SPECIFICATIONS

FOR

MERSEY RIVER BRIDGE REPLACEMENT

KEJIMKUJIK NATIONAL PARK, NOVA SCOTIA

FOR

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

ISSUED FOR TENDER

SNC-LAVALIN INC.

Halifax, Nova Scotia

Project No: R.077567.001 2016-05-13

MERSEY RIVER BRIDGE REPLACEMENT

ISSUED FOR TENDER

Todd Barkhouse, P.Eng.
Structural Engineer
SNC Lavalin Inc.

Adam Milligan, P.Eng., PMP
Civil Engineer
SNC Lavalin Inc.

Normand Landry, P.Eng.
Senior Project Manager
SNC Lavalin Inc.

Division 31 – Earthwork

Division 32 – Exterior Improvements

Division 34 – Transportation

Appendices

List of Drawings

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Nova Scotia Public Highways Act;

.2 Nova Scotia Forest Enhancement Act;

.3 Canada National Parks Act;

.4 Nova Scotia Environment Act; and

.5 Canadian Environmental Protection Act.

1.2 DESCRIPTION OF WORK

.1 Work under this Contract covers the furnishing of all labour, materials and equipment required to provide construction services for the replacement of Mersey River Bridge crossing on Eel Weir Road in Kejimkujik National Park in Nova Scotia. The bridge site location is: N 44° 19' 60", W 65° 12' 17". The project includes, but is not limited to:

.1 Site erosion and sediment control measures, including check dams, silt fencing, silt curtain, hay/straw bales, vegetative stabilization and other measures as required, maintained for the duration of the project.

.2 Barriers and enclosures for protection of public for duration of the project.

.3 Remove existing bridge, demolish existing abutments including abutments, wingwalls, fill materials, wingwalls and other components to a minimum of 1.0m below finished grade.

.4 Removal and disposal of existing features within limit of contract including tree clearing, grubbing, structures and foundations.

.5 Excavation of roadway structure.

.6 Excavation, as required.

.7 Supply and installation of new bridge structure, including but not limited to micropiles, reinforced concrete pile caps, bridge abutments, wingwalls, deck, reinforcing, railings, concrete sealing, and other associated fixtures.

1.2 DESCRIPTION OF WORK (Cont'd)

.1 (Cont'd)

.8 Supply, placement and compaction of bedding, surround and backfill/sub-grade and fill against structure materials.

.9 Upgrade existing approaches by raising and widening the road to the elevations and limits indicated.

.10 Supply, placement and compaction of sub-base and base gravels in roadway structure.

.11 Provide vegetative blankets to support all side slopes and back slopes exposed during construction.

.12 Supply modular bridge superstructure and deliver to site.

.13 Erect Bridge in accordance with manufacturer's instruction and launching requirements.

.14 Supply and installation of finish surfacing, including rip rap and shoulder gravel.

.15 Signage.

.16 Supply and installation of guard rail.

.17 Delivery of materials to site, including permits. Consider transport of bridge components and micro-piles to site.

.18 Clean work sites, including removal of construction waste, debris and recyclable materials. Remove and dispose of all demolished and surplus components. Clear debris from bearing seats.

.19 Provide mobilization and demobilization to the sites, access to the sites, temporary utilities, construction facilities, and temporary barriers and enclosures.

.20 Carry out environmental protection for work adjacent to waterways including but not limited to:

.1 No work permitted during restricted activity periods.

.2 Instream work requirements including but not limited to: cofferdams, fish rescue, sediment control, river bottom restoration;

.3 Vehicle restrictions;

.4 Silt fencing and sediment control requirements.

1.2 DESCRIPTION OF WORK (Cont'd)

.1 (Cont'd)

.20 (Cont'd)

.21 Design fabricated roadway bridge. Submit stamped engineering drawings for bridge design as specified, including geometry of bridge components and bearings. Submit all applicable bearing loads and reactions required for confirmation of foundation design.

.22 Supply fabricated roadway bridge materials to the site and unload on the site, including steel components, connection materials, proprietary hand tools for assembly, precut timber members, and materials required for launching of structure.

.23 Provide manufacturer's representative on site during initial erection and launching as specified in Section 32 34 23 - Fabricated Roadway Bridges.

.24 Provide temporary launching materials, including but not limited to rollers and launching panels, for the duration of launching period. Following launching period, provide loading and return delivery from site.

.25 Erect superstructure.

1.3 CODES

.1 Meet or exceed requirements of: Contract documents, Specified standards, codes and referenced documents.

.2 Conform to the latest revision of any referenced standard as re-affirmed or revised to the date of specification. Standards or codes not dated shall be deemed editions in force on the date of tender advertisement.

.3 Perform work in accordance with the following codes and legislative requirements, including all amendments up to tender closing date.

.1 Code of Practice of the Department of Labour, as it pertains to the Temporary Workplace Traffic Control Manual.

.2 Environment Act of the Province of Nova Scotia.

.3 Waste Control Regulation of the Province of Nova Scotia.

1.3 CODES (Cont'd)

.3 (Cont'd)

.4 Canadian Environmental Protection Act.

.5 Transportation Dangerous Goods Act.

.6 Canadian Fisheries Act.

.7 Canada Labour Code Occupational Health and Safety Standards.

.8 Canadian Highway Bridge Design Code, latest edition.

.9 Nova Scotia Occupational Health and Safety Act and Regulations.

.10 The Storage and Handling of Gasoline and Associated Products Regulations by the Province of Nova Scotia.

.11 Canadian Navigable Waters Protection Act.

.12 Any other Federal, Provincial, Municipal and Park Code, Standard, Regulation, Guideline, By-Law or Ordinance having jurisdiction.

.4 In the case of conflict or discrepancy, the more stringent requirements shall apply.

1.4 FAMILIARIZATION WITH SITE

.1 Before submitting a bid, visit the bridge site and its surroundings to review and verify the form, nature and extent of the work, materials necessary for the completion of the works, the means of access to the site, severity, exposure and uncertainty of weather, soil conditions, any accommodations they may require, and in general shall obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. No allowance shall be made subsequently in this connection on account of error or negligence to properly observe and determine the conditions that will apply.

.2 Review specification Section 01 35 29.06 - Health and Safety Requirements before visiting site. Take all appropriate safety measures for any visit to site, either before or after acceptance of bid.

.3 Obtain prior permission from the Departmental Representative before carrying out site inspection.

1.5 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy of each of the following:
.1 Contract Drawings;
.2 Specifications;
.3 Addenda;
.4 Reviewed shop drawings;
.5 Change orders;
.6 Other modifications to Contract;
.7 Field test reports;
.8 Copy of approved work schedule; and
.9 Manufacturer's installation and application instructions.
.10 All testing results.
.11 Fabricated roadway bridge design drawings;
.12 Fabricated roadway bridge launching requirements;
.13 Copy of Approved Work Schedule;
.14 Site specific health and safety plan;
.15 Permits and regulatory approvals and requirements; and
.16 Other documents as stipulated elsewhere in the Contract Documents.

1.6 WORK SCHEDULE

.1 Provide within 5 working days after Contract Award, construction schedule showing anticipated progress stages and final completion of work within time period required by Contract Documents and as specified herein.

.2 All in-stream work is to be carried out under low flow conditions and during the period indicated in Section 01 35 43 - Environmental Procedures.

.3 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of the Departmental Representative.

.4 Work schedule, completion date and operational requirements shall comply with requirements in Section 01 14 10 - Scheduling and Management of Work.

1.7 CONTRACTOR'S USE OF SITE

.1 Contractor's use of site trailers for storage and preparatory work shall be limited to an area within limits of traffic diversion and to the existing gravel parking lot to the east of the Mersey River Bridge. Do not block the adjacent canoe launching and landing area near bridge and laydown area. Protect and maintain construction laydown area. Any additional areas required shall be approved by the Departmental Representative prior to use.

.2 Maintain the site in a tidy condition free from the accumulation of waste products and debris. Upon substantial performance of the work, remove surplus products, tools, machinery and equipment from the site. Completion of clean-up is required for total performance of the work.

.3 Provide any and all traffic control services required for the project.

.4 Obtain all necessary permits to perform work and to comply with all permit requirements and conditions.

.5 Maintain work during construction. Undertake continuous maintenance each day. Maintain roadway and structures in a safe and tidy condition.

1.8 PROJECT MEETINGS

.1 Departmental Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.

.2 The Department Representative shall make available, with adequate notice, meeting facilities for regular project meetings.

.3 Attend project meetings as specified. arrange for and ensure applicable project sub-trades attend meetings as required.

1.9 SETTING OUT OF WORK

.1 Set out Work in accordance with Section 01 71 00 - Examination and Preparation.

1.9 SETTING OUT OF WORK (Cont'd)

.2 Assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.

.3 Provide devices needed to lay out and construct work.

.4 Supply such devices as straight edges and templates required to facilitate Departmental Representative's inspection of work.

.5 Mark all limbs and trees that require removal in accordance with Section 01 71 00 - Examination and Preparation.

.6 Delineate and mark the site construction boundaries as surveyed. Provide continuous delineation fence around perimeter of construction limits (except roadway) consisting of clearly visible wire rope and stanchions. Flag as required. maintain for duration of construction activities and remove following completion of work.

1.10 EXISTING SERVICES

.1 Where Work involves breaking into or connecting to existing services, carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to pedestrian and vehicular traffic.

.2 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.3 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.

.4 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.5 Record locations of maintained re-routed and abandoned service lines.

1.10 EXISTING SERVICES (Cont'd)

.6 Confirm all inverts and critical elevations in the field prior to construction.

.7 Maintain existing signs at all times. When it is necessary to temporarily remove a sign, dismantle and re-establish on a temporary post or stand set back from construction area. Sign may require relocation to more than one temporary location. Reinstate to permanent location at end of Work. This item is incidental to the Work and no separate payment will be made for maintaining or moving signs.

1.11 ADDITIONAL DRAWINGS

.1 Departmental Representative may furnish additional drawings for clarification. These additional drawings have same meaning and intent as if they were included with plans referred to in the Contract Documents.

1.12 CONSTRUCTION SAFETY MEASURES

.1 The Contractor must submit a Safety Plan prior to the pre-construction meeting.

1.13 EXCAVATION

.1 Prior to commencing any excavation, check for and become aware of all buried utilities and submit findings for review and approval by Departmental Representative.

1.14 STANDARD HOURS

.1 Work that involves temporary disruption of services will be scheduled through the Department Representative.

1.15 SITE CONDITIONS

.1 For geotechnical and borehole information, refer to final report prepared by EnGlobe, dated , December 14, 2015, (Ref. No. 20333), attached in Appendix A.

.2 Promptly notify Departmental Representative if subsurface conditions differ materially from those indicated in Contract Documents or a reasonable assumption of probable conditions based thereon.

1.15 SITE CONDITIONS (Cont'd)

.3 Visit the roadway and review existing site conditions prior to starting the Work.

.4 Cellular phone reception may be limited in all or portions of Kejimkujik National Park.

.5 There are no utilities available at the Mersey River site for use by the Contractor. This does not relieve the Contractor of responsibility for utility locates prior to excavations. Provide temporary utilities on site, including power to Section 01 51 00 - Temporary Utilities.

.6 Note that the roadway access to the Mersey River Bridge along Eel Weir Road is not appropriate for all standard vehicles and equipment. This includes, but is not limited to the following:

.1 Deep wheel track rutting, potholes and standing water in the existing gravel road may not be appropriate for some equipment, construction vehicles and some small passenger cars.

.2 The Eel Weir Road is a single-lane narrow roadway with tree cover on both sides. Roadway width is restricted for wide vehicles and equipment. Use only those vehicles and equipment that can be transported to site without cutting or damage to trees.

.3 Slow travel times and extra care may be required for equipment to reach the site.

.4 The tree canopy is low along portions of the Eel Weir Road. Roadway height is restricted for high vehicles and equipment. Use only those vehicles and equipment that can be transported to site without cutting or damage to trees.

.5 At the beginning of the route along Eel Weir Road, there is a single-lane wood bridge named "Grafton Brook Bridge". This bridge is posted at: 44 tonnes for 3 axles tonnes for 2 axles; and 6 tonnes for 1 axle.

.6 The maximum speed limit on Eel Weir Road is 20 km/hr.

1.16 EXISTING SURVEY

.1 Topographic survey used in the preparation of these contract documents was performed by SNC Lavalin Inc. in June 2015 (File No. 626789).

1.17 WORK WITHIN PARK BOUNDARIES

.1 The work is within a National Park. It is essential that all lands remain as undisturbed as possible. Use standards and methods beyond those for normal construction in order to protect the environment and ensure aesthetics of the Work. Strictly adhere to contract limits and take every precaution to minimize environmental damage and disruption to vegetation, wildlife habitat, and structures or existing services, both on construction and storage sites.

.1 If damage occurs during construction, bear the expense to immediately restore such damaged areas to the satisfaction of the Departmental Representative.

.2 If restoration fails to satisfy specified requirements, the Departmental Representative may complete repairs at the Contractor's expense.

.3 Ensure no damage will be done to aerial or underground electrical/communications cables.

.4 Submit all sources of aggregate and asphalt cement to Departmental Representative at least two weeks prior to start of the Work.

.5 Follow Provincial requirements regarding: Pit and Quarry guidelines; and Environmental Construction Practice Specifications.

.6 Make arrangements with authorities or owners of private properties for quarrying and transporting materials and machinery over properties and roads. Obtain associated permits and pay associated fees.

1.18 NOISE

.1 Fit all construction equipment with standard noise suppression devices. Maintain devices in accordance with manufacturer's requirements. Use smaller, less-disturbing equipment where possible.

.2 Limit scheduling of Work activities on site in accordance with Section 01 14 10, Scheduling and Management of Work.

1.19 AIR QUALITY

.1 Implement an anti-idling policy for trucks and machinery.

.2 Submit dust control measures to Departmental Representative prior to starting Work. Apply dust control measures during periods of dust generation.

1.20 RECORD DRAWINGS

.1 Maintain project drawings and record accurately deviations from Contract Documents. Record changes in red and mark one (1) set of prints during work. At completion of project and prior to final inspection, neatly transfer markings to second print set and submit both sets to Departmental Representative.

1.21 RELICS ANTIQUES AND WILDLIFE HABITAT

.1 Protect relics, antiquities, wildlife habitat, items of historical or scientific interest such as cornerstones and contents, animal nesting sites, commemorative plaques, inscribed tablets, and similar objects found during course of work.

.2 Give immediate notice to Departmental Representative and await Departmental Representative's written instructions before proceeding with work in this area.

.3 Relics, antiquities and items of historical or scientific interest remain her Majesty's property.

1.22 NATIONAL PARKS ACT

.1 For project within boundaries of National Park, perform work in accordance with National Parks Act.

1.23 PERMITS/ AUTHORITIES

.1 Obtain and pay for permits from authorities as required for the Work. Comply with pertinent regulations of authorities having jurisdiction over the Work. Provide copies of permits to Departmental Representative prior to starting the Work.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 – GENERAL

1.1 SUBMITTALS

.1 Upon acceptance of bid and prior to commencement of work, submit to Departmental Representative the following work management documents:
.1 Work Schedule as specified herein.
.2 Health and Safety Plan as specified in Section 01 35 29.06 – Health and Safety Requirements.
.3 Environmental Protection Plan as specified in Section 01 35 43 – Environmental Procedures.
.4 Traffic Control Plan as specified in Section 01 55 26 – Traffic Regulation.
.5 Erection plans for Bridge as specified herein.

1.2 WORK SCHEDULE

.1 Upon acceptance of bid submit:
.1 Preliminary work schedule within 5 calendar days of contract award.

.2 Comply with the following work schedule limitations:
.1 Complete the Work prior to end of day December 22, 2017.
.2 All in-stream work shall take place only under low flow conditions and during the period as indicated in Section 01 35 43, Environmental Procedures.
.3 Do not leave any temporary structures in the stream outside of in-stream work period. .4 Armour stone against completed abutments shall be in place prior to end of in-stream work period.
.5 Do not mobilize to site until July 1st due to species at risk in accordance with Section 01 35 43, Environmental Procedures.
.6 Carry out work during daylight hours unless approved in writing by Departmental Representative.
.7 Carry out work during daylight hours; from sunrise to sunset. Obtain written approval from Department Representative minimum 48 hours prior to proceeding with any work outside of daylight hours.

1.2 WORK SCHEDULE (Cont'd) .3 Schedule to indicate all calendar dates from commencement to completion of all work within the time stated in the accepted bid.

.4 Provide sufficient details in schedule to clearly illustrate entire implementation plan, depicting efficient coordination of tasks and resources, to achieve completion of work on time and permit effective monitoring of work progress in relation to established milestones.

.5 Work schedule content to include as a minimum the following:

.1 Bar (GANTT) Charts, indicating all work activities, tasks and other project elements, their anticipated durations, planned dates for achieving key activities and major project milestones supported with;

.2 Written narrative on key elements of work illustrated in bar chart, providing sufficient details to demonstrate a reasonable implementation plan for completion of project within designated time.

.3 Generally Bar Charts derived from commercially available computerized project management system are preferred but not mandatory.

.6 Work schedule must take into consideration and reflect the work phasing.

.7 Schedule work in cooperation with the Departmental Representative.

.8 Completed schedule shall be approved by Departmental Representative. When approved, take necessary measures to complete work within scheduled time. Do not change schedule without Departmental Representative's approval.

.9 Ensure that all subtrades and subcontractors are made aware of the work restraints and operational restrictions specified.

.10 Schedule Updates:

.1 Submit when requested by Departmental Representative.

.2 Provide information and pertinent details

1.2 WORK SCHEDULE (Cont'd)

explaining reasons for necessary changes to implementation plan.

.3 Identify problem areas, anticipated delays, impact on schedule and proposed corrective measures to be taken.

.11 Departmental Representative will make interim reviews and evaluate progress of work based on approved schedule. Frequency of such reviews will be as decided by Departmental Representative. Address and take corrective measures on items identified by reviews and as directed by Departmental Representative. Update schedule accordingly.

.12 In every instance, change or deviation from the Work Schedule, no matter how minimal the risk or impact on safety or inconvenience to users or public might appear, will be subject to prior review and approval by the Departmental Representative.

1.3 ERECTION PLANS

.1 Submit erection plan for new bridge. Erection plan shall include, but shall not be limited to the following information:

.1 Health and Safety Program for fabricated bridge erection;

.2 List any in-water works required for fabricated bridge erection;

.3 Include drawings for any temporary support structures, stamped by a Professional Engineer registered in Nova Scotia;

.4 Indicate erection equipment, including anticipated hoisting arrangements and associated outrigger loads;

.5 Submit planned roadway closures in accordance with Section 01 55 26 – Traffic Regulations.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 The Form of Tender includes one lump sum priced item and several unit priced items.

.2 The total tendered price shall be the sum of the lump sum item plus the amounts calculated from the unit priced items based on the approximate quantities identified for each of the unit priced items.

.3 The Contractor in submitting their Tender for the project understand that they will only be entitled to payment under the unit priced items when prior written authorization has been received from the Departmental Representative for utilization and then only to the extent of the work authorized by the Departmental Representative.

.4 The estimated quantities shown in the Unit Price Table are provided for the purpose of comparing proposals, and are not guaranteed to be final, accurate or complete. Actual quantities may vary from those initially estimated and will not be grounds for renegotiations of proposal unit prices. The unit prices shall be applicable to greater or lesser quantities. Payment shall be at the unit prices in the proposal.

.5 Additional instructions for measurement and/or payment for items of the work may be contained in specific sections of the Technical Specifications. In the case of a conflict between the instructions for measurement and payment contained in this section with that of any other section, the requirement of this section shall apply.

.6 The submitted tender prices will be inclusive of all costs for the complete supply and installation of all materials, labour and equipment required to complete the work. No separate payment will be made for any testing, inspections and approvals required by Contractor.

.7 All measurement shall be along a horizontal plane unless otherwise indicated.

1.1 GENERAL REQUIREMENTS (Cont'd)

.8 Lengths refer to measurements along centreline of installation unless otherwise indicated.

.9 Materials specified for measurement by mass shall be weighed on scales approved by Departmental Representative. Units used to haul material being paid for by mass shall bear legible identification numbers plainly visible to scale person as it approaches and leaves scale-house.

1.2 LUMP SUM ITEM

.1 No separate measurement for payment shall be made for any work completed under this item.

.2 Any and all items not specifically included in the unit price items are considered incidental to the work and are to be included in the lump sum portion of the work. The work of the lump sum item shall include, all works which are required for completion of the project, exclusive of those covered by the unit price items. This includes, but is not limited to the following:

.1 Mobilization, including complete mobilization to site.

.2 Demobilization, including removal of all materials, equipment, buildings, shops, offices, and other facilities after Work is complete and site is cleaned and left in condition to the satisfaction of the Departmental Representative and all other Agencies having Jurisdiction.

.3 Structure Demolition, including demolition and removal of existing bridge superstructure, including but not limited to: deck, curbs, railings, timber, fastenings, creosoted timber and rock infill. This item also includes complete demolition and removal of existing foundations for existing bridge to at least 1.0m below finished grade or finished riverbed elevation. This item includes riverbed. This item includes but is not limited to the East Abutment, West Abutment and two Central Piers. This item also includes excavation of all material of whatever nature encountered, to access existing foundations for demolition and water control.

.4 Reinforcing Steel, including but not limited to supply, transportation, and placing as indicated

1.2 LUMP SUM ITEM (Cont'd)

and necessary for this Work. Waste materials, chairs, bolsters, bracing and ties are considered incidental to this item.

.5 Concrete Mud Slab.

.6 Steel Fabricated Bridge, including shop drawings, erection drawings, steel, welding, fit-up, manufacture, galvanizing, supply, delivery, temporary supports (including formwork, falsework and shoring), erection, installation and touch-up galvanizing. This item also includes launching of the girders, setting, jacking, and base plates. This item includes launching rentals. This item also includes guiderail fastened to bridge.

.7 Bridge Bearings and miscellaneous metals fabrications, including shop drawings, supply, transportation and installation of galvanized steel items required to complete the work. Anchorage or casting-in of components are incidental to this item. Hot dip galvanizing and required zinc-solder touch-up are incidental to this item.

.8 Removal of existing interpretive sign on existing bridge and mounting on new structure.

.9 Guiderail on bridge structure, including shop drawings, supply, transportation and installation, complete with anchorage.

.10 Treated timber bridge deck and curbs.

.11 Silane concrete sealer, including preparation of surfaces, supply and installation, including all materials and tools. Overspray, waste materials and overlap are incidental to this item.

.12 All other items, including: all works that are required for completion of the project, exclusive of those covered by the unit priced items and those listed above. This includes, but is not limited to: removal and reinstatement of existing roadway gate; drain tile; complete with geotextile and clear stone. cofferdams; dewatering; water for compaction and dust control; project layout and surveying; construction facilities; weigh scales; permits; temporary structures; construction engineering; cold weather protection and curing of materials; water control; traffic control; environmental protection measures; silt curtains; coffer structures; temporary shoring structures; temporary structures for support of

superstructure, formwork and construction activities; coordination and payment of external utilities for work performed in the Park; site demolition; asphalt removal; guiderail removal; relocations; saw-cutting; deck removal; removal of existing reinforcing from demolished concrete; disposal and tipping fees for creosoted timber.

1.3 - NOT USED

1.3 - NOT USED

1.3 – NOT USED

1.3 NOT USED

PART 2 - PRODUCTS

2.1 NOT USED .1

PART 3 - EXECUTION

3.1 NOT USED .1

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative are specified under various sections.

1.2 APPOINTMENT AND PAYMENT

.1 Departmental Representative will appoint and pay for services of testing laboratory except as follows:
.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 Testing, adjustment and balancing of equipment and systems.
.4 Mill tests and certificates of compliance.
.5 Tests specified to be carried out by Contractor under the supervision of Departmental Representative.
.6 Additional tests specified in the following paragraph.

.2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

.1 Provide labour, equipment and facilities to:
.1 Provide access to Work to be inspected and tested.
.2 Facilitate inspections and tests.
.3 Make good Work disturbed by inspection and test.
.4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

1.3 CONTRACTOR'S RESPONSIBILITIES (Cont'd)

.2 Notify Departmental Representative sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 DEFINITIONS

.1 Activity: An element of Work performed during course of Project. An activity normally has an expected duration, an expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart). A 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. Generally Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: Original approved plan (for Project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: Number of work periods (not including holidays or other nonworking periods) required to complete an activity or other Project element. Usually expressed as workdays or workweeks.

.6 Master Plan: A summary-level schedule that identifies major activities and key milestones.

.7 Milestone: A significant event in Project, usually completion of major deliverable.

1.1 DEFINITIONS (Cont'd)

.8 Project Schedule: The planned dates for performing activities and the planned dates for meeting milestones. A 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.

.9 Project Planning, Monitoring and Control System: Overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 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.

1.3 SUBMITTALS

.1 Submit to Departmental Representative within 5 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

.2 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 PROJECT MILESTONES

.1 Project milestones form targets for Project Schedule.
.1 Work to achieve substantial completion within 18 weeks of Contract Award.

1.5 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise impractical schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
.1 Award.
.2 Shop Drawings, Samples.
.3 Permits.
.4 Mobilization.
.5 Excavation.

1.7 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule every 2 weeks reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 11 00 -General Instructions.

.2 Section 01 45 00 - Quality Control.

.3 Section 01 78 00 - Closeout Submittals.

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 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated 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.

1.2 ADMINISTRATIVE (Cont'd)

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

.11 Make any changes in submissions which Departmental Representative may require consistent with Contract Documents and resubmit as directed by Departmental Representative.

.12 Notify Departmental Representative, in writing, when resubmitting of any revisions other than those requested by Departmental Representative.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work that are specific to project requirements.

.2 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.3 Allow 5 working days for Departmental Representative's review of each submission. Calculation submittals and any submittals with greater than 20 drawings and/or 100 pages will require 10 working days.

1.3 SHOP DRAWINGS AND PRODUCT DATA (Cont'd)

.4 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.5 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of any revisions other than those requested.

.6 Accompany submissions with transmittal letter, containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.7 Submissions shall include:
- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication;
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances;
  - .3 Setting or erection details;
  - .4 Capacities;
  - .5 Performance characteristics;
  - .6 Standards;
  - .7 Operating weight;
  - .8 Relationship to adjacent work.

.8 After Departmental Representative's review, distribute copies.

1.3 SHOP DRAWINGS AND PRODUCT DATA (Cont'd)

.9 Submit 1 PDF digital file of shop drawings for each requirement requested in the Specification sections and as Departmental Representative may reasonably request.

.10 Submit 1 PDF digital file 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.

.11 Delete information not applicable to project.

.12 Supplement standard information to provide details applicable to project.

.13 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

1.4 SAMPLES

.1 Samples: examples of materials, equipment quality, finishes, workmanship.

.2 Submit for review samples as requested in respective specification Sections. Label samples with origin and intended use.

.3 Deliver samples prepaid to Departmental Representative's business address.

.4 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

1.4 SAMPLES (Cont'd)

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 PROGRESS PHOTOGRAPHS

.1 Submit electronic and hard copy of colour digital photographs in "jpg" format.

.2 Identification: name and number of project and date of exposure indicated.

.3 Number of view points: locations of view points determined by Departmental Representative.

.4 Frequency: monthly and at completion excavation and services before concealment.

1.6 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

.2 Submit transcription of insurance immediately after award of Contract.

1.7 WORK SCHEDULE

.1 Provide within 5 working days after contract award, schedule showing anticipated progress stages and final completion of work within time period required by Contract Documents.

.2 Interim reviews of work progress based on work schedule will be conducted as decided by Departmental Representative and schedule updated by Contractor in conjunction with and to approval of Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Fire Safety Requirements.

.2 Hot work Permit.

.3 Existing Fire protection and Alarm Systems.

1.2 RELATED SECTIONS

.1 Section 01 35 29 - Health and Safety Requirements.

1.3 REFERENCES

.1 National Fire Code 2010.

.2 CAN/CSA S16-14(R2016), Canadian Highway Bridge Design Code.

1.4 DEFINITIONS

.1 Hot Work defined as:
.1 Welding work.
.2 Cutting of materials by use of torch or other open flame devices.
.3 Grinding with equipment which produces sparks.
.4 Use of open flame torches such as for roofing work.

1.5 SUBMITTALS

.1 Submit copy of Hot Work Procedures and sample of Hot Work permit to Departmental Representative for review, within 14 calendar days of acceptance of bid.

.2 Submit in accordance with Section 01 33 00.

1.6 FIRE SAFETY REQUIREMENTS

.1 Implement and follow fire safety measures during Work. Comply with following:
.1 National Fire Code 2010.
.2 National Building Code 2010.
.3 Federal and Provincial Occupational Health and Safety Acts and Regulations.

1.6 FIRE SAFETY REQUIREMENTS (Cont'd)

.2 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.

1.7 HOT WORK AUTHORIZATION

.1 Obtain Departmental Representative's written" authorization to Proceed" before conducting any form of Hot Work on site.

.2 To obtain authorization submit to Departmental Representative:
.1 Contractor's typewritten Hot Work Procedures to be followed on site as specified below.
.2 Description of the type and frequency of Hot work required.
.3 Sample Hot Work Permit to be used.

.3 Upon review and confirmation that effective fire safety measures will be implemented and followed during performance of hot work, Departmental Representative will give authorization to proceed as follows:
.1 Issue one written "Authorization to Proceed" covering the entire project for duration of work or;
.2 Subdivide the work into pre-determined, individual activities, each activity requiring a separately written authorization to proceed.

.4 Requirement for individual authorization will be based on:
.1 Nature or phasing of work;
.2 Risk to Park operations;
.3 Quantity of various trades needing to perform hot work on project or;
.4 Other situation deemed necessary by Departmental Representative to ensure fire safety on premises.

.5 Do not perform any Hot Work until receipt of Departmental Representative's written "Authorization to Proceed" for that portion of work.

1.7 HOT WORK AUTHORIZATION (Cont'd)

.6 Coordinate performance of Hot Work with Park Manager through the Departmental Representative. When directed, perform Hot Work only during non-operative hours of the Park. Follow Departmental Representative's directives in this regard.

1.8 HOT WORK PROCEDURES

.1 Develop and implement safety procedures and work practices to be followed during the performance of Hot Work.

.2 Hot Work Procedures to include:
.1 Requirement to perform hazard assessment of site and immediate work area beforehand for each hot work event in accordance with Safety Plan specified in Section 01 35 29.
.2 Use of a Hot Work Permit system with individually issued permit by Contractor's Superintendent to worker or subcontractor granting permission to proceed with Hot Work.
.3 Permit required for each Hot Work event.
.4 Designation of a person on site as a Fire Safety Watcher responsible to conduct a fire safety watch for a minimum duration of 30-60 minutes immediately following the completion of the Hot Work.
.5 Compliance with fire safety codes, standards and occupational health and safety regulations specified.
.6 Site specific rules and procedures in force at the site as provided by the Park Manager.

.3 Generic procedures, if used, must be edited and supplemented with pertinent information tailored to reflect specific project conditions. Label document as being the Hot Work Procedures for this contract.

.4 Procedures shall clearly establish responsibilities:
.1 Worker performing hot work,
.2 Person issuing the Hot Work permit,
.3 Fire Safety Watcher,
.4 Subcontractor(s) and Contractor.

1.8 HOT WORK PROCEDURES (Cont'd)

.5 Brief all workers and subcontractors on Hot Work Procedures and of Permit system. Stringently enforce compliance.

1.9 HOT WORK PERMIT

.1 Hot Work Permit to include the following:
.1 Project name and project number.
.2 Area of Park and specific coordinates where hot work will be performed.
.3 Date of issue.
.4 Description of hot work type needed.
.5 Special precautions to be followed, including type of fire extinguisher needed.
.6 Name and signature of permit issuer.
.7 Name of worker to which the permit is issued.
.8 Permit validity period not to exceed 8 hours. Indicate start time/date and termination time/date.
.9 Worker's signature with time/date of hot work completion.
.10 Stipulated time period of safety watch.
.11 Fire Safety Watcher's signature with time/date.

.2 Permit to be typewritten form. Industry Standard forms shall only be used if all data specified above is included on form.

.3 Each Hot Work Permit to be completed in full, signed and returned to Contractor's Superintendent for safe keeping on site.

1.10 FIRE PROTECTION AND ALARM SYSTEMS

.1 Fire protection and alarm systems shall not be:
.1 Obstructed.
.2 Shut-off, unless approved by Departmental Representative.
.3 Left inactive at the end of a working day or shift.

.2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.

1.11 DOCUMENTS ON SITE

.1 Keep Hot Work Permits and Hazard assessment documentation on site for duration of Work.

1.11 DOCUMENTS ON SITE (Cont'd)

.2 Upon request, make available to Departmental Representative or to authorized safety Representative for inspection.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Procedures to isolate and lockout electrical facility and other equipment from energy sources.

1.2 RELATED SECTIONS

.1 Section 01 35 29.06 - Health and Safety Requirements.

1.3 REFERENCES

.1 CSA C22.1-12, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

.2 CAN/CSA C22.3 No. 1-06, Overhead Systems.

.3 CSA C22.3 No. 7-06, Underground Systems.

.4 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.

1.4 DEFINITIONS

.1 Electrical Facility: means any system, equipment, device, apparatus, wiring, conductor, assembly or part thereof that is used for the generation, transformation, transmission, distribution, storage, control, measurement or utilization of electrical energy, and that has an amperage and voltage that is dangerous to persons,

.2 Guarantee of Isolation: means a guarantee by a competent person in control or in charge that a particular facility or equipment has been isolated.

.3 De-energize: in the electrical sense, that a piece of equipment is isolated and grounded, e.g. if the equipment is not grounded, it cannot be considered de-energized (DEAD).

1.4 DEFINITIONS (Cont'd)

.4 Guarded: means that an equipment or facility is covered, shielded, fenced, enclosed, inaccessible by location, or otherwise protected in a manner that, to the extent that is reasonably practicable, will prevent or reduce danger to any person who might touch or go near such item.

.5 Isolate: means that an electrical facility, mechanical equipment or machinery is separated or disconnected from every source of electrical, mechanical, hydraulic, pneumatic or other kind of energy that is capable of making it dangerous.

.6 Live/alive: means that an electrical facility produces, contains, stores or is electrically connected to a source of alternating or direct current of an amperage and voltage that is dangerous or contains any hydraulic, pneumatic or other kind of energy that is capable of making the facility dangerous to persons.

1.5 COMPLIANCE REQUIREMENTS

.1 Comply with the following in regards to isolation and lockout of electrical facilities and equipment:
.1 Canadian Electrical Code.
.2 Federal and Provincial Occupational Health and Safety Acts and Regulations.
.3 Regulations and code of practise as applicable to mechanical equipment or other machinery being de-energized.
.4 Procedures specified herein.

.2 In event of conflict between any provisions of above authorities the most stringent provision will apply.

1.6 SUBMITTALS

.1 Submit copy of lockout procedures, sample of lockout permit and lockout tags proposed for use in accordance with Section 01 33 00. Submit within 14 calendar days of acceptance of bid.

1.7 ISOLATION OF EXISTING SERVICES

.1 Obtain Departmental Representative's written authorization prior to working on existing live or active electrical facilities and equipment and before proceeding with isolation of such item.

.2 To obtain authorization, submit to Departmental Representative the following documentation:
.1 Written request to isolate the particular service or facility and;
.2 Copy of Contractor's Lockout Procedures.

.3 Make a Request for Isolation for each event, unless directed otherwise by Departmental Representative, as follows:
.1 Fill-out standard form in current use at the Park as provided by Departmental Representative or;
.2 Where no form exist, make written request indicating:
.1 The equipment, system or service to be isolated and it's location.
.2 Duration of isolation period (ie: start time and date and completion time and date).
.3 Voltage of service feed to system or equipment being isolated.
.4 Name of person making the request.

.4 Do not proceed with isolation until receipt of written notification from Departmental Representative granting the Isolation Request and authorizating to proceed with the work.
.1 Note that Departmental Representative may designate another person at the Park being authorized to grant the Isolation Request.

.5 Conduct safe, orderly shut down of equipment or facility. De-energize, isolate and lockout power and other sources of energy feeding the equipment or facility.

.6 Determine in advance, as much as possible, in cooperation with the Departmental Representative, the type and frequency of situations which will require isolation of existing services.

1.7 ISOLATION OF EXISTING SERVICES (Cont'd)

.7 Plan and schedule shut down of existing services in consultation with the Departmental Representative and the Park Manager. Minimize impact and downtime of Facility operations. Follow Departmental Representative's directives in this regard.

.8 Conduct hazard assessment as part of the process in accordance with health and safety requirements specified Section 01 35 29.06.

1.8 LOCKOUTS

.1 De-energize, isolate and lockout electrical facility, mechanical equipment and machinery from all potential sources of energy prior to working on such items.

.2 Develop and implement clear and specific lockout procedures to be followed as part of the Work.

.3 Prepare typed written Lockout Procedures describing safe work practices, procedures, worker responsibilities and sequence of activities to be followed on site by workforce to safely isolate an active piece of equipment or electrical facility and effectively lockout and tagout it's sources of energy.

.4 Include as part of the Lockout Procedures a system of lockout permits managed by Contractor's Superintendent or other qualified person designated by him/her as being "in-charge" at the site.
.1 A lockout permit shall be issued to specific worker providing a Guarantee of Isolation before each event when work must be performed on a live equipment or electrical facility.
.2 Duties of person manging the permit system to include:
.1 Issurance of permits and lockout tags to workers.
.2 Determining permit duration.
.3 Maintaining record of permits and tags issued.
.4 Making a Request for Isolation to Departmental Representative when required as specified above.

1.8 LOCKOUTS (Cont'd)

.4 (Cont'd)
.2 (Cont'd)
.5 Designating a Safety Watcher, when one is required based on type of work.
.6 Ensuring equipment or facility has been properly isolated.
.7 Collecting and safekeeping lockout tags returned by workers as a record of the event.

.5 Clearly establish, describe and allocate responsibilities of:
.1 Workers.
.2 Person managing the lockout permit system.
.3 Safety Watcher.
.4 Subcontractor(s) and General Contractor.

.6 Generic procedures, if used, must be edited and supplemented with pertinent information to reflect specific project requirements.
.1 Incorporate site specific rules and procedures in force at site as provided by Park Manager through the Departmental Representative.
.2 Clearly label the document as being the Lockout procedures applicable to work of this contract.

.7 Use energy isolation lockout devices specifically designed and appropriate for type of facility or equipment being locked out.

.8 Use industry standard lockout tags.

.9 Provide appropriate safety grounding and guards as required.

1.9 CONFORMANCE

.1 Brief all workers and subcontractors on requirements of this section. Stringently enforce use and compliance.

1.10 DOCUMENTS ON SITE

.1 Post Lockout procedures on site in common location for viewing by workers.

1.10 DOCUMENTS ON SITE (Cont'd)

.2 Keep copies of Request for Isolation forms and lockout permits and tags issued to workers on site for full duration of Work.

.3 Upon request, make available to Departmental Representative or to authorized safety representative for inspection.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 24 - Special Procedures on Fire Safety Requirements.

.3 Section 01 35 25 - Special Procedures on Lockout Requirements.

1.2 DEFINITIONS

.1 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.

.2 Competent Person: means a person who is:
.1 Qualified by virtue of personal knowledge, training and experience to perform assigned work in a manner that will ensure the health and safety of persons in the workplace, and
.2 Knowledgeable about the provisions of occupational health and safety statutes and regulations that apply to the Work and;
.3 Knowledgeable about potential or actual danger to health or safety associated with the Work.

.3 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.

.4 PPE: personal protective equipment.

.5 Work Site: where used in this section shall mean areas, located at the premises where Work is undertaken, used by Contractor to perform all of the activities associated with the performance of the Work.

1.3 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit site-specific Health and Safety prior to commencement of Work.

1.3 SUBMITTALS (Cont'd)

.2 (Cont'd)

.1 Submit within 7 work days of notification of Bid Acceptance. Allow for 5-10 days for Department review and recommendations prior to the commencement of Work. Provide 3 copies.

.2 Departmental Representative will review Health and Safety Plan and provide comments.

.3 Revise the Plan as appropriate and resubmit within 5 work days after receipt of comments.

.4 Departmental Representative's review and comments made of the Plan shall not be construed as an endorsement, approval or implied warranty of any kind by Canada and does not reduce Contractor's overall responsibility for Occupational Health and Safety of the Work.

.5 Submit revisions and updates made to the Plan during the course of Work.

.6 Include results of site specific safety hazard assessment. Include results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Submit name of designated Health and Safety Site Representative and support documentation specified in the Safety Plan.

.4 Submit compliance certificates and other permits obtained.

.5 Submit copy of Letter in Good Standing from provincial Workers Compensation or other Department of Labour organization.

.1 Submit update of Letter of Good Standing whenever expiration date occurs during the period of Work.

.6 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.7 Submit copies of incident reports.

.8 Submit WHMIS MSDS - Material Safety Data Sheets.

.9 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.

1.4 COMPLIANCE REQUIREMENTS

.1 Comply with Occupational Health and Safety Act for Province of Nova Scotia, and Regulations made pursuant to the Act.

.2 Comply with Canada Labour Code - Part II (entitled Occupational Health and Safety) and the Canada Occupational Health and Safety Regulations as well as any other regulations made pursuant to the Act.
.1 The Canada Labour Code can be viewed at: www.http://laws-lois.justice.gc.ca/eng /acts/ -2 fulltext.html.
.2 Canadian Occupational Health and Safety Regulations can be viewed at: http://laws-lois justice.gc.ca/eng/ regulations/SOR-86-304/ index.html.
.3 A copy may be obtained at: Canadian Government Publishing Public Works & Government Services Canada Ottawa, Ontario, K1A 0S9 Tel: 819-956-4800 or 1-800-635-7943 Publication No. L31-85/2000 (E or F).

.3 Treasury Board of Canada Secretariat (TBS):
.1 Treasury Board, Fire Protection Standard April 1, 2010 www.tbs-sct.gc.ca/pol /doc-eng.aspx?id=17316& ection=text.

.4 Canadian Standards Association (CSA):
.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.5 Observe construction safety measures of:
.1 CAN/CSA S16-14(R2016), Canadian Highway Bridge Design Code.
.2 Municipal by-laws and ordinances.
.3 Provincial Worker's Compensation Board.

.6 In case of conflict or discrepancy between above specified requirements, "the more stringent shall apply".

.7 Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter in Good Standing.

.8 Medical Surveillance: Where prescribed by legislation or regulation, obtain and maintain worker medical surveillance documentation.

1.5 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons and environment adjacent to the site to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by all workers, sub-contractors and other persons granted access to Work Site with safety requirements of Contract Documents, applicable federal, provincial, and local by-laws, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.6 SITE CONTROL AND ACCESS

.1 Control the Work and entry points to Work Site. Approve and grant access only to workers and authorized persons. Immediately stop and remove non-authorized persons,
.1 Departmental Representative will provide names of those persons authorized by Departmental Representative to enter onto Work Site and will ensure that such authorized persons have the required knowledge and training on Health and Safety pertinent to their reason for being at the site, however, Contractor remains responsible for the health and safety of authorized persons while at the Work Site.

.2 Isolate Work Site from other areas of the premises by use of appropriate means.
.1 Erect fences, hoarding, barricades and temporary lighting as required to effectively delineate the Work Site, stop non-authorized entry, and to protect pedestrians and vehicular traffic around and adjacent to the Work and create a safe environment. See Section 01 11 00 and 01 52 00 for minimum acceptable requirements.

.3 Provide safety orientation session to persons granted access to Work Site. Advise of hazards and safety rules to be observed while on site.

.4 Ensure persons granted site access wear appropriate PPE. Supply PPE to inspection authorities who require access to conduct tests or perform inspections.

1.6 SITE CONTROL AND ACCESS (Cont'd)

.5 Secure Work Site against entry when inactive or unoccupied and to protect persons against harm. Provide security guard where adequate protection cannot be achieved by other means.

.6 Secure site at night time or provide security guard(s) as deemed necessary to protect site against entry.

1.7 PROTECTION

.1 Give precedence to safety and health of persons and protection of environment over cost and schedule considerations for Work,

.2 Should unforeseen or peculiar safety related hazard or condition become evident during performance of Work, immediately take measures to rectify situation and prevent damage or harm. Advise Departmental Representative verbally and in writing.

.3 Provide temporary facilities for protection and safe passage of public pedestrians and vehicular traffic around and adjacent to Work Site.

.4 Carry out work placing emphasis on health and safety of public, site personnel and protection of environment.

1.8 FILING OF NOTICE

.1 File Notice of Project with pertinent provincial health and safety authorities prior to beginning of Work.
.1 Departmental Representative will assist in locating address if needed.

1.9 PERMITS

.1 Post permits, licenses and compliance certificates, specified in Section 01 10 10, at Work Site.

.2 Where a particular permit or compliance certificate cannot be obtained, notify Departmental Representative in writing and obtain approval to proceed before carrying out applicable portion of work.

1.10 HAZARD ASSESSMENT

.1 Perform site specific health and safety hazard assessment of the work and its site.

.2 Carry out initial assessment prior to commencement of Work with further assessments as needed during progress of work, including when new trades and subcontractors arrive on site.

.3 Record results and address in Health and Safety Plan.

.4 Keep documentation on site for entire duration of the Work.

1.11 PROJECT / SITE CONDITIONS

.1 Following are potential health, environmental and safety hazards at the site for which Work may involve contact with:
.1 Park traffic.
.2 Active Park facility with public users, during and after hours.
.3 Underground Services.
.4 Working at heights.
.5 Excavations and Trenches.
.6 Environment (Extreme weather, wildlife).
.7 Lifting operations.

.2 Above items shall not be construed as being complete and inclusive of potential health and safety hazards encountered during Work.

.3 Include above items in the hazard assessment of the Work.

.4 MSDS data sheets of pertinent hazardous and controlled products stored on site can be obtained from Departmental Representative.

1.12 MEETINGS

.1 Attend pre-construction health and safety meeting, convened and chaired by Departmental Representative, prior to commencement of Work, at time, date and location determined by Departmental Representative. Ensure attendance of:
.1 Superintendent of Work.
.2 Designated Health and Safety Site Representative.

1.12 MEETINGS (Cont'd)

.1 (Cont'd)
.3 Subcontractors.

.2 Conduct regularly scheduled tool box and safety meetings during the Work in conformance with Occupational Health and Safety regulations.

.3 Keep documents on site.

1.13 HEALTH AND SAFETY PLAN

.1 Prior to commencement of Work, develop written Health and Safety Plan specific to the Work. Implement, maintain, and enforce Plan for entire duration of Work and until final demobilization from site.

.2 Health and Safety Plan shall include the following components:
.1 List of health risks and safety hazards identified by hazard assessment.
.2 control measures used to mitigate risks and hazards identified.
.3 On-site Contingency and Emergency Response Plan as specified below.
.4 On-site Communication Plan as specified below.
.5 Name of Contractor's designated Health and Safety Site Representative and information showing proof of his/her competence and reporting relationship in Contractor's company.
.6 Name of Contractor's designated Health and Safety Site Representative and information showing proof of his/her competence and reporting relationship in Contractor's company.

.3 On-site Contingency and Emergency Response Plan shall include:
.1 Operational procedures, evacuation measures and communication process to be implemented in the event of an emergency.
.2 Evacuation Plan: site and floor plan layouts showing escape routes, marshaling areas. Details on alarm notification methods, fire drills, location of firefighting equipment and other related data.

1.13 HEALTH AND SAFETY PLAN (Cont'd)

.3 (Cont'd)

.3 Name, duties and responsibilities of persons designated as Emergency Warden(s) and deputies.

.4 Emergency Contacts: name and telephone number of officials from:

.1 General Contractor and subcontractors.

.2 Pertinent Federal and Provincial Departments and Authorities having jurisdiction.

.3 Local emergency resource organizations.

.5 Harmonize Plan with Park's Emergency Response and Evacuation Plan. Departmental Representative will provide pertinent data including name of PWGSC and Park Management contacts.

.4 On-site Communication Plan:

.1 Procedures for sharing of work related safety information to workers and subcontractors, including emergency and evacuation measures.

.2 List of critical work activities to be communicated with Park Manager which have a risk of endangering health and safety of Park users.

.5 Address all activities of the Work including those of subcontractors.

.6 Review Health and Safety Plan regularly during the Work. Update as conditions warrant to address emerging risks and hazards, such as whenever new trade or subcontractor arrive at Work Site.

.7 Develop Health and Safety Plan in collaboration with all subcontractors. Address all work and activities of subcontractors as they arrive on site. Immediately update Plan and submit to Departmental Representative.

.8 Departmental Representative will respond in writing, where deficiencies or concerns are noted and may request re-submission of the Plan with correction of deficiencies or concerns.

1.13 HEALTH AND SAFETY PLAN (Cont'd)

.9 Post copy of the Plan, and updates, prominently on Work Site.

1.14 SAFETY SUPERVISION

.1 Employ Health and Safety Site Representative responsible for daily supervision of health and safety of the Work.

.2 Health and Safety Site Representative may be the Superintendent of the Work or other person designated by Contractor and shall be assigned the responsibility and authority to:
.1 Implement, monitor and enforce daily compliance with health and safety requirements of the Work.
.2 Monitor and enforce Contractor's site-specific Health and Safety Plan.
.3 Conduct site safety orientation session to persons granted access to Work Site.
.4 Ensure that persons allowed site access are knowledgeable and trained in health and safety pertinent to their activities at the site or are escorted by a competent person while on the Work Site.
.5 Stop the work as deemed necessary for reasons of health and safety.

.3 Health and Safety Site Representative must:
.1 Be qualified and competent person in occupational health and safety.
.2 Have site-related working experience specific to activities of the Work.
.3 Be on Work Site at all times during execution of the Work.

.4 All supervisory personnel assigned to the Work shall also be competent persons.

.5 Inspections:
.1 Conduct regularly scheduled safety inspections of the Work on a minimum bi-weekly basis. Record deficiencies and remedial action taken.
.2 Conduct Formal Inspections on a minimum monthly basis. Use standardized safety inspection forms. Distribute to subcontractors
.3 Follow-up and ensure corrective measures are taken.

1.14 SAFETY SUPERVISION (Cont'd)

.6 Cooperate with Park's Occupational Health and Safety representative should one be designated by Departmental Representative.

.7 Keep inspection reports and supervision related documentation on site.

1.15 TRAINING

.1 Use only skilled workers on Work Site who are effectively trained in occupational health and safety procedures and practices pertinent to their assigned task.

.2 Maintain employee records and evidence of training received. Make data available to Departmental Representative upon request.

.3 When unforeseen or peculiar safety-related hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.16 MINIMUM SITE SAFETY RULES

.1 Notwithstanding requirement to abide by federal and provincial health and safety regulations; ensure the following minimum safety rules are obeyed by persons granted access to Work Site:
.1 Wear appropriate PPE pertinent to the Work or assigned task; minimum being hard hat, safety footwear, safety glasses and hearing protection.
.2 Immediately report unsafe condition at site, near-miss accident, injury and damage.
.3 Maintain site and storage areas in a tidy condition free of hazards causing injury.
.4 Obey warning signs and safety tags.

.2 Brief persons of disciplinary protocols to be taken for noncompliance. Post rules on site.

1.17 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Departmental Representative will stop Work if non-compliance of health and safety regulations is not corrected in a timely manner.

1.18 INCIDENT REPORTING

.1 Investigate and report the following incidents to Departmental Representative:
.1 Incidents requiring notification to Provincial Department of Occupational Safety and Health, Workers Compensation Board or to other regulatory Agency.
.2 Medical aid injuries.
.3 property damage in excess of $10,000.00.
.4 Interruptions to Park operations resulting in an operational lost to a Federal department in excess of $5,000.00.

.2 Submit report in writing.

1.19 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS).

.2 Keep MSDS data sheets for all products delivered to site.
.1 Post on site.
.2 Submit copy to Departmental Representative.

1.20 BLASTING

.1 Blasting or other use of explosives is not permitted on site.

1.21 POWDER ACTUATED DEVICES

.1 Use powder actuated fastening devices only after receipt of written permission from Departmental Representative.

1.22 CONFINED SPACES

.1 Abide by occupational health and safety regulations regarding work in confined spaces.

.2 Obtain an Entry Permit in accordance with Part XI of the Canada Occupational Health and Safety Regulations for entry into an existing identified confined space located at the Park premises of Work.
.1 Obtain permit from Park Manager.
.2 Keep copy of permit issued.

.3 Safety for Inspectors:
.1 Provide PPE and training to Departmental Representative and other persons who require entry into confined space to perform inspections.
.2 Be responsible for efficiency of equipment and safety of persons during their entry and occupancy in the confined space.

1.23 SITE RECORDS

.1 Maintain on Work Site copy of safety related documentation and reports stipulated to be produced in compliance with Acts and Regulations of authorities having jurisdiction and of those documents specified herein.

.2 Upon request, make available to Departmental Representative or authorized safety Officer for Inspection.

1.24 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on Work Site in accordance with Acts and Regulations of Province having jurisdiction,

.2 Post other documents as specified herein, including:
.1 Site specific Health and Safety Plan.
.2 WHMIS data sheets.

1.25 TOOLS AND EQUIPMENT SAFETY

.1 Implement and follow a scheduled tool and equipment inspection/maintenance program at work site. Regularly check tools, equipment and machinery for safe operation and perform maintenance at pre-established time and frequency intervals as recommended by manufacturer. Include subcontractors equipment as part of the inspection process.

.2 Use standardized checklists to ensure established safety checks are stringently followed.

.3 Immediately tag and remove items found faulty or defective off site.

.4 Maintain written documentation on each inspection. Make available to Departmental Representative upon request.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 74 21 - Demolition Management and Disposal.

.2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

.1 Canadian Council of Ministers of the Environment (CCME), Environmental Quality Guidelines.

.2 Canadian Environmental Protection Act, 1999, amended on 2014-03-28.

.3 Nova Scotia Environment, Watercourse Alteration Specifications (2006) for Clear Span Permanent Bridges.

.4 Nova Scotia Department of Environment, Labour, Erosion and Sedimentation Control Handbook for Construction Sites.

.5 Environment Canada, Migratory Birds Convention Act, prohibits the deposit of oil, oil wastes, or other substances harmful to migratory birds or in any area frequented by birds and the harm of any migratory bird or its nest.

.7 Species at Risk Act.

.8 Nova Scotia Environment Act.

.9 Fisheries Act, 1985, Fisheries and Oceans Canada, amended 2013-11-25.

.10 Transportation of Dangerous Goods Act, 1992, Transport Canada, amended 2009-06-16

1.3 ENVIRONMENTAL LEGISLATION

.1 Perform all work in accordance with both federal and provincial legislation which includes, but is not limited to:
- .1 Canada Water Act;
- .2 Canada Wildlife Act;
- .3 Canadian Environmental Protection Act;

1.3 ENVIRONMENTAL LEGISLATION (Cont'd)

.4 Fisheries Act;
.5 Labour Code;
.6 Migratory Birds Convention Act;
.7 Navigation Protection Act;
.8 Occupational Health and Safety Code; and
.9 Species at Risk Act.

1.4 NOTICE

.1 The project site may be inspected to ensure compliance with federal, provincial and local environment requirements.

.2 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations.

.3 Upon receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.4 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.5 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

1.5 ENVIRONMENTAL PERFORMANCE

.1 A meeting on site will be held with the successful contractor at least two weeks prior to the commencement of construction activities. All Contractor staff and Departmental Representative's staff assigned to project are required to attend. Environmental protection requirements for the project will be reviewed, including, but not limited to watercourse maintenance or diversion, water quality management, soils disposal, dewatering management, related permit requirements and on-site reporting and monitoring procedures.

.2 The Contractor is held responsible to ensure that all necessary permits related to Environmental Protection have been obtained

1.5 ENVIRONMENTAL PERFORMANCE (Cont'd)_

and that necessary documentation is available on-site.

.3 Meet all requirements as detailed in the site specific Environmental Assessment included in Appendix B (Basic Impact Analysis, Mersey River Bridge Replacement Project). Where stipulations in Appendix B differ from those herein, the more stringent requirements shall apply. A copy of the site specific Environmental Assessment shall be available on-site in a conspicuous location.

.4 Prepare and submit the following documents as specified elsewhere in this section for review by the Departmental Representative:
.1 Diversion methodology.
.2 Construction Methodology.
.3 Erosion and Sedimentation Control Plan.
.4 Environmental/Spill Response Plan.

.5 Under the Canadian Environmental Protection Act, Federal Fisheries Act and Nova Scotia Environment Act, no sediment shall be released into any waterbody.

1.6 SITE SET-UP AND USE

.1 All site activities related to construction are to be confined within the defined project boundaries.

.2 Equip work site with appropriate and properly maintained sanitary facilities for use by workers.

.3 Do not allow workers to use Park sanitary facilities. Workers shall use Contractor-supplied sanitary facilities.

.4 Locate the sanitary facilities for use by workers at a location as approved by Departmental Representative.

.5 Garbage must be collected and removed daily from the work site. All material must be removed, transported and disposed of in accordance with existing federal, provincial, and municipal solid waste disposal guidelines

1.6 SITE SET-UP AND USE (Cont'd)

and/or regulations.

.6 Littering is prohibited.

.7 Temporary storage, parking areas, and turn-a-round facilities for contractor-related equipment and vehicles will be limited to those areas agreed to and designated by the Departmental Representative.

.8 Fires and burning of rubbish on site are not permitted.

.9 Comply with all regulations set out in the Canadian National Parks Act (S.C. 2000, C.32), in particular, the prohibition of illegal fishing, hunting and feeding of wildlife.

.10 Identify a properly contained staging area set back at the maximum available on site distance from the water's edge (30 meter minimum) for the storage of materials, liquid products (in a secure area on impermeable pads) and equipment.

.11 Exercise caution and use slow speeds while driving along the Eel River road to avoid harming wildlife. The maximum speed limit on Eel Weir Road is 20 km/hr.

.12 Stop work and contact Parks Canada staff if a species at risk is observed on the work site.

1.7 SITE CLEARING

.1 Restrict tree removal to areas indicated or designated by Departmental Representative. Minimize stripping of topsoil and vegetation.

.2 Do not clear vegetation unless approved by Departmental Representative (through Parks Canada Biologist). Clearing of vegetation is to be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of tree cutting, grubbing or uprooting.

1.7 SITE CLEARING(Cont'd)

.3 Bulldozers, graders, and other clearing and grubbing equipment should not be operated outside of designated clearing boundaries and should have a restricted turning radius.

.4 Vegetation and topsoil should not be removed to obtain fill for road construction purposes.

.5 Do not cut or remove trees and other vegetation outside the limits indicted on the drawings. Obtain written approval from Departmental representative minimum 48 hours prior to cutting or removal of any trees or snags posing a danger or safety hazard to operations.

.6 Trees and debris should not be permitted to fall outside cleared areas or into water courses.

.7 Whenever possible, organic debris removed during grading operations should be stored for use during site restoration. Such stockpiles should be located well away from any stream or water body and should be covered with coarse material or tarps to minimize wind and water erosion.

.8 Excavation for installation of new work grubbing operations should only be carried out where required. The vegetative mat should be disturbed in the grubbing operations area only.

1.8 WORK IN AND ADJACENT TO WATERWAYS

.1 Work adjacent waterways to be conducted in accordance with Nova Scotia Environment Nova Scotia Watercourse Alteration Activity Standards.

.2 All in-stream work is to be carried out under low flow conditions and during the period of June 1 to September 30.

.3 In addition to the restriction above, no work on site shall commence prior to July 15th to protect species at risk. Do not mobilize to site, store materials on site or begin work on

1.8 WORK IN AND ADJACENT TO WATERWAYS (Cont'd)

site prior to July 15th. This restriction also applies to mobilization, deliveries or any other activities on or near the site or laydown area.

.4 Do not operate construction equipment in waterways.

.5 Fording of watercourses is not permitted.

.6 Do not use waterway beds for borrow material.

.7 Do not dump excavated fill, waste material or other debris in waterways.

.8 Do not skid construction materials across waterways.

.9 Do not clean or drain equipment in waterways.

.10 Maintain watercourse flow for duration of the Work.

.11 The piers, rock apron and abutments are to be removed in their entirety.

.12 Keep a copy of the letter of advice provided by DFO on site and follow the prescribed advice. See Appendix B.

.13 Remove completely from the site daily any debris generated from clearing operations. Do not set-down or store daily debris without prior written approval by the Departmental Representative. Sites for setting down of materials shall be away from watercourses, surrounded by a natural vegetative buffer and screened from the road.

.14 All in-stream work is to be completed in the dry.

.15 Dewatering from any body of water or waterway is not permitted.

1.8 WORK IN AND ADJACENT TO WATERWAYS (Cont'd)

.16 Any fish encountered within the construction site must be removed by qualified personnel designated by the Departmental Representative. Place fish barrier nets as indicated.

.17 Do not pump or drain water containing suspended materials into waterways. Water containing suspended materials shall be pumped through an approved filter system and deposited into vegetation a minimum of 50m away from watercourses.

.18 Ensure material (both riprap and gravel) being used for instream works (or could eventually be exposed to river water) is clean of fine materials (silts and clays) that could contaminate the river.

.19 Limit machinery access to a single point on each bank.

.20 If work within the active channel (or instream work) is required:

.1 Use cofferdams to separate instream work site from flowing water (to work in dry conditions).

.2 Limit cofferdams to one side of the watercourse at any one time and ensure that they block no more than one third of the channel.

.3 Restore the original bottom grade after removing cofferdams.

.4 Treat all water pumped from behind the cofferdams to remove sediment before discharge. The clean, treated discharge shall be located in a well-vegetated area at least 50 m from the stream to prevent sediment from entering the stream.

.5 If the water becomes turbid, change work methods and revisit sediment control plan and practices to reduce turbidity levels.

.6 If potential for sediment generation is identified, a turbidity curtain may also be installed around the downstream end of each project area before starting work.

.7 A fish rescue shall be undertaken in the isolated area before construction activities begin. Prior to any fish salvage activities, a

1.8 WORK IN AND ADJACENT TO WATERWAYS (Cont'd)

fish research license issued by Nova Scotia Environment must be in place. In order to ensure that fish are relocated unharmed downstream, Departmental Representative's environmental personnel must be on site to facilitate the fish salvage activities. Provide notice prior to activities.

.8 Prior to decommission of the cofferdams, ensure that all aquatic works or works affecting the shoreline be completed and that water quality/turbidity inside the enclosed area is similar to the outside.

.21 Operate machinery on land above the high water mark wherever possible in a manner that minimizes disturbance to the banks and bed of the waterbody.

.22 Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish.

.23 Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself. In freshwater, follow these measures for design and installation of intake end of pipe fish screens to protect fish where water is extracted from fish-bearing waters:

.1 Locate screens in areas and depths of water with low concentrations of fish throughout the year.

.2 Locate screens away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.

.3 Orient the screen face in the same direction as the flow.

.4 Ensure openings in the guides and seals are less than the opening criteria to make “fish tight”.

.5 Locate screens a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.

1.8 WORK IN AND ADJACENT TO WATERWAYS (Cont'd)

.6 Provide structural support to the screen panels to prevent sagging and collapse of the screen.

.7 Install manifolds on large cylindrical and box-type screens to ensure even water velocity distribution across the screen surface. Provide solid materials for ends of structure and cap the end of the manifold capped.

.8 Provide heavier cages or trash racks fabricated from bar or grating to protect the finer fish screen, especially where there is debris loading (woody material, leaves, algae mats, etc.). Provide 150mm spacing between bars unless approved otherwise by Departmental Representative.

.9 Make provision for the removal, inspection, and cleaning of screens.

.10 Ensure regular maintenance and repair of cleaning apparatus, seals, and screens is carried out to prevent debris-fouling and impingement of fish.

.11 Shut down pumps when fish screens are removed for inspection and cleaning.

1.9 DISPOSAL OF WASTE

.1 Do not burn or bury rubbish and waste materials on site. Remove all garbage from site daily.

.2 Do not dispose of waste or volatile materials, such as mineral spirits or oil into waterways, storm or sanitary sewers.

.3 Dispose of uncontaminated construction/demolition materials which cannot be recycled or reused, at an approved construction and debris disposal site.

.4 Concrete waste:

.1 Do not discharge residual or rejected concrete on site.

.2 Immediately clean any accidental release of concrete on site prior to solidification.

.3 Do not wash and clean concrete vehicles on site.

.4 Perform dumping of residual material and truck cleaning operations only at the concrete

1.9 DISPOSAL OF WASTE (Cont'd)

plant. Follow environmental regulations and good practices as approved by the Provincial Department of the Environment and other authorities having jurisdiction.

.5 All waste (demolition, recyclables, and hazardous) shall be removed and placed into bins as frequently as possible.

.6 During transport of waste, bins must be covered to ensure waste does not escape and pollute roadways, public lands or private property.

.7 Keep all work sites free of edible and other garbage that could attract or harm wildlife. Inspect site for trash or spilled foods. Remove all garbage, leftover food, and litter daily from the site.

.8 Never feed animals. Feeding wildlife damages their health, alters natural behaviors, and exposes them to predators and other dangers.

.9 Protect wildlife and your food by storing rations and trash securely.

.10 Submit waste manifests to Departmental Representative.

1.10 DRAINAGE

.1 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

.2 Provide temporary drainage and pumping as necessary. Keep excavations at site clean, free of standing water, and loose soil.

.3 Protect open excavations against flooding and damage due to runoff.

.4 Watercourse shall be maintained within construction area. Submit construction methodology to Departmental Representative before proceeding. Methodology to include excavation dewatering techniques, maintenance

1.10 DRAINAGE (Cont'd)

of watercourse flow and isolation from construction areas for duration of construction.

.5 Do not pump or drain water containing suspended materials into waterways. Water containing suspended materials shall be pumped through an approved filter system and deposited into vegetation a minimum of 50 m away from watercourses.

1.11 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this contract.

.2 Control emissions from equipment to Federal, Provincial and local authorities emission requirements.

.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads. Water used for dust control must have prior approval of the Departmental Representative. All other chemicals for dust control are not permitted and will not be reviewed.

.4 Machinery is to arrive on site in a clean condition and be maintained free of fluid leaks. Departmental Representative will inspect equipment and reject any equipment not meeting these standards.

.5 Cleaning of heavy equipment, including concrete trucks, shall not be cleaned within the park boundaries.

.6 Minimize idling of engines and equipment at all times.

.7 Monitor dust conditions visually and take actions to suppress dust as necessary. Take whatever measures necessary to ensure that dust and debris from activities do not enter any surface waters or escape beyond the work area. Mitigation measures include; termination of operations during period of high wind, the use of low dust generating

1.11 POLLUTION CONTROL (Cont'd)

technologies, vacuuming of surfaces to remove dust and debris and the use of temporary barrier or enclosures; calcium chloride shall not be used as a dust suppressant due to the proximity of the work site to water.

1.12 EARTH MOVEMENT

.1 Where engineering and environmental requirements can be met, excavated materials from this project may be used for backfilling for the project, at the discretion of the geotechnical engineer designated by the Departmental Representative.

.2 All surplus excavated material must be disposed of at an approved location and in an approved manner.

.3 Rock material from the abutments, piers and rock aprons are not to be reused in another aquatic location.

.4 Any proposed sources of borrow material shall be approved by the Departmental Representative prior to start-up. Fill materials or aggregate used during this Contract shall not contain sulphide-bearing material as defined by the proposed Guidelines for Development on Slates in Nova Scotia (April, 1991).

.5 When vegetation must be removed, then the extent and duration of exposure should be kept to a minimum. Plan the phases of development so that only areas that are activity being developed are exposed.

.6 Any excavated material that is to be stockpiled on site must be covered to prevent erosion and minimize contaminated runoff.

.7 Areas of unstable clays should be left undisturbed.

.8 Where there is potential for severe erosion and/or downstream "siltation", cover excavations during major precipitation events as directed by Departmental Representative.

1.13 EROSION AND SEDIMENT CONTROL

.1 Appropriate preventative controls should be in place as soon as equipment is mobilized to the site and at all times during construction to prevent undue erosion and sedimentation. Provide to the Departmental Representative for approval seven days before start-up an Erosion and Sedimentation Control Plan. Comply with the Province of Nova Scotia's Manual entitled Erosion and Sedimentation Control, Handbook for Construction Sites. Incorporate necessary silt fences, silt traps, plastic lined trenches and ditches, temporary culverts or diversions as approved by the Departmental Representative. Supply, install and maintain all sedimentation and erosion control features for duration of the Work, in accordance with the approved plan. Remove all sedimentation and erosion control upon completion of the work and when requested by the Departmental Representative.

.2 The plan must cover all activities within the limits of the construction, laydown and traffic diversion areas.

.3 The plan must acknowledge the potential for excavated materials to be contaminated and may be a source of contaminated leachate / runoff.

.4 Backfilled slopes should be mechanically compacted and grades should be consistent with the prevailing down-slope grade. Where immediate re-vegetation is needed to stabilize an area, use annual grasses such as oats (weed, fertilizer and pesticide free mixes) or other temporary stabilization measures as directed by the Departmental Representative.

.5 Prior to carrying out work, check long range weather forecast to ensure that there is adequate time before forecast of heavy rain storms to stabilize the work. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation. Provide details of stabilization plan to Departmental Representative for review.

.6 Maintain a stockpile of appropriate erosion

1.13 EROSION AND SEDIMENT CONTROL (Cont'd)

and environmental protection materials (e.g. silt fences, straw bales, wood chips, clean rock fill and aggregate base course) on site at all times.

.7 Do not refuel equipment on site. Submit location, method and containment procedure for refueling vehicles and equipment to Departmental Representative.

.8 Remove accumulated sediments, debris and/or waste prior to removing control measures, and safely dispose of this material at a site licensed to receive it in accordance with all federal, provincial and municipal laws, regulations and guidelines;

.9 Inspect erosion and sediment control measures on a daily basis and maintain as necessary.

1.14 HAZARDOUS MATERIALS

.1 Transport hazardous materials and hazardous waste in compliance with the Transportation of Dangerous Goods Act.

.2 Dangerous goods, whose release into the environment could cause adverse effect, should be stored and handled in a manner which gives due regard for workers and public safety, and for the protection of the environment.

.3 No material toxic to fish or any aquatic life shall be permitted to enter any stream, river, or lake. This shall include, but not be limited to lubricants, fuels, testing fluids, insecticides, detergents, herbicides, cement, lime or concrete.

.4 The management of fuels, lubricants and chemicals must meet with the requirements of the Nova Scotia Dangerous Goods and Hazardous Wastes Management Criteria and all other appropriate provincial and federal regulations.

.5 Fuel is not to be stored on site.

1.14 HAZARDOUS MATERIALS (Cont'd)

.6 Fueling and lubricating of equipment cannot be done closer than 100 m to any watercourse.

.7 Refueling of equipment will occur off site on hardened surfaces only with adequate containment and care taken to avoid spills.

.8 All refueling and lubricating operations should employ protection measures such as drip pans, to reduce the potential for escape or petroleum products to the environment.

.9 The Departmental Representative must be immediately contacted after a spill of any fuel or lubricant, and after any amount of other chemical products has escaped.

.10 Departmental Representative may suspend work following the improper handling of hazardous materials.

.11 Storage of hazardous material, including explosives, shall not be permitted, except for quantities which shall normally be expected to be utilized in a day of Work, and which are not permitted to stockpile.

.12 In areas where quantities of hazardous materials are stored, maintain on-site adequate supply of proper spill control equipment/items. This includes but is not limited to: spill kits, MSDSs, absorbents, containers, caution sign/tape, and berming devices to contain spills. Spill control equipment shall be able to contain not less than 110% of the largest possible spill.

.13 The handling and storage of toxic materials (e.g., fuel, lubricants, oils, grouting, etc.) shall be carried out in a controlled area to avoid contamination of soils and surface waters. Hazardous materials disposal containers and personal safety gear shall be provided, as required, for the handling of any such materials. Hazardous materials shall be taken to a licensed site for proper disposal.

1.14 HAZARDOUS MATERIALS (Cont'd)

.14 Ensure all personnel on-site are trained in the use of spill control and response procedures, including spill source and receptor recognitions, spill prevention techniques, spill response measures and spill reporting protocol.

.15 Any spills will be immediately contained and cleaned up in accordance with provincial regulatory requirements.

1.15 ENVIRONMENTAL INCIDENT OR EMERGENCY

.1 In the event of an environmental incident or emergency such as:
.1 Chemical spill or petroleum spill;
.2 Poisonous or caustic gas emission;
.3 Biological or chemical explosion;
.4 Hazardous material spill;
.5 Sewage spill;
.6 Contaminated water into waterways.
.7 Notify the Contractor's job superintendent.
.8 Call the local emergency services and give type of emergency.
.9 Notify the environmental emergency reporting system (1-800-565-1633).
.10 Notify the Departmental Representative.

.2 Submit to Departmental Representative a copy of Contractor's Environmental/Spill Response Plan for approval.

1.16 BIRDS

.1 Migratory birds, their nests and eggs and nestlings are protected under the Migratory Birds Convention Act (1994). Minimize disturbance to all birds on site and adjacent areas during the entire course of the Work. Notify Departmental Representative if a nest is identified. Departmental Representative will consult with Parks Canada Biologist.

1.17 CULTURAL RESOURCES

.1 Plan work and place adequate controls so that there is no disturbance to the eel weir in the immediate vicinity to the bridge.

1.18 VEGETATION

.1 Make every reasonable effort to avoid introducing invasive weeds. Check for and clean all equipment, materials, and footwear of plant seeds, roots, and soil that could contain plant parts prior to arrival in the Park.

.2 Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation.

.3 Use a coir mat and native topsoil to allow natural re-vegetation by the native seed bank.

.4 If there is a serious erosion risk then use annual grasses such as oats, ensuring these are weed, fertilizer and pesticide free mixes.

.5 Do not use fertilizers.

1.19 TREATED WOOD

.1 Creosote is not approved for use in Parks.

.2 Make workers aware of the possible health risks associated with exposure to any existing CCA or creosote treated timber as well as the recommended safe practices for handling such materials.

.3 Dispose of treated wood wastes including saw-dust outside of the Park, and in accordance with all applicable Provincial and Municipal regulations. Pay attention to disposal of replaced guiderail posts and abutment and pier members that have been treated with creosote.

.4 Water contamination by preservative treated wood:

.1 Preservative treated lumber and timber, whether plant or site treated, shall be cured for a minimum of 30 days from date of the treatment application before their installation in areas which will be in contact with the water.

.2 Do not cut treated wood lumber over the surface of a watercourse or wetland.

1.19 TREATED WOOD (Cont'd)

.3 Do not use liquid applied preservative products over the surface of a watercourse or wetland.

.4 Do not use timber and lumber treated with creosote, petroleum or pentachlorophenol for any part of the work.

1.20 MICROPILE DRILLING

.1 For drilling into riverbeds:

.1 Ensure the pipe is clean of all contaminants before it is set in place;

.2 Ensure the pipe around the drill bit extends far enough above the water level to prevent material from spilling out;

.3 Leave the pipe in place for enough time to let the majority of the disturbed material settle in place.

.2 If drilling fluids are required, only fresh water shall be used for fluid preparation. Drilling fluids shall comply with industry standards and practices and shall be applied and used as recommended by the manufacturer. No toxic or hazardous substances are to be added to the drilling fluid at any time. Drilling fluid should be biodegradable, and it should be contained and recycled. The quality of the drilling fluid shall be maintained by the driller to prevent contamination of all water-bearing and potential water-bearing formations in the bore hole;

.3 Log when the drilling starts and stops and provide logs to Departmental Representative.

.4 Install an absorbent spill sock around the perimeter of all vertical borehole drilling sites to capture concrete materials, waste water and/or slurry/drilling fluids and to prevent any by product materials from entering the watercourse either directly, or indirectly. Use:

.1 Vacuuming equipment as required.

.2 Concrete slurry water filtration.

.3 or slurry separator/slurry flocculation technology.

1.20 MICROPILE DRILLING (Cont'd)

.5 Stabilize drill waste materials to prevent them from entering the watercourse. This includes covering spoil piles with biodegradable mats or tarps as well as capturing the top portions of sediment in a leak proof garbage container.

.6 Prior to commencement of micropile drilling, debris and dust control measures will be installed and maintained to ensure concrete dust/fines as a result of the activities do not enter the watercourse.

.7 Dispose of all soil cuttings and purged groundwater collected during drilling outside of the Park in accordance with the applicable provincial regulations. Dispose of wastes in a timely manner once the field work is complete.

.8 All lubricants used on drill pipe, bits, casings or other down-hole applications shall be free of any toxic or harmful contaminants.

1.21 CONCRETE

.1 When coring, clean water will be used and coring water will be pumped into a re-circulating tank.

.2 As concrete and concrete leachate is alkaline and highly toxic to fish and other aquatic life, ensure that all works involving the use of concrete, grout, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, grouting, concrete, concrete fines, wash or contact water into any watercourse.

3. All concrete, sealants, or other compounds shall be used according to the appropriate Product Technical Data Sheet, stating guidelines and methods for proper use, and provided by the manufacturer of the product.

1.22 SITE DECOMMISSIONING

.1 Unless prior permission from the Departmental Representative is obtained, all contractor equipment, facilities and materials must be removed from the site at the finish of each work phase, or if work is suspended due to weather or other circumstances, upon the suspension of work activities.

.2 All work sites must be returned to a neat and tidy condition upon site abandonment.

1.23 SOILS AND VEGETATION

.1 Ensure that equipment and traffic enter the site off of existing roads. Use the most direct route to enter and leave the Work site.

.2 Movement of equipment is not permitted beyond the pre-designated, surveyed and marked limits of construction and laydown areas. Within these areas, movement of equipment and vehicles on vegetated areas should be minimized as practical to reduce soil compaction and rutting. During periods of heavy precipitation or high wind events, activities that cause soils compaction, rutting, or admixing, shall be avoided.

.3 Store equipment and machinery in existing hard packed areas where possible.

.4 Protect trees and plants on site and adjust protection measures where indicated.

.5 Restrict tree removal to areas indicated or designated by Departmental Representative.

.6 Remove vegetation/brush from targeted areas by non-chemical means.

.7 Salvage vegetation and store at approved sites for future replacement as required and directed by the Departmental Representative.

.8 Do not use the treed areas for storage, stockpiling or any other purpose. Do not dump or flush any contaminants into areas near trees.

1.23 SOILS AND VEGETATION (Cont'd)

.9 The Contractor is responsible for ensuring the Departmental Representative is aware prior to excavation where the limit of the cut will be in respect to trees.

.10 Minimize stripping of topsoil and vegetation.

.11 Remove soil layers before any construction procedures commence.

.12 For soil removal, topsoil is to be removed separately from subsoil. Note that the depths of the soil horizons will vary.

.13 Pile soil in berms in locations as directed by the Departmental Representative. Stockpile height not to exceed 2.5 - 3m. The excavated material must be stockpiled separately with no less than 1.0m of space between the final stockpiles.

.14 Stockpiles are to be covered to sure erosion control and protect the piles against compaction and contamination.

.15 do not encroach onto protected areas.

.16 In the event that soil contamination is encountered during the project, cease activities on site and notify the Departmental Representative.

.17 Stabilize soil prior to project completion.

1.24 FIRES

.1 Fires and burning of rubbish on site is not permitted.

PART 2 – PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 – EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 REFUELING

.1 Refueling of equipment to be performed in locations as directed by Departmental Representative.

.2 Do not refuel equipment within 100 metres of any watercourse or storm water catch basin unless protection against spills is in place and location is approved by Departmental Representative.

.3 Use petroleum containers approved for products with no spill fill spouts for dispensing fuels. The sure pour nozzle to have self closing valve, prevent any flow of fuel until the nozzle is inserted into the receiving container. On removal from the receiving container the slide valve closes to eliminate any fuel spill. Nozzle to be equipped with its own automatic vent eliminating the need for the user to open or close air inlets on the pouring container.

.4 Nozzle to support the weight of the pouring container. Nozzles to automatically stop the flow when the receiving container becomes full. The nozzle to be such that it reduces evaporative losses of volatile organic compounds during the fuel transfer.

.5 All spills of hydrocarbon based products such as gasoline, kerosene, naphtha, lubricating oils, engine oils, greases and de-icing fluids or antifreeze **no** matter how large or small to be reported to Departmental Representative and the Park’s Environmental Protection Officer (EPO).

.6 Oil changes or equipment repairs in the field or on Parks Canada land are not permitted.

.7 Refueling to be performed on level surfaces, PCC Portland cement concrete or HMAC surfaces when approved by the Departmental Representative unless otherwise directed.

.8 Contractor to have drip pans sized for amounts of product to be recovered and customized to fit under pieces of equipment to perform routine

1.1 REFUELING (Cont'd)

maintenance to equipment while maintaining equipment on property. Drip Pans to be used whenever leaving equipment on site or parking overnight when not in use.

.9 Parking of equipment on site to be on level ground in locations away from watercourses and as approved by Departmental Representative. Equipment with leaks or poor mechanical repair to be removed from site when so ordered by Departmental Representative.

1.2 SPILL CONTROL KIT

.1 Contractor to have at the work site a spill control kit consisting of the following minimum types of equipment:

.1 a spaded shovel;
.2 a stable broom;
.3 a broad nosed shovel;
.4 a container(s) suitable, compatible to and of sufficient size to contain petroleum products being used with equipment;
.5 Absorbents;
.6 rags;
.7 metal container for soiled rags;
.8 Booms when working next to a watercourse that will traverse the width of the watercourse by two times; and
.9 Spill control kit to be inspected and approved by both the Nova Scotia Department of Environment & Conservation and the Departmental Representative prior to Work commencing. Spill control kits to be available to Contractor employees at all areas where Work of the Contract is being performed and at all times during the course of the Contract.
.10 Contractor employees to be trained in the use of the spill control kit and the equipment they contain.

1.3 SPILLS

.1 Disposal of spilled materials to be off Parks Canada property and at approved locations for materials to be disposed of.

.2 When parking of equipment on site, the equipment is to be secured from entry, inspected for leaks and the ground protected from leaks.

1.3 SPILLS (Cont'd)

.3 Contractor to protect all wells, catch basins, drywells, drains and watercourses from contamination in event of a spill.

.4 All equipment to be used for the Work of the Contract to be inspected by the Departmental Representative for leaks. Equipment not in good repair to be removed/repaired when directed by Departmental Representative.

.5 Spills in excess of 74 litres to be reported immediately to Departmental Representative, the Park's Environmental Protection Officer (EPO) and the Nova Scotia Department of Environment and Conservation.

.6 Contractor to immediately remove as much or all of the contaminated soils as possible, from any spills created from Work of the Contractor.

.7 Contaminated soils/materials to be placed in containers compatible to the contaminants.

.8 Any remaining clean-up to be performed at no extra cost to Parks Canada. Clean-up to be to the Departmental Representative's satisfaction.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 03 30 00 - Cast-In-Place Concrete.

.4 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.5 Section 31 24 13 - Roadway Embankments.

.6 Section 32 11 16.01 - Granular Sub-Base.

.7 Section 32 11 23 - Aggregate Base Courses.

1.2 CONTRACTOR RESPONSIBILITY

.1 Departmental Representative's Quality Control methods shall not relieve the contractor from their responsibility for Quality Assurance, including but not limited to: procedures, controls internal and independent testing.

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.

.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.

1.3 INSPECTION (Cont'd)

.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 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative, except for the following which remain part of the Contractor's responsibilities:
.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 Mill tests and certificates of compliance;
.4 Tests as specified within various sections designed to be carried out by Contractor under the supervision of Departmental Representative; and
.5 Additional tests specified.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 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, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.6 TESTING BY CONTRACTOR

.1 Provide all necessary instruments, equipment and qualifies personnel to perform tests designated as Contractor's responsibilities herein or elsewhere in the Contract Documents.

.2 At completion of tests, turn over two (2) copies of fully documented test reports to Departmental Representative. Additionally, obtain other copies in sufficient quantities to enable one (1) complete set of test reports to be placed in each of the maintenance manuals specified in Section 01 78 00 - Closeout Submittals.

.3 Submit mil test certificates as specified in various sections.

.4 Furnish Test results and mix designs as specified in various sections.

1.7 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 on site.

1.8 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner 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.

1.9 REPORTS

.1 Submit 1 PDF copy or 4 copies of inspection and test reports to Departmental Representative.

.2 Provide copies to Subcontractor of work being inspected or tested.

1.10 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

1.11 PDA TESTING

.1 Submit PDA test results for all piles tested. Ensure Departmental Representative is made aware of all testing at least five (5) working days before conducting tests.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 52 00 - Construction Facilities.

.2 Section 01 56 00 - Temporary Barriers and Enclosures.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use or as directed by Departmental Representative.

1.3 DEWATERING

.1 Provide temporary drainage to keep excavations and site free from standing water.

.2 Ensure discharge is not contaminated with sediment, oil, etc.

1.4 TEMPORARY HEATING AND VENTILATION

.1 Pay for costs of temporary heat, and pumping used during construction, including costs of supply, installation, fuel, operation, maintenance, and removal of equipment, if applicable.

.2 Maintain strict supervision of operation of temporary heating and pumping equipment:
- .1 Conform with applicable codes and standards.
- .2 Enforce safe practices.
- .3 Prevent abuse of services.
- .4 Prevent damage to finishes.

.3 Provide temporary heating and hoarding as required to:
- .1 Facilitate progress of Work.
- .2 Protect Work and products against dampness and cold.
- .3 Prevent moisture condensation on surfaces.

1.4 TEMPORARY HEATING AND VENTILATION (Cont'd)

.3 (Cont'd)

.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.

.5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Hoard, heat and provide protection for curing concrete in accordance with Section 03 30 00 - Cast In Place Concrete.

.5 Allow Departmental Representative to Inspect methods for fire safety.

1.5 TEMPORARY POWER AND LIGHT

.1 Departmental Representative will not provide or pay for temporary power during construction for temporary lighting operating of power tools, or any other purpose required for the work.

.2 Generate temporary power as required. Pay all costs for supply, installation, maintenance and removal.

.3 Temporary power for electric cranes and other equipment requiring in excess of above is responsibility of Contractor.

.4 Provide and maintain temporary lighting throughout project.

.5 Coordinate with all Parks Canada/PWGSC Staff.

.6 Supply and install temporary facilities for power to approval of local power supply authorities.

.7 Provide and pay for temporary power and lights for use of Departmental Representative site office.

1.6 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone, fax and data hook up, line(s) and equipment as necessary for own use and use of Departmental Representative.

1.7 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

1.8 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

.3 All surface modifications are restricted to the identified corridors. Accurate delineation of these corridors by field survey is required prior to commencement of construction.

1.9 STORAGE SHEDS

.1 Provide adequate weathertight sheds with raised floors, for storage of materials, tools and equipment which are subject to damage by weather.

1.10 ACCESS

.1 Provide and maintain adequate access to project site.

.2 Provide snow removal during period of work.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

.4 All surface modifications are restricted to the identified construction corridors. Accurate delineation of these corridors by field survey prior to commencement of construction is required.

1.10 ACCESS (Cont'd)

.5 All vehicle traffic is restricted to existing roadways or as indicated in project plans. A field visit will be scheduled with the Contractor for locational confirmation and all areas of proposed construction will be marked in the field with orange flagging tape prior to commencement of work.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 51 00 - Temporary Utilities.

.2 Section 01 56 00 - Temporary Barriers and Enclosures.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CGSB 1-GP-189M-2000, Primer, Alkyd, Wood, Exterior.
.2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
.1 CAN3-A23.1-/A23.2-14 (R2014) Concrete Materials and Methods for Concrete Construction/ Method of Test for Concrete.
.2 CSA-0121-CSA O121-08 (R2013), Douglas Fir Plywood.
.3 CAN/CSA-Z321-96 (R2006), Signs and Symbols for the Occupational Environment.

1.3 INSTALLATION AND REMOVAL

.1 Provide construction facilities in order to execute work expeditiously.

.2 Remove from site all such work after use.

.3 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.4 Gravel areas to prevent tracking of mud. Identify areas that require gravelling.

.5 Indicate use of supplemental or other staging area.

1.4 SCAFFOLDING

.1 Provide and maintain scaffolding, ladders and temporary stairs.

1.5 HOISTING

.1 Provide, operate and maintain hoists cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

.2 Hoists cranes shall be operated by qualified operator.

1.6 SITE STORAGE/LOADING

.1 Contractor's use of site storage and loading shall be limited to an area within limits of traffic diversion. Any conditional areas required shall be approved by Departmental Representative prior to use.

.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.7 CONSTRUCTION PARKING

.1 Parking will be limited to Contractor vehicles and equipment required to carry out work only, 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 site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.8 FIRST AID

.1 Provide a clearly marked and fully stocked first-aid case in a readily available location.

1.9 OFFICES

.1 Provide for use of Departmental Representative, an office space within a lit and ventilated mobile type trailer, with heating and cooling to maintain a temperature of 22 degrees Celsius. Office shall be of sufficient size to accommodate site meetings as required, and be furnished with a desk, chair, drawing laydown table and three-level shelf. All exterior doors shall be lockable.

.2 Limit the total number of trailers on site to one. This includes Contractor's office and tool storage. The trailer shall be located within the parking lot adjacent to Mersey River at a location approved by the Departmental Representative.

.3 The office space for the Departmental Representative shall be ready for use no more than 5 working days prior to start of work. Site office shall remain on site until final completion certificate is signed by Departmental Representative.

.4 Pay for and provide power, light, telephone, fax and data services for the Departmental Representative site office. Installations shall be inclusive of all required accessories to make complete and functional.

.5 Provide a clearly marked and fully stocked first-aid case in a readily available location.

.6 Contractors and Subcontractors may provide their own offices as necessary. Location of these offices to be to the satisfaction of the Departmental Representative.

1.10 EQUIPMENT TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.11 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.12 CONSTRUCTION SIGNAGE

.1 No other signs or advertisements, other than warning signs, are permitted on site.

.2 Signs and notices for safety and instruction shall be in both official languages Graphic symbols shall conform to CAN3-Z321.

.3 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.

1.13 CLEAN-UP

.1 Clean continuously as work progresses.

.2 Remove construction debris, waste materials, packaging material from work site daily.

.3 Clean dirt or mud tracked onto paved or surfaced roadways.

.4 Store materials resulting from demolition activities that are salvageable.

.5 Stack stored new or salvaged material not in construction facilities.

1.14 HEATING AND HOARDING

.1 Provide temporary heating and hording 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, installation and curing of materials.

1.14 HEATING AND HOARDING (Cont'd)

.1 (Cont'd)
.5 Provide adequate ventilation to meet health regulations for safe work environment.

.2 Hoard, heat and provide protection for curing concrete in accordance with Section 03 30 00 - Cast-in-Place Concrete.

.3 Parks Fire Inspector will inspect methods.

.4 Comply with Parks Fire requirements and implement corrective measures as directed by Base Fire Inspector.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Government of Canada Weights and Measures Act 1985.

.2 Government of Canada Weights and Measures Regulations 1990.

1.2 CERTIFICATION

.1 Prior to use, Contractor shall have weight scales certified as meeting requirements of Statues of Canada, Weights and Measures Act. Display certificate in a visible location.

1.3 OPERATION

.1 Contractor shall provide a weigher at scale location to issue tickets and prepare a daily summary sheet to submit to Departmental Representative. Also, Contractor shall provide checker on sire to receive materials, prepare daily summary and monitor spread rates.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Weigh scales: of sufficient capacity to weigh loaded vehicles in a single operation. The weigh scale shall be calibrated in SI units.

.2 Scale house:
- .1 To enclose mass indicator and where weigher can perform work and maintain records.
- .2 Waterproof, one sliding window facing scale platform, one other window for cross ventilation, entrance door not to fact on to scale platform.

.3 Approved weigh tickets, in triplicate, with consecutive serial numbers shall be provided by Contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Provide, install and maintain scales and scale house at location approved by Departmental Representative.

.2 Remove scales and scale house when no longer required and as directed by Departmental Representative. Level approach ramps.

.3 The work shall include installation of the anchorage assemblies.

3.2 MAINTENANCE

.1 Maintain scale platform and scale mechanism clean and free from gravel, asphalt, snow, ice and debris.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section is to provide traffic control as stipulated in the Nova Scotia Transportation and Infrastructure Renewal Temporary Workplace Traffic Control Manual (TCM).

.2 Road closure is permitted at bridge site for duration of work on site. No full temporary structure is required.

.3 Provide adequate space for vehicle turn-around without need to enter site.

.4 Make provision to allow park supplies and emergency response vehicles to safely cross the site at scheduled intervals.

.5 A Traffic Control Plan must be approved by the Departmental Representative prior to commencing any work. Traffic Control Plan to be submitted prior to the pre-construction meeting.

1.2 RELATED WORK

.1 Section 01 11 00 - General Instructions.

.2 Section 01 35 29.06 - Health and Safety Requirements.

.3 Section 01 56 00 - Temporary Barriers and Enclosures.

1.3 REFERENCE STANDARD

.1 Nova Scotia Department of Transportation and Infrastructure Renewal
.1 Nova Scotia Temporary Workplace Traffic Control Manual, 2009 (R2012).

1.4 CONSTRUCTION VEHICLES

.1 Do not allow more than two passenger vehicles (including cars, pick-up trucks and crew-cab trucks) at the site at any given time. This includes vehicles for contractor, subcontractors and other agencies related to the work.

1.4 CONSTRUCTION VEHICLES (Cont'd)

.2 Sign-in with the Park Office all construction vehicles and passenger vehicles prior to entering the site. Display record of sign-in as "permit" clearly visible on the dashboard of the vehicle.

.3 Co-ordinate transportation of contractor and subcontractor personnel to and from the site to a designated parking area outside of the Park as directed by Departmental Representative.

1.5 PROTECTION OF PUBLIC TRAFFIC

.1 Comply with requirements of Acts, Regulations and By-Laws in force 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 travelled way:
.1 Place equipment in position to present minimum of interference and hazard to travelling public.

.3 Do not close any lanes of roadway without approval of Departmental Representative. Before re routing traffic, erect suitable signs and devices in accordance with instructions contained in the TCM. Provide sufficient crushed gravel to ensure a smooth riding surface during work.

.4 Keep travelled way well graded, free of pot holes and of sufficient width that required number of lanes of traffic may pass.

.5 Provide and maintain reasonable road access and egress to property fronting along or in vicinity of work under Contract unless approved otherwise by Departmental Representative.

.6 All flag persons and traffic control personnel shall have successfully completed a traffic control training course approved by the Workplace Health, Safety and Compensation Commission of Nova Scotia. Proof of training for all persons shall be available on site at all times.

1.6 INFORMATIONAL AND WARNING DEVICES

.1 Provide and maintain signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from project work which may require road user response.

.2 All traffic signs are to be bilingual or symbolic and shall be Level 1 reflectivity.

.3 Supply and erect signs, declinators, barricades and miscellaneous warning devices as specified in TCM.

.4 Place signs and other devices in locations recommended in the TCM.

.5 Provide an Accredited Sign Supervisor to be on site at all times when traffic diversion is taking place. The Accredited Traffic Control Sign Supervisor will be responsible to supervise the placement and dismantling of all temporary condition signs and devices that indicate to the road and park users that construction activity exist and also to ensure that proper traffic control procedures are carried out in accordance with the TCM. The Accredited Sign Supervisor is considered part of the contractor’s supervision and administration staff and compensation for the provision this individual is considered incidental to the work.

.6 A Traffic Control Plan must be approved by the Departmental Representative prior to commencing any work.

.7 Continually maintain traffic control devices in use by:
.1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
.2 Removing or covering signs which do not apply to conditions existing from day to day.

1.7 CONTROL OF PUBLIC TRAFFIC

.1 Provide traffic control personnel who have valid provincial certification and are trained in accordance with and properly equipped as specified in the TCM, in following situations:
.1 When public traffic is required to pass working vehicles or equipment which may block all or part of travelled 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 workers or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.
.4 Where temporary protection is required while other traffic control devices are being erected or taken down.
.5 For emergency protection when other traffic control devices are not readily available.
.6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

.2 All Traffic Control Personnel shall be equipped with portable radios of sufficient range to ensure continuous communication within the traffic control zone.

.3 All construction vehicles shall operate in accordance with and are subject to traffic control restrictions and operations in place on the project.

.4 In addition to traffic control during the normal hours of work, a responsible person on site at all times to monitor that the traffic signage is working properly (including nights, weekends and holidays).

1.8 TRAFFIC MANAGEMENT PLAN REQUIREMENT

.1 Contractor to provide a Traffic Control plan, prior to construction, for approval by the Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 51 00 - Temporary Utilities.

.2 Section 01 52 00 - Construction Facilities.

1.2 REFERENCES

.1 Nova Scotia Temporary Workplace Traffic Control Manual, latest edition.

.2 Canadian General Standards Board (CGSB)
.1 CGSB 1.189M-2000, Primer, Alkyd, Wood, Exterior.
.2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.3 Canadian Standards Association (CSA International)
.1 CSA-O121-MO121-08 (R2013), Douglas Fir Plywood.

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.4 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations.

.2 Provide as required by governing authorities.

1.5 ACCESS TO SITE

.1 Provide and maintain access roads, as may be required for access to Work.

1.6 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent Traffic Control Persons, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect the public.

1.7 FIRE ROUTES

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 Within text of each specifications section, reference may be made to reference standards.

.2 Conform to these reference standards, in whole or in part as specifically requested in specifications.

.3 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.4 Cost for such testing will be borne by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

.5 Conform to latest date of issue of referenced standards in effect on date of submission of Tenders, except where specific date or issue is specifically noted.

1.2 QUALITY

.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, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

1.2 QUALITY (Cont'd)

.3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout bridge site.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions.

1.3 AVAILABILITY

.1 Immediately upon signing 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 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

1.4 STORAGE, HANDLING AND PROTECTION (Cont'd)

.4 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.5 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

.2 Transportation cost of products supplied by Owner will be paid for by Owner. Unload, handle and store such products.

1.6 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

.4 Unload products in accordance with manufacturer's instructions. Do not rely on labels provided with products. Obtain written instructions directly from manufacturer.

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 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.8 CO-ORDINATION

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

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.

1.10 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or pedestrian and vehicular traffic.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

.1 Owner's identification of existing survey control points and property limits.

1.3 QUALIFICATION OF SURVEYOR

.1 Qualified registered land surveyor, licensed to practice in Province of Nova Scotia, acceptable to Departmental Representative.

1.4 SURVEY REFERENCE POINTS

.1 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.

.2 Make no changes or relocations without prior written notice to Departmental Representative.

.3 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

.4 Require surveyor to replace control points in accordance with original survey control.

1.5 SURVEY REQUIREMENTS

.1 Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.

.2 Establish lines and levels, locate and lay out, by instrumentation.

1.5 SURVEY REQUIREMENTS (Cont'd)

.3 Stake for grading, fill and topsoil placement.

.4 Stake slopes.

.5 Establish pipe invert elevations and location of any exposed pipe not being removed under this contract.

.6 Record elevation and location of all existing and installed end caps of abandoned underground services.

.7 Survey the construction boundaries as identified on the design drawings. Mark all limbs and trees that require removal and notify Departmental Representative for review minimum 48 hours prior to any cutting.

1.6 EXISTING SERVICES

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

1.7 RECORDS

.1 Maintain a complete, accurate log of control and survey work as it progresses.

.2 On completion of site works, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

.3 Record locations of maintained, re-routed and abandoned service lines.

1.8 SUBMITTALS

.1 Submit name and address of Surveyor to Departmental Representative.

.2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform with Contract Documents.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTION

.1 Section 01 77 00 - Closeout Procedures.

1.2 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use clearly marked separate bins for recycling.

.6 Remove waste material and debris from site and deposit in waste container at end of each working day.

.7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.8 Dispose of waste materials, and debris off site at approved facilities.

1.3 FINAL CLEANING

.1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

1.3 FINAL CLEANING (Cont'd)

.3 Prior to final review, remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products and debris other than that caused by Owner or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.7 Sweep and wash clean bridge deck and solid surfaced areas.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

1.2 DEFINITIONS

.1 Materials Source Separation Program (MSSP): Consists of series of ongoing activities to separate reusable and recyclable waste material into material categories from other types of waste at point of generation.

.2 Recyclable: Ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse by others.

.3 Recycle: Process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.4 Recycling: Process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

.5 Reuse: Repeated use of product in same form but not necessarily for same purpose. Reuse includes:
.1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
.2 Returning reusable items including pallets or unused products to vendors.

.6 Salvage: Removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.7 Separate Condition: Refers to waste sorted into individual types.

1.2 DEFINITIONS (Cont'd)

.8 Source Separation: Acts of keeping different types of waste materials separate beginning from first time they became waste.

1.3 DOCUMENTS

.1 Maintain at job site, one copy of following documents:
.1 Material Source Separation Plan.

1.4 SUBMITTALS

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

.2 Prepare and submit following prior to project start-up:
.1 Submit 2 copies of Materials Source Separation Program (MSSP) description.

1.5 WASTE REDUCTION WORKPLAN (WRW)

.1 Prepare Waste Reduction Work plan.

.2 Structure WRW to prioritize actions and follow as first priority Reuse, then followed by Recycle.

.3 Describe management of waste.

.4 Post workplan or summary where workers at site are able to review its content.

1.6 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

.1 Prepare MSSP and have ready for use prior to project start-up. The DWA with related weight bills and/or receipt must be submitted on a monthly basis with the Contractor's monthly Progress claim.

.2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Departmental Representative.

.3 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.

1.6 MATERIALS SOURCE SEPARATION PROGRAM (MSSP) (Cont'd)

.4 Provide containers to deposit reusable and recyclable materials.

.5 Locate containers in locations, to facilitate deposit of materials without hindering daily operations.

.6 Locate separated materials in areas which minimize material damage.

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separate condition.
.1 Transport to approved and authorized recycling facility.

1.7 STORAGE, HANDLING AND PROTECTION

.1 Store, materials to be reused, recycled and salvaged in locations as specified in MSSP.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect, stockpile, store and catalogue salvaged items.

.4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.5 Protect structural components not removed for demolition from movement or damage.

.6 Support affected structures. If safety of road is endangered, cease operations and immediately notify Departmental Representative.

.7 Protect surface drainage and electrical from damage and blockage.

.8 Separate and store materials produced during dismantling of structures in designated areas.

.9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.

1.7 STORAGE, HANDLING AND PROTECTION (Cont'd)

.9 (Cont'd)
.1 On-site source separation is recommended.
.2 Remove co-mingled materials to off-site processing facility for separation.
.3 Provide waybills for separated materials.

1.8 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste, volatile materials, mineral spirits, or oil into waterways, storm, or sanitary sewers.

.3 Keep records of construction waste including:
.1 Number and size of bins.
.2 Waste type of each bin.
.3 Total weight generated.
.4 Weight reused or recycled.
.5 Reused or recycled waste destination.

.4 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

.5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in pre-demolition material audit.

1.9 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises.

.2 Maintain security measures established by PWGSC.

1.10 SCHEDULING

.1 Coordinate Work with other activities at site to ensure timely and orderly progress of Work.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Do Work in compliance with WRW.

.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

.3 Source separate materials to be reused/recycled into specified sort areas.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

.2 Section 01 74 11 - Cleaning.

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 Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
.1 Work has been completed and inspected for compliance with Contract Documents.
.2 Defects have been corrected and deficiencies have been completed.
.3 Systems have been tested and are fully operational.
.4 Certificates required by Nova Scotia Department of Labour and Environment has been submitted.
.5 Operation of systems have been demonstrated to Owner's personnel.
.6 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative, and Contractor. If Work is deemed incomplete by Owner and Departmental Representative, complete outstanding items and request reinspection.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedure.

.2 Section 01 45 00 - Quality Control.

.3 Section 01 71 00 - Examination and Preparation.

.4 Section 01 77 00 - Closeout Procedures.

1.2 SUBMISSION

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection, with Departmental Representative's comments.

.3 Revise content of documents as required prior to final submittal.

.4 If requested, furnish evidence as to type, source and quality of products provided.

.5 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.6 Pay costs of transportation.

1.3 FORMAT

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

1.3 FORMAT (Cont'd)

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in dxf or dwg format on diskettes or CD.

1.4 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;
.1 date of submission; names,
.2 addresses, and telephone numbers of Consultant and Contractor with name of responsible parties;
.3 schedule of products and systems, indexed to content of volume.

.2 For each product or system:
.1 list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.5 AS-BUILTS AND SAMPLES

.1 Maintain at the site for Departmental Representative one record copy of:
.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to the Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

1.6 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of opaque drawings, provided by Departmental Representative.

.2 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.3 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
.1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.2 Field changes of dimension and detail.
.3 Changes made by change orders.

1.6 RECORDING ACTUAL SITE CONDITIONS (Cont'd)

.3 (Cont'd)
.4 Details not on original Contract Drawings.
.5 References to related shop drawings and modifications.

.4 Specifications: legibly mark each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Addenda and change orders.

.5 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.7 FINAL SURVEY

.1 Submit final site survey certificate, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.8 WARRANTIES AND BONDS

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

1.8 WARRANTIES AND BONDS (Cont'd) .7 Retain warranties and bonds until time specified for submittal.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 35 43 – Environmental Procedures

.2 Section 01 55 26 – Traffic Regulation.

.3 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.2 DESCRIPTION

.1 This section specifies requirements for demolishing and removing wholly or in part various items designated to be removed or partially removed.

.2 Demolition and removal will consist of, but not necessarily be limited to, the following:
.1 Remove existing bridge structure, including but not limited to Abutment structures, wingwalls, piers, existing foundations to min. 1.0 m below grade, bridge railings and posts, expansion joints.
.2 Remove existing signage as indicated.
.3 Remove excess fill materials.

1.3 PROTECTION

.1 Protect existing objects designated to remain. In the event of damage, immediately replace or make repairs to approval of, and at no additional cost to, Departmental Representative.

PART 2 – PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 – EXECUTION

3.1 EXECUTION

.1 Inspect site and verify with Departmental Representative objects designated for removal.

3.2 REMOVAL

.1 Remove in their entirety all materials and objects specified for removal.

.2 Do not disturb adjacent work designated to remain in place.

3.3 SAFETY CODE

.1 Do demolition work in safe manner and according to applicable laws and regulations from authorities having jurisdiction.

.2 Blasting is not permitted.

3.4 DISPOSAL OF MATERIAL

.1 The Departmental Representative maintains the right of first refusal (at no cost) to demolished material except those designated for reuse.

.2 Upon refusal of demolished materials by the Departmental Representative, such Materials become the property of the Contractor. Remove such materials from sites and dispose in accordance with Section 01 74 21 - Construction/ Demolition Waste Management and Disposal.

3.5 RESTORATION

.1 Upon completion of work, remove debris, trim surfaces and leave work site in clean condition.

.2 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 74 21 - Construction/ Demolition Management and Disposal.

.2 Section 03 20 00 - Concrete Reinforcing.

.3 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.
.2 CSA-O86-14, Engineering Design in Wood (Limit States Design).
.3 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
.4 CAN/CSA-S269.3-M92(R2008) Concrete Formwork.
.5 CSA 0121-08, Douglas Fir Plywood.

.2 Council of Forest Industries of British Columbia (COFI)
.1 COFI Exterior Plywood for Concrete Formwork.

1.3 SHOP DRAWINGS

.1 Submit shop drawings for formwork and falsework for suspended slab formwork and supports in accordance with Section 01 33 00 - Submittal Procedures.

.2 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangements of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings. Comply with CAN/CSA-S269.3 for formwork drawings.

.3 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms.

1.3 SHOP DRAWINGS (Cont'd)

.4 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

.5 Each shop drawing submission shall bear stamp and signature of qualified professional engineer registered or licensed in the Province of Nova Scotia.

1.4 RESPONSIBILITY

.1 Design for method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, ties, liners, and locations of temporary embedded parts. Comply with CAN/CSA-S269.3 for formwork drawings.

.2 Indicate formwork design data, such as permissible rate of concrete placement, and temperature of concrete, in forms upon request from Departmental Representative.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

.4 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC's.
.1 Use of sealers, form release and stripping agents within the inboard side of the weather barrier, including must comply with VOC limits as set by SCAQMD Rule 1113.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, handle and store formwork materials to prevent weathering, warping or damage detrimental to the strength of the materials or to the surface to be formed.

1.6 DELIVERY, STORAGE AND HANDLING (Cont'd)

.2 Ensure that formwork surfaces which will be in contact with concrete are not contaminated by foreign matter. Handle and erect the fabricated formwork so as to prevent damage.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Formwork materials:
.1 Use wood and wood product formwork materials to CSA-A23.1/A23.2 and CSA O121.
.2 Plywood and wood formwork materials to CSA-O121, CAN3-O86.1, CAN3-O86.1S1, CSA O153.
.3 Use new and undamaged forms only for exposed surfaces. Use formwork liners as required to achieve stringent specified finish tolerances.

.2 Falsework materials: to CSA S269.1.

.3 Form ties:
.1 Use removable or snap-off galvanized metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm dia. in concrete surface. Holes are to be filled with non-shrink grout.
.2 Adjustable in lengths to permit tightening and alignment of forms.

.4 Form release agent: non-toxic, biodegradable, low VOC, chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms.

.5 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 to 24 mm^2 /sat 40°C, flashpoint minimum 150°C, open cup. Agent shall be compatible with bridge sealing and waterproofing systems where applicable.

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

.1 Verify lines and levels before proceeding with formwork/falsework and ensure dimensions agree with drawings. Review all drawings and check dimensions prior to construction for proper fit and report any discrepancies before proceeding with the work.

.2 Obtain Departmental Representative's approval for use of earth forms.

.3 Obtain Departmental Representative's approval before framing openings not indicated on drawings.

.4 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.5 Assemble formwork so that concrete is not damaged during its removal.

.6 Fabricate and erect falsework in accordance with CSA S269.1 and COFI exterior plywood for concrete formwork.

.7 Provide form finishes as per CAN/CSA A23.1 and ACI 301 as follows:
.1 Sides of footings below ground: rough form finish to CSA A23.1.
.2 Abutment walls exposed to view plus 500mm below ground surface: Rubbed finish to ACI 301.
.3 Deck soffits, curb faces and all other formed concrete surfaces unless otherwise indicated: Rubbed Finish to ACI 301.
.4 Repair all deficient areas prior to proceeding with other finishes.

.8 Do not place shores and mud sills on frozen ground.

.9 Provide site drainage to prevent washout of soil supporting mud sills and shores.

3.1 FABRICATION AND ERECTION (Cont'd)

.10 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.

.11 Align form joints and make watertight. Keep form joints to minimum.

.12 Locate horizontal form joints for walls and pilasters below top of finished grade. Minimize vertical form joints for walls above top of finished grade. Align horizontal form joints with recesses, reveals and other features of the abutment and bridge structure. Use non-standard size panels and reduced maximum tie spacings required to achieve panel layout.

.13 Make the forms mortar tight by sealing with building tape or sealants along all joints.

.14 Where concrete is to remain exposed, use 25mm chamfer strips on external corners and 25mm fillets at interior corners, joints, unless specified otherwise.

.15 Build inserts, anchor bolts, miscellaneous frames, flashing reglets, weather bars, holes, sleeves, and items otherwise specified as supplied and located under the Work of other sections into formwork.

.16 Embed no wood in concrete for purposes of anchorage.

.17 Form slots, openings, drips, recesses, expansion and control joints as indicated.

.18 Prior to placing concrete, the elevations of forms shall be checked to verify drainage slopes.

.19 Provide 48 hours notice to Departmental Representative for inspection prior to concrete placement.

3.1 FABRICATION AND ERECTION (Cont'd)

.20 Clean formwork as erection proceeds, to remove foreign matter. Remove cuttings, shavings and debris from within forms. Flush completely with water to remove remaining foreign matters. Ensure that water and debris drain to exterior through clean-out ports.

.21 During cold weather, remove ice and snow from within forms, do not use de-icing salts. Do not use water to clean out completed forms, unless formwork and concrete construction proceed within a heated enclosure.

.22 Patch all form tie holes and finish surface to remove all evidence of tie holes and/or patching.

.23 Construction Joints:
.1 Form construction joints where required and as approved.
.2 Build waterstops into forms, supported against displacement by pouring of concrete.
.3 Use preformed waterstop corners and intersections where they are available to suit conditions.
.4 Join waterstops to preformed corners and intersections, and between lengths with butted and welded connections in accordance with manufacturer's recommendations.

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

.25 Apply form release agent to all formed surfaces prior to casting concrete.

3.2 REMOVAL AND RESHORING

.1 Notify Departmental Representative prior to form removal.

.2 Form removal times are dependent on proper curing as specified herein. Provide written evidence of concrete strength to the Departmental Representative 24 hours prior to form removal to show that suitable strength has been achieved. Contractor shall pay for the concrete cylinder strength tests to demonstrate concrete strength prior to form removal.

3.2 REMOVAL AND RESHORING (Cont'd)

.3 Remove formwork progressively and in accordance with the reference code requirements, and so that no shock loads or imbalanced loads are imposed on the structure.

.4 Leave formwork in place for following minimum periods of time after placing concrete.
.1 3 days for footings, retaining walls and bridge abutment walls.
.2 Remove all forms. Do not leave any forms in place after completion of project.

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

.6 Loosen forms carefully. Do not wedge pry bars, hammers or tools against concrete surfaces.

.7 Provide all necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

3.3 FORM FINISHES

.1 Form finishes to CSA A23.1 and ACI 301 as follows:
.1 Sides of footings not exposed to view: Rough form finish.
.2 Sides of walls and formed surfaces exposed to view: Smooth form finish as per ACI 301.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 74 21- Construction/Demolition Waste Management and Disposal

.2 Section 03 10 00 - Concrete Forming and Formwork Accessories.

.3 Section 03 30 00 – Cast-in-Place Concrete.

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
.1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.
.2 CSA-G30.3 - Cold Drawn Steel Wire for Concrete Reinforcement.
.3 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
.4 CSA-A23.3-04 (R2010), Design of Concrete Structures for Buildings.
.5 CAN/CSA-G30.18-09, Billet-Steel Bars for Concrete Reinforcement.

.2 Reinforcing Steel Institute of Canada (RSIC)
.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

.3 ASTM A108-13, Standard Specification for Steel Bar, Carbon and Alloy, Cold finished.

.4 ANSI/ACI 315, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.

1.3 SHOP DRAWINGS

.1 Submit reinforcing steel shop drawings for review by the Departmental Representative that are sealed and signed by a registered Engineer in the Province of Nova Scotia.

.2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, splice lengths locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without references to structural drawings. Indicate sizes, spacings and locations of chairs, spacers and hangers.

1.3 SHOP DRAWINGS (Cont'd)

.3 Prepare reinforcement drawings in accordance with Reinforcing Steel Manual of Standard practice - by Reinforcing Steel Institute of Canada and to ANSI/ACI 315.

.4 Detail splice lengths to CSA-A23.3 as follows:
.1 All splices to be tension lap splices, Class "B".
.2 No more than 50% of the reinforcing to be spliced at any given location.
.3 Do not splice near locations of maximum stress (for example, do not splice bottom deck longitudinal reinforcement at midspan).

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Departmental Representative.

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.

.3 Cold-drawn annealed steel wire ties: minimum 1.5 mm diameter to CAN/CSA G30.3.

.4 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2, adequate for strength and support of reinforcing during construction conditions, all of which to be non-staining. Do not use metal chairs. Colour to be grey where all or portions of the chair may remain exposed.

.5 Mechanical splices: subject to approval of Departmental Representative.

.6 Galvanize reinforcing bars to CAN/CSA G164, with minimum zinc coating of 610 g/m^2.
.1 Seal galvanized reinforcing steel with chromate treatment.

2.1 MATERIALS (Cont'd)

.2 Carry out chromate treatment immediately after galvanizing by soaking steel in aqueous solution containing minimum 0.2% by weight sodium dichromate. Alternatively, quench in a minimum of 0.2% chromic acid solution. Solution shall be at least 32 degrees Celsius. Immerse each bar for at least 20 seconds. If galvanized steels are at ambient temperature, add sulfuric acid at a concentration of 0.5% to 1.0%.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, ANSI/ACI 315 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada. Shop fabricate and bend all reinforcing steel.

.2 Fabricate to the following tolerances:
.1 Sheared length + 25 mm.
.2 Stirrups, items and spirals to + 10 mm.
.3 Other bends + 25 mm.

.3 Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on placing drawings.

.4 Welding of reinforcing steel must receive prior approval of the Departmental Representative.

.5 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.6 Have welding performed by workers qualified under CSA W47.1.

.7 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 2 weeks prior to beginning reinforcing work. Mill certificates shall be in accordance with CAN/CSA G30.18.

.2 Upon request inform Departmental Representative of proposed source of material to be supplied.

2.4 CLEANING

.1 Clean reinforcing to CSA-A23.1/A23.2. All reinforcing bars are to be free of scale rust and contamination at time of placing in forms.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Examine work related to this section and report discrepancies to Departmental Representative.

.2 Commencement of work shall imply acceptance of conditions.

3.2 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

.4 Field Straightening:

.1 Shop bend reinforcing steel.

.2 Field straightening will be permitted at back walls as required for launching of bridge.

.3 Use bar hickey for field straightening. Field-Straighten in accordance with RSIC Manual of Standard Practice.

.4 Field straightening is permitted only once at each reinforcing bar.

.5 Field straighten only after concrete has reached 70% of its design strength.

.6 Allow for Departmental Representative to test the reinforcing steel using magnetic particle testing following Straightening and prior to second pour.

.7 Any damaged reinforcing steel or concrete to be brought to the attention of Departmental Representative for correction.

.8 After straightening, fully coat a total 600mm length of each bar centered at bend with two coats of zinc rich primer (300mm on each side of bend), regardless of condition of galvanizing. In addition, touch up all areas with damaged galvanizing.

3.3 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CSA-A23.1/A23.2.

.2 Provide all chairs, braces, lateral support, headers, ties, etc. to secure reinforcing in place during construction.

.3 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.4 Ensure cover to reinforcement is maintained during concrete pour.

.5 Under no circumstances will concrete trucks or road traffic be permitted to travel over the reinforcing during concrete placing operations.

.6 After reinforcing is placed and prior to closing of forms, notify the Departmental Representative for inspection of the Work.

.7 Reinforcement shall be adequately supported by chairs, spacers or hangers and secured against displacement within the tolerance permitted and in accordance with the latest ACI Standard 315.

3.4 STORAGE

.1 Store reinforcing steel to prevent deterioration, contamination or disfigurement.

.2 Store reinforcing steel off the ground.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Abbreviations and Acronyms:
- .1 Cement: hydraulic cement or blended hydraulic cement (GUb - where b denotes blended).
  - .1 Type GU or GUb - General use cement.

.2 Reference Standards:
- .1 ASTM International
  - .1 ASTM C 260-06, Standard Specification for Air-Entraining Admixtures for Concrete.
  - .2 ASTM C 309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - .3 ASTM C 494/C 494M-08a, Standard Specification for Chemical Admixtures for Concrete.
  - .4 ASTM C 1017/C 1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
  - .5 ASTM A615/A615M-12, Standard Specification for Deformed and Plain Carbon-steel Bars for Concrete Reinforcement.
- .2 CSA International
  - .1 CSA A23.1/A23.2-14, 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).
  - .4 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart, convene pre-installation meeting one week prior to beginning concrete works.

1.2 ADMINISTRATIVE REQUIREMENTS (Cont'd)

.1 (Cont'd)

.1 Ensure key personnel, site supervisor, Departmental Representative speciality contractor - forming concrete producer, testing laboratories attend.

.1 Verify project requirements.

1.3 CERTIFICATES

.1 Maximum 4 weeks prior to starting concrete work, submit to Departmental Representative manufacturer by qualified independent inspection and testing laboratory that the following materials will meet specified requirements:

.1 Portland Cement;
.2 Blended hydraulic cement;
.3 Supplementary cementing materials;
.4 Grout;
.5 Admixtures;
.6 Aggregates;
.7 Water; and
.8 Joint Filler.

.2 Provide certification that mix proportions selected will produce concrete of quality yield and strength as specified in concrete mixes, and will comply with CSA-A23.1/A23.3, and that mix design is adjusted to prevent alkali aggregate reactivity problems.

.3 Provide certification from a qualified independent inspection and testing company that plant, equipment and materials be used in concrete comply with requirements of CSA-A23.1/A23.3.

.4 Submit certification for the concrete supplier from the Atlantic Concrete Association - ACA Certification of Concrete Production Facilities.

.5 Submit written declaration that components used (including but not limited to sealers, curing agents, and admixtures) are compatible and will not adversely affect finished concrete.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with the Section 01 74 21 - Construction/Demolition and Waste Management and Disposal.

.2 Use trigger operated spray nozzles for water hoses.

.3 Designate a cleaning area for tools to limit water use and runoff.

.4 Carefully coordinate the specified concrete work with weather conditions.

.5 Ensure empties containers are sealed and stored safely for disposal away from children.

.6 Prevent plasticizers, water-reducing agents and air-entraining agents from entering drinking water supplies or streams. Using appropriate safety precautions collect liquid or solidify liquid with an inert, non-combustible material and remove for disposal. Dispose of all waste in accordance with applicable local, provincial and national regulations.

.7 Choose least harmful, appropriate cleaning method which will perform adequately.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide testing inspection results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.3 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

1.5 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.4 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

.5 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.

.6 4 weeks prior to commencing work, inform Departmental Representative of proposed source of aggregates and provide access for sampling.

.7 As a minimum, submit concrete mix information for each mix containing the following information:
.1 Cement type;
.2 Minimum compressive strength at 28 days;
.2 Exposure classification;
.3 Slump at time of discharge;
.4 Nominal size of coarse aggregate;
.5 Air content;
.6 Supplementary cementing materials type;
.7 Percentage of supplementary cementing materials by weight of total cementing materials (including breakdown for proprietary blends, if used, such as TerC³);
.8 Cement content (kg/m3);
.9 Water-to-cement ratio; and
.10 Proposed admixtures.

.8 Submit Chloride Ion Penetrability test date for proposed mix.
.1 Testing shall be in accordance with ASTM C1202 using specimens cured in accordance with CAN/CSA A23.2-3C and ASTM C31-M.

1.6 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

1.6 QUALITY ASSURANCE (Cont'd)

.2 (Cont'd)
.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.
.7 Joints.
.8 Backfilling.

.4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

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, laboratory 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

2.1 CONCRETE DESIGN CRITERIA

.1 Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 CONCRETE 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.

2.3 CONCRETE MATERIALS

.1 Cement: to CSA A3001, Type GU to CSA A23.1/A23.2 and CAN/CSA A5.

.2 Hydraulic cement: Type GUb to CSA A3001.

.3 Supplementary cementing materials: replacement to CAN/CSA A3001. Minimum and maximum content as specified. Acceptable types:
.1 Fly Ash Type "F";
.2 Ground Granulated Blast Furnace Slag Type "S"; and
.3 Silica Fume Type "SF".

.4 Water: to CSA A23.1.

.5 Aggregates: to CSA A23.1/A23.2. Coarse aggregates to be normal density.

.6 Admixtures:
.1 Air entraining admixture: to CSA A23.1/A23.2 and CAN3-A266.1.
.2 Chemical admixture: to CSA A23.1/A23.2 and CAN3-A266.4. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
.3 Obtain authorization from Departmental Representative for use of super plasticizing admixture, water reducer, and/or other admixtures as approved by Departmental Representative to achieve designed concrete properties.

.7 Concrete shall be normal and shall have a unit weight of 2350 kg/m3.

.8 Curing compound: to CSA A23.1/A23.2 white and ASTM C 309.

.9 Premoulded joint fillers:
.1 Bituminous impregnated fiber board: to ASTM D 1751.

2.3 CONCRETE MATERIALS (Cont'd)

.9 (Cont'd)
.2 Sponge rubber: to ASTM D 1752, Type I, flexible firm grade.
.3 Self-expanding Standard cork: to ASTM D 1752, Type III.

.10 Weep hole tubes: plastic.

2.4 CONCRETE MIXES

.1 Performance Method for specifying concrete: to meet Departmental Representative performance criteria and to CSA A23.1/A23.2.

.2 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.
.1 Provide concrete mix to meet following plastic state requirements:
.1 Uniformity: to CSA A23.1
.2 Workability: free of loss of mortar, segregation.
.3 Finishability: amount of bleeding.
.4 Set time: 2 hours maximum.
.2 Mix 1: Non-bridge footings, retaining walls, baffle drain and reinforced concrete not on bridge:
.1 Exposure Classification: C-1.
.2 Compressive strength at 28 age: 35 MPa minimum.
.3 Aggregate size 20 mm maximum.
.3 Mix 2: Mud slabs and lean concrete:
.1 Compressive strength at 28 days: 10 MPa minimum.
.2 Exposure classification: N.
.4 Mix 3: Concrete for Bridge pile cap, abutments, bridge deck curbs, sidewalks, wingwalls, precast girders and other cast-in-place elements for bridge.
.1 Exposure Classification: C-1, except as modified below.
.2 Minimum comprehensive strength at 28 days: 45 MPa.
.3 Chemical admixtures: in accordance with ASTM C494; submit to Departmental Representative for approval.
.4 Nominal maximum aggregate size: 20mm.
.5 Maximum Water/Cement Ratio: 0.35

2.4 CONCRETE MIXES (Cont'd)

.2 (Cont'd)

.4 (Cont'd)

.6 Total cementitious materials content: minimum 415 kg/m3, maximum 480kg/m3.

.7 Air content: 5-8%

.8 Slump: design for 60mm before addition of superplasticizer/ Tolerances per CAN/CSA A23.1.

.9 Maximum spacing factor for hardened concrete: 0.2mm to ASTM C457M.

.10 Maximum chloride ion penetrability: 1000 coulombs within 56 days.

.5 Use superplasticizer in all concrete to achieve workability. Pay for all admixtures as required to achieve specified properties.

.6 Maximum concrete temperature delivered: 25 degrees Celsius, except 18 degrees Celsius where thickness of element exceeds 2 meters.

.7 Maximum concrete temperature in situ: 70 degrees Celsius.

.8 Maximum temperature gradient: 20 degrees Celsius per meter.

.3 Provide quality management plan to ensure verification of concrete quality to specified performance.

.4 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Obtain Departmental Representative's written approval before placing concrete.

.1 Provide 24 hours minimum notice prior to placing of concrete.

.2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.

.3 During concreting operations:

.1 Development of cold joints not allowed.

3.1 PREPARATION (Cont'd)

.3 (Cont'd)
.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Pumping of concrete will be permitted only after approval of equipment and mix.

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

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

.7 Protect previous Work from staining.

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

.9 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
.1 Place steel dowels of deformed steel reinforcing bars and pack solidly with shrinkage compensating grout epoxy grout to anchor and hold dowels in positions as indicated.

.10 Do not place load upon new concrete until authorized by Departmental Representative. Backfilling of retaining walls is prohibited until authorized by Departmental Representative.

.11 Bond fresh concrete to hardened concrete to CAN/CSA A23.1.

.12 Do not permit free fall of concrete mix to exceed 1500mm.

.13 Concrete trucks or any other vehicles are not permitted to drive on membrane or reinforcing mats.

3.2 CONSTRUCTION

.1 Do cast-in-place concrete work to CSA A23.1/A23.2.

.2 Construction Joints:
.1 Construction joint locations shall be approved by wherever they are not specifically designated on drawings.
.2 Surface of concrete construction joints shall be cleaned and laitance removed.
.3 Locate construction joints so as to least impair the strength of the structure and to Departmental Representative approval. detailed on design drawings.
.4 Immediately before concrete is placed, all construction joints shall be wetted and standing water removed.

.3 Joint Fillers:
.1 Furnish filler for each joint in single piece for depth and width required for joint unless otherwise authorized by than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
.2 Locate and form isolation, construction, expansion joints as indicated and as per CAN/CSA A23.1. Supply and install joint filler.

.4 Sleeves and inserts:
.1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through walls except where indicated or approved by Departmental Representative.
.2 Where approved by Departmental Representative, set sleeves, ties, pipe hangers and other inserts and openings as indicated or specified elsewhere.
.3 Sleeves and openings greater than 100 x 100 mm not indicated, must be reviewed by Departmental Representative.
.4 Do not eliminate or displace reinforcement to accommodate hardware. If inserts cannot be located as specified, obtain written approval of modifications from Departmental Representative before placing of concrete.
.5 Confirm locations and sizes of sleeves and openings shown on drawings.
.6 Set special inserts for strength testing as indicated and as required by non-destructive method of testing concrete.

3.2 CONSTRUCTION (Cont'd)

.5 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.

.6 Finishing and curing:
.1 Finish concrete to 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. Applied finish on concrete: brushed on exposed pad footings. Provide written declaration that compounds used are compatible.
.4 Refer to Section 03 10 00 - Concrete forming and formwork accessories for form finish tolerances.
.5 Horizontal surface at top of Sidewalk: Broom finish to CSA A23.1.
.6 Top surfaces of curbs, barriers, and approach slab: steel trowelled finish to finish classification D per CAN CSA A23.1.

.7 Waterstops:
.1 Install waterstops to provide continuous water seal.
.2 Do not distort or pierce waterstop in way as to hamper performance.
.3 Do not displace reinforcement when installing waterstops.
.4 Use equipment to manufacturer's requirements to field splice waterstops.
.5 Tie waterstops rigidly in place.
.6 Use only straight heat sealed butt joints in field.
.7 Use factory welded corners and intersections unless otherwise approved by Departmental Representative.

.8 Concrete shall not be placed on or against any surface (including rebar) that is at the temperature below 5°C.

.9 Concrete at time of deposit shall be between 10°C and 30°C.

3.2 CONSTRUCTION (Cont'd)

.10 Pour concrete continuously between predetermined construction and control joints.

.11 Carry out winter concreting in strict accordance with CSA-A.23.1/A.23.2.

.12 Carry out hot weather concrete in accordance with CAN/CSA-A.23.1.

.13 Top surface of vertically formed lifts shall be generally level.

.14 Fill all construction joints in the completed concrete work minimum 28 days after casting employing an epoxy injection technique approved by Departmental Representative to completely seal cracks.

3.3 SURFACE TOLERANCE

.1 Concrete tolerance to CSA A23.1 Straightedge Method.

3.4 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
.1 Concrete pours.
.2 Slump.
.3 Air content.
.4 Compressive strength at 3 and 7 28 and 56 days.
.5 Air and concrete temperature.
.6 Weather.

.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 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and Departmental Representative.

3.4 FIELD QUALITY CONTROL (Cont'd)

.4 Departmental Representative will pay for costs of tests as specified in Section 01 29 83 - Payment Procedures for Testing Laboratory Services.

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

.6 For compressive strength testing, a minimum of 3 cylinders and 2 field cured cylinders are required for:
.1 Each day's pour
.2 Each type of grade of concrete
.3 Each change of supplier
.4 Each 40 cubic metre or fraction thereof for footings and foundation walls.
.5 Additional test specimens shall be taken whenever requested by the Departmental Representative to verify the concrete quality.

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

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

3.5 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
.1 Divert unused concrete materials from landfill to local quarry facility after receipt of written approval from Departmental Representative.
.2 Provide appropriate area on job site where concrete trucks and be safely washed.

3.5 CLEANING (Cont'd)

.2 (Cont'd)

.3 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Departmental Representative.

.4 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 health or environmental hazard.

.5 Prevent admixtures and additive materials from entering drinking water supplies or streams.

.6 Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal.

.7 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

3.6 CURING

.1 Ensure that freshly placed concrete is protected from freezing, dehydration, mechanical shock and contact with injurious substances.

.2 Do not use curing compounds that would have a detrimental effect on bonding, adhesion, curing, appearance, or similar qualities of materials applied to concrete surfaces. Use only moisture curing.

.3 Protect the concrete from premature drying and extremes of temperature.

.4 Cure, protect and finish concrete to CAN/CSA A23.1, CSA S269.1 and S269.3. Curing type in accordance with specified exposure classification unless more stringent requirements are noted otherwise. Special curing and finishing requirements are as follows:

.1 Exterior concrete pads: curing "TYPE 2". Seven (7) days total at >10°C and for the time necessary to attain 70% of the specified concrete strength.

.5 Foot traffic shall be kept off curing concrete for 1 day.

3.6 CURING (Cont'd)

.6 Vehicles shall be kept off concrete for 7 days.

3.7 DEFECTIVE WORK

.1 Repairs and classification of unacceptable concrete to be in accordance with CSA-A23.1/A23.2.

.2 Remove defective concrete and embedded debris and repair as directed by Departmental Representative.

.3 Excessive honeycomb or embedded debris in any concrete shall deem it defective. Remove and replace defective concrete.

.4 Remove to bare concrete curing compounds detrimental to application of specified finishes.

.5 Concrete to be supplied at the minimum strength requirement at 28 days. Tests indicating strengths lower than specified will necessitate further testing as required by the Departmental Representative. Cost for such testing to be at the Contractor's expense. Should further tests confirm low values, the Departmental Representative has the right to require strengthening of the affected area or removal and replacing of the weak concrete all to the Contractor's expense.

.6 Repair all shrinkage cracks in the completed concrete work employing a suitable epoxy injection technique acceptable to Departmental Representative to completely seal all such cracks.

3.8 HOT AND COLD WEATHER CONCRETING

.1 Hot Weather Concreting: When air temperature is at or above likely to rise above 27°C within 24 hours, take special measures, as detailed in CSA A23.1 to protect concrete from effects of hot and/or drying weather conditions. Temperature of formwork, reinforcing steel or material on which concrete is to be placed, shall not exceed 27°C. Concrete temperatures shall not exceed those specified in CSA A23.1, Table 16.

.2 Cold Weather Concreting:

.1 When mean air temperature is at or below 5°C or when temperature is likely to fall below 5°C within 24 hours, place, cure and protect concrete in accordance with CSA 23.1 and Cold Weather Protection requirements below.

.2 Do not place concrete on or against any surface at a temperature less than 5°C. Remove snow and ice before depositing concrete on any surface.

.3 Do not use calcium chloride or other de-icing chemicals in forms.

.4 If heating mix water and/or aggregates, adjust charging cycle to prevent concrete flash setting.

.5 Do not heat aggregates or water above 80°C. Reduce temperature of batched water and/or aggregates to below 40°C prior to addition of cementing materials.

.6 Exclude frozen lumps of aggregate from the mix.

.3 Cold Weather Protection:

.1 Protection Period: notwithstanding specified curing times, maintain temperature of concrete above 10°C for minimum five days after placing. Maintain concrete above 0°C for an additional minimum nine days (total 14 days).

.2 Where protection is required, heat mixing water and/or aggregates.

.3 When outside temperature during placing or protection period may fall below 5°C, cover surfaces with tarpaulins or polyethylene sheets.

.4 Where outside temperature during placing or protection period may fall below 0°C, fully insulate surfaces, then cover with tarpaulins or polyethylene sheets.

3.8 HOT AND COLD WEATHER CONCRETING (Cont'd)

.3 (Cont'd)

.5 Where outside temperature during placing or protection period may fall below -5°C, completely house concrete and provide supplementary heat. Ensure heat is supplied uniformly around concrete.

.6 Steam or hot air blowers may be used. When dry heat is used, do not permit hot air to flow directly onto concrete surface. Vent exhaust fumes. Provide means to maintain relative humidity greater than 95%.

.7 Do not allow temperature differential to exceed 20°C from interior of concrete element to exterior. Where minimum section dimension exceeds 2 m, do not allow temperature gradient to exceed 20°C/m from interior of element to exterior face.

.8 After protection period, use methods to withdraw protection and heating that do not induce thermal shock stresses in concrete. Gradually reduce concrete temperature to avoid cracking from thermal shock. Do not completely remove protection until concrete has cooled to temperature differential as per Table 18 of CSA A23.1.

END OF SECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 61 00 – Material and Equipment.

.3 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.2 REFERENCES

.1 American Association for State Highway and Transportation Officials (AASHTO).
.1 AASHTO Standard Specifications for Highway Bridges – 17th Edition 2003.

.2 American Society for Testing and Materials International (ASTM)
.1 ASTM A 325M-13, Specification for High-Strength Bolts for Structural Steel Joints Metric.
.2 ASTM A 490M-12, Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints.
.3 Canadian Standards Association (CSA International)
.1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CAN/CSA S6-06(R2012), Canadian Highway Bridge Design Code.
.4 CAN/CSA S16-09, Limit States Design of Steel Structures.
.5 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
.6 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
.7 CSA W59-13, Welded Steel Construction, (Metal Arc Welding) (Metric Version).

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures

.2 Each drawing submitted to bear signature and stamp of qualified professional engineer registered or licensed in province of Nova Scotia.

.3 Indicate shop and erection details including shop splices, cuts, copes, connections, holes, bearing plates, threaded fasteners, rivets and welds. Indicate welds by CSA A59, welding symbols.

.4 Proposed welding procedures to be stamped and approved by Canadian Welding Bureau.

.5 Submit description of methods, temporary bracing and strengthening, sequence of erection and type of equipment proposed for use in erecting structural steel.

.6 Falsework drawings submitted to bear signature and stamp of qualified professional engineer registered or licensed in province of Nova Scotia.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00 – Material and Equipment.

.2 Provide protective blocking for lifting, transportation and storing.
.1 Exercise care during fabrication, transportation and erection so as not to damage steel members.
.2 Do not notch edges of members.
.3 Do not cause excessive stresses

.3 Mark mass on members weighting more than 3 tonnes.

.4 Ensure that no portion of steel comes into contact with ground.

.5 Provide Departmental Representative with delivery schedules minimum 7 days prior to shipping.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.2 Divert unused metal materials from landfill to metal recycling facility approved by DCC Representative.

.3 Divert unused concrete materials from landfill to local facility approved by DCC Representative.

.4 Divert additive materials from landfill to official hazardous material collections site approved by DCC Representative.

.5 Do not dispose of unused additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Structural steel: to CSA G40.20/G40.21, grade and types as indicated:
.1 Plates (not including steel bearing plates): 300 WT.
.2 Bearing plates: 350 WT.
.3 Hollow structural sections: 350 WT, Class C. Alternates will NOT be accepted.
.4 Rolled steel channel/angels: 300 WT.
.5 Structural W and HP shapes: 350 WT.

.2 High strength bolts, nuts and washers: to ASTM A 325M.

.3 Anchor bolts, washers and nuts: to ASTM F1554 with A36 steel, galvanized.

.4 Bearings: elastomer bearing pads of neoprene grade 50 or 60 to CAN/CSA S6.

.5 Welding electrodes: to CSA W48 series.

2.1 MATERIALS (Cont'd)

.6 Hot dip galvanizing: to CAN/CSA G164, minimum zinc coating of 600 g/m2.

.7 Hot dip galvanize all structural steel after fabrication unless noted otherwise on drawings.
.1 Touch-up burned or scratched, cut or damaged galvanized surfaces less than 25mm in any direction with a high-zinc, lead-free galvanizing repair solder to ASTM A780-01. Re-galvanize or replace members with larger galvanizing defects.
.2 Threaded components shall be galvanized to CAN/CSA G164-M92(R2003). Threaded components of each assembly shall be hot-dip galvanized and spun by same process by same supplier and shipped preassembled.

2.2 SOURCE QUALITY CONTROL

.1 Provide Departmental Representative prior to fabrication, with two copies of steel producer certificates in accordance with CSA G40.20/G40.21.

PART 3 – EXECUTION

3.1 ERECTION

.1 Clean steel surfaces to Departmental Representative's approval when staining or defacing occurs.

.2 Verify location of substructure units, elevations of bearing seats and location of anchor bolts before erection of structural steel; report discrepancies to Departmental Representative.

.3 Do not disturb river banks or embankments without prior written permission of Departmental Representative.

.4 Restrict drifting during assembly to minimum required to bring parts into position without enlarging or distorting holes, and without distorting, kinking or sharply bending metal of any unit.
.1 Enlarge holes if necessary by reaming only after written approval is obtained from Departmental Representative.

3.1 ERECTION (Cont'd)

.5 Fabricate and install bearings as indicated.

.6 Place anchor bolts to elevations and location indicated:
.1 Protect holes against entry of water and foreign material.
.2 Provide heating and protection as directed by Departmental Representative and completely fill space around anchor bolts with grout.

3.2 INSTALLATION

.1 Do falsework in accordance with CSA S269.1, except where specified otherwise.

.2 Do fabrication and erection of structural steel in accordance with CAN/CSA-S6, Design of Highway Bridges.

.3 Do welding in accordance with CSA W59, except where specified otherwise:
.1 Do welding in shop unless otherwise permitted by Departmental Representative.
.2 Weld only at locations indicated.
.3 Do not weld to existing steel unless noted on drawings. Obtain approval from Departmental Representative prior to welding to existing steel not shown on drawings.

.4 High strength bolting in accordance with CAN/CSA S6 and CAN/CSA S16. Use 'turn-of-nut' tightening method.
.1 Bolted connections shall be slip-critical unless noted otherwise.

.5 Finish: members true to line, free from twists, bends, open joints, sharp corners and sharp edges.

.6 Allowable tolerance for bolt holes:
.1 Matching holes for bolts to line up so that dowel 2 mm less in diameter than hole passes freely through assembled members at right angles to such members.
.2 Finish holes not more than 2 mm in diameter larger than diameter of bolt unless otherwise specified by Departmental Representative.
.3 Centre-to-centre distance between any two holes of group to vary by not more than 1 mm from

3.2 INSTALLATION (Cont'd)

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 or distance in metre	Tolerance in plus 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.

.6 Mark members in accordance with CSA G40.20/G40.21.

.7 Match marking: shop mark bearing assemblies and splices.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
.1 ASTM A 53/A53M-07, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and seamless.
.2 ASTM A 307-07b, 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-1.181-99, Ready-Mixed, Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)
.1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel.
.2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CAN/CSA-S16-01 (R2007)), Limit States Design of Steel Structures.
.4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
.5 CSA W59-03, Welded Steel Construction (Metal Arc Welding) (Imperial Version).

.4 The Environmental Choice Program
.1 CCD-047a-98, Paints, Surface Coatings.
.2 CCD-048-98, Surface Coatings - Recycled Water-borne.

1.3 SUBMITTALS

.1 Product Data:

1.3 SUBMITTALS (Cont'd)

.1 (Cont'd)
.1 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
.1 For finishes, coatings, primers and paints.

.2 Shop Drawings
.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY ASSURANCE

.1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:
.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - 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 for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel sections and plates: to CAN/CSA-G40.20-04/G40.21-04, Grade 300WT.

.2 Steel pipe: to ASTM A 53/A53M-06a extra strong, black finish.

.3 Welding materials: to CSA W59-03.

.4 Welding electrodes: to CSA W48-06 Series.

.5 Bolts and anchor bolts: to ASTM A 307-04e1.

.6 Grout: non-shrink, non-metallic, flowable, 50 MPa at 24 hours.

.7 Stainless Steel: 316 Stainless Steel to CAN/CSA G40.21.

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m^2 to CAN/CSA-G164-M92(R2003).

.2 Unless noted otherwise, all metal fabrications except stainless steel shall be hot dip galvanized.

2.3 FINISHES (Cont'd)

.2 (Cont'd)
.1 Touch-up burned or scratched, cut or damaged galvanized surfaces less than 25 mm in any direction with a high-zinc, lead-free galvanizing repair solder to ASTM A780-1. Re-galvanize or replace members with larger galvanizing defects.
.2 Threaded components shall be galvanized to CAN/CSA G164-M92(R2003). Threaded components of each assembly shall be hot-dip galvanized and spun by same process by same supplier and shipped preassembled.

2.4 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.

2.5 SCHEDULE OF ITEMS

.1 Miscellaneous metal fabrication items include, but are not limited to, the following:
.1 Membrane drains and support members: galvanized.
.2 Bridge Rails, supports, base plates and anchorages: galvanized.
.3 Exterior railings, guards, and non-structural protective frames; hot dip galvanized.

PART 3 - EXECUTION

3.1 ERECTION

.1 Do welding work in accordance with CSA W59-03 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.

3.1 ERECTION (Cont'd)

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Provide components for bridge 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 or damaged during erection.

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

1.1 RELATED SECTIONS

.1 Section 01 35 43 – Environmental Procedures.

.2 Section 01 35 29.06 – Health and Safety Requirements.

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM A123/A123M-02, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.2 ASTM A653/A653M-[06], Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian Standards Association (CSA International)
.1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
.2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CSA O121-M1978(R2003), Douglas Fir Plywood.
.4 CSA O141-05, Softwood Lumber.
.5 CSA O151-04, Canadian Softwood Plywood.
.6 CSA O153-M1980 (R2003), Poplar Plywood.
.7 CAN/CSA-O325.0-92(R2003), Construction Sheathing.

.3 Forest Stewardship Council (FSC)
.1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
.2 FSC-STD-20-002-2004, Structure and Content of Forest Stewardship Standards V2-1.
.3 FSC Accredited Certified Bodies.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.5 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber 2005.

1.1 REFERENCES (Cont'd)

.6 South Coast Air Quality Management District (SCAQMD), California State (SCAQMD)
.1 SCAQMD Rule 1113-04, Architectural Coatings.
.2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.

1.2 SUBMITTALS

.1 Submit Submittal submissions: in accordance with Section 01 33 00 - Submittal Procedures.

1.3 QUALITY ASSURANCE

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 – PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

.1 Timber:
.1 CAN/CSA-0141;
.2 NLGA Standard Grading Rule for Canadian Lumber, Grade 2 or better;
.3 Species: Eastern white, ponderosa or red pine; Jack or lodgepole pine; Southern pine; Hemlock-Fir North, eastern or western hemlock; or true firs.
.4 Preservative treatment as specified.

2.2 WOOD PRESERVATIVE

.1 Treat wood to CSA O80 to obtain minimum net retention of preservative indicated for the grade of wood to achieve UC 4.1 as per CSA O80. Only the following treatment types are permitted:
.1 ACQ-A - Alkaline copper quat, Type A.
.2 ACQ-C - Alkaline copper quat Type C.
.3 ACQ-D - Alkaline copper quat Type D.
.4 CA-B – Copper Azole, Type B.

.2 Follow water-borne preservative treatment, dry material to maximum moisture content in accordance with CSA-080.

2.2 WOOD PRESERVATIVE (Cont'd)

.3 Surface apply cut ends of wood with wood preservative.

.4 Cover all surfaces of treated wood with two coats of an appropriate sealer.

.5 Comply with Section 01 35 43 – Environmental Procedures. This section includes special provisions for treated wood.

PART 3 – EXECUTION

3.1 PREPARATION

.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative in accordance with CSA 080.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

.4 Treat all lumber.

3.2 INSTALLATION

.1 Comply with requirements of CSA S6-14, supplemented by the following paragraphs.

.2 Install sleepers as indicated.

.3 Comply with Section 01 35 29.06 – Health and Safety Requirements. This section includes special provisions for treated wood.

3.3 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 03 30 00 – Cast-in-Place Concrete

1.2 REFERENCES

.1 NCHRP 244, Concrete Sealers for the Protection of Bridge Structures.

1.3 SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit manufacturer’s instructions in accordance with Section 01 33 00 – Submittal Procedures.

.3 Submit samples in accordance with Section 01 33 00 – Submittal Procedures. Samples shall demonstrate the colour and texture of the coating product.

.4 Submit drawing indicating locations of coloured coating application.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, handle, store and protect materials to prevent damage to packaging.

.2 Deliver and store materials in original wrappings and containers with manufacturer’s seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor. Store coating products in temperatures above 4°C.

1.5 WASTE MANAGEMENT

.1 Separate waste materials for disposal in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facility.

.3 Unused coating material must not be disposed of into the river, on to the ground or in other locations where it will pose health or environmental hazard.

1.5 WASTE MANAGEMENT (Cont'd)

.4 Divert unused coating material from landfill to official hazardous material collections site approved by Departmental Representative.

1.6 PROJECT CONDITIONS

.1 Environmental Limitations: conform to manufacturer's written instructions.

.2 Substrate Conditions:
.1 Do not proceed with installation of materials until contaminants capable of interfering with adhesion are removed from substrates.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of coatings including special conditions governing use.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Sealing all surfaces of concrete abutments above and below grade, except footings:
.1 100% Silane solution concrete sealer to NCHRP 24, Series II Reduction of Water Absorption. Ensure compatibility with water proofing membrane where applicable.

PART 3 – EXECUTION

3.1 APPLICATION

.1 Apply sealing compound to all surfaces of abutment and wingwalls. Clean overspray. Clean sealant from adjacent surfaces. After concrete has cured and surface of concrete is dry, apply one coat of silane concrete sealer uniformly to all surfaces indicated. First application shall be 165mL/m2. Do not apply silane sealer to damp surfaces. Allow coatings to thoroughly dry prior to applying subsequent coatings.

.2 Do not leave uncoated any exposed concrete surface above grade for the bridge.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 45 00 - Quality Control

.3 Section 01 74 21 – Construction/Demolition Waste Management and Disposal

.4 Section 03 30 00 - Cast-in-Place Concrete

1.2 REFERENCES

.1 ASTM C719-14, Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).

.2 ASTM C793-05(2010), Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants.

.3 ASTM C1193-13, Standard Guide for Use of Joint Sealants.

.4 ASTM C1330-02(2013), Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

.5 ASTM D412-06a(2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.

.6 ASTM D2240-05(2010), Standard Test Method for Rubber Property – Durometer Hardness.

.7 ASTM D5893/D5893M-10, Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements.

1.3 SUBMITTALS

.1 Submit product data including printed product literature and data sheets in accordance with Section 01 33 00 – Submittal Procedures. Data to include product characteristics, performance criteria, physical size, finish and limitations.

1.3 SUBMITTALS (Cont'd)

.2 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
.1 Submit sample for color selection.
.2 Submit sample for verification. Provide samples in color offered with joint sealants formed between two 150 mm long strip of material matching appearance of surfaces adjacent to joint sealants.

.3 Submit manufacturer's instructions in accordance with Section 01 33 00 – Submittal Procedures.
.1 Include preparation and installation instructions for each product used.

.4 Submit standard drawings illustrating manufacturer's recommended sealant joint profiles and dimensions. Indicate width, width to- depth ratio, thickness of joint sealant, and depth of recess limitations recommended by manufacturer.

.5 Preconstruction field-adhesion test reports.

.6 Field quality control adhesion test reports.

1.4 QUALITY ASSURANCE

.1 Preconstruction Field-Adhesion Testing: Prior to installing pavement sealants, field test adhesion to joint substrates using ASTM C1193 Method A. Verify adhesion is adequate. Modify joint preparation recommendations for failed joints and re-test. Submit written report to Departmental Representative.

1.5 DELIVERY,STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials to prevent damage to packaging.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

.3 Replace defective or damaged materials with new.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.4 Divert unused joint sealing material from landfill to official hazardous material collections sites approved by Departmental Representative.

.5 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic material destined for recycling.

.6 Fold up metal banding, flatten, and place in designated area for recycling.

1.7 PROJECT CONDITIONS

.1 Environmental Limitations: conform to manufacturer’s written instructions.
.1 Do not install silicone sealant during inclement weather or when such conditions are expected. Allow wet surfaces to dry.
.2 Do not install sealants when temperature is above 50° C or below 4.4°C.
.3 Do not install sealant when temperature is at or below dew point (the temperature at which the air is saturated with moisture vapor and liquid water (dew) begins to form).

.2 Substrate Conditions:
.1 Do not proceed with installation of materials until contaminants capable of interfering with adhesion are removed from substrates.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Labour Canada.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 One-part, non-sag silicone material that cures to a low-modulus silicone rubber sealant designed for sealing joints in Portland cement concrete and accommodates typical thermal movements to the following requirements.

Test Method	Test	Value
As Supplied		
Colour		
ASTM D2202	Slump of Sealants	Pass (< 7.6mm
ASTM C1183	Extrusion Rate	90 – 250 g/min
ASTM C679	Tack Free Time	Pass (5 hours max)
ASTM C792	Heat Aging	3.05% loss max
ASTM C661	Durometer Shore A-2	15 - 25
ASTM C792	Specific Gravity	1.450 – 1.515
As Cured – 21 days at 25°C and 50% RH		
ASTM D412	Ultimate Elongation	≥ 1200%
ASTM D412	Tensile Stress @ 150%	28 psi (45 psi max)
Performance		
ASTM C719	Movement, 10 cycles at +100/-50 percent	No Failure
ASTM C793	Accelerated Weathering at 5,000 hours	No cracks, blisters or bond loss

PART 3 – EXECUTION

3.1 JOINT SEALANT APPLICATION

.1 Apply sealant as indicated on drawings.

.2 Examine joint profiles and surfaces to determine if work is ready to receive paving sealants. Verify joint dimensions are adequate for development of sealant movement capability. Proceed with paving sealant work once conditions meet sealant manufacturer's recommendations.

.1 Comply with width, width-to-depth ratio, thickness of joint sealant, and depth of recess limitations published by manufacturer for specific products.

.3 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil, grease, and other matter which may impair Work using materials and methods recommended by sealant manufacturer.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

.1 Remove laitance, form-release agents, dust, and other contaminants.

.6 Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.

.7 Prime joint substrates when recommended by sealant manufacturer or when indicated by preconstruction testing. Apply recommended primer using sealant manufacturer's recommended application techniques. Allow to dry according to manufacturer's recommendations prior to sealant application.

.8 Select joint backing materials recommended by sealant manufacturer to be compatible with sealant material. Install backing material at depth required to produce profile of paving sealant allowing optimal sealant movement. Install continuously without gaps, twisting, stretching, or puncturing backing material.

3.1 JOINT SEALANT APPLICATION (Cont'd)

Use gauge to ensure uniform depth to achieve correct profile, coverage, and performance.

.9 Apply sealant to manufacturer's instructions. Comply with recommendations in ASTM C1193.

.1 Tool non-sag type sealants immediately with appropriately shaped tool to force sealants against joint backing and joint substrates, eliminating voids and ensuring full contact.

.1 Provide concave, smooth, uniform, sealant finish. Eliminate air pockets and ensure complete contact on both sides of joint opening.

.2 Tool joints with one continuous stroke.

.3 Use tooling agents recommended by sealant manufacturer for application.

.10 Curing: to manufacturer's recommendations.

.11 Cleanup.

.1 Clean adjacent surfaces immediately and leave work neat and clean.

.2 Remove excess and droppings, using recommended cleaners as work progresses.

.3 Remove masking tape after initial set of sealant without disturbing seal.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 This section applies to compaction effort for aggregate materials.

.1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Section 32 11 16.01 - Granular Sub-Base.

.3 Section 32 11 23 - Aggregate Base Courses.

.4 Section 31 24 13 – Roadway Embankments.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C 127-12, Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.

.2 ASTM D 698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft² (600 kN-m/m²)).

.3 ASTM D 1557-12, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft² (2,700 kN-m/m²)).

.4 ASTM D 4253-14, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

1.3 DEFINITIONS

.1 Corrected maximum dry density is defined as:

.1 D = (D1xD2) / ((F1 x D2) + (F2 x D1))

.2 Where: D = corrected maximum dry density kg/m³.

.1 F1 = fraction (decimal) of total field sample passing 4.75 mm sieve

.2 F2 = fraction (decimal) of total field sample retained on 4.75 mm sieve (equal to 1.00 - F1)

.3 D1 = maximum dry density, kg/m³ of material passing 4.75 mm sieve determined in accordance with ASTM D 698.

.4 D2 = bulk density, kg/m³, of material retained on 4.75 mm sieve, equal to 1000G where

1.3 DEFINITIONS(Cont'd)

G is bulk specific gravity (dry basis) of material when tested to ASTM C 127.

.3 For free draining aggregates, determine D1 (maximum dry density) to ASTM D 4253 dry method when directed by Departmental Representative.

PART 2 – PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 – EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 03 30 00 - Cast-in-Place Concrete.

.4 Section 32 11 16.01 - Granular Sub-Base.

.5 Section 32 11 23 - Aggregate Base Courses.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D 4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Allow continual sampling by Departmental Representative during production.

.3 Provide Departmental Representative with access to source and processed material for sampling.

.4 Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross section sampling.

.5 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Divert unused granular materials from landfill to facility to satisfaction of Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.

.2 Flat and elongated particles of coarse aggregate: to ASTM D 4791.
.1 Greatest dimension to exceed five times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
.1 Natural sand.
.2 Manufactured sand.
.3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.4 Coarse aggregates satisfying requirements of applicable section to be crushed rock:
.1 Gravel or crushed gravel will not be acceptable.
.2 River or beach gravels will not be acceptable.
.3 Salt water submerged deposits will not be acceptable.

.5 Aggregate to be placed in watercourses to be clean, non-erodible, non-orebearing and non-toxic. Aggregate material must be obtained from a non-watercourse source.

2.2 SOURCE APPROVAL AND QUALITY CONTROL

.1 Source(s) of materials to be incorporated into work or stockpiled to be to satisfaction of Departmental Representative.

2.2 SOURCE APPROVAL AND QUALITY CONTROL (Cont'd)

.2 Provide all necessary test data to demonstrate that aggregate materials meet the specified requirements in this and all related sections.

.3 Inform Departmental Representative of proposed source of aggregates and provide access for sampling within four (4) weeks of commencing production.

.4 If, in opinion of Departmental Representative, materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that material from source in question can be processed to meet specified requirements.

.5 Advise Departmental Representative four (4) weeks in advance of any change in material source to allow sampling, testing and approval.

.6 The Contractor will pay all costs associated with sampling, testing, and approval of any material source change made after approval of the initial source.

.7 Acceptance of material at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unsatisfactory.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Processing

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment to the satisfaction of Departmental Representative.

.3 Wash aggregates, if required to meet specifications. Use only equipment satisfactory to Departmental Representative.

3.1 PREPARATION (Cont'd)

.1 (Cont'd)

.4 When operating in stratified deposits, use excavation equipment and methods that produce uniform, homogeneous aggregate.

.2 Handling

.1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.3 Stockpiling

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet Project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 h of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:

.1 Max 1.5 m for coarse aggregate and base course materials.

.2 Max 1.5 m for fine aggregate and sub-base materials.

.3 Max 1.5 m for other materials.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.9 Do not cone piles or spill material over edges of piles.

.10 Do not use conveying stackers.

.11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.2 CLEANING

.1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.2 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

.3 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 74 21 - Construction Demolition Management System.

.2 Section 31 23 33.01 - Excavation, Trenching, and Backfilling.

.3 Section 31 14 13 - Soil Stripping and Stockpiling.

.4 Section 01 35 43 - Environmental Procedures.

1.2 REFERENCES

.1 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

.2 Environment Canada.

.3 When conflicts occur between EPA and Environment Canada, the more stringent requirement shall apply.

1.3 DEFINITIONS

.1 Clearing consists of cutting off trees and brush vegetative growth to not more than specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.

.2 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.

.3 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.

1.3 DEFINITIONS (Cont'd)

.4 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of fallen timber and surface debris off site.

.5 Grubbing consists of excavation and disposal of stumps, roots, boulders, rock fragments to not less than specified depth below existing ground surface.

1.4 QUALITY ASSURANCE

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Safety Requirements.

1.5 STORAGE AND PROTECTION

.1 Prevent damage to fencing, root systems of trees, bench marks, survey markers and monuments, existing pavement, landscaping, natural features, utility lines, site appurtenances, and water courses which are to remain.
.1 Repair damaged items to approval of Departmental Representative.
.2 Replace trees designated to remain, if damaged, as directed by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Soil Material for Fill:
.1 Excavated soil material: free of debris, roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, deleterious, or objectionable materials. Must be approved for use by the Departmental Representative for use on this project.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Inspect site and verify with Departmental Representative items designated to remain.

3.1 PREPARATION (Cont'd)

.2 Locate and protect utility lines: preserve in operating condition active utilities traversing site.

.1 Notify Departmental Representative immediately of damage to or when unknown existing utility lines are encountered.

.3 Notify all applicable utility authorities before starting clearing and grubbing.

3.2 CLEARING

.1 Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal occurring within cleared areas.

.2 Clear as indicated by cutting at height of not more than 300 mm above ground. In areas to be subsequently grubbed, height of stumps left from clearing operations to be not more than 1000 mm above ground surface.

.3 Cut off branches and cut down trees overhanging area cleared as directed by Departmental Representative.

.4 Cut off unsound branches on trees designated to remain as directed by Departmental Representative.

3.3 ISOLATED TREES

.1 Cut off isolated trees as indicated or as directed by Departmental Representative at height of more than 300 mm above ground surface.

.2 Grub out isolated tree stumps.

3.4 GRUBBING

.1 Remove and dispose of roots larger than 75 mm in diameter, matted roots, and designated stumps from indicated grubbing areas.

.2 Grub out stumps and roots to not less than 200 mm below ground surface.

3.4 GRUBBING (Cont'd)

.3 Grub out visible rock fragments and boulders, greater than 300 mm in greatest dimension, but less than 0.25 m^3.

.4 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

3.5 REMOVAL AND DISPOSAL

.1 Remove cleared and grubbed materials off site in accordance with all applicable municipal, provincial and federal regulations.

.2 Cut timber greater than 125 mm diameter and stockpile. Stockpiled timber becomes property of Contractor.

.3 Remove diseased trees identified by Departmental Representative and dispose of this material in accordance with all applicable municipal, provincial and federal regulations.

3.6 FINISHED SURFACE

.1 Leave ground surface in condition suitable for immediate grading operations and stripping of topsoil, to approval of Departmental Representative.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 35 43 Environmental Procedures.

.2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

.1 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

.2 Environment Canada.

.3 When conflicts occur between EPA and Environment Canada, the more stringent requirement shall apply.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 STRIPPING OF TOPSOIL

.1 Ensure that procedures are conducted in accordance with applicable federal, provincial and municipal requirements.

.2 Remove topsoil before construction procedures commence to avoid compaction of topsoil.

.3 Handle topsoil only when it is dry and warm.

.4 Remove vegetation from targeted areas by non-chemical means and dispose of stripped vegetation by alternative disposal.

3.1 STRIPPING OF TOPSOIL (Cont'd)

.5 Remove brush from targeted area by non-chemical means and dispose of through alternative disposal.

.6 Strip topsoil to depths as indicated and to satisfaction of Departmental Representative.
.1 Avoid mixing topsoil with subsoil.

.7 Pile topsoil in berms in locations as directed by Departmental Representative.
.1 Stockpile height not to exceed 2 m.

.8 Dispose of unused topsoil as indicated and in accordance with all applicable federal, municipal and provincial regulations.

.9 Protect stockpiles from contamination and compaction.

.10 Cover topsoil that has been piled for long term storage with anchored waterproof and insulated tarps, as required to resist wind, water and winter conditions. Place straw bales around the stockpile to filter sediment entering or exiting the pile.

3.2 PREPARATION OF GRADE

.1 Verify that grades are correct and notify Departmental Representative if discrepancies occur. Do not begin work until instructed by Departmental Representative.
.1 Grade area only when soil is dry to lessen soil compaction.
.2 Grade soil establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage.

3.3 PLACING OF TOPSOIL

.1 Place topsoil only after Departmental Representative has accepted subgrade.

.2 Spread topsoil during dry conditions in uniform layers not exceeding 150 mm, over unfrozen subgrade free of standing water.

.3 Establish traffic patterns for equipment to prevent driving on topsoil after it has been spread to avoid compaction.

3.3 PLACING OF TOPSOIL (Cont'd)

.4 Cultivate soil following spreading procedures.

3.4 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 05 16 - Aggregate Materials.

.2 Section 31 24 14 - Fill Against Structure.

.3 Section 32 11 16.01 - Granular Sub Base.

.4 Section 32 11 23 - Aggregate Base Courses.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM C 117-13, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
.2 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.3 ASTM D 422-63(2007), Standard Test Method for Particle-Size Analysis of Soils.
.4 ASTM D 698-10, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ^{3}) (600 kN-m/m ^{3}).
.5 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act (CEPA), 1999, c.33.
.2 Transportation of Dangerous Goods Act(TDGA), 1992, c.34.

.4 Nova Scotia Department of Transportation and infrastructure Renewal (NSTIR)
.1 Standard Specification - Highway Construction and Maintenance (latest edition).

1.3 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
.1 Rock: solid material in excess of 1.00 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95m^3-1.15m^3 bucket. Frozen material not classified as rock.
.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation including dense tills, hardpan and frozen materials.

.2 Topsoil:
.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

.3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.5 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.6 Unsuitable materials:
.1 Weak, chemically unstable, wet and compressible materials.
.2 Frost susceptible materials:
.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D 4318-10, and gradation within limits specified when tested to ASTM D 422-63(2007) and ASTM C 136-06: Sieve sizes to CAN/CGSB-8.2-M88.
.2 Table:

1.3 DEFINITIONS (Cont'd)

.6 (Cont'd)

.2 (Cont'd)

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

.3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

.7 Unshrinkable fill: very weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Quality control: in accordance with Section 01 45 00 - Quality Control:
.1 Submit to Departmental Representative testing results and reports as described in Part 3 of this section.

.3 Preconstruction Submittals:
.1 Submit construction equipment list for major equipment to be used in this section prior to start of work.

.4 Samples:
.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
.2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source(s) of fill materials and provide access for sampling.

1.5 QUALITY ASSURANCE

.1 For design of any temporary structures submit design and supporting data at least 2 weeks prior to installation or construction.

.2 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Nova Scotia, Canada.

1.5 QUALITY ASSURANCE (Cont'd)

.3 Keep design and supporting data on site.

.4 Engage services of qualified professional Engineer who is registered or licensed in Province of Nova Scotia, Canada in which Work is to be carried out to design and inspect shoring, bracing and underpinning required for Work.

1.6 EXISTING CONDITIONS

.1 Examine geotechnical report prepared by EnGlobe, dated December, 2015, Ref No. 20333, attached in Appendix A.

.2 Existing buried utilities and structures:

.1 Before commencing work obtain all required digging permits from local utilities and/or authorities, and verify and establish location of buried services on and adjacent to site.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

.3 Remove obsolete buried services within 2 m of foundations and/or structures: cap cut-offs.

.4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.5 Prior to beginning excavation Work, notify Departmental Representative or authorities to clearly mark such locations to prevent disturbance during Work.

.6 Confirm locations of buried utilities by hand digging or careful test excavations in presence of Departmental Representative. Hand dig all cables one metre either side of cable prior to machine excavation.

.7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

.8 Where unidentified utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing or otherwise disturbing utilities or structures.

.9 Record location of maintained, re-routed and abandoned underground lines.

1.6 EXISTING CONDITIONS (Cont'd)

.3 Existing surface features:

.1 Conduct, with Departmental Representative, condition survey of existing fencing, trees and other plants, service poles, wires, lighting fixtures, pavement, survey benchmarks and monuments, and all other surface features which may be affected by Work.

.2 Protect existing surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

.3 Protect existing asphalt and concrete pavements which may be affected by Work from damage while work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

.4 Where required for excavation, cut roots or branches as directed by Departmental Representative.

1.7 SHORING, BRACING, AND UNDERPINNING

.1 Shoring, Bracing or underpinning may be required to prevent undermining of adjacent structures, underground utilities and/or traffic areas.

.2 Comply with safety requirements and applicable local legislation to protect existing features.

.3 Engage services of qualified Professional Engineer who is registered in the Province of Nova Scotia to design and inspect cofferdams, shoring, bracing and underpinning required for work.

.4 At least 2 weeks prior to commencing work, submit design and supporting data.

.5 Design and supporting data submitted to bear the stamp and signature of qualified Professional Engineer licensed in the Province of Nova Scotia.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Fill Against Structure: in accordance with Section 31 24 14 - Fill Against Structure.

.2 Clean Rock Fill: 'Clear Stone C4' in accordance with Division 3, Section 4 of NSTIR Standard Specification - Highway Construction and Maintenance (latest edition).

.3 Select Backfill Material: from excavations or other sources, approved by the Departmental Representative for use intended, dry, unfrozen and free from rocks larger than 80 mm, cinders, ashes, sods, refuse or other deleterious or unsuitable materials.

.4 Geotextiles: to Section 31 32 19.01 - Geotextiles.

.5 Unshrinkable Fill: proportioned and mixed to provide:
.1 Maximum compressive strength of 1.0 MPa at 28 days.
.2 Maximum Portland cement content of 25 kg/m3.
.3 Minimum strength of 0.07 MPa at 24 h.
.4 Concrete aggregates: to CAN/CSA-A23.1.
.5 Portland cement: Type GU.
.6 Slump: 150 minimum.

PART 3 - EXECUTION

3.1 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

3.2 STOCKPILING

.1 Stockpile fill materials in areas designated by Departmental Representative.
.1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

3.2 STOCKPILING (Cont'd)

.3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.3 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements and Health and Safety Act for the Province of Nova Scotia.

.2 Obtain permit from authority having jurisdiction for any temporary diversion or pumping of water course.

.3 During backfill operation:
.1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.
.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

.4 Upon completion of substructure construction:
.1 Remove cofferdams, shoring and bracing.
.2 Remove excess materials from site and restore watercourses as directed by Departmental Representative.

3.4 DEWATERING

.1 Keep excavations free of water while Work is in progress.

.2 Submit for Departmental Representative's review details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

.4 Protect open excavations against flooding and damage due to surface run-off.

3.4 DEWATERING (Cont'd)

.5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved runoff areas and in manner not detrimental to public and private property, existing facilities, or portion of Work completed or under construction.
.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.6 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.5 EXCAVATION

.1 Excavate to lines, grades, elevations and dimensions as indicated.

.2 For foundation and structures:
.1 Excavate as required to carry out work, in all materials encountered, to level of competent bearing stratum, described in geotechnical report as compact to dense glacial till or 'bedrock'. Do not disturb soil or rock below bearing surface.
.2 Inspection by professional geotechnical engineer designated by Departmental Representative, as required.
.3 If bearing surface is unsatisfactory, perform additional excavation as directed by Departmental Representative. Replace excavated material to satisfaction of Departmental Representative.
.4 Obtain Departmental Representative's approval of completed excavation.

.3 Remove concrete and asphalt paving, demolished foundations and rubble and other obstructions encountered during excavation.

.4 Excavation must not interfere with normal 1:1 (H:V) spray of bearing capacity of adjacent foundations and traffic areas. If interference will occur, excavation must be shored, braced or underpinned as described elsewhere in this specification.

.5 Do not disturb soil within branch spread of trees or shrubs that are to remain.

3.5 EXCAVATION (Cont'd)

.5 (Cont'd)

.1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.6 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.7 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

.8 Restrict vehicle operations directly adjacent to open trenches.

.9 Dispose of surplus and unsuitable excavated materials off-site in accordance with applicable provincial and municipal regulations.

.10 Do not obstruct flow of surface drainage or natural watercourses. Diversions of flow are to be submitted in detailed plan and approved by Departmental Representative and other authorities before proceeding.

.11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.12 Notify Departmental Representative when bottom of excavation is reached and/or appears unsuitable and proceed as directed by Departmental Representative.

.13 Obtain Departmental Representative's approval of completed excavation.

.14 If encountered, remove unsuitable material from excavation bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.1 In areas occupied by foundations or structures, replace excavated material with Fill Against Structure compacted to not less than 100% Standard Proctor maximum dry density.

3.5 EXCAVATION (Cont'd)

.15 Correct unauthorized over-excavation as follows:
.1 In areas not occupied by foundations or structures, replace excavated material with Select Backfill Material compacted to not less than 98% of Standard Proctor Maximum Dry Density.

.16 Hand trim, make firm and remove loose material and debris from excavations.
.1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
.2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

.17 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

3.6 BACKFILL TYPES AND COMPACTION

.1 Use types of backfill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D 698.
.1 Clean Rock fill: compact to 100% of maximum dry density.
.2 Fill Against Structure: compact to 100% of maximum dry density.
.3 Select Backfill Material: compact to 95% of maximum dry density.

3.7 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:
.1 Departmental Representative has inspected and approved installations.
.2 Removal of concrete formwork.
.3 Removal of shoring and bracing;
.4 Backfilling of voids with satisfactory soil material.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

3.7 BACKFILLING (Cont'd)

.4 Place backfill material in uniform layers not exceeding 200 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer. Departmental Representative may authorize thicker lifts if it can be shown specified compaction can be achieved.

.5 Backfilling around installations:
.1 Place bedding and surround material as specified elsewhere.
.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
.3 Place layers simultaneously on both sides of installed Work to equalize loading.
.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and obtain approval from Departmental Representative.
.5 Place unshrinkable fill in areas as indicated or directed by Departmental Representative. Consolidate and level unshrinkable fill with internal vibrators.

3.8 RESTORATION

.1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.

.2 Replace topsoil, seed and fertilize as indicated.

.3 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

.4 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.5 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

3.8 RESTORATION (Cont'd)

.6 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures

.2 Section 01 35 29.06 – Health and Safety

.3 Section 01 35 43 – Environmental Procedures

.4 Section 02 41 16 – Structure Demolition

.5 Section 03 30 00 – Cast-In-Place Concrete

.6 Section 31 05 16 –Aggregate Materials

.7 Section 31 24 14 – Fill against Structure

.8 Section 31 32 19.01 – Geotextiles

.9 Section 31 37 00 –Armour Rock

.10 Section 32 11 16.01 – Granular Sub-base

.11 Section 32 11 23 – Aggregate Base Courses

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.

.2 Preconstruction Submittals:

.1 Submit construction equipment list for major equipment to be used in this section prior to start of work.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Conduct, with Departmental Representative, condition survey of existing structures, trees and other plants, lawns, fencing, service poles, wires, pavement, survey bench marks and monuments which may be affected.

3.1 EXAMINATION (Cont'd)

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovering.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Install temporary barrier and temporary retaining structures to separate and protect work zone from park users.

3.3 TEMPORARY DAMS, SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 – Health and Safety and Health and Safety Act for the Province of Nova Scotia, Canada.

.2 Construct temporary Works to depths, heights and locations as indicated or directed by Departmental Representative.

3.4 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while work is in progress.

.2 Protect open excavations against flooding and damage due to surface run-off.

.3 Dispose of water by pumping into vegetated areas in approved collection runoff areas and in manner not detrimental to public, private property, watercourse, or portion of Work completed or under construction.

3.4 DEWATERING AND HEAVE PREVENTION (Cont'd)

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.2 Do not allow sediment laden water to reach adjacent watercourses.

3.5 EXCAVATION

.1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.

.2 Excavate to lines, grades, elevations and dimensions as indicated on the drawings or as directed by Departmental Representative.

.3 Excavation must not interfere with bearing capacity of adjacent foundations.

.4 Keep excavated and stockpiled materials safe distance away from construction activities.

.5 Restrict vehicle operations directly adjacent to open trenches.

.6 Dispose of surplus and unsuitable excavated material in approved location as directed by the Departmental Representative.

.7 Do not obstruct flow of surface drainage or natural watercourses.

.8 Ensure excavation completed in a phased manner as indicated to maintain two lanes of traffic on the existing bridge and approaches facilities in any manner.

.9 Earth bottoms of excavations to be undistributed soil, level, free from loose, soft or organic matter.

.10 Notify Departmental Representative when bottom of excavation is reached.

.11 Obtain Departmental Representative approval of completed excavation.

.12 Remove unsuitable material from excavation bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

3.5 EXCAVATION (Cont'd)

.13 Correct unauthorized over-excavation as follows:
.1 Fill with Fill Against Structure gravel compacted to not less than 100% of corrected Standard Proctor maximum dry density.

.14 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

.15 Protect environment from erosion and sediment, transport as per requirements of Environment Protection Plan.

.16 The use of explosive or other means, which in the opinion of the Departmental Representative might disturb the existing structure, etc. shall not be permitted.

.17 Boulders removed shall be satisfactorily utilized or disposed of as directed by the Departmental Representative.

.18 After removal of forms and the required concrete strength has been achieved as noted on the Contract Drawings, the excavations around the structure shall be backfilled up to the level shown on the Contract Drawings, utilizing the backfill materials noted in the Contract Documents. Materials obtained from the foundation excavation shall not be used as backfill unless written approval to do so is provided by the Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 14 13 - Soil Stripping and Stockpiling.

.2 Section 32 11 16.01 - Granular Sub-Base.

.3 Section 32 11 23 - Aggregate Base Courses.

.4 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

.1 Reference Standards:

.1 ASTM International

.1 ASTM D 698-12ea1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,000 ft-lbf/ft^3) (600 kN-m/m^3).

1.3 EXISTING CONDITIONS

.1 Examine geotechnical report prepared by Englobe dated December 2015, Ref No. 20333 attached in Appendix A.

.2 Protect existing fencing, trees, landscaping, natural features, bench marks, pavement, surface features which are to remain. If damaged, restore to original or better condition unless directed otherwise by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Embankment materials require approval by Departmental Representative.

.2 Material used for embankment not to contain more than 3% organic matter by mass, frozen lumps, weeds, sod, roots, logs, stumps or other unsuitable material.

.3 Embankment Material:

2.1 MATERIALS (Cont'd)

.3 (Cont'd)

.1 Obtain from sources such as quarry, or borrow pit as approved by Departmental Representative.

.1 Embankment Material to consist of acceptable earth material and processed rock material free from objectionable quantities of organic matter, frozen soil, stumps, trees, moss, and other unsuitable materials, with less than 25% fines passing the No. 200 sieve, and free of cobbles and boulders with a maximum particle size no greater than 200 mm.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that condition of substrate is acceptable for roadway embankment Work:

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 COMPACTION EQUIPMENT

.1 Compaction equipment: vibratory rollers or small compactors capable of obtaining required density in materials on project.

.1 Demonstrate compaction equipment effectiveness on specified material and lift thickness by documented performance of test-strip before start of Work.

.2 Replace or supplement equipment that does not achieve specified densities.

.2 Operate compaction equipment continuously in each embankment when placing material.

3.3 WATER DISTRIBUTORS

.1 Apply water with equipment capable of uniform distribution.

3.4 STRIPPING OF TOPSOIL

.1 Strip top soil and unsuitable materials as required in accordance with Section 31 14 13 - Soil Stripping and stockpiling.

.2 Remove clearing and grubbing debris from stripping.

3.5 EMBANKMENTS

.1 Scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces.
.1 Method used to be to be pre-approved by Departmental Representative.

.2 Break up or scarify existing road surface prior to placing embankment material.

.3 Do not place material which is frozen nor place material on frozen surfaces.

.4 Maintain crowned surface during construction to ensure ready run-off of surface water.

.5 Drain low areas before placing materials.
.1 Place and compact to full width in layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100 mm.

.6 Where material consists of rock:
.1 Place to full width in layers of sufficient depth to contain maximum sized rocks, but in no case is layer thickness to exceed 1 m.
.2 Distribute rock material to fill voids with smaller fragments to form compact mass.
.3 Fill surface voids at subgrade level with rock spalls or selected material to form earth-tight surface.
.4 Do not place boulders and rock fragments with dimensions exceeding 150 mm within 300 mm of travel surface subgrade elevation.

3.6 COMPACTION

.1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.

.2 Deposit, spread, and level, embankment material in layers 300 mm maximum thickness before compaction.
.1 Compact each layer of embankment until compaction equipment achieves no further significant consolidation.
.2 Ensure required compaction for each layer before placing any material for next layer.

.3 Use specialized compaction equipment supplemented by routing, hauling, and levelling equipment over each layer of fill.

.4 Obtain written approval from Departmental Representative before using specialized compaction equipment such as tamping rollers, vibratory rollers, or other alternate compaction equipment that produces the required results
.1 For tamping rollers, use equipment that exerts 1000 kPa minimum of pressure on tamping surface of each tamping foot in transverse row.

.5 Compact each layer to minimum 98% maximum dry density: ASTM D 698

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

3.7 FINISHING

.1 Shape entire roadbed to within 25 mm of design elevations.

.2 Finish slopes true to lines, grades and drawings where applicable.

.3 Hand finish slopes that cannot be finished satisfactorily by machine.

.4 Round top of backslope 1.5 m both sides of top of slope.

3.7 FINISHING (Cont'd)

.5 Provide graded travel surface over embankment material, smooth and free of pot hole.

.1 Place and compact granular sub-base in accordance with Section 32 11 16.01 - Granular Sub-Base.

.2 Place and compact removed asphalt pavement (millings) sufficiently to stabilize the surface to the satisfaction of the Departmental Representative.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 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 - Cleaning.

3.9 PROTECTION

.1 Maintain finished surfaces in condition conforming to this section until removal of embankment.

.2 Provide silt fences and erosion protection as required to mitigate and prevent impacts to adjacent properties.

3.10 REMOVAL

.1 Remove all embankment materials and reinstate all areas, not otherwise impacted by new work or infrastructure, to a condition equal to or better than existed prior to work.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 30 00 – Cast-in-Place Concrete

.2 Section 31 23 33.02 – Excavating for Bridge

.3 Section 31 37 00 – Rip-Rap

.4 Section 31 61 13 – Pile Foundations, General Requirements.

1.2 REFERENCES

.1 ASTM C117, Test Method for Material Finer Than 75 µm Sieve in Mineral Aggregate by Washing.

.2 ASTM C131, Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.3 ASTM C136, Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D4318, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Crushed and screened gravel or rock approved by the Departmental Representative prior to placement.

.2 Material shall be tested in accordance with ASTM C117 and ASTM C136 and shall conform to the following gradation:

Sieve Size µm	Percent Passing
112 000	100
40 000	60 – 85
5 000	25 – 50
315	5 – 15
80	2 – 7

.3 Fill Against Structure shall conform to the physical properties requirements listed in the following:

2.1 MATERIALS (Cont'd)

Property	Test Method	FAS
LA Abrasion (Grading A)	ASTM C131	45
Plasticity Index (Sand Portion)	ASTM D4318	< 6

PART 3 - EXECUTION

3.1 PLACING

.1 The embankment underlying the Fill Against Structures shall be compacted as indicated on the drawings.

.2 Prior to placing structural fill, inspect subgrade and concrete abutment structures to assure stability. Do not proceed with filling operations until these areas are approved by the Departmental Representative.

.3 Fill material shall be placed in layers not exceeding 300 mm in thickness and each layer compacted as specified herein by means of a vibratory compactor. Refer to Contract Drawings for allowable compaction equipment adjacent to fully integral abutment caps. Compaction of fills behind each abutment shall not be undertaken until the deck and top portion of the integral abutment cap are cast and reach at least 35 MPa. Backfilling and compaction of the Fill Against Structure material behind each abutment shall be carried out simultaneously in equal lifts to equalize longitudinal loads applied on the fully integral abutments.

.4 Fill Against Structure shall be compacted using special equipment, suitable for work in confined spaces and as outlined on the Contract Documents.

.5 Compaction of Fill Against Structure shall compacted as indicated on the Drawings.

.6 Extents of Fill Against Structure adjacent and surrounding each abutment on both approaches shall be as indicated on the Drawings or as determined by the Departmental Representative.

3.1 PLACING (Cont'd)

.7 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.8 Do not use Fill Against Structure material which is frozen or contains ice, snow or debris.

3.2 SITE TOLERANCES

.1 The extent of Fill Against Structure shall be as indicated on the plans or as determined by the Departmental Representative.

3.3 PROTECTION

.1 Upon completion of Work, remove waste materials and debris and correct defects as directed by Departmental Representative.

.2 Maintain finished slopes and lines until subsequent material is placed covering the Fill Against Structure.

.3 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.4 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

.2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.3 Section 31 24 13 - Temporary Roadway Embankments.

1.2 REFERENCES

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

.1 ASTM D 4491-99a(2011), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.2 ASTM D 4595-09, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.3 ASTM D 4716-08(2013), Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

.4 ASTM D 4751-12, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-4.2 No. 11.2-M89(2004), Textile Test Methods - Bursting Strength - Ball Burst Test (Reaffirmation of September 1989).

.2 CAN/CGSB-148.1, Methods of Testing Geotextiles and Complete Geomembranes.

.1 No.2-M85, Methods of Testing Geosynthetics - Mass per Unit Area.

.2 No.3-M85, Methods of Testing Geosynthetics - Thickness of Geotextiles.

.3 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.

.4 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.

.5 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

1.2 REFERENCES (Cont'd)

.2 (Cont'd)
.2 (Cont'd)

.3 Canadian Standards Association (CSA International)
.1 CAN/CSA-G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.4 Nova Scotia Department of Transportation and infrastructure Renewal (NSTIR)
.1 Standard Specifications - Highway Construction and Maintenance, (latest edition).

1.3 SUBMITTALS

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to Departmental Representative following samples at least 4 weeks prior to beginning Work.
.1 Minimum length of 2 m of roll width of geotextile.

.3 Submit to Departmental Representative copies of mill test data and certificate at least 4 weeks prior to start of Work, and in accordance with Section 01 33 00 - Submittal Procedures.

1.4 DELIVERY, STORAGE AND HANDLING

.1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21
Construction/Demolition Waste Management And Disposal.

1.5 WASTE MANAGEMENT AND DISPOSAL (Cont'd)

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 MATERIAL

.1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
.1 Medium Weight geotextile to Division 6, Section 12 of NSTIR Standard Specification - Highway Construction and Maintenance, (latest edition).

.2 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m^2 to CAN/CSA G164.

.3 Factory seams: sewn in accordance with manufacturer's recommendations.

.4 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

3.1 INSTALLATION (Cont'd)

.3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

.4 Overlap each successive strip of geotextile in accordance with manufacturer's instructions.

.5 Join successive strips of geotextile by sewing in accordance with manufacturer's instructions.

.6 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.7 After installation, cover with overlying layer within 4 h of placement.

.8 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

.9 Place and compact soil layers in accordance with Section 31 23 33.01 - Excavating Trenching and Backfilling and Section 31 24 13 - Temporary Roadway Embankments.

3.2 CLEANING

.1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner in accordance with applicable federal, municipal and provincial regulations.

3.3 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 32 19.01 - Geotextiles.

1.2 REFERENCES

.1 ASTM C 127, Test Method for Material Finer than 75 µm Sieve in Mineral Aggregate by Washing.

.2 ASTM C 131, Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

PART 2 - PRODUCTS

2.1 ARMOUR ROCK

.1 Armour Rock to Division 3, Section 8 of NSTIR Standard Specifications - Highway Construction & Maintenance (latest edition).

Table 3.8.2 Armour Rock Sizes

Approximate Maximum Dimension, mm	Percent Smaller Than R2
1 050	
850	100
650	
550	0-50
300	
230	0-15

.2 Hard, dense with relative density not less than 2.65, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:

.1 Channel Rip-Rap

.1 70% (min) of stone shall be between 200 and 450 mm diameter.

.3 Armour Rock to be clean, inorganic, non ore-bearing, non-toxic material from a non-watercourse source. It shall be hard, resistant to weathering and angular in shape.

2.1 ARMOUR ROCK (Cont'd)

.4 Where specified for stream beds, armour rock shall be placed in lifts and washed following placement.

2.2 GEOTEXTILE FILTER

.1 Geotextile: in accordance with Section 31 32 19.01 - Geotextiles.

PART 3 - EXECUTION

3.1 PLACING

.1 Fine grade area to be uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.

.2 Place geotextile on prepared surface in accordance with Section 31 32 19.01 - Geotextiles and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.

.3 Place armour rock to thickness and details as indicated.

.4 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.

.5 Hand placing:

.1 Use larger stones for lower courses and as headers for subsequent courses.

.2 Stagger vertical joints and fill voids with rock spalls or cobbles.

.3 Finish surface evenly, free of large openings and neat in appearance.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 63 33 – Drilled Micro Piles.

.2 Appendix A – Geotechnical Investigation Report.

.3 Section 01 35 43 – Environmental Procedures.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 – Submittals.

.2 Product Data: submit manufacturer’s printed product literature, specifications and datasheet.

.3 Sub-surface investigation report: when site conditions differ from those indicated, submit written notification to Departmental Representative and await further instructions.

.4 Submit schedule of planned sequence of driving to Departmental Representative for review.

.5 Equipment:
.1 Submit prior to pile installation for review by Departmental Representative, list and details of equipment for use in installation of piles.
.2 Micro-pile installation equipment: submit manufacturer’s written data as specified.

.6 Submit site-specific micropile design as specified, to Departmental Representative.

.7 Quality assurance submittals:
.1 Test reports: submit certified test reports for piles from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics for specified performance.
.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00 – Material and Equipment and manufacturer's instructions.

.2 Protect piles from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.

.3 Replace damaged piles as directed by Departmental Representative.

1.4 EXISTING CONDITIONS

.1 Sub-surface investigation report is bound into specification Appendix A.

.2 Notify Departmental Representative in writing if subsurface conditions at site differ from those indicated and await further instructions from Departmental Representative.

1.5 SCHEDULING

.1 Install micro piles in accordance with reviewed sequence.

.2 Provide schedule of planned sequence of installation to Departmental Representative for review, not less than two weeks prior to commencement of pile installation.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Supply or fabricate full length piles as indicated and provide equipment to handle full length piles without cutting and splicing.

.2 Splice piles only with written approval of Departmental Representative.
.1 When permitted provide details for Departmental Representative review.
.2 Design details of splice to bear dated signature stamp of professional engineer registered or licensed in Province of Nova Scotia, Canada.

PART 3 – EXECUTION

3.1 PREPARATION

.1 Protection:
.1 Protect adjacent structures, services and work of other sections from hazards due to pile installation operations.
.2 Arrange sequencing of pile installation operations and methods to avoid damages to adjacent existing structures.
.3 When damages occur, remedy damaged items to restore to original or better condition at own expense.

.2 Ensure that ground conditions at pile locations are adequate to support pile installation operation and load testing operations.
.1 Make provision for access and support of piling equipment during performance of Work.

.3 Install piles only when excavation has been completed.

.4 Install piles within embankments only when embankment has been placed and compacted to at least bottom elevation of pile cap.

3.2 INSTALLATION

.1 Allowable design load capacity of pile at specified and factored load is as indicated.

.2 Installation of each pile will be subject to review of Departmental Representative.
.1 Departmental Representative will be sole judge of acceptability of each pile with respect to final resistance, depth of penetration or other criteria used to determine load capacity.

.3 Install each pile to pile tip minimum elevation as indicated.

3.3 INSTALLATION TOLERANCES

.1 Pile heads to be within 150 mm of locations as indicated.

.2 Piles not to be more than 1.0 % of length out of vertical alignment (or out of batter), and not more than 100 mm.

3.4 OBSTRUCTIONS

.1 Where obstructions are encountered that cause deviation from specified tolerances, remove obstruction.

3.5 REPAIR AND RESTORATION

.1 Pull out rejected piles and replace with new piles.

.2 Remove rejected pile and replace with new, and if necessary, longer pile.

.3 Remove rejected pile and fill hole as directed by Departmental Representative.

.4 If approved by Departmental Representative, leave rejected pile in place and cut off as directed by Departmental Representative.
.1 Leave rejected pile in place, place adjacent pile and modify pile cap as directed by Departmental Representative.

.5 No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 11 – Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 35 43 – Environmental Procedures.

.2 Section 31 61 13 – Pile Foundations, General Requirements.

1.2 DESCRIPTION

.1 Design, supply and install micropiles to meet the performance requirements indicated on drawings.

.2 Select the micropile type, size, size of reinforcement, pile top attachment, installation means and methods, depth of the required grout bond zone and final micropile diameter. The micropile contractor shall design and install micropiles that will develop the load capacities indicated on the contract plans.

1.3 PROTECTION

.1 Protect public and construction personnel, adjacent structures and work of other Sections from effect of pile installation operations.

.2 Caution is to be exercised in selecting and constructing micropiles in close proximity to the existing structures on the site.

1.4 REFERENCES

.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

.2 CSA A23.3-14(R2010), Design of Concrete Structures.

.3 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005), Includes Update No. 1 (2009), Update No. 2 (2010), Update No. 3 (2011).

.4 CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

.5 CSA-G40.20-04/G40.21-04(R2009), General

1.4 REFERENCES (Cont'd)

Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.6 CSA S16-09, Design of Steel Structures, Includes Update No.1 (2010).

.7 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel, Includes Update No.3 (2011).

.8 CSA W59-03(R2008), Welded Steel Construction (Metal Arc Welding).

.9 CSA W178.1-08, Certification of Welding Inspection Organizations.

.10 CSA W178.2-08, Certification of Welding Inspectors.

.11 ASTM A615/A615M-09b, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

.12 ASTM A722/A722M-07 Standard Specification for Uncoated High-Strength Steel Bars for Prestressing Concrete.

.13 ASTM C494/C494M-11, Standard Specification for Chemical Admixtures for Concrete

.14 ASTM D1143/D1143M-07e1, Standard Test Methods for Deep Foundations Under Static Axial Compressive Load.

.15 ASTM D3689-07, Standard Test Methods for Deep Foundations Under Static Axial Tensile Load.

.16 US FHA "Micropile Implementation Manual" June 2000.

.17 FHWA-SA-97-070 "Micropile Design and Construction Guidelines".

1.5 QUALITY ASSURANCE

.1 The micropile contractor shall be fully experienced in all aspects of micropile design and construction, and shall furnish all necessary plant, materials, skilled labour, and

1.5 QUALITY ASSURANCE (Cont'd)

supervision to carry out the contract. The contractor will have successfully completed at least five projects in the previous five years of similar scope and size.

.2 Requirements of Regulatory Agencies:
.1 Conform to the local and provincial regulations, including construction safety regulations.

.3 Allowable Installation Tolerances:
.1 Plan location at cut-off: 75 mm.
.2 Vertical Alignment: Plumb within 2% of total length.
.3 Cut-off elevation of top pile: + 25 mm.
.4 Centreline of core reinforcing shall not be more than 20 mm from centreline of piling.

.4 Minimum Bond Length:
.1 Micropile bond socket in sound rock shall not be less than 1000 mm.

.5 Quality Control
.1 Quality control may be performed by an Inspection and Testing Company appointed by the Departmental Representative.
.2 Inspection and Testing Company shall be qualified under CSA W178.1.
.3 Welding inspectors shall be certified by Canadian Welding Bureau for bridges to CSA W178.2.
.4 Inspection service provided by Inspection and Testing Company does not relieve Contractor of sole responsibility for quality control over Work. Performance or non-performance by Inspection and Testing Company, shall not limit, reduce or relieve the Contractor of responsibilities in complying with the requirements of the Specification.
.5 Include the cost of pile load tests in the stipulated price (see 3.4 Field Quality Control).
.6 Refer to Load Test paragraph in this section for minimum frequency of load tests.
.7 The cost of additional inspection and testing, including load testing, because of the failure of Work to meet specified requirements or because of changes to Contract Documents requested by Contractor, shall be at

1.5 QUALITY ASSURANCE (Cont'd)

Contractor's expense.

.8 Mill Inspection: Inspection shall confirm that materials conform to specified requirements. Mill test reports, correlated to materials, will be accepted in lieu of physical tests.

1.6 SITE CONDITIONS

.1 Geotechnical investigation in included in Appendix A.

1.7 SUBMITTALS

.1 Construction Submittals

.1 Submit in accordance with Section 01 33 00.

.2 The Contractor shall prepare and submit to the Departmental Representative for review and approval, working drawings and relevant structural design calculations for the micropile system or systems intended for use. All design submittals shall be sealed by a Registered Professional Engineer, currently licensed in the Province of Nova Scotia.

.3 The Contractor shall submit a detailed description of the construction procedures proposed for use to the Departmental Representative for review.

.4 The Working Drawings shall include micropile installation details giving:

.1 Micropile number, location and pattern.

.2 Micropile design load.

.3 Type and size of reinforcing steel.

.4 Type and casing size.

.5 Grouted drill hole diameter.

.6 Minimum total bond length.

.7 Casing socket length.

.8 Overburden/ free length.

.9 Batter angle if applicable.

.10 Bar transfer length if applicable.

.11 Total micropile length.

.12 Grouting volumes and maximum pressures.

.13 Micropile top attachment.

.14 Micropile cut-off elevation.

.5 The Contractor shall submit shop drawings for all structural steel, including the micropile components, corrosion protection

1.7 SUBMITTALS (Cont'd)

system, pile top attachment and bond length details to the Departmental Representative for review.

.6 Submit source of materials and mill test reports.

.7 The Contractor shall submit the grout mix designs, including details of all materials to be incorporated, and the procedure for mixing and placing the grout to the Departmental Representative for review.

.8 The Contractor shall submit detailed plans for the method proposed for testing the micropiles to the Departmental Representative for review and acceptance prior to beginning load tests. This shall include all necessary drawings and details to clearly describe the test method and equipment proposed.

.9 The Contractor shall submit to the Departmental Representative calibration reports for each test jack, pressure gauge, and master pressure gauge to be used. The calibration tests shall have been performed by an independent testing laboratory and tests shall have been performed within one year of the date submitted. Testing shall not commence until the consultant has reviewed the jack, pressure gauge and master pressure gauge calculations.

.10 Work shall not begin until the appropriate submittals have been received and reviewed in writing by the Departmental Representative.

.2 Inspection Reports

.1 Inspections and Testing Company shall submit written reports of inspection and tests.

.2 Include in each report a plan locating each pile and identifying each pile which fails to satisfy specified tolerances.

.3 Micropile test records, analysis and details.

.4 Distribute reports as follows:

.1 Three (3) copies to Departmental Representative.

.2 One (1) copy to Contractor.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Admixtures:

.1 Admixtures shall conform to the requirements of ASTM C494/C494M. Admixtures which control bleed, improve flowability, reduce water content, and retard set may be used in the grout subject to review and acceptance of the Departmental Representative. Expansive admixtures shall only be added to the grout used for filling sealed encapsulations. Accelerators will not be permitted. Admixtures shall be compatible with the grout and mixed in accordance with the manufacturer's recommendations. The use will only be permitted after appropriate field tests on fluid and set grout properties. Admixtures with chlorides shall not be permitted.

.2 Cementing Materials:

.1 Cementing materials shall conform to the requirements of CSA A3000. If the brand or type of cement is changed during a project, additional mix tests shall be conducted to ensure consistency of quality and performance in situ.

.3 Bar Reinforcement:

.1 Reinforcing shall be deformed bars in accordance with CSA G30.18 or ASTM A722/A722M.

.2 For cases of tensile loading, bar couplers, if required, shall develop the ultimate tensile stress of the bar, without any evidence of failure. For compressive loading, the coupler shall be compatible with efficient load transfer and overall reinforcement performance requirements.

.4 Plates and Shapes:

.1 Structural steel plates and shapes for pile top attachments shall conform to CSA G40.20/G40.21.

.5 Centralizers:

.1 Centralizers shall be fabricated from plastic, steel or material that is non-detrimental to the reinforcing steel. Wood shall not be used.

PART 3 – EXECUTION

3.1 INSTALLATION

.1 The micropile installation technique shall be such that it is consistent with the geotechnical, logistical, environmental, and load carrying conditions of the project. The micropile contractor shall select the drilling method and the grouting procedures used for the installation of the micropiles, subject to the approval of the Departmental Representative.

.2 The drilling equipment and methods shall be suitable for drilling through the conditions to be encountered and restraints of existing structures with minimal disturbance to these conditions or any overlying or adjacent structure or service. The borehole must be open to the defined nominal diameter, full length, prior to placing grout and reinforcement.

.3 All installation techniques shall be determined and scheduled such that there will be no adverse effect on the achieved final set of adjacent piles.

.4 Centralizers shall be provided at 3 m center maximum spacing on central reinforcement. The uppermost centralizer shall be located a maximum of 1.5 m from the top of the micropile, for micropile with continuous central bar, or at the bar end if central bar is not continuous through whole micropile length. Centralizers shall permit the free flow of grout without misalignment of the reinforcement.

.5 The central reinforcement steel with centralizers, shall be lowered into the stabilized drill holes to the desired depth without difficulty. Partially inserted reinforcing bars shall not be driven or forced into the hole such that there will be no interconnection or damage to piles in which the grout has not achieved final set.

.6 Damaged or Defective Piles:
.1 Replace piles which do not meet

3.1 INSTALLATION (Cont'd)

requirements of Drawings and Specifications at no cost to the Departmental Representative.

.2 Leave rejected pile in place and install adjacent pile or piles as directed by the Departmental Representative.

.3 No compensation will be made for removing and replacing or other work necessary due to rejection of defective piles.

.4 Related expenses, such as pile cap redesign, shall be paid by Contractor.

3.2 GROUTING

.1 The Contractor shall provide systems and equipment to measure the grout quality, quantity and pumping pressure during the grouting operations. This information is to be measured and recorded.

.2 After drilling, the hole shall be finished with water and/or air to remove drill cuttings, and/or other loose debris. The Contractor shall provide a stable, homogenous, neat cement grout or a sand cement grout with a minimum 28 day unconfirmed compressive strength of 30 MPa. The grout shall not contain lumps or any other evidence of poor or incomplete mixing. Admixtures, if used, shall be mixed in accordance with manufacturer's recommendations. The pump shall be equipped with a pressure gauge to monitor grout pressures. The pressures gauge shall be capable of measuring pressures of at least 1 MPa or twice the actual grout pressure used by the Contractor, whichever is greater.

The grouting equipment shall be sized to enable the grout to be pumped in one continuous operations. The grout shall be kept in constant agitation prior to pumping.

.3 The grout shall be injected from the lowest point of the drill hole (by tremie methods) until clean, pure grout flows from the top of the micropile. The tremie grout may be pumped through grout tubes, hollow stem augers, or drill rods. Subsequent to tremie grouting, all grouting operations, associated with, for example, extraction of drill casing and pressure grouting, must ensure complete

3.2 GROUTING (Cont'd

continuity of the grout column. The use of compressed air to directly pressurize the fluid grout is not permissible. The grout pressures and grout takes shall be controlled to prevent excessive heave in cohesive soils or fracturing of soil or rock formations. The entire pile shall be grouted to the design cut-off level.

.4 Grout within the micropiles shall be allowed to attain the minimum design strength prior to being loaded.

3.3 PILE SPLICES

.1 Pile splices shall be constructed to develop the required design strength of the pile section.

.2 Lengths of casing and reinforcing steel to be spliced shall be secured in proper alignment and in such a manner that no eccentricity between the axes of the two lengths spliced or angle between the results.

3.4 FIELD QUALITY CONTROL

.1 Inspection and Testing Company appointed as specified for Quality Control elsewhere in this Section, may perform sampling, inspection and testing of concrete and detailed inspection of piling operations including the following:
.1 Monitor and record pile installation procedures.
.2 Record installed pile lengths.
.3 Confirm installed pile tolerances.
.4 Monitor and analyze results of pile testing.
.5 Confirm concrete strength in accordance with Section 03 30 00.

.2 Load Test:
.1 One pre-construction compression test (to minimum 250% of working load) for every 100 piles installed.
.2 5% of remaining piles in tension.
.3 Submit proposed apparatus and structure for the load tests to the Departmental Representative for review.
.4 Pile to be tested will be selected.

.5 Carry out testing in accordance with ASTM D1143/D1143M and ASTM D3689.

3.5 CLEAN UP

.1 Remove from site excess waste materials, cut-off piles and debris resulting from the Work of this Section. Leave premises in a condition acceptable to Departmental Representative on completion of Work.

3.6 ENVIRONMENTAL

.1 Environmental requirements specific to Micro piles are listed in Section 01 35 43 – Environmental Procedures. Comply with these requirements.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Section 31 05 16 - Aggregate Materials.

.3 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.4 Section 31 24 13 - Temporary Roadway Embankment.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C 117-13, Standard Test Methods for Material Finer Than 75-micro m (No. 200) Sieve in Mineral Aggregates by Washing.

.2 ASTM D6928-10, Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.

.3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.4 ASTM D 422-63 (2007), Standard Test Method for Particle-Size Analysis of Soils.

.5 ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).

.6 ASTM D 1883-07e2, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.

.7 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.

.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)

1.2 REFERENCES (Cont'd)

.3 (Cont'd)
.1 Standard Specification - Highway Construction and Maintenance, (latest edition).

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Divert unused granular material from landfill to local facility to the satisfaction of the Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular sub base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
.1 Type 2 Gravel to Division 3, Section 2 of NSTIR Standard Specification - Highway Construction and Maintenance, (latest edition), with the following modification: the allowable percentage passing the 80 µm sieve shall be 3 to 5%.

PART 3 - EXECUTION

3.1 PLACING

.1 Place granular sub-base after subgrade is to the satisfaction of the Departmental Representative.

.2 Construct granular sub-base to depth and grade in areas indicated.

.3 Ensure no frozen material is placed.

.4 Place material only on clean, unfrozen surface, free from snow or ice.

.5 Place granular sub-base materials using methods which do not lead to segregation or degradation.

3.1 PLACING (Cont'd)

.6 Place material to full width in uniform layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

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

.8 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

.1 Compaction equipment to be capable of obtaining required material densities.

.2 Compact to density of not less than 100% of Maximum Dry Density in accordance with ASTM D 698.

.3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.

.4 Apply water as necessary during compaction to obtain specified density.

.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers to the satisfaction of the Departmental Representative.

.6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 SITE TOLERANCES

.1 Finished sub-base surface to be within 25 mm of elevation as indicated but not uniformly high or low.

3.4 PROTECTION

.1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by the Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.3 Section 31 05 16 - Aggregate Materials.

.4 Section 31 24 13 - Temporary Roadway Embankment.

.5 Section 32 11 16.01 - Granular Sub-base.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)
.1 ASTM C 117-13, Standard Test Methods for Materials Finer Than 75-mirco m Sieve in Mineral Aggregates by Washing.
.2 ASTM D 6928-10, Standard Test Method for Resistance of coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
.3 ASTM C 136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.4 ASTM D 698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).
.5 ASTM D 1883-07e1, Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils.
.6 ASTM D 4318-10, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

.3 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)

1.2 REFERENCES (Cont'd)

.3 (Cont'd)
.1 Standard Specification - Highway Construction and Maintenance, (latest edition).

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Divert unused granular material from landfill to local facility to satisfaction of Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular base material: in accordance with Section 31 05 16 - Aggregate Materials and following requirements:
.1 Type 1 Gravel to Division 3, Section 2 of NSTIR Standard Specification - Highway Construction and Maintenance (latest edition), with the following modification: the allowable percentage passing the 80 µm sieve shall be 3 to 5%.
.2 Type 1S Gravel to Division 3, Section 2 of NSTIR Standard Specification - Highway Construction and Maintenance (latest edition).

PART 3 - EXECUTION

3.1 SEQUENCE OF OPERATION

.1 Place granular base after sub-base surface is inspected and approved by the Departmental Representative.

.2 Placing
.1 Construct granular base to depth and grade in areas indicated.
.2 Ensure no frozen material is placed.
.3 Place material only on clean unfrozen surface, free from snow and ice.
.4 Place material using methods which do not lead to segregation or degradation of aggregate.

3.1 SEQUENCE OF OPERATION (Cont'd)

.2 (Cont'd)

.5 Place material to full width in uniform layers not exceeding 200 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

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

.7 Remove and replace that portion of layer in which material becomes segregated during spreading.

.3 Compacting

.1 Compaction equipment to be capable of obtaining required material densities.

.2 Compact to density not less than 100% of Maximum Dry Density in accordance with ASTM D 698.

.3 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.4 Apply water as necessary during compacting to obtain specified density.

.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers to the satisfaction of the. Departmental Representative.

.6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.2 SITE TOLERANCES

.1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.3 PROTECTION

.1 Maintain finished base in condition conforming to this Section until succeeding material is applied or until acceptance by the Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.2 REFERENCES

.1 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
.1 Standard Specifications - Highway Construction and Maintenance (latest edition).
.2 Canadian General Standards Board (CGSB).
.3 CAN/CGSB-15.1-(92), Calcium Chloride.

1.3 DELIVERY STORAGE AND HANDLING

.1 Supply calcium chloride as required to prevent blowing dust.

.2 Deliver calcium chloride to site in moisture-proof bags, bulk. Indicate name of manufacturer, name of product, net weight or mass, and percentage of calcium chloride guaranteed by manufacturer.

.3 Store bags of calcium chloride in weather- proof enclosures.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.2 Collect and separate plastic, paper packaging, and corrugated cardboard in accordance with Waste Management Plan.

.3 Place materials defined as hazardous or toxic in designated containers.

.4 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Water: clean, potable, free from foreign matter.

PART 3 - EXECUTION

3.1 APPLICATION

.1 Apply water with equipment approved by Departmental Representative when directed by Departmental Representative.

.2 Apply water with distributors equipped with means of shut-off and with spray system to ensure uniform application.

END OF SECTION

PART 1 - GENERAL

1.1 INTRODUCTION

.1 This specification describes the technical requirements for the design, supply, fabrication, delivery, unloading and erection of a Pre-Engineered Modular Steel Panel Bridge.

.2 Supply and unload steel bridge systems and materials including, but not limited to:

.1 Structural framing including longitudinal trusses formed of modular steel panels pinned end to end with transverse girders spanning between them that support a single lane timber decked roadway.

.2 No individual bridge truss component shall exceed 526 kg. Provide lifting bars for assembly.

.3 All connections requiring field assembly shall use pins or bolts that can be installed using hand tools. Do not provide connections requiring the use of pneumatic, electric powered, or specialist tools for field installation, such as but not limited to: high strength friction grip bolts. No connection shall require on-site welding.

.4 Bridge Structure System shall be capable to achieve bridge length as indicated on drawings.

.5 Bridges shall have a modular wood deck roadway.

.6 The internal clearance between the bridge trusses shall be as indicted on the design drawings.

.7 Provide bridge capable of being installed by cantilever launching method without need for temporary intermediate supports.

.8 Provide bridge capable of being de-launched and dismantled for return to stock or site relocation.

.9 Provide engineering load data, bridge superstructure geometry, geometry of bridge bearings, reaction forces, and thermal movements for foundation design.

.10 Provide sealed design drawings stamped by a Professional Engineer licensed to practice in the Province of Nova Scotia.

1.2 REFERENCES

.1 Perform the work in accordance with the relevant codes and standards from the regulatory agencies and institutes listed below. The latest issue of an individual code, standard or regulation at the time of contract signing governs.

.1 American National Standards Institute (ANSI)
- .1 ANSI/AWS D1.1M-2010, Structural Welding Code
- .2 ANSI/AWS D1.5M-2010, Bridge Welding Code

.2 American Society for Testing and Materials International, (ASTM)
- .1 ASTM A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A193M-14, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
- .3 ASTM A307-10 – Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
- .4 ASTM A325M-13, Specification for High-Strength Bolts for Structural Steel Joints Metric.
- .5 ASTM A572M-13a, Standard Specification for High Strength, Low-Alloy Columbium Vanadium Structural Steel.

.3 British Standard/European Committee for Standardization (BS EN)
- .1 BS EN 10025-2 Hot rolled products of structural steels, Technical conditions
- .2 BS 970 Specification for wrought steels for mechanical & allied engineering purposes
- .3 BS 5400 Steel, concrete & composite bridges, specification for loads.

.4 Canadian Standards Association (CSA International)
- .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA S6-14, Canadian Highway Bridge Design Code.
- .4 CAN/CSA W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel.

1.2 REFERENCES (Cont'd)

.5 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
.6 CSA W59-13, Welded Steel Construction, (Metal Arc Welding) (Metric Version).
.7 CAN/CSA G164 Hot Dip Galvanizing of Irregularly Shaped Articles.
.8 CAN/CSA O80-08 (R2012), Consolidated – Wood Preservation.

.5 National Lumber Grades Authority (NLGA)
.1 NLGA Standard Grading Rules for Canadian Lumber, 2014 Edition.

1.3 SYSTEM DESCRIPTION

.1 Longitudinal trusses: formed of modular steel panels pinned end to end with transverse girders.

.2 The major truss components shall comprise prefabricated modular panels made of hot rolled steel sections formed in such a way that they connect together solely by single pins in the top and bottom chords.

.3 No more than three different types of modular panel shall be used to form the trusses of the bridge. Where two types are used, they shall be easily visually identifiable from one another.

.4 The same modular panels shall be capable of forming the trusses of bridges throughout the span specified above in single or double storey construction and shall not exceed a bridge span to truss depth ratio of 25:1.

.5 The capacity of the bridge trusses shall be increased as necessary by the attachment of reinforcing components to the prefabricated modular panels.

.6 Attachment of reinforcing components and bracing components shall be by bolts. Bolts may vary in length to suit particular joints. Bolts shall be of the same diameter for given components (Chords Bolts, Deck Bolts, and Others) to minimise the number of installation tools required.

.7 All surfaces of structural elements shall be fully accessible for inspection and maintenance.

.8 Hollow sections shall only be permitted in structural elements at ends of bridges.

1.3 SYSTEM DESCRIPTION (Cont'd)

.9 Cross girders: rolled steel section beams spanning between longitudinal trusses.

.10 Restrain each cross girder against overturning by connection to the trusses and by bracing adjacent cross girders together at no fewer than one position centrally between trusses.

.11 Provide plan bracing as required to resist the effects of wind and any other lateral forces that may be applied to the structure.

.12 The roadway decking shall comprise timber decking that span between adjacent cross girders.

.13 Deck units shall be capable of being attached to cross girders from above, without need for access under decking.

.14 Allowable Deflection: Comply with CAN/CSA-S6 Figure 3.1 - Deflection Limits For Highway Bridge Superstructure Vibration. Maximum Deflection due to factored traffic load, including dynamic load allowance shall not exceed the limit shown in Figure 3.1 for a bridge `Without Sidewalks'. Submit calculations for deflection and first flexural frequency.

.15 Supply bridge bearings, base plates and all end posts.

.16 Miscellaneous Hardware: Specify miscellaneous hardware, deck plugs and other structural steel used in erection and assembly of modular bridge.

1.4 DESIGN REQUIREMENTS

.1 Design bridges to the following:

.1 CAN/CSA-S6 Canadian Highway Bridge Design Code, for CL 625 Loading.

.2 Environmental Conditions:

.1 The bridge shall be designed to be suitable for use in areas subject to the following effective temperatures:

.1 Temperatures: -29°C to +47°C, for Kejimkujik National Park, Nova Scotia.

.2 Refer to CAN/CSA S6, Annex A3.1. Design for "Heavy" Ice Accretion Zone (Ice Thickness of 31mm) in accordance with

1.4 DESIGN REQUIREMENTS (Cont'd)

CAN/CSA S6.

.3 Design for Climatic and Environmental Data for Kejimkujik National Park, Nova Scotia as follows:

.1 Hourly Mean wind pressure: 435 Pa for return period of 10 years.

.2 Hourly Mean wind pressure: 610 Pa for return period of 50 years.

.3 Seismic performance Category 1.

.4 S(0.2)=0.128; S(0.5)=0.055; and S(2.0)=0.029.

.3 Design Loading:

.1 Bridge shall be designed to sustain the theoretical design live loadings of the below standard, including the effects of dynamic impact and vehicular eccentricity:

.1 CAN/CSA-S6 Canadian Highway Bridge Design Code

.4 Design Analysis:

.1 The design analysis of the bridge and of its component parts shall be carried out in accordance with the below standard:

.1 CAN/CSA-S6 Canadian Highway Bridge Design Code

.5 Fatigue Life:

.1 Single lane bridges shall be able to sustain a minimum 100,000 cycles of stress due to CL-625 theoretical truck or lane loading, including the effects of dynamic impact and vehicular eccentricity.

.6 Fatigue Analysis:

.1 The fatigue analysis of the bridge and of its component parts shall be carried out in accordance with CAN/CSA-S6 Canadian Highway Bridge Design, unless the fatigue capacities of the bridge system and/or of its component parts (i.e. bridge trusses and deck units) have been determined by testing.

.2 Proof of Capacity:

.1 Where the assessments of the bending and shear capacities of the bridge system are

1.4 DESIGN REQUIREMENTS (Cont'd)

based upon testing, provide independently certified evidence of full-scale tests. Published bridge capacities based upon these tests shall be such that they provide as a minimum a 1.7 factor of safety against failure.

.2 Where the assessment of the fatigue capacity of the bridge system is based upon testing, provide independently certified evidence of such tests that define the fatigue characteristics of the main truss elements and, where appropriate, of the main deck components.

.7 Bridge Bearings:

.1 Design bridge bearings in accordance with the Canadian Highway Bridge Design Code CSA-S6. Galvanize components for bearing system in accordance with CAN/CSA-G164.

.8 Design for future bridge to accommodate a 104mm inside diameter telephone line conduit to run along the bridge. Design for casing that is either PVC or HDPE.

1.5 SUBMITTALS

.1 One (1) week after award, submit generic cut sheet information for the bridge to be used for preliminary abutment design. Including but not limited to:

.1 Bearing and Anchorage geometry.

.2 Six (6) weeks after award, submit the following information to Departmental Representative in accordance with 01 33 00 - Submittals for Departmental Representative's Review and Acceptance.

.1 One (1) electronic copy of the design and assembly drawings and instructions including geometry of backwalls at each abutment for abutment design. Submit electronic copies in PDF and CAD format.

.2 One (1) electronic copy in PDF format of the design and assembly drawings and/or instructions.

1.5 SUBMITTALS (Cont'd)

.3 A schematic for each part – one (1) electronic copy in PDF format.

.4 Design drawings indicating plans and grid lines, structural members and connection details, bearing and anchorage details, accessories, schedule of materials and finishes, camber, loads and reaction forces, fasteners and welds. Indicate welds by CSA W59, welding symbols.

.5 One illustrated method to launch the bridge including launching loads.

.6 Factored and unfactored reactions for substructure design to be included on the drawings (Dead Load, Live Load, Braking Load, and 1/50 year Wind Loads, Seismic, Ice Accretion).

.7 A complete part list with mass of each part.

.8 A proof of a valid welding certification in accordance with CSA W47.1 or approved equivalent.

.9 Proposed welding procedures to be stamped and approved by Canadian Welding Bureau.

.10 Launching nose requirements.

.11 Verification of methods and materials used in fabrication for compliance to the approved design drawings.

.12 Submit description of methods, temporary bracing and strengthening, sequence of erection and type of equipment proposed for use in erecting bridge.

.13 Mass of Structure.

.14 Design calculations indicating that the modular bridge conforms to the requirements of CAN/CSA-S6.

.15 Design drawings and calculations stamped by a Professional Engineer licensed to practice in the province of Nova Scotia.

.16 Warranty Documentation: Submit manufacturer's warranty. Refer to Item 1.7 for Warranty requirements.

.17 Submit Mill Certificates. Provide mill certificates upon request as confirmation of the steel quality used for the fabrication of main structural elements. The Departmental Representative maintains the right to take random samples from any equipment supplied and to have the samples independently tested for

1.5 SUBMITTALS (Cont'd)

verification of material specification conformity.

.3 Submit initial site report within five (5) working days of material delivery on site.

.4 Submit interim Report within five (5) working days of Interim Site Inspection.

.5 Following Final Inspection, submit a stamped letter from a Professional Engineer licensed to practice in Nova Scotia certifying that the bridge has been constructed in conformance with the manufacturer's instructions, and that it is adequate for the specified loads.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer. Schedule delivery of materials with Departmental Representative, following review and acceptance of shop drawing submittals for each individual bridge.

.2 Provide protective blocking for lifting, transportation and storing.

.1 Exercise care during fabrication, transportation and unloading so as not to damage members.
.2 Do not notch edges of members.
.3 Do not cause excessive stresses.

.3 Store and handle materials in accordance with manufacturer's instructions.

.4 Keep materials in manufacturer's original, unopened containers and packaging until installation.

.5 Ensure no portion of steel comes in contact with ground.

.6 Store materials on flat, level surface, raised above ground, with adequate support to prevent sagging.

.7 Protect materials and finish during storage, handling, and installation to prevent damage.

1.6 DELIVERY, STORAGE AND HANDLING (Cont'd)

.8 Handle and protect galvanized materials from damage to zinc coating.

.1 During storage, space surfaces of galvanized materials to permit free circulation of air.

1.7 WARRANTY

.1 Provide warranty for all materials - including coating systems, equipment, and workmanship supplied under The Work for a period of 5 years from the date of final acceptance.

.2 Submit signed copy of 5 year notarized Warranty to Departmental Representative in accordance with 01 33 00 - Submittals for Departmental Representative's Review and Acceptance to include:

.1 List subcontractor, supplier and manufacturer, with name, address, and telephone number of responsible principal.
.2 Obtain warranties, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
.3 Except for items put into use with Departmental Representative's permission; leave date of beginning of time of warranty until the Date of Substantial Performance is determined.
.4 Verify that documents are in proper form, contain full information, and are notarized.
.5 Co-execute submittals when required.
.6 Retain warranties until time specified for submittal.

.3 Upon notice from Departmental Representative of defective materials, equipment or workmanship, replace or repair defective materials due to faults in manufacture. Provide repair or replacement within 45 construction days of notice. For repairs to coating systems only, a construction day shall be defined as a working day where the mean temperature exceeds 5 degrees C.

.4 The Warranty may exclude the following items:

.1 Damage resulting from normal wear and tear.
.2 Bridge equipment or any part thereof that has

1.7 WARRANTY (Cont'd)

been subjected to negligence, alteration, or misuse. Misuse includes but is not limited to vehicle traffic in excess of specified weights.

.3 Accessories or parts not supplied as part of The Work.

.5 Make repairs as required to the protective coating system, including but not limited to:

.1 Insufficient coating thickness;
.2 Debonding or failure of adhesion of the coating either to the structural steel or other coatings
.3 The appearance of any rust stains on the coated structure
.4 Chipping and abrasion damage

.6 Repairs under warranty shall include all costs to supply material, labour, traffic control, if required, and all equipment necessary to correct deficiencies to specified condition. Payment for warranty repairs will not be made separately.

.7 Refer to Item 3.2 Field Quality Control for site inspections required during construction.

.8 Refer to Item 1.5 Submittals for Site Inspection Reports to be submitted to Departmental Representative.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 All bridge components shall be unused and the manufacture controlled by a fabricator accredited with ISO 9001.

.2 All materials used during manufacture and supply will comply with the relevant National and International Standards and have mechanical properties suitable for the purpose for which they will be used, including but not exclusively the following:

.1 Panels (Chords, Diagonals and Verticals) and Reinforcing Chords: Provide steel equivalent to:
.1 CAN/CSA G40.21, Grade 450W;
.2 ASTM A572, Grade 65; or
.3 BS EN10025-2 Grade S450J0.

2.1 MATERIALS (Cont'd)

.2 Floor Beams / Stringers – Provide steel equivalent to:
- .1 CAN/CSA G40.21, Grade 350W;
- .2 ASTM A572, Grade 50; or
- .3 BS EN10025-2 Grade S450J0

.3 Steel Components Not Listed Otherwise:
- .1 CAN/CSA G40.21, Grade 350W;
- .2 ASTM A572, Grade 50; or
- .3 BS EN10025-2 Grade S450J0

.4 Timber Decking – Dressed:
- .1 NLGA Standard Grading Rules for Canadian Lumber, Grade 2 or better.
- .2 Species: Red Pine, Jack Pine or Eastern Hemlock.
- .3 Pressure treatment: to Section 06 10 00.01 – Rough Carpentry.

.5 Bolts complete with Nuts and Washers:
- .1 Structural Steel Connections: ASTM A325M, Galvanized
- .2 Timber Decking Connections: ASTM A307, Galvanized
- .3 Minimum Diameters:
  - .1 Chord Bolts: 32 mm
  - .2 Deck Bolts: 19 mm
  - .3 Others: 25 mm

.6 Panel Connecting Pins: Provide steel equivalent to:
- .1 ASTM A193, Grade B7;
- .2 BS 970 Wrought Steel, Grade 709M40

.7 Provide Spring Circlips as required.

2.2 MATERIAL THICKNESSES

.1 For bridge components that are to be protected from corrosion by hot dip galvanizing, the minimum thickness of steel to be used for the manufacture of any major structural element shall be 6 mm, and the minimum thickness of steel to be used for the manufacture of any minor structural element or for a deck component shall be 5 mm.

2.3 WELDING

.1 Welding materials: to CSA W59.

.2 Welding by certified operators in a shop certified to CAN/CSA W47.1-09 (R2014), classification 2.1 or ANSI/AWS D1.1. Provide welders certificates verifying certification by the CWB or AWS.

2.3 WELDING (Cont'd)

.3 Fabricator of all major components such as Panels, Chord Reinforcing, and Floor Beams/Stringers shall be accredited to ISO 9001 standards.

2.4 CORROSION PROTECTION

.1 All steel bridge components shall have a preferred surface protection to the following standards:

.1 All steel components shall be Hot Dip Galvanized in accordance with CAN/CSA-G164-M92 or ASTM A123

.2 All threaded components, bolts, nuts, pins and clips shall be spun galvanized in accordance with CAN/CSA-G164-M92. Ship preassembled.

.3 Minimum quantity of Galvanizing Material: 600 g/m^2.

2.5 SOURCE QUALITY CONTROL

.1 Provide Departmental Representative prior to fabrication, with two copies of steel producer certificates, in accordance with CSA G40.20/G40.21

PART 3 – EXECUTION

3.1 UNLOADING

.1 Clean steel surfaces to Departmental Representative's approval when staining or defacing occurs.

.2 Do not disturb river banks or embankments without prior written permission of Departmental Representative.

.3 Provide all equipment necessary to unload and store all components of the bridge.

3.2 FIELD QUALITY CONTROL

.1 Provide onsite technical support to the Erector during erection. Conduct a minimum of three (3) site visits during erection. The first visit shall be at the start of erection, the second visit in the middle of erection and the final visit upon completion of erection.

.2 Arrange a site visit within 5-days notice from Departmental Representative for each site inspection.

.3 Submit Site Inspection Reports to Departmental

3.2 FIELD QUALITY CONTROL (Cont'd)

Representative as outlined in Item 1.5 Submittals.

.4 Carry out initial inspection of bridge components with the Erector and Departmental Representative upon delivery of supplied components. Submit initial report, including but not limited to the following items:

.1 Certification that supplied components meet specifications.
.2 Identification of coating defects, such as:
  .1 Insufficient coating thickness;
  .2 Debonding or failure of adhesion of the coating either to the structural steel or other coatings
  .3 The appearance of any rust stains on the coated structure
  .4 Chipping and abrasion damage
.3 Identify any deficiencies in the as-constructed abutment geometry and verify general conformance with bridge design requirements.

.5 Carry out a second site inspection partway through construction and submit an Interim Report, including but not limited to the following items:

.1 Inspect Erection progress and identify any deficiencies in the Erection or methods of erection.
.2 Indicate progress of Erection.

.6 Complete a final inspection after the Erector has completed erecting the system. Submit a stamped letter from a Professional Engineer licensed to practice in Alberta certifying that the bridge has been constructed in conformance with the Manufacturer's instructions, and that it is adequate for the specified loads.

.7 Be available to conduct additional site visits within 5 working days of request from Departmental Representative in the event of Erector damages. Be available to conduct site visit and make recommendations for repair as required.

3.3 BRIDGE ERECTION

.1 Erect fabricated roadway bridge as supplied to site.

.2 Comply with manufacturer’s requirements for fabricated roadway bridge erection.

.3 Be responsible for the integrity of fabricated roadway bridge. Make good any damage to the fabricated roadway bridge during construction period. This includes but is not limited to integrity of galvanizing.

.4 Inspect all materials prior to erection. Submit written report To Departmental Representative on condition and confirm piece quantities per manufacturer requirements.

.5 Accommodate for fabricated roadway bridge manufacturer to perform site inspections:
.1 Part-way through construction,
.2 Final inspection at completion of erection, and
.3 Additional inspections as required by Departmental Representative.

.6 Provide access as required for manufacturer’s inspector(s) to conduct complete review of structure as required.

.7 Do not install temporary in-water support structures or bents in the river for erection.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 14 13 - Soil Stripping and Stockpiling.

.2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

.1 Agriculture and Agri-Food Canada
.1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 Canadian Council of Ministers of the Environment
.1 PN1340-2005, Guidelines for Compost Quality.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Quality control submittals :
.1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.

1.4 QUALITY ASSURANCE

.1 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.

PART 2 - PRODUCTS

2.1 TOPSOIL

.1 Topsoil to come from material previously stockpiled on site.

2.1 TOPSOIL (Cont'd)

.2 Additional topsoil for seeded areas: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

.1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.

.2 Contain no toxic elements or growth inhibiting materials.

.3 Finished surface free from:

.1 Debris and stones over 50 mm diameter.

.2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.4 Consistence: friable when moist.

2.2 SOURCE QUALITY CONTROL

.1 Contractor is responsible for amendments to supply topsoil as required.

.2 Provide for soil testing by recognized testing facility for PH, P and K, and organic matter.

.1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

PART 3 - EXECUTION

3.1 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 requirements of authorities having jurisdiction and sediment and erosion control drawings.

.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.

3.2 STRIPPING OF TOPSOIL

.1 Strip topsoil in accordance with Section 31 14 13 - Soil Stripping and Stockpiling.

3.3 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct.
  .1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
  .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
  .2 Remove debris which protrudes more than 75 mm above surface.
  .3 Dispose of removed material off site.

3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Place topsoil after Departmental Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 Spread topsoil as indicated to following minimum depths after settlement.
  .1 100 mm for seeded areas.

.4 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

3.5 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.
  .1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.
  .1 Leave surfaces smooth, uniform and firm against deep footprinting.

3.6 ACCEPTANCE

.1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.7 SURPLUS MATERIAL

.1 Dispose of materials not required where directed by Departmental Representative off site.

3.8 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASHTO)
.1 AASHTO M180-2011, Corrugated Sheet Steel Beams for Highway Guardrails.

.2 American Society for Testing and Materials (ASTM International)
.1 ASTM A 307-10, Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.4 Canadian Standards Association (CSA International)
.1 CAN/CSA-O80 Series-97(February 2000), Wood Preservation.

.5 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
.1 Standard Specification - Highway Construction and Maintenance (2011).

1.3 SAMPLES

.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

.2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed sources of guide rail and components.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel W-beam guide rail as indicated and to following requirements:

.1 Steel rail, channel, terminal sections and installation hardware (all galvanized): to Division 5, Section 6 of NSTIR Standard Specification - Highway Construction and Maintenance (latest edition).

.2 Treated wooden posts and treated wooden off-set blocks:

.1 Species, type and grade: to Division 5, Section 6 of NSTIR Standard Specification - Highway Construction and Maintenance (latest edition).

.2 Dimensions: as indicated.

.3 This is a National Park. Treatment shall be in accordance with that specified in Section 06 10 00.01 - Rough Carpentry - Short Form.

PART 3 - EXECUTION

3.1 ERECTION

.1 Erect guide rail in accordance with following NSTIR Standard Drawings, attached in Appendix C.

.1 Standard Drawing HS518 - Guardrail and Post Details.

.2 Standard Drawing HS520 - Steel Beam Guard Rail Buried End Treatment.

.3 Standard Drawing HS521 - Road Side Barrier at Concrete Bridge Approach.

.4 Standard Drawing HS522 - Michigan Shoe Detail.

.5 Standard Drawing HS523 - Guardrail Channel Detail.

.2 Set posts by instrument for alignment, and locations as indicated and as directed by Departmental Representative.

.3 Excavate post holes to depths as indicated and to diameter of 360 mm plus or minus 20 mm. Compact bottom to provide firm foundation. Set post plumb and square in hole.

3.1 ERECTION (Cont'd)

.4 Backfill around posts using excavated material and compact in uniform layers not exceeding 150 mm compacted thickness.

.5 Cut off tops of posts as indicated, with tops parallel to grade of pavement edge.

.6 Worker protection: workers must wear appropriate breathing, eye, and clothing protection when handling, drilling, sawing, cutting or sanding preservative treated wood and applying preservative materials.

.7 Treat cut tops with two coats of same type of wood preservative used to pressure treat posts.

.8 Construct anchorages to details as indicated. Place and compact backfill for anchors as directed by Departmental Representative.

.9 Erect steel W-beam components to details as indicated. Lap joints in direction of traffic. Tighten nuts to 100 N.m torque. Maximum protrusion of bolt 12 mm beyond nut.

3.2 PAINTING TOUCH UP

.1 Galvanized steel-touch up:
.1 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas. Pre-treat damaged surfaces according to manufacturer's instructions for zinc-rich paint.

.2 Major abrasions shall be repaired by re-galvanizing.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Measurement procedures.

.2 Waste management and disposal.

.3 Materials.

.4 Installation.

.5 Removal and salvage.

.6 Cleaning.

1.2 RELATED SECTIONS

.1 Section 01 55 26 – Traffic Regulation

.2 Section 01 35 43 – Environmental Procedures

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM)
.1 ASTM A276-91a, Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
.2 ASTM B209M-92a, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
.3 ASTM B210M-92a, Specification for Aluminum-Alloy Drawn Seamless Tubes.
.4 ASTM B211M-92a, Specification for Aluminum and Aluminum-Alloy Bar, Rods and Wire.

.2 Canadian General Standards Board (CGSB)
.1 CGSB1-GP-12c-65, Standard Paint Colours:
.2 CAN/CGSB-1.28-M89, Alkyd, Exterior House Paint.
.3 CAN/CGSB-1.59-M89, Alkyd, Exterior Gloss Enamel.
.4 CAN/CGSB-1.94-M89, Xylene Thinner (Xylol)
.5 CAN/CGSB-1.99-92, Exterior and Marine Phenolic Resin Varnish.
.6 CAN/CGSB-1.104-M91, Semigloss Alkyd Air Drying and Baking Enamel.
.7 CAN/CGSB-1.132-M90, Zinc Chromate Primer, Low Moisture Sensitivity.
.8 CGSB 1-GP-189M-78, Primer, Alkyd, Wood, Exterior.
.9 CGSB 31-GP-3M-88, Corrosion Preventative Compound, Cold Application, Soft Film.
.10 CGSB 62-GP-9M-80, Prefabricated Markings,

1.3 REFERENCES(Cont'd)

Positioning, Exterior, for Aircraft Ground Equipment and Facilities.
.11 CGSB 62-GP-11M-78, Marking Materials, Retroreflective, Enclosed Lens, Adhesive Backing.

.3 Canadian Standards Association (CSA)
.1 CAN/CSA-G40.21-M92, Structural Quality Steels.
.2 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CAN/CSA-080 Series-M89, Wood Preservation.
.4 CSA 0121-M1978, Douglas Fir Plywood.
.5 CSA W47.2-M1987, Certification of Companies for Fusion Welding of Aluminum.CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped.

.4 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR)
.1 Standard Specification, Highway Construction and Maintenance.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 35 43 – Environmental Procedures.

.2 Divert unused metal and/or plastic materials to recycling facility approved by Departmental Representative.

.3 Damaged signs and posts from any removals to be transported to recycling facility approved by the Departmental Representative.

PART 2 - PRODUCTS

2.1 SIGNS

.1 Signs as indicated on drawings.

2.2 MATERIALS

.1 All materials shall be in accordance with NSTIR Standard Specification Highway Construction and Maintenance and Parks Canada Specifications.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 The Contractor shall load, haul and install posts and existing signs (see detail sheet for typical sign) and bases in the following manner:

.1 The Contractor is responsible for locating power/telephone/gas lines/services/utilities at all proposed sign locations.

.2 The Contractor is responsible for layout and measurements to ensure signs are installed as per drawings and as directed by the Departmental Representative.

.3 Sign bases: Excavate hole for the post at the location and depth provided by the Departmental Representative. Using some of the excavated materials, level and compact bottom of hole. Place post with one side parallel to the edge of asphalt and level.

.4 Adjust the post height by using a cut off saw. All post cuts will be determined in the field by the Departmental Representative. The Departmental Representative will measure existing elevations at each site and calculate the cuts needed. The Contractor is required to provide the Departmental Representative with a minimum of 48 hours notice in order to perform the calculations.

.5 Assemble the signs on the forks on the ground. Slide forks onto posts and place the cap.

.6 Drill 1 hole in the base sleeves and posts for ½″ bolts, as shown in the detail sheet and as verified by the Departmental Representative, and shim to plumb if necessary.

.7 Bases must be perfectly plumbed. Vertical and horizontal tolerances for the base are 0.075m. Tolerance for the plumb of the posts is 0.01 m per 1.0 m or ¼″ on a two foot carpenters level. Tolerances for the signs are 0.075 m for distance from asphalt and 0.075 m for height above white line.

.8 The Contractor is responsible for hauling all materials to and from each work site.

.9 Landscape so the top of the base is flush or 25 mm above finished grade.

.10 Remove all excess material on site including, boulders larger than 100 mm.

.11 All signs are to be covered until the Departmental Representative advises to uncover.

3.1 INSTALLATION (Cont'd)

.12 Payment for this item shall be based on the number of signs installed and shall include all material, labour and equipment required to satisfactorily complete this item of work.

3.2 CLEANING

.1 Upon completion of installation remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Appendix A

Geotechnical Report

Englobe
Soils Materials Environment

SNC Lavalin Inc.

Geotechnical Investigation
Mersey River Bridge
Kejimkujik National Park, Nova Scotia

Draft Report

Date: January 13, 2016
Ref. N°: 21222

SNC Lavalin Inc.

Geotechnical Investigation
Mersey River Bridge Kejimkujik National Park, Nova Scotia

Draft Report | 21222

Prepared by:

Richard W. Henry, P. Eng.
Project Manager, Geotechnical Engineering

Reviewed by :

S. A. Simms, M.Eng., P. Eng.
Team Leader, Geotechnical Engineering

TABLE OF CONTENTS

Tables

Figures

Appendices

Property and Confidentiality

REVISION AND PUBLICATION REGISTER		
Revision N°	**Date**	**Modification And/Or Publication Details**
0	2016-01-13	Draft Report

1 INTRODUCTION

Englobe Corp. at the request of SNC Lavalin Inc., has carried out a geotechnical investigation at the site of a proposed bridge replacement or rehabilitation identified as Mersey River Bridge in Kejimkujik National Park, Nova Scotia. The purpose of the work was to assess the subsurface conditions at select areas of the site and to make recommendations for the design and costing of earthworks and foundations.

This report presents the observations and engineering recommendations associated with the geotechnical investigation of the site. Included herein are the factual results of the field investigation including discussion of field procedures, subsurface conditions, and recommendations for site development.

2 SITE AND PROJECT DESCRIPTION

It is understood that Parks Canada proposes to replace or rehabilitate the existing bridge structure identified as Mersey River Bridge in Kejimkujik National Park, in Nova Scotia. Detail design drawings are not available; however, the foundation for the structure will likely be supported on either concrete spread footings or driven steel 'H' or pipe piles. It is understood that the bridge design may utilize either fully integral or semi-integral abutments as a measure to reduce maintenance costs during the life span of the bridge.

3 INVESTIGATION PROCEDURE

The fieldwork for the investigation was carried out on December 16 and 18, 2015, when three (3) boreholes were drilled at the locations shown on the enclosed Figure 1. The boreholes investigation was carried out using a CME-55 track-mounted auger drill rig supplied by Logan Geotech of Stewiacke, Nova Scotia.

The investigation was carried out by qualified field engineering personnel who logged the subsurface conditions. The boreholes were advanced using continuous flyte augers and casing rod with field sampling and testing performed in the open borehole. Standard Penetration Tests (SPT) were carried out at regular intervals in the boreholes to obtain soil blow counts (i.e. N-values) using a 50-mm O.D. split spoon sampler. Disturbed soil samples were obtained from the boreholes using conventional techniques. Bedrock was drilled and sampled using HQ-sized (i.e. 63.5 mm dia.) coring equipment.

Following field sampling and visual description, overburden samples were placed in sample bags and transported to our Dartmouth laboratory for further examination and testing.

4 SUBSURFACE CONDITIONS

An explanation of terms and symbols used in the report is provided in Appendix 1. A summary of the encountered geologic conditions is provided in the Borehole Logs in Appendix 2. Laboratory test results are provided in Appendix 3.

It should be noted that the stratigraphic boundaries on the Borehole Logs typically represent a transition of one soil type to another and do not necessarily indicate an exact plane of geologic change. Subsurface conditions may vary between and beyond the borehole locations.

The subsurface conditions encountered at the borehole locations were found to be similar. In general fill deposits were encountered overlying undisturbed site-native glacial till and bedrock. The following paragraphs further describe the subsurface conditions at the site.

Table 4-1. Summary of Subsurface Conditions at Boreholes.

BOREHOLE NUMBER	ELEVATION (metres)	NORTHING (metres)	EASTING (metres)	DEPTH TO GLACIAL TILL (metres)	DEPTH TO BEDROCK (metres)	DEPTH OF BOREHOLE (metres)
BH 1	91.460	4910588.151	5443758.283	1.5	--	5.79
BH 1A	91.378	4910590.519	5443765.541	1.4	6.6	8.08
BH 2	90.675	4910615.938	5443818.332	2.8	4.0	4.95

4.1 Fill

Fill was encountered at the surface of all borehole locations. The fill can generally be described as sand and gravel with trace to some silt and occasional cobbles. The fill was moist and grey-brown in colour. Standard penetration N-values for the fill deposits at the boreholes ranged from 4 to 17 blows per 300 mm penetration, indicating a loose to compact material. The higher N-values recorded are due mainly to gravel and cobble content in the fill interfering with the test and not necessarily representative of *insitu* relative density. The fill was proven to a total depth of 2.7 metres at borehole BH 2.

Laboratory gradation testing of a select fill sample indicated a material with 47 percent gravel, 39 percent sand and a fines (i.e. silt and clay sizes) content of 14 percent. Moisture content testing of select fill samples provided values of 9.6 and 24.1 percent.

4.2 Topsoil/Organic Soils

Topsoil and organic soils were encountered below the fill deposits at Borehole BH 2. The topsoil and organic soils were approximately 75 mm in thickness at borehole BH 2.

4.3 Site-Native Glacial Till

At all borehole locations, site-native glacial till was encountered either the below the fill deposits or topsoil and organic soils. These typically compact to dense soils are described on the Borehole Logs in Appendix 2 as silty sand, trace to some gravel and clay. The till contained occasional cobbles and small boulders. Observations of the *insitu* deposits indicated that the material was grey-brown in colour and its moisture content was described as wet to saturated. Standard penetration N-values for the till at the boreholes ranged from 26 to 43 blows per 300 mm penetration, indicating a compact to dense material. The till was proven to a total depth of 6.6 metres below the existing ground surface at borehole BH 1A.

Laboratory gradation testing of select till samples indicated a material with 14 and 16 percent gravel, 22 and 36 percent sand and a fines (i.e. silt and clay sizes) content of 50 and 62 percent. Moisture content testing of select till samples provided values ranging from 8.1 to 12.9 percent.

4.4 Bedrock

Geological mapping of the proposed development area indicates that the site is underlain by the Meguma Group. Specifically, Halifax Formation Slate underlies the immediate development area. These consolidated deposits are typically fine-grained, bluish grey in colour and fractured.

Bedrock was encountered and core-drilled in boreholes BH 1A and BH 2 at depths of 6.6 metres and 4.0 metres, respectfully. Examination of bedrock core samples indicates that the site is underlain by slate bedrock.

The bedrock has been observed to be highly fractured, medium strong and bluish grey in colour. The Rock Quality Designation (RQD) values of core samples were 0% and 13% indicating a very poor quality rock. Due to the highly fractured nature of the recovered rock cores there were insufficient intact cores for Unconfined Compressive Strength testing.

4.5 Groundwater

Groundwater was not identified during the field investigation through open-hole measurement at the borehole locations due to the injection of water during drilling. The groundwater level at the site is expected to be influenced by the water level in adjacent brook.

5 DISCUSSION AND RECOMMENDATIONS FOR DESIGN

5.1 Site Development – General

In the following paragraphs, a discussion of site development is presented in light of the observed subsurface conditions. Currently, detailed design information is not available; however, the bridge may be supported on either concrete spread footings or driven steel 'H' or pipe piles.

For reporting, it has been necessary to make some assumptions regarding the extent of development, particularly, the type of structure, site grades, construction methodology, etc. As a result, some of the recommendations outlined below are of a preliminary nature and can only be confirmed as specific designs are presented for the site.

5.2 Site Preparation, Excavation and Earthworks

To prepare the immediate bridge area to receive shallow foundations, it will be necessary to remove all organic soils, fill materials, and wet / loose soils from beneath foundation bearing areas. This material should be subexcavated to the level of competent soil (i.e. material noted on the Borehole Logs as “Site-Native Glacial Till or Bedrock”). This excavation will vary depending on final bridge location and design grades. At the borehole locations this is expected to range from 1.4 metres to 2.8 metres below the existing ground surface. This excavation may extend below the water table in some areas, so inflow of groundwater into the excavation should be anticipated. All work will require diversion of the water flow from the brook utilizing cofferdams, diversion piping and pumps of suitable capacity so that bridge foundation installation work can be carried out in the dry. As an alternative, the new bridge abutments may be set back a suitable distance from the brooks edge.

Following this initial subexcavation, a general proof-rolling of the exposed subgrade (with vibratory compaction equipment) is recommended to identify any loose or soft areas. Any such areas identified should be subexcavated and replaced with an approved fill. Importation of an approved structural fill may be utilized for this purpose.

Excavations in the site-native glacial till or fill deposits are expected to remain temporarily stable at side slopes of 1:1 (horizontal to vertical), while long-term stability can be achieved at 3:1.

For pile foundations, only nominal earthworks will be necessary to ready the site for construction. Subexcavation of unsuitable soils is not required – only removal of materials that would impede installation of piles and regrading of the site is anticipated. Some minor earthworks may be necessary to temporarily support pile cap concrete.

5.3 Spread Footings

After removal of all unsuitable soil, if loose/wet soil conditions are encountered at proposed design grades, further subexcavation followed by placement of a properly prepared engineered fill may be required. Structural fill materials may consist of varied material types, subject to approval, which can be compacted to the required density. Structural fill should consist of a well-graded rockfill or, if conditions require, clear rockfill. The material should have a maximum particle size of 200 mm and a nominal "fines" content (i.e. minus 0.08 mm size). Fill should be placed in lifts not exceeding 300 mm thickness and should be compacted to the equivalent of 100 percent of the materials standard Proctor maximum dry density or equivalent for rockfill. Water and loose/soft soils should be removed from excavations, and bearing stratum approved prior to fill placement. It is strongly recommended that an approved clean rockfill be used for the bottom lift(s) (i.e. 1 metres thickness),

due to expected wet conditions. Placement of alternative structural fill materials can be utilized upon approval from the geotechnical engineer. Geotechnical inspection and certification of engineered fill material placement is recommended.

For design of foundations by Limit States Design, the factored soil bearing resistance (using a bearing resistance factor of 0.5) of footings with a minimum width of 0.6 metres and at a minimum depth of 1.2 metres are as follows:

Table 5-1. Limit States Design Parameters.

LIMIT STATES DESIGN PARAMETERS	GLACIAL TILL / STRUCTURAL FILL
Factored Geotechnical Bearing Resistance at Ultimate Limit States (ULS)	300 kPa
Geotechnical Resistance at Serviceability Limit States (SLS)	200 kPa

The serviceability limit states are based on a maximum allowable settlement of 25 mm. Unfactored loads should be used with the SLS bearing pressures in accordance with the 2014 Canadian Highway Bridge Design Code (CHBDC).

5.4 Pile Foundations

Piled foundations may be considered as a foundation design for support of the bridge abutments. Driven steel piles may be either traditional pipe piles or 'H' type piles. These piles may be driven to practical refusal within the bedrock encountered at depths of between 4.0 and 6.6 metres below existing grade at the borehole locations.

Load carrying capacity for either the pipe or 'H' type steel piles for two typical end bearing piles on bedrock are given below. The pile type and size chosen for design will be influenced by several factors such as the structural loads carried by the foundation, the availability of the pile type/size and the pile driving equipment.

The pile capacities given below are based on the proposed pile size and anticipated site conditions. Final pile capacities are a function of pile size, penetration depth, resistance criteria, site grading requirements, etc. For preliminary design of piles driven to a suitable depth end-bearing in the bedrock, the calculated ULS load capacity (with applied resistance factor of 0.4) is as follows:

Pile Type	ULS Capacity
HP 310 x 110 'H' Pile	950 kN
355 x 12.7 Pipe Pile (open-ended)	750 kN

Steel piles should have a minimum wall thickness of 12 mm and the tip protected with a driving shoe. For steel piles, a pile driving hammer capable of delivering energy of 252 Joules/cm^2 to 315 Joules/cm^2 of steel cross-section is recommended. The pile hammer shall deliver a rated energy of not less than 33,895 kN-m. Piles should be re-tapped no sooner than 24 hours after achieving the

refusal criteria and sufficiently driven to re-establish the refusal criteria. Additional subsequent re-taps should be conducted as necessary.

Piles should be spaced no closer than 3 times the pile diameter (measured centre-to-centre). Strict control of pile location and verticality should be exercised to ensure accurate pile spacing and prevent eccentric and non-vertical loading of piles and groups.

Quality control inspection during piling operations is recommended to ensure proper seating of piles and that driving criteria has been met. A quality assurance-testing program for piles is recommended and should include Pile Driving Analyzer (PDA) monitoring to confirm load capacities.

Driving records should be kept throughout the pile installation period. Information to be recorded should include, pile dimensions, hammer type, rated energy, ram weight, anvil weight and driving resistance.

5.5 Re-use of On-site Materials and Backfilling

Select portions of the glacial till and fill may be considered suitable for reuse at the site as common material or, in some applications, as engineered fill. Any organic soils, and loose/wet soils are not suitable to reuse for engineered fill, these may be reused at the site in general site grading and landscaping (i.e. in non-settlement sensitive areas). The reuse of on-site materials will be contingent to a large extent on the condition of the materials after excavation, handling and stockpiling.

To qualify as engineered wall backfill, all boulders, debris and deleterious inclusions should be removed. Wall backfill should be placed in lifts not exceeding 250 mm thickness and compacted in-place to 95 percent standard Proctor maximum dry density.

5.6 Seismic Response

The effect of site conditions on seismic response should be considered in the design of foundations. Based on the subsurface soil conditions encountered in the boreholes, the site may be considered as Class C for seismic site response (CHBDC 2014 Table 4.1).

5.7 Interpreted Soil and Bedrock Design Parameters

Soil and bedrock parameters recommended for use in design are outlined in the following table. The parameters indicated have been summarized from laboratory and field testing and from known empirical correlations. The values indicated are provided as a guide and their specific use in design should be confirmed with the geotechnical engineer.

Table 5-2. Interpreted Soil and Bedrock Design Parameters

PARAMETER	SITE-NATIVE GLACIAL TILL DEPOSITS	BEDROCK
Bulk Unit Weight, kN/m^3	21	26
Moisture Content, %	11	--
Effective Unit Weight, kN/m^3	11	16
Soil Cohesion (C_u), kN/m^3	0	0
Effective Angle of Internal Friction	32˚	44˚
Active Earth Pressure Coeff.(K_a)	0.31	--
Passive Earth Pressure Coeff.(K_p)	3.3	--

5.8 De-watering

All work may require diversion of the water flow from the brook around the construction site utilizing pumps of suitable capacity (i.e. minimum 150 mm diameter) so that foundation installation work can be carried out in the dry. The rate of infiltration into the foundation excavations is expected to be moderate to high and can be controlled by conventional dewatering techniques consisting of 75 to 100 mm diameter portable pumps and grading of excavations to sump locations. Water pumped from excavations is expected to contain “fines” and will require care in disposal. Provision for proper site drainage in accordance with applicable municipal, provincial, and federal environmental requirements should be made at the construction stage. The use of coffer dams or sheet piling may be necessary where excavations encroach on the watercourse boundary(s).

5.9 Erosion and Sediment Control Guidelines

Nova Scotia Environment has published a set of guidelines dealing with environmental protection, specifically, erosion and sedimentation control. The document is of a general nature, however, presents proven methods for lessening the impact of soil erosion on downstream receptors. The Guidelines should be adopted for construction.

6 COMMENTS ON CONSTRUCTION

The following comments on specific construction aspects of the project are provided for the guidance of designers. The contractor undertaking the work should make their own interpretation of the factual information provided in this report as it affects their construction procedures and scheduling.

The in situ soils are subject to loosening and softening in the presence of water. Construction methods and scheduling should reflect this. If construction takes place in the winter months care

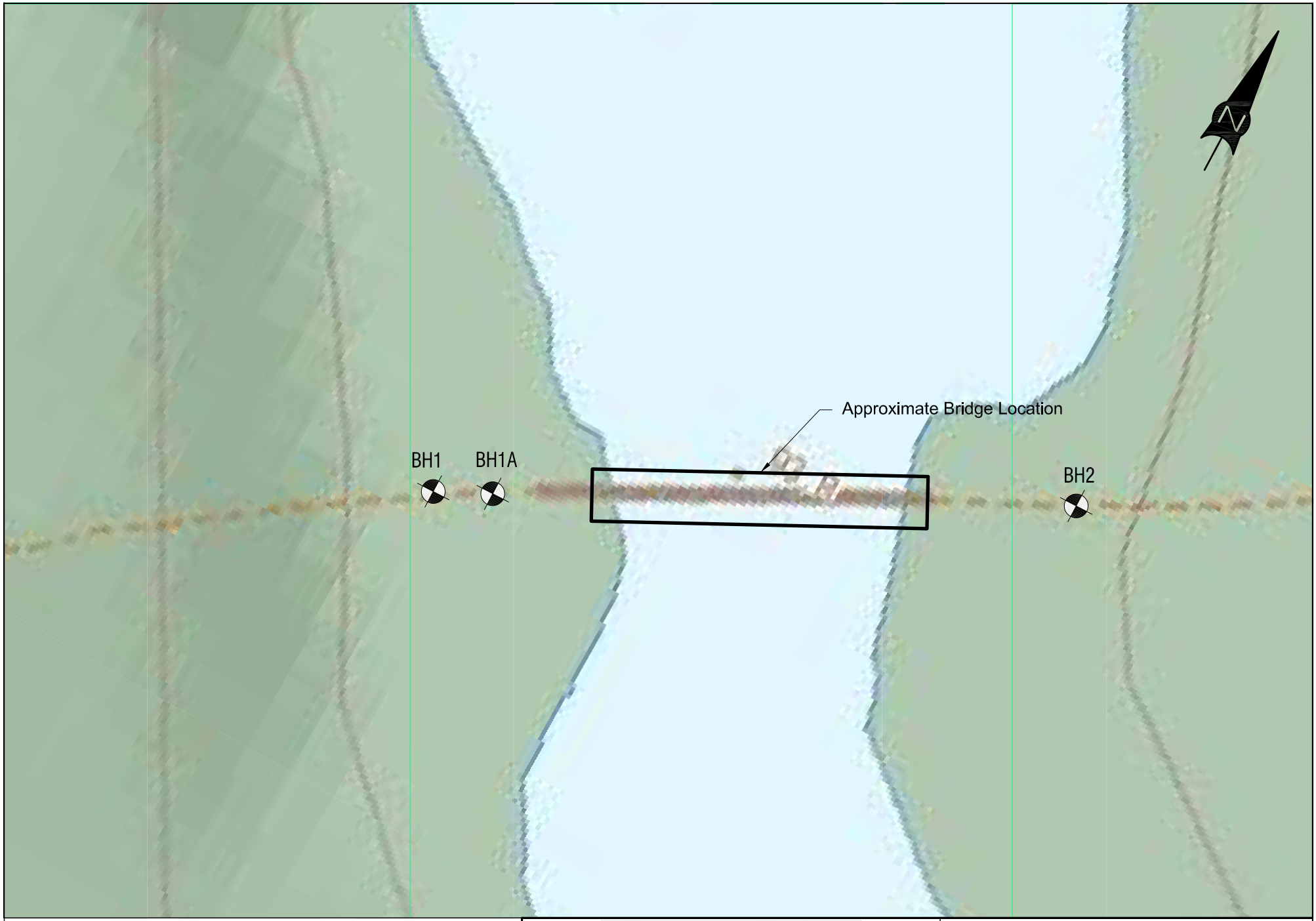
must be taken not to allow freezing of subsoil. Any fill or native soil that freezes must be sub excavated and replaced.

In periods of inclement weather or during extended work delays, foundation excavations within the site native soils should be protected by a working mat of lean concrete placed over the bearing soil immediately following excavation and preparation of the foundation contact area. Alternatively, a 150 mm thick compacted granular layer (e.g. Type II gravel) can be constructed at the founding level. It may be also necessary to insulate the founding strata during periods of subzero temperatures.

Geotechnical inspection and testing by qualified personnel is recommended during earthworks construction.

7 CLOSURE

The geotechnical investigation undertaken has involved random sampling of site conditions. Should any conditions be encountered during constructions that are contrary to those reported herein, we request immediate notification so that reassessment can be undertaken.



LEGEND

- Borehole Location

Englobe

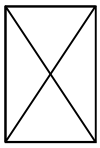
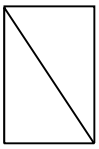
Borehole Location Plan
Mersey River Bridge
Kejimkujik National Park, NS

DATE: January 2016	SCALE: NTS	DRAWN BY: GG	CKD BY: RH	JOB No. 21222	FIGURE 1

Appendix 1 Explanation of Terms and Symbols

SOIL SAMPLES

CONDITION – This column graphically indicates the depth and condition of the sample:

 undisturbed  disturbed  not recovered

TYPE – The type of sample is indicated in this column as follows:

A auger sample
B block sample
C rock core, or frozen soil core
D drive sample
G grab sample
SS split spoon
P Pitcher tube sample
U tube sample (usually thin-walled)
W wash or air return sample
O other (see report text)

PENETRATION RESISTANCE – Unless otherwise noted this column refers to the number of blows (N) of a 140 pound (63.5 kg) hammer freely dropping 30 inches (0.76 m) required to drive a 2 inch (50.8 mm) O.D. open-end sampler 0.5 feet (0.15 m) to 1.5 feet (0.45 m) into the soil, or until 100 blows have been applied, in which case, the penetration is stated. This is the standard penetration test referred to in ASTM D 1586.

OTHER TESTS

In this column are tabulated results of other laboratory tests as indicated by the following symbols:

*C	Consolidation test
Fines	Percentage by weight smaller than #200 sieve
D_R	Relative density (formerly specific gravity)
k	Permeability coefficient
*MA	Mechanical grain size analysis and hydrometer test (if appropiate)
pp	Pocket pentrometer strength
*q	Triaxial compression test
q_U	Unconfined compressive strength
*SB	Shearbox test
SO_4	Concentration of water-soluble sulphate
*ST	Swelling test
TV	Torvane shear strength
VS	Vane Shear Strength (undistrubed-remolded)
ε_f	Unit strain at failure
γ	Unit weight of soil or rock
γ_d	Dry unit weight of soil or rock
ρ	Density of soil or rock
ρ_d	Dry density of soil or rock

* The results of these tests usually are reported separately

SYMBOLS AND TERMS USED ON THE BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Behavioural properties (i.e. plasticity, permeability) take precedence over particle gradation in describing soils.

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidation of clay minerals, shrinkage cracks etc.
Fissured	- having cracks, and hence a blocky structure
Varved	-composed of regular alternating layers of silt and clay
Stratified	- composed of alternating layers or different soil types, e.g. silt and sand or silt and clay
Well Graded	- having wide range in grain sizes and substantial amounts of all intermediate particle sizes
Uniformly Graded	- predominantly of one grain size.

Terminology used for describing soil strata based upon the proportion of individual particle size present:

Trace, or occasional	Less than 10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. silt and sand)	35-50%

The standard terminology to describe cohesionless soils includes the relative density, as determined by laboratory test or by the Standard Penetration Test 'N' - value: the number of blows of 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (305 mm) into the soil.

Relative Density	'N' Value	Relative Density %
Very loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer tests, unconfined compression test, or occasionally by standard penetration tests.

Consistency	Undrained Shear Strength Kips/sq.ft.	kPa	'N' Value
Very Soft	<0.25	<12.5	<2
Soft	0.25-0.5	12.5-25	2-4
Firm	0.5-1.0	25-50	4-8
Stiff	1.0-2.0	50-100	8-15
Very Stiff	2.0-4.0	100-200	15-30
Hard	>4.0	>200	>30

SOIL CLASSIFICATION SYSTEM (MODIFIED U.S.C.)

MAJOR DIVISION			GROUP SYMBOL	GRAPHIC SYMBOL	COLOR CODE	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA	
HIGHLY ORGANIC SOILS			Pt		ORANGE	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOR OR ODOR, AND OFTEN FIBROUS TEXTURE	
COARSE-GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN NO. 200 SIEVE SIZE)	GRAVELS MORE THAN HALF COARSE FRACTION LARGER THAN NO.4 SIEVE SIZE	CLEAN GRAVELS	GW		RED	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, <5% FINES	$Cu = \frac{D_{60}}{D_{10}} > 4$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1$ to 3	
			GP		RED	POORLY-GRADED GRAVELS, AND GRAVEL-SAND MIXTURES, <5% FINES	NOT MEETING ALL ABOVE REQUIRMENTS	
		DIRTY GRAVELS	GM		YELLOW	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR $I_p < 4$	
			GC		YELLOW	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE "A" LINE OR $I_p > 7$	
	SANDS MORE THAN HALF COARSE FRACTION SMALLER THAN NO.4 SIEVE SIZE	CLEAN SANDS	SW		RED	WELL-GRADED SANDS, GRAVELLY SANDS, <5% FINES	$Cu = \frac{D_{60}}{D_{10}} > 6$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1$ to 3	
			SP		RED	POORLY-GRADED SANDS, OR GRAVELLY SANDS, <5% FINES	NOT MEETING ALL ABOVE REQUIRMENTS	
		DIRTY SANDS	SM		YELLOW	SILTY SANDS, SAND-SILT MIXTURES >12% FINES	ATTERBERG LIMITS BELOW "A" LINE OR $I_p < 4$	
			SC		YELLOW	CLAYEY SANDS, SAND-CLAY MIXTURES >12% FINES	ATTERBERG LIMITS ABOVE "A" LINE OR $I_p > 7$	
FINE - GRAINED SOILS (MORE THAN HALF BY WEIGHT PASSES NO.200 SIEVE SIZE)	SILTS BELOW "A" LINE ON PLASTICITY CHART; NEGLIGIBLE ORGANIC CONTENT		ML		GREEN	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	$W_L < 50$	SEE CHART BELOW
			MH		BLUE	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS	$W_L > 50$	
	CLAYS ABOVE "A" LINE ON PLASTICITY CHART; NEGLIGIBLE ORGANIC CONTENT		CL		GREEN	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS	$W_L < 30$	
			CI		GREEN-BLUE	INORGANIC CLAYS OF MEDIUM PLASTICITY SILTY CLAYS	$W_L > 30$, < 50	
			CH		BLUE	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	$W_L > 50$	
	ORGANIC SILTS & ORGANIC CLAYS BELOW "A" LINE ON PLASTICITY CHART		OL		GREEN	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	$W_L < 50$	
			OH		BLUE	ORGANIC CLAYS OF HIGH PLASTICITY	$W_L > 50$	

FILL TILL BEDROCK

1. All sieve sizes mentioned on this chart are U.S. Standard, ASTM E11.

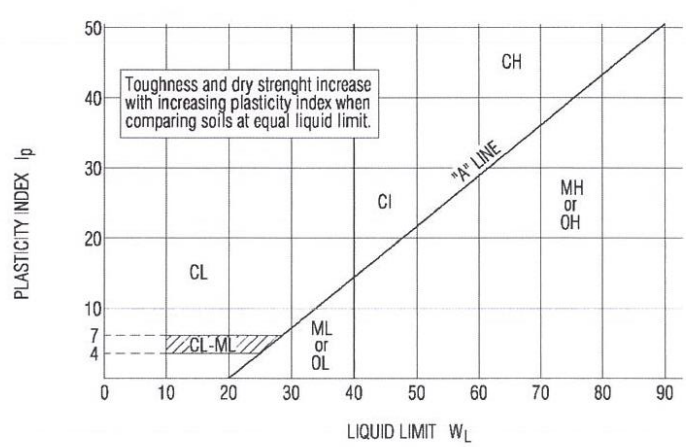
2. Boundary classifications possessing characteristics of two groups are given combined group symbols eg GW-GC is a well-graded gravel-sand mixture wtih clay binder between 5% and 12%.

3. Soil fractions and limiting textural boundaries are in accordance with the Unified Soil Classification System, except that an inorganic clay of medium plasticity (CI) is recognized.

4. The following adjectives may be employed to define percentage ranges by weight of minor components:

and	50 - 36%
gravelly, sandy, silty, clayey, ect.	35 - 21%
some	20 - 11%
trace	10 - 1%

PLASTICITY CHART



Englobe

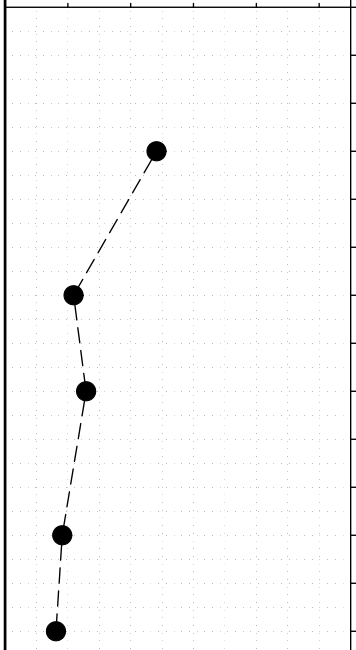
Appendix 2 Borehole Logs

BOREHOLE LOG

PROJECT

Geotechnical Investigation -
Mersey River Bridge, Kejimkujik National Park, NS

LOGGED/DWN. LL	CKD. RH	DATE OF INVEST. 12/16/15	JOB NO. 21222	HOLE NO. BH 1



DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	COND.	TYPE	PENE. RESIST.
				DATUM Ground Surface Elevation provided by SNC Lavalin SURFACE ELEVATION 91.46 meters			
				FILL : sand and gravel, trace to some silt, occasional cobbles, compact to loose, moist to wet, grey-brown.		SS	N=7
2						SS	N=5
4	1						
				TILL : silty sand, trace to some gravel and clay, occasional cobbles and small boulders, compact to dense, wet to saturated, grey-brown.		SS	N=26
6	2					SS	N=30
8							
10	3					SS	N=32
12						SS	N=35
14	4						
16	5					SS	N=33
18						SS	N=43
20	6			End of Borehole at 5.79 metres in Till. Groundwater not identified due to injection of water during drilling. Groundwater expected to be at/near level of adjacent brook.			
22							
24	7						
26	8						
28							
30	9						
32							
	10						

DRILL TYPE

Drill Rig

OTHER TESTS

PLATE 1

BOREHOLE LOG

PROJECT

Geotechnical Investigation -
Mersey River Bridge, Kejimkujik National Park, NS

LOGGED/DWN. LL	CKD. RH	DATE OF INVEST. 12/18/15	JOB NO. 21222	HOLE NO. BH 1A

CASING RESISTANCE blows/300mm ⇩

WC % wp- □ w- ● wl- △ 10 20 30 40 50

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	SOIL SAMPLE COND.	SOIL SAMPLE TYPE	SOIL SAMPLE PENE. RESIST.	OTHER TESTS
				DATUM Ground Surface Elevation provided by SNC Lavalin SURFACE ELEVATION 91.37 meters				DRILL TYPE: Drill Rig
2, 4	1			FILL : sand and gravel, trace to some silt, occasional cobbles, compact to loose, moist to wet, grey-brown.				TCR - Total Core Recovery RQD - Rock Quality Designation
6, 8, 10, 12, 14, 16, 18, 20	2, 3, 4, 5, 6			TILL : silty sand, trace to some gravel and clay, occasional cobbles and small boulders, compact to dense, wet to saturated, grey-brown.				
22, 24, 26	7, 8			BEDROCK : Slate, highly weathered and fractured, poor quality, bluish grey.		RC		TCR = 100% RQD =13%
28, 30, 32	9, 10			End of Borehole at 8.08 metres in Bedrock. Groundwater not identified due to injection of water during drilling. Groundwater expected to be at/near level of adjacent brook.				

PLATE 2

BOREHOLE LOG

PROJECT
Geotechnical Investigation -
Mersey River Bridge, Kejimkujik National Park, NS

LOGGED/DWN. LL	CKD. RH	DATE OF INVEST. 12/16/15	JOB NO. 21222	HOLE NO. BH 2

CASING RESISTANCE blows/300mm ⇩

WC % wp- □ w- ● wl- △ 10 20 30 40 50

DRILL TYPE: Drill Rig

DATUM Ground Surface Elevation provided by SNC Lavalin

SURFACE ELEVATION 90.68 meters

DEPTH ft	DEPTH m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION	COND.	TYPE	PENE. RESIST.	OTHER TESTS
2				FILL : sand and gravel, trace to some silt, occasional cobbles, compact to loose, moist to wet, grey-brown.		SS	N=17	TCR - Total Core Recovery RQD - Rock Quality Designation UCS - Unconfined Compressive Strength
4	1					SS	N=13	
6	2					SS	N=4	
8						SS	N=59	
10	3			Topsoil/Organic Soils TILL : silty sand, trace to some gravel and trace clay, occasional cobbles and small boulders, compact to dense, wet to saturated, grey-brown.		SS	N=27	
12						SS	50/25	50 blows for 25 mm
14	4			BEDROCK : Slate, highly weathered and fractured, poor quality, bluish grey.		RC		TCR = 100% RQD =0%
16	5			End of Borehole at 4.95 metres in Bedrock. Groundwater not identified due to injection of water during drilling. Groundwater expected to be at/near level of adjacent brook.				
18								
20	6							
22	7							
24								
26	8							
28								
30	9							
32	10							

PLATE 3

Appendix 3 Laboratory Test Results

TABLE 3-1: SUMMARY OF LABORATORY DATA
Geotechnical Investigation
Mersey River Bridge, Kejimkujik National Park, NS
Englobe Project No. 21222

Borehole No.	Sample No.	Depth (m)	Description	Moisture Content (%)	Particle Size Distribution		
					Gravel (%)	Sand (%)	Fines (silts and clays) (%)
BH 1	2	0.6 - 1.2		24.1			
	3	1.5 - 2.1	Till : silty sand, trace to some clay and gravel	10.9	14	36	50
	4	2.1 - 2.7	Till : silty sand, trace to some clay and gravel	12.9	16	22	62
	5	3.0 - 3.6		9.1			
	6	3.6 - 4.2		8.1			
BH 2	2	0.8 - 1.4	Fill : sand and gravel, some silt	9.6	47	39	14
	3	1.5 - 2.1		11.3			
	4	2.3 - 2.9		11.0			
	5	3.0 - 3.6		11.4			

METRIC SIEVE ANALYSIS REPORT

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
SNC Lavalin Inc.
65 Beech Hill Road, Suite 2
Antigonish, Nova Scotia
B2G 2P9

Attn: Todd Barkhouse
PHONE (902) 863-1220 **FAX:** (902) 863-3225

Our Project No: 21222
Client Contract No.: 633937
Client PO.:
CC:

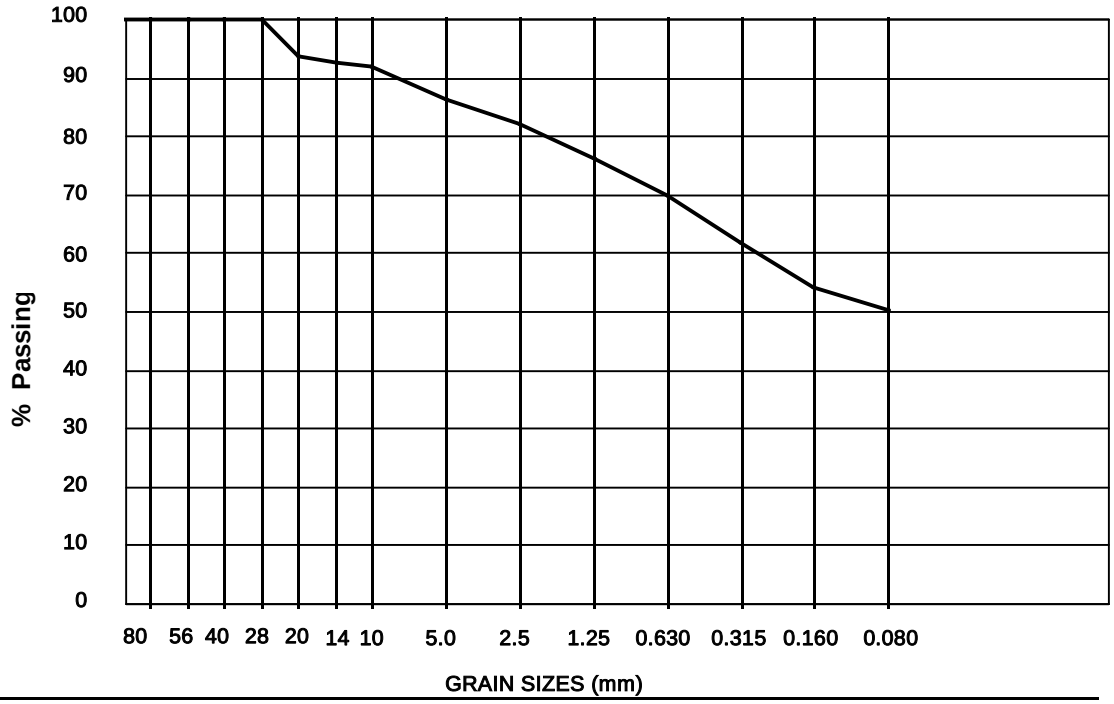
Project: Geotechnical Investigation - Mersey River Bridge, Keji Park, NS
Source: BH #1
Sample No: 3
Location: 1.5 - 2.1 m
Date Sampled: 16-Dec-15
Sampled by: LL
Date Received: 18-Dec-15
Date Tested: 21-Dec-15

PHYSICAL PROPERTY TESTS					
Soil Type	Till	Liquid Limit		Flat and Elongated Particles, %	
Gravel, %	14	Plastic Limit		Coarse Spec. Gravity	
Sand, %	36	Plasticity Index		Fractured Faces, %	
Silt and Clay, %	50	Coarse Absorption, %		Petrographic No.	
Moisture Cont., %	10.9	Fine Absorption, %		Max. Dry Density, (kg/m3)	
Abrasion Loss, %		Micro Deval Loss, %		Optimum Moisture, %	

Sieve Size (mm)	Percent Passing	Spec. Band
112		
80		
56		
40		
28	100	
20	94	
14	93	
10	92	
5.0	86	
2.5	82	
1.25	76	
0.630	70	
0.315	62	
0.160	54	
0.080	50.4	

GRAIN SIZE CURVE

Spec Band
NO SPEC



Comments:

Record No: 9798 Englobe Tech: TM PER

CERTIFIED LABORATORY FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager Richard Henry

METRIC SIEVE ANALYSIS REPORT

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
SNC Lavalin Inc.
65 Beech Hill Road, Suite 2
Antigonish, Nova Scotia
B2G 2P9

Attn: Todd Barkhouse
PHONE (902) 863-1220 **FAX:** (902) 863-3225

Our Project No: 21222
Client Contract No.: 633937
Client PO.:
CC:

Project: Geotechnical Investigation - Mersey River Bridge, Keji Park, NS
Source: BH #1
Sample No: 4
Location: 2.1 - 2.7 m
Date Sampled: 16-Dec-15
Sampled by: LL
Date Received: 18-Dec-15
Date Tested: 21-Dec-15

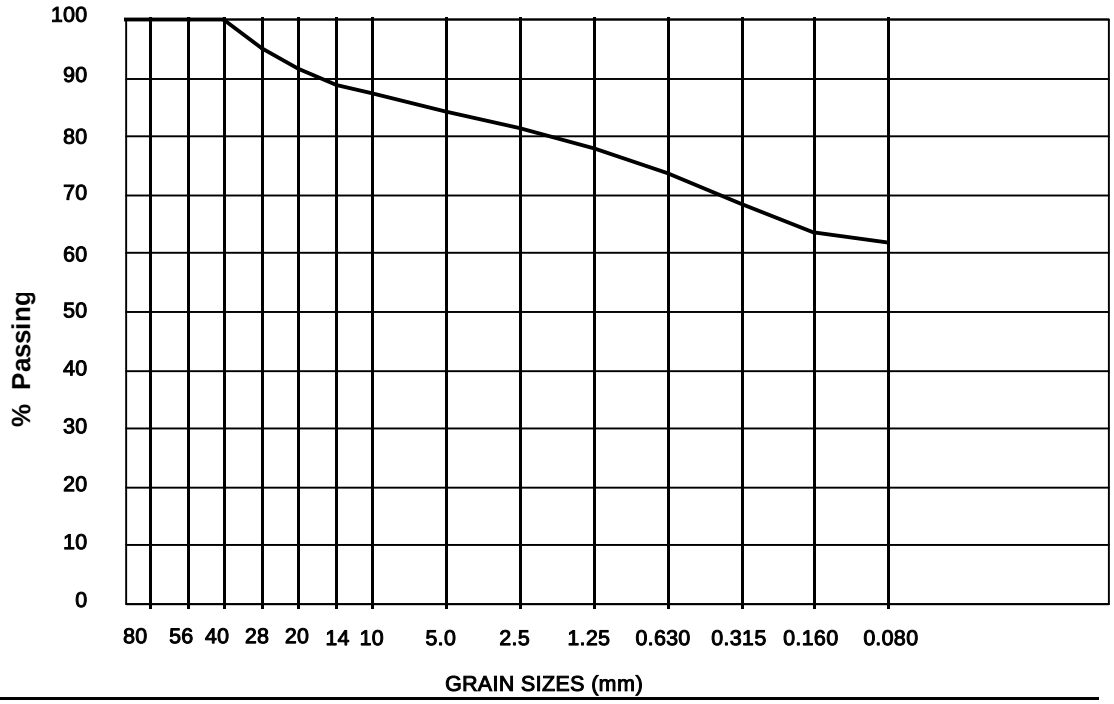
PHYSICAL PROPERTY TESTS

Soil Type	Till	**Liquid Limit**		**Flat and Elongated Particles, %**	
Gravel, %	16	**Plastic Limit**		**Coarse Spec. Gravity**	
Sand, %	22	**Plasticity Index**		**Fractured Faces, %**	
Silt and Clay, %	62	**Coarse Absorption, %**		**Petrographic No.**	
Moisture Cont., %	12.9	**Fine Absorption, %**		**Max. Dry Density, (kg/m3)**	
Abrasion Loss, %		**Micro Deval Loss, %**		**Optimum Moisture, %**	

Sieve Size (mm)	Percent Passing	Spec. Band
112		
80		
56		
40	100	
28	95	
20	91	
14	89	
10	88	
5.0	84	
2.5	81	
1.25	78	
0.630	74	
0.315	68	
0.160	64	
0.080	61.9	

GRAIN SIZE CURVE

Spec Band
NO SPEC



Comments:

Record No: 9799 Englobe Tech: TM PER

CERTIFIED LABORATORY FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager Richard Henry

METRIC SIEVE ANALYSIS REPORT

97 TROOP AVE., DARTMOUTH, N.S. B3B 2A7 - TEL (902) 468-6486 FAX 468-4919

Client:
SNC Lavalin Inc.
65 Beech Hill Road, Suite 2
Antigonish, Nova Scotia
B2G 2P9

Attn: Todd Barkhouse
PHONE (902) 863-1220 **FAX:** (902) 863-3225

Our Project No: 21222
Client Contract No.: 633937
Client PO.:
CC:

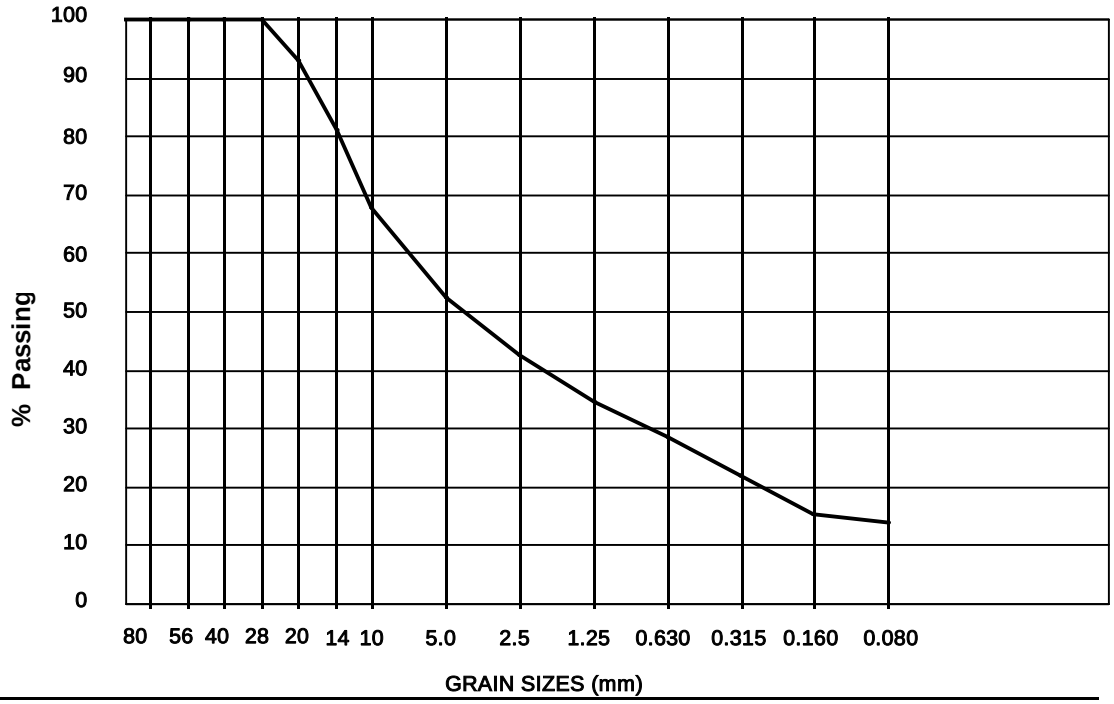
Project: Geotechnical Investigation - Mersey River Bridge, Keji Park, NS
Source: BH #2
Sample No: 2
Location: 0.8 - 1.4 m
Date Sampled: 16-Dec-15
Sampled by: LL
Date Received: 18-Dec-15
Date Tested: 21-Dec-15

PHYSICAL PROPERTY TESTS					
Soil Type	Fill	Liquid Limit		Flat and Elongated Particles, %	
Gravel, %	47	Plastic Limit		Coarse Spec. Gravity	
Sand, %	39	Plasticity Index		Fractured Faces, %	
Silt and Clay, %	14	Coarse Absorption, %		Petrographic No.	
Moisture Cont., %	9.6	Fine Absorption, %		Max. Dry Density, (kg/m3)	
Abrasion Loss, %		Micro Deval Loss, %		Optimum Moisture, %	

Sieve Size (mm)	Percent Passing	Spec. Band
112		
80		
56		
40		
28	100	
20	93	
14	81	
10	68	
5.0	53	
2.5	43	
1.25	35	
0.630	29	
0.315	22	
0.160	15	
0.080	13.9	

GRAIN SIZE CURVE

Spec Band
NO SPEC



Comments:

Record No: 9797 Englobe Tech: TM PER

CERTIFIED LABORATORY FOR TESTING CONCRETE

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on request.

project manager Richard Henry

Appendix B

Site-specific Environmental Assessment

Parks Canada Basic Impact Analysis

1. PROJECT TITLE & LOCATION

Mersey River Bridge Renewal. Mersey River Bridge (No.2), Kejimkujik National Park and National Historic Site, Nova Scotia.

2. PROPONENT INFORMATION

Chris Ferguson
Technical Services Officer
Kejimkujik National Park and National Historic Site of Canada | Parc national et lieu historique national Kejimkujik
P.O Box236, Maitland Bridge, Nova Scotia, B0T 1B0 | BP 236, Maitland Bridge, Nouvelle-Écosse, B0T 1B0
chris.ferguson@pc.gc.ca Telephone | Telephone 902-529-0204 Facsmile | Telecopieur 902-682-2492

3. PROPOSED PROJECT DATES

Planned commencement: 2017-07-01
Planned completion: 2017-12-15

4. INTERNAL PROJECT FILE

Parks Canada # 745 / PWGSC #R.077567.001

5. PROJECT DESCRIPTION

The Project

Renewal of the Mersey River Bridge No.2 (B089) will involve the replacement of the existing bridge. The bridge originally built in 1952, has undergone previous repairs but is currently in decline and needs to be replaced. The existing bridge is a treated wood structure with three spans, two cribwork piers/blocks and two cribwork abutments. The existing stone-filled treated timber crib piers, including interior stone and abutments, as well as the large rock scour protection islands at the foot of the piers will be removed. The proposed replacement bridge is a single-span modular proprietary pony-truss steel bridge with no in water cribwork or abutments. The replacement bridge, longer (3-5 m) and wider (~2m on each side) than the existing, will expand the current footprint along the water and existing road. The timber crib abutments will be replaced with a concrete wingwall anchored with micropiles. A small amount of clean fill is anticipated to be required for the abutments and the approach roads within the existing disturbed area. Riprap embankments (clean source) will be required for scour protection of the pile cap. The laydown area for the project will mainly be within the existing parking lot (180 m2). Construction equipment and personnel will use the existing seasonal Eel Weir Road to access the construction site. Minor road re-alignment (i.e. vegetation clearing and removal) will occur and will require the expansion of the existing road footprint.

Removal of the existing bridge (deck and timber crib piers with interior stone and abutments) will primarily involve land based equipment (most likely an excavator). The material will be removed from the watercourse and trucked from the park to an approved location for disposal in accordance with both the *Cultural Resource Impact Assessment* (*CRIA*) and *Archeological Overview Assessment* (*AOA*) including the recommendation for archeological monitoring (Appendix 1). Trucks and dump trucks will be used to bring in and take out material. The new bridge will be assembled on dry land along the roadway and then launched across the river from one side. Sediment and erosion control measures will be in place prior to the commencement of any construction activities at the site. The abutments for the new bridge will consist of micropiles that will be drilled or pounded into the shallow till and bedrock, and pile caps of reinforced concrete. Machinery required for micropiles, and concrete wingwalls installation, and instream work will generally operate from the land. Although micropiles require less depth to preclude scour than traditional spread-footing abutments, there will likely still be a requirement for limited excavation and temporary watercourse diversion and pumping around the pile cap excavations. See Appendix 2 for a schematic showing existing conditions and project plans.

Environmental Setting

Location

The Mersey River Bridge crosses the lower Mersey River, south-east of George Lake and is located along the seasonal Eel River Road in Kejimkujik National Park and National Historic Site, Nova Scotia (hereafter referred to as Kejimkujik). The landscape in the immediate vicinity of the bridge is mostly vegetated and has few signs of human disturbance with the exceptions of the existing Environment and Climate Change Canada's hydrometric station, parking lot, canoe launch and gravel road. Beyond the bridge, the Eel Weir Road is limited to foot traffic only and used by visitors to access the backcountry, associated

campsites and for hiking, biking and canoeing opportunities. Vehicular access is limited to park staff only.

Cultural Resources

Two historic V-shaped stone eel weirs built by the Mi'kmaq to help trap fish and eels are located in the Mersey River near the project site. Due to the presence of these weirs, the area in the vicinity of the bridge is known as the "Eel Weir". Additionally, the eel weirs, considered to be an important cultural site, are directly linked to the park's designation as a national historic site. The *CRIA* and *AOA* found in Appendix 1 provides a detailed description of the cultural aspects of the eel weirs and the project location.

Natural Resources

Wildlife

A variety of freshwater fish valued by commercial, recreational, and Aboriginal (CRA) fisheries are found within the Mersey River and in the vicinity of the project location. Additionally, the riparian and upland areas in close proximity to the bridge and road are attractive for breeding and nesting to a variety of migratory birds protected by federal regulation under the *Migratory Birds Convention Act, 1994* (MBCA).

Species at Risk

Kejimkujik is a host to a number of species that are Endangered, Threatened and Special Concern under Schedule 1 of the *Species at Risk* Act (SARA) and/or by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Species listed as Endangered, Threatened and Vulnerable under the Nova Scotia *Endangered Species Act* (NS ESA) are also considered in managing species at risk in Kejmkujik. Refer to Table 1 for a list of species at risk and their associated designation which have been documented at/near the existing bridge or along the Eel Weir Road. Defined critical habitat within in the vicinity of the Mersey Bridge Renewal Project is found in Appendix 3.

Table 1 Species at Risk Occurring in Kejimkujik in Vicinity of the Mersey Bridge Renewal Project

Species	SARA status	COSEWIC	Provincial Status
Vascular Plants			
Black Ash	--	--	Threatened
Water Pennywort	Threatened	Special Concern	Endangered
Reptiles			
Eastern Ribbonsnake	Threatened	Threatened	Threatened
Blanding's Turtle	Endangered	Endangered	Endangered
Snapping Turtle	Special Concern	Special Concern	Vulnerable
Birds			
Barn Swallow	--	Threatened	Endangered
Common Nighthawk	Threatened	Threatened	Threatened
Eastern Wood-pewee	--	Special Concern	Vulnerable
Evening Grosbeak	--	Special Concern	--
Mammals			
Little Brown Myotis	Endangered	Endangered	Endangered
Northern Myotis	Endangered	Endangered	Endangered
Tri-coloured Bat	Endangered	Endangered	Endangered

Species at Risk at or Near the Proposed Construction Site

Water pennywort although previously found in the Eel Weir area, has not been documented since 2002 and has limited likelihood to be present. Snapping turtles are known to nest on the eastside approach to the existing bridge and side slopes along the Eel Weir Road. Barn swallows have been documented in the past using the existing bridge for perching and nesting, as well as foraging along the Mersey River. Though it is assumed no swallows have nested on the bridge since 2014. Although, common nighthawks have been recorded foraging at the existing bridge, there is low potential for nesting within the vicinity of the project. Previous research conducted in Kejimkujik, has identified the Eel Weir area as a location where three species of bats (little brown myotis, Northern myotis and tri-coloured bat) concentrate to forage along the river (Broders pers comm, Poissant 2009). As well, the upland forest habitat in the vicinity of the construction site and along the road are suitable for roosting by both northern myotis and tri-coloured bat (Broders pers comm, Broders et al 2003, Farrow 2007) with historic records of a northern myotis maternal roost located 15 m north of the Mersey River (Broders et al 2003) and tri-coloured roost approximately 80 m north of the proposed staging area (Farrow 2007).

Species at Risk Along or Near Construction Access Road

The Eel Weir Road, used to access the construction site, is used by Blanding's turtles to reach nesting sites, one of which is adjacent to the road. Eastern ribbonsnakes cross the Eel Weir Road in the spring (April/May) after emerging from hibernation and fall (September to November) to return to their hibernaculum for overwintering near Grafton and the entrance to the Eel Weir Road. While all wetland are determined to be critical habitat for ribbonsnakes, no sightings have been documented near the construction site. Black ash, eastern wood-pewee and evening grosbeaks have been documented using habitat along the Eel Weir Road.

Visitor Experience

The project will support park visitor experience objectives by allowing for the continued use of the bridge for hiking, fishing and camping opportunities in the backcountry of Kejimukjik, but access from Eel Weir Road will be closed to visitors during the period of construction.

6. VALUED COMPONENTS THAT MAY BE AFFECTED

Without proper mitigation potential effects for the Project (construction site and access road to site) are well understood and predictable. They include:

Cultural Resources

- Adverse effects on the heritage value or character-defining elements of the cultural resource (i.e. Kejimkujik is a Mi'kmaw cultural landscape, this area around the Mersey River is significant)
- Impacts to archaeological resources (known or potential) (See the *CRIA* and *AOA*; Appendix 1 for a detailed analysis.)

Natural Resources

Water Resources:

- Reduced water quality due to increased erosion, sedimentation, transportation of debris and contamination (i.e. from leaks, accidental spills, improper use of erosion and sediment control measures, etc.)
- Physical alteration of aquatic habitat
- Adverse modifications to surface drainage patterns

Soil and Land Resources:

- Slope and soil instability due to increased soil exposure, improper excavation and storage
- Soil compaction and rutting which can lead to increased soil erosion, surface water ponding, water runoff, surface soil waterlogging and decreased flora productivity
- Soil contamination
- Changes in slopes, landforms and landscape

Air Quality:

- Decreased ambient air quality (ie. from dust, equipment emissions, etc.)
- Increased ambient noise levels
- Temporary increased levels of CO2 and other pollutants
- Temporary increased localized temperatures from equipment operation

Vegetation:

- Damage to and/or removal of vegetation in immediate or adjacent areas (i.e. riparian, upland and/or along roadsides)
- Introduction of non-native species, or expansion of existing populations (i.e. transport by dirty vehicles and equipment or restoration efforts)

Wildlife:

General Wildlife

- Wildlife habituation and attraction to artificial food sources and waste generated by project activities which can lead to increased human-wildlife conflicts for construction personnel, visitors and park staff
- Wildlife sensory disturbance causing displacement and avoidance of preferred habitat (i.e. for nesting, denning, foraging)
- Impeded/altered wildlife movement or disruption to wildlife corridors
- Direct damage/harm to nests and young or disruption of nesting animals
- Direct mortality from project activities (i.e. from equipment, vegetation removal, construction traffic on existing roads, etc.)
- Damage to the quality of nesting / spawning / roosting habitats
- Introduction of non-native species populations, or expansion of existing populations

Fish

- Improper timing of construction activities could impact sensitive stages for fish, especially during larval stage and hatching
- Direct injury or mortality of fish eggs, larvae, invertebrates, etc. by crushing, excavation, siltation or toxicity
- Fish could become caught in pump intakes or impinged at screens resulting in injury or mortality
- In-stream infrastructure can impede or disrupt fish migration between feeding, rearing and spawning areas

Migratory Birds

- Direct damage/harm to nests and young or disruption of nesting migratory birds by construction and demolition activities, including bird species with special conservation status (i.e. common nighthawk, eastern wood-pewee, evening grosbeak)
- Direct mortality from project activities (i.e. from equipment, vegetation removal, construction traffic on existing roads, etc.)
- Damage to the quality of nesting habitats
- During construction, lights can adversely impact birds especially night-flying birds attracted to lights during fog, drizzle, haze, storm, etc., which could result in collisions with the bridge and construction equipment
- Disoriented birds are prone to circling a light source and may deplete their energy reserves and either die of exhaustion or drop to the ground where they are at risk of predation
- Vehicle and pedestrian traffic on shorelines loosens sand, damages vegetation and disrupts or displaces birds

Species at Risk

- Blanding's turtles use Eel Weir Road to access nesting sites in June/early July. Vehicle traffic could stress, harm or kill the turtles or their hatchlings.

- Snapping turtles walk out of the water and dig nests in June. Previous nests have been located on the bridge road approach as well as the side slopes. Vehicle traffic or construction activities could stress, harm or kill the adult turtles, harm the eggs and/or hatchlings.
- Eastern Ribbonsnakes cross the Eel Weir Road in the spring and fall when moving between overwintering and breeding areas. Vehicle traffic or construction activities could stress, harm or kill snakes using the road.
- Barn swallows and their nests could be disturbed, harmed or destroyed by construction and demolition activities if they are attempting to use the bridge for roosting and nesting
- Endangered bat species could be disturbed, harmed or destroyed by construction activities or vegetation removal while foraging or roosting in the vicinity of the project
- Black ash could be damaged or destroyed during vegetation removal activities along the Eel Weir Road
- The construction access road falls within critical habitat identified for both Blanding's turtle and eastern ribbonsnake, while the Project site at the bridge falls within the identified critical habitat for water pennywort (Appendix 3). See **Section 7** for more detailed information.

Visitor Experience / Safety

- Decreased quality of visitor experience due to temporary area closures during and leading up to construction activities, operation of equipment, sensory disturbance
- Potential impacts to visitor safety due to construction activities and movement of equipment by those attempting to approach closure areas (i.e. pedestrians, cyclists and canoeists)
- Potential impacts to visitor safety during scheduled bridge and road closures to those utilizing the backcountry (i.e delayed response time due to inaccessibility for emergencies, fire, evacuation situations, etc.)
- Potential impacts to the safety of Kejimkujik research and monitoring staff requiring access to the backcountry during bridge and road closures, construction activities and movement of equipment
- Potential impacts to Kejimkujik operational support staff safety requiring to access the backcountry to preform scheduled campsite, cabin and trail maintenance during bridge and road closures, construction activities and movement of equipment
- Restricted access to the Environment and Climate Change Canada's hydrometric station.

Health and Socioeconomic Conditions with Respect to both Aboriginal and Non-Aboriginal Peoples

- None expected beyond safety noted above.

Refer to the Effects Identification Matrix (Appendix 4), for a summary of identified potential interactions between the project and the surrounding environment, including cultural and natural resources along with visitor experience and safety.

7. EFFECTS ANALYSIS

Cultural Resources

Any potential effects to Mi'kmaq artifacts and traditional use of this site is identified in the CRIA and AOA found in Appendix 1.

Natural Resources

The most important **positive** environmental effect will be improved aquatic habitat. The new bridge is more suitable for high flow periods. Removal of the stone-filled treated timber crib piers, cribwork abutments and rock apron will return the river to a more natural state.

The most important **negative** effects could be the potential impacts to species at risk (adults, eggs, young, nests or roots), including black ash, Blanding's turtle, snapping turtle, eastern ribbonsnake, barn swallow and bats), impacts to migratory birds, clearing of project footprint, construction area and laydown areas, as well as impacts to fish and fish habitat during the construction phase of the undertaking from siltation, accidents or malfunctions. To the highest extent possible the construction site, access road and laydown area will be isolated to existing disturbances which assists in minimizing the risks associated to potential impacts.

While it is prohibited under SARA to destroy critical habitat, the term 'destruction' has not been defined under law. Parks Canada Species at Risk staff have defined 'destruction' based on the functionality of the habitat for the life cycles that require that habitat. For this project, though critical habitat has been defined for Blanding's turtle, eastern ribbonsnake and water pennywort either at the construction site or along the Eel Weir Road, the existing disturbances (bridge and road) along with the slight expansion of the road and bridge footprint will not cause a loss of the larger functionality of the critical habitat for these species. Construction activities will not impact critical biophysical attributes or habitat function required for the survival of the species.

Visitor Experience / Safety

The bridge replacement will improve safety for both visitors and Parks Canada staff.

8. MITIGATION MEASURES

Environmental Surveillance

1. The Project is subject to environmental surveillance by the Environmental Surveillance Officer (ESO) to ensure that mitigation measures as outlined through the EIA process are implemented during all phases of construction, including clearing, demolition, construction, clean-up, follow-up monitoring and restoration.
2. The ESO will report deficiencies to the Project Manager (PM) and summarize site visit observations in a surveillance report. The surveillance report will be filed to supplement information for updated mitigation, follow-up monitoring and/or restoration activities in the future.
3. The Prime Contractor is responsible for keeping the PM and ESO informed of project activities and will notify both the PM and ESO prior to the following activities:
    - Vegetation clearing and soil stripping < 30 m from sensitive features
    - Activities in and < 30 m from water;
    - Species at risk or other wildlife mitigation measures; and
    - As otherwise outlined in the Project BIA.

Environmental Protection Plan

4. An Environmental Protection Plan (EPP) will be prepared by the Prime Contractor that outlines the mitigations for the valued components and related plans identified within this BIA
5. The requirements of the EPP will be scaled to the scope and associated risks of the Project as outlined in the BIA and/or determined by the Impact Assessment Officer (IAO) or ESO.
6. The EPP will be developed by a qualified professional and is subject to approval by the IAO prior to the commencement of construction activities.

Minimum Requirements of the EPP

7. The minimum requirements of the EPP include consideration of:
    - Project Description:
        - Brief description of the Project including Location and Scope of Work;
        - List of all construction or related activities to be undertaken (include equipment types and methods, as relevant);
        - Project schedule including restricted work period;
        - Site drawing (i.e. site location, site set-up and layout, in-stream work areas, environmental sensitivities, if applicable); and
        - Project materials (with emphasis on those whose use carries higher environmental risk (i.e. cast in place concrete in/near water bodies).
    - EPP Orientation and Awareness:
        - Outline if workers require an environmental pre-work training and orientation, including but not limited to, attending mandatory briefing with Parks Canada ESO;
        - Pre-construction meeting requirements (environmental component); and
        - And information, as applicable, on start-up and/or daily job planning meetings.

- EPP Implementation details:
    - Name and contact details for the contractor site representatives and Parks Canada staff (i.e. PM and ESO);
    - Other project contacts with key responsibilities;
    - Monitoring reporting requirements;
    - Training and communication strategy;
    - Environmental Compliance;
    - Incidental Reporting requirements; and
    - EPP review and update procedures.
- Regulatory Framework and Content Requirements of an EPP:
    - List of permits, approvals, authorizations (responsibilities for and copies included, if required)
    - Ensure all relevant environmental and contingency plans/sections are included, such as:
        1. Erosion and Sediment Control Plan
        2. Turbidity control, drainage water and wastewater management plan
        3. Soils and terrain management plan
        4. Vegetation clearing plan
        5. Waste management plan
        6. Hazardous material management plan
        7. Health and safety plan
        8. Traffic management plan
        9. Wildlife and human conflict management plan
        10. Equipment maintenance and fueling procedure
        11. Air quality, odour, dust control and emission/pollution management plan
        12. Noise pollution plan
        13. Management of non-native species
        14. Site-clean-up and restoration plan
        15. Emergency and contingency response plans
        16. Fire response plan
        17. Discovery of cultural or natural resource procedure plan
- Mitigation Measures for valued components and related plans in the BIA (i.e. fish, fish habitat, migratory birds, species at risk, water quality, etc.)
- Any applicable documents to assist workers meet environmental requirements (i.e. maps, MSDS sheets, etc.).

Erosion and Sediment Control

8. An Erosion and Sediment Control Plan (ESCP) will be prepared by the Prime Contractor that covers all construction and restoration periods.
9. The requirements for an ESCP will be scaled to the scope and associated risks of the Project as outlined in the BIA and/or determined by the IAO or ESO.

10. The ESCP will be developed by a qualified professional and is subject to approval by the IAO prior to the commencement of construction activities.
11. The ESCP can be a standalone documented or incorporated as an Appendix to the EPP.
12. Prior to any excavation the implementation and maintenance of multi-barrier perimeter controls to prevent the release of sediment-laden runoff off-site must be installed and outlined in the ESCP.
13. Schedule work to avoid extreme wet, windy and rainy periods that may increase erosion and sedimentation.
14. Avoid soil disturbing activities during periods with saturated soils, periods of runoff, high rainfall intensity, high winds, or wet snow. Temporarily stop work when wet ground conditions contribute to erosion and sediment transport.
15. Erosion control measures that prevent sediment transport into any waterway, waterbody or wetland shall be implemented by the contractor.
16. Identify high risk areas or components of the project including areas with fine-grained soils, sandy deposits, slopes, shallow soils, or adjacent to sensitive features (e.g., riparian areas).
17. Identify sources of potential runoff (e.g., ditches, slopes) from within the construction site or from upslope areas. Construct and maintain structures to deflect sources of runoff from entering areas of exposed soils (e.g., diversion ditches, vegetative filter strips).
18. Acquire necessary erosion and sediment control equipment (i.e., landscaping fabric, sediment fences, coir rolls etc.) and install prior to risk of sediment transport.
19. Minimize slope lengths and angles, promote surface roughness on slopes, and avoid designs and construction practices that result in smooth, uniform slopes. Incorporate texture and organics into the cover of slopes to reduce soil erodibility.
20. Plan project activities to minimize soil handling.
21. Limit equipment movement over exposed soils.
22. Avoid activities that contribute to soil compaction and use practices that roughen and decompact soils to promote infiltration.
23. Ensure all activities are conducted at least 30 m from waterbodies wherever possible.
24. For in water work, the in-stream work site will be isolated from river flow and work conducted "in the dry". If potential for sediment generation is identified, a turbidity curtain may also be installed around the downstream end of each project area before starting work. In-stream construction for the abutments will be done in a manner that isolates the stream flow from each abutment as construction occurs. Less than one third of the river width will be obstructed at any point during construction. If in-stream work is required for pier/stone footing removal, the in-stream worksite will also be isolated from river flow and will be conducted in a manner so as not to alter the stream bottom. In-stream work where required will take place during low flow season (prior to September 30). In-stream work and implementation of appropriate sediment and erosion control measures will follow DFO guidance as outlined in the DFO Mitigation Section, and the site will be stabilized on completion.
25. Minimize extent of vegetation cover removal and grubbing. Clearly mark construction boundaries to prevent accidental damage to vegetation.
26. Where vegetation cannot be retained, apply soil covers to erodible areas (granular materials, mulches, tackifier, tarps).

27. Immediately stabilize shoreline or banks disturbed by any activity associated with the Project to prevent erosion and/or sedimentation, preferably through mechanical means such as a coir mat or equivalent and natural re-vegetation by the native seed bank.
28. No seeds containing fertilizers or pesticides are to be used during stabilization effects.
29. Minimize the length of time soils are exposed and complete work in one area before commencing work in another area.
30. If vegetation clearing is scheduled early due to timing windows, grubbing should be delayed until just prior to construction activities, in order to maintain soil stability.
31. Initiate replanting of disturbed areas immediately after construction is completed, where required.
32. Ensure all erosion and sediment control devices are weed free.
33. Maintain and repair all erosion and sediment control structures in a timely manner. If the design of the control measures is not functioning effectively they are to be repaired.
34. The site will be secured against erosion during any periods of construction inactivity or shutdown.
35. Install all erosion and sediment control devices according to Typical Drawings included in ESCP. Typical Drawings must be on site and available at the request of the ESO.
36. Remove accumulated sediments, debris and/or waste prior to removing control measures, and safely dispose of this material at a site licensed to receive it in accordance with all federal, provincial and municipal laws, regulations and guidelines.
37. If there is a serious erosion risk, then use annual grasses such as oats, ensuring these are weed, fertilizer and pesticide free mixes.

Minimum Requirements of the ESCP

38. The minimum requirements of an erosion and sediment control plan include consideration of:
    - Project design and spatial concept of environmental sensitivities (i.e. watercourses, wetlands, steep slopes, etc.);
    - Erosion prevention procedures (i.e. project schedule, minimization of work area, site management, ground cover measures);
    - Sediment control measures (i.e. sediment fences, check dams, sediment traps, etc.) including specifications and Typical Drawings of sediment control structures;
    - Detailed plans for instream works including site isolation measures and project timelines as outlined in the **DFO Mitigation** Section;
    - Water management plans including site control, equipment necessary and proposed dewatering locations;
    - Locations of erosion and sediment control measure application;
    - Monitoring of prevention and control measures and corrective actions (i.e. repairs); and
    - Removal of non-biodegradable materials once site is stabilized.

Emergency Response Plan

39. The general emergency contact for Kejimkujik is 9-1-1.

Spill Response Plan

40. The Prime Contractor is responsible for ensuring that a Spill Response Plan is developed prior to start of work and the plan is subject to approval of the IAO prior to the commencement of construction activities.
41. The Spill Response Plan can be a standalone document or incorporated as an Appendix to the EPP.
42. The Prime Contractor is responsible for ensuring that spill kits sufficient to contain and clean up 110% of the site's largest possible fuel / chemical spill must be retained on site at each location of potential spills and where fuel is stored (sites where equipment is working).
43. The Prime Contractor is responsible for ensuring that all crew members and sub-consultants on site receive a briefing about the Spill Response Plan and are aware of the location and use of spill kits and containment devices.
44. Avoid work in high risk areas, particularly in areas of high water table, steep slopes or in close proximity to streams.
45. Absorbent booms must be immediately available on site during works in and near water.
46. Ensure all construction equipment is free of leaks from oil, fuel or hydraulic fuels. See **General Activities Mitigation** section for the requirements for equipment inspection by the ESO prior to entry to Kejimkujik.
47. The crossing of any waterbody (including wetlands) by construction equipment, or the use of such equipment within waterbodies is strictly prohibited unless prior approval has been confirmed from the ESO.
48. Designate refuelling areas at least 100 m away from any water body. Refuelling activities should not be conducted where run-off could carry contaminants into drainage pathways.
49. Hazardous or toxic products shall be stored off-site and no closer than 100 metres from streams, wetlands, water bodies or waterways in secure areas.
50. Equipment will be stored, maintained and fuelled on a flat, hardened surfaces. Fuel storage and refuelling will be done in accordance with Best Management Practices developed for Parks Canada.
51. Spill kits shall be provided at re-fuelling, lubrication, and repair locations.
52. Dispose of contaminated materials at provincially certified disposal sites outside of Kejimkujik. No treatment of contaminated soils (e.g., bioremediation) is allowed in Kejimkujik. All applicable documentation demonstrating proper disposal will be provided to Parks Canada.
53. If potentially hazardous materials (e.g. cement-based products, sealants or paints) are used on site ensure raw material, mixed compounds and wash water are not released to any watercourse or soils. Secondary containment measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double-lined fuel tanks are required.
54. All gas generators and water pumps require secondary containment. Electric pumps are preferred.
55. Follow all applicable regulations and codes for the management and handling of hazardous waste.
56. The costs involved in a spill incident (the control, clean up, disposal of contaminants and site remediation to pre-spill conditions), shall be the responsibility of the Prime Contractor. The site will

be inspected by the ESO to ensure completion to the expected standard and to the satisfaction of Parks Canada.

57. Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.
58. The PM (Chris Ferguson 902-529-0204) and ESO shall be notified immediately of any spill. In the event of a major spill, Environment Canada oil spill and pollution (24 hr) reporting line (1-800-565-1633) shall be notified immediately.All other work shall be stopped and all personnel devoted to spill containment and clean-up.

Minimum Requirements of a Spill Response Plan

59. The Spill Response Plan must at minimum, include the following information:
    - List of products and materials that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement, sand blasting agents, paint, solvents and hydrocarbons.
    - required equipment on site and location of spill kits;
    - spill prevention procedures (i.e., containment and storage of materials, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products in accordance with all applicable federal and provincial legislation);
    - fuelling procedures, fuel storage;
    - spill response (i.e., containment, clean-up, disposal of contaminated materials, etc.);
    - spill reporting procedure; and
    - up-to-date emergency response contact list including contact information for reporting spills.

Spill Reporting Requirements

60. Immediate spill reports are verbal notifications and must include all available information. Follow-up written spill reports must include the following:
    - Prime Contractor Name;
    - Name and Contact Number;
    - Location and time the spill occurred;
    - Type and quantity of the substance spilled;
    - Cause of the spill;
    - Size of area the spill spread to;
    - Was the spill in water or on land;
    - Does the spill have potential to enter a water body;
    - Detail of immediate action taken to control the spill;
    - Additional actions required or ongoing to control the spill;
    - Any restoration required at the spill site; and
    - Names of Parks Canada representatives that were present at the spill site.

Fire Contingency Plan

61. An emergency fire contingency plan is required for projects where risk of fire exists (e.g. extremely dry conditions, fire season) as requested by the IAO in consultation with the Fire Management Officer.
62. Fires or burning of wastes is not permitted.
63. The Prime Contractor is responsible for ensuring that all crew members and sub-consultants on site receive a briefing about the Fire Contingency Plan and are aware of the location of emergency equipment, such as fire extinguishers.
64. Where an emergency fire contingency plan has been requested, the Prime Contractor should provide, at minimum, the required equipment as defined by Nova Scotia`s *Forest Fire Prevention Regulations* and summarized in the table below
65. The fire contingency plan must at minimum contain the following information:
    - required equipment on site;
    - fire prevention procedures;
    - initial response;
    - fire reporting procedure; and
    - up-to-date emergency response contact list.

Table 2 Adapted from Nova Scotia Forest Fire Prevention Regulations Subsection 6(1)

Required Equipment for Fire Control People Employed at the Site of Operations	**Required Equipment for Fire Control**					
	Shovels	Pails	Axes or equivalent*	Grub hoes or equivalent*	200 gal water tank or bag with hand pump	Motor pump[1] & 305 m 38 mm hose & nozzle[2] or motor pump, portable (910 L) tank & 61 m of 38 mm hose & nozzle[3]
1-2	1	-	-	-	-	-
3-5	2	1	1	1	2	-
6-10	4	2	2	1	2	-
11-20	8	4	4	2	3	1
21-30	12	6	6	3	5	1
31-40	16	8	8	4	8	1
41-50	20	10	10	5	12	1
50+	Refer to the Nova Scotia Forest Fire Prevention Regulations					

1. Minimum 180 L per minute at 690 kPa,
2. Minimum 305 m of suffient hose to be able to reach from an acceptable water source to all areas of the work site.
3. Minimum 345 kPa shutoff pressure capable of reach all areas of the work site.

* A Pulaski = axe + grub hoe

General Activities Mitigation

Construction activities involve the use of laydown/staging areas, equipment operations, storage and handling of hazardous materials. Potential adverse effects include: alteration of vegetation, erosion and sedimentation, constriction for wildlife movements and introduction/spread of non-native vegetation.

66. All employees must attend an environmental briefing with an Environmental Surveillance Officer (ESO) before beginning work at the site to review and explain the mitigations that are conditions of the project approvals. Employees must attend this briefing before beginning their work at this site.

67. All equipment and vehicles will be made available for inspection by the ESO on arrival to Kejimkujik. The Prime Contractor will give 48 hours notice and schedule an equipment inspection with the ESO. Vehicles found leaking hazardous materials will be ordered off-site.
68. All activities on the premises shall be conducted in compliance with national and provincial applicable environmental regulations and in accordance with accepted environmental practices.
69. Any new development or major changes to proposed project plans and/or scheduling will be reported to the ESO immediately to identify appropriate revision to mitigation measures as required by the *Canadian Environmental Assessment Act* (CEAA).
70. A copy of the mitigation measures shall be present and available at the work site.
71. An experienced site inspector/monitoring team is to be engaged to note environmental concerns early and apply adaptive management to mitigate them immediately. Team should include the Parks Canada ESO.
72. Environment and Climate Change Canada and other researchers and monitoring staff, including volunteers shall be advised by the PM of the Project and how it may affect their ability to access the hydrometric station and backcountry Ecological Integrity monitoring sites.
73. Contractor must ensure any fill or rock rip-rap used during construction and bridge replacement activities is clean and free of non-native species to avoid accident introductions into Kejimkujik. Any material used will be subject to inspection by the ESO.
74. Confine construction activities to hours set below to reduce sensory disturbance to wildlife and visitors.
75. Time activities to minimize vehicle conflicts on access roads (i.e. where possible, schedule activities so that equipment operations does not disrupt traffic flow or result in wildlife collisions).
76. All Parks Canada designated speed limits apply to construction vehicles. Additional speed restrictions may be required to protect wildlife and visitor safety.

	Required	**Location(s)**	**Notes**
Additional Speed Limits	✓ (May be required)	Along Eel Weir Road	In the event that the ESO determines that construction traffic is adversely impacting wildlife, additional speed restrictions may be applied
Work Hour Restriction	✓	Bridge and Road	Construction activities will be restricted to **daylight hours only** (from one half hour after sunset to one half hour before sunrise) to avoid disturbance during periods when bats are most active.

Timing Windows

77. Timing windows to reduce erosion, maintain compliance with the *MBCA*, *Fisheries Act*, *SARA* and may be part of best practices to reduce erosion and environment effects. See detailed mitigations for timing windows under Erosion and Sediment Control and Vegetation Removal sections where these activities are part of the project works. A summary of these restrictions is made below.
78. Time the Project to minimize interactions with sensitive fisheries windows (October 1st to May 31st), Blanding's Turtle and Snapping Turtle nesting activities (delay project start to July 1st). For more

detailed information on the species specific mitigation requirements during construction activities refer to the **Species at Risk Mitigation** Section.

Consideration	Restricted Window	Notes
Migratory Bird Breeding Period	April 10 to August 13	See **Vegetation Removal Mitigation** Section for detailed information under *Wildlife Timing Windows*
Barn Swallow Activity Period	May 1 to August 31	See Section XXX for detailed information
Bat Maternity Roost Activity Period	April 1 to August 31	See **Vegetation Removal Mitigation** Section under *Wildlife Timing Windows* and **Species at Risk Mitigation** for detailed information
Bat General Activity Period	April 1 to October 31	See **Vegetation Removal Mitigation** Section under *Wildlife Timing* Windows and **Species at Risk Mitigation** for detailed information
Sensitive Fisheries Windows	October 1 to May 31	See **DFO Mitigation** and **Works Over or Immediately Adjacent to Water** Sections for detailed information.
Blanding's and Snapping Turtle Activity Period	May 15 to July 15 (Blanding's turtle nesting) May 15 to July 1 (snapping turtle nesting) August 15 to November 30 (hatchling emergence)	See **Species at Risk Mitigation** Section for detailed information
Eastern Ribbonsnake Activity Period	April 1 to May 31 (emergence from hibernaculum) September 1 to October 31 (retreat to hibernaculum)	See **Species at Risk Mitigation** Section for detailed information
Tree Trimming (Limbing) Restricted Period	May 1 to October 31	See **Vegetation Removal Mitigation** Section for detailed information

Cultural Resources

79. Due to the high cultural value of the project area archaeologists and Cultural Resource Management professionals will be on-site to monitor construction during excavation, abutment and cribwork removal and/or as determined by the Cultural Resource Manager (CRM) to mitigate any impacts on archaeological resources.
80. Follow additional mitigations outlined in the *Cultural Resource Impact Assessment* and *Archaeological Overview Assessment* (*CRIA* and *AOA*; Appendix 1).
81. Digging/excavations shall not commence until a Parks Canada archaeologist or designate has provided approval.

82. During any digging/construction operation, should any archaeological/cultural resources be discovered, work shall cease immediately and findings shall be reported to the PM and the CRM (Keith Mercer [902-426-1992], or the ESO. Work shall resume only upon authorization from the CRM.

Work Site Conditions/Staging/Laydown

83. To minimize vegetation-clearing activities and ground disturbance staging will be located within the existing parking lot and on hardened areas where possible.
84. A properly contained staging area set back at the maximum available on site distance from the water's edge (30 meter minimum) shall be identified for the storage of materials, liquid products (in a secure area on impermeable pads) and equipment.
85. Delineate work zone; clearly mark the limits to active construction, sensitive features and the access and egress locations.
86. The Prime Contractor is responsible for security and safety of the work site.
87. If contamination is found within the work site, cease work immediately and if necessary, implement Emergency Response Plan.
88. All site personnel will transit to worksite from out of park location in shuttle vehicles to a) reduce number of vehicles on limited site footprint b) limit damage to vegetation and wildlife and c) limit traffic volume and associated road wear and dust. Parking of personal crew vehicles will be limited to two crew vehicles to reduce the risk of roadkills and impacts to vegetation along the road.
89. All site personnel must adhere to Parks Canada posted speed limits. Speed reductions may be warranted if deemed appropriated by an ESO.

Equipment Operation

90. Equipment movements shall be restricted to the designated footprint of the construction area and existing access road.
91. Equipment should be inspected daily for fluid/fuel leaks and maintain equipment in good working order.
92. Operate machinery on land above the high water mark, on ice, or in a manner that minimizes disturbance to the banks and bed of any water body.
93. All small equipment (i.e. chainsaws, mowers, etc.) should be kept in good working condition and free of oil and fuel leaks.
94. Fueling of chainsaws will take place outside of riparian areas and sensitive features.
95. More information regarding mitigation measures for traffic (i.e. shuttle) and operation considerations pertaining to species at risk can be found in the **Work Site Conditions/Staging/Laydown** and **Species at Risk Mitigation** Sections, respectively.

Site Clean-up/Waste Disposal

96. Clean tools and equipment at an appropriate off-site facility to prevent the release of wash water that may contain deleterious substances.
97. Sweep up loose material or debris. Any material that may pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site.

98. No construction waste (sawdust, soil, vegetation, debris, pumped water, hydrocarbon, chemicals, cement, asphalt, etc.) shall be allowed to enter an aquatic habitat or be deposited on undisturbed lands unless the said lands are part of the project works and approved for temporary waste storage.
99. Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried or discarded at the construction site or elsewhere in Kejimkujik. These wastes shall be contained and removed in a timely and approved manner and disposed at an appropriate waste landfill site located outside Kejimkujik.
100. Construction waste storage containers, shall be emptied when 90% full. Waste containers will have lids, be wildlife proof if containing attractants, and waste loads shall be covered while being transported.
101. Sanitary facilities, such as a portable container toilet, shall be provided by the contractor and maintained in a clean condition. Sanitary facilities must be in good condition, and located away from sensitive resources including water bodies at a location approved by an ESO.
102. Waste generated, including creosote treated timber, will be disposed according to regulations (i.e. Nova Scotia *Solid Waste-Resource Management* Nova Scotia *Construction and Demolition Debris Management* Regulations) or under the advice of the ESO and PM. Creosote treated timber is not to be disposed of on Parks Canada lands.

Wildlife Observations and Encounters

103. Notify the ESO immediately of any dens, litters, nests, carcasses (road kills or other), wildlife encounters, or carnivore (bears or coyotes) observations on or around the worksite.
104. Should a nest or den be discovered, work shall cease immediately and findings reported to the PM and ESO. Proper mitigation will be determined by the ESO in consultation with appropriate regulations. Work shall resume only upon authorization from the ESO.
105. If wildlife is observed at or near the work site, allow the animal(s) the opportunity to leave the work area to the surrounding habitat and away from areas of potential conflict.
106. If potentially dangerous wildlife (i.e. bear, coyote) persistently enter the work area or display aggressive behaviour, the contractor will immediately stop work, notify Parks Canada staff and safely evacuate the area.
107. Secure all materials that might attract wildlife (i.e. petroleum products, human food, recyclable food and drink containers and garbage).
108. All garbage/debris kept on site more than 1 working day must be free of food matter that may attract and feed wildlife.
109. All garbage containing food matter or residue must be left in sealed containers or vehicles and must be transported off site daily.
110. No feeding, baiting or luring any wildlife (include bears, small mammals, birds); do not approach or harass wildlife in any way. Notify the ESO immediately if wildlife obtain garbage or human food. If wildlife get into attractants that have been intentionally or accidently left out, individuals or the contractor could be charged under the *Canada National Parks Act* (CNPA) Regulations.
111. In the event that wildlife mortality or harm as a result of construction activities or traffic, the ESO must be verbally notified immediately and must include all available information. If it is

determined that wildlife was intentionally harmed, individuals or the contractor could be charged under the CNPA Regulations. Follow-up written reports must include the following:

- Prime Contractor Name;
- Name and Contact Number;
- Location and time of occurrence;
- Cause of wildlife mortality or harm;
- Detail of activities leading up to occurrence and any corrective actions to minimize re-occurrence;
- Names of workers or Parks Canada staff on-site during occurrence, if applicable

Air Quality Mitigations

112. The effects on air quality and noise from construction activities are generally controlled by good construction practice and proper equipment function which involves the use of well-maintained heavy equipment and machinery, preferably fitted with fully functional emission control systems/muffler/exhaust baffles, engine covers, etc.
113. Diesel equipment used on the Project shall be fuelled with low sulfur diesel fuels and shall conform to local emissions requirements.
114. Minimize idling of engines at all times
115. Schedule dust generating activities during periods with lower wind speeds.
116. Ensure fine materials being transported are covered and protected.
117. Noise and vibration from construction will be temporary during the construction period only.
118. Monitor dust conditions visually and take actions to suppress dust as necessary. Take whatever measures necessary to ensure that dust and debris from activities do not enter any surface waters or escape beyond the work area. Mitigation measures include; termination of operations during period of high wind, the use of low dust generating technologies, vacuuming of surfaces to remove dust and debris and the use of temporary barrier or enclosures; calcium chloride shall not be used as a dust suppressant due to the proximity of the work site to water. Any other treatment options must be approved by the ESO prior to implementation.
119. Reduce dust from roadway by observing 20km/hour speed limit and minimizing traffic volume by moving workers via designated shuttle vehicles.

Vegetation Removal Mitigation

Project activities that may alter or remove vegetation include mowing, brushing and landscape maintenance activities, non-native species management, fire hazard reduction and prescribed burn operations and pre-construction site clearing. Grubbing (stump and root removal may be required to prepare the ground surface for other activities.

120. Minimize vegetation and tree removal within the surveyed project footprint. All activities are to be under the supervision of a Parks Canada biologist. No tree cutting or vegetation removal beyond the surveyed project footprint.
121. The ESO must be made aware of any vegetation removal requirements and prior to activities, the ESO must approve the removal area and assess the area for potential impacts (i.e. birds and/or species at risk), if deemed appropriate.

122. Black Ash, a species listed under Nova Scotia's *Endangered Species Act* is located in Kejimkujik along the Eel Weir Road. All vegetation removal activities shall ensure that no ash species are incidentally or accidentally damage or destroyed in consultation with the Parks Canada biologist or ESO.
123. Every reasonable effort will be made to avoid introducing invasive weeds. All equipment, materials, and footwear will be checked and cleaned of plant seeds, roots, and soil that could contain plant parts prior to arrival in the Park.
124. If previously unidentified sensitive features are found during construction immediately stop work and notify the ESO (i.e nest).
125. Vegetation removal should be limited to the minimum area required for safe operations during construction or to meet the objects of clearing activities.
126. Minimize full removal and retain vegetation when possible to reduce erosion.
127. Retain 30 metre vegetated buffer around sensitive features; where disturbance is unavoidable < 30 m, a restoration plan is required and the ESO must be on site during disturbance activities.
128. Do not deposit debris in water bodies.
129. Limbing must be completed using the appropriate equipment to minimize damage to the tree (i.e. using a hoe bucket to limb trees is not appropriate as it can cause the bark to tear and can make the remaining tree vulnerable to disease and rot).
130. Tree Limbing should not be completed from **May 1 to October 31** to minimize the impact to growing trees.
131. To maintain appropriate timing window restrictions, vegetation removal activities should be completed by Parks Canada.

Wildlife Timing Windows

All vegetation has the potential to provide habitat for wildlife. Applicable timing windows are listed under the **General Activities Mitigations** Section.

Migratory Birds

132. Migratory birds, their nests and eggs and nestlings are protected under the *Migratory Birds Convention Act*, 1994 (MBCA). Project works or activities (i.e. noise) are potentially disruptive activities to birds, their nests or eggs or nestlings and should be avoided at key locations or during key periods such as breeding or times of high use such as migration and/or feeding. These locations and periods vary by region and by species. Conduct activities outside of the nesting season for migratory birds known to breed in the area or during sensitive migration/staging, hibernation or nursing periods. See Appendix 5 on regulatory guidance for further detail on the MBCA and *Species at Risk Act* (SARA).
133. The regional migratory bird nesting period in Kejimkujik is **April 10 to August 13**. Avoid all vegetation removal during this time. If vegetation removal is scheduled to occur within this period or the ESO determines construction activities can potentially impact migratory birds near the construction site, the ESO may complete pre-construction surveys for nesting migratory birds.
    - Nesting surveys must be completed within 7 days of the Project activities.
    - There is a **risk of delays** to Project activities due to the presence of nesting migratory birds.

- If a nest is found during the pre-construction surveys, the vegetated area will be left intact and a suitable sized protected buffer will be established until the young have left the nest and vicinity. Size of the buffer is species dependent, to be determined by the ESO in consultation with federal regulatory guidance.

Bats

134. Vegetation clearing and construction activities can negatively impact bats in spring and summer. Trees can be used by bats as maternity roosts and active roosts would be considered residences for bats under SARA. Bats generally use the same trees. The timing windows for avoidance of vegetation removal in habitat likely to support roosting bats is **April 1 to August 31.** If vegetation removal is scheduled to occur within this period or the ESO determines construction activities can potentially impact Endangered bat species, the ESO may complete pre-construction surveys for bat presence and roosts.
    - Surveys must be completed within 7 days of Project activities.
    - There is a **risk of delays** to Project activities due to the presence of bat roosts.
    - If a potential bat roost is located, a site-specific mitigation strategy must be developed dependent on the type of roost and species present, to be determined by the ESO in consultation with federal regulatory guidance.

Amphibians and Reptiles

135. Vegetation removal can negatively impact amphibians and reptiles (turtles and snakes), especially during breeding, transformation and important movement periods within and close to wetlands, watercourses and water bodies.
    - If vegetation removal is scheduled to occur during non-frozen conditions, the ESO will complete an amphibian and reptile ground search immediately prior to vegetation removal activities at locations where potential interactions with species could occur.

Other Timing Considerations

136. Where ground disturbance accompanies vegetation removal, time activities to minimize soil handling, soil compaction and erosion potential. Avoid extreme dry windy and wet conditions.
137. In areas of weed infestations, reduce weed spread through vegetation removal prior to seed set.

Tree Removal

138. Tree and shrub cutting must be completed outside the migratory bird breeding period (**April 10 to August 13**) in order to minimize impacts of breeding birds. Please refer to ***Wildlife Timing Windows*** above for more information.
139. Safety of workers and the public is the first priority for all tree removal operations. In consultation with the ESO, felling of snags or hazard tress outside the designated work area may be permitted, where required for safety of workers.
140. Unless approved by the ESO tress are to be felled away from sensitive features, such as watercourses, wetlands, riparian zones or ecological features.

141. Ensure tree limbs/stumps are flush cut as close to the ground or stem as possible. Root systems shall be left intact.
142. Fallers should assess each tree individually for critical wildlife features such as nests or cavities. Notify ESO if unexpected features are identified.
143. Mechanical falling can be used where it is determined that machines will cause minimal site degradation, due to suitable soil conditions, or on a site that is to be developed for future access or facilities.
144. Logs or other salvage materials are to be conveyed to and placed at a storage site without spread of debris or damage to other standing trees or landscape resources outside the marked clearing or storage limits. They shall not be skidded through wetlands, watercourses or water bodies.
145. Preserve identified wildlife trees.

Disposal of Vegetation Debris

146. Where practicable, as much of the coarse woody debris and organic matter from tree removal should remain on the site and be used in restoration. The quantity and distribution of slash remaining must not impede wildlife movement, choke out native vegetation, create a significant fire hazard or cause excessive nutrient flush.
147. All debris that is not being disposed of on-site must be removed as soon as possible from the Project footprint, by transporting off-site for disposal.
148. If temporary storage is required, store debris on already disturbed areas to minimize footprint of disturbance.
149. All vegetation containing non-native species will be bagged and removed off-site to a disposal facility.
150. If removal is not feasible a chipper may be used. Chip depth must not exceed 5 cm, as to not cover underlying vegetation, prevent new native seedlings from sprouting, and cause soil/seed bank sterilization.

Soil Handling Mitigation

To successfully complete restoration of disturbed areas, and protect areas from erosion, proper soil handling and backfilling procedures must be followed. Post excavation and stripping soil and vegetation restoration mitigations should be applied.

151. All soil handling activities require consideration of erosion and sediment control. See **Erosion and Sediment Control** section.
152. No soil stripping shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest.
153. Stripping close to any watercourse, water body or wetland shall employ methods to ensure materials are not pushed, do not fall or erode into the water or wetlands.
154. Soil must in stripped in accordance with the **ESCP**. Key components for soil stripping are:
    - Minimize soil movement and handling at all times.
    - Strip topsoil under dry conditions, whenever possible.

- In the event of a work program shutdown during inclement weather (i.e. winter conditions unfavourable for construction, heavy rain events, construction delays, etc.) contingency planning for bared soils or excavated material stockpiles is required.

Topsoil Salvage

155. Salvage topsoil at all excavation sites for restoration purposes.
156. Prevent loss of topsoil through wind or water erosion
157. Usually the upper 15 cm of soil, below the sod layer if present, is considered topsoil, where top soil depths exceed 15 cm then salvage the entire depth of topsoil. Where depths exceed 15 cm, salvage the upper 15 cm separately from the remaining where the seedbank is filled with desirable native seed material.
158. The ESO may designate separate storage of topsoil zones whereby clean topsoil are stored separately from weed contaminated soils.
159. Allow space for separate storage of topsoil and spoil; where space is available, separate stored topsoil from spoil by at least 1 m. Use appropriate material (i.e. geotextile) to separate soil components where space is limited.

Excavation

160. All trenches or ditches left unattended overnight must be fenced or covered to prevent wildlife entrapment or provide appropriate egress for wildlife.
161. Workers must inspect for trapped wildlife prior to backfilling. If a trench has been left open for > 24 hours, an ESO must be notified and time allowed for the ESO to complete additional inspection for trapped wildlife such as salamanders.
162. Materials shall be placed at storage sites or on the grade without spillage outside the working limits. Any material inadvertently falling outside the work limits is to be removed promptly in a manner that does not damage trees or vegetation.
163. Minimize changes to the ground surface that affects its infiltration and runoff characteristics and maintain/re-establish effective surface drainage on completion of the Project.
164. All disturbed soil shall be stabilized by backfilling and compacting excavations as soon as possible following completion of work. Optimize degree of compaction to minimize erosion and allow for re-vegetation and use of abutment shoulders by nesting turtles. The establishment of native plant root structures will provide aeration to compacted soils.
165. To limit over compaction, use equipment which minimizes surface disturbance including low ground pressure tracks/tires, blade shoes and brush rake attachments.
166. All excavations will remain free of water.
167. An archeologist must monitor excavation activities as outlined in the CRIA and AOA (Appendix 1) and digging shall not be permitted until approved by an archeologist
168. A wildlife monitor must be on-site during excavations activities at known turtle nesting locations. See the **Species at Risk Mitigation** Section for more detailed information.

Dewatering

Dewatering will allow for sites to be effectively dry during construction, reducing the impact of sediment laden water entering fish bearing waters.

169. A site-specific dewatering plan, to be included with the Environmental Protection Plan, is required to be provided before commencing a pump-out sump to dewater excavation sites with specific details on how and where water will be discharge.
170. Site specific mitigations may be required depending on the conditions of the discharge area such as freezing conditions operations, overflow avoidance, decanting and settlement pond restoration.
171. Water containing suspended materials shall not be pumped into any watercourse, drainage system or on to land, except with the permission of the ESO
172. Soil and vegetation erosion protection is required for water pumped on to land.

Works Over or Immediately Adjacent to Water

Works over or immediately adjacent to water include activities associated with the maintenance and repair of bridge structures located adjacent to water. Activities could include the cleaning and painting of structures as well as the repair, rehabilitation, and replacement of elements including decks, railings, abutments, and bearings. Works may include concrete works, timber truss, abutment and piling maintenance. These activities help ensure bridge structures remain structurally sound and safe for public use.

Timing of Works

173. Time work in water to respect **timing windows** to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they fed.
174. Work in the water is to be completed prior to September 30.
175. Conduct in-stream work during periods of low flow to further reduce risk to fish and their habitat or to allow work in water to be isolated from flows.
176. Bridges can provide nesting and roosting habitat for wildlife including barn swallows and bat species. See timing windows under the **General Activities Mitigation** Section. If work must occur within restricted timing windows, the ESO may complete pre-construction surveys to determine if activities may proceed. Additional mitigation for species can be found in the **Species at Risk Mitigation** Section.

General Mitigation for In-water Work

177. There is to be no fording of the river bed.
178. The piers, rock apron and abutments are to be removed in their entirety while minimizing excavation of the river substrate.
179. Ensure any fill or rock rip-rap to be used during construction and bridge replacement activities is suitably clean to ensure no accidental introductions of non-native species into Kejimkujik.
180. Keep a copy of the letter of advice provided by Department of Fisheries and Oceans Canada (DFO) on site and follow the prescribed advice (See Appendix 6).

181. Refer to the water mitigation section above and **DFO Mitigation** Section for further mitigation measures on requirements for working "in-the-dry", appropriate erosion and sediment control measures to be included in the ESCP and potential impacts to fish species.
182. If work schedule requires working in the rain, the area of work must be isolated with appropriate sediment controls installed to prevent release of sediment-laden water or any other deleterious substances into surface waters.

Water Withdrawal Mitigation

Construction often requires the use of water; many common methods of excavation and site isolation require dewatering. Temporary, short-term water withdrawal provides an efficient uncontaminated water source for project activities.

183. Diversion of river water is required so that bridge removal and construction can be carried out in the dry.

Permits

184. All water withdrawal requires a Restricted Activity Permit issued by the IAO or designated Parks Canada staff.

Equipment Cleaning

185. All hoses, pumps, intake hoses, or equipment from outside of Kejimkujik must be clean and dry on arrival and require approval and inspection by the ESO prior to use in Kejimkujik.
186. Do not bring equipment into Kejimkujik from areas that have known infestations of aquatic invasives.
187. Thoroughly clean water trucks, hoses, pumps and intake hoses using clean HOT WATER with as much pressure as possible prior to entering Kejimkujik.
188. If last use of equipment was out of province, allow hoses, pumps and intake hoses to dry completely and then remain dry (ideally for > 20 days).

Water Withdrawal

189. Water withdrawal should follow the 10/90 rule which allows for up to 10 % of the stream flow to be withdrawn, as long as the stream flow does not fall below 90% exceedence flow.
190. Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish, amphibians and/or reptiles. Entrainment occurs when a fish or amphibian is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish, reptile or amphibian is held in contact with the intake screen and is unable to free itself.
191. For more detailed information regarding fish protection, relocating fish by a qualified professional, screen and velocity requirements refer to the **DFO Mitigation** Section.

Dewatering

192. A site specific dewatering plan is required to be provided before commencing a pump-out sump to dewater excavation sites

Pressure Treated Wood Mitigation

193. For proper disposal of the treated wood found within the existing Mersey Bridge, refer to *Parks Canada Treated Wood Management Guide*; Appendix 7. Proper disposal should ensure:
    - Never dispose of treated wood by burning;
    - Do not compost scraps, wood chips or sawdust from treated wood;
    - All remaining scraps, cuttings, wood chips and sawdust must be collected efficiently and in a timely manner; and
    - Re-use treated wood to the extent possible

194. Waste generated, including creosote treated timber, will be disposed according to regulations (i.e. Nova Scotia *Solid Waste-Resource Management* and Nova Scotia *Construction and Demolition Debris Management* Regulations) or under the advice of the ESO and PM. Creosote treated timber is not to be disposed of on Parks Canada lands.

195. Pressure Treated Wood will be utilized in accordance with Parks Canada Guidelines (Section 5.5 of the Treated Wood Management Guide provides guidance on this subject; Appendix 7) as follows:
    - Permitted products (non-aquatic): Wood treated with ACQ, Borate, CA-B, Copper Naphthenate and/or Zinc Naphthenate is permitted under the following conditions:
        - o documented rationale that there are no viable alternatives to the use of treated wood; See Appendix 7 in the Treated Wood Management Guide for a template
        - o the use is permissible under the Pest Control Product Act 2006 (i.e. full compliance with the current relevant pesticide labels issued under the act);
    - The treatment and use are compliant with the CSA O80 series of standards
    - Risk mitigation measures to minimize the leaching of the preservative are implemented.
        - o The contractor can store treated wood provided amounts are less than 55 m^3 for less than 90 days and the following mitigations are followed:
            1. minimize on site storage time
            2. Store on flat ground (slope less than 10%) more than 10 m from high water mark
            3. elevate to avoid contact with water runoff
            4. provide absorbent base (ex. wood chips)
            5. place tarpaulin or weather resistant material over wood
            6. inspect storage area for evidence of leaching treatment chemicals

Drilling Activities Mitigation

196. For drilling into riverbeds:
    - Ensure the pipe is clean of all contaminants before it is set in place;
    - Ensure the pipe around the drill bit extends far enough above the water level to prevent material from spilling out;
    - Leave the pipe in place for enough time to let the majority of the disturbed material settle in place.

197. If drilling fluids are required, only fresh water shall be used for fluid preparation. Drilling fluids shall comply with industry standards and practices and shall be applied and used as

recommended by the manufacturer. No toxic or hazardous substances are to be added to the drilling fluid at any time. Drilling fluid should be biodegradable, and it should be contained, removed to an off-site location and recycled at an approved location. The quality of the drilling fluid shall be maintained by the driller to prevent contamination of all water-bearing and potential water-bearing formations in the bore hole.

198. Log when the drilling starts and stops and provide logs to Parks Canada in the event of inquiries from members of the public.
199. Install an absorbent spill sock around the perimeter of all vertical borehole drilling sites to capture concrete materials, waste water and/or slurry/drilling fluids and to prevent any by product materials from entering the watercourse either directly, or indirectly. Use:
    - vacuuming equipment as required;
    - concrete slurry water filtration; and/or
    - slurry separator/slurry flocculation technology.
200. Stabilize dirt waste materials to prevent them from entering the watercourse. This includes covering spoil piles with biodegradable mats or tarps as well as capturing the top portions of sediment in a leak proof garbage container.
201. Prior to commencement of micropile drilling, debris and dust control measures will be installed and maintained to ensure concrete dust/fines as a result of the activities do not enter the watercourse. All soil cuttings and purged groundwater collected during drilling is to be disposed by the operator outside of the park in accordance with the applicable provincial regulations. Wastes should be disposed of in a timely manner once the field work is complete.
202. When coring, clean water will be used and coring water will be pumped into a re-circulating tank.
203. All lubricants used on drill pipe, bits, casings or other down-hole applications shall be free of any toxic or harmful contaminants.

Concrete Handling Mitigations

Concrete is a common construction material. Its use ensures longevity of the infrastructure and safety for public use. One litre of concrete wash water or leachate in 1000L of water will kill fish. Cement-based products including grouts and concrete are lethal to fish and many other aquatic organisms. Raw product or leachate entering a watercourse will alter water chemistry, making it more basic or alkaline.

204. All concrete and concrete leachate is alkaline and highly toxic to fish and other aquatic life, ensure that all works involving the use of concrete, grout, cement, mortars, and other Portland cement or lime-containing construction materials will not deposit, directly or indirectly, sediments, debris, grouting, concrete, concrete fines, wash or contact water into any watercourse.
205. All concrete, sealants, or other compounds shall be used according to the appropriate Product Technical Data Sheet, stating guidelines and methods for proper use, and provided by the manufacturer of the product.
206. Surplus concrete is to be returned to the batching yard.
207. Water contaminated in the placing of cement and curing of concrete shall be contained and removed from the site to an approved disposal facility.
208. The concrete batching plant must be operated pursuant to applicable dust, air emission, and water quality control regulations.

209. Temporary concrete washout facilities shall be located a minimum of 100 m from watercourses, water bodies or wetlands.
210. Temporary concrete washout facilities shall be temporary pit or bermed areas constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
211. Wood stakes and sandbag materials can be used to construct temporary containment walls or "barriers".
212. Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material.
213. The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.
214. Washout of concrete mixer trucks is not permitted in Kejimkujik.
215. Wash concrete from mixer truck chutes into approved concrete washout facility or collect in an impermeable bag for disposal.
216. Pump excess concrete in concrete pump bin back into concrete mixer truck.
217. Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and properly disposed of off-site.
218. Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per federal and provincial regulations.

Water Quality Mitigation

219. Rock material from the abutments, piers and rock aprons should be used on-site if possible. The rocks are not to be reused in another aquatic location.
220. All rock material that will be used for the abutments must be free of excessive fines, clean, non-ore bearing, non-toxic material (i.e. free of fuel, oil, grease and/or other contaminants) from a provincially approved, non-watercourse source, and approved for use in freshwater projects.
221. If run-off water becomes turbid, change work methods and revisit sediment control practices to reduce turbidity levels. Excessive sedimentation can lead to shut downs and delayed construction schedules. The costs involved reducing sedimentation and down time associated with shut downs shall be the responsibility of the contractor. The site will be inspected to ensure completion to the expected standard and to the satisfaction of Parks Canada.
222. Risks to water quality from erosion and sedimentation must be included with the **ESCP** (Refer the **Erosion and Sediment Control** Section). Additional sections within the BIA are also applicable to water quality issues (i.e. Equipment Operation, Vegetation Removal, Soil Handling, Works Over and Immediately Adjacent to Water, Drilling Activities, Concrete Work, etc.).

Species at Risk Mitigation

For more information about regulatory guidance for SARA refer to **Appendix 5**.

Blanding's and Snapping Turtles

Construction activities and construction traffic could negatively impact Blanding's and/or snapping turtles during active periods. Applicable timing windows are listed under the **General Activities Mitigations** Section for both species.

223. Blanding's turtles are known to nest adjacent to the Eel Weir Road and have been documented using along the Eel Weir Road to move between nesting and overwintering/foraging sites. The Blanding's turtle restricted activity period for nesting is **May 15 to July 15**. To minimize disturbance to nesting turtles, completing work outside this period would be recommended.

224. If work must be completed during the Blanding's turtle nesting activity period to facilitate working during periods of low water in fish-bearing watercourses, the following mitigation must be applied:

- Parks Canada staff and volunteers will conduct spring surveys at overwintering sites and fit adult female turtles with radio transmitters to determine location and movement of nesting turtles;
    - The ESO will consult with Parks Canada staff and volunteers and should it be determined that spring surveys have not adequately tracked movement of Blanding's turtles to minimize risk of road mortality along the Eel Weir Road, there is a **risk of delay** until it has been determined that impacts by vehicle movement and/or construction activities can be avoided or additional enhanced mitigation measures can be developed
- Parks Canada staff and volunteers will monitor nesting turtles and protect any applicable nests along Eel Weir Road prior to the commencement of construction activities;
    - The ESO will consult with Parks Canada staff and volunteers and should it be determined that nesting activities are delayed, there is a **risk of delay** until it has been determined that impacts can be avoided or additional enhanced mitigation measures can be developed
- No construction activities, including staging or delivery of materials are to commence prior to July 1 to avoid interactions with Blanding's and snapping turtles;
- A qualified wildlife monitor must be on-site during restricted activity periods (i.e staging events and movement of construction traffic);
- To minimize vehicle conflict on the Eel Weir Road, all site personnel will transit to the worksite from an out of park location in shuttle vehicles;
- All construction vehicles, including those transporting construction material to the staging area, must be escorted or given permission to proceed to and from site by a qualified wildlife monitor;
- Operators of staging vehicles or shuttle vehicles must attend a pre-mobilization meeting with the ESO and wildlife monitor to understand potential impacts and required compliance of mitigation;
- If it is determined that activities are causing too much undue stress to Blandings or snapping turtles, delivery of material or construction activities must cease until a time when potential impacts can be minimized;

225. The restricted activity period for Blanding's Turtle hatchlings is **August 15 to November 30.** To minimize disturbance, hatchlings are to be moved by Parks Canada staff if they are within 50 m

of Eel Weir Road. Appropriate permits must be obtained by wildlife monitors for the handling of a SARA listed species, should it be determined by the IAO that it is required.

226. Snapping turtles are known to nest at the Mersey River Bridge. The restricted activity period for nesting snapping turtles is **May 15 to July 1.** The ESO and Parks Canada staff are to determine appropriate mitigation measures prior to the nesting period (i.e. deter nesting or move nests).
227. If nest re-location is required, the ESO and Parks Canada staff is to coordinate with volunteers to move the eggs laid in snapping turtle nests as soon as possible after they have been laid, which is expected to occur in mid/late June. A re-location site must be identified in early spring prior to the breeding season.
228. Once re-located, the snapping turtle nests will be protected by enclosures to minimize risks of potential predation and to assist in achieving management objectives for snapping turtles as outlined in Parks Canada's *Multi-species Action Plan for Kejimkujik National Park and National Historic Site of Canada [Proposed]* (Parks Canada 2016a).
229. Nests will require follow-up monitoring, as directed by the ESO, until hatchlings have emerged.
230. A qualified wildlife monitor must be on-site at the commencement of construction activities if the ESO has determined that nesting activities have been delayed, to monitor for nesting snapping turtles
    - Should a nesting snapping turtle be observed, construction activities will be halted until the nesting activities have been completed and Parks Canada staff and/or volunteers have been able to remove the nest to the identified re-location area. Work shall resume only upon authorization from the ESO
231. A qualified wildlife monitor must be on-site during excavation activities in areas of known nesting, in case additional snapping turtle nests are unearthed.
    - Should a nest be discovered, construction activities shall halt immediately and the ESO must be notified. Proper mitigation will be determined by the ESO in consultation with appropriate regulations. Work shall resume only upon authorization from the ESO.
232. During excavation, the road material will be stockpiled and reused on the shoulders of the road to re-create suitable snapping turtle nesting areas. Ideally this material will be compacted to less than 95% to allow easy turtle excavation
233. Conversely, the roadbed will be compacted to a maximum degree and covered with a suitable material that will inhibit nesting of future snapping turtles on the roadbed (i.e. honeycomb matting).
234. Vehicles are required to follow the Parks Canada posted speed limit along Eel Weir road and watch for and avoid turtles. Speed limit reductions may be required as determined by the ESO should conflicts with wildlife occur.

Eastern Ribbonsnakes

Construction activities and construction traffic could negatively impact Eastern ribbonsnakes during active periods. Applicable timing windows are listed under the **General Activities Mitigations** Section for this species.

235. Visual monitoring for ribbonsnakes will be carried out by a qualified wildlife monitor along the Eel Weir Road and at the construction site. An initial survey is to be conducted by a member of the Eastern Ribbonsnake recovery team along with the ESO.
236. Regular informal site surveys are to be carried out by the ESO.
237. If a ribbonsnake is observed at the construction site, work is to be halted and the ESO is to be notified immediately if work cannot continue without disturbing it.
238. If monitoring of the construction site indicates that the area is frequently used by Eastern Ribbonsnakes, the principles of adaptive management should be applied and the frequency of monitoring and types of mitigation measures are to be re-evaluated.
239. The Eel Weir Road is used by Eastern ribbonsnakes to retreat to overwintering grounds. During active periods (**September 1 to October 31**) when there is a higher risk to impacts from vehicles, a qualified wildlife monitor will be on-site.
    - To minimize vehicle conflict on the Eel Weir Road, all site personnel will transit to the worksite from an out of park location in shuttle vehicles;
    - All construction vehicles must be escorted or given permission to proceed to and from site by a qualified wildlife monitor;
    - Operators of construction vehicles must attend a pre-mobilization meeting with the ESO and wildlife monitor to understand potential impacts and required compliance of mitigation;
    - Vehicles are required to follow the Parks Canada posted speed limit along the Eel Weir Road and watch for and avoid snakes. Speed limit reductions may be required as determined by the ESO should conflicts with wildlife occur.

Barn Swallows

Construction activities and construction traffic could negatively impact barn swallows during active periods. Applicable timing windows are listed under the **General Activities Mitigations** Section for this species.

240. Barn swallows have been known to nest under the Mersey River Bridge. The barn swallow restricted activity period is **May 1 to August 31**. To minimize disturbance to nesting habitats, completing work outside this period would be recommended.
241. If work must be completed during the barn swallow activity period to facilitate working during periods of low water in fish-bearing watercourses, the following mitigation must be applied:
    - It is the responsibility of the Parks Canada PM to ensure methods to deter barn swallows from nesting on the bridge be installed **prior to April 15;**
    - Methods such as netting or geotextile fabric, must be of suitable size to ensure swallows or other species cannot become entrapped or entangled and approved by the IAO;
    - Prior to installation of netting, old nests should be removed (only if **no** signs of current occupancy are observed);
    - Nest removal activities requires a Restricted Activity Permit issued by the IAO or designated Parks Canada staff in accordance with the *CNPA*. Netting material should be taut, free of tears, and placed securely so swallows cannot nest on the bridge or to ensure no entrapment of flying birds;

- Once installed, the ESO and PM will ensure that daily monitoring inspections of the area are completed to ensure swallows have not infiltrated the barrier to nest or individuals are not entangled;
- In the event that a nest is observed, a **risk of delay** of construction activities may occur until the young have left the nest, are no longer in the area and/or the nest is determined to no longer be active.
- The deterrent/exclusion method must stay in place until the commencement of construction activities on the existing bridge, unless otherwise determined by the ESO that the deterrent is negatively impacting bird or bat species, at which time it must be removed at the direction of the Parks Canada PM and ESO. In the event of removal, a **risk of delay** of construction activities may occur if a nest is consequently established.
- The PM will ensure new barn swallow nesting habitat must be created to replace the habitat that will be removed (i.e. bridge). Structures must be in place by April 15 (before the birds return from their migration). Habitat creation must be completed by modifying an existing structure or building a new structure and installing nest cups following Ontario Ministry of Natural Resources (OMNR) guidelines (OMNR 2015):
    - Create new habitat by building at least 1 new structure or modifying an existing structure to suit the bird(s);
    - Build or modify a structure:
        - within 1 km of the affected habitat and
        - within 200 metres of an area that is accessible and suitable for foraging
    - Provide more habitat than what was removed
    - Provide suitable nesting conditions:
        - horizontal ledges or rough vertical surfaces with a sheltered overhang
        - areas where barn swallow can attach nests, away from predators and disturbances
        - entry and exit points that allow the bird(s) to fly freely
        - enough area to allow for space between nests
        - be structurally sound and capable of providing long term habitat
    - Park Staff will maintain the new habitat after it is created to assist in achieving management objectives for barn swallows as outlined in Parks Canada's *Multi-species Action Plan for Kejimkujik National Park and National Historic Site of Canada [Proposed]* (Parks Canada 2016a).

Bats

Construction activities and construction traffic could negatively impact Endangered bat species during active periods. Applicable timing windows are listed under the **General Activities Mitigations** Section for these species.

242. The Government of Canada emergency listed three species of bats as Endangered to Schedule 1 of *SARA.* These three bat species –little brown myotis, northern myotis, and tri-coloured bat – have been listed, as their survival is imminently threatened by a deadly and highly contagious

disease, White-nose Syndrome (WNS). Under SARA these species are legally protected where they are found on federal lands. These legal protections prohibit:

- The killing, harming, harassing, capturing or taking of an individual of one of the three bat species;
- The possession, collection, buying, selling or trading of an individual or any part or derivative of an individual of one of the three species; and
- The damage or destruction of the residence of one or more individuals of one of the three species.

243. The area in the near the existing Mersey Bridge has been an attractive hotspot for foraging bat species, as well as suitable habitat located in upland areas in close proximity to the Project area. The bat roost restricted activity period is **April 1 to August 31** and bat general activity period is **April 1 to October 31**.

244. In the event that construction activities must be completed during the bat activity period, the following mitigation must be applied:

- Parks Canada staff will conduct acoustic monitoring surveys near the Project location in the spring to determine presence of bat species the area;
- It is recommended that all vegetation removal be completed prior to April 10th to minimize disturbance to bat species.
- Should bat species be detected, bat roost surveys must be conducted by a qualified expert within 7 days of Project activities using guidance from *Parks Canada's Pre-Construction Bat Roost Survey Guidelines for Projects Requiring Tree Removal* (Parks Canada 2016b).
- Should a maternal roost be detected in the immediate vicinity of the construction site, the ESO will consult with experts and Parks Canada Resource Conservation Staff to determine appropriate site-specific mitigation, if warranted.
- If it is determined that a maternal roost could be negatively impacted by construction activities, there is a **risk of delay** until the young have successfully fledged and the maternal roost is no longer active.
- Timing of construction activities will be **restricted to daylight hours** from one half hour after sunrise to one half hour before sunset, in order to minimize disturbance and undue stress to bat species.

245. Should any bats be observed by construction workers during project activities, the ESO must be immediately notified.

246. Additional information pertaining to bat mitigation is found in the **Vegetation Removal Mitigation** Section.

Other Species at Risk

247. No vegetation removal should be completed during the migratory bird breeding period (**April 10 to August 13).** This will ensure adequate mitigation for the Eastern wood-pewee and evening grosbeak.

248. Should vegetation removal be required, a pre-construction nest survey will be conducted by the ESO within 7 days of construction activities. See the **Vegetation Removal Mitigation** Section for more detailed information on survey requirements for migratory birds.
249. Should vegetation removal be required, black ash along the Eel Weir will be identified and an appropriate protective buffer will be established.
250. The common nighthawk may forage in the vicinity of the Mersey Bridge. Timing construction activities during daylight hours as outlined above for bats, will also minimize undue stress to nighthawks.
251. Limited suitable nesting habitat for common nighthawks is located in close proximity to the Mersey Bridge and Eel Weir Road, with the exception of the open gravel parking lot. Visitor use prior to construction activities likely would deter potential nesting. However, upon area closures should it be determined by the ESO that there is an increased potential for nesting, a pre-construction nest survey specific for nighthawks will be conducted.
252. Water pennywort was last identified in the area of the Mersey Bridge in 2002 and is no longer believed to be present. Prior to construction the ESO or Park Staff may investigate possible occurrence. If warranted, appropriate mitigation with protective buffers will be determined.

Visitor Experience / Safety

To maintain visitor safety during construction activities, area closures will be required. To facilitate for visitor safety requirements, Parks Canada staff will ensure the following mitigations within this section are adhered to.

253. The Mersey River Bridge will be closed as of June26th to visitors.
254. The Eel Weir Road from Grafton Lake to the Mersey River Bridge will also be closed to all traffic, including pedestrians and cyclists to minimize potential impacts to visitor safety.
255. The Eel Weir Road will also be closed from the Mersey Bridge to Peskowesk for backcountry trail users.
256. Backcountry users will not be able to start their trip from or return to Eel Weir.
257. The Mersey River downstream of George Lake will be closed to recreation use.
258. Two campsites will be closed (23 and 28).
259. Sites on the southern part of Kejimkujik Lake (26, 27, 25) and southern lakes (W2, 38, W1, 32, 31, 34, 29, 30) will only be accessible from the northern part of Kejimkujik Lake.
260. The Liberty Lake hiking trail will only be accessible from the Big Dam parking area. Hikers will not be able to complete the Liberty Lake loop and must return to Big Dam.
261. Firewood delivery in the southern lake sites will be affected; campers will need to pick up firewood at centralized wood piles.
262. Appropriate signage, barriers and information will be available to visitors to ensure safety while visiting Kejimkujik.
263. In advance of the bridge closure, Park Staff in coordination with the ESO and Public Safety Officer, must ensure appropriate equipment (i.e. trucks, ATVs, etc.) are available on the west side of the bridge to mitigate safety and emergency response measures.
264. Equipment will be stored, maintained and fuelled on a flat, hardened surfaces. Fuel storage and refuelling will be done in accordance with Best Management Practices developed for Parks Canada.

265. Fuel storage for emergency and park staff vehicles must be located 100 m away from any water body, wetland or watercourse. Refuelling activities should not be conducted where run-off could carry contaminants into drainage pathways.
266. Hazardous or toxic products shall be stored off-site no and closer than 100 metres from streams, wetlands, water bodies or waterways in secure areas.
267. Spill kits shall be available.
268. No mechanized equipment (i.e. ATV) will be forded across water bodies or on temporary crossing structures
269. Park staff will develop an Emergency Response Plan to mitigating for visitor safety during bridge and trail closures which must be communicated to contractors.
270. Contractors must be made aware that in the event of an emergency, construction activities may be halted by the Public Safety Officer, PM, ESO or other designated Parks Canada staff to facilitate timely response and unobstructed evacuation of casualties/visitors, if necessary.
271. Should it be determined that an alternate crossing method is required; adaptive management, location and mitigation measures will be identified in consultation with the IAO.

Health and Socioeconomic Conditions with Respect to both Aboriginal and Non-Aboriginal Peoples

272. Clear and regular communication with Parks Canada volunteers and researchers on construction activities will be required.
273. Caution is to be exercised by construction vehicles to avoid potential conflicts with volunteers, Parks Canada staff on Eel Weir Road.

9. DFO MITIGATION

The remaining section involves DFO recommended measures to avoid causing harm to fish and fish habitat *(http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html).* Adherence will help avoid causing harm to fish and comply with the Act.

Project Planning

1. Time work in-water to respect timing windows (June 1 to September 30) to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed as recommended by DFO and in accordance with the Nova Scotia's *Watercourse Alteration Standard* under the *Environment Act*;
2. Minimize duration of in-water work;
3. Conduct in-stream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows;
5. Design and plan activities and works in waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided;
6. Design and construct approaches to the waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation;
7. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures;
8. Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse;
9. Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals do not enter the watercourse;
10. Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance and keep an emergency spill kit on site;
11. Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish;

Erosion and Sediment Control

12. Develop and implement an *Erosion and Sediment Control Plan* for the site that minimizes risk of sedimentation of the waterbody during all phases of the project. Erosion and sediment control measures should be maintained until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin and runoff water is clear. The plan should, where applicable, include:

    a. Installation of effective erosion and sediment control measures before starting work to prevent sediment from entering the water body;
    b. Measures for managing water flowing onto the site, as well as water being pumped/diverted from the site such that sediment is filtered out prior to the water entering a waterbody. For example, pumping/diversion of water to a vegetated area, construction of a settling basin or other filtration system;
    c. Site isolation measures (e.g., silt boom or silt curtain) for containing suspended sediment where in-water work is required (e.g., dredging, underwater cable installation);
    d. Measures for containing and stabilizing waste material (e.g., dredging spoils, construction waste and materials, commercial logging waste, uprooted or cut aquatic plants, accumulated debris) above the high water mark of nearby waterbodies to prevent re-entry;

e. Regular inspection and maintenance of erosion and sediment control measures and structures during the course of construction;
f. Repairs to erosion and sediment control measures and structures if damage occurs; and,
g. Removal of non-biodegradable erosion and sediment control materials once site is stabilized.

Shoreline/Bank Re-vegetation and Stablization

13. Clearing of riparian vegetation should be kept to a minimum as defined by the surveyed construction footprint. Use existing trails, parking lots, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting;
14. Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed;
15. Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site;
16. Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
17. If replacement rock reinforcement/armoring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment; and,
18. Remove all construction materials from site upon project completion.

Fish Protection

19. Ensure all in-water activities, or associated in-water structures, do not interfere with fish passage, constrict the channel width, or reduce flows with the exception of cofferdams.
20. Retain a qualified environmental professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site.
21. Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself. In freshwater, follow these measures for design and installation of intake end of pipe fish screens to protect fish where water is extracted from fish-bearing waters:

I. Screens should be located in areas and depths of water with low concentrations of fish throughout the year.
II. Screens should be located away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.
III. The screen face should be oriented in the same direction as the flow.
IV. Ensure openings in the guides and seals are less than the opening criteria to make “fish tight”.

V. Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.
VI. Structural support should be provided to the screen panels to prevent sagging and collapse of the screen.
VII. Large cylindrical and box-type screens should have a manifold installed in them to ensure even water velocity distribution across the screen surface. The ends of the structure should be made out of solid materials and the end of the manifold capped.
VIII. Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where there is debris loading (woody material, leaves, algae mats, etc.). A 150 mm (6 in.) spacing between bars is typical.
IX. Provision should be made for the removal, inspection, and cleaning of screens.
X. Ensure regular maintenance and repair of cleaning apparatus, seals, and screens is carried out to prevent debris-fouling and impingement of fish.
XI. Pumps should be shut down when fish screens are removed for inspection and cleaning.

10. PUBLIC/STAKEHOLDER ENGAGEMENT & ABORIGINAL CONSULTATION

10 a) Indicate whether public/stakeholder engagement was undertaken in relation to potential adverse effects of the proposed project:
☒ No
☐ Yes

10 b) Indicate whether Aboriginal consultation was undertaken in relation to potential adverse effects of the proposed project:
☐ No
☒ Yes (on-going)

A series of communications have been had with Mi'kmaq representatives and councils in regards to the Mersey Bridge replacement. Communication was received regarding potential impacts to cultural resources and was recommended that care be taken in regards to potential archeological artifacts. This project will require consultation and ongoing dialogue as the project moves from planning into construction.

11. SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

Taking into account the specific mitigation measures mentioned above, it is anticipated that the project is not likely to cause significant residual environmental effects. Implementation would have a limited effect on natural and cultural resources.

12. SURVEILLANCE

☐ Surveillance is not required
☒ Surveillance is required.
Due to the fact that the project is located within a National Park and National Historic Site it is recommended that inspections be conducted by an on-site construction inspector and a Parks Canada staff member to ensure proper mitigations measures are being implemented properly for potential affects outlined for Cultural and National Resources. This includes ensuring archeological and wildlife monitoring is conducted when required as outlined within the BIA, CRIA and AOA.

13. FOLLOW-UP MONITORING

Follow-up monitoring is:

- ☐ not required
- ☐ required by legislation or policy
- ☒ required to evaluate effectiveness of mitigation measures and/or assess restoration success which is to be summarized in a follow up monitoring plan. Monitoring Plan will be developed during construction monitoring Phase and will be based on realized potential for long term effects.

14. SARA NOTIFICATION

Notification is:

- ☒ not required
- ☐ required under the *Species at Risk Act*

15. EXPERTS CONSULTED

Include Parks Canada experts. Add as many entries as necessary for the project.

Department/Agency/Institution: Parks Canada	Date of Request: 2016-02-29
Expert's Name & Contact Information: Megan Crowley	Title: Resource Management Officer
Expertise Requested: Blanding's and Snapping Turtle, Eastern Ribbon Snake Ecology and Mitigation Measures	
Response: • Snapping turtles can nest during the day or night. 80% of nesting occurs within a 4-5 day period. It can be difficult to observe nesting and cover the nests before racoons and other predators destroy the nests. • There is an incubator that has been used in the past to incubate turtle eggs at Oaklawn Zoo. • Turtles have high nesting site fidelity. • Snapping turtles can lay up to 50 circular eggs. • Discussed using a barrier or tarp to discourage snapping turtles from nesting on the road bed or near the project site. • Recommended allowing the nests to be created and moving the eggs immediately afterwards. • Discussed creating of a new area for snapping turtle nesting. • Blanding's turtles use Eel River Road to access their nesting areas. • The project location is not a high concentration area for ribbon snakes. • Mornings are the best time of day for ribbon snake surveys.	

Department/Agency/Institution: Eastern Ribbon Snake Recovery Team	Date of Request: 2016-03-04, 2016-04-18, 2017-01-13 and 2017-01-17
Expert's Name & Contact Information: Jeffie McNeil	Title: Eastern Ribbon Snake Recovery Team
Expertise Requested: Blanding's and Snapping Turtle, Ribbonsnake Ecology and Mitigation Measures	
Response:	

- Adult Blanding's Turtles can be protected by avoiding the time they are going to and returning from their nesting sites.
- There has been good success with moving Blanding's Turtle nests and eggs within Kejimkujik National Park.
- Based on data on Blanding's Turtles, it is best to move Snapping Turtle nests as soon as possible after being laid.
- Snapping turtles nest on lakeshore and roadways. The site needs to hold moisture, be sunny and exposed. The slope may make a difference, they seem to prefer a gradual slope, facing the sun.
- Would not recommend deterring snapping turtles from nesting, they are very persistent and would still attempt in the area further down the road.
- Radio transmitters have been placed in the past and will be placed during the Summer of 2017 on Blanding's Turtles. Tracking the turtles has provided details on the timing and routes some of the turtles take to get to their nesting areas.
- Recommended a July 15th, 2016 start date vs. July 8th to avoid late nesting Blanding's Turtles.
- Extra caution to prevent harm to Blanding's Turtle adults would be necessary for any site visits prior to July 15th, 2016. (wildlife monitor, minimal/limited entries, not equipment to move until given the all clear, etc.)
- All wetlands on Kejimkujik lake have been designated critical habitat for the Eastern Ribbon Snake.
- Ribbonsnakes do cross the Eel Weir Road, especially in September to November when returning to hibernaculum.
- There is no data on Eastern Ribbon Snake occurrences near the Mersey River bridge
- There is a hibernaculum off of the Eel Weir road between the start of the gravel road and the Mersey River Bridge.
- Eastern Ribbon Snakes like to hide under things.
- They are active, including crossing Eel Weir road, in September and November as they head to their hibernacula.
- If they were observed earlier in the Summer, they would be basking or giving birth.
- Discussed initial monitoring plan and moving snakes should one be observed on site.

Department/Agency/Institution: University of Guelph (retired)	Date of Request: 2016-04-04, 2017-01-03 and 2017-02-15
Expert's Name & Contact Information: Ron Brooks	Title: Professor Emeritus
Expertise Requested: Snapping Turtle Ecology and Mitigation Measures	
Response: • It is more important to protect the adults vs. the eggs/hatchlings. • Areas exposed to the sun for a large part of the day are used for nesting.	

- West or Southwest slopes are best for nesting, not slopes that face North or East. The eggs won't hatch with these orientations. Nest areas are chosen mostly based on sun exposure.
- Snapping turtles use many substrates for nesting.
- Turtles can climb up chain link fences.
- Areas subject to flooding would not be good for nesting.
- Snapping turtle eggs should be dug out and moved as soon as possible after laying.
- The air bubble in the eggs must be placed upwards when placing eggs in to a new nest.
- If construction is only a 1 year event, deterring snapping turtles from nesting location would likely not pose a problem. Will move on to a new location and come back the following year
- Due to the level of predation currently known to occur at the Eel Weir Road, should not be concerned with deterring nesting
- Secured silt fencing has worked in the past to block turtles from nesting locations but would still need to monitor for potential intruders

Department/Agency/Institution: Chair of Friends of Kejimkujik National Park/Blanding's Turtle Recovery Team	Date of Request:
Expert's Name & Contact Information: Norm Green	Title: Blanding's Turtle Recovery Team Member
Expertise Requested: Blanding's and Snapping Turtle Ecology and Mitigation Measures	

Response:

- A Blanding's Turtle nests on the side of the Eel Weir Road. Volunteers will cover the nest after eggs have been laid.
- There is no good area to relocate the nest to.
- The hatchlings can't leave the nest until a volunteer removes the cover.
- The hatchlings could be relocated 100-200m into the woods.
- Hatchlings can travel 1-2 km.
- Discussed ensuring safety for volunteers.
- Radiotracking is completed every other day.
- For two of the Blanding's Turtles, in Summer 2015 (after a late winter), the latest nesting was June 24th, in 2014 it was June 13th and in 2013 it was June 24th. For another individual turtle, only 2015 data is available where nesting was completed on July 18th.
- Snapping turtle nesting is a 3-5 hour process.
- A nest relocation site for Snapping turtles will have to be identified.
- A southern exposed site is best.

Department/Agency/Institution: St. Mary's University (University of Waterloo)	Date of Request: 2016-12-14, 2016-12-22, 2017-01-18
Expert's Name & Contact Information: Hugh Broders	Title: Professor
Expertise Requested: Bat Ecology in Kejimukujik and mitigation	
Response: • During research work conducted in Kejimukujik, lots of bats were observed to forage around the bridge • Eel weir was an awesome place to be at sunset with swallows, nighthawks and bats. • Been several years since work has been conducted in Keji • Closest known roost for little brown bat was observed at that time was +/- 500 m S of bridge • Emergence study 12yrs ago had 230 bats emerging from the tree • Northern myotis and tri-coloured bats have maternal roost throughout the area • Found tri-coloured bat roost ~ 150 m North of Bridge and ~80 m north of parking lot with several more in vicinity of Minard Bay, Keji Lake and Mountain Lake. Bats that used these roosts regularly foraged over Eel Weir • Most certainly have potential for maternity roosts to be in close proximity to the Bridge, but identifying would require fieldwork. • Northern myotis use multiple trees over a fairly large area so you need to understand their biology to really grasp the potential impact. • Research speculates that for tri-coloured bats birthing happens late June to early July. Given the expectation that it takes 3 weeks for young to "ween" they should be flying by late July • For northern and little brown myotis, we have found the timing of parturition to be highly variable among females and to be anywhere from end of June to 20ish of July. Would think that in Keji most females have given birth by the second week of July and by the first week of august vast majority of young would be flying. • Would recommend for construction to be delayed to the beginning of August • For moving construction to early in July: Though it is not known how many bats are currently in the area, regardless if known, a higher degree of caution is required now given the provincial and federal status	

Department/Agency/Institution: Variety	Date of Request: 2017-02-16
Expert's Name & Contact Information: Blanding's turtle recovery: Norm Green (Friends of Keji) Tom Herman (Acadia) Jeffie McNeil (MTRI) Steve Mockford (Acadia) Matt Smith (Parks Canada)	Title: Recovery team members
Expertise Requested: Blanding's Turtle ecology in Kejimkujik	
Response:	

- 4 turtles are known to move along or across Eel Weir Road to access nesting sites
- Latest known nest along Eel Weir Road is June 27
- Some uncertainty about movement, with Autumn being only tracked for one year and moving along the road for a good distance into July
- Team proposed conducting spring monitoring surveys at known overwintering sites, and fit turtles with transmitters which would allow for determining location of turtles utilizing the Eel Weir Road.
- Team wanted to ensure that should transmitter implementation not be successful, construction may have to be delayed after July 1, if turtles are determined to be at risk of road mortality
- Wildlife monitors on-site would be required until the active period is over, to clear road for construction traffic.
- Volunteers will assist with nest re-location (snapping turtles) when necessary and can be contacted once nesting is observed.

Department/Agency/Institution: Parks Canada	Date of Request: 2017-02-02
Expert's Name & Contact Information: Darien Ure and Pippa Sheppard	Title: Species Conservation Specialist and Acting Implementation Manager, Species Conservation
Expertise Requested: Bat ecology	
Response: • Vegetation removal should be completed outside of the activity period, preferably in winter • Acoustic surveys could determine species presences • As long as no vegetation removal is required during the active period, and efforts to determine bat presence of bat species are implemented, it is not likely that construction activities would pose a threat to bat species and would be comfortable with a July 1 start date. • However, should vegetation removal be required, information from acoustic monitoring could assist in determining the effort of additional pre-construction surveys.	

Department/Agency/Institution: Dalhousie University	Date of Request: 2016-12-21
Expert's Name & Contact Information: Tara Imlay	Title: PhD Candidate
Expertise Requested: Barn swallow ecology	
Response: • Conducted barn swallow research on Maritime nesting from 2014 to 2016. • In the Martimes, barn swallows often (~50% of pairs) produce two broods each year. The earliest hatching date on record is June 1st and latest is August 15 (mean = June 30). Second broods are often reared in the same nest or nest near the first (< 2m away) • Young of both species can stay in the nest for 18-26 days	

- If hoping to start construction by mid-July there is a strong possibility that barn swallows' second brood could be impacted if they are nesting at the site
- Recommends putting off work until September. At this point you would be past the nesting period, but more importantly, many of the structures provided as alternative breeding sites are rarely used by Barn Swallows

Department/Agency/Institution: Parks Canada – Waterton Lakes National Park	Date of Request: 2016-12-02
Expert's Name & Contact Information: Jennifer Carptenter	Title: Environmental Assessment Scientist
Expertise Requested: barn swallow deterrents	

Response:

- Waterton Lakes National Park (WLNP) has not used deterrents because analysis found that the risk of delay if the deterrent failed was greater to the project than the alternative of just avoiding the breeding period and were able to change construction windows.
- Deterrents need very site-specific inputs. If deterrents are the chosen option, contractors and proponents accept the risk that they may fail and the birds will nest anyways potentially causing delays
- Some upcoming bridge work in WLNP also has a secondary concern of bats known to roost on the bridge, which means not only are swallows and the Migratory Birds Convention Act to be considered by also a species listed under the Species at Risk Act.
- Anecdotally told about bats chewing through netting and then the swallows nest on the site anyways.

Department/Agency/Institution: Parks Canada – National Conservation Branch	Date of Request: 2016-12-05 and 2017-01-13
Expert's Name & Contact Information: Vanessa Rodriguez	Title: Impact Assessment Specialist – Infrastructure Planning
Expertise Requested: barn swallow deterrents	

Response:

- Success at Fort Rodd and the Gulf of Cannery National Historic Sites.
    - Barn swallows were excluded from nesting in buildings by closing up buildings prior to breeding season, ultrasonic deterrents would be used (however, not suitable where bats are present)
    - Alternate nesting habitat was also provided using cedar swallow nest boxes.
- Thousand Island National Park (TINP) had success with alternate habitat when a gunboat building that house barn swallows was demolished and removed, in winter.
    - TINP followed guidance from OMNR for providing an alternate nesting structure (kiosk) when a building known to support nesting swallows is altered or replaced (http://www.ontario.ca/environment-and-energy/alter-sturcture -habitat-barn-swallow).

- Though swallow haven't been observed nesting at Eel Weir for two years, better to err on the side of caution to deter swallows before the nesting season, to minimize the likelihood that construction will be delayed.

Department/Agency/Institution: Parks Canada – Mount Revelstoke and Glacier National Parks	Date of Request: 2016-12-02
Expert's Name & Contact Information: Alexandra Taylor	Title: Environment Assessment Coordinator
Expertise Requested: barn swallow deterrents	
Response: • Had success with bridge work project. Contractor wrapped bridge in geotextile fabric prior to nesting season • A monitor visited the site daily until work was started to inspect for nests and/or individuals • Contractors and Project Management made aware that if one swallow started nesting, construction would be delayed until September	

Department/Agency/Institution: Parks Canada – Banff National Park	Date of Request: 2016-12-07
Expert's Name & Contact Information: Dani MacIntosh	Title: Environmental Assessment Scientist
Expertise Requested: barn swallow deterrents	
Response: • Constructing 3 wildlife underpasses on the TransCanada Highway, all three had signs of barn swallows nesting • Before construction commenced, a nest sweep was conducted and all in-active nests (last year's nests) were removed prior to April bird window and on if no sighs of the nests being active • The contractor installed netting (commercially available bird netting ¾" mm or less) under each of the wildlife underpasses and ESO monitored it daily to ensure that no swallows were able to re-establish nests while the work was underway. • The netting stayed in place for the duration of the project. • It was successful no instances of swallows being able to access the underside of the bridges.	

Department/Agency/Institution: Parks Canada – Jasper National Park	Date of Request: 2016-12-05
Expert's Name & Contact Information: Meagan Saunders	Title: Environmental Assessment Scientist
Expertise Requested: barn swallow deterrents	
Response: • 2015 Jasper had 5 major bridge projects on TransCanada Highway, two of which involved full girder replacements	

- Netting was effective in terms of preventing actual nesting on the girders (ESO on site daily to remind contractors of implications if swallows get past netting, [i.e. delay in construction]).
- Netting was tight and secure and checked by contractors and ESO daily for areas where swallows may be able to enter
- Swallows were visible at almost every early season site visit attempting to find their way through the netting to nest
- Though no swallows made their way through, based on their attempts to nest, it seems very likely that this energetic cost hurt their nesting efforts in the early, now investigating other deterrent options for future work to minimize stress
- Deterrents such as owls not very effective for swallows
- University of Alberta has a research proposal looking into whether physical barriers such as netting to prevent nesting is more or less energetically detrimental than potentially allowing birds to nest on bridges with additional vibrational and auditory disturbance.
- Additional work at the Athabasca bridges, investigated the potential for using swallow kiosks for providing alternate habitat for nesting once swallows were excluded from the bridges. In this situation because the swallows had other existing nest/colony habitat in the area, the kiosks were deemed to likely not work because of this.
- Kiosks successful when no other options for nesting were available, successful use in highway projects in Ontario

16. DECISION

Taking into account implementation of mitigation measures outlined in the analysis, the project is:

☒ not likely to cause significant adverse environmental effects.
☐ likely to cause significant adverse environmental effects.

NOTE: If the project is identified as likely to cause significant adverse effects, CEAA 2012 prohibits approval of the project unless the Governor in Council (Cabinet) determines that the effects are justified in the circumstances. A finding of significant effects therefore means the project CANNOT go ahead as proposed.

FOR SARA REQUIREMENTS:

☐ There are no residual adverse effects to species at risk and therefore the SARA-Compliant Authorization Decision Tool was not required. Planned mitigation measures will allow for no residual effects on Blanding's Turtles, the Eastern Ribbon Snake and Snapping Turtles.

OR, the SARA-Compliant Authorization Decision Tool (Appendix 8) was used and determined:

☒ There is no contravention of SARA prohibitions
☐ Project activities contravene a SARA prohibition and CAN be authorized under SARA
☐ Project activities contravene a SARA prohibition and CANNOT be authorized

17. RECOMMENDATION AND APPROVAL

Prepared by: Tamara McFarland, Environmental Services, Public Services and Procurement **Updated by**: Troy Pretzlaw Resource Management Officer- Impact Assessment, MNSFU, Parks Canada **Revised by:** Elizabeth Walsh Resource Management Officer- Impact Assessment, MNSFU, Parks Canada	Date: 2016-05-06 Date: 2016-05-13 Date: 2017-02-17
Recommended by: Chris McCarthy Resource Conservation Manager, Kejimkujik National Park and National Historic Site, Parks Canada	Date: 2017-02-21
Recommended by: Jonathan Sheppard Park Superintendent, Kejimkujik National Park and National Historic Site, Parks Canada	Date: 2017-02-21
Recommended by: Functional manager of the project: Mark Garnett Asset Manager, MNSFU, Parks Canada	Date: 2017-02-21
Approved by: Julie Tompa Field Unit Superintendent, MNSFU, Parks Canada	Date:
Signature:	

18. REFERENCES

Broders, H.G., G.M. Quinn, G.J. Forbes. 2003. Species Status, and the Spatial and Temporal Patterns of Activity of Bats in Southwest Nova Scotia, Canada. Northeastern Naturalist. 10(4): 383-398

Farrow, L.J. 2007. Distribution of Eastern Pipistrelle (*Perimyotis subflavus*) in Southwest Nova Scotia Relative to Landscape Factors. Master's Thesis, St. Mary's University, Halifax, Nova Scotia

Ontario Ministry of Natural Resources. 2015. Alter a structure (habitat for Barn Swallow). Available Online: https://www.ontario.ca/page/alter-structure-habitat-barn-swallow Accessed: December 2016

Parks Canada Agency. 2016a. Multi-species Action Plan for Kejimkujik National Park and National Historic Site of Canada [Proposed]. *Species at Risk Act* Action Plan Series. Parks Canada Agency, Ottawa. v + 28 pp.

Parks Canada Agency. 2016b. Draft – September 2016 Pre-construction Bat Roost Survey Guidelines for Projects Requiring Tree Removal from 15 April to 01 September. Parks Canada Agency, Banff Field Unit. 12 pp.

Poissant, J.A. 2009. Roosting and social ecology of the tricolored bat, *Perimyotis subfalvus*, in Nova Scotia. Master's Thesis, St. Mary's University, Halifax, Nova Scotia

19. ATTACHMENTS/ APPENDICES

Appendix 1: Cultural Resource Impact Assessment and Archaeological Overview Assessment
Appendix 2: Existing Footprint and Project Design Schematics Effects Identification Matrix
Appendix 3: Species at Risk Critical Habitat Near Mersey Bridge and Eel Weir Road
Appendix 4: Environmental Impact Analysis Tools: Effects Identification Matrix
Appendix 5: Regulatory Guidance
Appendix 6: Fisheries and Oceans Canada, Fisheries Protection Program "No Serious Harm" letter
Appendix 7: PCA Treated Wood Management Guide
Appendix 8: SARA – Compliant Authorization Decision Tool

20. NATIONAL IMPACT ASSESSMENT TRACKING SYSTEM

☒ Project registered in tracking system

☐ Not yet registered *(CEAA 2012 requires PCA submit a report to Parliament annually. EIAs must be entered in the tracking system* ***by the end of April*** *to enable reporting*.

Appendix 1 Cultural Resources

Appendix 1.1 Cultural Resource Impact Analysis (CRIA) *May 2016*

Keith Mercer, CRM Manager, Mainland Nova Scotia Field Unit, Parks Canada

---

Contacts

For the project generally, questions should be directed to Chris Fergusson, Project Manager: 902-682-2926 / 902-682-249 / chris.fergusson@pc.gc.ca.

Decisions affecting cultural resources, or potentially affecting such resources, will be made by Keith Mercer: 902-426-1992 / 902-402-5360 / keith.mercer@pc.gc.ca.

Project Description

The purpose of this approved Federal Infrastructure Project (RPA 745-746) is to replace the Mersey River Bridge in Kejimkujik National Park and National Historic Site. Originally built in 1952, this wooden bridge has undergone various repairs over the years, but now is in serious decline and needs to be replaced. It is located in an area known as "Eel Weir," which is named after the V-shaped stone weirs constructed by the Mi'kmaq in that area of the river to help them trap fish and eels. The replacement bridge will be a single-span pony-truss steel bridge, with an expanded footprint along the water and road.

Cultural Resource Impact Analysis

Located in southwest Nova Scotia, Kejimkujik is Canada's only combined National Park and National Historic Site. It is one of the true cultural and ecological treasures of the Parks Canada system. Kejimkujik opened as a park in 1974, with a seaside adjunct added in 1985. Following a joint application by Parks Canada and the Mi'kmaq of Nova Scotia, it then became an historic site in 1995. It was named an historic site because of its importance as a "Mi'kmaq cultural landscape." This was and continues to be traditional and spiritual Mi'kmaw land. They occupied, travelled, hunted, and enjoyed this area for thousands of years. This is captured in the park's Commemorative Integrity Statement (CIS 2000):

> *The cultural landscape of Kejimkujik National Park was designated a national historic site in 1994 because it attests to Mi'kmaw occupancy of this area since time immemorial, and includes petroglyph sites, habitation sites, fishing sites, hunting territories, travel routes and burials.*

This important message is also conveyed on the Historic Sites and Monuments Board plaque, which was unveiled at the park in 2000:

> *The cultural landscape of the Mi'kmaq at Kejimkujik attests to a presence here* since *time immemorial. The relationship between Aboriginal peoples and the natural environment is evident in features such as seasonal camps, fish weirs, hunting territories, portages, trails and burial grounds. In the 19th and 20th centuries, Mi'kmaq cleared homesteads around Kejimkujik Lake, worked in forestry, and excelled as fishing and hunting guides. Petroglyphs, engraved on rock outcrops along the lakeshores, portray many aspects of Mi'kmaq life and spirituality, reflecting the bond between people and the land.*

Based on earlier excavations, we know that the park is rich in cultural and archaeological resources, particularly in the Mersey River watershed. These resources include the rock carvings known as petroglyphs, a village site, burial and encampment locations, fishing weirs, portage routes, and artifacts. These sites are particularly valuable because they date primarily from the pre-European period. Evidence suggests that the Mi'kmaq used the Mersey area regularly for more than 4000 years, but then much less often after European contact. Artifacts excavated in this area include projectile points, scrapers, ceramics and animal remains, with petroglyphs located less than 200 metres away.

According to Kejimkujik's CIS and Management Plan (2010), Eel Weir is one of the most important and sensitive cultural sites in the park. It is related directly to the park's designation as a national historic site. For these reasons, it is imperative that Parks Canada safeguard these cultural resources. This is part of our mandate.

Mitigation must include the following conservation priorities:

1. **Protecting the eel weirs**. The ruins of three stone fishing weirs survive on the north and south sides of the existing bridge, in some cases only several metres away. They date from commercial Mi'kmaw eel fishing in the 20th century, but likely incorporate the foundation of historic weirs, which used the same technology. These are cultural resources of national historic significance and must be protected. Although construction of the bridge should not impact them, the project manager and contractor should take all necessary precautions. Previous investigations by Parks Canada staff and external experts have determined that they are in stable condition.

2. **Removing underwater crib works**. From consultation with Mi'kmaw experts and Parks Canada archaeologists, it was determined that the stones used in these two structures were not part of any Mi'kmaw fishing weirs. Their removal presents no obvious danger to cultural resources, but archaeological monitoring is recommended. See the attached Archaeological Overview Assessment (AOA).

3. **Expanding footprint of abutments**. For CRM, this is the most sensitive part of the project, but it also presents research opportunities. The existing timber and stone

abutments, supported by deep layers of fill and gravel on both sides of the bridge along Eel Weir Road, will be replaced with a concrete wingwall anchored with micropiles. This new foundation's footprint will be significantly larger than its predecessor, in both width and length. According to the tender drawings and discussions with the project manager, it is estimated that the width of this foundation will extend an extra 5 feet horizontally on either side of the bridge, then backwards another 10-15 feet, forming a rough rectangle in shape – with wings extending out. In addition, the footprint of the foundation on the road itself, heading away from the river, will be 25-30 feet. That is approximately 10-15 longer than the existing footprint. Removal of the existing abutments and digging the hole to lay the concrete for the new, expanded footprint will require significant excavation, using heavy machinery. Although this is a heavily disturbed area, care should be taken to minimise the machinery's impact on the surrounding area.

As mentioned above, the area immediately surrounding the bridge is rich in cultural resources and Mi'kmaw artifacts. In the early 1970s, researchers from Trent University conducted detailed excavations on both sides of the bridge, finding hundreds of prehistoric tools, flakes, pottery, animal remains, and some European artifacts. We have detailed reports from those excavations, and the objects now form part of Kejimkujik's rich artifact collection. In 1980, following the construction of the road leading to the Mersey River Bridge, Saint Mary's University students sifted through piles of soil that had been removed from the roadway and placed to the side. They found Mi'kmaw tools, such as adzes and scrapers. Because of these studies, and other known Mi'kmaw sites along the river, both archaeological teams concluded that further excavation had a very strong potential of unearthing Mi'kmaw artifacts.

To protect cultural resources, and allow Parks Canada archaeologists to explore this area for research purposes, the following is recommended. First, prior to construction, Parks Canada archaeologists should have an opportunity to survey and conduct test pits in the area immediately surrounding the bridge and road. This can be achieved ahead of time and will not delay or impede construction. Because a section of the road leading to the bridge will have to be cleared of trees to make room for machinery, test pits could be conducted in this area too. Second, during active excavation for removing the old abutment and laying the new foundation, an archaeologist will be present on site to monitor work at all times. The CRM Manager will also be present for part of this phase, which should last about one week. The project manager and contractors should understand that the archaeologists will only stop work as a last resort, when artifacts are obviously unearthed or if a larger cultural site is exposed. All parties should work as a team and communicate openly throughout this important phase of the project. While the 1980 road construction likely destroyed some of these sites on other side of the road – and testing would mostly encounter deep layers of gravel and fill, not much historic soil – the new

foundation will create a significantly larger footprint to explore. Third, when soil is unearthed and laid to the side of the roadway, best efforts will be made to ensure that archaeologists have both reasonable time and space to sample those piles through sifting or other methods. Well before construction, the CRM Manager and project manager will work with the archaeologists to develop a plan and timeline for carrying out this work. It is vital that the contractors understand the cultural sensitivities and archaeological priorities involved in this project.

4. **Archaeological guidance**. In the same way that the environment and species at risk are safeguarded in this larger BIA, it is imperative that all parties involved in this project respect the recommendations of Parks Canada archaeologists. This is a sensitive area, rich in Mi'kmaw cultural resources. From a conservation standpoint, we must therefore adhere to professional standards in terms of archaeology and cultural resource management. This means using this CRIA and AOA as guides in carrying out the work, as well as discussing matters with CRM specialists on the ground. Archaeologists and the CRM Manager will be on site monitoring excavation, but good planning should ensure that CRM concerns do not delay or impede this project.

Next Steps

- This assessment is part of a larger Basic Impact Analysis (BIA), which addresses environmental elements of this project.

- A Request for a Cultural Resource Impact Assessment (RCRIA) was submitted to HCCD.

- Terrestrial Archaeology has been informed about this project. It is on their work plan for 2016-17, with construction likely in July 2017. The AOA is below. Although it is based on an older bridge design, it nevertheless provides sound CRM advice and historical context. The CRM Manager will work with archaeologists and the project manager to develop a plan for carrying out archaeological work. A more detailed Archaeological Impact Assessment (AIA) will form part of that plan.

- A tender package is almost complete.

- All CRM and archaeology assessments will be added to the project file in both Kejimkujik and Halifax – both hard and digital copies.

- All CRM concerns in this project are examined within the context of the following documents: Kejimkujik's Commemorative Integrity Statement (2000); Parks Canada's CRM Policy (2013); and the *Standards and Guidelines for the Conservation of Historical Places in Canada*, 2nd Edition (2010).

Appendix 1.2 Archaeological Overview Assessment

Kejimkujik NHS&NP: Bridge Replacements – FII project RPA 745-746 *April 2016*

Martin Perron, FII Project Archaeologists, Parks Canada Agency
Archaeology and History Directorate, HCCD, National Office, Gatineau

The Mersey River Bridge replacement

The Mersey River Bridge is located on the Lower Mersey River, south-east of Lake Kejimkujik. Built in 1952, it links the two river banks where George Lake narrows just a few meters south of the Aboriginal/Mi'kmaq fishing weirs at Eel Weir (Fig. 1; Maps 1-2) which corresponds to one of the designated cultural resources of national historic value for the Kejimkujik NHS&P. The Eel Weir road and the bridge provide access to south-east area of the park for monitoring purposes and facilitate access to some archaeological sites associated with the reasons for designation of the national historic site. The bridge measures 33.5 meters long by 3.6 meters wide.

Fig. 1. The Mersey River Bridge. View towards the West.

POTENTIAL FOR ARCHAEOLOGICAL RESOURCES

According to Parks Canada's documentation, the immediate surroundings of the Mersey Bridge have a high potential for archaeological and cultural resources of national historic significance (formerly Level 1). Mi'kmaq petroglyphs are known at the mouth of the river/Lake George outlet located less than 200m north of the bridge (Map 3). For the pre-contact period, fishing weirs are recorded a few meters north and south of the bridge and three archaeological sites (9B6/Eel Weir I, 9B47/Eel Weir XI, and 9B15/Eel Weir X) have been identified and carefully surveyed and tested on both sides of the bridge in the 1970s by the Anthropology Department of Trent University (see Meyers 1972; 1973, p. 57-67). These sites have delivered hundreds of prehistoric lithic tools, flakes, pottery sherds and faunal remains and some European artifacts. Several other indigenous Eel Weir sites – most likely seasonal occupations related with eels fishing – have also been

recorded south of the river. Consequently, the Mersey River bridge area and the banks of the Lower Mersey River offer an extremely rich environment for indigenous and historic findings of national significance, and of other value, associated with the Mi'kmaq occupation of the park. Sites 9B47/Eel Weir XI and 9B15/Eel Weir X – the only one located on the east bank of the Mersey River – have, however, largely been damaged by the construction of the Eel Weir Road. Nevertheless, intact sections of the site remain north and south of the road where some of the bridge replacement work will most likely take place.

PROJECT INTRODUCTION AND OBJECTIVES

The Mersey River Bridge is nearing the end of its life cycle and suffered several damages caused by winds and watering. The bridge structure, renovated in 1987, has been evaluated by AMEC in 2011. The report suggested immediate repairs on the structure. Many wooden planks are rotten or damaged (Fig. 2-3). Some beams have been replaced in the early 2000's, but the Field Unit is facing a recurrent problem that requires a more permanent solution so that visitors can once again access the site. The Mersey River Bridge is posted for restricted truck loading since 2007.

Fig. 2-3. The Mersey River Bridge. Details of the damaged structure. View towards the West.

SNC Lavalin has been mandated to design and supervise the new bridge replacement. Five options have been considered (SNC Lavalin 2016, p. 38-39, section 7.1):

Option A1: Repair to as-designed condition
Option A2: Repair and Upgrade loading capacity
Option B1: Replace with Single-Span Modular Proprietary Pony-Truss Steel Bridge
Option B2: Replace with Triple-Culvert
Option B3: Replace with Two-Span Girder Bridge

The Field Unit has clearly expressed their desire to replace the current bridge with a new structure. However, we still do not know which one of the B options is preferred. SNC Lavalin has a preference for Option B1 and has suggested that the new structure should be either positioned in the same footprint of the existing bridge or upstream of it to allow the existing bridge to remain in service during construction (SNC Lavalin 2016, p. 39). This latter option would, however, require a realignment of the roadway at both approaches to the bridge, some landscaping and tree removal

(SNC Lavalin 2016, p. 46-47). Larger equipment/materials and more laydown space would also be required. Option B1 would also add 6.5m to the current footprint of the bridge span and 1,9m to the overall deck width.

GEOTECHNICAL INVESTIGATION (SNC Lavalin 2016, p. 15; Geotech Report – Mersey River)

A geotechnical investigation has been carried out on both sides of the Mersey River in December 2015. The aim of the investigation was to document the soil deposition and to estimate the depth of the bedrock on which will stand the new structure. Three boreholes (BH1, BH1a and BH2) have been performed on both sides of the bridge at a distance of 7.5 m from the bridge edges on the footprint of the Eel Weir Road (Fig. 4). The drill auger measured 21.59 cm in diameter. The drilling was executed by the consulting firm Logan Geotech under the supervision of the engineer firm Englobe Corp. The Field Unit had informed the Terrestrial Archaeology Service of Parks Canada about the project a week before the drilling and no mitigation was required as the size of the auger was minimal, and the drilling, located in a disturbed environment.

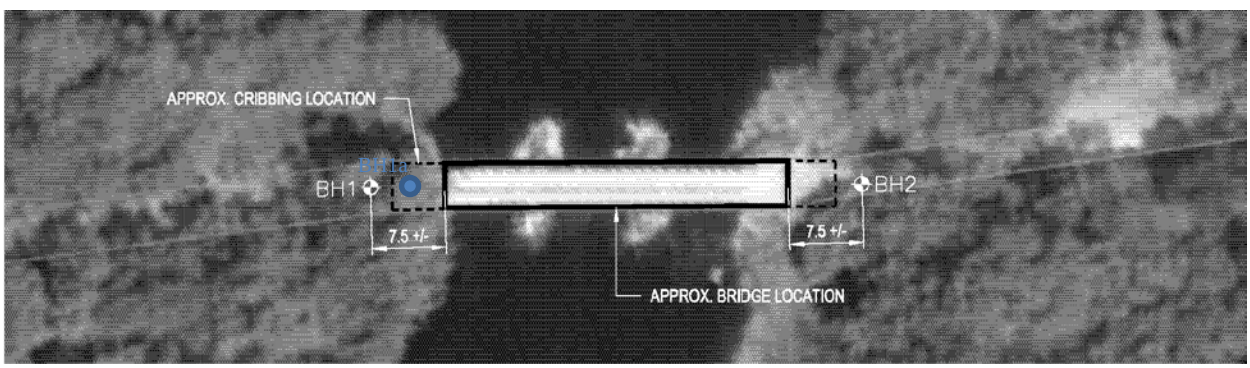


Fig. 4. Boreholes drilling at Mersey River Bridge. (Logan Geotech Work Plan, p. 3). The blue circle = borehole BH1a.

The results of the drilling have shown that the soil deposition sequences of the two boreholes (BH1 and BH1a) performed on the west side of the bridge are disturbed. A thick layer of coarse fill was observed below the road "topsoil" and above the undisturbed glacial till resting on the bedrock (Geotech, Report - Mersey River, p. 2, Plate 1 and 2). The fill layer was most likely put in place during the construction of the Eel Weir road or of the Mersey River Bridge. No *in situ* soil horizons dating to the pre-contact and historical periods seem to remain having been probably obliterated by the road work.

The stratigraphic sequence observed in borehole BH2 is almost similar on the east side of the river. However, a thin layer of buried topsoil/organic soils has been encountered at a depth of 2.70m below the surface and the fill deposit (See Map 4 and Geotech Report - Mersey River, p. 2, Plate 3). The organic layer rest on the till and corresponds most likely to the undisturbed post-glacial accumulation layer. This organic soil could potentially be contemporaneous with the occupation of the area by the indigenous Mi'kmaq populations.

OBSERVATIONS AND ARCHAEOLOGICAL REQUIREMENTS

According to the archaeological documentation available for this area of the park (which includes the archaeological site inventory, reports, field notes, topographic maps and historical maps), the area targeted by the project has a high potential for archaeological resources of national historic significance related with Mi'kmaq history. Potential impacts are to be expected on the archaeological resources as the bridge replacement will require the dismantlement of the pier crib walls located on both sides of the river and machinery circulation over a known archaeological site. The archaeological requirements needed to further identify and mitigate these impacts are the followings and should all be conducted by professional archaeologists.

The bridge replacement

- To prepare the immediate bridge area to receive shallow foundations, it will be necessary, according to Geotech and SNC Lavalin, **to remove all organic soils, fill materials, and wet / loose soils from beneath foundation bearing areas**. This material will be excavated to the level of bedrock. The excavation will vary depending on final bridge location and design grades, but is expected to range from 1.4 metres to 2.8 metres below the existing ground surface (Geotech Report - Mersey River, p. 4). Tree removal, landscaping and realignment of the roadway may also be required during the work. While the river banks have been damaged by the construction of the Eel Weir Road, the bridge and its retaining walls, chance finds and other archaeological features could be uncovered in the vicinity of the bridge during the proposed work. **To mitigate this activity, archaeological survey and test-pitting on both river banks south and north of the Eel Weir Road (+ within a 20m buffer zone) will be required to further determine if potential archaeological resources are located on the area to be impacted by the project**. If the boreholes performed on the west bank of the Mersey bridge have revealed the presence of a thick fill, areas north and south of the road at this location may be intact. As for the east river bank, the borehole drilling BH2 has shown that a buried organic layer was still *in situ* underneath the fill. **Archaeological monitoring will be required on the east bank** during the modern fill removal to determine if cultural resources are still preserved over or inside this organic layer.
- During the bridge replacement work, the existing pier crib resting on the river shore will be removed, causing disturbances in a sensitive archaeological area. **To mitigate this activity, archaeological monitoring will be required during the dismantlement of the pier crib to determine if cultural resources can be identified.** This will also give the opportunity to draw scarp profiles and to confirm the stratigraphic deposition sequence of the river banks as documented by the boreholes performed by Logan Geotech/Englobe inc.
- As for the new bridge location, **we strongly recommend that the Field Unit keeps the same footprint as the existing bridge. Otherwise, archaeological test-pitting will be required at both ends of the new bridge line and along the new roadway connecting the bridge to the Eel Weir Road**.

Machinery, laydown location(s) and turn-arounds.

- A laydown area has been identified by SNC Lavalin east of the bridge in the former dirt parking lot located north of the Eel Weir Road. This area, capped with gravel, seems totally suitable for a laydown space for material and machinery. The boreholes performed in the Eel Weir Road footprint have also revealed that there is a substantial fill deposit on the road path. However, if trucks or machinery need to circulate north or south of the existing Eel Weir Road, Parks Canada will need to be informed. **The machinery should always remain on the current roadways and/or on disturbed areas. The machinery, the new bridge material and the old bridge debris will need to be parked and/or stored in the parking lot located east of the bridge on the north side of the Eel Weir Road to avoid *in situ* soil disturbances.**

Finally, as mentioned in the 1972 and 1973 archaeological reports, **we strongly recommend that the archaeological investigation of this important area of the park be continued with a view to determining the function, chronology, and extent of the individual pre-contact occupations**.

CONCLUSION

To conclude, we would like to inform the Field Unit that the mitigation measures presented in this Archaeological Overview Assessment are subjected to additions and alterations prior to and during the Kejimkujik bridge replacements project. If additional or modified scenarios are considered by the consulting engineering firm and/or the project manager, these mitigation measures will no longer apply and the new or modified plan must be send to Parks Canada for review and evaluation. In addition, if any cultural resource/artifact is encountered during the course of the project, the Kejimkujik NHS&P Project Manager or the contractor should immediately stop the ongoing work, record the find to the best of their ability (digital photographs, GPS location coordinates, and notes) and report their discovery to Parks Canada's Terrestrial Archaeology Section for further guidance. Preferably, artifacts should be left in place until a Parks Canada archaeologist has been consulted. The contractor shall only resume activity when permitted to proceed with the authorization of Parks Canada. The contractor and/or any member of their team shall not divulge the finding of cultural resources/artifacts nor share photographs unless it is with the express permission of the Parks Canada Representative.

Contacts

Martin Perron, FII Project Archaeologist
Archaeology and History Branch
Indigenous Affairs and Cultural Heritage Directorate
Parks Canada, Gatineau
martin.perron@pc.gc.ca
Tel: (819) 420-9558

Virginia Sheehan, FII Archaeologist – National Coordinator

Archaeology and History Branch
Indigenous Affairs and Cultural Heritage Directorate
Parks Canada, Gatineau
virginia.sheehan@pc.gc.ca
Tel: (819) 420-9213

Keith Mercer, Mainland Nova Scotia Field Unit Cultural Resources Manager
Indigenous Affairs and Cultural Heritage Directorate
Parks Canada, Halifax
keith.mercer@pc.gc.ca
Tel: (902) 426-1992

Anne Desgagné, Cultural Resources Policy Officer
Indigenous Affairs and Cultural Heritage Directorate
Parks Canada, Quebec
anne.desgagne@pc.gc.ca
Tel: (418) 648-4472

References

Myers, H. B. 1972. *Archaeological Survey of Kejimkujik National Park, Nova Scotia 1972*, National Historic Parks and Sites Branch, Department of Indian and Northern Affairs, Halifax.

Myers, H. B. 1973. *Archaeological Survey of Kejimkujik National Park, Nova Scotia 1972*, National Historic Parks ansd Sites Branch Manuscript Report 106, Department of Indian and Northern Affairs, Halifax.

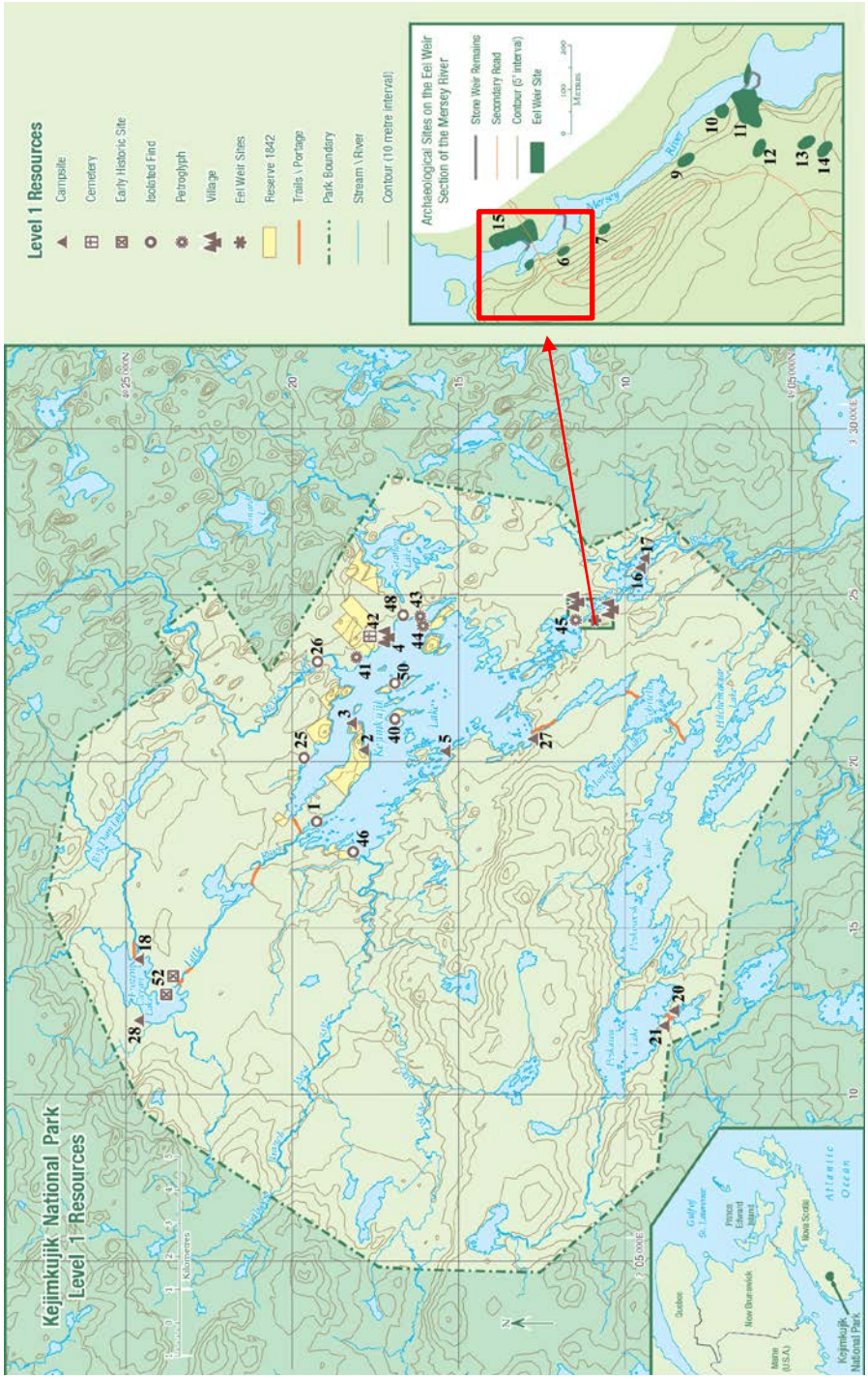
SNC Lavalin – Englobe Corp. – Logan Geotech 2016. *Geotechnical investigation, Mersey River Bridge, Kejimkujik National Park, Nova Scotia*, Halifax.

SNC Lavalin – Englobe Corp. – Logan Geotech 2016. *Geotechnical investigation, Peskowesk River Bridge, Kejimkujik National Park, Nova Scotia*, Halifax.

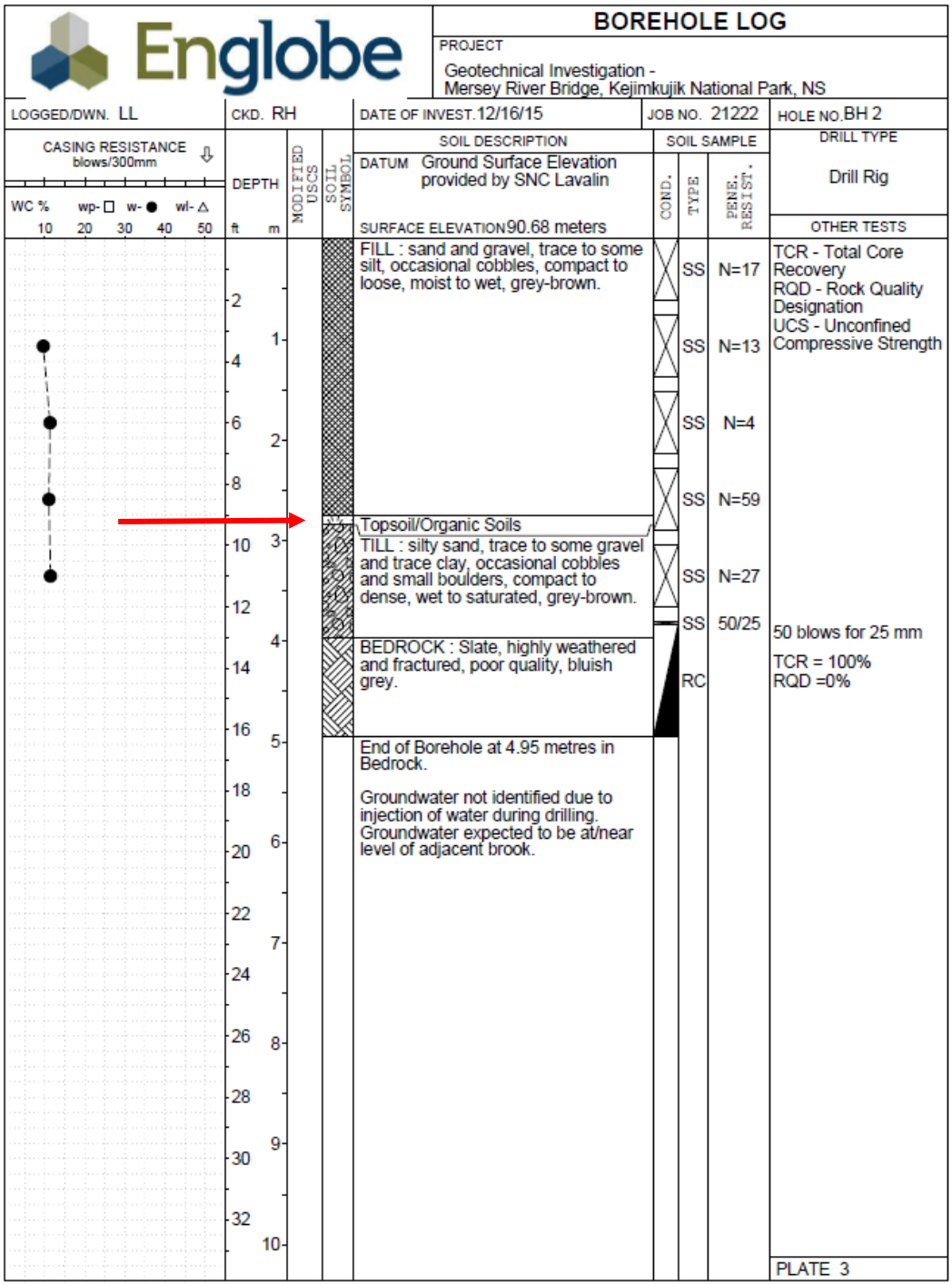
SNC Lavalin 2016. *Two bridge renewals, Kejimkujik National Park, Nova Scotia RS1/RS2 Design Report – Pre-Design services and design concept report – Infrastructure Engineering*, Public Works and Government Services Canada, Halifax.

Map 1. Location of the Mersey Bridge (Credit Google Map)

Map 2. Location of the Mersey Bridge and Eel Weir Road (Credit Google Map)



Map 3. Map of the cultural resources of historic national significance recorded at the Kejimkujik NHS&P.



Englobe

BOREHOLE LOG

PROJECT
Geotechnical Investigation - Mersey River Bridge, Kejimkujik National Park, NS

LOGGED/DWN. LL | CKD. RH | DATE OF INVEST. 12/16/15 | JOB NO. 21222 | HOLE NO. BH 2

DRILL TYPE: Drill Rig

CASING RESISTANCE blows/300mm

WC % wp- □ w- ● wl- △ 10 20 30 40 50

DEPTH ft m

MODIFIED USCS | SOIL SYMBOL

SOIL DESCRIPTION

DATUM Ground Surface Elevation provided by SNC Lavalin

SURFACE ELEVATION 90.68 meters

SOIL SAMPLE: COND. | TYPE | PENE. RESIST.

OTHER TESTS

FILL : sand and gravel, trace to some silt, occasional cobbles, compact to loose, moist to wet, grey-brown.

SS N=17

SS N=13

SS N=4

SS N=59

Topsoil/Organic Soils

TILL : silty sand, trace to some gravel and trace clay, occasional cobbles and small boulders, compact to dense, wet to saturated, grey-brown.

SS N=27

SS 50/25

50 blows for 25 mm

BEDROCK : Slate, highly weathered and fractured, poor quality, bluish grey.

RC

TCR = 100%
RQD =0%

End of Borehole at 4.95 metres in Bedrock.

Groundwater not identified due to injection of water during drilling. Groundwater expected to be at/near level of adjacent brook.

TCR - Total Core Recovery
RQD - Rock Quality Designation
UCS - Unconfined Compressive Strength

PLATE 3

Map 4. Log of borehole no BH2 performed on the east side of the Mersey River Bridge.

Appendix 2 Existing Footprint and Project Design Schematics

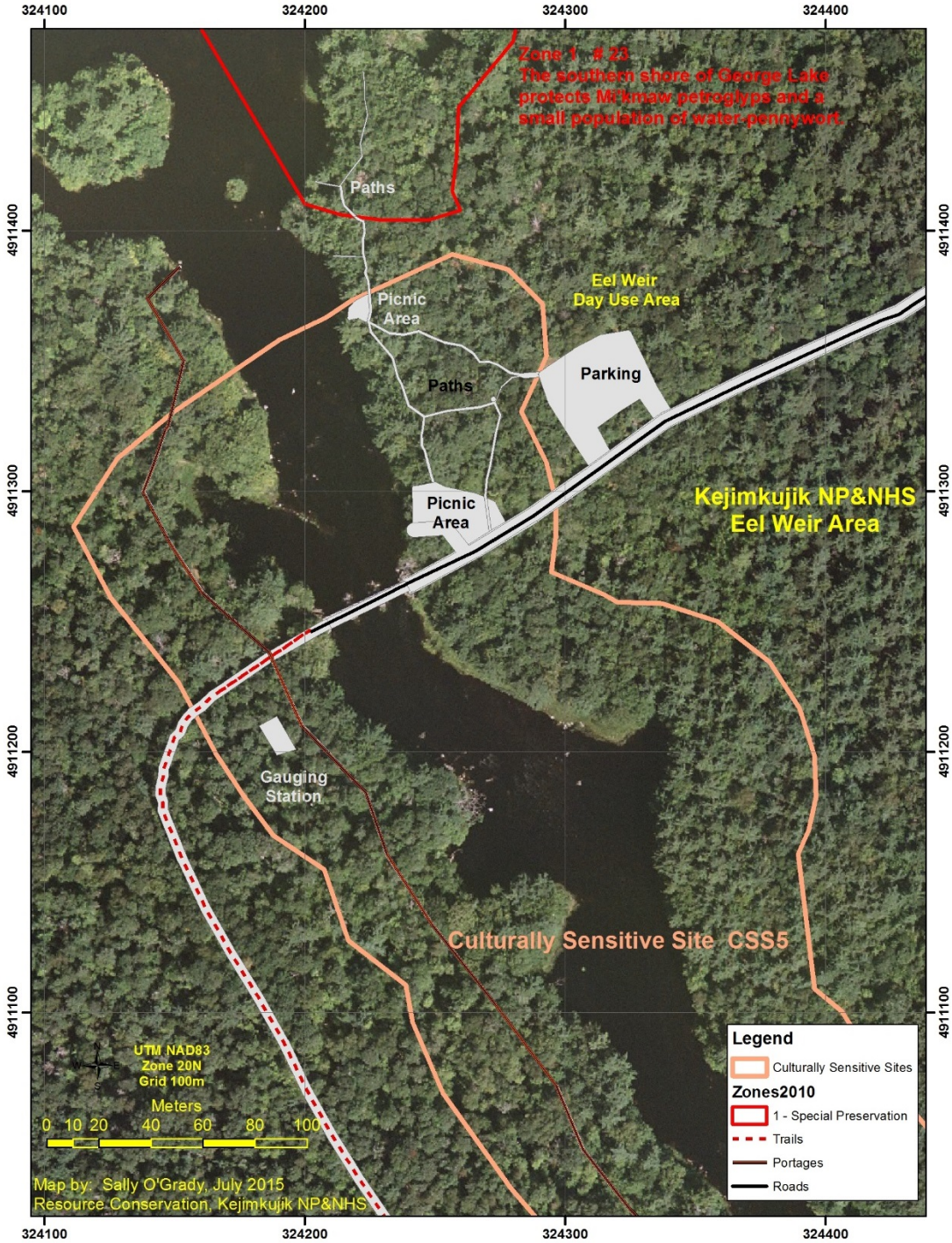


Figure 1. Existing Footprint (Area of cleared vegetation and sensitive zones)

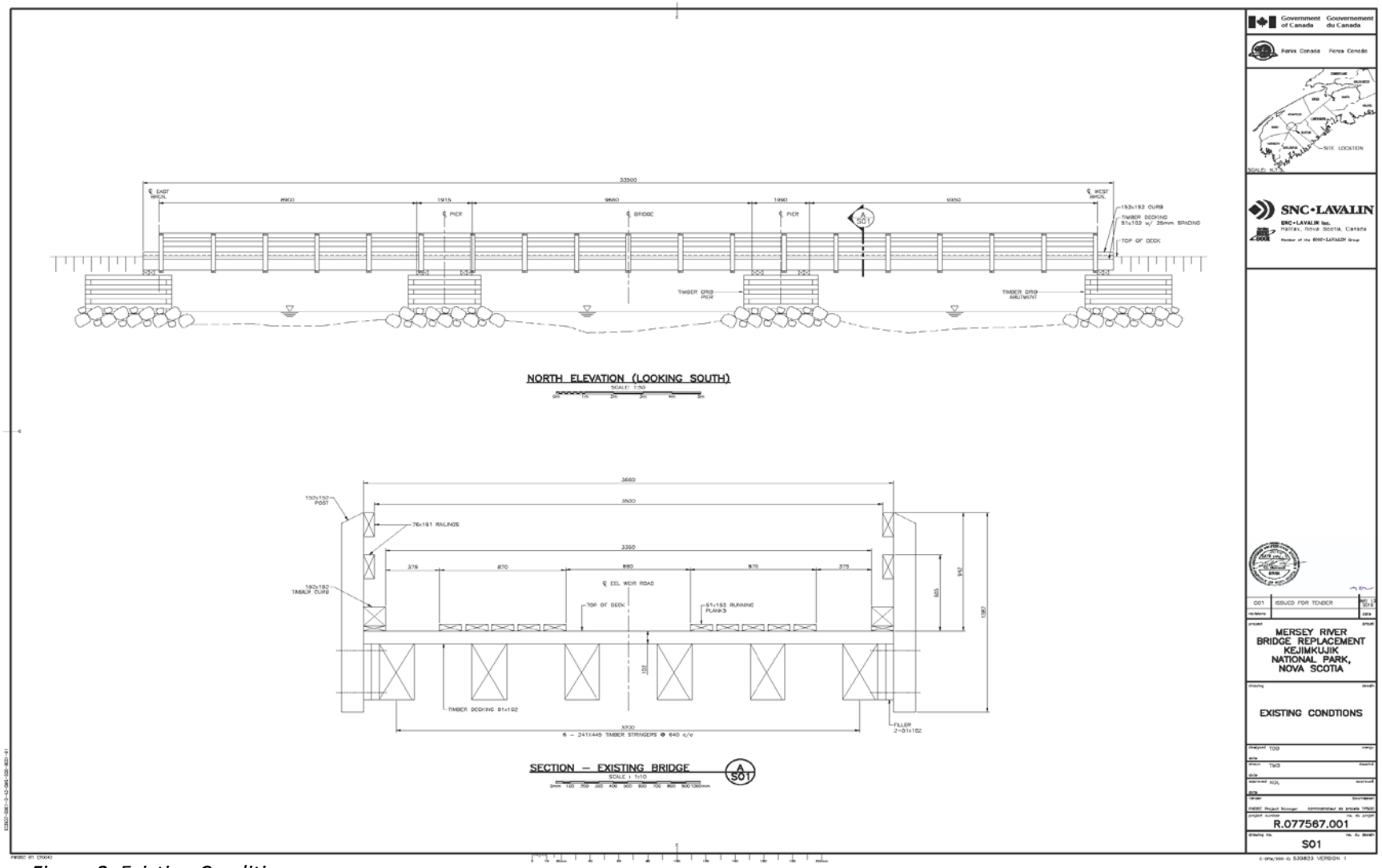


Figure 2. Existing Conditions

Figure 3. Construction Limits Plan

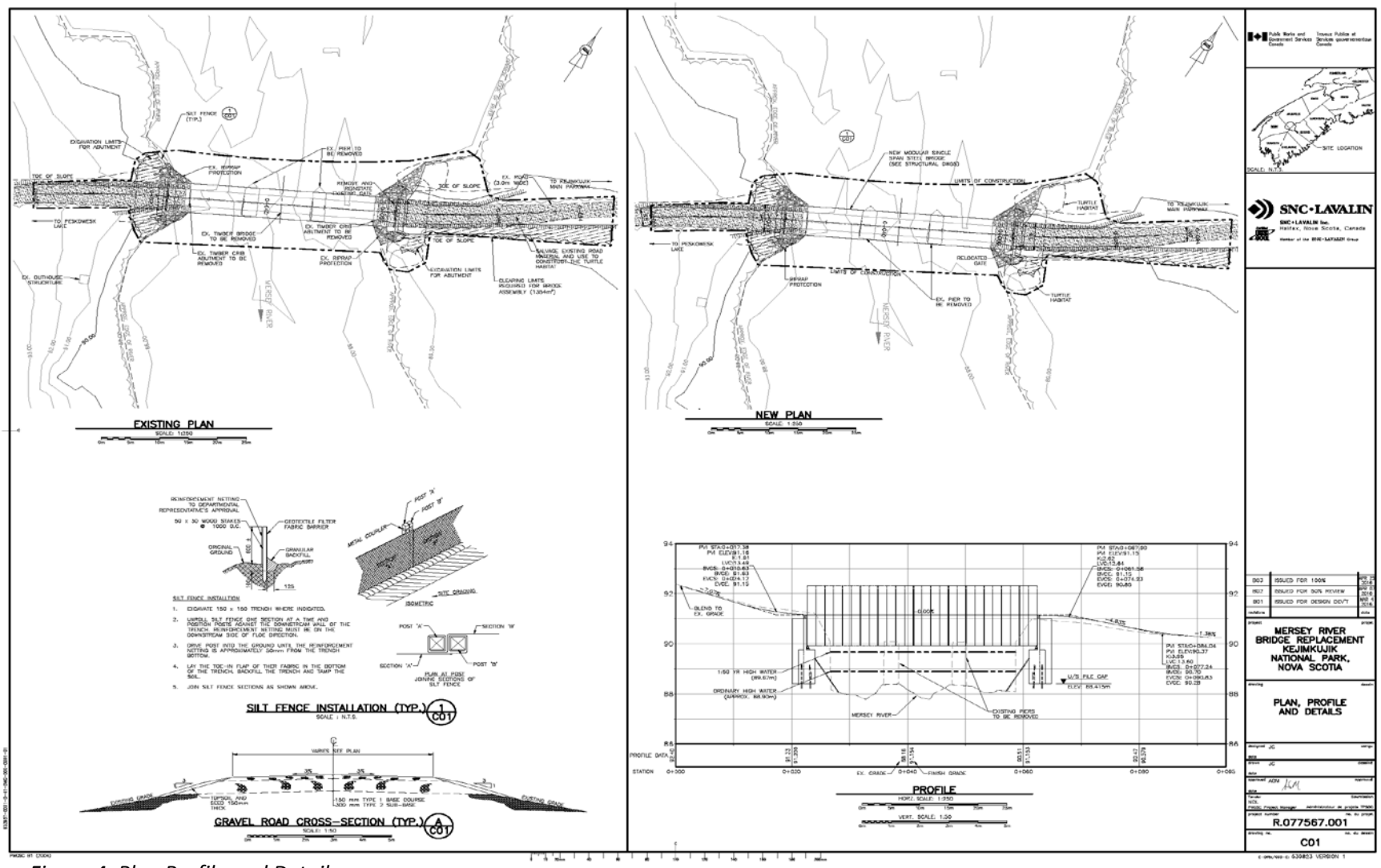


Figure 4. Plan Profile and Details

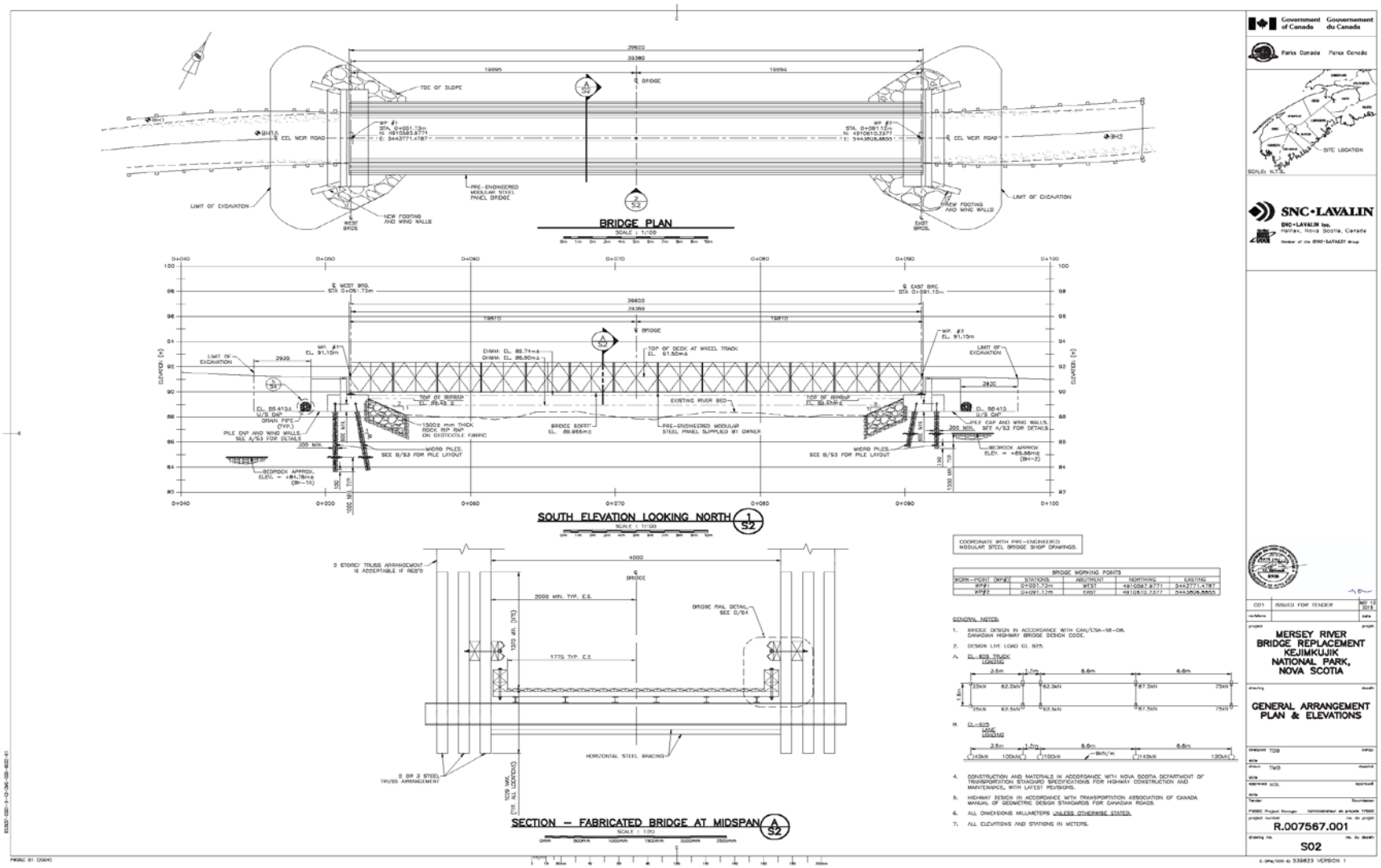


Figure 5. General Abutment Plan and Elevation

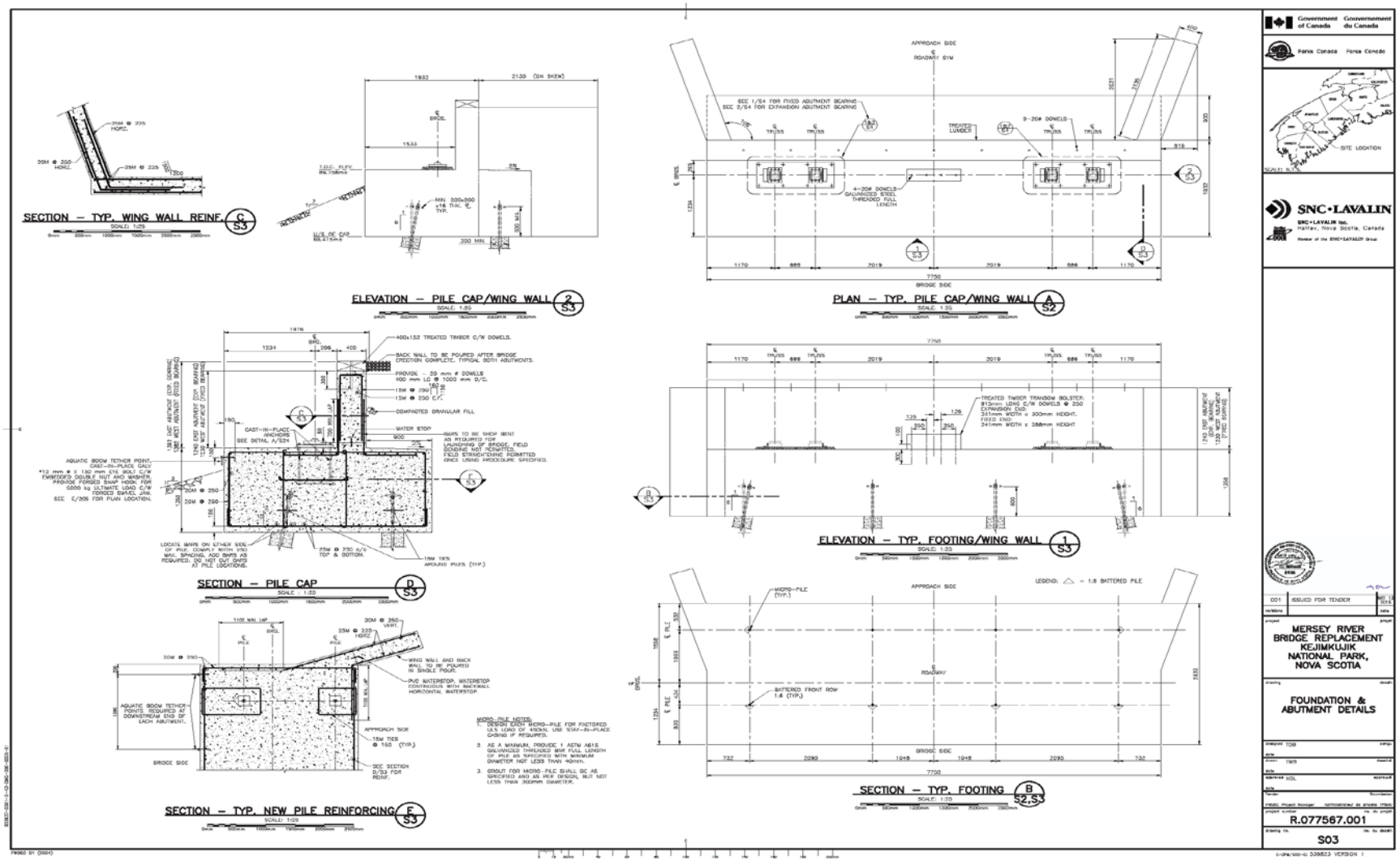


Figure 6. Foundation and Abutment Details

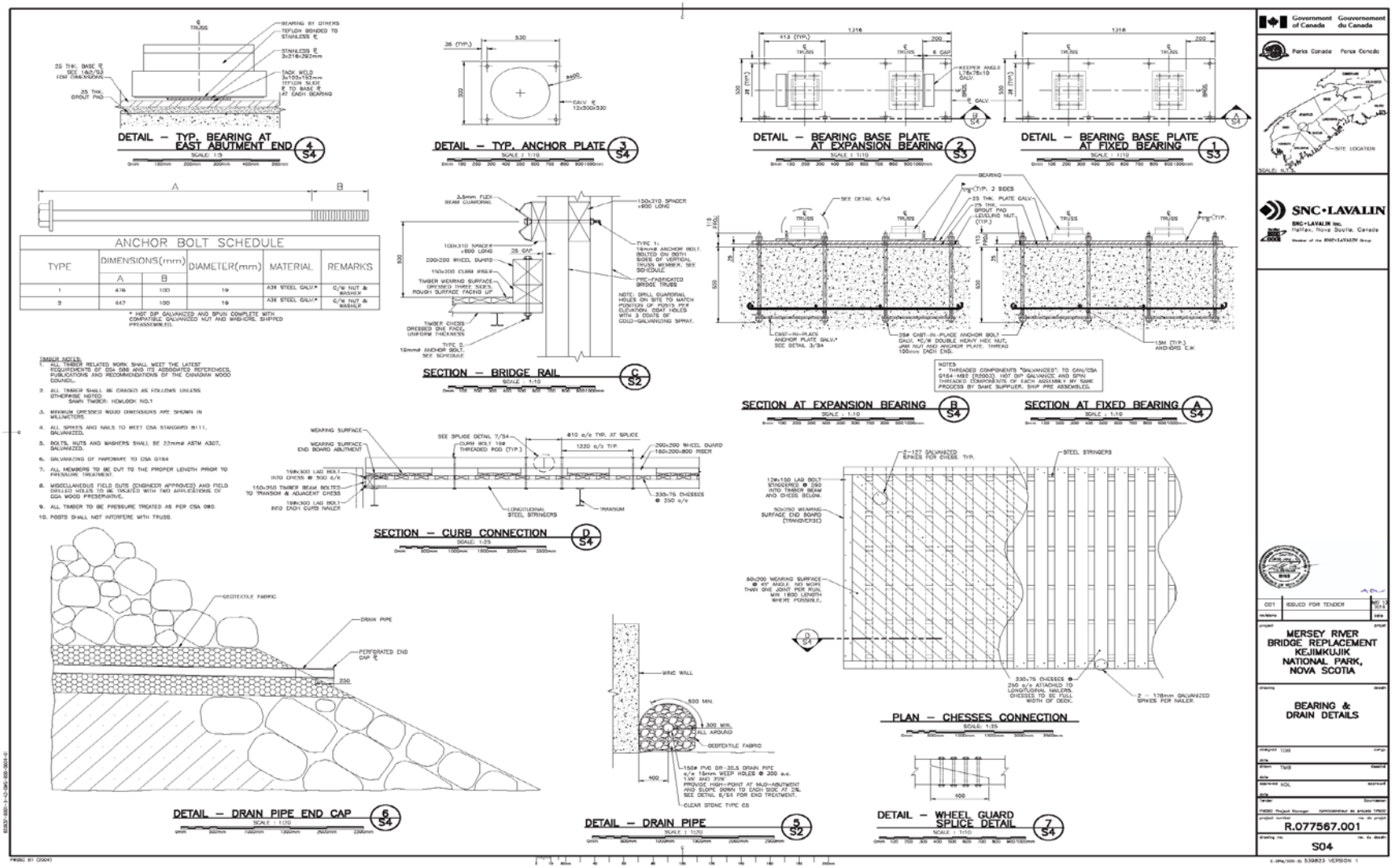
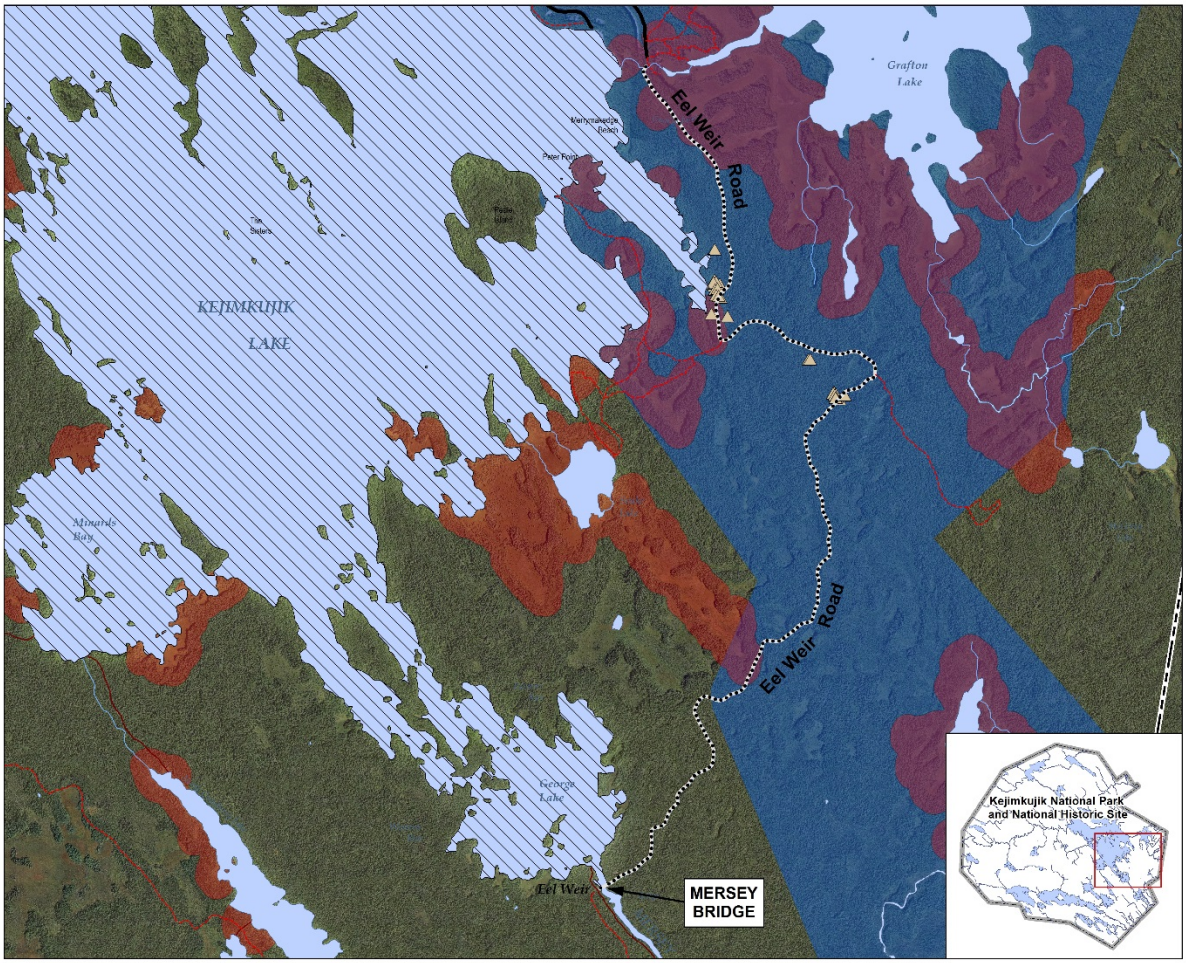


Figure 7. Bearing and Drain Details

Appendix 3 Species at Risk Critical Habitat Near Mersey Bridge and Eel Weir Road



Mersey Bridge Renewal -
Identified Critical Habitat for Species at Risk

Eastern Ribbonsnake Critical Habitat
Blanding's Turtle Critical Habitat
Eastern Ribbonsnake and Blanding's Turtle Critical Habitat
Water Pennywort Critical Habitat
Black Ash
Hiking Trails
Portages
Paved Road
Construction Access Road
Park Boundary

N W E S

0 0.25 0.5 1 1.5 2
Kilometres

Map prepared by: J. Woodruff
Parks Canada, 2017

Imagery from Applied Geomatics Research Group in 2011.

Appendix 4 Environmental Impact Analysis Tools: Effects Identification Matrix

***Section A** focuses on direct effects of the project and **Section B** on indirect effects that are caused by changes to the environment.*

A. Direct Effects									
			Valued components potentially directly affected by the proposed project						
			Natural Resources					Cultural Resources	
			Air	Soil & landforms	Water (surface, ground, crossings, etc.)	Flora (including SAR)	Fauna (including SAR)	Mi'kmaw cultural landscape	Mi'kmaw Historic Use Artefacts
	Phase	Examples of Associated Activities							
Project Components	Preparation / Construction	Supply and storage of materials	☐	☒	☒	☒	☒	☐	☐
		Burning	☐	☐	☐	☐	☐	☐	☐
		Clearing	☐	☒	☒	☒	☒	☒	☐
		Demolition	☐	☒	☒	☒	☒	☒	☐
		Disposal of waste	☐	☒	☒	☒	☒	☐	☐
		Blasting/ Drilling	☐	☒	☒	☒	☒	☐	☐
		Dredging/ Excavation	☐	☐	☒	☐	☒	☒	☒
		Drainage/Dewatering	☐	☐	☒	☐	☒	☐	☐
		Excavation	☐	☒	☒	☒	☒	☐	☒
		Grading	☐	☒	☒	☒	☒	☒	☒
		Backfilling	☐	☒	☒	☒	☒	☐	☒
		Use of machinery	☒	☒	☒	☒	☒	☐	☐
		Transport of materials/ equipment	☒	☒	☒	☒	☒	☐	☐
		Waste disposal	☐	☒	☒	☒	☒	☐	☐
		Maintenance	☒	☒	☒	☒	☒	☐	☐
		Use	☐	☒	☒	☒	☒	☐	☐
		Use/Removal of temporary facilities	☐	☒	☒	☒	☒	☐	☐
		Planting	☐	☐	☐	☐	☐	☐	☐
		Vehicle Traffic	☒	☒	☒	☒	☒	☐	☐

B. Indirect Effects (all phases)							
		Impacts as a result of changes to the environment					
		With respect to non-Aboriginal peoples:	With respect to Aboriginal peoples:		With respect to visitor experience		
		Health and socio-economic conditions	Health & socio-economic conditions	Current use of lands and resources for traditional purposes	Access & services	Recreation & accommod'n opportunities	Safety
Phase	**Natural resource components affected by the project**						
Preparation /construction operation/implementation/decommissioning	Could impacts to air lead to adverse effects on…	☐	☐	☐	☐	☐	☐
	Could impacts to soils and landforms lead to adverse effects on…	☐	☐	☐	☐	☐	☐
	Could impacts to water (e.g. surface, ground water and water crossings) lead to adverse effects on…	☒	☐	☒	☒	☒	☐
	Could impacts to flora (including SAR) lead to adverse effects on…	☐	☐	☐	☐	☐	☐
	Could impacts to fauna (including SAR) lead to adverse effects on…	☐	☐	☐	☐	☐	☐

Appendix 5 Regulatory Guidance

Jurisdictions

While all projects on lands managed by Parks Canada must adhere to Federal law and regulation, it is considered best practice to refer to local community, regional, provincial regulation and best practices where federal guidance is silent and/or attempt to meet those targets if it can reduce the overall impact of the project.

Some of the project activities reviewed have potential environmental impacts that are addressed by various provincial, federal and territorial acts and regulations. All activities must meet current environmental law and regulations in their design and construction. The following is a brief description of some of the key federal acts and regulations. Further review, understanding and application of other federal, provincial and territorial environmental laws are part of a rigorous approach to project planning and execution.

Canada National Parks Act and Regulations-Parks Canada

All work inside National Parks and Protected Areas must be performed in accordance with the laws and regulations set out in the *Canada National Parks Act* and Regulations. This includes the requirement for most activities described to only be done under a permit such as: business licence for contractor, disturbance of natural objects, travel in restricted areas, special events or use of disposal sites.

Fisheries Act - Fisheries and Oceans Canada

If a project is to be conducted near water, it is the proponent's responsibility to ensure they avoid causing **serious harm to fish** in compliance with the ***Fisheries Act***. The **advice on the Fisheries and Oceans website** will help a proponent avoid causing harm and comply with the Act.

If the water body in the project area has fish or is connected to waters at any time that have fish, the project must meet the **self-assessment criteria on the Fisheries and Oceans website**, if not a project review can be made by Fisheries and Oceans Canada to assess whether the project requires authorization or authorization can be requested directly. Given the level of detail required for a review and/or authorization request, the EIA officer may need to consider a more involved EIA pathway in those circumstances.

Migratory Birds Convention Act, 1994 – Environment and Climate Change Canada

The purpose of this Act is to implement the Convention by protecting and conserving migratory birds - as populations and individual birds - and their nests. Section 6 - prohibits the disturbance, destruction, or taking of a nest, egg, or nest shelter of a migratory bird.

In Canada, the general nesting period may start as early as mid-March and may extend until end of August. This is a general nesting period that covers most federally protected migratory bird species. This period varies regionally across Canada mainly due to differences in species assemblages, climate, elevation and habitat type. Generally, the nesting period is delayed in more northerly latitudes, corresponding to vegetation development and food availability.
(Environment Canada, 2014). To help with determining regionally relevant periods where nesting is likely to occur, Environment and Climate Change Canada is publishing estimated regional nesting periods within large geographical areas across Canada referred as "nesting zones". These periods are estimated for

each zone and consider the time of first egg-laying until the young have naturally left the vicinity of the nest. Field Units may wish to refine this section and add their known local nesting periods.

Species at Risk Act

If a species listed under the *Species at Risk Act* (SARA) is found within the project area, any potential adverse effects from the proposed project to the individuals of the species, their residences and/or their critical habitat must be understood. Species at risk considerations require specific expertise, due to additional legal requirements under the SARA and CEAA 2012.

If the project activities could affect a listed species or its critical habitat, the EIA officer may need to consider a more involved EIA pathway in those circumstances.

Appendix 6 Fisheries and Oceans Canada, Fisheries Protection Program "No Serious Harm" letter

Fisheries and Oceans Canada | Pêches et Océans Canada

Bedford Institute of Oceanography
1 Challenger Drive,
P.O. Box 1006
Station B410
Dartmouth, N.S.
B2Y 4A2

Your file *Votre référence*

April 25, 2016

Mersey River Bridge No. 2 (B089) - Bridge Renewal

Our file *Notre référence*
16-HMAR-00117

Tamara McFarland
Environmental Services
Public Works and Government Services Canada
1713 Bedford Row
Halifax, N.S.
B3J 1T3

Dear Ms. McFarland:

Subject: Serious harm to fish can be avoided or mitigated

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received a proposal on April 11, 2016.

Based on the information provided, the proposal has been identified as a project where a *Fisheries Act* authorization is not required given that serious harm to fish can be avoided by following standard measures. Proposals in this category are not considered to need an authorization from the Program under the *Fisheries Act* in order to proceed. In order to comply with the Act, it is recommended that the guidance tools, which can be found at the website (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html), be followed.

Should the plans change or if there is omitted information in the proposal such that the proposal meets the criteria for a site specific review, as described on our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html), the request for review form that is also available on the website should be completed and submitted.

Should the proponent have any questions or concerns about the compliance of their proposal with the *Fisheries Act* (and/or those prohibitions of the *Species at Risk Act* that apply to listed aquatic species)* they may wish to engage an environmental professional

*Those sections most relevant to the review of development proposals include 20 and 35 of the *Fisheries Act* and sections 32, 33 and 58 of the *Species at Risk Act*. For more information please visit www.dfo-mpo.gc.ca.

Canada

.../1

16-G-117 - 2 -

familiar with measures to avoid impacts to fish and fish habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/env-pro-eng.html).

Yours sincerely,

Craig Hominick
Team Lead
Fisheries Protection Program

Appendix 7 Parks Canada Agency Draft Treated Wood Management Guide

Parks Canada Parcs Canada

Parks Canada

Treated Wood Management Guide

December 2015

Canada

Contents

NAME: Parks Canada Treated Wood Management Guide

APPROVAL DATE:
EFFECTIVE DATE:

CONTACT: Environmental Management, Strategy & Plans

Alexandre Ferland Chief, Environmental Management 819-420-9111 alexandre.ferland@pc.gc.ca	Mikailou Sy Manager, Environmental Management 819-420-5176 mikailou.sy@pc.gc.ca

Parks Canada Intranet Site: http://intranet2/our-work/environmental-and-fleet-management/environmental-management/treated-wood-bois-traité/

RESCINDED DOCUMENT: Guidelines for the Use, Handling and Disposal of Treated Wood, 2009

REVIEW: This Guide will be reviewed on a five year basis, and updated/revised as necessary.

AMENDMENTS:

CHANGE / RATIONALE	DATE	APPROVAL

1 PURPOSE

This Management Guide provides operators on Parks Canada lands and waters with detailed information on, management procedures for, alternatives to and Best Practices for use, storage, handling and disposal of treated wood.

2 INTRODUCTION

This guide is developed to complement the Parks Canada Treated Wood Management Standard, which aims at increasing awareness, compliance with applicable legislation and code of practice, and consistency across the Agency, while reducing potential risk to human health and the environment. While the requirements of the standard are to be complied with, these guidelines are only recommended for consideration when working with treated wood across the Agency. Types of wood preservatives legally registered in Canada (see Appendix 1 for list and explanation) and best practices for managing treated wood, including alternatives to treated wood, are discussed with further references provided. A template to rationalize for use of treated wood within each Field Unit, as required under the Parks Canada Treated Wood Management Standard, is also provided, so as to promote consistency across the Agency and facilitate audit, evaluation and monitoring activities.

3 DEFINITIONS

Borate	Natural water-soluble mineral, harmless to humans and animals, yet effective in protecting wood against rot and insects.
Fixation	Industrial chemical process by which the metals in a waterborne wood preservative solution react with and bond to the wood fiber molecules.
Fungus	Organism (plant-like) that lacks chlorophyll and that must obtain its food by microscopic, root-like filaments that penetrate wood tissue and absorb its energy-rich chemicals.
Marine Borer	Xylophagous bivalve mollusc of the *Teredinidae* family that uses tooted rings on its shell as drills to bore tunnels in submerged wood in marine environments.
On-Site Release	Discharge of a pollutant, from within the boundaries of a facility, to the environment, including (i) emissions to air, (ii) discharges to surface waters, (iii) discharges to land and (iv) deep-well underground injections.
Sealer	Water repellent chemical that is impregnated into the wood along with the preservative optimum appearance and durability.

Toxic Substance Substance listed under Schedule 1 of the *Canadian Environmental Protection Act 1999* (CEPA 1999).

Treated Wood Wood that is impregnated with a pesticide that is a wood preservative duly registered in Canada, as required under the *Pest Control Products Act 2006* (PCPA 2006). The preservation process requires (i) a pesticide (the active ingredient), (ii) a carrier (water or oil) and a treatment method (heat, manual application or pressure).

4 LIST OF ACRONYMS

ACA	Ammoniacal copper arsenate
ACQ	Alkaline copper quaternary
ACZA	Ammoniacal copper zinc arsenate
CA	Copper azole
CCA	Chromated copper arsenate
CuN	Copper naphthenate
PAH	Polycyclic aromatic hydrocarbon
PCP	Pentachlorophenol
PE	Polyethylene
ZnN	Zinc naphthenate

5 BEST PRACTICES

5.1 Alternatives to Treated Wood

The use of treated wood should be minimized. The following are some examples of possible alternatives.

5.1.1 Composites (Recycled-Plastic Lumber)

Composites are made of wood fibres and recycled grocery bags/milk jugs. They do not warp, split, chip or rot and do not require sealing or staining. They tend to be durable, stable and weather resistant. Composites are more expensive than treated wood, are not for structural use and can be vulnerable to mold and colour fading (U.S. EPA 2005a).

5.1.2 Virgin Polymer Plastic Lumber

Virgin polymer plastic lumber is the use of virgin polypropylene and/or polystyrene instead of recycled plastics. It has a higher flex modulus and flexural strength than recycled plastic lumber (EPIC & CSR, 2003). It is durable, stable and weather resistant. It also does not warp, split, chip or rot and does not require sealing or staining. It is more expensive than treated wood and is not for structural use.

5.1.3 Rubber Lumber

Rubber lumber is made of 50% plastic and 50% recycled tires (U.S. EPA, 2005a). It is durable, impermeable, and resistant to insects. It is not for structural use and the colour tends to fade.

5.1.4 Native Durable Wood

Some native trees of North America produce wood that is naturally more durable than others. The hardwood of white oak (*Quercus alba*) or burr oak (*Quercus macrocarpa*), and the softwood of Northern white cedar (*Thuja occidentalis*) may naturally resist to decay and pests for 5 to 15 years. The softwood of the Eastern red cedar (*Juniperus virginiana*), the Western red cedar (*Thuja plicata*) and the redwood (*Sequoia spp.*) may exhibit such resistance for 10 to 30 years (Hoffman et al., 2002). Redwood, for instance, on top of being aesthetically pleasant, does not usually need sealing or staining and is easy to nail and saw. However, the worldwide supply of Redwood is depleting, bringing the price even higher and raising sustainability concerns, aside from being vulnerable to scratching and denting (U.S. EPA 2005a).

5.1.5 Exotic Durable Wood

Exotic durable hardwoods include the wood of Mahogany (*Swietenia spp., Entandrophragma spp., Khaya spp.,* etc.) and several Ironwood species (*Tabebuia serratifolia, Krugiodendron ferreum, Diospyros spp.,* etc.). They are naturally durable, resistant to decay and insects, do not usually need sealing or staining and are relatively impermeable to water. Unfortunately their worldwide supplies are depleting, raising sustainability concerns and maintaining high prices.

5.2 Existing Treated Wood Structures and Facilities

Many structures and facilities built with treated wood can be found in sites managed by Parks Canada. These structures and facilities should be handled as follows:

1. If they are in good condition, existing structures and facilities built with any type of treated wood should not be replaced, unless they may be in direct contact with drinking water.

2. The surfaces of all structures and facilities that have been treated with a CCA or ACZA wood preservative and that may be touched regularly by visitors (e.g. handrails, picnic tables, etc.) should be completely covered with a penetrating, oil-based sealer. In addition to waterproofing the wood, the application of such sealers reduces the release of chemicals contained in CCA-treated wood by 80% to 95% (Stilwell and Musante, 2003). Another coat of penetrating oil-based sealer should be applied when the current finish begins to show signs of deterioration.

3. The use of non-penetrating finishes, such as paint or urethane, is not recommended because peeling and flaking can increase exposure to preservatives contained in the wood (U.S.EPA, 2005b).

4. It may not be justifiable to add a coat of preservative to a structure made from old treated wood. This practice would not extend the structure's durability. Instead, the replacement of the existing structure should be considered if it has reached the end of its useful life.

5. For treated wood structures that are in place in aquatic environments polyethylene (PE) wear strips should be used to prevent abrasion (Environment Canada, 2004).

5.3 New Treated Wood Structures and Facilities

In order to use treated wood in accordance with the Parks Canada Treated Wood Management Standards, the following Best Practices should be considered in the design of new structures and facilities.

1. Mixtures of several active ingredients for multipurpose wood preservation contexts are becoming more common and intracellular[1] impregnation of the wood with active ingredients is deemed to significantly reduce leaching and increase durability.

2. A wide array of environmental certification programs exist for treated wood. It is recommended to thoroughly review the scope of the technological and environmental certification claims as part of the rationale for use of treated wood on Parks Canada lands and waters, on a case per case basis. For assistance with this please contact Environmental Management.

3. Treated wood should only be used when it is important that the wood be protected (risk of decay, attack by insects or contact with water or damp soil), in accordance with *the National Building Code of Canada* or where it is necessary to maintain the heritage value of a historic place or asset. Wood treatment should not be a substitute for good construction design.

4. Project proponents should be able to determine the most appropriate products and should be able to justify their use. A template can be found in Appendix 1 as well as on the Parks Canada Intranet to document the rationale for the use of treated wood.

5. No treated wood should be used in the construction of items that may come in direct contact with food/ drinking water or that may introduce chemicals into the food chain: feeders, picnic tables, silos and other feed storage structures, hives, drinking troughs, compost bins and wood chip mulch.

6. Purchased treated wood should be marked with an end tag to show it was produced under the national certification program and that it has been treated to the applicable CSA treatment standard. The end tag should show the preservative used, the use category, the product group and a plant identification number. Below is an example of an end tag.

A: Product Group
XXXX: Preservative type (ex. ACQ-B)
UCX.X: Use Category
Use Location: i.e. above ground or ground contact

Figure 1: End tag certification mark (modified from Canadian Wood Council, date NA c)

[1] A copper-based wood preservation technology is currently marketed in Canada and USA.

7. Choose wood that has been treated in accordance to the CSA O80 Standard Product Group and Use Category system that corresponds to the planned use. There are four residential product groups: A (members 25 mm or thinner for use where decay is unlikely), B (members between 25 mm and 40 mm and less than 150 mm wide, where potential for decay is low or that are not used for structural purposes), C (structural lumber thinner than 40 mm used for supports in exterior applications) and D (members used for posts and timbers in ground contact). The Use Categories are as follows:

Table 1: Treated Wood Use Categories (modified from: Wood Preservation Canada, 2012)

Category	Conditions
UC1	Wood that is to be used in interior construction in dry conditions (no ground contact)
UC2	Wood that is to be used in interior construction with potentially damp conditions (no ground contact)
UC3.1	Wood to be used in exterior construction that are coated and exposed to weather but have rapid water run-off (no ground contact)
UC3.2	Wood to be used in exterior construction that are uncoated or have poor water run-off (no ground contact)
UC4.1	Wood to be used in ground contact (non-critical components)
UC4.2	Wood to be used in ground contact (critical structural components or difficult replacement)
UC5A	Wood to be exposed to coastal waters
UCF.1	Fire protection

5.4 Storage and Safe Handling of Treated Wood

1. Treated wood should be visually inspected before and after installation to ensure that it appears clean and its surface is free of preservative residues. Otherwise, the lumber should not be used and should be disposed of in accordance with the manufacturer's guidelines, as specified in the treated wood MSDS.

2. Anyone who handles treated wood should wear gloves and a long-sleeve shirt. When sawing, sanding and shaping treated wood, workers should also wear dust masks and goggles to avoid touching or inhaling sawdust.

3. Workers must always cut and work with treated wood outdoors or in an adequately ventilated area.

4. Anyone who works with treated wood should wash their hands immediately after finishing their work, and especially before eating, drinking or smoking.

5. Hazardous incidents involving treated wood may occur through direct handling of treated wood or during the treatment process (ex. in-field treatment of cut ends). In all cases of hazardous incidents the Policy and Procedures on Hazardous Occurrence Reporting and

Recording should be followed. Any related records should be kept for a period of thirty (30) years. For more information please contact ohs-sst@pc.gc.ca
The contact listed on the MSDS or pesticide label should also be informed in cases of incidents involving treated wood.

6. If treated wood is to be stored on site prior to installation or post use the following table provides recommended instructions:

Table 3: Storage Recommendations (modified from Environment Canada, 2004)

Time Period	Volume of Storage	Factors
90 Days or Less	55 m^3 or less	-Store on flat ground (slope less than 10%) and a minimum of 10 m from environmentally sensitive area -If possible elevate to avoid contact with water runoff -provide absorbent base (ex. wood chips) -minimize on site storage time -inspect wood upon delivery -place tarpaulin or weather resistant material over wood -inspect storage area for evidence of leaching treatment chemicals
	More than 55 m^3	-Store on flat ground (slope less than 10%) and a minimum of 30 m from environmentally sensitive area -If possible elevate to avoid contact with water runoff -provide absorbent base (ex. wood chips) -minimize on site storage time -inspect wood upon delivery -place tarpaulin or weather resistant material over wood -inspect storage area for evidence of leaching treatment chemicals
More than 90 days	55 m^3 or less	-Store on flat ground (slope less than 10%), a minimum of 10 m from environmentally sensitive area and a minimum of 3 m from drainage ditches -If possible store on surfaces with limited permeability (ex. clay or concrete) and elevate to avoid contact with water runoff -Provide absorbent base (ex. wood chips) -Provide emergency response information and fire protection equipment -Limit access to the storage area -Minimize on site storage time - place tarpaulin or weather resistant material over wood -inspect storage area for evidence of leaching treatment chemicals
	More than 55 m^3	-Store on flat ground (slope less than 10%), a minimum of 30 m from environmentally sensitive area and a minimum of 3 m from drainage ditches -store at least 30 m from potable water supply and outside of 100-year flood plain where possible -Store at least 30 m from forested area and clear storage area of combustible ground vegetation. -If possible store on surfaces with limited permeability (ex. clay or concrete) and elevate to avoid contact with water runoff

		-Provide absorbent base (ex. wood chips) and choose a storage area where runoff can be captured/ managed -Provide emergency response information and fire protection equipment -Limit access to the storage area, and provide fencing/ signage around area -Minimize on site storage time -inspect storage area for evidence of leaching treatment chemicals

5.5 Installation, Field Treatment and Maintenance of Treated Wood

1. In order to mitigate risk it is recommended that a sealer be used to reduce leaching potential. Wood treated with borate preservatives should also not be used in locations where it will be subject to heavy rains or ground contact to reduce leaching.

2. The use of cleaning and bleaching products containing sodium hypochlorite, sodium hydroxide, sodium percarbonate or citric or oxalic acid on treated wood should be avoided because these products can cause the wood to release toxic chemicals (PTW-SafetyInfo Website, date NA).

3. In order to minimize the need for in-field treatment it is recommended that framing, sawing, cutting and drilling should be done before treatment to the maximum degree possible. Although it may require more engineering it will insure a more efficient installation.

4. Exposed cut ends and drill holes should be field-treated[2] with a preservative (along with a sealer) in accordance with the manufacturer's and the preservative label instructions, preferably well away from water, in a protected cutting area and prior to the assembly of the wooden structure.

5. If the preservative used for field treatment (i.e. cut ends) is a commercial or restricted class pesticide, training and certification or training and permit may be required for the field applicator. This training is provided provincially to meet the "*Standard for Pesticide Education, Training and Certification in Canada*" established by Health Canada – Pest Management Regulatory Agency (PMRA). The following table provides links for more information on training for each province and territory.

British Columbia	http://www2.gov.bc.ca/gov/content/environment/pesticides-pest-management/pesticide-use/pesticide-certification
Alberta	http://esrd.alberta.ca/lands-forests/land-industrial/programs-and-services/pesticide-management/pesticide-use/applicator-certification/pesticide-applicator-certification-program.aspx
Saskatchewan	http://www.agriculture.gov.sk.ca/Pesticide-Applicator

[2] Ensure that field applicators (using commercial or restricted class pesticides) meet the requirements of the "*Standard for Pesticide Education, Training and Certification in Canada*" established by Health Canada – Pest Management Regulatory Agency (PMRA).

Manitoba	https://www.gov.mb.ca/agriculture/permits-and-licences/pesticide-and-manure/pesticide-applicator-licence.html
Ontario	http://www.ontariopesticide.com/
Quebec	http://www.mddelcc.gouv.qc.ca/pesticides/permis-en/
New Brunswick	http://www2.gnb.ca/content/gnb/en/services/services_renderer.2915.Pesticide_Applicator_Certificate.html
Nova Scotia	http://www.novascotia.ca/nse/pests/applicator.asp
Prince Edward Island	http://www.gov.pe.ca/environment/pesticide-applicator-certificate
Newfoundland and Labrador	http://www.env.gov.nl.ca/env/env_protection/pesticides/business/training.html
Yukon	http://www.env.gov.yk.ca/air-water-waste/pesticides_regs.php
Northwest Territories	http://services.exec.gov.nt.ca/service/208
Nunavut	http://gov.nu.ca/sites/default/files/gnjustice2/justicedocuments/Consolidated%20Law/Original/PESTICIDE%20ACT/633409249303125000-5932574-Reg277.pdf

6. If the chemical solution is accidentally spilled while ends are being field-treated, the spill should be contained with a disposable absorbent substance (soil, sawdust, forest litter or rags) and cleaned up immediately. Dispose of the contaminated absorbent material safely, in accordance with the pesticide (preservative) label.

5.6 Disposal of Treated Wood

1. Never dispose of treated wood by burning.
2. Do not compost scraps, wood chips or sawdust from treated wood.
3. All remaining scraps, cuttings, wood chips and sawdust must be collected efficiently and in a timely matter.
4. Refer to the treated wood MSDS for appropriate disposal of the materials.

5.7 Recommended Hardware for Treated Wood

5.7.1 Connectors

1. Connectors used for ACQ- or CA-treated wood should be manufactured from steel and be either galvanized in accordance with ASTM A653, G185 designation, or be galvanized after manufacture in accordance with ASTM A123.

2. For borate-treated wood used inside buildings, the same connectors can be used as for untreated wood.

5.7.2 Fasteners

1. Fasteners for ACQ-, CA-, treated wood should be galvanized in accordance with ASTM A153. Stainless steel may be used for maximum service life or severe applications. Where appropriate, copper fasteners may also be used.

2. Corrosion-resistant fastenings should be used to minimize moisture damage.

3. Fasteners used in combination with metal connectors must be the same type of metal to avoid galvanic corrosion caused by dissimilar metals.

4. For borate-treated wood used inside buildings, the same fasteners can be used as for untreated wood.

5.7.3 Flashing

1. Flashing used in contact with treated wood must be compatible with the treated wood.

2. Copper and stainless steel are the most durable metals for flashing. Galvanized steel, in accordance with ASTM A653, G185 designation, is also suitable for use as flashing. Fasteners should be compatible to avoid galvanic corrosion.

5.7.4 Other Hardware

1. There may be additional products such as polymer or ceramic coatings, or vinyl or plastic flashings that are suitable for use with treated wood products. Consult the individual fastener, connector or flashing manufacturer for recommendations for use of their products with treated wood.

6 REFERENCES

Brooks, K.M., (2004). *Polycyclic Aromatic Hydrocarbon Migration from Creosote – Treated Railway Ties into Ballast and Adjacent Wetlands*. United States Department of Agriculture in Co-operation with the United States Department of Transportation.

Canadian Wood Council. (Date NA b). *FAQs – Treated Wood*. http://cwc.ca/wp-content/uploads/FAQ-durability-Treated_wood.pdf

Canadian Wood Council. (Date NA c). *Introducing the Canadian National System for Certification of Pressure Treated Wood*. http://www.boabc.org/assets/Latest~News/Canadian%20National%20System%20for%20Certification%20of%20Pressure%20Treated%20Wood.pdf

Environment Canada. (2004). *Industrial Treated Wood Users Guidance Document*. http://www.electricity.ca/media/pdfs/environmental/wood_preservation/UGD_eng.pdf

Environment Canada, the Pest Management Regulatory Agency & Wood Preservation Canada.

(2013). *Recommendations for the Design and Operation of Wood Preservation Facilities.* http://ec.gc.ca/pollution/8A0440A3-9F44-4C11-947B-6A7BB07AA873/1459_DRT_2013_ENG_WEB_Final.pdf

Environmental and Plastics Industry Council (EPIC) & Corporations Supporting Recycling (CSR). (2003). *Recycled Plastic Lumber.* http://www.plastics.ca/_files/file.php?filename=file_files_PlasticLumber_Final_Report.pdf

Hoffman, T.R., L.T. Hendricks, K. Powell. (2002). *Selecting Preservative Treated Wood with Special Emphasis on Landscape Timbers.* University of Minnesota, College of Natural Resources. http://www.extension.umn.edu/distribution/housingandclothing/DK0897.html

Hutton, K.E. and Samis, S.C. (2000). *Guidelines to Protect Fish and Fish Habitats from Treated Wood Used in Aquatic Environments in the Pacific Region.* Fisheries and Oceans Canada, Habitat and Enhancement Branch. Canadian Technical Report of Fisheries and Aquatic Sciences 2314: vi + 34p. http://www.dfo-mpo.gc.ca/Library/245973.pdf

Lebow, S.T. and Tippie, M. (2001). *Guide for Minimizing the Effect of Preservative –Treated Wood on Sensitive Environments.* United States Department of Agriculture in cooperation with the Forest Service. 22p. http://www.fpl.fs.fed.us/documnts/fplgtr/fplgtr122.pdf

Newfoundland and Labrador Environmental Industry Association, Division of Water Resources. (1993). *Policy Directive: Guideline for Treated Utility Poles in Water Supply Areas.* http://www.env.gov.nl.ca/env/waterres/regulations/policies/utility_poles.html

Pest Management Regulatory Agency and Health Canada. (2005). *Fact Sheet on Chromated Copper Arsenate (CCA) Treated Wood.* http://www.hc-sc.gc.ca/cps-spc/pubs/pest/_fact-fiche/cca-acc/index-eng.php

PTW-SafetyInfo. (Date NA). *Consumer Safety Information Sheet – Chromated Copper Arsenate (CCA).* http://www.ptw-safetyinfo.ca/en/chromated-copper-arsenate-cca

Simpson Stron-Tie, Inc. (2005) *Pressure – Treated Wood FAQs*. http://www.strongtie.com

Stilwell, D.E. and Musante, C.L. (2003). 11p. *Effect of Coatings on CCA Leaching From Wood in a Soil Environment.* http://www.ccaresearch.org/Pre-Conference/pdf/stilwell.pdf

U.S. Environmental Protection Agency. (2005a). *Chromated Copper Arsenate (CCA): Alternatives to Pressure-Treated Wood.* http://www.epa.gov/oppad001/reregistration/cca/pressuretreatedwood_alternatives.htm

U.S. Environmental Protection Agency. (2005b). *Questions & Answers on CCA-Treated Wood Sealant Studies (Interim Results).* http://www.epa.gov/oppad001/reregistration/cca/sealant_qa.htm

Wood Preservation Canada. (2012). *Wood Preservation Standards – Non Residential Applications.* http://www.woodpreservation.ca/images/pdf/wpc_specifiers_guide.pdf

Appendix 1: VARIOUS TYPES OF WOOD PRESERVATIVES

Wood preservatives have been used around the world for many years and across Canada for more than a hundred years. During that time, wood preservatives have proven to be an effective treatment against natural wood degradation agents such as fungi and insects. The following section describes the most common types of wood preservatives.

1.0 Waterborne Wood Preservatives

Chromated copper arsenate (CCA), alkaline copper quaternary compounds (ACQ), copper azole (CA), and ammoniacal copper zinc arsenate (ACZA) are common waterborne preservatives. These react with or precipitate in the wood substrate and become "fixed" to prevent leaching. Waterborne preservatives are often used in residential applications because they have a dry paintable surface. These preservatives are primarily used to treat softwood species and are very effective for this application. However, because their cellular structure is different, hardwoods treated with waterborne preservatives may not be adequately protected in some types of exposures or environments (Lebow and Tippie, 2001). Waterborne wood preservatives may increase corrosion of unprotected metal, and so all metal fasteners used with treated wood should be hot-dipped galvanized or stainless steel. Although, not all stainless steel fasteners are acceptable for use with treated wood (Simpson, 2005).

1.1 Alkaline Copper Quaternary (ACQ)

Alkaline copper quaternary (ACQ) prevents decay from fungi and insects and was developed because of environmental and safety concerns with CCA. This preservative contains copper and a quaternary ammonium compound (quat). Multiple variations of ACQ have already been standardized allowing flexibility to work with different wood species and end use applications. Currently there are three types, ACQ-A, ACQ-C and ACQ-D, registered for use in Canada. Type ACQ-A has 50% copper oxide and 50% quat. ACQ-C and-D both have 2:1 ratios of copper oxide to quat but different forms of quat (Environment Canada, 2013). It is not for use in critical infrastructure such as utility poles, railway ties or foundations (Environment Canada, 2013).

1.2 Copper Azole (CA)

Copper azole (CA) is another developed wood preservative that contains copper, boric acid, and tenuconazole. These three active ingredients work together to protect against decay fungi and insects. CA is able to provide good treatment for southern pine and hemlock/fir species groups (Lebow and Tippie, 2001). It can be used in residential, general construction and agricultural uses, but is not to be used as a treatment for utility poles and pilings (Environment Canada, 2013).

1.3 Borate-Based Preservatives

Borate preservatives are salts such as sodium octaborate (disodium octaborate tetrahydrate – DOT), sodium tetraborate and sodium pentaborate that are dissolved in water. Borate preservatives remain water-soluble and readily leach out in soil or rainwater (Lebow and Tippie, 2001).

1.4 Chromated Copper Arsenate (CCA)

Chromated copper arsenate (CCA) is a waterborne preservative containing arsenic, chromium and copper. This type of preservative is used for the long-term protection of wood against attack by fungi, insects and marine borers. CCA-treated wood typically has a light green color but it may also be factory stained or dyed to various shades of brown. A water-repellent treatment is sometimes applied to help prevent checking and splitting when the wood is used on a flat surface, such as decking. CCA-treated wood has little or no odour associate to it (Lebow and Tippie, 2001).

Until January 2004, CCA was the most widely used wood preservative in North America (Health Canada, 2005), however it was voluntarily phased out from use in residential applications in 2003 and now is only allowed for industrial use (Environment Canada, 2013). In Canada type C oxide is the only formulation currently used. Use of CCA treated wood is prohibited in Parks Canada operations due to the presence of inorganic arsenic and chromium VI, which are listed as toxic substances under CEPA 1999.

1.5 Ammoniacal Copper Zinc Arsenate (ACZA)

Ammoniacal copper zinc arsenate (ACZA) contains copper, zinc, and arsenic. It protects against attack by decay fungi, insects and most types of marine borers. Its uses are very similar to those of CCA and include treatment of poles, pilings and timbers. Because of its ability to penetrate Douglas fir and other difficult–to-treat wood species, it is most widely used on the west coast. The colour tends to be dark brown to bluish green. The wood initially has a slight ammonia odour, but soon dissipates after treatment as the wood dries (Lebow and Tippie, 2001). The Pest Management Regulatory Agency updated the label to prohibit use in residential applications in 2011. Use of ACZA treated wood is prohibited in Parks Canada operations due to the presence of inorganic arsenic which is listed as a toxic substance under CEPA 1999.

2.0 Oilborne Wood Preservatives

Creosote, pentachlorophenol (PCP), copper naphthenate and zinc naphthenate are common oilborne preservatives that are used for applications such as utility poles, bridge timbers, railroad ties, pilings and laminated means. They tend to have a strong odour and can be oily, they therefore are generally not used for purposes that may have frequent human skin contact or inside dwellings. These preservatives also act as water repellants because of their oily nature, and can help to prevent the checking and splitting of wood (Lebow and Tippie, 2001).

2.1 Creosote

Although Creosote differs from other oilborne preservatives because it is not usually dissolved in oil it still maintains properties that make it look and feel oily. It is a distillate of coal tar (a byproduct of the carbonization of coal during coke production) (Lebow and Tippie, 2001). Creosote contains a chemically complex mixture of organic molecules, up to 80% of which are polycyclic aromatic hydrocarbons (PAHs) (Brooks, 2004). Use of Creosote treated wood is prohibited in Parks Canada operations because Polycyclic Aromatic Hydrocarbons (PAHs) and creosote-impregnated waste materials are listed as toxic substances under CEPA 1999.

2.2 Pentachlorophenol (PCP)

Pentachlorophenol (PCP) is a crystalline solid that can be dissolved in various types of oils. Petroleum oils are generally used as carriers of PCP (NEIA, 1993). Although this type of

preservative does not protect well against ocean marine borers, it is commonly used due to its effectiveness against fungi and insects. The type of oil used as a carrier solvent determines that appearance of wood treated with PCP: a very light brown color and dry surface if a light oil is used or a dark brown color and somewhat oily surface if a heavy oil is used (Lebow and Tippie, 2001). PCP itself is odourless, but the carrier solvent may have a distinct odour that can be noticed when approaching this type of treated wood. There are two types of PCP treatments; Pressure Pentachlorophenol (PCPP) and Thermal Pentachlorophenol (PCPT).
Use of PCP treated wood is prohibited in Parks Canada operations due to the presence of dioxins, furans and hexachlorobenzene, which are listed as toxic substances under CEPA 1999.

2.3 Copper Naphthenate (CuN)

Copper naphthenate (CuN) is the reaction product of naphthenic acids and copper salts dissolved in oil. CuN is used for the treatment of utility poles, highway construction (Lebow and Tippie, 2001) bridges and is commonly available in retail lumberyards for use in fencing and decking (Hutton and Samis, 2000). Like PCP, the properties of CuN are dependent on the type of oil used as the carrier. The oils that are most commonly used as carrier solvents are fuel oil and mineral spirits. The color of the CuN-treated wood varies from light brown to dark green, depending on the type of carrier solvent and the applied treating process. The carrier solvents for CuN-treated wood give it a distinct odour. Wood that is treated using CuN in light oil is easier to paint or stain than wood treated with CuN in dark oil. CuN is widely applied for hand dressing on end cuts or holes bored into treated wood during construction (Lebow and Tippie, 2001).

2.4 Zinc Naphthenate

Zinc Naphthenate is used to protect cut ends of treated wood. It can be applied with a brush as a component of a ready-to-use product. It is only for exterior above ground use. It can be colourless or matched to the colour of treated wood with a greenish tint (Canadian Wood Council, date NA b.)

APPENDIX 2 Rationale for Use of Treated Wood in Parks Canada Operations

Field Unit:
Project and Location:
Quantity (m^3):

Part 1: Are there applicable alternatives to treated wood?

	YES	NO	Explanation
Untreated Wood	☐	☐	
Composites	☐	☐	
Plastic	☐	☐	
Metal	☐	☐	
Concrete	☐	☐	

Part 2: Treatment / Use Compliance

	YES	NO
CSA Stamped:	☐	☐
Intended use consistent with preservative label:	☐	☐
MSDS obtained and reviewed:	☐	☐

Please Select Preservative Type:

ACQ	☐	
Borate	☐	
CA-B	☐	
Copper Naphthenate	☐	
Zinc Naphthenate	☐	
Other	☐	Explain:

Part 3: Best Practices

	YES	NO	
Recommended hardware will be used:	☐	☐	
Other Best Practices Followed:	☐	☐	Explain:

Part 4: Conclusion[3][4]

The use of treated wood is acceptable based on the above rationale: YES ☐ NO ☐	Project Manager:
	Signature:
	Date:

[3] Only use treated wood when all boxes in Part 1 are checked "NO" and all boxes in Part 2 are checked "YES"; it is also preferable that "YES" be chosen for Part 3 statements.

[4] Keep the signed copy of this rationale with project file

17

Appendix 8 SARA-Compliant Authorization Decision Tool

- This tool provides a structured process to record effects of a project on species at risk (SAR), determine if a SARA authorization is required, if it can be issued, and how to issue it.
- Consultation with a representative of the Species Conservation and Management (SCM) team is encouraged to help ensure consistent application of this tool.
- Guidance for each question is provided in *grey italics* text within the form and should be deleted from the final version.

Date this document was completed:	Where this activity will occur: (i.e., PCA site)	SAR implicated by this activity:	Title of proposed activity (e.g., Trail development in Blue Meadow):	Author of this Document:	Collaborators involved in drafting this document:
January 20, 2017	Kejimkujik National Park and National Historic Site – Mersey River Bridge	Blanding's turtle	Mersey River Bridge Renewal	Elizabeth Walsh	Darien Ure

Part A – Does a SARA authorization need to be considered for this activity?

1. Will the activity lead to residual adverse effects that contravene a SARA prohibition for a listed endangered (En), threatened (Th) or extirpated (Ex) species at risk, its residence or its critical habitat? (If more than one species will be affected, clearly delineate the effects on each species).

SARA prohibitions: s.32 - Cannot: kill, harm, harass, capture, or take individuals; possess, collect, buy, sell or trade individuals or parts of individuals; s.33 – Cannot damage or destroy residences; s.58 – Cannot destroy any part of critical habitat[1]; s.80 - Cannot carry out an activity that is prohibited under a protection order.

Check one of the boxes and document your rationale here. *To determine whether there are residual adverse effects that contravene a SARA prohibition, consider whether the activity or effects of the activity are identified as a threat to the survival or recovery of the species. Refer to the threats and critical habitat (e.g., biophysical attributes, activities likely to destroy) sections of relevant SARA documents (e.g., COSEWIC status report, recovery strategy and/or action plan for the species) and residence descriptions where available.*

☒ **Yes. Residual adverse effects of the activity will contravene a SARA prohibition**.

Blanding's turtles are known to nest and travel along the existing Eel Weir Road that will be used by construction traffic and personnel to access the Mersey Bridge construction site and to transport and deliver materials. A known nesting location, adjacent to the construction access road will be protected after the nest is established. During hatchling emergence, increased risks from accidental road mortality could occur. Hatchlings observed close to the road will be relocated further into the woods. The Blanding's turtle Recovery Strategy (RS) for the Nova Scotia Population identifies disturbance and persecution from collection for pets and/or relocation as known a threat to the survival of Blanding's turtles. Relocation (capture) may have

[1] Critical habitat destruction would result if a portion of the critical habitat were degraded, either permanently or temporarily, by activities occurring either internal or external to the critical habitat, such that the habitat function provided by the degraded portion is no longer available to the species when needed.

residual adverse effects. However, research and management approaches for vehicular mortality, as outlined in the RS states to "to action where is imminent risk of mortality by moving vulnerable adults, hatchlings and nests." Although the construction access road is located within the defined critical habitat for Blanding's turtle, the existing disturbance (gravel road) or minor vegetation removal will not impact the biophysical attributes of the critical habitat or functionality of the landscape for the survival of the species. Biophysical attributes for nesting habitat includes human-modified sites such as roadsides.

Continue to Question 2.

☐ **No. Residual adverse effects of the activity will NOT contravene a SARA prohibition**.

STOP - you have completed the tool. **Check the first box in Part C and submit for approval**.

2. Is the activity authorized under S. 83 of SARA?

☒ **Yes. A SARA authorization is NOT required.** The activity is authorized in a recovery strategy or action plan;
Document here the specific section of the published recovery strategy or action plan that authorizes this activity(ies) under S.83(4) of SARA.
Section 6.2 of the Blanding's Turtle RS states that the Research and Management Approaches threats associated by Vehicular Mortality is to "take actions where there is imminent risk of mortality by moving vulnerable adults, hatchlings and nests.

OR

☐ **Yes. A SARA authorization is NOT required.** The activity is required for public safety, health or national security **AND** authorized by or under another Act of Parliament**.**
Refer to the Guideline for the use of SARA ss. 83(1)(a) Exceptions in Protected Heritage Areas for further details. Append the completed s.83 template to this decision tool for final decision approval by the appropriate FUS/Director of a Waterway, or Delegate.

STOP - If all activities that would contravene a SARA prohibition are already authorized under SARA s.83, **check the first box in Part C and submit for approval**.

☐ **No. A SARA authorization is required. Continue to Part B.**

Part B – Is the activity eligible for authorization under SARA?

******Complete ONLY if you have answered NO to Question 2, above******

3. Does the activity fall into one of the following three categories?

Select the appropriate box (check only one) and **continue to Question 4** OR, if the proposed activity DOES NOT fit in any of the three categories below the activity CANNOT be authorized, and you can check the second box in **Part C and submit for approval.**

☐ The activity is scientific research related to the conservation of the species and conducted by qualified persons; **OR**

☐ The activity benefits the species or is required to enhance its chance of survival in the wild (an activity that supports the implementation of recovery actions as described in recovery documents (recovery strategies/action plans) for the species, where these area available. Where recovery documents are not available, the activity must support the recovery of the species based on an assessment of best information available (incl. status reports, species experts, peer-reviewed information); **OR**

☐ Affecting the species is incidental to the activity (i.e. the purpose of the activity is not to engage in an activity that is prohibited under SARA (e.g., kill, harm, harass an individual; destroy a residence or critical habitat). For example, fishing for a listed species cannot be permitted, but accidental by-catch *may* be.

4. **Alternatives that would reduce the impact(s) on the species have been considered and the best solution adopted**

SARA Policy Statement: The applicant is required to consider all reasonable alternatives to their activity with a view to reducing the impact on the species, make a choice among the alternatives considered, and justify why this choice is the best one. The range of alternatives considered will be proportional to the significance of the activity's anticipated impact on species at risk. Costs may be considered when deciding whether a given alternative is reasonable. Among the reasonable alternatives identified, the solution that best advances conservation of the species must be adopted.

Document the assessment of alternatives here, based on the above policy statement.
NOTE: If this tool is being used with an RCPS application and this question is already addressed in your response to Question 37(a), please copy and paste your response here.

Continue to Question 5.

5. **All feasible measures must be taken to minimize the impact of the activity**

SARA Policy Statement: The feasibility of measures will be determined based on an evaluation of biological, ecological, technical and economic factors. The amount of analysis required to identify all feasible measures, and the nature of such measures, must be proportional to the significance of the activity's impact on species at risk.

Ensure that the mitigations to address the residual adverse effects of the activity to the species identified in question 1 of this form are as comprehensive as possible. NOTE: If this tool is being used with an RCPS application and this question is are already addressed in your response to Question 37(b), please copy and paste your response here. If you have already explained your mitigation measures in an accompanying impact assessment; you may simply reference the relevant section(s) here.

Continue to Question 6.

6. **Will the activity jeopardize the survival or recovery of the species?**

SARA Policy Statement: An activity would be considered to jeopardize the survival or recovery of a species at risk if the activity would prevent the attainment of the population and distribution objectives described in a recovery strategy for the species. **Where a proposed activity would jeopardize the survival or recovery of the species, a permit could be issued only if the activity were accompanied by actions to benefit the species such that the residual effects of the activity would not jeopardize its survival or recovery.**

Clearly document how you considered potential jeopardy to the survival or recovery of the species. It is encouraged that you check this analysis with the SCM team.

Answer the following questions to document the assessment of whether the residual adverse effects of the activity will prevent the achievement of the population and distribution (P&D) objectives identified for the species. The robustness of this assessment is key to determining whether or not the activity can be authorized. NOTE: If this tool is being used with an RCPS application and this question is already addressed in your response to Question 37(c) please copy and paste your response into this field.

- *What is the national P&D objective as described in the recovery strategy for the species? In the absence of a proposed or final recovery strategy that describes the population and distribution objectives for a species at risk, the assessment of jeopardy will consider survival in the context of the survival threshold, and recovery in the context of the "best achievable scenario", as described in the Draft* Policy on Survival and Recovery.
- *How does this translate into P&D objectives at your site? If available, provide the site-based population and distribution objectives as identified in the Parks Canada site analysis and/or site-based action planning process.*
- *What is most up-to-date information you have about population status and trends?*
- *Using the threat assessment for the species (e.g., in the recovery strategy or status report), explain whether / how the activity will contribute to threats.*
- *How will that influence your ability to meet the P&D objectives? Consider impacts to key stages of life cycle and cumulative impacts from other activities affecting the species*

If the activity will jeopardize the survival or recovery of the species, refer to the Guidance for the Use of Biodiversity Offsets as Part of a SARA s.74 Authorization in Protected Heritage Areas for further details.

Also describe (where available) additional conservation measures that the PHA is undertaking or will undertake to benefit the species.

***NOTE -** as the degree of uncertainty increases about whether an activity would jeopardize the survival or recovery of a species, the likelihood decreases that a permit can be issued. Where data is sufficient to support the completion of quantitative analyses, such as population viability, this should be done. However, in many cases, such analyses will not be possible and a precautionary approach should guide the assessment of jeopardy based on the best available information and the weight of available evidence.*

☐ **Yes. The activity CANNOT be authorized.**

Check the second box in Part C and submit for approval.

☐ **No. The activity CAN be authorized.**

☐ **No. The activity CAN ONLY be authorized with the implementation of an offset to avoid jeopardizing survival or recovery of the species.** *Refer to the Guidance and Template for the Use of Biodiversity Offsets as Part of a SARA s.74 Authorization in Protected Heritage Areas for further details. Append the completed offsetting plan to this decision tool for final decision approval by the appropriate FUS/Director of a Waterway, or Delegate.*

Check the third box in Part C and submit for approval.

Part C – SARA Authorization Decision

*****Note: if this section addresses multiple species, specify to which species the answer(s) pertain.*****

Select the appropriate answer and continue to Part D.

☒ This activity does not require a SARA authorization, as indicated in Questions 1 and 2.

☐ This activity requires a SARA authorization but cannot be authorized because it does not fit into one of the three required categories (see response to Question 3) OR it does not meet one of the SARA pre-conditions (see responses to Questions 4-6).

☐ This activity requires a SARA authorization and can be authorized (see response to Questions 3-6).

Part D - Prepare the SARA authorization and posting explanation

*****Issue the SARA authorization using the template on the intranet and complete Question 7 to prepare the explanation for the SAR Public Registry.*****

7. Provide description for posting

SARA requires an explanation of why a SARA authorization is issued to be posted on the SARA Public Registry in both official languages within 30 days of the authorization being issued. Prepare the explanation, using the information you entered in your RCPS application, or impact assessment process, and previous sections of this tool. Your regional SCM representative will have the explanation translated and will publish it on the SARA registry.

Regional or Local Number:

Provide the authorization number issued by Parks Canada (in this instance, the file number of your RCPS permit or other process)

Start Date of Authorization: *XXX* **End Date of Authorization**: *XXX*

Issuing Authority: Parks Canada Agency

Authority Used: SARA s.74

Location of Activity *(province, territory or ocean)*: *XXX*

Affected Species:

Limit your list to species that are listed under SARA as Extirpated, Endangered or Threatened for which the assessment concludes that the residual adverse effects are likely to contravene SARA or an EPO, and for which the pre-conditions for the SARA authorization have been met.

Purpose:

Select the answer indicated in Section 3 of this Appendix:

- Affecting the species is incidental to the activity; OR
- The activity is necessary or beneficial to the species, OR
- The activity is scientific research related to the conservation of the species and conducted by qualified persons.

Description of the Activity:

Provide a one-paragraph summary of the activity and how it will affect the listed species **Pre-Conditions:** *Provide three brief paragraphs that summarize sections 4, 5 and 6 of this tool, respectively. Limit your explanation to species for which the authorization will be issued.*

Part E – SARA Authorization Recommendation and Approval	
Prepared by (add additional blocks as required) Name & position of author:	Date: YYYY-MM-DD
Name & position of additional collaborator(s) & reviewer(s):	Date: YYYY-MM-DD
Recommended by Name & Position:	Date: YYYY-MM-DD
Decision Approval	
Name & Position: (FUS/Director of a Waterway, or Delegate)	
Signature:	Date: YYYY-MM-DD

Appendix C

NSTIR Standard Details

Sign Size	# of Posts	Post Size	Post Spacing		
			A	B	C
60 x 30 cm	1	10 x 10 cm	30 cm		
90 x 30 cm	1	10 x 10 cm	45 cm		
60 x 45 cm	1	10 x 10 cm	30 cm		
90 x 45 cm	1	10 x 10 cm	45 cm		
60 x 60 cm	1	10 x 10 cm	30 cm		
90 x 60 cm	1	10 x 10 cm	45 cm		
75 x 75 cm	1	10 x 10 cm	40 cm		
90 x 75 cm	1	10 x 10 cm	45 cm		
90 x 90 cm	1	10 x 10 cm	45 cm		
120 x 30 cm	2	10 x 10 cm	15 cm		90 cm
150 x 30 cm	2	10 x 10 cm	30 cm		90 cm
180 x 30 cm	2	10 x 10 cm	30 cm		120 cm
215 x 30 cm	2	10 x 10 cm	45 cm		120 cm
120 x 45 cm	2	10 x 10 cm	15 cm		90 cm
150 x 45 cm	2	10 x 10 cm	30 cm		90 cm
180 x 45 cm	2	10 x 10 cm	30 cm		120 cm
215 x 45 cm	2	10 x 10 cm	45 cm		120 cm
120 x 60 cm	2	10 x 10 cm	15 cm		90 cm
150 x 60 cm	2	10 x 10 cm	30 cm		90 cm
180 x 60 cm	2	10 x 10 cm	30 cm		120 cm
215 x 60 cm	2	10 x 10 cm	45 cm		120 cm
120 x 75 cm	2	10 x 10 cm	15 cm		90 cm
150 x 75 cm	2	10 x 10 cm	30 cm		90 cm
180 x 75 cm	2	10 x 10 cm	30 cm		120 cm
215 x 75 cm	2	10 x 10 cm	45 cm		120 cm
120 x 90 cm	2	10 x 10 cm	15 cm		90 cm
150 x 90 cm	2	10 x 10 cm	30 cm		90 cm

Sign Size	# of Posts	Post Size	Post Spacing		
			A	B	C
180 x 90 cm	2	10 x 10 cm	30 cm		120 cm
215 x 90 cm	2	10 x 10 cm	45 cm		120 cm
120 x 120 cm	2	10 x 10 cm	15 cm		90 cm
150 x 120 cm	2	10 x 10 cm	30 cm		90 cm
180 x 120 cm	2	10 x 10 cm	30 cm		120 cm
215 x 120 cm	2	10 x 10 cm	45 cm		120 cm
245 x 30 cm	3	10 x 10 cm	30 cm	90 cm	
245 x 45 cm	3	10 x 10 cm	30 cm	90 cm	
245 x 60 cm	3	10 x 10 cm	30 cm	90 cm	
245 x 75 cm	3	10 x 10 cm	30 cm	90 cm	
245 x 90 cm	3	10 x 10 cm	30 cm	90 cm	
275 x 90 cm	3	10 x 10 cm	45 cm	90 cm	
305 x 90 cm	3	15 x 15 cm	30 cm	120 cm	
335 x 90 cm	3	15 x 15 cm	45 cm	120 cm	
365 x 90 cm	3	15 x 15 cm	45 cm	135 cm	
245 x 120 cm	3	15 x 15 cm	30 cm	90 cm	
275 x 120 cm	3	15 x 15 cm	45 cm	90 cm	
305 x 120 cm	3	15 x 15 cm	30 cm	120 cm	
335 x 120 cm	3	15 x 15 cm	45 cm	120 cm	
365 x 120 cm	3	15 x 15 cm	45 cm	135 cm	
395 x 90 cm	4	15 x 15 cm	40 cm	105 cm	105 cm
425 x 90 cm	4	15 x 15 cm	40 cm	115 cm	115 cm
395 x 120 cm	4	15 x 15 cm	40 cm	105 cm	105 cm
425 x 120 cm	4	15 x 15 cm	40 cm	115 cm	115 cm
455 x 120 cm	4	15 x 15 cm	40 cm	125 cm	125 cm
485 x 120 cm	4	15 x 15 cm	40 cm	135 cm	135 cm

NOTES:

Manager Traffic Engineering Services

Director Highway Engineering Services

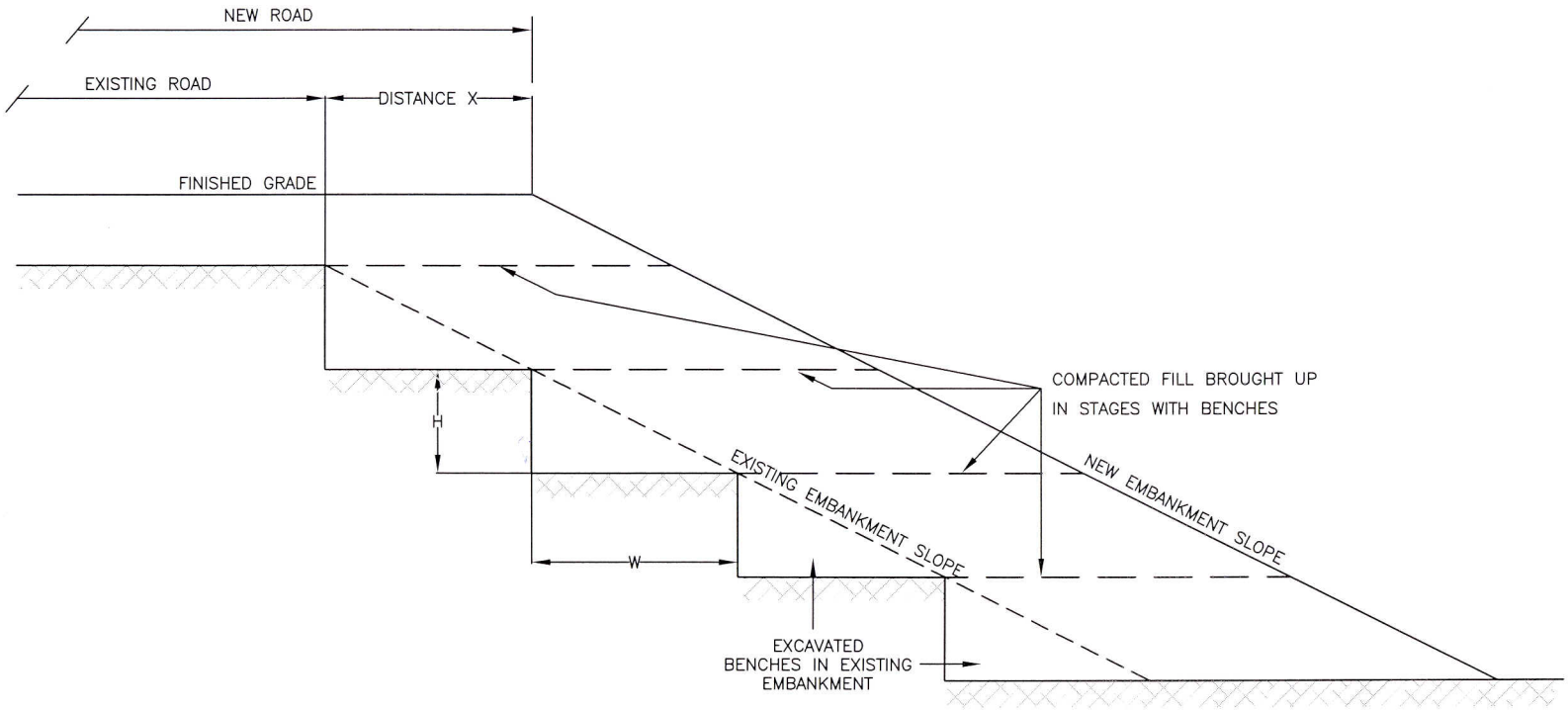
Executive Director Highway Engineering and Construction

NOVA SCOTIA
Transportation and Infrastructure Renewal

No.	REVISION

Scale : N.T.S.
Drawn by : J.MACINTOSH/B.STORRIE
Checked by : P.HILL
Date of Plan : MAY2011
File No. : S-2011-101

WOOD SIGN STRUCTURE POST SPACING CHART



MAXIMUM BENCH HEIGHT & WIDTH DIMENSIONS		
EXISTING SLOPES	FILLS >= 4.0m	FILLS < 4.0m
3:1 TO 2:1	W=2.5m H=VARIES	W=1.25m H=VARIES
2:1	W=VARIES H=1.25m	W=VARIES H=0.75m

NOTES:
1. THIS STANDARD APPLIES TO WIDENING OF EMBANKMENTS WHEN DISTANCE X >= 1.0m AT FINISHED GRADE LEVEL OF NEW ROADBED.
2. BENCHING NOT REQUIRED ON SLOPES FLATTER THAN 3:1 OR WHERE FIELD CONDITIONS SHOW IT UNNECESSARY AS DETERMINED BY THE ENGINEER.
3. BENCHES TO BE EXCAVATED ONE LEVEL AT A TIME AND COMPACTED FILL BROUGHT UP BEFORE NEXT LEVEL IS EXCAVATED.

Manager Highway Planning and Design

Director Highway Engineering Services

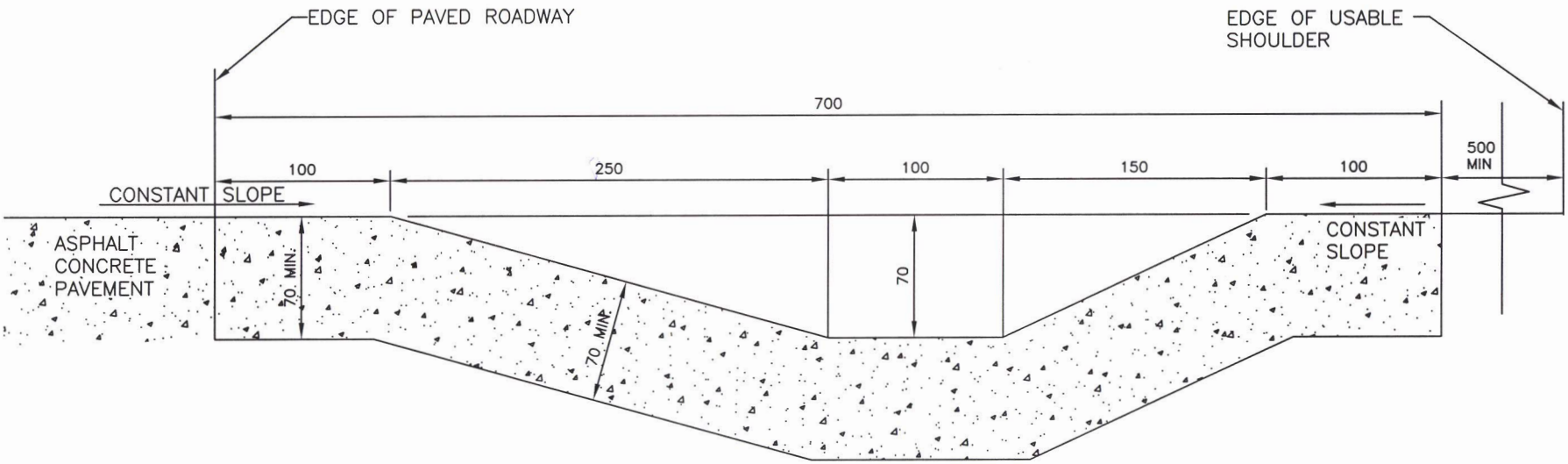
Executive Director Highway Engineering and Construction

NOVA SCOTIA
Transportation and Infrastructure Renewal

No.	REVISION

Scale : N.T.S.
Drawn by : M.LABRECHE
Checked by : K.BODDY
Date of Plan : AUG2009
File No. : S-2009-016

BENCHING OF EMBANKMENT SLOPES



NOTES:
1. OFFTAKE GUTTERS ARE TO BE CONSTRUCTED AT LOCATIONS SPECIFIED BY THE ENGINEER AND ARE TO EXTEND TO THE EDGE OF SHOULDER AND DOWN THE SLOPE 1m MINIMUM.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Manager Highway Planning and Design

Director, Highway Engineering Services

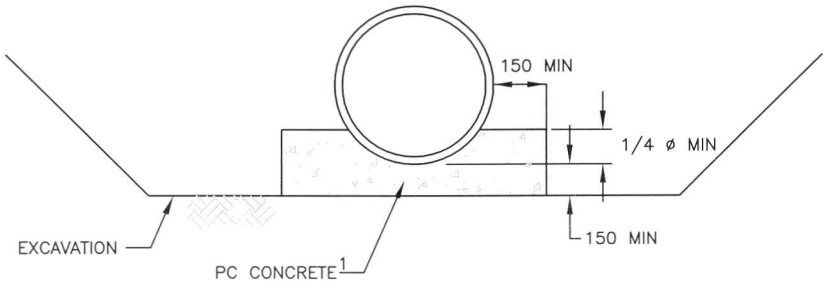
Executive Director Highway Engineering and Construction

NOVA SCOTIA
Transportation and Infrastructure Renewal

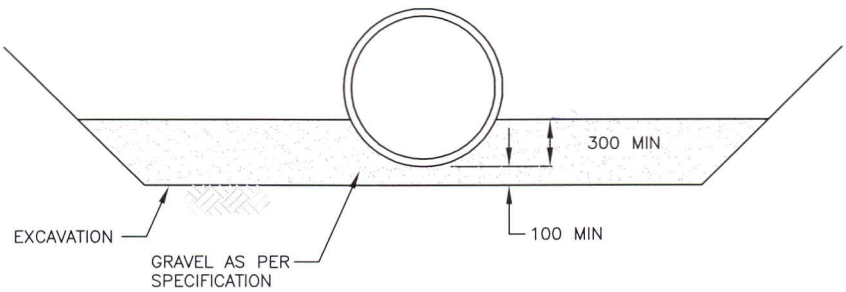
No.	REVISION
1	HS # ADDED TO TITLE

Scale :	N.T.S.
Drawn by :	M.LABRECHE
Checked by :	K.BODDY
Date of Plan :	AUG2009
File No. :	S-2009-023

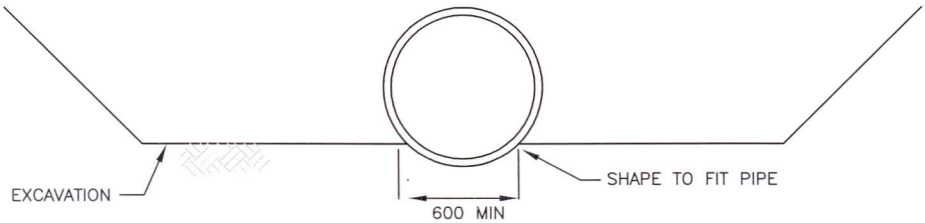
ASPHALT CONCRETE GUTTER HS-403



CLASS A BEDDING



CLASS B BEDDING



CLASS C BEDDING

NOTES:
1. CRUSHED STONE OR GRAVEL INSTEAD OF CONCRETE PERMITTED ON ROCK FOUNDATION WITH METHOD OF LAYING AS PER CLASS B BEDDING.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Scale :	N.T.S.
Drawn by :	M.LABRECHE
Checked by :	W.DEVEAU
Date of Plan :	AUG2009
File No. :	S-2009-051

Manager Highway Planning and Design

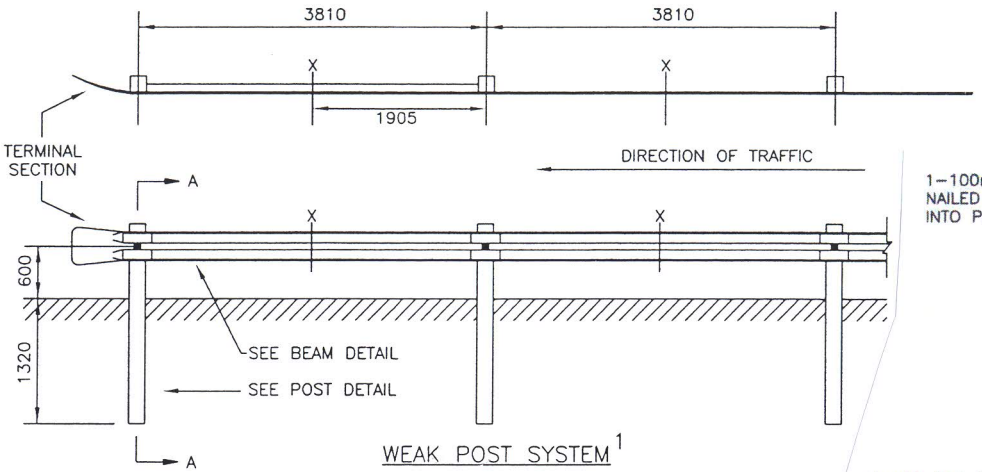
Director Highway Engineering Services

Executive Director Highway Engineering and Construction

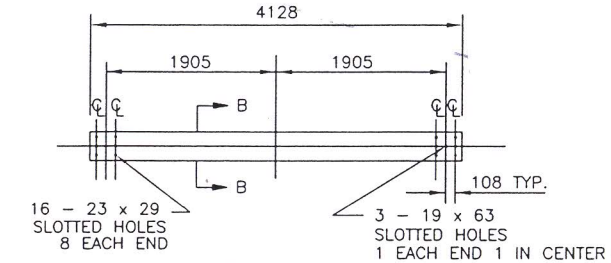
NOVA SCOTIA
Transportation and Infrastructure Renewal

No.	REVISION

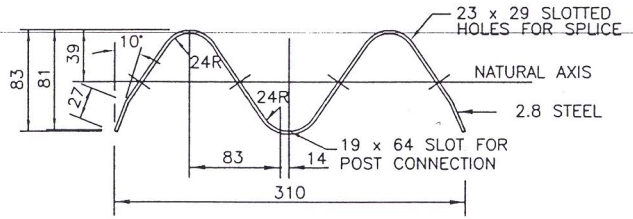
BEDDING FOR CONCRETE PIPE
HS506



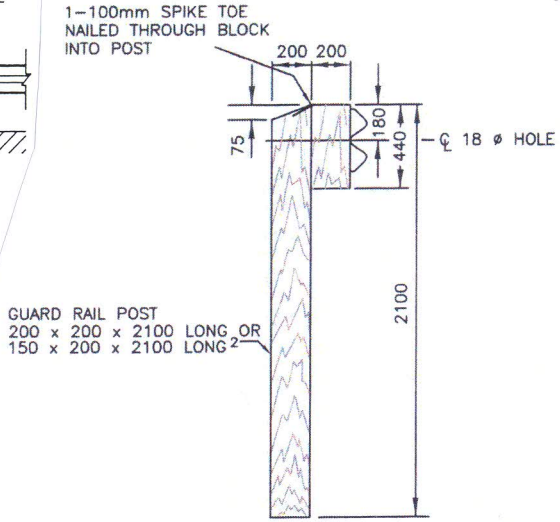
WEAK POST SYSTEM [1]



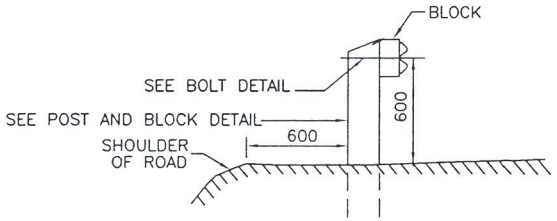
BEAM DETAIL



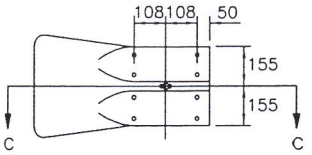
SECTION B–B



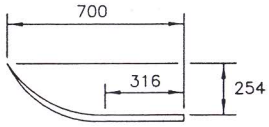
POST AND BLOCK DETAIL



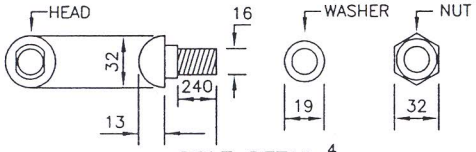
SECTION A–A



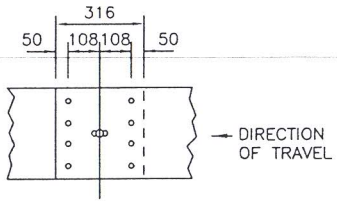
BEAM TERMINAL DETAIL [3]



SECTION C–C



BOLT DETAIL [4]



BEAM SPLICE DETAIL

NOTES:
1. FOR STRONG POST SYSTEM, ADD POST AT POINT X.
2. IF 150 x 200 x 2100 LONG POSTS ARE USED, THE MATERIAL IS TO BE HARDWOOD.
3. TERMINAL SECTION ONLY APPROPRIATE FOR 4–LANE DIVIDED HIGHWAYS.
4. ALL BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED BY THE HOT DIP PROCESS. BOLTS SHALL BE CAPABLE OF WITHSTANDING 106 kN IN SINGLE SHEAR. 16mm SQUARENUT AND 19mm ROUND WASHERS ARE TO BE USED. ONE WASHER FOR EACH 240mm x 16mm BOLT. BOLTS ARE TO HAVE 75mm THREADS
5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Manager Highway Planning and Design

Director, Highway Engineering Services

Executive Director Highway Engineering and Construction

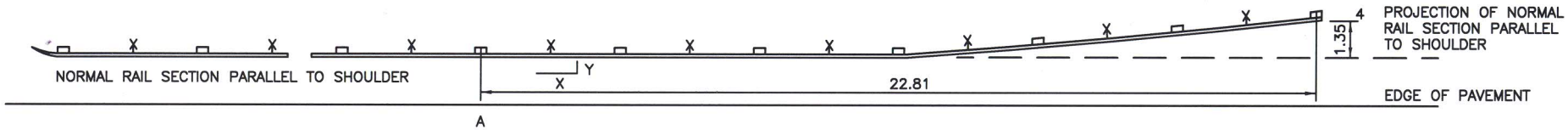
NOVA SCOTIA
Transportation and Infrastructure Renewal

No.	REVISION
2	BEAM SPLICE DETAIL MODIFIED /SEP10
1	DETAILS, NOTES, TITLES /FEB 10

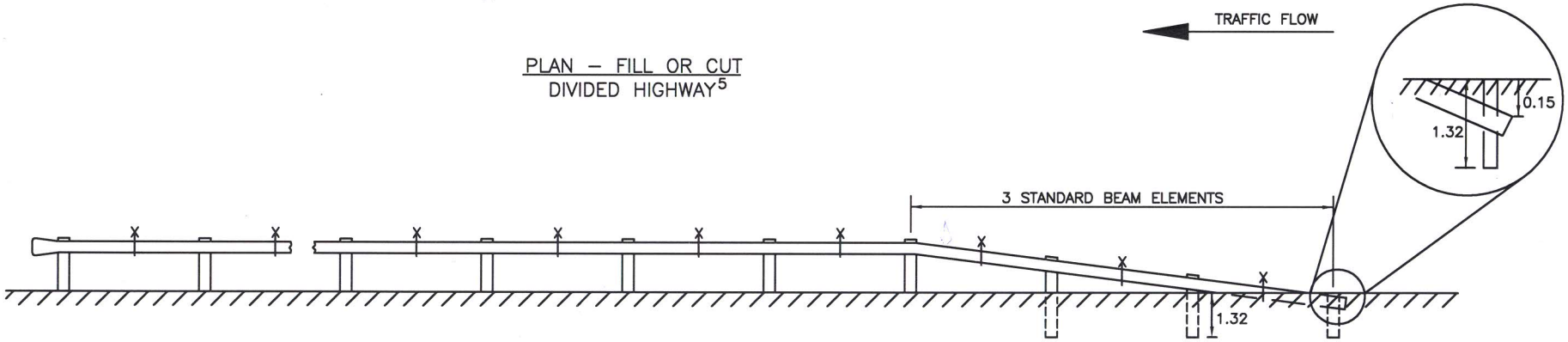
Scale : N.T.S.
Drawn by : M.LABRECHE
Checked by : J.RAE
Date of Plan : AUG2009
File No. : S–2009–071

GUARD RAIL AND POST DETAILS
HS518

POST OFFSET TABLE	
FILL OR CUT	
X	Y[3]
3.81	0.04
7.62	0.15
11.42	0.34
15.22	0.60
19.02	0.94
22.81	1.35



PLAN – FILL OR CUT
DIVIDED HIGHWAY[5]



ELEVATION
DIVIDED HIGHWAY[5]

1. FOR STRONG POST SYSTEM, ADD POST AT POINT "X"
2. THIS STANDARD DRAWING IS NOT APPLICABLE TO NEW 100 SERIES HIGHWAY CONSTRUCTION WHERE ENERGY ABSORBING GUARD RAIL TERMINALS (EAGRT) SYSTEMS ARE SPECIFIED.
3. MEASURED FROM FACE OF RAIL BASED ON NORMAL RAIL SECTION PARALLEL TO SHOULDER AT A.
4. GUARD RAIL MAY BE PLACED AS PRACTICABLE FROM EDGE OF SHOULDER. IN NO CASE MAY GUARD RAIL BE PLACED DOWN THE SLOPE.
5. FOR 2–LANE/ 2–WAY ROADWAYS, BURY BOTH ENDS OF GUARD RAIL.
6. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.

NOVA SCOTIA
Transportation and Infrastructure Renewal

No.	REVISION
4	Addition of EAGRT note – Feb 12
3	Addition of post bury depth – FEB 11
2	Addition of "X" for strong post system
1	Notes, Titles – Feb 10

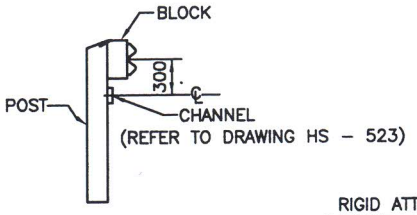
Scale :	N.T.S.
Drawn by :	M.LABRECHE
Checked by :	J.RAE
Date of Plan :	AUG2009
File No. :	S–2009–072

Manager Highway Planning and Design

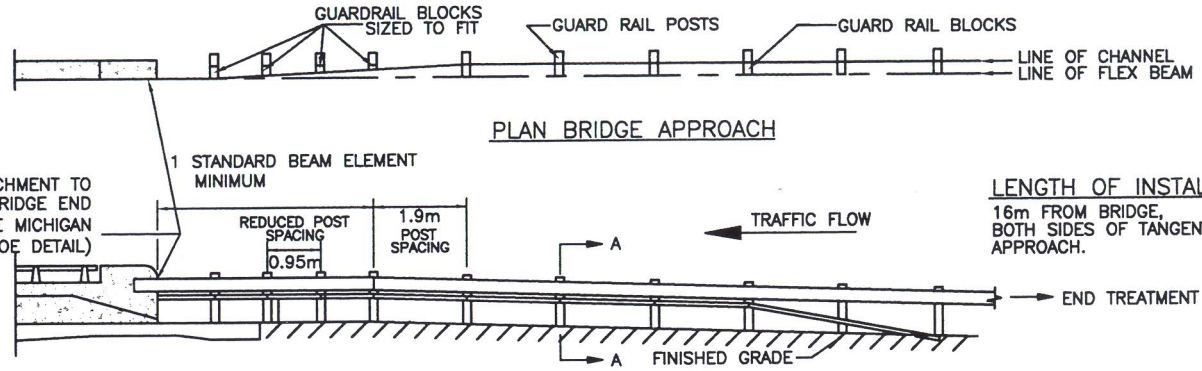
Director Highway Engineering Services

Executive Director Highway Engineering and Construction

STEEL BEAM GUARD RAIL
END TREATMENT HS520



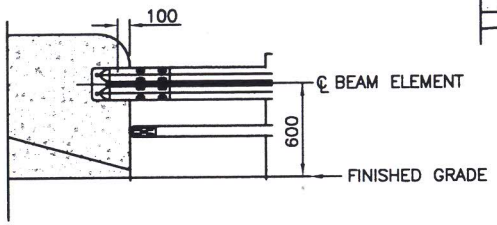
SECTION A–A



PLAN BRIDGE APPROACH

LENGTH OF INSTALLATION

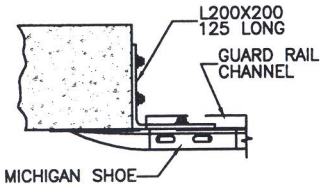
16m FROM BRIDGE, BOTH SIDES OF TANGENT APPROACH.



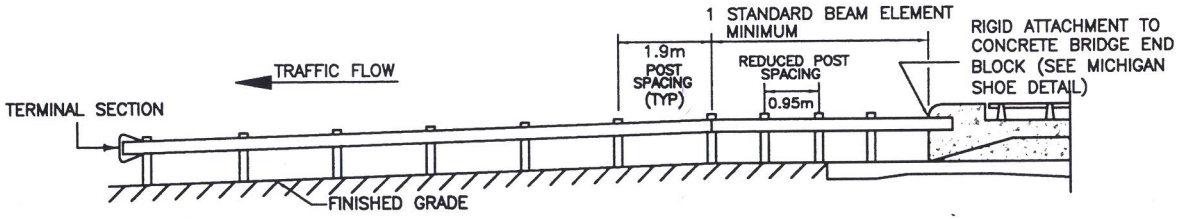
ELEVATION END BLOCK CONNECTION

ELEVATION – ROADSIDE BARRIER AT CONCRETE BRIDGE

– TWO WAY TRAFFIC AT ALL FOUR CORNERS OF BRIDGE
– DIVIDED HIGHWAY AT APPROACH TO BRIDGE ONLY



PLAN END BLOCK CONNECTION



ELEVATION – ROADSIDE BARRIER AT CONCRETE BRIDGE (NO CHANNEL)

– DIVIDED HIGHWAY AT DEPARTURE OF BRIDGE ONLY

NOTES:
1. SEE BEAM DETAIL, BEAM TERMINAL DETAIL, BEAM SPLICE DETAIL, POST AND BLOCK DETAIL, BOLT DETAIL, NOTE 2, NOTE 3, NOTE4 ON STANDARD DRAWING S–2009–071.
2. SEE STANDARD DRAWING S–2009–072 FOR END TREATMENT.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Manager Highway Planning and Design

Director Highway Engineering Services

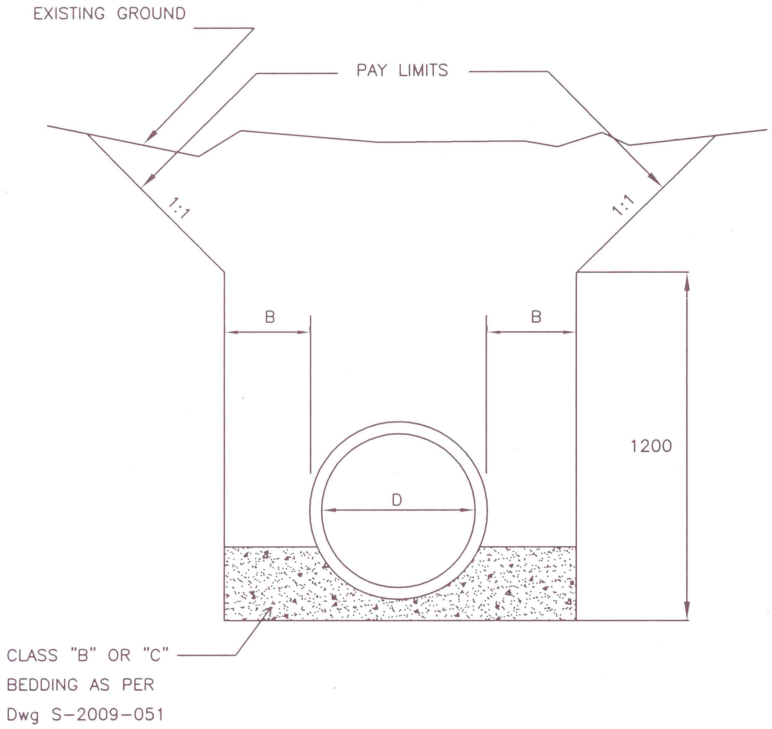
Executive Director Highway Engineering and Construction

NOVA SCOTIA
Transportation and Infrastructure Renewal

No.	REVISION
4	Moved note 4 and 5 under headings – Jan 12
3	Length of installation note – Aug 11
2	Addition of Note 4 and 5 – Feb 11
1	SEC A–A, Notes – Feb 10

Scale :	N.T.S.
Drawn by :	M.LABRECHE
Checked by :	J.RAE
Date of Plan :	AUG2009
File No. :	S–2009–073

ROADSIDE BARRIER AT CONCRETE BRIDGE APPROACH HS521



PIPE DIAMETER, D (INSIDE)	DIMENSION B
UP TO 500	300
501 TO 1200	400
OVER 1200 OR ANY OTHER PRECAST SECTION	500

NOTES:
1. THE CROSS SECTION REPRESENTS MAXIMUM PAY LIMITS FOR FOUNDATION EXCAVATION. IF THE BOTTOM WIDTH IS LESS OR IF THE SIDE SLOPES ARE STEEPER THAN INDICATED, THE SECTIONAL AREA WILL BE COMPUTED ACCORDINGLY.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

Scale : N.T.S.
Drawn by : M.W.L.
Checked by :
Date of Plan : Sept. 2009
File No. : S-2009-144

Manager Highway Planning and Design

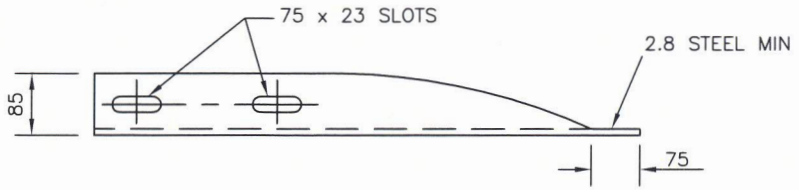
Director Highway Engineering Services

Executive Director Highway Engineering and Construction

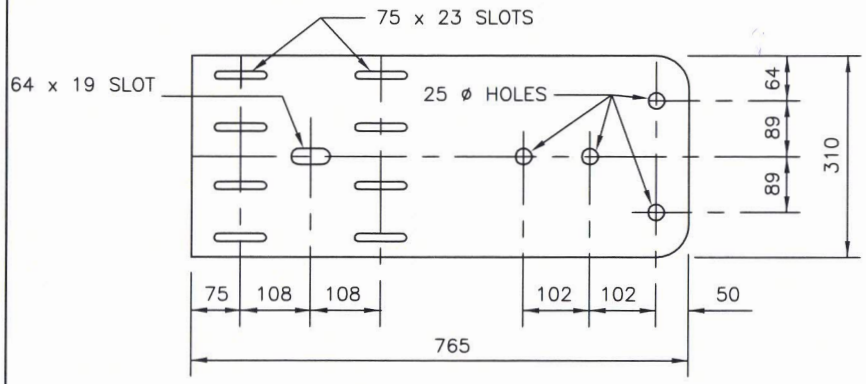
NOVA SCOTIA
Transportation and Infrastructure Renewal

No.	REVISION
1	HS # ADDED TO TITLE

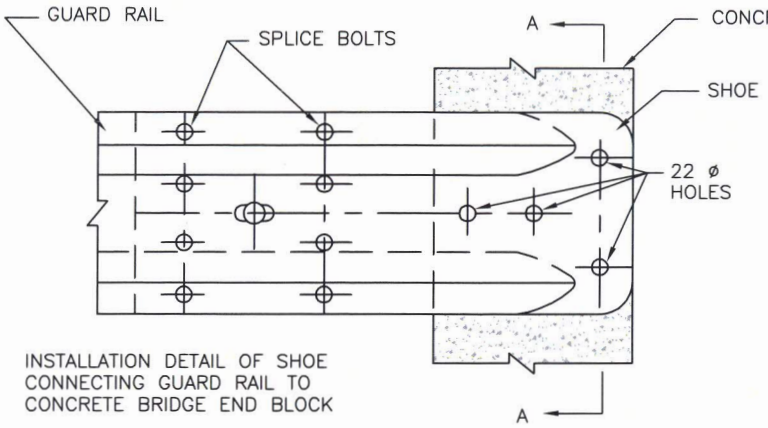
FOUNDATION EXCAVATION LIMITS FOR CULVERTS HS-528



PLAN DETAIL OF SHOE

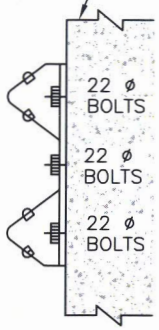


ELEVATION DETAIL OF SHOE



INSTALLATION DETAIL OF SHOE
CONNECTING GUARD RAIL TO
CONCRETE BRIDGE END BLOCK

ELEVATION DETAIL OF INSTALLED SHOE



SECTION A–A

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Manager Highway Planning and Design

Director Highway Engineering Services

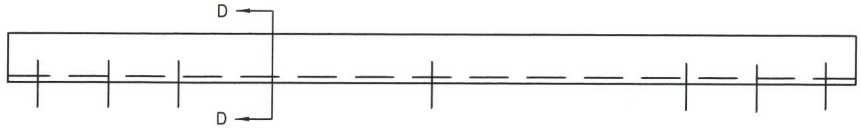
Executive Director Highway Engineering and Construction

NOVA SCOTIA
Transportation and Infrastructure Renewal

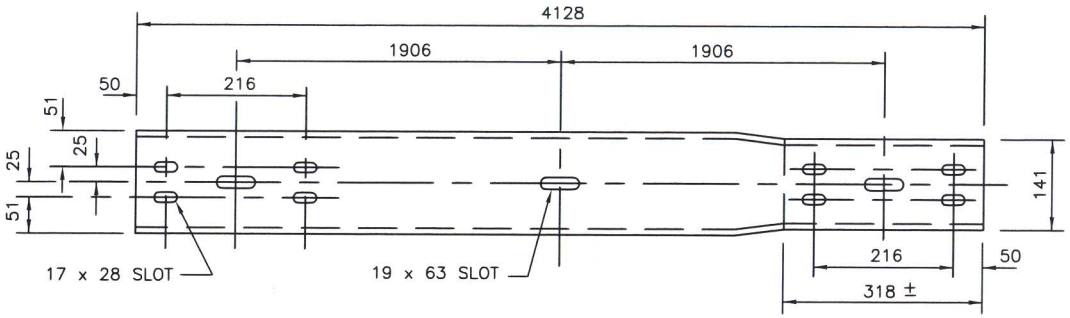
No.	REVISION
1	"HS" # ADDED TO TITLE

Scale :	N.T.S.
Drawn by :	M.LABRECHE
Checked by :	J.RAE
Date of Plan :	AUG2009
File No. :	S–2009–074

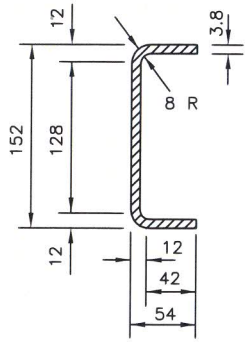
MICHIGAN SHOE DETAIL
HS522



PLAN

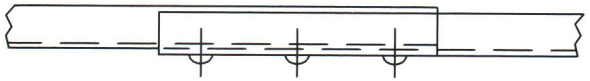


ELEVATION

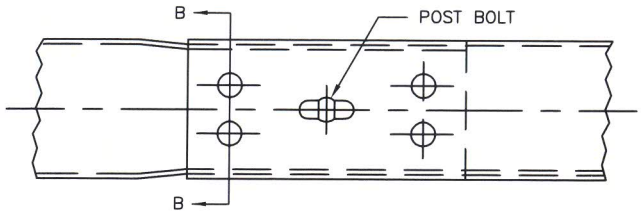


SECTION D–D

COLD ROLLED CHANNEL DETAIL

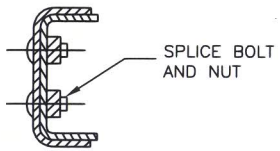


PLAN



ELEVATION

SWAGGED SPLICE



SECTION B–B

SWAGGED SPLICE DETAIL

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Manager Highway Planning and Design

Director Highway Engineering Services

Executive Director Highway Engineering and Construction

NOVA SCOTIA
Transportation and Infrastructure Renewal

No.	REVISION
1	HS # ADDED TO TITLE

Scale :	N.T.S.
Drawn by :	M.LABRECHE
Checked by :	J.RAE
Date of Plan :	AUG2009
File No. :	S–2009–075

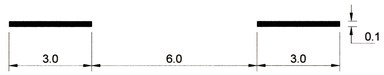
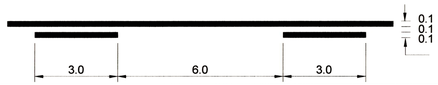
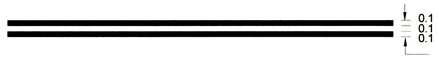
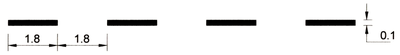
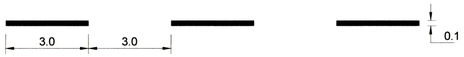
GUARDRAIL CHANNEL DETAIL
HS523

S-2013-300

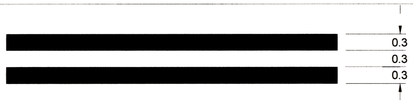
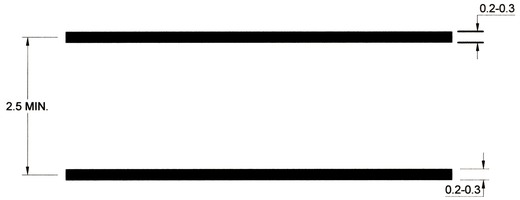
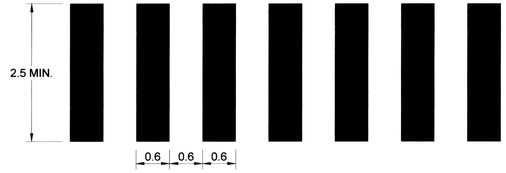
PATTERN OF LINES

HIGHWAY PAVEMENT MARKINGS

PATTERNS OF LONGITUDINAL LINES

NAME OF LINE	DIMENSIONS (m)	USE
SOLID		• EDGELINES (WHITE OR YELLOW) • DIRECTIONAL DIVIDING LINES (YELLOW) • LANE LINES PROHIBITING LANE CHANGES (WHITE)
BROKEN		• DIRECTIONAL DIVIDING LINES (YELLOW) • LANE LINES (WHITE)
SIMULTANEOUS SOLID AND BROKEN		• DIRECTIONAL DIVIDING LINES (YELLOW) • TWO-WAY LEFT TURN LANES (YELLOW)
DOUBLE SOLID		• DIRECTIONAL DIVIDING LINES (YELLOW)
WIDE SOLID		• EDGELINES AT GORE AREAS OF 100 SERIES HIGHWAYS AND IN OTHER CRITICAL AREAS (WHITE ON RIGHT, YELLOW ON THE LEFT)
DASHED 0.5m		• GUIDING LINES (E.G. INTERSECTION MOVEMENTS) (YELLOW OR WHITE BASED ON THE COLOUR OF LINE BEING EXTENDED)
DASHED 1.8m		• LANE LINES IN ROUNDABOUTS (WHITE)
DASHED 3.0m		• CONTINUITY LINES IN MERGING AND DIVERGING AREAS (WHITE) • LANE LINES FOR LEFT TURN AND RIGHT TURN BAYS AND TAPERS (WHITE)
WIDE DASHED 3.0m		• CONTINUITY LINES IN MERGING AND DIVERGING AREAS ON 100 SERIES HIGHWAYS (WHITE)

PATTERNS OF TRANSVERSE LINES

NAME OF LINE	DIMENSIONS (m)	USE
STOP		• INTERSECTION STOP LINES (WHITE)
DOUBLE STOP BAR		• RAILWAY CROSSINGS (WHITE) (OPTIONAL SEE S-2013-312 FOR CONDITIONS)
PARALLEL CROSSWALK		• PEDESTRIAN CROSSWALKS (WHITE)
ZEBRA CROSSWALK		• SCHOOL CROSSWALKS (WHITE) • MID-BLOCK CROSSWALKS (WHITE) MUST BE APPLIED USING HIGH FRICTION MATERIAL
ROUNDABOUT YIELD BAR 0.6 m		• ROUNDABOUT YIELD BAR FOR SINGLE LANE ENTRY (WHITE)
ROUNDABOUT YIELD BAR 1.8 m		• ROUNDABOUT YIELD BAR FOR MULTI-LANE ENTRY (WHITE)

(ADAPTED FROM MUTCDC FIGURE C1-1)

Designed by:		Manager Traffic Engineering and Road Safety — DEC 9, 2014 Date			
Surveyed by:					
Drawn by: R. Hird					
Checked by: P. Hill		Director, Highway Engineering Services — DEC 9, 2014 Date	1	Nov 10, 2014	Added Zebra Crosswalk Markings
Approved by:			MK.	DATE	REVISION

NOVA SCOTIA
Transportation and Infrastructure Renewal

Scale:	NTS
Date:	Dec 2013
File No. :	S-2013-300
Sheet No. :	1 of 1

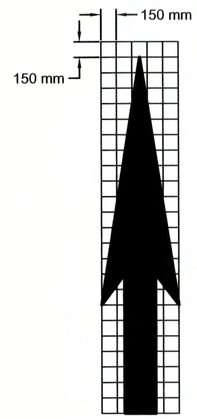
HIGHWAY PAVEMENT MARKINGS

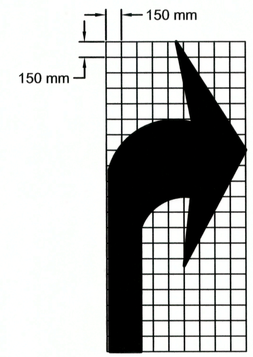
PATTERNS OF LINES

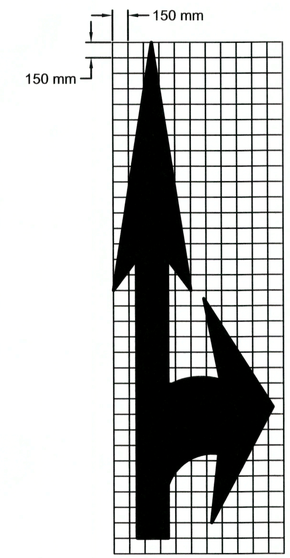
S-2013-301

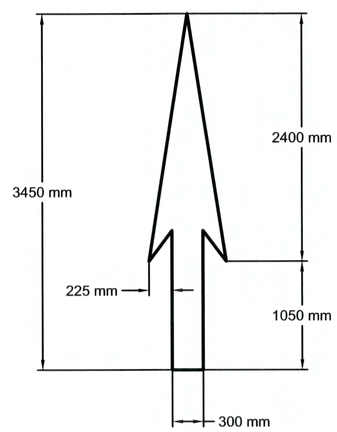
DIRECTIONAL ARROW SYMBOLS

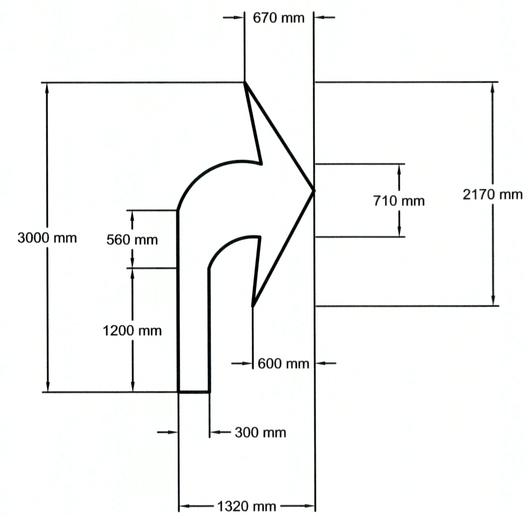
HIGHWAY PAVEMENT MARKINGS

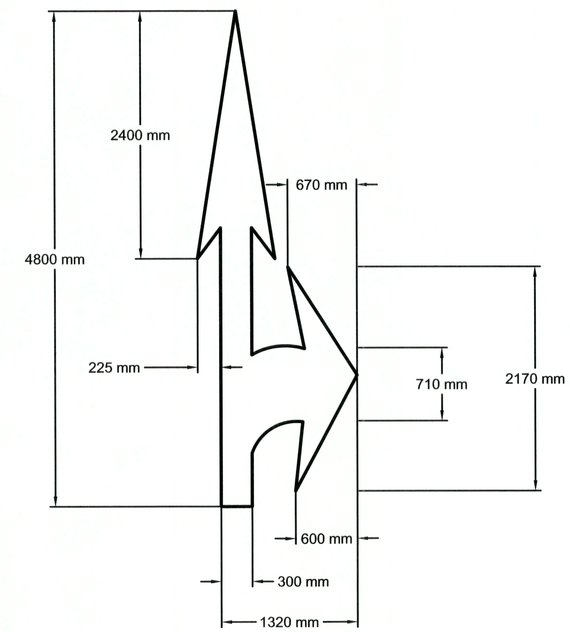












NOTES

1. Dimensions are measured from MUTCDC Figure C1-3
2. Arrows shown as they are to be placed on the pavement. Arrows will appear compressed to the driver. See MUTCDC Figure C1-3 for details.
3. On urban streets, the Area manager may approve the placement of directional arrow symbols that are 75% of the size shown above.

Designed by:		Manager Traffic Engineering Services — Dec 13/13 Date	MK.	DATE	REVISION	NOVA SCOTIA Transportation and Infrastructure Renewal	Scale: NTS	HIGHWAY PAVEMENT MARKINGS
Surveyed by:							Date: Dec 2013	
Drawn by: R. Hird		Director, Highway Engineering Services — 13 Dec/13 Date					File No.: S-2013-301	DIRECTIONAL ARROW SYMBOLS
Checked by:							Sheet No.: 1 of 1	
Approved by:								

Appendix D

Fisheries Protection Letter

Fisheries and Oceans Canada
Pêches et Océans Canada

Bedford Institute of Oceanography
1 Challenger Drive,
P.O. Box 1006
Station B410
Dartmouth, N.S.
B2Y 4A2

Your file *Votre référence*

April 25, 2016

Mersey River Bridge No. 2
(B089) - Bridge Renewal

Our file *Notre référence*
16-HMAR-00117

Tamara McFarland
Environmental Services
Public Works and Government Services Canada
1713 Bedford Row
Halifax, N.S.
B3J 1T3

Dear Ms. McFarland:

Subject: Serious harm to fish can be avoided or mitigated

The Fisheries Protection Program (the Program) of Fisheries and Oceans Canada received a proposal on April 11, 2016.

Based on the information provided, the proposal has been identified as a project where a *Fisheries Act* authorization is not required given that serious harm to fish can be avoided by following standard measures. Proposals in this category are not considered to need an authorization from the Program under the *Fisheries Act* in order to proceed. In order to comply with the Act, it is recommended that the guidance tools, which can be found at the website (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html), be followed.

Should the plans change or if there is omitted information in the proposal such that the proposal meets the criteria for a site specific review, as described on our website (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html), the request for review form that is also available on the website should be completed and submitted.

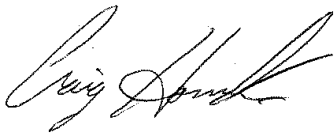
Should the proponent have any questions or concerns about the compliance of their proposal with the *Fisheries Act* (and/or those prohibitions of the *Species at Risk Act* that apply to listed aquatic species)* they may wish to engage an environmental professional

*Those sections most relevant to the review of development proposals include 20 and 35 of the *Fisheries Act* and sections 32, 33 and 58 of the *Species at Risk Act*. For more information please visit www.dfo-mpo.gc.ca.

Canada

familiar with measures to avoid impacts to fish and fish habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/env-pro-eng.html).

Yours sincerely,



Craig Hominick
Team Lead
Fisheries Protection Program