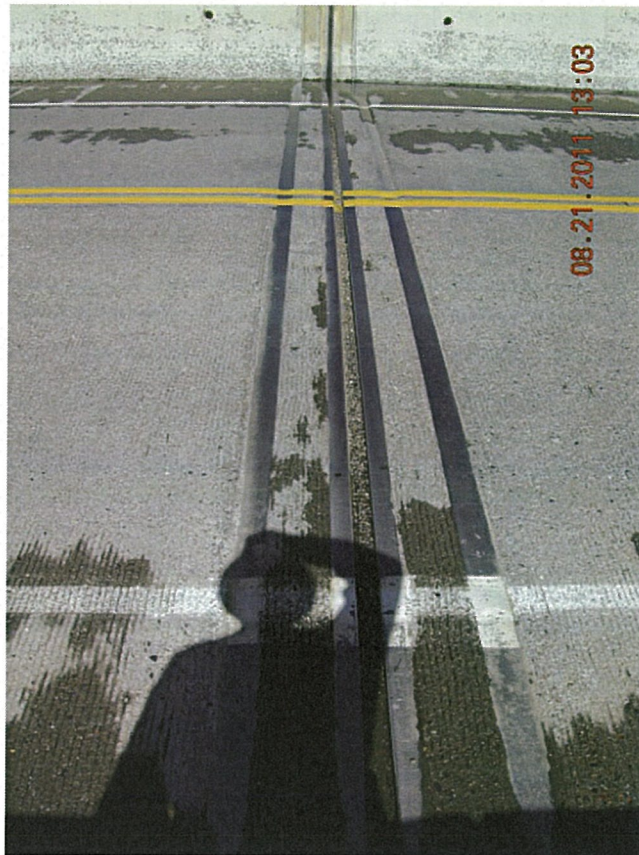


P10 - South Abutment Deck Joint

**Hyland River Bridge
Alaska Highway km 937.3**



P11 - Pier 1 Expansion Joint



P12 - Pier 4 - Expansion Joint - Looking East

**Hyland River Bridge
Alaska Highway km 937.3**



P13 - North Abutment Deck Joint - Joint Seal has Failed



P14 - North Abutment Deck Joint - Joint Seal has Failed

**Hyland River Bridge
Alaska Highway km 937.3**



P15 - North Approach Slab



P16 - Concrete Bridge Barriers - Light Scaling in Spray Zone

**Hyland River Bridge
Alaska Highway km 937.3**



P17 - South Approach - 1 Pot Hole in West Lane near Bridge



P18 - Span 1 - 6 Galvanized Steel Girders and Orthotropic Steel Deck Soffit

**Hyland River Bridge
Alaska Highway km 937.3**



P19 - Span 2 - East Truss - Looking South



P20 - Inspected by Snooper

**Hyland River Bridge
Alaska Highway km 937.3**



P21 - Span 2 - Floor System - Floorbeams 1, 2 and 3 - Galvanized Stringers



P22 - Span 2 - L0-U0 East - Vertical - Paint System Falling Below Deck Joint - Light Surface Corrosion - Negligible Section Loss

**Hyland River Bridge
Alaska Highway km 937.3**

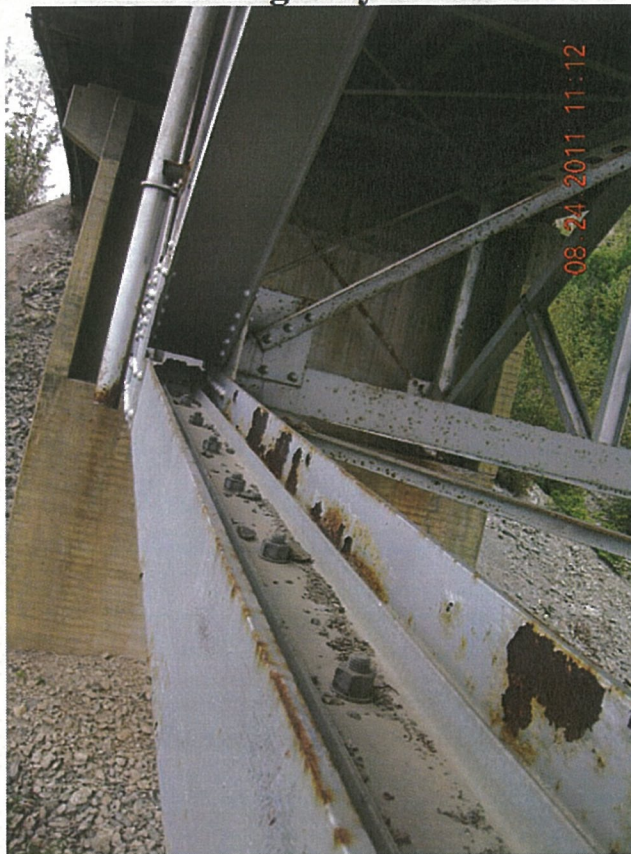


P23 - Span 2 - South End of Deck Truss



P24 - Span 2 - Bay 2 - Lower Sway Bracing

**Hyland River Bridge
Alaska Highway km 937.3**



P25 - Span 2 - Bay 3 - East Bottom Chord - Strengthened



P26 - Span 2 - Bay 7 - Bottom Chord

**Hyland River Bridge
Alaska Highway km 937.3**



P27 - Span 2 - East Truss - Bay 4 Diagonal and Brace - Light Surface Corrosion Showing Through Paint - Typical

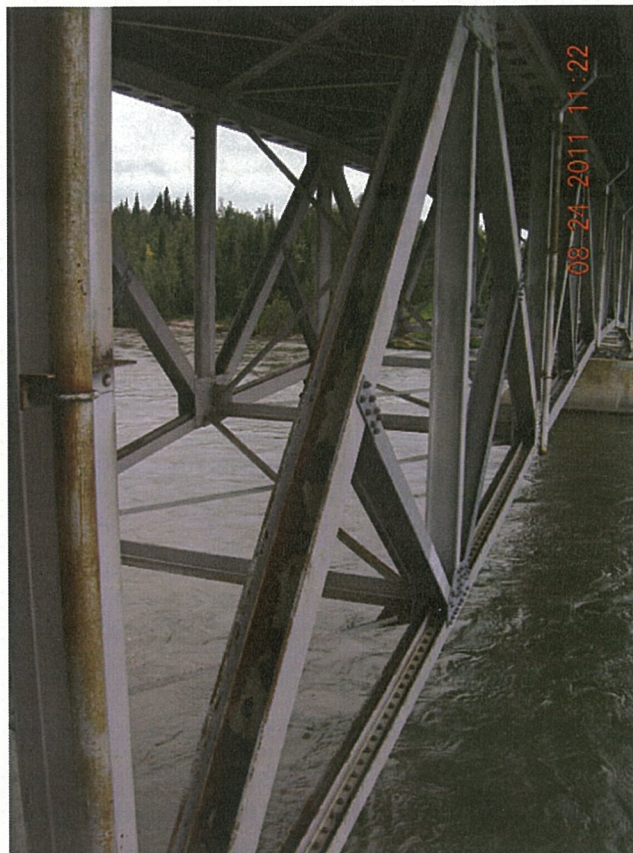


P28 - Span 3 - East Side - Looking North

**Hyland River Bridge
Alaska Highway km 937.3**



P29 - Span 3 - East Truss - Looking North



P30 - Span 3 - Bay 2 - East Truss Diagonal with Newer Galvanized Brace

**Hyland River Bridge
Alaska Highway km 937.3**



P31 - Span 3 - Orthotropic Deck Soffit - Looking North from Midspan



P32 - Span 3 - Bays 7 and 8 - West Bottom Chord

**Hyland River Bridge
Alaska Highway km 937.3**



P33 - Span 3 - Deck Truss - Looking North



P34 - Span 3 - Deck Truss - Looking North - Bottom Chords and Sway Bracing

**Hyland River Bridge
Alaska Highway km 937.3**



P35 - Span 3 - Top East Chord - Bay 7



P36 - Span 4 - Orthotropic Deck Soffit - Looking South

**Hyland River Bridge
Alaska Highway km 937.3**



P37 - Span 4 - Orthotropic Steel Deck Panel Soffit

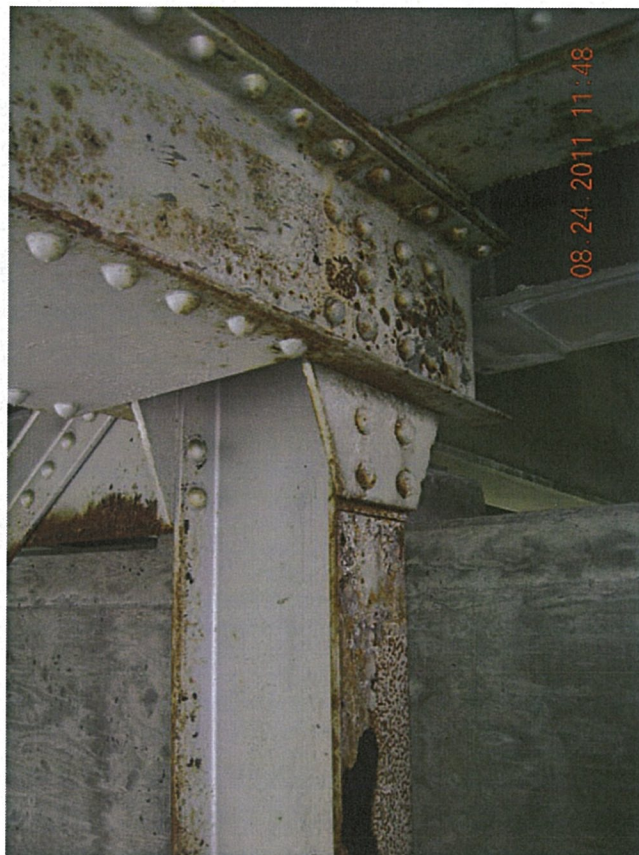


P38 - Span 4 - End Frame at Pier 4

**Hyland River Bridge
Alaska Highway km 937.3**

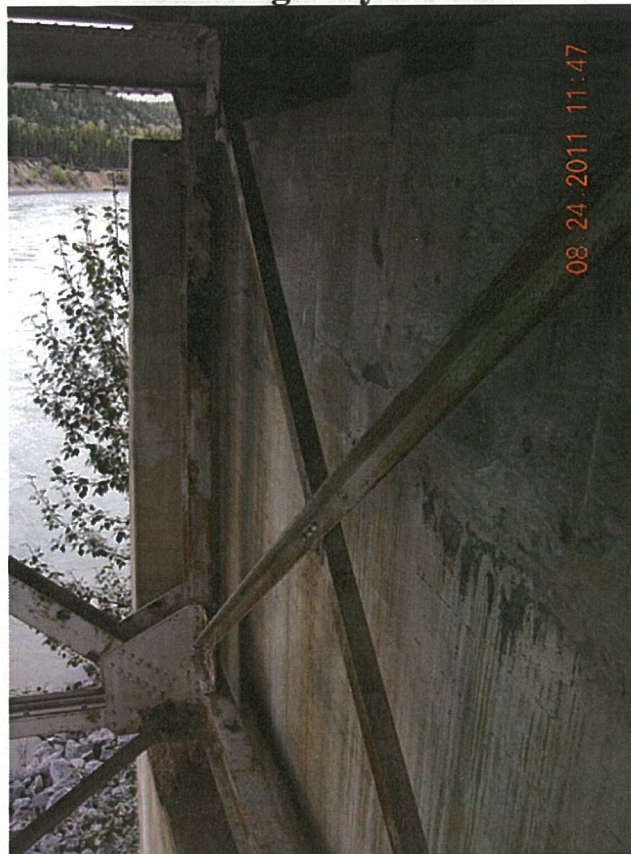


P39 - Span 4 - End Floorbeam below Deck Joint - Light Surface Corrosion on Bottom Flange



P40 - Span 4 - End Floorbeam and Top East Chord below Deck Joint - Light Surface Corrosion

**Hyland River Bridge
Alaska Highway km 937.3**



P41 - Span 4 - End Frame at Pier 4 - Light Surface Corrosion below Deck Joint - Negligible Section Loss



P42 - Span 5 - 6 Galvanized Steel Girders and Orthotropic Steel Deck Soffit

**Hyland River Bridge
Alaska Highway km 937.3**



P43 - Galvanized Steel Orthotropic Steel Deck Panel Soffit



P44 - Span 5 - Girders 2 and 3

**Hyland River Bridge
Alaska Highway km 937.3**



P45 - South Abutment and Embankment - Active Scour on SE Embankment



P46 - South Abutment and Embankment

**Hyland River Bridge
Alaska Highway km 937.3**



P47 - South Abutment and Embankment



P48 - South Abutment and Bearing Seat - Water Seeping through Deck Joint

**Hyland River Bridge
Alaska Highway km 937.3**



P49 - South Abutment Wall - Hairline Vertical Crack near West End



P50 - South Abutment - Neoprene Bearing 5 - Moisture on Bearing Seat

**Hyland River Bridge
Alaska Highway km 937.3**



P51 - Pier 1 - South Face - Pier Cap Replaced in 2004

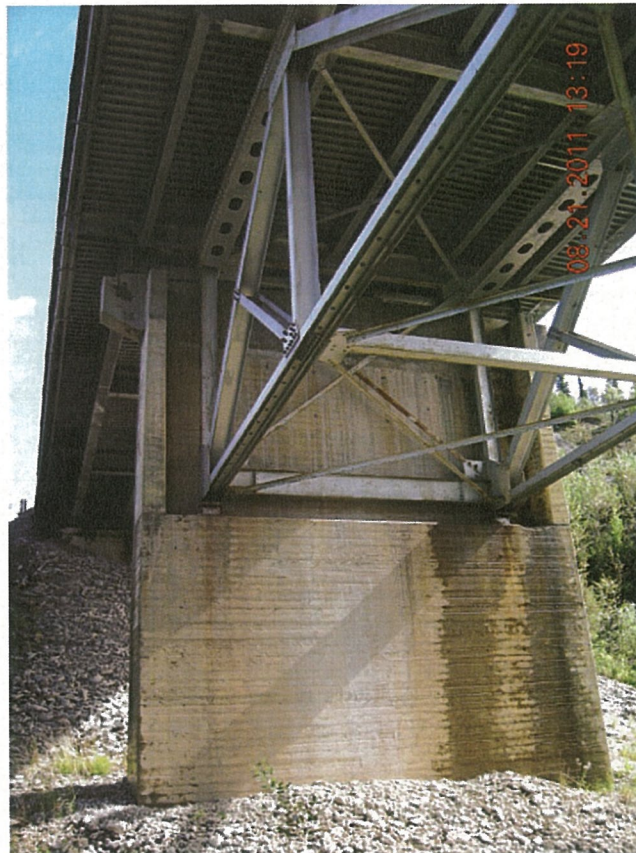


P52 - Pier 1 Bearing Seat - Span 1 Neoprene Bearings

**Hyland River Bridge
Alaska Highway km 937.3**



P53 - Pier 1 - Span 1 - Neoprene Bearing 2



P54 - Pier 1 - North Face

**Hyland River Bridge
Alaska Highway km 937.3**



P55 - Pier 1 - Span 2 - East Rocker Bearing



P56 - Pier 1 - Span 2 - West Rocker Bearing - Bearing Seat Dirty - Spalling in Seat Adjacent to Bearing

**Hyland River Bridge
Alaska Highway km 937.3**



P57 - Pier 2 - East Nosing - Now Completely Surrounded by Water - River has Moved Significantly - In 2007 Pier 2 was Not in Water



P58 - Pier 2 - North Face

**Hyland River Bridge
Alaska Highway km 937.3**



P59 - Pier 2 - East Rocker Bearing - Pier Cap Repaired in 2004 - Light Surface Corrosion Typical



P60 - Pier 2 - West Rocker Bearing - Pier Cap Repaired in 2004

**Hyland River Bridge
Alaska Highway km 937.3**



P61 - Pier 3 - East Nosing - Fast Current



P62 - Pier 3 - South Face

**Hyland River Bridge
Alaska Highway km 937.3**



P63 - Pier 3 - North Face - Pier Cap Repaired in 2004



P64 - Pier 3 - East Fixed Bearing - Pier Cap Repaired in 2004

**Hyland River Bridge
Alaska Highway km 937.3**

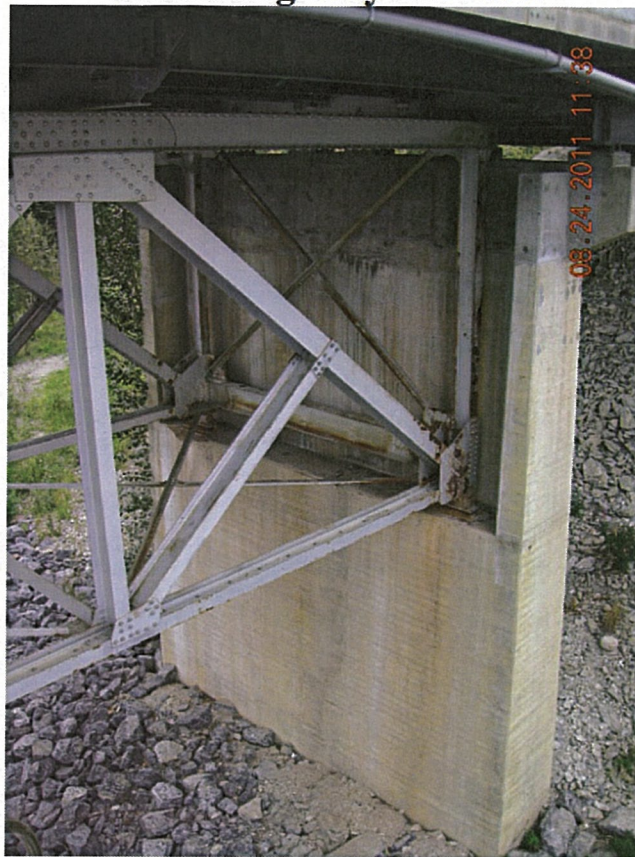


P65 - Pier 4 - North Face - Pier Cap Rebuilt in 2004



P66 - Pier 4 - Span 4 - Neoprene Bearings

**Hyland River Bridge
Alaska Highway km 937.3**



P67 - Pier 4 - South Face - Bearing Seat for Span 4



P68 - Pier 4 - Span 4 - Bearing Seat Dirty

**Hyland River Bridge
Alaska Highway km 937.3**



P69 - Pier 4 - Span 4 - East Rocker Bearing - Bearing Seat Dirty



P70 - Pier 4 - Span 4 - West Rocker Bearing - Spalling in Seat Adjacent to Bearing

**Hyland River Bridge
Alaska Highway km 937.3**



P71 - North Abutment and Embankment



P72 - North Abutment - Moisture Seeping Through North Abutment Deck Joint

**Hyland River Bridge
Alaska Highway km 937.3**



P73 - North Abutment - Span 5 - Neoprene Bearing 2 - Moisture Seeping Through Deck Joint



P74 - SE Shoreline - Undergoing Significant Scour - Many Trees Going into Water