



Parks Canada Agency

**Pleasant Bay to
North Mountain
Rehabilitation KM
33.17 to 38.74**


**Technical
Specifications**

ISSUED FOR TENDER

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PCA Project No: 1114

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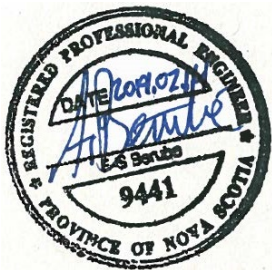
Parks Canada Agency

Cabot Trail Rehabilitation
Pleasant Bay to North Mountain
KM 33.17 to 38.74
Cape Breton Highlands National Park

Project No. 1114
Stantec Consulting Limited



Peter Flower, P.Eng.
Senior Civil Engineer
Stantec Consulting Limited



Alexis Berubé, P.Eng
Senior Structure Engineer
Stantec Consulting Limited

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Part 1 General

1.1 PROJECT LOCATION

- .1 The project is located in Cape Breton Highlands National Park (CBHNP), Nova Scotia. The work is located on the Cabot Trail (Trunk 30) at the eastern Park Boundary of Pleasant Bay to the foot of North Mountain, approximately 5.57 km's.

1.2 DESCRIPTION OF WORK AND LOCATION

- .1 The work under this Contract covers the furnishing of all labour, materials and equipment required to provide construction services for the rehabilitation of a section of Cabot Trail within CBHNP from Station 33+170 to Station 38+740. This Contract also includes the rehabilitation of a bridge crossing on the Cabot Trail, located at Grande Anse River.
- .2 Station 0+000 is defined from the Park Boundary at Chéticamp River. Station chainage starts and stops at Park Boundaries.
- .3 The Contractor shall restrict road work to a maximum length of 1.0 km, before rehabilitation activities can proceed to the opposite side of the roadway. Road work activities excluded from this includes; clearing, culvert replacements, top lift paving and work activities at the grubbing Storage Yard. Asphalt paving for shoulder widening (AC Paving for Widening) shall commence within 3 days of completing placement of base gravels.
- .4 The Contractor shall bring Type 1 Gravels to within 50 mm of the adjacent asphalt grade at the end of each day's work. In areas of shoulder widening the Contractor shall provide a temporary taper between the existing edge of asphalt and granular shoulder, prior to opening the closed lane to the public.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Parks Canada has prepared contract documents to rehabilitate a section of Cabot Trail, Station 33+170 to 38+740 which includes the rehabilitation of Grande Anse River Bridge. Work covered in the Contract Documents are as follows:
- .2 Rehabilitation of the Grande Anse River Bridge (B070). The structure is a 15.9 m simple span slab-on-girder bridge composed of a cast-in-place reinforced concrete slab with T-section reinforced concrete girders integral with the deck. The girders are fixed at the West abutment while the steel plate bearings are provided at the East abutment to accommodate expansion. Work required on the bridge generally consists of the following.
 - .1 Selective demolition of existing bridge components, including removal and disposal of asphalt, barrier, end blocks, sidewalks, bottom bearing plates and bearing blocks and other incidentals required to complete the work as indicated

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- on Contract drawings. Restoration of site shall be considered incidental to the work.
- .2 Removal and disposal of existing bridge features within the Contract including concrete end blocks and steel traffic barrier (posts and railings).
 - .3 Abrasive blast cleaning of concrete deck surface. Following removal of asphalt from deck surface, concrete removal quantities of unsound concrete shall be verified by the Departmental Representative employing one or more of the following techniques: visual observations, sounding or chain drags, half cell survey or radar techniques. The remaining existing exposed concrete shall be abrasive blast cleaned.
 - .4 Supply and installation of modified deck overhangs, end diaphragm restoration, expansion joint assembly, bearing block restoration, laminated elastomeric bearings, curbs, crash blocks, barrier, deck waterproofing membrane, asphalt and incidentals required to complete the work as shown in the Contract Documents.
- .3 Cabot Trail work generally includes roadway and embankment widening to provide for 1.5 m wide paved shoulders and placement of an asphalt overlay over approximately 5.57 km's. Work required on the road generally consists of the following.
- .1 Removal of existing asphalt concrete and reuse/disposal as required.
 - .2 Clearing, grubbing, soil stripping, ditching, and grading areas as shown on the Contract Drawings.
 - .3 Removal disposal and replacement of culverts and associated elephant trunks as indicated on the Contract Drawings.
 - .4 Removal disposal and replacement of guard rail and posts as indicated on the Contract Drawings.
 - .5 Excavation, embankment widening, ditching, backfilling, grading, and the placement of rock fill, common borrow, granular materials, rip-rap, asphalt and RAP to the lines and grades shown on the Contract Drawings and as specified in the Contract Documents.
 - .6 Supply, placement, compaction and grading of aggregate materials.
 - .7 Supply and place base and surface course asphalt concrete. A material transfer vehicle (Roadtec SB 2500C or approved equal) is to be used to transfer all hot mix asphalt from haul units to asphalt spreader.
 - .8 Supply and placement of precast F-Shape concrete barriers as indicated on the Contract Drawings.
 - .9 Placement of RAP shouldering material.
 - .10 Work requirements at the noted 'Day Use' areas as noted on the Contract Drawings.
 - .11 All landscaping requirements and reclamation as provided in the Contract Documents.
 - .12 Removal of regulatory and warning signs and sign posts and replace with new signs and posts. The Contractor shall provide the new regulatory and warning signs.

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- .13 Removal of Park signs and sign posts and deliver to a location within the Park as directed by the Departmental Representative. The Contractor shall replace sign posts and reinstate signs provided by the Park upon completion of the Work.
 - .14 Supply and placement of hydroseeding and dry mulch on designated slopes.
 - .15 Establish the layout of pavement markings, delineation, and arrows etc. prior to line stripping. Provide for review and approval to the Departmental Representative, drawings of new layout locations prior to pavement marking.
 - .16 Supply and installation of all temporary and permanent pavement markings.
 - .4 The above listed Work is subject to the following constraints and requirements during construction:
 - .1 Carry out a preconstruction survey to:
 - .1 Layout and place wooden grade stakes at every construction stage of the roadway structure (top of backslope, toe of slope, subgrades, granulars, etc.) on both sides of the roadway. Establish and maintain 20 m stationing and placement of offset stakes of the 20 m stations on which is written with the chainage and centreline offset.
 - .2 Confirm dimensions of existing bridge components that are critical to the completion of the work. This shall include, but not be limited to, the width of the travel lanes during construction stages, deck overhang dimensions, bearing block and bearing seat dimensions and elevations, location of abutment repairs and total length of structure.
 - .3 This includes stakes, marks and grades necessary for clearing, grubbing and stripping limits, cuts, fills, and culvert layouts.
 - .4 The preservation of stakes and marks shall be the responsibility of the Contractor and are to be maintained throughout the Work.
 - .5 The Contractor shall ensure access for the Departmental Representative for checking control lines and grades.
 - .6 The Contractor shall meet the design lines and grades as provided in the Contract Drawings.
 - .7 Remove all grade stakes and markings at the completion of Work.
 - .8 The preconstruction survey is considered incidental to the Contract.
 - .2 Supply traffic control signs, temporary traffic lights, portable electronic message boards, F-shape barriers, double weighted reflective drums for delineation, traffic control personnel and pilot vehicle including means of transporting cyclist and their bicycles thru the traffic control zone.
 - .3 Maintenance of single lane of traffic on existing bridge, with appropriate signage and traffic signal per the Temporary Workplace Traffic Control Manual until the bridge rehabilitation is complete and open to traffic.
 - .4 Record the direction, start station, and end station of all pavement markings within the project limits. Establish offset stake at each location, re-establish and pre-mark prior to new placement of permanent pavement marking.
 - .5 The Contractor shall develop an Environmental Protection Plan for submission and approval prior to starting work based on Parks Canada's Best Management

Practices document as shown in **Appendix B**. (*Parks Canada National Best Management Practices – Roadway, Highway, Parkway and Related Infrastructure (May 2015)*), **Appendix C**, *BMP (Mitigation)*, *Works In and Around Waterbodies*, *Grande Anse Bridge Rehabilitation* and in accordance with EPP template document provided in **Appendix D**.

- .6 Site erosion and sediment control measures, including check dams, silt fencing, silt curtain, Straw bales, vegetation stabilization and other measures as required, maintained for the duration of the Work.
- .7 Coordinate, schedule and facilitate the removals, temporary relocation and reinstatement of NS Power and Bell Aliant's aboveground and underground utility infrastructure as required.
 - .1 Delays resulting from the location or relocation of these services shall not constitute a claim on the part of the Contractor for damages or for any loss of anticipated profits.
- .8 Construct, maintain, and remove all detours.
- .5 The Contractor is responsible for the delineation of the construction zones and the existing highway.
- .6 All work to be carried out in accordance with applicable federal, provincial regulations for those agencies having jurisdiction for the work. The work is subject to the National Park Act and Regulations, Canadian Environmental Protection Act, and the Code of Practice of the Department of Labour, as it applies to the Temporary Workplace Traffic Control Manual (TWTCM).
- .7 All mitigation measures to protect downstream water quality impacts contained within these specifications require full adherence from the Contractor.
- .8 The Contractor must be aware that other construction work may be performed at several different locations within the Park during the time frame of this contract and that coordination with other Contracts may be required. The Contractor must plan their work accordingly. A list of other anticipated work areas along with the appropriate kilometer station of Cabot Trail includes:
 - .1 Rock Slope Stabilization – French Mountain.
 - .2 Road Rehabilitation - French Mountain.
 - .3 Effie's Brook Bridge Replacement.
 - .4 Trout Brook Campground Reconstruction.
- .9 In addition to identified construction work taking place in the Park; NSTIR may be completing roadway rehabilitation from Ingonish Beach to Ingonish during the time frame of this contract and that coordination with this Contract should be considered.

1.4 CONTRACT METHOD

- .1 Construct the Work under a combined lump sum and unit price items Contract.

1.5 CODES AND STANDARDS

- .1 Perform work in accordance with National Parks Act, Code of Practice of the Department of Labour, as it pertains to the Temporary Workplace Traffic Control Manual (Nova Scotia Department of Transportation and Infrastructure Renewal and any other code of federal, provincial, or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply).
- .2 Materials and workmanship must conform to or exceed applicable standards of Canadian General Standards Board (CGSB), Canadian Standards Association (CSA), American Society for Testing and Materials (ASTM) and other standards organizations.
- .3 Conform to latest revision of any referenced standard as re-affirmed or revised to date of specification. Standards or codes not dated shall be deemed editions in force on date of tender advertisement.
- .4 Vehicle weights and dimensions shall conform to Public Highways Act (Nova Scotia).

1.6 TERMS AND DEFINITIONS

- .1 Engineer: Unless specifically stated otherwise, the term Engineer where used in the Specifications and on the Drawings shall mean the Departmental Representative as defined in the General Conditions of the Contract.
- .2 Project Limits: The clearing limits.
- .3 Roadway: Portion of right-of-way included within construction limits of grading, drainage, base course, shouldering and surface course improvements and appurtenant structures.

1.7 SITE SURVEY AND SETTING OUT OF WORK

- .1 Existing topographic data used in the preparing these Contract Documents was provided by Leading Edge Geomatics using LIDAR supplied data. Topographic survey by Stantec Consulting Ltd. was completed to supplement the LIDAR data.
- .2 If required, georeferenced CAD files of the site can be provided to the Contractor for use in layout of Work.
- .3 Contractor shall carry out all layouts.
- .4 Contractor shall assume full responsibility for and execute complete layout of work to locations, lines and elevations indicated.
- .5 Contractor shall supply such devices as straight edges and templates required to facilitate Departmental Representative's inspection of work.

- .6 Contractor shall supply pre and post construction cross sections at 20m intervals to ensure that lines and grades of the project can be checked by the Departmental Representative including toe of slope, rounding and centerline offsets, etc.
- .7 Provide coordinates, elevations and dimensions in the field, as required by the Departmental Representative.

1.8 WORK WITHIN PARK BOUNDARIES

- .1 The project is within a National Park and it is essential that lands remain as undisturbed as possible. The Contractor will be expected to use standards and methods beyond those for normal construction in order to protect the environment and ensure the aesthetics of the work. Contract limits shall be strictly adhered to and every precaution shall be taken to minimize environmental damage and disruption to vegetation, wildlife habitat, and structures or existing services, both on construction and storage sites:
 - .1 If any damage occurs during construction, the Contractor is responsible to bear the expense to immediately restore such damaged areas to the satisfaction of the Departmental Representative.
 - .2 If Contractor fails to repair damage to the satisfaction of the Departmental Representative, the Departmental Representative may complete repairs at the Contractor's expense.
 - .3 The Contractor shall ensure that contracted work meets the standards outlined in the contract specification and drawings.
 - .4 All sources of aggregate and asphalt cement must be submitted to the Departmental Representative for approval at least two weeks prior to the start of any work.
 - .5 The Contractor is responsible to follow the Provincial requirements regarding the following:
 - .1 Pit and Quarry Guidelines.
 - .2 Environmental Construction Practice specifications.
 - .6 The Contractor will make arrangements with authorities or owners of private properties for quarrying and transporting materials and machinery over their properties and be responsible for obtaining and paying of fees.

1.9 MAINTENANCE OF WORK DURING CONSTRUCTION

- .1 Maintain work during construction. Undertake continuous and effective maintenance work day by day, with adequate equipment and forces so that the roadway or structures are continuously kept in a condition satisfactory to Departmental Representative:
 - .1 A mechanical sweeper is to be used to remove debris tracked onto paved surfaces. Pave surfaces shall be swept daily to remove debris.
 - .2 The contractor shall stake both sides of roadway and at every stage of the pavement structure construction, Subgrade, and Type 1 surfaces. These stakes are to be maintained throughout each stage of construction and are to be replaced when removed or damaged.

- .3 The contractor shall ensure that following culvert replacements, the travelled lanes are resurfaced to grade using RAP material immediately prior to opening the closed lane to traffic.
- .4 The contractor shall ensure dust control within the Work area at all times.

1.10 WORK SEQUENCE

- .1 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities without approval from Departmental Representative.
- .2 Required stages of work sequence for the Grande Anse Bridge Rehabilitation:
 - .1 Installation of law and code required traffic control prior to reduction to one lane of travel on bridge.
 - .2 Rehabilitation of bridge within shut-down portion and segment of approaches that will not impede flow of traffic on existing bridge and approaches.
 - .3 Repositioning of traffic control to shift travel lane to rehabilitated portion of bridge.
 - .4 Rehabilitation of bridge within shut-down portion and segment of approaches that will not impede flow of traffic on shifted travel lane of existing bridge and approaches.
 - .5 Removal of traffic control and restoration of two lanes of travel on bridge.
- .3 Required stages of work sequence for the Roadway Rehabilitation:
 - .1 Widening and paving activities will be completed in two phases; work in Phase 1 shall be completed before commencing Phase 2 activities.
 - .2 Work activities in both phases are required on both sides of the road. The Contractor shall restrict road work to a maximum length of 1.0 km, before rehabilitation activities can proceed to the opposite side of the roadway.
 - .1 Phase 1:**
 - .1 Clearing, grubbing and soil stripping of existing slopes. Note that all clearing is to be completed prior to May 15.
 - .2 Place embankment fill to limits required for subgrade widening.
 - .3 Remove the existing shoulder material to a depth of 350 mm, taking care not to undermine the edge of existing asphalt.
 - .4 Place 300 mm of new gravel Type 1 to protect the edge of the existing asphalt.
 - .2 Phase 2:**
 - .1 Asphalt paving for shoulder widening (AC Paving) in Phase 2 to commence within 3 days of completing placement of base gravels (Type 1) in Phase 1.
 - .2 Mill asphalt key into edge of existing asphalt on both sides of the road. Key is to be 200 mm wide and 50 mm deep.
 - .3 Place 50 mm asphalt shoulder base using mix Type D-HF.

- .4 Tack coat and surface the entire roadway width with 50 mm of mix Type D-HF.
- .5 Place 100 mm thick RAP shoulder material.

1.11 SITE CONDITIONS

- .1 Before submitting a bid, it is **recommended** that bidders visit the site to review and verify the form, nature and extent of the work, materials needed, the means of access and the temporary facilities required to perform the Work.
- .2 Obtain prior permission from the Parks Canada Asset Manager before carrying out such site inspection.
- .3 All persons visiting the site are to review specification Section 01 35 29.06 – Health and Safety Requirements before arrival on site. Take all appropriate safety measures for any visit to site, either before or after acceptance of bid.
- .4 For geotechnical and borehole information, refer to report prepared by Stantec Consulting Ltd. dated January 2018, attached in **Appendix A**. Any interpretations of its findings will be made at the Contractor's own risk and the Departmental Representative will not be held responsible for the interpretation of this document.
- .5 Promptly notify the Departmental Representative if subsurface conditions differ materially for those indicated in the Contract Documents or a reasonable assumption of probable conditions based on thereon.

1.12 WORK BY OTHERS

- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from the Departmental Representative.
- .2 Co-ordinate work with that of other Contractors. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of Work.

1.13 WASTE DISPOSAL

- .1 Materials from grubbing Work shall be stockpiled within the identified area at the former Pleasant Bay Pit (Sta. 33+350); provided in **Appendix I**. The Contractor will be required to place approved screened and processed grubbings along the roadway slopes within the Contract prior to hydroseeding. All grubbings require approval by Departmental Representative prior to disposal. All other waste generated from this project will be disposed of outside of Park boundaries.

1.14 WORK SCHEDULE

- .1 Provide to the Departmental Representative in writing and within 5 working days after Contract award, a detailed construction schedule, health and safety plan, environmental protection plans, trucking management plan and traffic control plan. The schedule shall show proposed work to be undertaken and anticipated completion dates for each category of work in the Lump Sum items and Unit Price Table.
- .2 After receiving the Contractor's plan and prior to start of construction, a pre-construction meeting involving Contractor, Departmental Representative and Parks Canada will be held at a place and time to be determined by the Departmental Representative. This meeting will review implications of the contract, design, schedule of work, methods of construction, health and safety, environment protection methods and traffic control.
- .3 The interim completion date for the Bridge Work shall be **June 30, 2019**. The final project completion date shall be **September 13, 2019**.
- .4 There shall be no Work during the Cabot Trail Relay Race (May 25 and 26, 2019).
- .5 Work must be undertaken without environmental impact to Grande Anse River and its tributaries. Work in and adjacent Grande Anse River must be done during periods of low water or at times acceptable to the Departmental Representative.
- .6 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.
- .7 No work will begin until the pre-construction meeting is held.
- .8 Following the pre-construction meeting and approval of the schedule, health and safety plan, environmental protection plan, trucking management plan and traffic control plan, the work will be so scheduled to meet the time restraints and have the project completed on time.

1.15 CONTRACTOR'S USE OF SITE

- .1 Limit use of premises for Work, to allow:
 - .1 Work by other Contractors.
 - .2 Public usage.
- .2 Use of site: for execution of Work within roadway right of way and those areas specified by the Departmental Representative.
- .3 The Departmental Representative will specify the areas for work and storage.
- .4 Contractor's use of site for storage, stockpiles and preparatory work shall be limited to an approved area. Any areas required shall be approved by The Departmental Representative prior to use.

- .1 The Contractor has been provided a designated location at the former Pleasant Bay Pit (Station 33+350) for grubbing stockpiling, provided in **Appendix I** as an approved location for stockpiling of this material. This location has been designated as the only approved area for the Contractor's use within the Park.
- .2 All other areas from equipment/material storage, stockpiling of materials, field office, and employee parking etc. shall be to the approval of the Departmental Representative.
- .3 Material storage, stockpiles and all disposal sites are to be reinstated to pre-construction activities as directed by the Departmental Representative.
- .5 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
- .6 The Contractor shall 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 work.
- .7 Contractor shall provide any and all necessary traffic control services required for the project.
- .8 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.
- .9 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by the Departmental Representative.
- .10 At completion of operations condition of existing work: equal to or better than that which existed before new work started.
- .11 Contractor to obtain all necessary permits and/or approvals to perform work and to comply with all permit requirements and conditions

1.16 SANITARY SERVICES

- .1 The Contractor shall provide and maintain sanitary facilities for the use of workers at locations specified by the Departmental Representative. Provision of sanitary facilities shall meet requirements of provincial government and municipal statutes and authorities.

1.17 PROJECT MEETINGS

- .1 The Contractor shall attend all project meetings at the call of the Departmental Representative.
- .2 After receiving the Contractor's schedule, traffic control plan, trucking management plan, health and safety hazard assessment, and environmental protection plan, and prior to start of construction, a meeting involving Contractor, Departmental Representative and Parks

Canada will be held at a place and time to be determined by the Departmental Representative. This meeting will review implications of the contract, design, schedule of work, health and safety, methods of construction, environment protection methods and traffic control.

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

1.18 DEPARTMENTAL REPRESENTATIVE

- .1 The Departmental Representative will be assigned after contract award.

1.19 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each of following:
 - .1 Contract drawings.
 - .2 Specifications.
 - .3 Addendas.
 - .4 Site Instructions.
 - .5 Reviewed Shop Drawings.
 - .6 List of Outstanding Shop Drawings.
 - .7 Manufacturer's installation and application instructions.
 - .8 Change orders.
 - .9 Other modifications to Contract.
 - .10 Field Test Reports.
 - .11 Copy of Approved Work Schedule.
 - .12 Health and Safety Plan and Other Safety Related Documents.
 - .13 Environmental Protection Plan.
 - .14 Plan Locating all Aboveground and Underground Utilities.
 - .15 Other Documents as stipulated elsewhere in the Contract Documents.

1.20 TRUCK MANAGEMENT PLAN

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit site-specific Truck Management Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Truck Management Plan shall include, but not limited to:
 - .1 Speed and Unsafe Driving: Contractor shall outline how they will monitor and discipline trucks for any violations. The Plan must indicate the progressive steps that will be followed should violations occur.

- .2 Over Weight Loads: Departmental Representative will periodically spot check and divert loads (i.e. any material without weigh slips) to scales for random compliance check.
 - .1 Any material hauled in excess of the maximum weight limits of Section 191, Weights and Dimensions of Vehicles Regulations under the NS Motor Vehicle Act, will be not paid for or considered eligible for payment as part of the work under any Section of the Contract.
- .3 Tarping: All loads delivered to site shall be tarped. Loads delivered to site not tarped will not be paid for.
- .3 The Contractor shall be responsible to provide a Daily Weighers Report to the Departmental Representative to cross reference delivered material. The Report shall include, but not limited to:
 - .1 Driver name;
 - .2 Company;
 - .3 License plate number;
 - .4 Tare, including gross and net weight.
- .4 Any work days with missing Daily Weighers Reports or weigh slips will not be paid for.
- .5 Submit other data, information and documentation upon request as stipulated elsewhere in this Section.

1.21 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 Contract documents.

1.22 MEASUREMENT FOR PAYMENT

- .1 Notify Departmental Representative sufficiently in advance of operations to permit required measurements for payment.

1.23 CUTTING AND PATCHING

- .1 Cut and patch as required to make work fit.
- .2 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.

1.24 RELICS, ANTIQUES & 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.

1.25 NATIONAL PARKS ACT

- .1 For projects within boundaries of National Park, perform work in accordance with the National Parks Act and Regulations for arrears.

1.26 MEASUREMENT OF QUANTITIES

- .1 Linear: Items which are measured by metre or kilometre, such as pavement markings will be measured along centreline of installation unless otherwise shown on plans.
- .2 Area:
 - .1 Longitudinal and transverse measurements for areas to be measured horizontally.
 - .2 Longitudinal and transverse measurements for such items as hydroseeding and mulching to be made on actual flat or sloped surface seeded or sodded.
- .3 Volume:
 - .1 In computing volumes of excavation, average end area method will be used unless otherwise directed by Departmental Representative in writing.
 - .2 Term: Litre shall mean 1000 mL or L.
- .4 All volume measurements refer to in place measure unless specified elsewhere in specification.
- .5 Mass:
 - .1 Term "tonne" shall mean 1000 kg.
 - .2 Materials which are specified for measurement by mass shall be weighed on scales at a location determined by the Contractor. 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.
- .6 Time:
 - .1 Unless otherwise provided for elsewhere or by written authority of Departmental Representative, hourly rental of equipment will be measured in actual working time and necessary travelling time of equipment within limits of project at an all-inclusive rate. Equip each unit of mobile equipment with an approved device to register hours of operation. Devices which only measure hours of running of motor will not be accepted.

1.27 PERMITS/AUTHORITIES

- .1 The Contractor shall obtain, and pay for, permits from authorities as required for all operations and construction. The Contractor shall also comply with all pertinent regulations of all authorities having jurisdiction over the work. The Contractor shall provide copies of all permits and approvals to the Owner prior to starting the work. The Contractor shall be responsible for obtaining all applicable permits, inspections and approvals required and shall pay all changes in connection therewith.

1.28 EQUIPMENT RENTAL RATES

- .1 Upon written request, the Contractor will supply the Departmental Representative with a list of the rental equipment to be used on work beyond the scope of bid items. Equipment rental rates will be in accordance with current rates published by the Nova Scotia Road Builders Association.

1.29 PROTECTION

- .1 Store all materials and equipment to be incorporated into work to prevent damage by any means.
- .2 Repair and replace all materials or equipment damaged in transit or storage to the satisfaction of the Departmental Representative and at no cost to Crown.
- .3 Contractor will take adequate precautions to protect existing structures when operating tracked equipment.
- .4 Exercise care so as not to obstruct or damage public or private property in the area.
- .5 At completion of work, restore area to its original condition. Damage to ground and property will be repaired by Contractor. Remove all construction materials, residue, excess, etc., and leave site in a condition acceptable to Departmental Representative.

1.30 EXISTING SERVICES

- .1 Notify the Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give the Departmental Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to vehicular traffic.
- .3 Establish location and extent of service lines in area of work before starting Work. Notify the Departmental Representative of findings.

- .4 Submit schedule to and obtain approval from the Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.
- .5 Where unknown services are encountered, immediately advise the Departmental Representative and confirm findings in writing.
- .6 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .7 Record locations of maintained, re-routed and abandoned service lines.
- .8 Ensure that at least one lane of traffic is maintained at construction sites at all times.
- .9 Cut and patch as required to make work fit.
- .10 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.
- .11 Carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to pedestrian and vehicular traffic.
- .12 Ensure pedestrian and other traffic is not unduly impeded, interrupted or endangered by execution or existence of work or plant.
- .13 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .14 Maintain existing signs at all times. When it is necessary to temporarily remove a sign, it shall be dismantled and re-established on a temporary post or stand set back from construction area. The work is considered to be incidental and no separate payment will be made for maintaining or moving signs.

There are existing roadside signs, power and utility poles, aboveground and underground lines located within the project area that are impacted by the new work and will require relocation. This includes the existing "Road Closed When Lights Flashing" sign located on the west approach. The Contractor will be required to coordinate their work with utility companies and schedule the works accordingly. This sign is to be relocated and shall be fully operational no later than **August 31, 2019**. Non-compliance in not meeting this requirement will result in retention of five thousand dollars (\$5,000.00) per day. Additionally, any expense related to damage caused to the sign during the Work shall be at the cost of the Contractor.

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 REQUIREMENTS

- .1 Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
- .2 Section 01 35 00.06 - Special Procedures for Traffic Control.

1.2 ACCESS AND EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, in accordance with relevant municipal, provincial, and other regulations.

1.3 USE OF SITE AND FACILITIES

- .1 Provide for personnel and vehicle access.
- .2 The Contractor shall not park equipment on the shoulder of the roadway at the end of each work day.
- .3 The Contractor shall coordinate and submit a plan to the Departmental Representative of proposed locations for laydown, equipment storage and Contractor staff parking for review and approval.
- .4 The Contractor has been provided a designated location at the former Pleasant Bay Pit (Station 33+350) for grubbing stockpiling. This location has been designated as the only approved area for the Contractor's use within the Park. The Contractor shall install appropriate signage and barricades to delineate the work area.
- .5 Stockpiles of RAP material to be used for this project is located at the Parks Canada Pleasant Bay Salt Storage Yard. The Contractor shall install appropriate signage and barricades to delineate the work area. A plan showing the location of the stockpiles is provided in **Appendix G**.
- .6 The Contractor shall restrict road work to a maximum length of 1.0 km, before rehabilitation activities can proceed to the opposite side of the roadway. Road work activities excluded from this includes; clearing, culvert replacements, top lift paving and work activities at the grubbing Storage Yard. Asphalt paving for shoulder widening (AC Paving for Widening) shall commence within 3 days of completing placement of base gravels.
- .7 The Contractor shall bring Type 1 Gravels to within 50 mm of the adjacent asphalt grade at the end of each day's work. In areas of shoulder widening the Contractor shall provide a temporary taper between the existing edge of asphalt and granular shoulder, prior to opening the closed lane to the public.
- .8 Placement of permanent pavement markings shall be installed within 5 days of completing surface lift asphalt.
- .9 Contractor shall maintain access to 'Day Use' locations at all times except when they require closure for construction activities. Any work being completed at the Day Use areas requires 48-hour notice to the Departmental Representative's review and approval.

- Access to Day Use locations shall be appropriately delineated and is to be signed during the Work.
- .10 Maintenance work on Contractor/Sub-Contractor equipment is prohibited within the Park boundary.
 - .11 The Contractor to provide survey layout with stakes on both sides of the road/alignment at 20 m Stations (top of back slope, toe of slope, subgrade, granulars, shoulders, etc.) with C/L offset.
 - .12 Special Move Permit (over weight & over dimension) from the province shall be submitted to the Departmental Representative for review and approval prior to activity.
 - .13 Maintain Road & Site Signage **at all times** during Contract (ie. dust control, no potholes, bumps, PVMS, etc.)
 - .14 Water extraction within the Park is not permitted.
 - .15 Blasting is prohibited.
 - .16 Relics, Antiques, Artifacts, Wildlife Habitat encountered, and all spills must be reported to Parks Canada and the Departmental Representative as per Contract.
 - .17 The Work shall be conducted in accordance with Parks Canada Best Management Practices – Roadway, Highway, Parkway and Related Infrastructure (May 2015), Environmental Construction Practice Specifications, National Parks Act and Regulations, Canadian Environmental Protection Act, provided in **Appendix B**, the Best Management Practices (Mitigation), Works In and Around Waterbodies, Grand Anse Bridge Rehabilitation, provided in **Appendix C**. The Work shall also comply to the Environmental Protection Plan Template Document provided in **Appendix D**.
 - .18 If native topsoil is encountered, the Contractor shall stockpile and maintain at an approved location, so embankments and designated areas can be dressed at the end of the project prior to hydroseeding and dry mulch.
 - .19 Any materials deemed salvageable such as Guide Rail, Signage etc. The Contractor shall deliver these materials to the Park Compounds. Guide Rail shall be unbolted and neatly stored with hardware provided.
 - .1 The Contractor shall coordinate with Park staff:
 - .1 Cheticamp Compound: Jerry LeBlanc (902-224-2041)
 - .2 Ingonish Compound: Dean Lefriend (902-776-0397)
 - .20 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
 - .21 Where security is reduced by work provide temporary means to maintain security.
 - .22 The Contractor is advised that there is other Work ongoing in other areas of the Park outside the limits of the Work for this Contract.
 - .23 The Contractor is required to record As-Built information and provide at the end of the project as per the Contract Documents.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS

- .1 Execute work with least possible interference or disturbance to public and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.
- .2 The Contractor may install pipe culverts outside of the 1 kilometer work zone. Any culvert areas outside of the 1 kilometer work zone shall be resurfaced using RAP material immediately prior to reestablishment of full traffic availability.
- .3 If native topsoil is encountered, the Contractor shall maintain so embankments and designated areas can be dressed at the end of the project prior to hydroseeding and dry mulch.

1.5 EXISTING SERVICES

- .1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.
 - .1 The Contractor shall obtain clearance reports from all utilities and ensure temporary lines are not disturbed during the duration of this project, this information shall indicate depth, location, protection measures if required, etc. The Contractor will be required to coordinate their work with utility companies and schedule the works accordingly.
 - .2 The Contractor shall ensure that they make provisions for safe working conditions while operating near live power and communication lines. The Contractor has sole responsibility to have the utility companies place required safety coverings over power lines, hold poles or suspend lines at the Contractor's expense. Contractors are advised to review these costs with the Utility prior to the submission of their tender. All costs are deemed to be included in the Contract unit prices quoted in the tender submission.
- .2 Provide for personnel, pedestrian and vehicular traffic. Provide for one lane traffic during working hours and provide two lane traffic at the end of each working day for the road rehabilitation.

1.6 SPECIAL REQUIREMENTS

- .1 No Work permitted at night, on weekends or statutory holidays, that is not long duration setup as per NS Temporary Workplace Traffic Control Manual. Night time is defined as sunset to sunrise for the location nearest the area as posted by Environment Canada.
- .2 There shall be no Work during the Cabot Trail Relay Race (May 25 and 26, 2019). The Contractor is responsible for confirming event details and requirements with the Departmental Representative.
- .3 The maximum cumulative traffic delay within the project limits during the peak season (July 1 – August 31) between the hours of 9am and 4pm shall be 10 minutes. The maximum cumulative traffic delay within the project limits shall be 20 minutes during the off-peak season. The Contractor shall be aware of the Road Rental clause associated with Traffic Delays as specified in Section 01 35 00.06, subsection 3.1.5.1.
- .4 During the school year, minimize delays for school buses.

- .5 Water extraction from within the Park boundaries is strictly forbidden. Water extraction may be permitted following a detailed proposal submitted by the Contractor and subject to approval by the Departmental Representative.
- .6 The Contractor is advised that all materials with the exception of any quantity of topsoil shall come from outside the Park limits.
- .7 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .8 Keep within limits of work and avenues of ingress and egress.
- .9 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedule - Bar (GANTT) Chart.
- .10 An environmental non-compliance clause for this Contract has been identified. The Contractor shall be aware of the environmental clause as specified in Section 01 35 43.
- .11 The Contractor shall ensure that they make provisions for safe working conditions while operating near live power and communication lines. The Contractor has sole responsibility to have the utility companies place required safety coverings over power lines, hold poles or suspend lines at the Contractor's expense. Contractors are advised to review these costs with the Utility prior to the submission of their tender. All costs are deemed to be included in the Contract unit prices quoted in the tender submission.

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 General Conditions.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 PRIME COST SUM

- .1 Include in Contract Price a total Prime Cost Sum of \$150,000.
- .2 The Contract Price, and not Prime Cost Sum, includes Contractor's overhead and profit in connection with such prime cost sum.
- .3 Prime Cost Sum provided for in the unit price table is not a sum due the Contractor. Rather, payment will be made against it for miscellaneous work not included in the unit price table ordered under GC 6.1 of the General Conditions.
- .4 Such work may include, but not be limited to:
 - .1 Coordination for the temporary relocation and reinstatement of aboveground and underground Bell Aliant communication cable(s), within the limits of Work.
 - .1 The Contractor shall schedule and coordinate the Work with Bell Aliant.
Allister MacLean
C: 1 (902) 565-7431
Allister.maclean@bellaliant.ca
 - .2 Coordination efforts with Nova Scotia Power for the removal and relocation of hydro poles and associated infrastructure, within the limits of Work.
 - .1 The Contractor shall schedule and coordinate the Work with NS Power.
Shoaib Badshah
T&D Capital Engineer
Nova Scotia Power
O: 1 (902) 496-4879
C: 1 (902) 789-9687
Shoaib.qabilbadshah@nspower.ca
- .5 Once a Prime Cost Sum has been agreed upon with Parks Canada, it shall be included as an item on the Project Schedule. This shall occur on the next update of the Project Schedule.

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PRIME COST SUM

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Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 11 00 – Summary of Work.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures

1.3 DESCRIPTION

- .1 Mobilization and Demobilization consists of preparatory work and operations including but not limited to, those necessary for the movements of personnel, equipment, supplies and incidentals to and from the project sites.
- .2 For those purposes of mobilization and demobilization, “project site” means the location.

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 GENERAL REQUIREMENTS OF THE BID AND ACCEPTANCE FORM

- .1 This section covers the measurement of Work done for payment purposes.
- .2 The quantities listed in the Bid and Acceptance Form are approximate only and are for the purpose of tendering. Payment to the Contractor will be based on actual quantities of work completed in accordance with the Drawings and Specifications.
- .3 There shall be no measurement or payment for Work carried out beyond the limits defined on the Drawings.
- .4 The total of all Unit Prices and Lump Sum payments shall constitute full compensation for the entire Work of the Contract, as shown, specified, and intended.
- .5 The Contractor will only be entitled to payment 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.
- .6 The unit and lump sum prices for all items in the Unit Price Table and Lump Sum Table shall represent the full compensation for the work of the item and shall include the cost of furnishing all materials, labour, tools, and equipment necessary to complete the work in accordance with the Contract, the Drawings and Specifications, and shall cover all costs of surety. Each item shall include all necessary supervision, plant and services, and all operations and allowances customary and necessary to complete each item and the Contract as a whole, notwithstanding the fact that not every such necessary operation is mentioned or included specifically for measurement.
- .7 Unless specified otherwise, all materials necessary to complete the items listed in the Unit Price Table, Lump Sum Table and the finished Work shall be new materials supplied by the Contractor and the cost of such material is to be included in the Contractor's prices.
- .8 All measurements for progress payment purposes shall be taken jointly by the Contractor and the Departmental Representative.
- .9 Items which are measured by the meter shall be measured along centreline of installation unless otherwise indicated.
- .10 Longitudinal and transverse measurement shall be made on the actual flat or sloped surface.
- .11 In computing volumes of excavation, average end area method will be used unless otherwise directed by Departmental Representative.
- .12 All volume measurements refer to in-place measures unless specified otherwise.

- .13 Materials which are specified for measurement by mass shall be weighed on scales approved by Departmental Representative refer to Section 01 54 30 – Temporary Weigh Scales. 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.
- .14 There will be no payment for work carried out on weighed material in the absence of weight tickets.
- .15 Overhaul will not be paid on this Contract.

1.2 MEASUREMENT AND PAYMENT

- .1 The numbers of the items described below correspond to the items in the Bid and Acceptance Form.
- .2 All items in this Contract will be paid for as indicated in the Bid items below:
 - .1 **Section A** items are Bid items (Lump Sum and Unit Price) related to the Bridge Work, and
 - .2 **Section B** items are Bid items (Lump Sum and Unit Price) related to the Road Work.

1.3 SECTION A- BRIDGE WORK ITEMS (LUMP SUM TABLE)

- .1 Lump Sum Item 1A – Section 01 25 20 – Mobilization / Demobilization
 - .1 Terms of Payment: Lump Sum (LS).
 - .2 This Item includes:
 - .1 For 50% of Lump Sum Contract price for mobilization and demobilization to be paid when mobilization to site is complete. The remainder of the Lump Sum price for mobilization and demobilization to be paid when work is complete, and all materials, equipment, buildings, shops, offices, and other facilities have been removed from site and site cleaned and left in condition to the satisfaction of the Departmental Representative and all other agencies having jurisdiction.
- .2 Lump Sum Item 2A – Section 01 35 00.06 - Special Procedures for Traffic Control
 - .1 Terms of Payment: Lump Sum (LS).
 - .2 This Item includes:
 - .1 Traffic control persons and traffic accommodation person(s).
 - .2 Provision, installation, and maintenance of temporary traffic control devices, including; traffic control signals, construction signage, delineator drums, jersey barriers, and temporary pad sites.
 - .3 Traffic control devices and measures required to comply with NSTIR's Temporary Workplace Traffic Control Manual (TWTCM) including but not limited to all labour, materials and equipment related to traffic control, Accredited Sign Supervisor, traffic control signage, traffic control

signals, flashing light units, reflectors, F-shape barriers, traffic barrels, and TC-63 delineator drums (double weighted) etc.

- .3 Lump Sum Item 3A – Section 01 35 43 – Environmental Procedures
 - .1 Terms of Payment: Lump Sum (LS).
 - .2 This item includes:
 - .1 Maintenance of all erosion control measures as directed by Departmental Representative.
 - .2 All environmental protection, sedimentation and erosion control measures required to complete the project, such as (but not limited to) diversion ditching, temporary ground covers, and rock flow checks in accordance with Parks Canada National Best Management Practices – Roadway, Highway, Parkway, and Related Infrastructure (May 2015), and Best Management Practices (Mitigation) **Appendix B**, Works In and Around Waterbodies, Grande Anse Bridge Rehabilitation **Appendix C**.
 - .3 Submission of the Environmental Protection Plan (EPP) as per the EPP Template Document, provided in **Appendix D**. The EPP shall be developed using this template document and is to be submitted to the Departmental Representative for review and approval.
- .4 Lump Sum Item 4A - Section 02 41 16 - Structure Demolition – Includes Abrasion Blast Cleaning
 - .1 Terms of Payment: Lump Sum (LS).
 - .2 This item includes:
 - .1 Demolition, transporting and disposal of existing bridge structure components, including abrasive blast cleaning of deck and approach slab and blast cleaning of exposed existing reinforcing bars as indicated in the Contract Documents to the approval of Departmental Representative. This item shall include but is not limited to removal of the existing bridge barriers in addition to concrete to be removed and tippage fees.
 - .2 Dismantling, transporting and disposal of guide rail, hardware, wooden guide posts and offset blocks as indicated in the Contract Documents and to the approval of the Departmental Representative.
- .5 Lump Sum Item 5A - Section 07 19 10 – Concrete Coating
 - .1 Terms of Payment: Lump Sum (LS).
 - .2 This item includes:
 - .1 Preparation of surfaces, supply and installation of concrete coating system.
- .6 Lump Sum Item 6A – Other Items Not Included in the Unit Price Table
 - .1 Unit of Measurement: Lump Sum (LS).
 - .2 This item includes: All other work considered incidental to the work and which are not specifically mentioned or accounted for in the Unit Price Table or other

items in the Lump Sum Table but are necessary to complete the Work in accordance with the Contract, the Drawings, and Specifications. This item shall include but is not limited to the following; project layout and surveying, health and safety co-ordinator, weigh scales, permits, water control, fish rescue, drainage requirements, and approvals required to complete the Work.

1.4 SECTION A - BRIDGE WORK ITEMS (UNIT PRICE TABLE)

- .1 Unit Price Item 1A - Section 02 41 13.14 - Asphalt Pavement Removal
 - .1 Unit of Measurement: Square Metres (m²).
 - .2 Method of Measurement: Horizontal measurement of surface area.
 - .3 This item includes: the supply of all necessary materials, labour and equipment required for asphalt pavement removal associated with the Grande Anse Bridge as indicated on the Contract Drawings. Milling of the asphalt at the Grande Anse Bridge will be required to expose the concrete on the bridge deck and approach slabs, to provide transition to finished grade at the roadway, and to allow for the placement of asphalt pads at the both ends of the bridge. The Contractor shall, at no additional costs, supplement with additional coring as required if additional information on the existing asphalt thickness is required. Payment will include all milling, cutting, removal, hauling and, disposal of asphalt. The Contractor shall replace at no extra cost to the Departmental Representative, asphalt driving surface in any areas where milling operations break through to underlying granulars.
 - .4 Asphalt removal for the construction of temporary tapers, keyed joints and, transition joints at the intersection of existing paved roadways, shall be considered incidental to the overall Work.
- .2 Unit Price Item 2A - Section 03 15 15 – Laminated Elastomeric Bridge Bearings
 - .1 Unit of Measurement: Each (Ea).
 - .2 This item includes: Labour, supply and installation of jacks, jacking of existing concrete beams, removal of the existing steel bottom bearing plates, protection of steel surfaces to remain, blast cleaning of exposed surfaces of bearing surfaces, application of two coats rust inhibiting primer on exposed surfaces beam plate, preparation of shop drawings, and the supply and installation of new laminated elastomeric bearing pads, and all ancillaries required to complete the works to approval of Department Representative.
- .3 Unit Price Item 3A - Section 03 20 00 – Concrete Reinforcing – Reinforcing Steel
 - .1 Unit of Measurement: Kilogram (kg).
 - .2 This item includes: Shop Drawings, fabrication, supply, transportation, placing of steel reinforcing as indicated on Contract Drawings. Clips, wire or other mechanical means required for fastening are considered incidental to this bid item and will not be measured for payment.
- .4 Unit Price Item 4A - Section 03 30 00 – Cast-in-Place Concrete and Section 03 10 00 – Concrete Forming and Accessories

- .1 Unit of Measurement: Cubic Metre (m³).
 - .2 Method of Measurement: Volume measured from plan and cross-sectional dimensions as indicated on Contract Drawings.
 - .3 This item includes: Supply, transportation, placement of all cast-in-place concrete in wingwalls, bearing blocks and seats, diaphragms, curbs and crash blocks. This shall include all materials, aggregates, cement, supplementary cementing materials, water, admixtures, other materials, transportation, equipment, plant, tools, labour, formwork and falsework, form liners, curing, incidentals, and all other work necessary to complete the job as indicated on the Contract Drawings.
 - .4 There shall be no payment for extra thickness of concrete placed outside of limits. Whenever in the opinion of the Departmental Representative there is extra thickness, the appropriate volume will be deducted.
 - .5 The volume of concrete required for sampling and testing is also considered incidental to this item.
- .5 Unit Price Item 5A - Section 03 30 51 – Bridge Deck Concrete – Partial Depth Repair (Provisional Item)
- .1 Unit of Measurement: Square Metre (m²).
 - .2 Method of Measurement: Plan area of partial depth repair to the bridge deck as indicated on Contract Drawings.
 - .3 This item includes: Supply, transportation, placement of all cast-in-place concrete required for partial depth repairs to the bridge deck. This shall include all materials, aggregates, cement, supplementary cementing materials, water, admixtures, other materials, transportation, equipment, plant, tools, labour, formwork and falsework, form liners, curing, incidentals, and all other work necessary to complete the job as indicated on the Contract Drawings and finishing of concrete as described under Section 03 30 00. This shall also include the fabrication, supply, transportation, placing of steel reinforcing as indicated on Contract Drawings for partial depth deck repairs.
 - .4 There shall be no payment for extra thickness of concrete placed outside of limits. Whenever in the opinion of the Departmental Representative there is extra thickness, the appropriate volume will be deducted.
 - .5 The volume of concrete required for sampling and testing is also considered incidental to this item.
- .6 Unit Price Item 6A - Section 03 30 52 - High Strength Patching Mortar
- .1 Unit of Measurement: Square Metre (m²).
 - .2 Method of Measurement: Area of repairs to depth of 150mm, dimensions as indicated on Contract Drawings.
 - .3 This item includes: Preparation of existing concrete and reinforcing, supply, transportation, placement of all repair mortar as indicated on Contract Drawings. Work done up to a base depth of 150 mm will be paid at the contract unit price rate. Work done with depth greater than 150 mm as approved by Department Representative. Payment will be based on the progressive multiple 150 mm depth

of cut, beyond the initial 150 mm, multiplied by number of square meters at that depth with the price increasing 50% at each level.

- .7 Unit Price Item 7A - Section 05 12 33 – Structural Steel for Bridges – Metal Traffic Barriers and Metal Railings for Structures and Section 05 50 00 – Metal Fabrications.
- .1 Unit of Measurement: Linear Metre (m).
- .2 Method of Measurement: Lineal metres of railings installed as indicated on the drawings. The measurement shall be taken along the centre of the railings from end to end of rails.
- .3 This item includes: Shop drawings, erection drawings, fabrication, supply, delivery and installation of complete railing system as indicated and necessary for this work as measured from the Contract Drawings.
- .8 Unit Price Item 8A - Section 05 50 00 – Metal Fabrications – Deck Drain Outlet Extensions and Section 05 12 33 – Structural Steel for Bridges
- .1 Terms of Payment: Kilogram (kg).
- .2 This item includes: Shop drawings, supply and installation of the deck drain outlet extensions and the galvanized armour angles as detailed on the Contract Drawings. This shall include supply and installation, including all tools, labour, materials, equipment and services necessary to complete the work.
- .9 Unit Price Item 9A - Section 07 11 00 – Bridge Deck Waterproofing
- .1 Unit of Measurement: Square Metre (m²).
- .2 Method of Measurement: Plan area of bridge deck and approach slabs concrete horizontal top surface as indicated on the drawings.
- .3 This item includes: Preparation of surfaces, supply and installation of waterproofing membrane, protection board and tack coat on bridge decks and approach slabs as applied to the bridge deck and approach slabs and extending 80 mm vertically on each curb. Measurement shall be based on the Contract Drawings.
- .10 Unit Price Item 10A - Section 07 19 00 – Concrete Joint Sealant - Silane
- .1 Unit of Measurement: Square Metre (m²).
- .2 Method of Measurement: Plan area of bridge deck and approach slab concrete horizontal top surface as indicated on the drawings. Top surface of bridge girder bearing seat surfaces at both abutments.
- .3 This item includes: Preparation of surfaces, supply and installation of concrete silane sealer on bridge decks and approach slabs as measured from Contract Drawings.
- .11 Unit Price Item 11A - Section 07 95 23 – Sealed Expansion Joint Assemblies
- .1 Unit of Measurement: Each (Ea).
- .2 This item includes: Supply and installation of the complete sealed expansion joint assemblies in accordance with this specification item section. This shall include steel extrusions, cover plates, anchors, inserts, screws and the compressible seal.

- .3 Removal of the existing system is considered incidental to this item.

1.5 SECTION B – ROAD WORK ITEMS (LUMP SUM TABLE)

.1 Lump Sum Item 1B – Section 01 21 00 – Prime Cost Sum

- .1 Terms of Payment: Lump Sum (LS).
- .2 This Item includes, but not limited to:
 - .1 Coordination efforts by the Contractor for the removal and relocation of hydro poles and associated infrastructure. This includes temporary relocation and reinstatement of the aboveground and underground utilities provided by NS Power and Bell Aliant to the satisfaction of the Departmental Representative.
 - .2 All incidentals to cover miscellaneous work (allowance) which may occur during work on the project. Payment will be made against it for miscellaneous work not included under items specified in the Lump Sum or Unit Price Tables ordered under GC 6.1 of the General Conditions. Prime Cost Sum is not a sum due the Contractor.

.2 Lump Sum Item 2B – Section 01 25 20 – Mobilization / Demobilization

- .1 Terms of Payment: Lump Sum (LS).
- .2 This Item includes:
 - .1 For 50% of Lump Sum Contract price for mobilization and demobilization to be paid when mobilization to site is complete. The remainder of the Lump Sum price for mobilization and demobilization to be paid when work is complete, and all materials, equipment, buildings, shops, offices, and other facilities have been removed from site and site cleaned and left in condition to the satisfaction of the Departmental Representative and all other agencies having jurisdiction.

.3 Lump Sum Item 3B – Section 01 35 00.06 - Special Procedures for Traffic Control

- .1 Terms of Payment: Lump Sum (LS).
- .2 This Item includes:
 - .1 Traffic control persons and traffic accommodation person(s).
 - .2 Provision, installation, and maintenance of temporary traffic control devices, including; detour signs, construction signage, trail closure signage and barricades, portable variable message signs, delineator drums, jersey barriers, and temporary pad sites.
 - .3 Provision, maintenance and removal of **all** detours and reinstatement to pre-detour conditions.
 - .4 Vehicles including pilot vehicle including means of transporting cyclist and their bicycles through the work area, equipment, supplies, and additional manpower required by traffic accommodation persons.
 - .5 Traffic control devices and measures required to comply with NSTIR's Temporary Workplace Traffic Control Manual (TWTCM) including but not limited to all labour, materials and equipment related to traffic

control, Accredited Sign Supervisor, traffic control signage, traffic control signals, flashing light units, reflectors, F-shape barriers, traffic barrels, and TC-63 delineator drums (double weighted) etc.

.4 Lump Sum Item 4B – Section 01 35 43 – Environmental Procedures

.1 Terms of Payment: Lump Sum (LS).

.2 This item includes:

- .1 Maintenance of all erosion control measures as directed by Departmental Representative.
- .2 All environmental protection, sedimentation and erosion control measures required to complete the project, such as (but not limited to) diversion ditching, temporary ground covers, and rock flow checks in accordance with Parks Canada National Best Management Practices – Roadway, Highway, Parkway, and Related Infrastructure (May 2015).
- .3 Submission of the Environmental Protection Plan (EPP) as per the EPP Template Document, provided in **Appendix D**. The EPP shall be developed using this template document and is to be submitted to the Departmental Representative for review and approval.

.5 Lump Sum Item 5B – Section 01 52 00 – Construction Facilities

.1 Terms of Payment: Lump Sum (LS).

.2 This item includes:

- .1 Provide and maintain adequate access to project site.
- .2 Build and maintain temporary roads during period of the Work.
- .3 Upon completion of the Work, rehabilitate any temporary roads to the satisfaction of the Departmental Representative.
- .4 Clean roads and parking areas where used by the Contractor or employees.
- .5 Provide, erect and maintain project identification site signs, safety and instruction signs, trail and access closure signs and notices.
- .6 Provide sanitary facilities.
- .7 Construction Site Trailer(s).
- .8 Asphalt and Aggregate Lab facilities.
- .9 Removal of temporary facilities from site as directed by the Departmental Representative.

.6 Lump Sum Item 6B – Section 10 14 53 – Traffic Signage

.1 Terms of Payment: Lump Sum (LS).

.2 This item includes:

- .1 Supply and installation of new regulatory and warning signs and timber posts, including all hardware including all excavation, backfill and compaction as indicated on the Plans. Regulatory and warning signs to be supplied by the Contractor.

- .2 Supply and installation of new timber/metal posts, foundations and reinstatement of salvaged or new Parks Canada signs; including all hardware, all excavation, backfill and compaction as indicated on the Plans. This work also includes the required relocation of the 'Road Closed Ahead' sign and electrical components. Parks Canada signs to be supplied by the Departmental Representative.
- .3 Work considered incidental to this item are the removal of existing signs, posts and hardware being replaced, reinstated or removed including filling of holes and reinstatement of disturbed surfaces. Any Signs, Posts and associated hardware that are deemed salvageable by the Departmental Representative shall be delivered to the Park Compound (Cheticamp). Any Signs, Posts and associated hardware that are non-salvageable shall be disposed of by the Contractor.
- .4 Removal and Reinstatement of sign pads is considered incidental to the Work.
- .5 There shall be no payment for transporting and stockpiling materials.
- .7 Lump Sum Item 7B – Section 32 17 23 – Pavement Markings
 - .1 Terms of Payment: Lump Sum (LS).
 - .2 This item includes: The supply and application of paint in the colours, sizes, and configurations shown on the Drawings and as specified by the Departmental Representative. Also includes layout and pre-marking. All delineation markings, and other special markings in the sections will be considered incidental to this item. No additional payment for traffic control associated with the application of pavement markings shall be made.
- .8 Lump Sum Item 8B – Other Items Not Included in the Unit Price Table
 - .1 Unit of Measurement: Lump Sum (LS).
 - .2 This item includes: All other work considered incidental to the work and which are not specifically mentioned or accounted for in the Unit Price Table or other items in the Lump Sum Table but are necessary to complete the Work in accordance with the Contract, the Drawings, and Specifications.
 - .3 This item shall include but is not limited to the following:
 - .1 Project layout and surveying.
 - .2 Provision for a full-time, on-site Health and Safety Co-Ordinator.
 - .3 Weigh scales.
 - .4 Permits and Approval required to complete the Work.
 - .5 Water control, and fish rescue.
 - .6 Supply, delivery and placement of specified plantings and landscaping requirements at culvert outlets.
 - .7 Landscape reclamation work at the grubbing storage yard
 - .8 Any berm construction, trail connections, temporary structures, drainage requirements required to complete the Work to the satisfaction of the Departmental Representative.

1.6 SECTION B - ROAD WORK ITEMS (UNIT PRICE TABLE)

- .1 Unit Price Item 1B - Section 02 41 13 - Selective Site Demolition - Removal of Guard Rail and Posts.
 - .1 Unit of Measurement: Linear Metre (m).
 - .2 Method of Measurement: End points of measurements will be at centreline of the guide rail and at the ends of each section of guide rail.
 - .3 This item includes: Transporting, dismantling, salvage, stockpiling, and disposal of guide rail, hardware, wooden guide posts and offset blocks as indicated in the Contract Documents to an approved facility to the approval of the Departmental Representative. Delivery slips are to be provided to Departmental Representative prior to payment.
 - .4 For all other items to be removed such as (but not limited to) fencing, driveway markers, etc. including location and protection (in operating condition) of utilities traversing the site there shall be no measurement for payment and the work is considered incidental to the overall work of the project.
- .2 Unit Price Item 2B - Section 31 05 16 – Aggregate Materials – Rock Fill (200mm minus)
 - .1 Unit of Measurement: Metric Tonne (t).
 - .2 Method of Measurement: Scale tickets signed by the Departmental Representative.
 - .3 This item includes: Supply, haulage, placement and compaction of rock fill material to the limits and at the locations indicated on the Drawings or as directed by the Departmental Representative.
 - .4 There shall be no payment for extra thickness of aggregate materials placed outside of limits. Whenever in the opinion of the Departmental Representative there is extra thickness or width, the appropriate weight will be deducted.
- .3 Unit Price Item 3B - Section 31 11 00 – Clearing
 - .1 Unit of Measurement: Hectare (ha).
 - .1 Clearing will be measured in hectares by plan area within limits indicated or as directed by the Departmental Representative.
 - .2 This Section includes: The cutting and disposal of all trees and brush from areas indicated.
 - .3 There will be no payment for areas cleared outside the Work area unless approved by the Departmental Representative.
- .4 Unit Price Item 4B - Section 31 11 00 – Grubbing
 - .1 Unit of Measurement: Hectare (ha).
 - .1 Grubbing will be measured in hectares by plan area within the limits indicated or as directed by the Departmental Representative.
 - .2 This Section includes: The removal, hauling, and stockpiling of all stumps, roots, downed timber, slash embedded logs, rootmat, humus, and topsoil stripping from areas indicated on the Contract Drawings.

Grubbings are to be screened and processed for future top dressing finished grades prior to hydroseeding as directed by the Departmental Representative.

- .3 Placement of screened and processed organic grubbing and topsoil materials shall be considered as incidental to the Work.
- .4 Any Work at stockpiles and disposal sites is incidental to the Contract.
- .5 There will be no payment for areas grubbed outside the Work area unless approved by the Departmental Representative.

.5 Unit Price Item 5B – Section 31 23 33.01 – Excavating, Trenching and Backfilling – Cut Common

- .1 Unit of Measurement: Cubic Metre (m³).
- .2 Method of Measurement: To the theoretical lines and grades as indicated on the Drawings, along with final cross sections to the finished lines and grades.
- .3 This item includes: Excavation, loading, hauling, disposal of surplus or unsuitable material, placement and compaction of excavated material as indicated on the Drawings, including areas where culverts are being removed and not replaced. Surplus material not incorporated into the roadway cross section shall become the property of the Contractor and disposed of outside the Park.
- .4 This item does **not** include culvert replacement locations, grubbing, guard rail, signage removals and installations which are deemed to be included in those respective items.
- .5 This item includes shoring, bracing, cofferdams, underpinning and de-watering of excavation if required.
- .6 There shall be no payment for excavation beyond the limits indicated on the Drawings.
- .7 Any additional backfill material required to complete the Work is to be sourced by the Contractor to the approval of the Departmental Representative and will not be measured separately for payment and shall be considered as incidental to the Work.
- .8 Excavation and Disposal of unsuitable materials due to Contractor activities will not be measured separately for payment.
- .9 Re-ditching of the existing roadway embankments in distress areas at locations as indicated on the Drawings will not be measured separately for payment and shall be considered as incidental to the Work.

.6 Unit Price Item 6B – Section 31 23 33.01 – Excavating, Trenching and Backfilling – Borrow Common

- .1 Unit of Measurement: Metric Tonne (t).
- .2 Method of Measurement: To the theoretical lines and grades as indicated on the Drawings, along with final cross sections to the finished lines and grades.
- .3 This item includes: Loading, hauling, placement, and compaction of approved fill material, as indicated on the Drawings, including areas where culverts are being removed and not replaced.

- .4 This item does **not** include culvert replacement locations, guard rail, signage removals and installations which are deemed to be included in those respective items.
- .5 There shall be no payment for fill placed beyond the limits indicated on the Drawings.
- .6 Borrow material to complete the Work is to be sourced and provided by the Contractor to the approval of the Departmental Representative. There shall be no extra payment for additional borrow material required to complete the works.
- .7 Unsuitable materials fill materials placed due to Contractor activities shall be removed from the project limits and shall not be measured for payment.
- .7 Unit Price Items 7B, 8B and 9B – Section 31 37 00 - Rip-Rap – R25, Rip-Rap – R100 and Rip-Rap – R250 (Provisional Item)
 - .1 Unit of Measurement: Metric Tonne (t).
 - .2 Method of Measurement: Scale tickets signed by the Departmental Representative.
 - .3 This item includes: Supply, placement and compaction of Rip-Rap materials at culvert inlets, outlets and offtakes, along steep ditch slopes, roadway backslopes and areas as indicated on the Contract Drawings at the direction of the Departmental Representative.
 - .4 Supply and placement of geotextiles is considered incidental to this item.
- .8 Unit Price Item 10B - Section 32 11 23 - Shoulder Material - Reclaimed Asphalt Product (RAP)
 - .1 Unit of Measurement: Cubic Metre (m³).
 - .2 Method of Measurement: To the theoretical lines and grades as indicated on the Drawings.
 - .3 This item includes: Screening, processing, haulage, placement and compaction of shoulder material (RAP) to the limits and at the locations indicated on the Drawings. RAP shouldering material for use on this work shall be obtained from PCA's Pleasant Bay Salt Storage Yard located at Station 36+500.
 - .4 There shall be no payment for extra thickness or width of shoulder material placed outside of the theoretical lines and grades as indicated on the Drawings unless approved or directed by the Departmental Representative.
- .9 Unit Price Item 11B - Section 32 11 23 – Aggregate Base Courses – Type 1 Gravel
 - .1 Unit of Measurement: Metric Tonne (t).
 - .2 Method of Measurement: From scale and ticket generated and signed by the Departmental Representative.
 - .3 This item includes: Supply, handling, loading, hauling, placing, fine grading and compaction of granular base materials, as well as any incidentals, to the limits and at the locations indicated on the Drawings.
 - .4 There shall be no payment for extra thickness or width of base materials placed outside of the theoretical lines and grades as indicated on the Drawings.

Whenever in the opinion of the Departmental Representative there is extra thickness or width, the appropriate weight will be deducted.

- .10 Unit Price Item 12B - Section 32 12 16 – Asphalt Paving – Type “D-HF”
- .1 Unit of Measurement: Type “D-HF” – Metric Tonne (t).
 - .2 Method of Measurement: From scale and ticket generated and signed by the Departmental Representative.
 - .3 Payment adjustment will be made for escalation/de-escalation in the price of liquid asphalt in accordance with the supplementary conditions of the Contract documents.
 - .4 There shall be no payment for extra thickness or extra width of asphalt placed outside of the theoretical lines and grades as indicated on the Drawings. Wherever in the opinion of the Departmental Representative there is extra thickness or width, the appropriate weight will be deducted.
 - .5 This item includes: Supply, loading, hauling, placement and compaction as indicated and all equipment, labour, materials required, **including the material transfer vehicle. It includes the supply and application of tack coat as required** and temporary pavement markings. Asphalt Cement will be paid for separately.
- .11 Unit Price Item 13B - Section 32 12 16 – Asphalt Paving – AC Paving for Widening
- .1 Unit of Measurement: Type “D-HF” – Metric Tonne (t).
 - .2 Method of Measurement: From scale and ticket generated and signed by the Departmental Representative.
 - .3 Payment adjustment will be made for escalation/de-escalation in the price of liquid asphalt in accordance with the supplementary conditions of the Contract documents.
 - .4 There shall be no payment for extra thickness or extra width of asphalt placed outside of the theoretical lines and grades as indicated on the Drawings. Wherever in the opinion of the Departmental Representative there is extra thickness or width, the appropriate weight will be deducted.
 - .5 This item includes: Supply, loading, hauling, placement and compaction as indicated and all equipment, labour, materials required, **including the material transfer vehicle. It includes the supply and application of tack coat as required**. Asphalt Cement will be paid for separately.
 - .6 Asphalt removal for the longitudinal milled key joint for widening, is considered incidental to this bid item.
- .12 Unit Price Item 14B – Section 32 12 16 – Asphalt Paving - Asphalt Cement
- .1 Unit of Measurement: – Metric Tonne (t).
 - .2 Method of Measurement: Performance Graded Asphalt Binder (PGAB) shall be paid at the Contract bid Unit Price per tonne. The quantity of PGAB to be paid for under this section shall be calculated on the basis of the PGAB delivered to the plant and adjustments will be made for initial and final tank measurements corrected to 15°C, Contractor shall provide inbound delivery tank slips.

- .3 The Contractor will not be reimbursed for PGAB that is used in other work or any that is wasted. If other work is undertaken by the Contractor, additional tank measurements will be undertaken to determine the quantity of PGAB used in the other work.
- .4 The payment adjustment for PGAB will be made for escalation/de-escalation in the price of liquid asphalt in accordance per the supplementary conditions of the Contract documents.
- .13 Unit Price Item 15B – Section 32 15 60 – Roadway Dust Control – Water
 - .1 Unit of Measurement: Kilolitres (kl).
 - .2 Method of Measurement: Water shall be measured in kilolitres. This item includes: Supply, loading, hauling and placement of water and at times as directed by the Departmental Representative.
 - .3 Delivery slips are to be provided to Departmental Representative prior to acceptance.
- .14 Unit Price Item 16B – Section 32 92 19.16 – Hydraulic Seeding – Hydroseeding
 - .1 Unit of Measurement: Square Metre (m²).
 - .2 Method of Measurement: Slope measure
 - .3 This item includes: Supply, haulage and placement of hydroseed mix, erosion control agent, water and fertilizer as specified and maintenance.
- .15 Unit Price Item 17B – Section 32 92 19.16 – Hydraulic Seeding – Dry Mulch
 - .1 Unit of Measurement: Square Metre (m²).
 - .2 Method of Measurement: Slope measure.
 - .3 This item includes: Supply, haulage and placement of dry mulch, erosion control agent, water and fertilizer as specified and maintenance.
 - .4 Mulch shall be blown.
- .16 Unit Price Items 18B, 19B, 20B, 21B, 22B, 23B - Section 33 42 13 – Pipe Culverts - (Various Sizes)
 - .1 Unit of Measurement: Linear Metre (m) for each size and type of culvert.
 - .2 Method of Measurement: Along centreline of new culvert pipe, from end to end of culvert, as laid and as accepted by the Departmental Representative.
 - .3 Payment for this item includes:
 - .1 Dewatering of site and temporary water control.
 - .2 The removal and disposal of existing culverts, headwalls, cut off walls and foundations shall be incidental to the Work.
 - .3 All required excavation including asphalt removal at culvert replacement locations.
 - .4 Excavation of trench, supply and placement of all bedding, and backfill material, and disposal of all old fill and culvert material, as well as any extra excavated material required to install new culvert. If existing fill material to top of subgrade is deemed suitable by the Departmental

- Representative, it shall be used for backfilling. Unsuitable fill material shall be disposed of, as directed by the Departmental Representative.
- .5 Supply and placement of new culverts.
 - .6 Supply and placement of fish baffles as shown on Contract Drawings.
 - .7 Supply and installation of culvert tension assemblies and fittings as indicated on the Contract Drawings.
 - .8 Supply and placement of concrete blocks as shown on Contract Drawings.
 - .9 Supply and placement of rigid insulation.
 - .10 Supply and placement of geotextiles, offtake channels and inlet and outlet treatments and pools as specified on Contract Drawings.
 - .11 Supply and placement of Individual Rock Placements as provided on Contract Drawings.
- .17 Unit Price Items 24B - Section 33 42 13.01 – Precast Concrete Box Culverts – 2400 mm x 1800 mm
- .1 Unit of Measurement: Linear Metre (m) for each size of culvert.
 - .2 Method of Measurement: Along centreline of new culvert pipe, from end to end of culvert, as laid and as accepted by the Departmental Representative.
 - .3 Payment for this item includes:
 - .1 Dewatering of site and temporary water control.
 - .2 Construction staging and sequencing of the works to install new box culverts.
 - .3 Supply and installation of temporary detours and associated traffic control, along with removal of temporary detours upon completion of construction.
 - .4 The removal of existing culverts, headwalls, cut off walls and foundations shall be incidental to the Work.
 - .5 All required excavation including asphalt removal at culvert replacement locations.
 - .6 Excavation of trench, supply and placement of all bedding, and backfill material, and disposal of all old fill and culvert material, as well as any extra excavated material required to install new culvert. If existing fill material to top of subgrade is deemed suitable by the Departmental Representative, it shall be used for backfilling. Unsuitable fill material shall be disposed of, as directed by the Departmental Representative and is considered incidental to this bid item.
 - .7 Supply and installation of new precast concrete box culverts, including, headwalls and beveled end sections. Year of fabrication to be embedded in the inlet and outlet end sections as dimensioned on the Contract Drawings.
 - .8 Supply and placement of fish baffles as shown on Contract Drawings.
 - .9 Supply and installation of the waterproofing membrane system.

- .10 Supply and installation of culvert tension assemblies and fittings as indicated on the Contract Drawings.
- .11 Supply and placement of concrete blocks as shown on Contract Drawings.
- .12 Supply and placement of geotextiles, offtake channels and inlet and outlet treatments and pools as specified on Contract Drawings.
- .13 Stockpiling salvaged streambed material for placement as indicated on Contract Drawings.
- .14 Supply and placement of Individual Rock Placements as provided on Contract Drawings.
- .18 Unit Price Item 25B – Section 34 71 13.25 – Vehicle W-Beam Guide Rail (Weak Post)
 - .1 Unit of Measurement: Linear Metre (m).
 - .2 Method of Measurement: Linear metres of guide rail installed as indicated on the Drawings. The measurement shall be taken along the centre of the guard rail from end to end of each section of guard rail including buried ends, not including overlaps.
 - .3 This item includes: Common excavation and backfill, supply and placing posts and surface reinstatement. Supply and installation of new guard rail, hardware, delineators, accessories, offset blocks, toe spikes, Michigan shoes, channels and hardware of guard rail for bridge approach system, weak post system and any guard rail adjustments as indicated on the Contract Drawings. There shall be no payment for guard rail overlaps.
- .19 Unit Price Item 26B – Section 34 71 43 – Concrete Jersey Barrier – F-shape
 - .1 Unit of Measurement: Each (Ea).
 - .2 This item includes: Supply and installation of new F-shape barrier sections, including tapered end sections, hardware for anchorage, and delineators, as indicated on the Contract Drawings.
 - .3 Removal, delivery and storage of the existing barriers to the Pleasant Bay Salt Storage yard is considered incidental to this bid item.

1.7 ITEMS CONSIDERED INCIDENTAL TO THE WORK

- .1 Incidentals to the Work shall include but are not limited to the following. There shall be no measurement and payment for these items:
 - .1 Access.
 - .2 Barricades.
 - .3 Clean-up.
 - .4 Cold weather protection and curing of materials.
 - .5 Consumables.
 - .6 Design, supply, fabrication, use and removal from site of all temporary works and erection equipment.
 - .7 Environmental protection and disposal of hazardous materials.
 - .8 Field measurements and sketches.

- .9 Lost time due to weather.
- .10 Obtaining any permits or approvals required.
- .11 Protection of existing structures.
- .12 Protection, relocation, moving, storage and final location of stored equipment.
- .13 Provision of services.
- .14 Reinstatement of damaged surfaces.
- .15 Rental of equipment; products.
- .16 Safety measures, equipment, and training.
- .17 Scaffolding / staging.
- .18 Security.
- .19 Shoring and bracing.
- .20 Any access equipment and time necessary for inspections and testing.
- .21 Snow removal.
- .22 Submissions.
- .23 Surfacing.
- .24 Weigh Scales and Scale person.
- .25 Survey and measurement assistance for Departmental Representative.
- .26 Transportation of equipment.
- .27 Working Drawings.
- .28 All ancillaries required to complete the Work to the full satisfaction of the Departmental Representative.
- .2 The Contractor shall be responsible for all costs should remediation be necessary to return the environment to its original condition.
- .3 The Contractor shall be responsible for the costs of repair. The cost of Quality Assurance will be paid by PCA, with the exception of additional testing required for re-inspection of non-conforming areas; PCA reserves the right to pass this additional cost along to the Contractor.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

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PAYMENT PROCEDURES

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END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 03 30 00 – Cast-in-Place Concrete.
- .2 Section 03 30 52 – High Strength Patching Mortar.
- .3 Section 05 50 00 – Metal Fabrications.
- .4 Section 31 05 16 – Aggregate Materials.
- .5 Section 31 23 33.01 – Excavating, Trenching & Backfilling.
- .6 Section 31 24 13 – Roadway Embankments.
- .7 Section 31 25 05 – Erosion and Sedimentation Control.
- .8 Section 31 32 19.01 – Geotextiles.
- .9 Section 31 37 00 – Rip-Rap.
- .10 Section 32 11 16.01 – Granular Sub-Base.
- .11 Section 32 11 23 - Aggregate Base Courses.
- .12 Section 32 12 13.16 –Asphalt Tack Coat.
- .13 Section 32 12 16 – Asphalt Paving.
- .14 Particular requirements for inspection and testing to be carried out by testing laboratory designated by the Departmental Representative are specified under various sections.

1.2 APPOINTMENT AND PAYMENT

- .1 The 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 conveying systems, mechanical and electrical equipment and systems.
 - .4 Mill tests and certificates of compliance.
 - .5 Tests specified to be carried out by Contractor under the supervision of the Departmental Representative.

- .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 the 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 for inspection and testing.
 - .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.
- .2 Notify the 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 the 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 REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 52 00 - Construction Facilities.
- .3 Section 01 78 00 - Closeout Submittals.

1.2 ADMINISTRATIVE

- .1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.
- .4 Provide physical space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants, affected parties not in attendance and the Departmental Representative.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.3 PRE-CONSTRUCTION MEETING

- .1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Senior representatives of Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .3 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

- .4 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .5 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .6 Owner provided products.
- .7 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .8 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .9 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .10 Monthly progress claims, administrative procedures, photographs, hold backs.
- .11 Appointment of inspection and testing agencies or firms.
- .12 Insurances, transcript of policies.

1.4 PROGRESS MEETINGS

- .1 During course of Work and two weeks prior to project completion, schedule progress meetings bi-weekly.
- .2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.
- .3 Notify parties minimum 7 days prior to meetings.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 4 days after meeting.
- .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
 - .6 Corrective measures and procedures to regain projected schedule.
 - .7 Revision to construction schedule.
 - .8 Progress schedule, during succeeding work period.
 - .9 Review submittal schedules: expedite as required.
 - .10 Maintenance of quality standards.
 - .11 Review proposed changes for effect on construction schedule and on completion date.
 - .12 Other business.

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 REQUIRMENTS

- .1 Section 01 33 00 – Submittal Procedures.

1.2 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
- .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. 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 (5) 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 activity or other project element. Usually expressed as workdays or work weeks.
- .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
- .7 Milestone: significant event in project, usually completion of major deliverable.
- .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
- .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.3 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 Limit activity durations to maximum of approximately ten (10) working days, to allow for progress reporting.

- .4 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.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 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.
- .3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

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.

1.7 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on weekly basis 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.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

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 REQUIREMENTS

- .1 Section 01 32 16.07 – Construction Progress Schedules – Bar (GANTT) Chart.
- .2 Section 01 35 00.06 – Special Procedures for Traffic Control.
- .3 Section 01 35 29.06 – Health and Safety Requirements.
- .4 Section 01 35 43 – Environmental Procedures.
- .5 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .6 Section 02 41 16 – Structure Demolition.
- .7 Section 03 10 00 – Concrete Forming and Accessories.
- .8 Section 03 15 15 – Laminated Elastomeric Bridge Bearings.
- .9 Section 03 20 00 – Concrete Reinforcing.
- .10 Section 03 30 00 – Cast-in-Place Concrete.
- .11 Section 03 30 51 – Concrete Bridge Decks.
- .12 Section 03 30 52 – High Strength Patching Mortar.
- .13 Section 05 12 33 – Structural Steel for Bridges.
- .14 Section 05 50 00 – Metal Fabricators.
- .15 Section 07 11 00 – Bridge Deck Waterproofing.
- .16 Section 07 19 00 – Concrete Sealer and Coating.
- .17 Section 07 95 23 – Sealed Expansion Joint Assemblies.
- .18 Section 31 05 16 – Aggregate Materials.
- .19 Section 31 32 19.01 – Geotextiles.
- .20 Section 32 11 16.01 – Granular Sub-base.
- .21 Section 32 11 23 – Aggregate Base Courses.
- .22 Section 32 12 16 – Asphalt Paving.

- .23 Section 32 17 23 – Pavement Marking.
- .24 Section 32 92 19.16 – Hydraulic Seeding.
- .25 Section 33 42 13 – Pipe Culverts.
- .26 Section 34 71 13.25 - Vehicle W-Beam Guide Rail.

1.2 ADMINISTRATIVE

- .1 Submit to the Departmental Representative submittals listed for review in each specification section. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for 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 the Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and 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 considered rejected.
- .6 Notify the 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 co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by the Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by the Departmental Representative's review.
- .10 Keep one reviewed copy of each submission on site.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in the Province of Nova Scotia.

- .3 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 co-ordinated, regardless of section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 10 days for the Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by the Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as the Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify the Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.

- .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After the Departmental Representative's review, distribute copies.
- .10 Submit 6 prints of shop drawings for each requirement requested in specification sections and as the Departmental Representative may reasonably request.
- .11 Submit 6 copies of product data sheets or brochures for requirements requested in specification sections and as requested by the Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit 6 copies of test reports for requirements requested in specification sections and as requested by the Departmental Representative:
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .13 Submit 6 copies of certificates for requirements requested in specification sections and as requested by the Departmental Representative:
 - .1 Statements printed on Manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit 6 copies of Manufacturer's instructions for requirements requested in specification sections and as requested by the Departmental Representative:
 - .1 Statements printed on Manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .15 Submit 6 copies of manufacturer's instructions for requirements requested in specification sections and as requested by Departmental Representative:
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .16 Submit 6 copies of Manufacturer's Field Reports for requirements requested in specification sections and as requested by Departmental Representative:

- .1 Documentation of the testing and verification of actions taken by manufacturer's representative to confirm compliance with Manufacturer's standards or instructions.
- .17 Submit 6 copies of Operation and Maintenance Data for requirements requested in specification sections and as requested by Departmental Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 If upon review by the Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .21 The review of shop drawings by Parks Canada is for sole purpose of ascertaining conformance with general concept:
 - .1 This review shall not mean that Parks Canada approve detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
 - .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.4 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to the Departmental Representative's business address.
- .3 Notify the Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .4 Where colour, pattern or texture is criterion, submit full range of samples.
- .5 Adjustments made on samples by the Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to the Departmental Representative prior to proceeding with Work.
- .6 Make changes in samples which the 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 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

1.6 MEASUREMENT PROCEDURES

- .1 The work for this section will not be measured for payment, but will be incidental to 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 RELATED REQUIREMENTS

- .1 Section 01 11 00 – Summary of Work.
- .2 Section 01 14 00 – Work Restrictions.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 REFERENCES

- .1 Nova Scotia Department of Transportation and Infrastructure Renewal:
 - .1 Temporary Workplace Traffic Control Manual (Latest Edition).
 - .2 Standard Specification – Highway Construction and Maintenance (Latest Edition).
- .2 Manual of Uniform Traffic Control Devices for Canada (MUTCD-C) – (Latest Edition).

1.4 DESCRIPTION

- .1 This section specifies requirements and procedures for traffic regulation to ensure protection of work and safety of public to satisfaction of Departmental Representative.

1.5 REFERENCE STANDARD

- .1 Regulate traffic in accordance with the Nova Scotia Department of Transportation and Infrastructure Renewal Temporary Workplace Traffic Control Manual (Latest Edition), **no exceptions.**
- .2 Given the nature of the highway, its critical transportation link, effect on motorists, etc. it is imperative that Park personnel be kept notified as to the number of construction areas, their locations, duration of work, etc. This information must be provided by the Contractor to the Park Communications staff on an ongoing basis.
- .3 The Departmental Representative reserves the right to direct the Contractor to reduce either the number or length of traffic control work areas during peak traffic volumes or when cumulative delays exceed the specified maximum.

1.6 TRAFFIC CONTROL PERSONS TO BE INSTRUCTED

- .1 Contractor shall ensure that only employees who are in possession of "Traffic Control Persons Certificate" as per the Nova Scotia Department of Transportation and Infrastructure Renewal Temporary Workplace Traffic Control Manual (Latest Edition).
- .2 Contractor shall ensure that at minimum, 1 Temporary Workplace Signer is on site at all times during Work.

1.7 INFORMATIONAL AND WARNING DEVICES

- .1 Provide and maintain fully actuated traffic signals; signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.
- .2 All traffic signs are to be bilingual or symbolic.
- .3 Supply and erect signs, delineators, barricades, F-shape barriers and miscellaneous warning devices as specified in Part D, Temporary Conditions Signs and Devices, of MUTCD manual and TWTCM.
- .4 Place signs and other devices in locations as recommended by TWTCM.
- .5 All flag persons and traffic control personnel shall have successfully completed a traffic control training course approved by the Workers' Compensation Board of Nova Scotia. Proof of training for all persons shall be available on site at all times.
- .6 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.

1.8 CONTROL OF PUBLIC TRAFFIC

- .1 Provide traffic control personnel who have a valid provincial license and trained in accordance with, and properly equipped as specified in TWTCM manuals in following situations:
 - .1 When public traffic is required to pass working vehicles or equipment that 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 workmen or equipment are employed at 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.
 - .7 At each end of restricted sections where pilot vehicles are required.
- .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 Flag persons are to be equipped with portable radios only, not cellular devices. Any flag person using cellular devices, except for emergency use only, shall be deemed incompetent and shall be removed from the site immediately. PCA shall not be held responsible for any lost time incurred due to the removal of such an individual.

1.9 OPERATIONAL REQUIREMENTS

- .1 Maintain existing conditions for traffic throughout period of Contract except that, when required for construction under Contract and when measures have been taken as specified herein and approved by Departmental Representative to protect and control public traffic, existing conditions for traffic may be restricted as follows:
 - .1 In accordance with TWTCM.
 - .2 Maintain two-lane, two-way traffic for the duration of the Contract unless otherwise approved by the Departmental Representative following submission of a traffic control plan.
 - .3 As directed by Departmental Representative, temporarily relocate traffic control informational devices, warning devices and barriers as required to accommodate 'wide load' traffic. Minimum 24 hours notice will be provided by Departmental Representative for passage of such traffic.
- .2 A traffic control plan and emergency response plan which accounts for the operational requirements above, must be approved by the Departmental Representative prior to commencing any work.

Part 2 Products

2.1 TRAFFIC CONTROL DEVICES

- .1 Traffic signals, barricades, signs, delineators, warning lights, traffic control person's paddles and other devices shall be in strict accordance with the Nova Scotia Department of Transportation and Infrastructure Renewal Temporary Workplace Traffic Control Manual.
- .2 Signs, barricades, delineators and traffic control persons paddles shall be as new and reflectorized to show same shape and colour by night as by day.
- .3 Signs to be bilingual and symbolic.
- .4 All detour, lane restriction, traffic control and speed restriction signs required at an individual frost heave repair site must be in place before any road excavation at that site commences.
- .5 Contractor to supply a pilot vehicle including means of transporting cyclists and their bicycles through the work area. Bicycle racks on the pilot vehicle(s) to transport bicycles through the work area is required to the approval of the Departmental Representative.

Part 3 Execution

3.1 GENERAL

- .1 Conduct operations as to create a minimum of inconvenience to traffic.
- .2 Provide and maintain access to and from properties adjacent to work area.
- .3 Provide traffic control through use of either an approved traffic signal system or traffic control persons.
- .4 5 days following contract award and prior to pre-construction meeting; submit to Departmental Representative a traffic control signing plan. This layout shall indicate the quantity, spacing and detail of signs, to be used during construction for each work area site (including adjustments for various stages of work). Work shall not commence until Departmental Representative has approved layout.
- .5 Accommodating Traffic and hours of work:
 - .1 **Road Rental for Traffic Delays:** Parks Canada Agency (PCA) and the Contractor agree that the **maximum cumulative time delay to traffic through the Contract limits shall be ten (10) minutes from nine (9) am to four (4) pm during July and August and twenty (20) minutes during remaining time periods.** In the event that this time limit is not met by the Contractor, PCA will suffer damages which are very difficult to identify with precision because of the nature of the project. PCA and the Contractor agree that a fair pre-estimate of the amount of set damages is **One Thousand Dollars (\$1,000.00)** per 15 minute interval or part thereof for which the traffic delay extends beyond maximums identified. Therefore, the parties agree that the Contractor shall pay to PCA for each and every 15 minute increment the traffic delay extends after maximum time limit identified, the sum of **One Thousand Dollars (\$1,000.00)** determined by the parties hereto to be liquidated damages, not a penalty.
 - .2 During the school year, delays for school buses shall be avoided. Any bus delays reported will be subject to road rental clause.

3.2 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 minimize interference and hazard to travelling public.
 - .2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.
 - .3 Do not leave equipment on travelled way overnight.
- .3 Close one lane of road only after receipt of written approval from Departmental Representative:
 - .1 One lane of traffic must remain open at all times.

- .4 Both lanes are to be open at the end of each work day and Contractor to ensure that the travelled lanes are adequately delineated as per these specifications.
- .5 Keep travelled way graded, free from pot holes and of sufficient width for required number of lanes of traffic.

3.3 DETOURS

- .1 Construct and maintain detour roads as may be required, to the approval of the Departmental Representative.

3.4 SIGNS, BARRICADES AND DELINEATORS

- .1 Portable Variable Message Sign and Trailer assembly will be used at each end of the project limits to provide public traffic information regarding the ongoing construction and potential delay. Temporary pad sites shall be constructed for the Portable Variable Message Sign and approved by the Departmental Representative.
- .2 Provide, erect and maintain necessary barricades, suitable and sufficient flashing warning lights, danger signals and other signs.
- .3 Placement and erection of signs, barricades, delineators and warning lights and other devices to be in strict accordance with the Nova Scotia Department of Transportation and Infrastructure Renewal Temporary Workplace Traffic Control Manual.
- .4 Remove or cover signs which do not apply to existing conditions.
- .5 Check devices daily for damage, legibility and correct positioning. Repair, replace or reposition as required or as directed by Departmental Representative.
- .6 The Contractor shall provide (TC-63) double weighted delineator drums along the entire length of the contract. The drums shall be in accordance with the Nova Scotia Department of Transportation and Infrastructure Renewal Temporary Workplace Traffic Control Manual.
 - .1 The drums shall be placed along both sides of the road at minimum 100 m spacing along tangents and 50 m along curves through the Contract length.
 - .2 The drums shall be placed when shoulder widening operations have started and shall remain in place until permanent pavement markings on the new top lift of asphalt are installed to the approval of the Departmental Representative.
- .7 The Contractor shall provide for F-shape barriers to be placed in any areas where new guard rail is required as per the Contract Plans and immediately following removal of any guard rail and shall remain in place until new guard rail has been installed. All barriers shall be in accordance with the Nova Scotia Department of Transportation and Infrastructure Renewal Temporary Workplace Traffic Control Manual.
- .8 For Work at the Pleasant Bay Salt Storage Yard equipment/material storage yard, the Contractor shall provide TC-64A Light Barricades at the entrance with signs (1-TC-141 (NS) and 1-TC-142 (NS)) that indicates the Area is closed to the public. This must be maintained and put in place at all times during the project.

3.5 SPEED ZONES

- .1 Speed zone signing within a construction zone shall be established following authorization as per the Nova Scotia Department of Transportation and Infrastructure Renewal Temporary Workplace Traffic Control Manual.
- .2 There will be strict enforcement of the Speed limits by the RCMP, Environmental Protection Officer and Parks Canada Warden Service.

3.6 TRAFFIC ACCOMODATION PERSON

- .1 The Contractor shall provide for services 24 hrs per day.
- .2 Major responsibilities of the traffic accommodation person:
 - .1 Maintain traffic control devices and signs during regular shutdown on weekends and at night throughout the week.
 - .2 Clean signs, flares, barricades, etc. used to control and accommodate traffic.
- .3 Assist the travelling public the event of an emergency.
- .4 Contact proper authorities in the event of an emergency, i.e., Contractor's Supervisor, Park Warden, and Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.

1.2 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2 Province of Nova Scotia:
 - .1 Occupational Health and Safety Act, S.N.S.

1.3 DEFINITIONS

- .1 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.
- .2 Competent Person means a person to 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.
 - .2 Knowledgeable about the provisions of occupational health and safety statutes and regulations that apply to the Work.
 - .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.

1.4 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan prior to commencement of Work:
 - .1 Submit within ten (10) work days of notification of Bid Acceptance. Provide three (3) hard copies and one (1) electronic PDF file.

- .2 Departmental Representative will review Health and Safety Plan and provide comments.
- .3 Revise the Plan as appropriate and resubmit within five (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 revision and updates made to the Plan during the course of Work.
- .3 Submit name of designated Health & Safety Site Representative and support documentation specified in the Safety Plan.
- .4 Submit building permit, 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.

1.5 COMPLIANCE REQUIREMENTS

- .1 Comply with the Occupational Health and Safety Act for the Province of Nova Scotia, and the Regulations made pursuant to the Act.
- .2 Comply with Canada Labour Code Part II, and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code.
- .3 Observe and enforce construction safety measures required by:
 - .1 1995 National Building Code of Canada, Part 8.
 - .2 Provincial Worker's Compensation Board.
 - .3 Municipal statutes and ordinances.
 - .4 Comply with Occupational R.S.Q., c. S-2.1, an Act respecting Health and Safety Code for the Construction Industry.
- .4 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.

- .5 A copy of the Canada Labour Code Part II may be obtained by contacting:

Canadian Government Publishing
Public Works & Government Services Canada
Ottawa, Ontario K1A 0S9
Tel: (819) 956-5800 (1-800-635-7943)
Publication No. L31-85/2000 E or F)
- .6 Observe construction safety measures of:
 - .1 Part 8 of National Building Code.
 - .2 Municipal by-laws and ordinances.
- .7 In case of conflict or discrepancy between above specified requirements, the more stringent shall apply.
- .8 Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter in Good Standing.
- .9 Medical Surveillance: Where prescribed by legislation or regulation, obtain and maintain worker medical surveillance documentation.

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 56 00 for minimum acceptable requirements.
 - .2 Post signage at entry points and other strategic locations indicating restricted access and conditions for access.
 - .3 Use professionally made signs with bilingual message in the two (2) official languages or international known graphic symbols.
- .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.
- .5 Secure Work Site against entry when inactive or unoccupied and to protect persons against harm.

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.

1.8 RESPONSIBILITY

- .1 Be responsible for safety of persons and property on work site and for protection of building employees and general public circulating adjacent to work operations to extent that they may be affected by conduct of work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.9 FILING OF NOTICE

- .1 File Notice of Project and other Notices with Provincial authorities prior to commencement of Work.
- .2 Upon request, Departmental Representative will provide name and mailing address of provincial department to whom the Notice of Project must be sent.
- .3 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.10 PERMITS

- .1 Obtain permits, licenses and compliance certificates, at appropriate times and frequency as stipulated by authorities having jurisdiction.
- .2 Where particular permit or compliance certificate cannot be obtained at the required stage of work, notify Departmental Representative in writing and obtain Departmental Representative's approval to proceed prior to carrying out that portion of work.
- .3 Post all permits on site. Submit copies to Departmental Representative.

1.11 SAFETY ASSESSMENTS

- .1 Implement and carry out a health and safety hazard assessment program as part of the work. Program to include:
 - .1 Initial hazard assessment carried out immediately upon notification of contract award and prior to commencement of work.
- .2 On-going hazard assessments performed during the progress of work identifying new or potential health risks and safety hazards not previously known. As a minimum, hazard assessments shall be carried out when:
 - .1 New subtrade work, new subcontractor(s) or new workers arrive at the site to commence another portion of the work.
 - .2 The scope of work has been changed by Change Order.
 - .3 Potential hazard or weakness in current health and safety practices are identified by Departmental Representative or by an authorized safety representative.
- .3 Hazard assessments to be project and site specific, based on review of contract documents, site and weather conditions.
- .4 Each hazard assessment to be made in writing. Keep copies of all assessments on site for duration of work. Upon request, make available to Departmental Representative for inspection.

1.12 PROJECT/SITE CONDITIONS

- .1 The following are known or potential project related safety hazards at site:
 - .1 Work immediately adjacent/atop high steep embankments and cliffs with heavy equipment and construction personnel.
 - .2 Highway Traffic.
 - .3 Working adjacent highway rockcuts which have potential to release rock into ditches and onto roadway below.
 - .4 Other construction contractors work on site.
- .2 Obtain from Departmental Representative, copy of MSDS Data sheets of existing hazardous materials stored on site or being used by Facility and Tenant personnel in the course of their operations.

- .3 Above lists shall not be construed as being complete and inclusive of safety and health hazards encountered as a result of Contractor's operations during the course of work. Include above items into the hazard assessment program specified herein.

1.13 SAFETY MEETINGS

- .1 Prior to commencement of work attend health and safety meeting conducted by Departmental Representative. Have Contractor's Site Superintendent in attendance. Departmental Representative will advise of time and location.
- .2 Provide site safety orientation session to all workers and other authorized persons prior to granting them access to work site. Brief persons on site conditions and on the minimum site safety rules in force at site.
- .3 Conduct site specific occupational health and safety meetings during the entire work as follows:
 - .1 Formal meetings on a minimum monthly basis.
 - .2 Informal tool box meetings on a regular basis from a predetermined schedule.
- .4 Keep workers informed of anticipated hazards, on safety practices and procedures to be followed and of other pertinent safety information related to:
 - .1 Progress of Work.
 - .2 New sub-trades arriving on site.
 - .3 Changes in site and project conditions.
- .5 Record and post minutes of meetings. Make copies available to Departmental Representative upon request.

1.14 HEALTH AND SAFETY PLAN

- .1 Develop written site-specific Project Health and Safety Plan, based on hazard assessments, prior to commencement of work. Submit plan to Departmental Representative within 7 calendar days of Contract Award date.
- .2 Health and Safety Plan shall contain the following three (3) parts:
 - .1 Part 1: List of individual health risks and safety hazards identified by hazard assessments.
 - .2 Part 2: List of specific measures to control or mitigate each hazard and risk identified in part one of Plan. Describe the engineering controls, personnel protective equipment and safe work practises to be implemented and followed when performing work related to each identified hazard or risk.
 - .3 Part 3: Emergency Measures and Communications Procedures as follows:
 - .1 Emergency Measures: on-site operating procedures, evacuation measures and emergency response to be implemented in the occurrence of an incident. Procedures to be specific and relevant to identified hazards.

Measures to complement and be integrated with the facility and tenants Emergency Response Plans in place at site:

- .1 Obtain information on existing emergency and evacuation plans from Departmental Representative and incorporate appropriate data.
- .2 Communication Procedures:
 - .1 List of names and telephone numbers of designated officials, to be contacted should an incident or emergency situation occur, including the following:
 - .1 General Contractor and all Subcontractors.
 - .2 Federal and Provincial Departments and local emergency resources organizations, as resources organizations, as applicable laws and regulations.
 - .3 Officials from Parks Canada. Departmental Representative will provide list of names to be included.
 - .2 Procedures implemented at site to communicate and share information between workers, subcontractors, and General Contractor on work activities.
 - .3 Prepare Health and Safety Plan in a three column format, addressing the three parts specified above, as follows:

<u>Column 1</u>	<u>Column 2</u>	<u>Column 3</u>
Identified	Control	Emergency Measures & Communications
Hazard	Measures	Implemented Procedures
	.4	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.
	.5	Implement, maintain and enforce compliance with requirements of the Health and Safety Plan until final completion of work and demobilization from site.
	.6	As work progresses, review and update Plan addressing additional health risks and safety hazards identified by on-going hazard assessments.
	.7	Submit revised versions of Plan to Departmental Representative.
	.8	Post a typed written copy, including all updates, of the Health and Safety Plan in a common visible location at work site.

- .9 Submission of the Health and Safety Plan, and updates, to the Departmental Representative is for review and information purposes only. It's submission shall not be construed to imply approval by Departmental Representative, be interpreted as a warranty of being complete, accurate and legislative compliant and shall not relieve Contractor of his legal obligations for the provision Health and Safety on the construction project.

1.15 SAFETY SUPERVISION AND INSPECTIONS

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-Ordinator. Health and Safety Co-Ordinator must:
 - .1 Have site-related working experience specific to activities associated with bridge and roadway rehabilitation projects completed with live traffic.
 - .2 Have working knowledge of occupational safety and health regulations.
 - .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
 - .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
 - .5 Be on site during execution of Work and report directly to and be under direction of site supervisor.
- .2 The Health and Safety Co-Ordinator shall be required to conduct regularly scheduled safety inspections of the work site as follows:
 - .1 Informal inspections on a minimum daily basis noting deficiencies and remedial actions taken in a log book or diary. Make the log book and/or diary available for the Departmental Representative's viewing as requested.
 - .2 Formal inspections on a minimum weekly basis and shall provide a written report to the Departmental Representative for each formal inspection, document deficiencies, remedial action needed and assign responsibility for rectification to The appropriate party.
 - .3 Follow-up and ensure corrective measures are taken.
 - .4 Keep inspection reports and supervision related documentation on site.
- .3 The Health and Safety Co-Ordinator 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.
- .4 Health & Safety Co-Ordinator 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.
- .5 All supervisory personnel assigned to the Work must also be competent persons.
- .6 Cooperate with Facility's Occupational Health and Safety representative should one be designated by Departmental Representative.

1.16 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.

1.17 MINIMUM SITE SAFETY RULES

- .1 Notwithstanding the requirement to abide by federal and provincial health and safety regulations, the following safety rules shall be considered minimum requirements at the work site and obeyed by all persons granted access:
 - .1 Wear personnel protective equipment (PPE) appropriate to function and task on site; the minimum requirements being hard hat, safety footwear (and eye protection where appropriate).
 - .2 Immediately report unsafe activities, conditions, near-miss accidents, injuries and damages.
 - .3 Maintain site in tidy condition.
 - .4 Obey warning signs and safety tags.
- .2 Brief workers on site safety rules, and on the disciplinary measures to be taken for violation or non-compliance of such rules. Post such information on site.

1.18 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.

1.19 INCIDENT REPORTING

- .1 Investigate and report incidents and accidents as outlined in Provincial Occupational Safety and Health Act and Regulations.
- .2 Investigate and immediately report to Departmental Representative incidents and accidents which results, or has the potential of resulting in:
 - .1 Injuries requiring medical aid.
 - .2 Property damage in excess of \$10,000.00.
 - .3 Required notification to Workers Compensation Board or other regulatory agencies as stipulated by applicable regulations.
 - .4 Interruptions to Facility operations resulting in an operational lost to a Federal department in excess of \$5000.00.
- .3 Medical aid in above clause shall have the same meaning as the term "medical aid injury" as defined in the Canadian Dictionary of Safety Terms - 1987 issue, from the Canadian Society of Safety Engineers (C.S.S.E) as follows:
 - .1 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 Submit report in writing.

1.20 TOOLS AND EQUIPMENT SAFETY

- .1 Implement and follow a scheduled tool and equipment inspection 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.

1.21 HAZARDOUS PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information Systems (WHMIS).
- .2 Keep MSDS data sheets on site. Provide copies of all data sheets to Departmental Representative upon receipt of materials on site.
- .3 Post all MSDS data sheets on site, in a common area, visible to workers.
- .4 On building renovation projects where work is adjacent to occupied areas, locate data sheets in a public location accessible to tenant employees.

1.22 BLASTING

- .1 Blasting or other use of explosives is not permitted without prior written instructions from Departmental Representative.
- .2 Do blasting operations in accordance with Section 31 23 16.26 - Rock Removal.

1.23 POWDER ACTUATED DEVICES

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

1.24 POSTING OF DOCUMENTS

- .1 Post documents indicated herein and as required by Authority having jurisdiction.
- .2 Post other documents as specified herein, including:
 - .1 Site specific Health and Safety Plan.
 - .2 WHMIS data sheets.

1.25 RECORDS ON SITE

- .1 Maintain on site copy of safety documentation as specified in this section and other safety related reports and documents issued to or received from authorities having jurisdiction.
- .2 Make available to Departmental Representative, or authorized safety representative, for inspection 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 REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 REFERENCES

- .1 Canadian Environmental Protection Act.
- .2 Nova Scotia Provincial Standards.
- .3 Guidelines for Protection of Freshwater Fish Habitat, DFO Canada.
- .4 DFO's, Measures to avoid causing harm to fish and fish habitat including aquatic species at risk. <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesures-eng.html>
- .5 Parks Canada National Best Management Practices – Roadway, Highway, Parkway and Related Infrastructure (May 2015), Environmental Construction Practice Specifications, National Parks Act and Regulations, Canadian Environmental Protection Act, provided in **Appendix B**.
- .6 Best Management Practices (Mitigation), Works In and Around Waterbodies, Grand Anse Bridge Rehabilitation, provided in **Appendix C**.
- .7 Environmental Protection Plan Template Document provided in **Appendix D**.

1.4 DEFINITIONS

- .1 **Environmental Pollution and Damage:** presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2 **Environmental Protection:** prevention/control of pollution and habitat or environment disruption during construction.

1.5 ENVIRONMENTAL PERFORMANCE

- .1 The Contractor shall comply with all mitigative measures, terms and conditions outlined in the attached Best Management Practices (Mitigation), Works In and Around Waterbodies,

Grand Anse Bridge Rehabilitation, Parks Canada and Parks Canada National Best Management Practices Roadway, Highway, Parkway and Related Infrastructure.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 An Environmental Briefing will be held prior to work commencing at the site, which will outline environmental factors to be considered during the work. It is mandatory that all current staff of the Contractor attend this meeting with the Departmental Representative and Environmental Protection Officer (EPO).
- .3 5 days after contract award and prior to the pre-construction meeting, submit Environmental Protection Plan for review and approval by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.
 - .1 An Environmental Protection Plan is required for the Bridge Work, and
 - .2 A separate Environmental Protection Plan is required for the Road Work.
- .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .5 Environmental Protection Plan: include as applicable; but not limited to:
 - .1 Name of person responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Name and qualifications of person responsible for manifesting hazardous waste to be removed from site.
 - .3 Name and qualifications of person responsible for training site personnel.
 - .4 Descriptions of environmental protection personnel training program.
 - .5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
 - .6 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
 - .1 Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
 - .7 Spill Contingency Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
 - .8 Non-Hazardous Solid Waste Disposal Plan identifying methods and locations for solid waste disposal including clearing debris and recycling of decommissioned bridge materials.
 - .9 Air pollution Control Plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

- .10 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .11 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

1.7 FIRES

- .1 Fires and burning of rubbish on site not permitted.
- .2 The Contractor is required to comply with the Fire Protection Regulations of the National Parks Act.
- .3 In accordance with these Regulations, the Park Superintendent may restrict activities, or access to work areas, in the interest of fire prevention.
- .4 The Contractor's equipment must be in proper working condition and be used in such a manner as to minimize the potential for ignition of vegetation.
- .5 Vehicles and stationary equipment must be equipped with fire suppression equipment such as an operable fire extinguisher.
- .6 If storage and/or operation of in-Park equipment during a high fire hazard season is of concern to the Park, the Contractor may be required to prepare and implement a Fire Suppression Contingency Plan.
- .7 The Departmental Representative and the Duty Warden of the Park must be contacted immediately in the event of a fire. The Contractor is held responsible to make all reasonable efforts to extinguish any fires on the site.

1.8 DRAINAGE

- .1 A part of the Environmental Protection Plan, the Contractor shall provide Erosion and Sediment Control Plan that identifies type and location of erosion and sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .2 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .3 Do not pump water containing suspended materials into waterways, or drainage systems.

- .4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with Provincial authority requirements.

1.9 SITE CLEARING AND PLANT PROTECTION

- .1 Restrict vegetation removal to areas indicated or designated by Departmental Representative.
- .2 Sensitive areas should be cleared in a manner which will minimize disturbance to surface vegetation and soils. Areas such as stream crossings should only be cleared immediately prior to construction using light equipment.
- .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 Whenever possible, organic debris and topsoil 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 to minimize wind and water erosion.
- .6 Should cultural resources artifacts be unearthed or discovered during project excavation, work in that area should be stopped and the Departmental Representative contacted immediately.
- .7 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .8 Minimize stripping of topsoil and vegetation.

1.10 SITE SET-UP AND USE

- .1 All site activities related to construction are to be confined within the defined project boundaries.
- .2 Office trailer(s) will be permitted to be located within the boundaries of the Cape Breton Highlands National Park. Location is subject to approval of the Departmental Representative.
- .3 Work sites will be equipped with appropriate and properly maintained sanitary facilities.
- .4 Garbage must be collected and removed daily from the worksite to keep the site sanitary and to prevent unwanted interactions with Park fauna (e.g. bears). All material must be removed, transported and disposed of in accordance with existing provincial-municipal and Park solid waste disposal guidelines, project waste management plan and/or regulations.

- .5 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.
- .6 To reduce potential negative impacts on Park fauna, noise control measures, such as properly functioning mufflers on equipment, must be in place.
- .7 Littering is prohibited.
- .8 Water extraction from within the Park boundaries is strictly forbidden. Water extraction may be permitted following detailed proposal submitted by the Contractor and subject to approval by Departmental Representative.

1.11 DISPOSAL OF WASTES

- .1 Do not bury rubbish and waste material on site. Remove all garbage from site daily.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.12 WORK ADJACENT TO WATERWAYS

- .1 Any required instream work must be completed between June 1 and September 30.
- .2 Do not operate construction equipment in waterways.
- .3 All work is to be done in the dry. Environmental controls required to separate the work from the waterway is the responsibility of the Contractor.
- .4 All work is to be carried out with siltation control which separates the work area from the watercourse. The method of siltation control shall be provided as part of the Erosion and Sediment Control Plan.
- .5 No fresh concrete, lime, cement, or other construction materials or debris is to enter the watercourse.
- .6 All heavy equipment to be used on the project site is to be cleaned of mud, soil or debris prior to being brought to the site, in good working order, without leaks of fuel, oil, grease or lubricants.
- .7 The movements of fish through the project site will be unimpeded at all times.
- .8 Contractor is to have a copy of the environmental assessment and all applicable permits at the project site at all times.
- .9 Do not use waterway beds for borrow of material.
- .10 Do not clean or drain equipment in waterways.

- .11 Blasting is prohibited within the Park boundaries unless approved by the Departmental Representative. Blasting outside Park boundaries shall be in accordance with the project EPP and requires approval from the Department of Fisheries and Oceans, and shall be in accordance with the "Guidelines for Use of Explosives in Canadian Fisheries Waters" (DFO, April 1993).
- .12 Temporary diversion ditches, approved by the Departmental Representative are to be plastic lined.
- .13 Temporary storage sites for debris and soil generated from clearing operations should be deposited away from watercourses, should be surrounded by a natural vegetative buffer, should be screened from the road and should be selected by the Departmental Representative.
- .14 All temporary structures, piles, falseworks and debris are to be completely removed from the waterway.
- .15 Dredged material is not to re-enter the waterway.
- .16 Design and construct temporary crossings to minimize erosion to waterways.
- .17 Do not skid logs or construction materials across waterways.

1.13 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area:
 - .1 Provide temporary enclosures where directed by the Departmental Representative.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.14 EARTH MOVEMENT

- .1 Clearing and grubbing of project site is to be kept to a minimum.
- .2 Where engineering requirements can be met, excavated materials from this project must be used for backfilling.
- .3 There are no borrow areas available in the Park.
- .4 All surplus excavated material must be removed from the Park as soon as possible and disposed of at an approved location and in an approved manner.

- .5 Any proposed sources of borrow material shall be approved by the Departmental Representative prior to start-up.
- .6 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 which are actively being developed are exposed.
- .7 Topsoil from excavated sections shall be stockpiled for subsequent application to side slopes requiring revegetation. Steep slopes on stockpiles should be avoided in order to prevent erosion.
- .8 Sediment traps, basins, or ponds, whether temporary or permanent, shall be installed before construction begins on the rest of the site.
- .9 Dust control measure will be necessary, especially when asphalt is removed. The use of chemical dust control agents must be pre-approved by the Departmental Representative.
- .10 Where there is potential for severe erosion and/or downstream siltation the Contractor shall cover excavations during major precipitation events as directed by Departmental Representative.

1.15 EROSION AND SEDIMENT CONTROL

- .1 Appropriate preventative controls shall be in place at all times during construction to prevent undue erosion and sedimentation. As part of the Environmental Protection Plan, the Contractor is required to provide to the Departmental Representative seven days before start-up an Erosion and Sedimentation Control Plan. Such a plan shall incorporate necessary silt fences, silt / sediment traps, plastic lined trenches and ditches, temporary culverts or diversions as approved by the Departmental Representative
- .2 Backfilled slopes shall be mechanically compacted, and grades should be consistent with the prevailing down-slope grade. Exposed soils should be immediately stabilized against erosion by covering with seed and hay mulch, clean rock, gravel or other suitable materials. Hydroseeding operations with approved seed mix will be carried out, as directed by Departmental Representative. All environmental controls must be monitored on a daily basis and following precipitation events. Any required maintenance or must be done immediately.

1.16 HAZARDOUS MATERIALS

- .1 As part of the Environmental Protection Plan, the Contractor must submit a Fuel and Hazardous Materials Management and Spill Contingency Plan.
- .2 The management of fuels, lubricants and chemicals must meet with the requirements of the Nova Scotia Dangerous Goods and Hazardous Waste Management Criteria and all other appropriate provincial and federal regulations to include but not be limited to the following:

- .1 Temporary fuel storage sites are to be located a minimum 200 m from any watercourse.
- .2 Fuel storage containers must be accompanied by impermeable structures that would provide containment of 125% of the container capacity in the event of a leak or spill.
- .3 Fueling and lubricating of equipment cannot be done closer than 100 m to any
- .4 watercourse.
- .5 All refuelling and lubricating operations should employ protection measures such as drip pans, to reduce the potential for escape of petroleum products to 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 Departmental Representative and the Park Warden must be immediately contacted after a spill of more than 10 L of fuel or lubricant, and after any amount of other chemical products has escaped. All stained soil resulting from the Contractor's use of chemicals and fuel is to be cleaned up and disposed of at an approved disposal site.
- .5 Storage of large amounts of fuel (more than 900 L) in the Park is not permitted. Refuelling of on-line equipment from storage facilities located outside Park boundaries is strongly preferred. Storage of any fuel has to occur only in previously approved locations, and with Park consent. The Contractor is expected to be prepared to effect the containment and cleanup of all spills related to the Work.
- .6 Storage of hazardous material, including explosives, shall not be permitted within the Park, except for quantities which shall normally be expected to be utilized in a day of Work, and which are not permitted to stockpile.
- .7 Emulsion storage tanker and transfer of emulsion from tanker to spray vehicle are not permitted within the National Park.
- .8 Equipment maintenance is not permitted within the Park boundaries.

1.17 TREATED WOOD

- .1 Creosote is not approved for use in Parks.
- .2 Workers should be made aware of the possible health risks associated with exposure to CCA or creosote treated timber as well as the recommended safe practices for handling such materials.
- .3 Disposal of treated wood wastes including saw-dust must be outside of the Park, and in accordance with all applicable Provincial and Municipal regulations. Similar attention must be given to the disposal of any replaced guiderail posts which have been treated with creosote.

1.18 SITE DECOMMISSIONING

- .1 Unless prior permission from the Departmental Representative is obtained, all contractor equipment, facilities and materials must be removed from the Park at the finish of each work phase, or if work is suspended due to weather or other circumstance, upon the suspension of work activities.
- .2 All work sites must be returned to a neat and tidy condition upon site abandonment.

1.19 HISTORICAL/ARCHAEOLOGICAL CONTROL

- .1 Provide historical, archaeological, cultural resources, biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.
- .2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.
- .3 Relics and antiquities and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found on site or in structures demolished, shall remain property of Canada. Protect such articles and request direction from Departmental Representative.
- .4 Give immediate notice to Departmental Representative if evidence of archaeological finds are encountered during construction and await written instructions before proceeding with work in the area.

1.20 NOTIFICATION

- .1 The Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform the Departmental Representative of proposed corrective action and take such action for approval by the Departmental Representative.
 - .1 Take action only after receipt of written approval by the Departmental Representative.
- .3 The Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

1.21 ENVIRONMENTAL PROTECTION PLAN

- .1 Submit a plan showing all pollution control measures that will be used to fulfill the requirements of the Environmental Protection Section. This plan will be reviewed by the Departmental Representative and the Environmental Protection Officer prior to commencement of any work. Any deviation from this plan will require further approval by the Departmental Representative. Submit the protection plan prior to the pre-construction meeting.
- .2 The Environmental Plan will outline how the Contractor will address the environmental protection requirements, including removal and installation of culverts, and ensure pollution created by the construction is controlled. It must show sufficient detail on products to be used and physical placement on site to determine effectiveness of these items.

1.22 ENVIRONMENTAL PERFORMANCE

- .1 Follow the Canadian Environmental Protection Act.
- .2 Confirm all necessary permits related to Environmental Protection have been obtained and that necessary documentation is available on-site.

1.23 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 Hazardous material spill.
 - .4 Sewage spill.
 - .5 Contaminated water into waterways.
- .2 The Contractor or his employees must:
 - .1 Notify the Contractor's job superintendent.
 - .2 Call the local emergency services and give type of emergency.
 - .3 Submit to Departmental Representative a copy of its Environmental/Spill Response Plan for approval.

1.24 NON-COMPLIANCE OF REQUIREMENTS

- .1 The failure to adhere to the environmental protection measures of the specifications, and following the issuance of an environmental non-compliance notice, the Contractor is subject to a permanent retention of sums applicable as a fine for each infraction factually noted by the Departmental Representative or one of their agents. The fine sum per infraction is based on the total construction contract value as stated below:
 - .1 Total contract value < \$1 M = \$1,000
 - .2 Total contract value > \$1M < \$3M = \$2,000

- .3 Total contract value > \$3M < \$5M = \$3,000
- .4 Total contract value > \$5M = \$5,000
- .2 Any infraction that is not be corrected by the following day shall be subject to an additional permanent retention in the sum of the same amount. Each following day shall be subject to the same until the infraction is corrected. Additionally, any expense related to the damage caused to the environment shall be at the cost of the Contractor, notably any analysis, report, works required to manage restoration of fauna and wildlife and indemnities.
- .3 In the case of non-execution by the Contractor of repairs or damage, the Owner/Applicable Public Authority shall proceed with corrective works and will charge the Contractor the cost of such works and delays as permanent retention of sums.
- .4 Protection of the environment: Prevention/control of pollution and disturbances to the environment and surrounding habitat during construction.
- .5 In the case of work done for the Federal Government; sections of Division 1 have priority over the technical sections of other divisions of project specifications. The Contractor shall at all times respect the National Parks Act and Regulations Reference Standards.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.
 - .1 Leave Work area clean at end of each day.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.

1.2 INSPECTION

- .1 Allow the 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 the Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.
- .4 The Departmental Representative will order 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.

1.3 INDEPENDENT INSPECTION AGENCIES

- .1 An Inspection/Testing Agency will be engaged by the Departmental Representative for the purpose of inspecting and/or testing portions of Work.
- .2 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .3 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 the Departmental Representative at no cost to the Departmental Representative. Pay costs for retesting and re-inspection.

1.4 PORTABLE SITE LABORATORY

- .1 The contractor is to provide a testing laboratory for the following tasks:
 - .1 Conducting gradation analysis during the production of granular materials including the asphalt aggregates.
 - .2 Testing asphalt concrete during paving operations.
- .2 The site laboratory shall be located near the aggregate production or asphalt plant location or as agreed upon with the Departmental Representative.

- .3 The Portable Site Laboratory shall include the following:
 - .1 Safe access
 - .2 Electricity as necessary to operate typical laboratory equipment
 - .3 A continuous source of water
 - .4 Heating/air conditioning as necessary to maintain a comfortable work environment
 - .5 Work benches for testing equipment
 - .6 A desk, chair and file cabinet
- .4 The Inspection/Testing Agency will provide the required testing equipment for the work.

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 PROCEDURES

- .1 Notify appropriate agency and the 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 orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.7 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by the 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 the Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by the Departmental Representative.

1.8 REPORTS

- .1 Submit 4 copies of inspection and test reports to the Departmental Representative.

1.9 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by the Departmental Representative and may be authorized as recoverable.

1.10 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Construct in locations acceptable to the Departmental Representative as specified in specific section.
- .2 Prepare mock-ups for the Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .3 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .4 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.11 MEASUREMENT PROCEDURES

- .1 The work for this section will not be measured for payment, but will be incidental to the work.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

2.2 Execution

2.3 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.2 ACCESS

- .1 Provide and maintain adequate access to project site.
- .2 Build and maintain temporary roads during period of work. Parks Canada must approve prior to their use, any proposed temporary roads within the Park.
- .3 Upon completion of contract work, rehabilitate any temporary roads to the satisfaction of the Departmental Representative.
- .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 Contractor's use of roads.
- .5 Clean roads and parking areas where used by Contractor's equipment or employees' vehicles.

1.3 DEPARTMENTAL REPRESENTATIVE'S SITE OFFICE

- .1 Contractor to provide Departmental Representative's office trailer/space. Minimum office trailer/space size is 3.0 m x 12.5 m. The office space shall be fully functional and operational prior to the start of Work.
- .2 Insulate building and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.
- .3 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colors. Finish floor with 19 mm thick plywood.
- .4 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10% upward light component.
- .5 Contractor to arrange and pay for fax machine, internet connection and photocopier in Departmental Representative's office for its exclusive use. Capacity of internet connection to be suitable for business applications.
- .6 Contractor to equip office with two 1 m x 2 m tables, one 1 m x 2 m drafting table, 4 chairs, 6 m of shelving 300 mm wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.
- .7 Upon completion of the Contract; all equipment and furniture provided by the Contractor shall be returned to it.

- .8 Supply of the Departmental Representative's office, supplies and services will be incidental to the work.
- .9 Contractor to provide laboratory space for the Departmental Representative at the aggregate crushing operation, laboratory to include the following.
 - .1 Ability to secure laboratory.
 - .2 Minimum laboratory trailer/space size is 3.0 m x 7.5 m.
 - .3 Contractor to supply continual access to clean water.
 - .4 One work desk and one chair.
 - .5 Contractor to supply continual access to electricity and lighting. Sufficient electricity and outlets to power two 120v/240v warming ovens, one 120v hot plate, one electronic scale, one 120v sieve shaker and three table fans simultaneously.
 - .6 Sink for washing samples.
 - .7 Secure storage for a nuclear density gauge.
 - .8 Minimum 1.0 m x 3.0 m work bench.
- .10 Contractor to provide laboratory space for the Departmental Representative at the Asphalt Plant, laboratory to include the following.
 - .1 Ability to secure laboratory.
 - .2 Minimum laboratory trailer/space size is 3.0 m x 10.0 m.
 - .3 Contractor to supply continual access to clean water.
 - .4 One work desk and one chair.
 - .5 Contractor to supply continual access to electricity and lighting. Sufficient electricity and outlets to power one NCAT 240v Ignition oven, two 120v/240v warming ovens, one 120v hot plate, one electronic scale, one 120v sieve shaker, one 120v vacuum pump and three table fans simultaneously.
 - .6 Sink for washing samples.
 - .7 Secure storage for a nuclear density gauge.
 - .8 Minimum 1.0 m x 5.0 m work bench.

1.4 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
 - .1 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.5 PARKING

- .1 Parking space for work force will be limited to the construction limits for each area under construction.

1.6 REMOVAL OF TEMPORARY FACILITIES

- .1 Remove temporary facilities from site when directed by Departmental Representative.

1.7 CONTRACTOR'S CAMP

- .1 The Contractor will not be permitted to set up a camp within Cape Breton Highlands National Park.

Part 2 Materials

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 weigh scales certified as meeting requirements of Statutes of Canada, Weights and Measures Act. A copy of the inspection report to be provided to the Departmental Representative prior to work proceeding. 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. Tickets shall include information to identify project, material type and source, the truck and registered weight along with tare, gross and net weights.
 - .1 Tickets shall not be issued to vehicles which exceed the vehicle's registered weight.

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 face 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.
- .2 Maintain approach ramps in good condition free from sags and ruts.
- .3 Have scales re-tested and re-certified if requested by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 35 00.06 - Special Procedures for Traffic Control.
- .2 Section 01 35 29.06 - Health and Safety Requirements.
- .3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.2 REFERENCES

- .1 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as Of: May 14, 2004.

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, open edges of structures, or as indicated by Contract Documents.
- .2 Provide as required by governing authorities and as indicated.

1.5 ACCESS TO SITE

- .1 Provide and maintain access roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

1.6 PUBLIC TRAFFIC FLOW

- .1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect 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.

1.9 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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 Within text of each specifications section, reference may be made to reference standards. Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .2 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .3 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 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.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 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.

- .4 Store sheet materials on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.4 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 Departmental Representative. Unload, handle and store such products.

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

1.6 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.

1.7 CO-ORDINATION

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.8 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate 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.

1.9 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 building occupants and 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 REQUIREMENTS

- .1 Section 01 78 00 – Closeout Submittals.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 Control reference from the LiDAR survey data collected by Leading Edge Geomatics in June, 2015 shall be the only approved source for the project. Survey control based on the CAN-NET (www.can-netgps.ca), Nova Scotia active control network at CAN-NET stations NHBR (Neils Harbour) and CHET (Cheticamp).

1.4 QUALIFICATIONS OF SURVEYOR

- .1 Qualified Surveyor or Geomatics Technologist, from a recognized post-secondary school, acceptable to the Departmental Representative.

1.5 SURVEY REFERENCE POINTS

- .1 Survey control is based on the CAN-NET (www.can-netgps.ca), Nova Scotia active control network at CAN-NET stations NHBR (Neils Harbour) and CHET (Cheticamp). The Departmental Representative will establish 2 control points from NSHPN for the Contract. The Contractor shall:
 - .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 the Departmental Representative.
 - .3 Report to the Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 - .4 Confirm receipt of control points from Departmental Representative in accordance with original survey control.

1.6 SURVEY REQUIREMENTS

- .1 Record and maintain daily logs of survey work, with recorded checks.
- .2 Record and maintain locations, with horizontal and vertical data in Project Record Documents. Records must be available on request from Departmental Representative.
- .3 Establish lines and levels, locate and layout, by instrumentation.

- .4 Stake for all grading, fill placement, granular materials, and culvert placements.
- .5 Stake slopes, berms and areas as requested by the Departmental Representative.
- .6 Establish pipe invert elevations and location of any exposed pipe not being removed under this contract.

1.7 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of all existing service lines in area of Work and notify the Departmental Representative of findings.
- .2 Remove abandoned service lines as directed by the Departmental Representative.

1.8 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform the Departmental Representative of impending installation and obtain approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by the Departmental Representative.

1.9 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site improvements, prepare as-builts showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of maintained, re-routed and abandoned service lines.

1.10 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit name and address of Surveyor to the Departmental Representative.
- .2 On request of the Departmental Representative, submit documentation to verify accuracy of field engineering work.
- .3 Submit as-builts signed by the Surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

1.11 SUBSURFACE CONDITIONS

- .1 Promptly notify the Departmental Representative if subsurface conditions within project area differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
- .2 After prompt investigation, should the Departmental Representative determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

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 Public Works Government Services Canada (PWGSC) Standard Acquisition Clauses and Conditions (SACC) – ID: R0202D, Title: General Conditions “C”, In Effect as Of: May 14, 2004.

1.2 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.
- .3 Clear snow and ice from access to site or facilities of the work, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide suitable on-site containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling.
- .7 Dispose of waste materials and debris outside the limits of the National Park at a location/facility approved by the Authority having jurisdiction.
- .8 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

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.
- .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, unless approved by Departmental Representative.
- .6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

- .7 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .8 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .9 Remove dirt and other disfiguration from exterior surfaces.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling.

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 REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 11 - Cleaning.
- .3 Section 02 41 13 – Selective Site Demolition.

1.2 REFERENCES

- .1 Nova Scotia Solid Waste Resource Strategy.
- .2 Nova Scotia's Environmental Act, Section 84, Used Oil Regulations.
- .3 Local Municipal Bylaws.

1.3 WASTE MANAGEMENT GOALS

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PCA's Waste Management Plan and Goals.
- .2 Accomplish maximum control of solid construction waste.
- .3 Preserve environment and prevent pollution and environmental damage.

1.4 DEFINITIONS

- .1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Departmental Representative.
- .2 Class III: non-hazardous waste - construction renovation and demolition waste.
- .3 Inert Fill: inert waste - exclusively asphalt and concrete.
- .4 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .5 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .6 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.
- .7 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.

- .8 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .9 Separate Condition: refers to waste sorted into individual types.
- .10 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

1.6 USE OF SITE AND FACILITIES

- .1 Execute Work with minimal interference and disturbance to normal use of premises.
- .2 Maintain security measures established by facility provide temporary security measures approved by Departmental Representative.

1.7 WASTE PROCESSING SITES

- .1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.

1.8 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .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 Separate and store materials produced during project in designated areas.
- .6 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities:
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to offsite processing facility for separation.
 - .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.

1.9 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil or paint thinner 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 tonnage generated.
- .4 Tonnage reused or recycled.
- .5 Reused or recycled waste destination.
- .4 Remove materials on-site as Work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

1.10 USE OF SITE FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Maintain security measures established by PCA.

1.11 SCHEDULING

- .1 Co-ordinate 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 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Canadian Environmental Protection Act (CEPA):
 - .1 SOR/2008-197, Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations.

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Acceptance of Work Procedures:
 - .1 Contractor's Inspection: Contractor: conduct 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 submit verification that corrections have been made.
 - .2 Request Departmental Representative inspection.
 - .2 Departmental Representative Inspection:
 - .1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
 - .2 Contractor to correct Work as directed.
 - .3 Completion Tasks: submit written certificates that tasks have been performed as follows:
 - .1 Work: completed and inspected for compliance with Contract Documents.
 - .2 Defects: corrected and deficiencies completed.
 - .3 Equipment and systems: tested, adjusted and balanced and fully operational.
 - .4 Operation of systems: demonstrated to Owner's personnel.
 - .5 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.
 - .2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

1.3 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 11 – Cleaning:
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: separate waste materials for reuse and recycling.

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 REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 45 00 – Quality Control.
- .3 Section 01 71 00 – Examination and Preparation.

1.2 REFERENCES

- .1 Canadian Environmental Protection Act (CEPA).

1.3 DEFINITIONS

- .1 As-Built Drawings: means a complete set of stamped and signed Engineering drawings prepared following the completion of construction that shows, insofar as possible, the true co-ordinate location and pertinent information regarding all infrastructure constructed, placed or installed.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week prior to contract completion with contractor's representative and the Departmental Representative to:
 - .1 Verify Project requirements.
 - .2 Review manufacturer's installation instructions and warranty requirements.
 - .2 The Departmental Representative to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide evidence, if requested, for type, source and quality of products supplied.

1.6 FORMAT

- .1 Organize data as 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:
 - .1 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.
- .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:
 - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide the Departmental Representative 1:1 scaled CAD file in an approved dwg format on an external memory stick.

1.7 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: 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 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:
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.8 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, in addition to requirements in General Conditions, at site for the Departmental Representative one record copy of:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda's.
 - .4 Site Instructions
 - .5 Change Orders and other modifications to Contract.
 - .6 Reviewed shop drawings, product data, and samples.
 - .7 Field test records.
 - .8 Inspection certificates.
 - .9 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction:
 - .1 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:
 - .1 Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition:
 - .1 Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by the Departmental Representative.

1.9 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by the Departmental Representative.
- .2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.
- .3 Record information concurrently with construction progress:
 - .1 Do not conceal Work until required information is recorded.
- .4 Contract Drawings and shop drawings: 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 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

- .3 Field changes of dimension and detail.
- .4 Changes made by change orders.
- .5 Details not on original Contract Drawings.
- .6 References to related shop drawings and modifications.
- .7 Contractor shall maintain a set of **Red Line** mark up drawings of As-Built information and provide to Departmental Representative at the completion of the Work along with digital CAD (dwg format) copy of As-Built records.
- .5 Specifications: 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.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specification sections.
- .7 Provide digital photos, if requested, for site records.

1.10 AS-BUILT SURVEY

- .1 Submit final As-Built survey in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance with the Contract Documents.

1.11 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to the Departmental Representative approval.
- .3 Warranty management plan to include required actions and documents to assure that the Departmental Representative receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to the Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .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 applicable item of work.
- .4 Verify that documents are in proper form, contain full information, and are notarized.
- .5 Co-execute submittals when required.
- .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 10 month warranty inspection, measured from time of acceptance, by the Departmental Representative.
- .9 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 - .2 Provide list for each warranted equipment, item, feature of construction or system indicating:
 - .1 Name of item.
 - .2 Model and serial numbers.
 - .3 Location where installed.
 - .4 Name and phone numbers of manufacturers or suppliers.
 - .5 Names, addresses and telephone numbers of sources of spare parts.
 - .6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.
 - .7 Cross-reference to warranty certificates as applicable.
 - .8 Starting point and duration of warranty period.
 - .9 Summary of maintenance procedures required to continue warranty in force.
 - .10 Cross-Reference to specific pertinent Operation and Maintenance manuals.
 - .11 Organization, names and phone numbers of persons to call for warranty service.
 - .12 Typical response time and repair time expected for various warranted equipment.
 - .3 Contractor's plans for attendance at 10 month post-construction warranty inspections.
 - .4 Procedure and status of tagging of equipment covered by extended warranties.
 - .5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions:
 - .1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.12 MEASUREMENT PROCEDURES

- .1 The work for this section will not be measured for payment, but will be incidental to 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 RELATED REQUIREMENTS

- .1 Section 32 11 16.01 - Granular Sub-base.
- .2 Section 32 12 23 – Aggregate Base Courses.
- .3 Section 32 12 13 – Asphalt Tack Coat.
- .4 Section 32 12 16 - Asphalt Paving.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 Payment Procedures.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Milled / Reclaimed Asphalt Pavement (RAP) shall be reused in the following manners:
 - .1 Screened, processed and placed as shoulder material.
 - .2 Unused RAP to be disposed of by the Contractor outside of Park limits. All costs related to disposing of the surplus material to be borne by the Contractor.

Part 2 Products

- .1 Not Used.

Part 3 Execution

3.1 PREPARATION

- .1 Prior to beginning removal operation, inspect and verify with Departmental Representative, areas, depths and lines of asphalt pavement to be removed.

3.2 EQUIPMENT

- .1 Where required to key into existing asphalt pavements or where a specified depth of material is to be removed, use cold milling or grinding equipment with automatic grade controls capable of operating from stringline, and capable of removing part of pavement surface to depths or grades indicated.

3.3 PROTECTION

- .1 Protect existing pavement not designated for removal from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

3.4 REMOVAL

- .1 Remove existing asphalt pavement to specified depths:
 - .1 Remove existing asphalt to lines and grades as indicated.
 - .2 Current asphalt thicknesses are included in the Geotechnical Report provided in **Appendix A**, the Contractor shall supplement the information as required to ensure the specified thickness remains after milling.
 - .3 The contractor shall ensure that traffic does not travel on subgrade or sub-base at any time during construction unless directed by Departmental Representative.
 - .4 The Contractor shall continuously maintain the work site free of pot holes and standing water and in a condition providing for a safe and efficient flow of traffic, from the time of removal, until such time as the new asphalt concrete is placed. Hot mix asphalt concrete shall be placed in the pot holes; cold mix or RAP are acceptable only as a temporary repair. Signage indicating the driving condition of the milled surface shall be posted. Milled and aged asphalt concrete surfaces shall be treated with bituminous tack coat in accordance with Section 32 12 13 – Asphalt Tack Coat prior to the placing of asphalt concrete
 - .5 Lanes shall be completed to the same location and elevation at the end of day's cold milling operations where it is intended to have both lanes milled.
 - .6 The surface remaining after cold planing shall have a constant and continuous cross fall matching the intended surface course cross fall and shall have an even texture free of grooves and/or ridges in all directions.
 - .7 All residue left by the cold planing process shall be removed immediately from the road.
 - .8 Mechanical sweeping shall be performed at the end of each day's operations. Low points in the asphalt as a result of cold planing operations, where water ponding may occur, shall have the shoulder milled for draining rainfall. Any guide rail contaminated as a result of cold planing or sweeping operations shall be cleaned to the satisfaction of the Departmental Representative. Any milled material that is lost over the shoulder shall be immediately retrieved and disposed of in an approved manner.
 - .9 The Contractor shall dispose of residue at an approved waste disposal area provided by the Contractor at his own expense.
 - .10 Use equipment and methods or removal and hauling which do not tear, gouge, break or otherwise damage or disturb underlying pavement.
 - .11 Prevent contamination of removed asphalt concrete pavement and granular base by topsoil, underlying gravel or other materials.
 - .12 Provide for suppression of dust generated by removal process.
 - .13 Compact underlying material in areas of complete removal of asphalt concrete.

- .14 In areas where localized pavement removal is carried out within the traffic lane ensure traffic is restricted from area until the surface is restored.
- .15 Prior to paving operations commencing, a traverse butt joint must be constructed. If a transverse vertical cut is milled in the existing pavement at the limit of the work area the Contractor shall immediately construct with hot mix asphalt concrete a temporary smooth 1.5 m long taper. The temporary taper must be removed prior to paving of the milled area.
- .16 TOMS required on any milled surface prior to opening of traffic lanes at the end of each day. Spacing shall be to NSTWTCM.

3.5 TRAFFIC CONTROL

- .1 Maintain at least one lane of alternating two-way traffic at construction site at all times as specified in Section 01 35 00.06 – Special Procedures for Traffic Control.

3.6 CLEANING

- .1 Leave Work area clean at end of each day.
- .2 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.
- .3 Removed asphalt pavement which is to be recycled in hot mix asphalt concrete under this contract may be stockpiled at designated asphalt plant site.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 45 00 - Quality Control.
- .3 Section 01 35 43 - Environmental Procedures.
- .4 Section 01 35 29.06 – Health and Safety Requirements.
- .5 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 MEASUREMENT FOR PAYMENT

- .1 Guard Rail and Posts Removal: See Section 01 29 00 – Payment Procedures.
- .2 Signs and Sign Posts: See Section 01 29 00 – Payment Procedures.
- .3 For all other items to be removed such as (but not limited to) fencing, underground Bell Aliant communication cables, driveway markers, etc. there shall be no measurement for payment and the work is considered incidental to the overall work of the project.

1.3 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS):
 - .1 Material Safety Data Sheets (MSDS).

1.4 SUMMARY

- .1 Section includes:
 - .1 Methods and procedures for demolishing, salvaging, recycling and removing sitework items designated to be removed in whole or in part, and for backfilling resulting trenches and excavations.

1.5 DEFINITIONS

- .1 Demolition: rapid destruction of building following removal of hazardous materials.
- .2 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial/Territorial regulations.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Store and manage hazardous materials in accordance with Section 01 35 43 – Environmental Procedures.
- .2 Storage and Protection:
 - .1 Protect in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
 - .2 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.
 - .3 Remove and store materials to be salvaged, in manner to prevent damage.
 - .4 Store and protect in accordance with requirements for maximum preservation of material.
 - .5 Handle salvaged materials as new materials.

1.9 SITE CONDITIONS

- .1 Site Environmental Requirements:
 - .1 Perform work in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
 - .3 Do not dispose of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
 - .1 Ensure proper disposal procedures are maintained throughout the project.

- .4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities as directed by Departmental Representative.
- .6 Protect trees, plants and foliage on site and adjacent properties where indicated.
- .2 Existing Conditions:
 - .1 Remove contaminated or hazardous materials as defined by authorities having jurisdiction as directed by Departmental Representative from site, prior to start of demolition Work, and dispose of at designated disposal facilities in safe manner in accordance with TDGA and other applicable regulatory requirements.

Part 2 Products

2.1 EQUIPMENT

- .1 Contractor shall supply all equipment necessary to complete the Work.
- .2 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

Part 3 Execution

3.1 PREPARATION

- .1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.
- .2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.
- .3 Notify and obtain approval of utility companies before starting demolition.

3.2 REMOVAL OF HAZARDOUS WASTES

- .1 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

3.3 REMOVAL OPERATIONS

- .1 Remove items as indicated.
- .2 Do not disturb items designated to remain in place.

- .3 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving.
- .4 Excavate 300 mm below pipe invert, when removing pipes under existing or future pavement area.
- .5 Decommission water wells and monitoring wells in accordance with Municipal regulations.
- .6 Remove designated trees during demolition:
 - .1 Obtain written approval of Departmental Representative prior to removal of trees not designated.
 - .2 Grind, chip, or shred vegetation for mulching and composting.
- .7 Provide erosion control, hydroseeding and dry mulch if not immediately used.
- .8 Disposal of Material:
 - .1 Dispose of materials not designated for salvage or reuse on site as instructed by Departmental Representative at authorized facilities approved in Waste Reduction Workplan.
- .9 Backfill:
 - .1 Backfill in areas as indicated and in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .10 Parks Canada signs will be removed, salvaged and delivered for reinstallation.

3.4 STOCKPILING

- .1 Label stockpiles, indicating material type and quantity.
- .2 Designate appropriate security resources/measures to prevent vandalism, damage and theft.
- .3 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.
- .4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

3.5 REMOVAL FROM SITE

- .1 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.
- .2 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

- .3 Transport material designated for alternate disposal using approved facilities listed in Waste Reduction Workplan and in accordance with applicable regulations:
 - .1 Written authorization from Departmental Representative is required to deviate from facilities listed in Waste Reduction Workplan.
- .4 Dispose of materials not designated for alternate disposal in accordance with applicable regulations:
 - .1 Disposal Facilities: approved and listed in Waste Reduction Workplan.
 - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

3.6 RESTORATION

- .1 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.
- .2 Use soil treatments and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning:
 - .1 Leave Work area clean at end of each day.
 - .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work.
 - .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.8 PROTECTION

- .1 Repair damage to adjacent materials or property caused by selective site demolition.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29.06 - Health and Safety Requirements.
- .3 Section 01 35 43 - Environmental Procedures.
- .4 Section 01 45 00 - Quality Control.
- .5 Section 01 56 00 - Temporary Barriers and Enclosures.
- .6 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 Definitions:
 - .1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or materials that endanger human health or environment if handled improperly.
 - .2 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating related, required submittal and reporting requirements.
 - .3 Abrasive: means a solid substance capable of grinding or wearing down.
- .2 Reference Standards:
 - .1 ASTM International:
 - .1 D 4285-83 (R2006) - Standard Test Method for Indicating Oil or Water in Compressed Air.
 - .2 CSA International:
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
 - .3 Department of Justice Canada (Jus):
 - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
 - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33:
 - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
 - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.

- .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- .4 Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE)
- .1 SSPC-SP 6/NACE No. 3-2007 Commercial Blast Cleaning

1.4 SUMMARY

- .1 The Work under this section will include the supply of labour, supervision, materials, equipment, and transportation necessary to complete demolition work as shown on the Drawings, per the Specifications, and as directed by the Departmental Representative, complete in every respect.
- .2 Generally, the work in Demolition is the responsibility of the Contractor and includes but is not necessarily limited to the following:
 - .1 Preparation of abutment walls for concrete patching.
 - .2 Demolition of existing bearing blocks and removal of bottom bearing plates.
 - .3 Removal and demolition of existing steel barriers, including concrete end blocks, curbs and sidewalks.
 - .4 Removal and disposal of debris.
 - .5 Abrasive blast cleaning of concrete bridge deck.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 WMC is responsible for fulfilment of reporting requirements.
- .3 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal and indicate:
 - .1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.
 - .2 Schedule of selective demolition.
 - .3 Number and location of dumpsters.
 - .4 Anticipated frequency of tippage.
 - .5 Name and address of haulers and waste receiving organizations.
- .4 Submit 2 copies of certified receipts from authorized disposal sites and reuse and recycling facilities for material removed from site upon request of Departmental Representative:
 - .1 Written authorization from Departmental Representative is required to deviate from receiving organizations listed in Waste Reduction Workplan.
- .5 Shop Drawings:
 - .1 Submit for review and approval demolition drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning.

- .2 Submit demolition drawings stamped and signed by professional engineer registered or licensed in Province of Nova Scotia, Canada.

1.6 QUALITY ASSURANCE

- .1 Regulatory Requirements: Ensure Work is performed in compliance with Section 01 45 00 - Quality Control.
- .2 After abrasive blast cleaning is completed, the abrasive blast cleaned concrete surfaces and reinforcing steel shall be examined by the Departmental Representative to verify that the requirements of this specification have been met.

1.7 SITE CONDITIONS

- .1 Environmental protection:
 - .1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution:
 - .1 No machinery shall be allowed in the water at any time.
 - .3 Fires and burning of waste or materials is not permitted on site.
 - .4 Do not bury rubbish waste materials.
 - .5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers:
 - .1 Ensure proper disposal procedures are maintained throughout project.
 - .6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.
 - .7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with as directed by Departmental Representative.
 - .8 Protect trees, plants and foliage on site and adjacent properties where indicated.
 - .9 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
 - .10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

1.8 EXISTING CONDITIONS

- .1 Refer to Drawings indicating existing and temporary conditions.

1.9 SCHEDULING AND STAGING

- .1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion:
 - .1 In event of unforeseen delay notify Departmental Representative in writing.

- .2 The Contractor is to respect all restrictions on in water work as outlined in the Contract Documents.
- .2 Stage bridge demolition as follows:
 - .1 Demolition of the existing bridge barrier shall not commence until traffic is permanently diverted onto the temporary single lane of travel, including all required traffic control and temporary jersey barriers.

Part 2 Products

2.1 EQUIPMENT

- .1 Equipment and heavy machinery:
 - .1 On-road vehicles to: CEPA-SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
 - .2 Off-road vehicles to: EPA CFR 86.098-10 and EPA CFR 86.098-11.
- .2 Contractor to implement an anti-idling policy. Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.
- .3 All Equipment used to remove concrete from the repair areas shall be subject to the approval of the Departmental Representative.
- .4 Concrete demolition:
 - .1 Chipping hammers:
 - .1 Chipping hammers shall weigh less than 15 kg.
 - .2 Chipping hammers shall be permitted in all areas of concrete removal.
 - .2 Jackhammers:
 - .1 Jackhammers shall weigh less than 40 kg.
 - .2 Concrete removal utilizing a jackhammer shall not be permitted in the following areas:
 - .1 Within 100 mm of concrete that is to remain in place;
 - .2 Within 25 mm of reinforcing steel that is to remain in place.
 - .3 Rig-Mounted Breakers:
 - .1 Utilizing a rig-mounted breaker for concrete removal will not be permitted for this project.
- .5 Abrasive Blast Cleaning:
 - .1 Air Compressor:
 - .1 The air compressor for abrasive blast cleaning shall be capable of delivering material at a pressure of 620 kPa. The air pressure shall be measured in the delivery system at a distance not greater than 3 m from the nozzle end.
 - .2 The compressed air shall be clean, dry, and free of oil residue when tested according to ASTM D 4285.

- .3 Nozzles used for abrasive blast cleaning shall have a minimum diameter of 8 mm and the size shall be indicated on the nozzle.
- .4 Hoses used for abrasive blast cleaning shall have an internal diameter not less than 40 mm.

Part 3 Execution

3.1 PREPARATION

- .1 Temporary Erosion and Sedimentation Control:
 - .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to: sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.
- .2 Protection of in-place conditions:
 - .1 Work in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Prevent movement, settlement or damage of adjacent structures:
 - .1 Provide bracing, shoring and underpinning as required.
 - .2 Repair damage caused by demolition as directed by Departmental Representative.
 - .3 Support affected structures and, if safety of structure being demolished adjacent structures or services appears to be endangered, take preventative measures, stop Work and immediately notify Departmental Representative.
 - .4 Prevent debris from blocking surface drainage system, elevators, mechanical and electrical systems which must remain in operation.
- .3 Preparation:
 - .1 Contact utilities prior to commencing work. Coordinate removals and relocations with respective utilities.
 - .2 Disconnect any utility affected by the required work:
 - .1 Post warning signs on electrical lines and equipment which must remain energized to serve other properties during period of demolition.
 - .3 Disconnect and cap any utility to remain.
 - .4 Do not disrupt active or energized utilities designated to remain undisturbed.
 - .5 Remove rodent and vermin as required by Departmental Representative.

3.2 DEMOLITION

- .1 Do demolition work in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .2 Blasting operations not permitted during demolition.
- .3 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.
- .4 Demolish parts of structure as indicated on the drawings and as described herein.
- .5 Crush concrete generated due to demolition to size suitable for recycling as directed:
 - .1 Where possible identify markets which will accept crushed material as aggregate.
 - .2 For further information regarding acceptable uses contact Provincial aggregate producers associations and Ministries of Transportation.
- .6 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.
- .7 At end of each day's work, leave Work in safe and stable condition.
- .8 Demolish to minimize dusting. Keep materials wetted as directed by Departmental Representative.
- .9 Remove structural components and asphaltic material as indicated on Contract Drawings.
- .10 Only dispose of material specified by selected alternative disposal option as directed by Departmental Representative.
- .11 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.
- .12 Dispose of materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .13 Partial depth removal and disposal of loose and unsound concrete:
 - .1 The actual locations, area and extent of removal shall be determined on the site by the Departmental Representative.
 - .2 Partial depth removal shall apply to but is not limited to:
 - .1 Sidewalks and curbs;
 - .2 The top surface of decks; and
 - .3 Barrier walls, endposts and ballastwalls.
 - .3 Concrete shall be removed in such a manner as to prevent damage to adjacent concrete, other components and utilities that are to remain in place.
 - .4 Reinforcing steel and other components to remain in place shall not be damaged or loosened.
 - .5 Hammers shall not come in contact with reinforcing bars in a manner which will cause debonding of bars in adjacent concrete areas not being repaired.

- .6 Concrete removal shall not be permitted within 1 m of newly placed concrete for a period of 72 hours and to a minimum compressive strength of 20 MPa.
- .7 The unsound and delaminated areas of the concrete deck slab, curbs and end posts, as determined by the Departmental Representative, shall be saw cut along all edges to a depth of approximately 15 mm orientated perpendicular to the original concrete surface.
 - .1 Concrete shall be removed to a minimum of 20 mm below the bottom bar of the top mat of reinforcing steel.
 - .1 Any additional unsound concrete, beyond the minimum specified, shall also be removed from these areas.
- .8 All of the exposed reinforcing steel within these repair areas shall be cleaned by sandblasting (or Departmental Representative approved alternate method) such that it is free of scale, rust and concrete.
- .9 The maximum size of the air hammer to be used when removing concrete around reinforcing steel shall be 156 N.
- .10 In areas where the top mat of reinforcing steel is completely exposed, the bars shall be retied at each intersection point.
- .14 Full depth removal and disposal of concrete:
 - .1 The actual locations, area and extent of removal shall be determined on site by the Departmental Representative, in addition to deck cantilever as per Contract Drawings.
 - .2 Full depth removal areas shall be saw cut along all edges, perpendicular to the existing concrete surface to a depth of 25 mm or to the top layer of reinforcing steel, whichever is less.
 - .3 All of the exposed reinforcing steel within these repair areas shall be cleaned by sandblasting (or Departmental Representative approved alternate method) such that they are free of scale, rust and concrete.
 - .4 Care shall be taken not to damage, cut or loosen the reinforcing steel.
 - .5 Exposed reinforcing steel shall be retied at each intersection point.

3.3 ABRASIVE BLAST CLEANING

- .1 Abrasive blast cleaning shall only be permitted when the concrete and reinforcing steel are surface dry.
- .2 Areas and components not designated for abrasive blast cleaning shall be protected from adjacent abrasive blast cleaning operations.
- .3 Adequate access to the work area shall be provided to facilitate the work and for any inspection or measurement required by the Departmental Representative.
- .4 Reinforcing Steel:
 - .1 The full circumference of the existing exposed reinforcing steel shall be abrasive blast cleaned to a commercial blast cleaned finish according to SSPC-SP 6/NACE No. 3, and the blast cleaned steel surfaces shall be according to the applicable visual standards specified in SSPC-VIS 1.

- .2 When silica sand is used as the abrasive material, the subsequent placement of concrete shall be done within 72 hours or the reinforcing steel shall be reblasted. When other types of abrasive materials are used, the subsequent placement of concrete shall be done within 36 hours or the reinforcing steel shall be reblasted.
- .5 Concrete:
 - .1 All new and existing concrete surfaces against which new concrete is to be placed shall be abrasive blast cleaned.
 - .2 The abrasive blast cleaning shall be of an extent to expose and clean the coarse aggregate and remove all dirt, laitance, and hardened concrete slurry. Any oil or grease on the surface of the concrete shall be removed using hand tools.
 - .3 The abrasive blast cleaning of concrete surfaces shall be carried out not more than 48 hours prior to the placement of concrete against them.
 - .4 Immediately after abrasive blast cleaning is completed, the surface shall be checked by the Departmental Representative for fractured concrete or loose aggregate. This material shall be removed using hand tools.
 - .5 Deck and approach slab sealer:
 - .1 Abrasive blast cleaning shall proceed by delineating an area of the deck not exceeding 10 square metres and completing abrasive blast cleaning within the delineated area prior to proceeding to the adjacent areas of the deck surface.
 - .2 Areas of concrete that are abrasive blast cleaned for the subsequent silane sealer treatment, shall have the sealer applied within 36 hours or shall be reblasted.

3.4 CLEANING

- .1 Divert excess materials from landfill to site approved Departmental Representative.
- .2 Designate appropriate security resources / measures to prevent vandalism, damage and theft.
- .3 Locate stockpiled materials convenient for use in new construction. Eliminate double handling wherever possible.
- .4 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures:
 - .1 Label stockpiles, indicating material type and quantity.
- .5 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project construction.
- .6 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.
- .7 Transport material designated for alternate disposal using approved haulers listed in Waste Reduction Workplan and in accordance with applicable regulations:

- .1 Written authorization from Departmental Representative is required to deviate from haulers listed in Waste Reduction Workplan.
- .8 Dispose of materials not designated for alternate disposal in accordance with applicable regulations:
 - .1 Disposal facilities must be those approved of and listed in Waste Reduction Workplan.
 - .2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 The Work under this Section includes the supply of all labour, supervision, materials, plant, equipment, and transportation necessary for the supply, erection and stripping of all formwork for concrete work shown on the Drawings, per the Specifications, and as directed by the Departmental Representative, complete in every respect.

1.2 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 03 20 00 - Concrete Reinforcing.
- .4 Section 03 30 00 - Cast-In-Place Concrete.
- .5 Section 03 30 51 - Concrete Bridge Decks.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA International):
 - .1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
 - .3 CSA O121-M1978(R2003), Douglas Fir Plywood.
 - .4 CSA O151-04, Canadian Softwood Plywood.
 - .5 CSA O153-M1980(R2003), Poplar Plywood.
 - .6 CAN/CSA-O325.0-92(R2003), Construction Sheathing.
 - .7 CSA O437 Series-93(R2006), Standards for OSB and Waferboard.
 - .8 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
 - .9 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings for formwork and falsework:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Nova Scotia, Canada.
- .3 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement 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.

- .4 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
- .5 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Store and manage hazardous materials in accordance with jurisdictional requirements.

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 0121.
 - .2 Plywood and wood formwork materials to CSA-0121, CAN3-086.1S1, CSA 0153.
 - .3 Formwork shall be constructed from lumber devoid of warped defects in order to achieve face alignment free of distortion. This shall apply to all panel forms including prefabricated boards, plywood and steel panels.
- .2 Form ties:
 - .1 For concrete not designated 'Architectural', use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes not larger than 25 mm diameter in concrete surface.
 - .2 For Architectural concrete, use snap ties complete with plastic cones and light grey concrete plugs (applied before concrete sealers and coatings are applied).
- .3 Form liner:
 - .1 Plywood: to be determined by the Departmental Representative based on the condition of the forms.
- .4 Form release agent: 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. Form release agents must be compatible with waterproofing systems where applicable.
- .5 Falsework materials: to CSA-S269.1.

Part 3 Execution

3.1 FABRICATION AND ERECTION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

- .2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Assemble forms so that concrete is not damaged during its removal.
- .5 Fabricate and erect falsework in accordance with CSA S269.1.
- .6 Do not place shores and mud sills on frozen ground.
- .7 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .8 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.
- .9 Align form joints and make watertight:
 - .1 Keep form joints to minimum.
- .10 Use 19 mm chamfer strips on external corners and/or 19 mm fillets at interior corners, joints, unless specified otherwise.
- .11 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .12 Construct forms for architectural concrete, and place ties as indicated:
 - .1 Joint pattern not necessarily based on using standard size panels or maximum permissible spacing of ties.
- .13 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections:
 - .1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .14 Line forms for following surfaces:
 - .1 Outer face of bridge deck and curbs.
 - .2 Secure lining taut to formwork to prevent folds.
 - .3 Pull down lining over edges of formwork panels.
 - .4 Ensure lining is new and not reused material.
 - .5 Ensure lining is dry and free of oil when concrete is poured.
 - .6 Application of form release agents on formwork surface is prohibited where drainage lining is used.
 - .7 If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.
 - .8 Cost of textile lining is included in price of concrete for corresponding portion of Work.
- .15 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

- .1 Leave formwork in place for following minimum periods of time after placing concrete:
 - .1 7 days (168 hours) for all.
- .2 Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 Provide 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.
- .4 Space reshoring in each principal direction at not more than 3 meters apart.
- .5 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.
- .6 When formwork is removed during the curing period the exposed concrete will be cured as specified.

END OF SECTION

Part 1 General

1.1 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.2 REFERENCES

- .1 Nova Scotia Transportation and Infrastructure Renewal (NSTIR) Standard Specification for Highway Construction and Maintenance (current edition).
- .2 CAN/CSA S6-14, Canadian Highway Bridge Design Code.

1.3 SUMMARY

- .1 This section specifies requirements for supplying, removal of existing, and installing new laminated elastomeric bridge bearings for bridge structures.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 At least 4 weeks prior to beginning Work, provide Departmental Representative with samples of material if requested.
- .3 Provide Departmental Representative a minimum 4 weeks prior to starting installation 2 copies of the manufacturer's product information.
- .4 At least 4 weeks prior to beginning Work, provide Departmental Representative for approval with design notes and drawings sealed and signed by a Professional Engineer registered and licensed in the Province of Nova Scotia. Notes and drawings are to show:
 - .1 Method of placement of jacking frame arrangement:
 - .1 Material thickness, dimensions of material, size of frame.
 - .2 Location with regard to existing structure.
 - .3 Method of attaching to existing structure.
 - .4 Required and provided jack capacities.
 - .2 Required capacity and resistance of diaphragms or deck, if load transferred through these components.
 - .3 Scheduling of events detail.
 - .4 Method of removing existing bearings.
 - .5 The maximum proposed lift of the bridge.
 - .6 The maximum differential lift of the bridge.

Part 2 Products

2.1 PERFORMANCE CRITERIA

- .1 Quality Control Plan: ensure bearing supplier meets performance criteria as established:
 - .1 Nova Scotia Transportation and Infrastructure Renewal (NSTIR) Standard Specification for Highway Construction and Maintenance (current edition).
 - .2 CAN/CSA S6-14, Canadian Highway Bridge Design Code.

2.2 MATERIALS

- .1 Free Bearings:
 - .1 Size: 250 mm x 400 mm x 80 mm thick.
 - .2 Elastomer:
 - .1 The elastomer used in the bearings shall be 100% virgin natural polyisoprene of nominal 55 ± 5 durometer hardness having properties conforming to the requirements of CAN/CSA S6.
 - .2 The elastomer compound used in the bearings shall conform to Grade 5 low temperature behaviour.
 - .3 The elastomers shall conform to the following:
 - .1 Virgin natural polyisoprene shall be only raw polymer permitted.
 - .2 The physical properties of the polyisoprene used shall conform to the following requirements:

Property	Test	Requirements
Hardness, Shore A	ASTM D2240	55 ± 5
Tensile Strength, MPa	ASTM D412	min. 17.0
Ultimate Elongation, %	ASTM D412	min. 400
Heat Resistance	ASTM D573	70h at 70°C
Change in hardness, Shore A		max. +10
Change in tensile strength, %		max. -25
Change in ultimate elongation, %		max. -25
Compression Set, %	ASTM D395 Method B	22h at 70°C max. 25
Ozone	ASTM D518 Mounting Procedure A 20% strain $40 \pm 2^\circ\text{C}$	25 pphm, 48 h no cracks
Bond between steel and Elastomer laminates, N. mm^{-1}	ASTM D429 Method B	min. 7.0
Brittleness at - 40°C	ASTM D746 Procedure B	no failure
Low temperature crystallization increase in	ASTM D2240	168 h at -25°C max. +15

Property	Test	Requirements
hardness, Shore A		

.3 Steel Laminations:

- .1 The steel laminations incorporated into the bearings shall be rolled mild steel sheets, with a minimum yield strength of 230 MPa and not less than 3 mm nor more than 5 mm in thickness.

- .4 The rubber/steel bearings must be moulded as complete units.

- .5 Vulcanizing or otherwise bonding rubber sheet to bearings cut from larger moldings shall not be accepted.

- .6 Bearing pressures, compressive deflections, rotation and shear deformations shall conform to the limits as specified in CAN/CSA S6.

- .7 The effective rubber thickness, denoted as T in CSA Standard S6-14, shall be the sum of the thicknesses of all laminates with a shape factor less than or equal to 12.

- .8 Bearings shall be stored at least 100 mm off the ground in a weatherproof enclosure.

Part 3 Execution

3.1 INSTALLATION

- .1 Refer to drawing S-4 "Rehabilitation Plan and Sections" in Contract Documents for suggested sequence for installation of bearings.

3.2 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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29.06 - Health and Safety Requirements.
- .3 Section 01 45 00 - Quality Control.
- .4 Section 33 42 13 – Pipe Culverts.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 American Concrete Institute (ACI)
 - .1 SP-66-04, ACI Detailing Manual 2004.
- .2 ASTM International
 - .1 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - .2 ASTM A143/A143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
 - .3 ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .4 ASTM A775/A775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
- .3 CSA International
 - .1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
 - .2 CAN/CSA-A23.3-04(R2010), Design of Concrete Structures.
 - .3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.
 - .4 CSA-G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .6 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

- .4 Reinforcing Steel Institute of Canada (RSIC)
 - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.4 SUMMARY

- .1 The Work in this section includes the supply of all labour, supervision, materials, plant, equipment, and transportation necessary for the placement of steel reinforcement in concrete as shown on the Drawings, per the Specifications, and as directed by the Departmental Representative, complete in every respect.

1.5 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with SP-66.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Nova Scotia of Canada.
 - .1 Indicate placing of reinforcement and:
 - .1 Bar bending details.
 - .2 Lists.
 - .3 Quantities of reinforcement.
 - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
 - .5 Indicate sizes, spacings and locations of chairs, spacers and hangers.
 - .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.
 - .4 When Chromate solution is used as replacement for galvanizing non-prestressed reinforcement, provide product description for review by Departmental Representative prior to its use.

1.6 QUALITY ASSURANCE

- .1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.
 - .1 Mill Test Report: upon request, provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.
 - .2 Upon request, submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations.
 - .2 Replace defective or damaged materials with new.

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 CSA-G30.18, unless indicated otherwise.
- .3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.
- .4 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.
- .5 Deformed steel wire for concrete reinforcement: to ASTM A82/A82M.
- .6 Welded steel wire fabric: to ASTM A185/A185M.
 - .1 Provide in flat sheets only.
- .7 Welded deformed steel wire fabric: to [ASTM A82/A82M].
 - .1 Provide in flat sheets only.
- .8 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .9 Mechanical splices: subject to approval of Departmental Representative.

2.2 FABRICATION

- .1 Fabricate reinforcing steel in accordance with Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada, SP-66 and CSA-A23.1/A23.2.
 - .1 SP-66 unless indicated otherwise.
- .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

- .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 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 4 weeks prior to beginning reinforcing work.
- .2 Upon request inform Departmental Representative of proposed source of material to be supplied.

Part 3 Execution

3.1 FIELD BENDING

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1/A23.2.
- .2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.

3.3 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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29.06 - Health and Safety Requirements.
- .3 Section 01 45 00 - Quality Control.
- .4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .5 Section 02 41 16 - Structure Demolition.
- .6 Section 03 10 00 - Concrete Forming and Accessories.
- .7 Section 03 20 00 - Concrete Reinforcing.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 Abbreviations and acronyms:
 - .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement:
 - .1 Type GU, GUb and GUL - General use cement.
 - .2 Type MS and MSb - Moderate sulphate-resistant cement.
 - .3 Type MH, MHb and MHL - Moderate heat of hydration cement.
 - .4 Type HE, HEb and HEL - High early-strength cement.
 - .5 Type LH, LHb and LHL - Low heat of hydration cement.
 - .6 Type HS and HSb - High sulphate-resistant cement.
 - .2 Fly ash:
 - .1 Type F - with CaO content less than 15%.
 - .2 Type CI - with CaO content ranging from 15 to 20%.
 - .3 Type CH - with CaO greater than 20%.
 - .3 GGBFS - Ground, granulated blast-furnace slag.
- .2 Reference Standards:
 - .1 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) - Standard Specification – (Latest Edition) - Division 5 – Section 7 – Cast In Place Concrete
 - .2 ASTM International:
 - .1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.

- .2 ASTM C309-07, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- .3 ASTM C494/C494M-10a, Standard Specification for Chemical Admixtures for Concrete.
- .4 ASTM C1017/C1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- .5 ASTM A153/A153M-09 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- .6 ASTM A563-07a, Standard Specification for Carbon and Alloy Steel Nuts.
- .7 ASTM F436-11, Standard Specification for Hardened Steel Washers.
- .8 ASTM F1554-07a, Standard Specification for Anchor Bolts, Steel, 36, 55 and 105 ksi Yield Strength.
- .3 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral Colloid-Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
 - .2 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .4 CSA International:
 - .1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA A283-06, Qualification Code for Concrete Testing Laboratories.
 - .3 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.4 SUMMARY

- .1 The Work in this section includes the supply of all labour, supervision, materials, plant, equipment, and transportation necessary for the placing and finishing of all reinforced concrete work as shown on the Contract Drawings, per the Specifications, and as directed by the Departmental Representative, complete in every respect.

1.5 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide testing results 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.
- .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.

1.6 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Site Meetings: one week prior to beginning concrete works:
 - .1 Ensure key personnel such as site supervisor, Departmental Representative, specialty contractor - finishing, forming, concrete producer, testing laboratories attend.
 - .2 Verify project requirements.
- .3 Submit to Departmental Representative, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete:
 - .1 When plant does not hold valid certification, provide test data and certification by qualified independent inspection and testing laboratory that materials used in concrete mixture will meet specified requirements.
- .4 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.
- .5 Quality Control Plan: provide written report, as described in PART 3 - VERIFICATION to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.
- .6 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching:
 - .1 Modifications to maximum time limit must be agreed to Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
 - .2 Deviations to be submitted for review by Departmental Representative.
- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.
- .3 Waste Management and Disposal:

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21.
- .2 Divert unused concrete materials from landfill to local facility approved by Departmental Representative.
- .3 Provide an appropriate area on the job site where concrete trucks can be safely washed.
- .4 Divert unused admixtures and additive materials from landfill to official hazardous material collections site as approved by the Departmental Representative.
- .5 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
- .6 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable jurisdictional regulations.

Part 2 Products

2.1 DESIGN CRITERIA

- .1 CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 PERFORMANCE CRITERIA

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.3 MATERIALS

- .1 Portland Cement: to CSA A3001.
- .2 Cementing material to be a blended Portland cement, fly ash, silica fume cement, Type GUb F/SF. The minimum proportion by mass of the total cementing materials for silica fume shall be 6% and a maximum of 8%. The maximum proportion by mass of the total cementing material for fly ash is 25%.
- .3 Supplementary cementing materials: to CAN/CSA-A3000.
- .4 Water: to CSA-A23.1 and to be free from injurious amounts of oil, acid, alkali soluble chloride, organic matter, sedimentation and other deleterious substances.
- .5 Admixtures:
 - .1 Air entraining admixture: to ASTM C260.
 - .2 Chemical admixture: to CSA A23.1/A12.2. The Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

- .3 Corrosion-inhibiting admixture: to CSA A23.1/A23.2.
- .4 Lithium-based admixture: to CSA A23.1/A23.2.
- .5 Shrinkage-reducing admixture (SRA): to CSA A23.1/A23.2.
- .6 Viscosity-modifying agent (VMA): to CSA A23.1/A23.2.
- .6 Aggregates: to CAN/CSA-A23.1/A23.2. The maximum Petrographic Number of course aggregate shall not exceed 140. The maximum absorption of course aggregate shall not exceed 2%:
 - .1 Coarse aggregate shall consist of a minimum of 60% crushed particles. Aggregates shall have 1.00% by mass maximum passing the 75 µm sieve.
 - .2 Coarse aggregate for overlays that form the bridge deck riding surface shall be composed of at least 80% siliceous igneous and metamorphic rocks and minerals.
- .7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2:
 - .1 Compressive strength: 45 MPa at 28 days.
 - .2 Consistency:
 - .1 Fluid: to ASTM C827. Time of efflux through flow cone (ASTM C939), under 30 seconds.
 - .2 Flowable: to ASTM C827. Flow tables, 5 drops in 35 (ASTM C109, applicable portion) as to 145%.
 - .3 Plastic: to ASTM C827. Flow table, 5 drops in 35 (ASTM C109, applicable portions) 100 to 125%.
- .8 Curing compound: to ASTM C309, Type 2.
- .9 Dampproofing:
 - .1 Emulsified asphalt, mineral colloid type, unfilled: to CAN/CGSB-37.2.
- .10 Polyethylene film under approved slabs: 2 sheets each 6 mils thick, to CAN/CGSB-51.34.
- .11 Bonding agent under bearing plinths: modified latex bonding agent.
- .12 Waterstop: preformed rectangle 25 mm x 8 mm hydrophilic waterstop for joints with up to 670% expansion in water, 1000 psi tensile strength, 600% elongation, and >100 ft. head pressure.

2.4 MIXES

- .1 Performance Method for specifying concrete: to meet Departmental Representative performance criteria in accordance with to CAN/CSA A23.1/A23.2:
 - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.
 - .2 Proportion normal density concrete in accordance with CAN/CSA-A23.1, to give the properties for concrete in bridge deck, curbs, crash blocks, approach slabs and bearing blocks. Concrete shall be proportioned using Portland cement, Type SF silica fume, Type F fly ash, fine and coarse aggregates, air entraining, water

reducing, and/or set regarding admixtures. Concrete mixtures shall be designed to meet the following:

- .1 Minimum compressive strength at 28 days: 45 MPa.
- .2 Class of exposure: C1.
- .3 Chemical admixtures: type as approved and in accordance with ASTM C494.
- .4 Normal size of aggregate: 20mm.
- .5 Maximum water to cement ratio: 0.35.
- .6 Minimum cementitious content: 420 kg/m³.
- .7 Air content: $6 \pm 1\%$.
- .8 Maximum slump before superplasticization: 60mm.
- .9 Slump after superplasticization: 180 ± 30 mm.
- .10 Maximum spacing factor of hardened concrete not to exceed 300mm.
- .11 Average spacing factor of hardened concrete not to exceed 250 mm.
- .12 Rapid concrete permeability @ 56 days: <1000 coulombs.
- .13 Maximum concrete temperature (from delivery equipment):
 - .1 Thickness >2 metres: 18°C.
 - .2 Thickness <2 metres: 25°C.
- .14 Maximum concrete temperature (in situ): 70°C.
- .15 Maximum temperature gradient: 20°C/metre.
- .16 Superplasticizer shall be used in all concrete.
- .17 The mix shall contain shrinkage compensating additives such that there will be no separation of the patched area from the existing concrete. This shrinkage-compensating additive shall be utilized so as to produce expansion in the concrete of no more than 3 percent.

Part 3 Execution

3.1 PREPARATION

- .1 All new and existing concrete surfaces against which new concrete is to be placed shall be abrasive blast cleaned in accordance with Section 02 41 16 - Structure Demolition.
- .2 Obtain Departmental Representative's written approval before placing concrete:
 - .1 Provide 24 hours minimum notice prior to placing of concrete.
- .3 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .4 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

- .5 Pumping of concrete is permitted only after review of equipment and mix by Departmental Representative.
- .6 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .7 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.
- .8 Protect previous Work from staining.
- .9 Clean and remove stains prior to application of concrete finishes.
- .10 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .11 Remove all debris including sawdust, chips and any other deleterious materials from the interior of the forms.
- .12 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 INSTALLATION/APPLICATION

- .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
- .2 Sleeves and inserts:
 - .1 Do not permit penetrations, sleeves, ducts, pipes or other openings to pass through joists, beams, column capitals or columns, 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 Anchor bolts:
 - .1 Set anchor bolts to templates in under supervision of appropriate trade prior to placing concrete.
 - .2 With approval of Departmental Representative, grout anchor bolts in preformed holes as indicated on the drawings.
 - .3 Protect anchor bolt holes from water accumulations, snow and ice build-ups.
 - .4 Set bolts and fill holes with shrinkage compensating grout.
 - .5 Locate anchor bolts used in connection with expansion shoes, rollers and rockers with due regard to ambient temperature at time of erection.
- .4 Drainage holes and weep holes:

- .1 Form weep holes and drainage holes in accordance with Section 03 10 00 – Concrete Forming and Accessories.
- .2 Install weep hole tubes and drains as indicated.
- .5 Placing of concrete:
 - .1 Consolidation:
 - .1 All methods of consolidation shall be subject to the approval of the Departmental Representative.
 - .2 Concrete shall be consolidated thoroughly and uniformly by means of hand tamping vibrators or finishing machines to obtain a dense, homogeneous structure, free from cold joints, voids and honeycomb.
 - .3 A sufficient number of vibrators shall be employed to adequately handle the anticipated rate of placement. The size and frequency of vibrators shall be as specified in CSA A23.1. A stand-by vibrator shall be available on the site at all times.
 - .4 Internal vibrators shall be used wherever practicable. External type vibrators may be used where surfaces cannot be properly consolidated with the internal type alone.
 - .5 Insertion of internal vibrators shall be made systematically at intervals such that the zones of influence of the vibrator overlap.
 - .6 Extreme care shall be taken to ensure that the internal type vibrators do not displace the reinforcing steel or the forms. Vibrators shall have rubber or non-metallic vibrating heads if epoxy coated reinforcing steel is used.
 - .2 Curing concrete:
 - .1 Concrete shall be protected from freezing, premature drying, high temperature and moisture loss for a period of time necessary to develop the desired properties of the concrete.
 - .2 Curing shall be applied to concrete as soon as possible without damaging or marring the surface.
 - .3 The curing time shall be as indicated in CSA A23.1 or this specification. Curing shall be achieved by one or more of the following:
 - .1 Burlap. Two layers of pre-soaked burlap shall be carefully laid on the surface as soon as the concrete has set sufficiently to support the mass of the burlap without marking the surface. Strips shall be overlapped 150 mm, secured to the surface and kept wet throughout the curing period.
 - .2 Moisture Vapour Barrier. The Contractor shall provide an effective vapour barrier and prevent any flow of air between it and the concrete surface. Where polyethylene sheet is used, it shall be white opaque pigmented with a minimum thickness of 100 µm. The vapour barrier shall be secured to the surface and overlapped 150 mm.

- .3 White Pigment Liquid Membrane. Curing compounds shall not be used on a surface where a bond is required for additional concrete. A curing compound may be approved by the Department Representative under certain circumstances where the application of moisture is impracticable and where such compounds will not jeopardize the appearance of the concrete. Curing compounds shall be applied at the Manufacturer's recommended application rate. Curing compounds are not permitted on construction joints, surfaces requiring weatherproofing sealants or deck sections.
- .4 Water. All cast-in-place concrete bridge decks shall be cured with water unless otherwise directed by the Departmental Representative. Concrete exposed surfaces shall be kept continuously moist for a minimum of seven consecutive days after placing. The water for curing shall be clean and free from any material which could cause staining or discoloration of the concrete. All freshly placed and consolidated concrete shall be suitably protected from the elements.
- .3 Hot Weather Concreting: When the air temperature is at or above 27°C, or is likely to rise above 27°C within 24 hours, special measures, as detailed in CSA A23.1 shall be taken by the Contractor to protect the concrete from the effects of hot and/or drying weather conditions. The temperature of the formwork, reinforcing steel or the material on which the concrete is to be placed, shall not exceed 27°C. Concrete temperatures shall not exceed those specified in CSA A23.1, Table 16.
- .4 Cold weather concreting:
 - .1 When the mean air temperature is at or below 5°C or when the temperature is likely to fall below 5°C within 24 hours, the Contractor shall place, cure and protect concrete in accordance with CSA A23.1 and this specification.
 - .2 Concrete shall not be placed on or against any surface which is at a temperature less than 5°C. Snow and ice shall be removed before concrete is deposited on any surface.
 - .3 Calcium chloride or other de-icing chemicals shall not be used as a deicing agent in the forms.
 - .4 If heating of the mix water and/or aggregates is used, the charging cycle shall be altered to prevent flash setting of the concrete.
 - .5 Aggregates and water shall not be heated above 80°C. Water and/or aggregates heated to a temperature in excess of 40°C, shall be batched in the mixer first to reduce the temperature of the combination below 40°C, prior to the addition of the cementing materials.
 - .6 All frozen lumps of aggregate shall be excluded from the mix.
- .5 Protection classes:
 - .1 Protection and curing depends upon the outside temperature, the wind velocity, and the size of the concrete section.

- .2 Under normal circumstances the following methods of protection may be required to maintain the protection necessary for the conditions described.
- .3 Heating of the mixing water and/or aggregates shall be required for all classes of protection.
- .4 When the outside temperature during placing or during the protection period may fall below 5°C, adequate covering of all surfaces with tarpaulins or polyethylene sheets shall be provided.
- .5 When the outside temperature during placing or during the protection period may fall below 0°C, all surfaces shall be covered with an approved insulating material, over which tarpaulins or polyethylene sheets are placed.
- .6 When the outside temperature during placing or during the protection period may fall below -5°C, a complete housing of the concrete, together with supplementary heat, shall be provided. The Contractor shall ensure that heat is supplied uniformly around the concrete.
- .7 For mass concrete, defined as minimum section dimension in excess of 2 m, the temperature gradient shall not exceed 20°C/m from the interior of the element to the exterior face.
- .8 In thin sections, less than 2 m, the temperature differential from the interior to the exterior shall not exceed 20°C.
- .9 Steam or hot air blowers may be used, but a means of maintaining relative humidity of not less than 95% shall be provided. The use of salamanders, coke stoves, oil/gas burners and spot heaters availing of open flame shall be prohibited.
- .10 When dry heat is used, hot air shall not be permitted to flow directly onto the concrete surface. Exhaust fumes shall be vented.
- .11 The protection and curing shall continue to maintain the temperature of the concrete at not less than 10°C for five days after placing. The concrete shall be kept above 0°C for a total period of fourteen days.
- .12 At the end of the curing and protection period, protection and heating shall be withdrawn in such a manner as not to induce thermal shock stresses in the concrete.
- .13 The temperature of the concrete shall be gradually reduced to avoid cracking due to sudden temperature changes near the end of the curing period. The protection shall not be completely removed until the concrete has cooled to the temperature differential stated in Table 18 of CSA A23.1.

- .6 Finishing and curing:
 - .1 Basic treatment:
 - .1 Upon removal of the forms, all cavities, honeycomb, and other deficiencies shall be patched with a sand cement mortar of the same composition as that used in the concrete.
 - .2 Mortar shall be composed of cement, fine aggregate and water, proportioned and mixed as specified.
 - .3 When the proportioning of cement and fine aggregate is not specified, the mortar shall consist of one (1) part by volume of cement and two (2) parts of fine aggregate.
 - .4 The quantity of water used in mixing the mortar shall be sufficient to make it capable of being freely spread with the trowel.
 - .5 Mortar shall be mixed in quantities which can be utilized within 60 minutes.
 - .6 Mortar shall not be re-tempered or re-mixed with water after initial set.
 - .7 All bolts, ties, nails, or other metal not specifically required for construction purposes, shall be removed or cut back to a depth of 25 mm from the surface of the concrete unless otherwise directed by the Departmental Representative.
 - .8 The cavity shall be kept saturated for 60 minutes prior to the application of a latex bonding agent or neat cement paste.
 - .9 The mortar shall be pressed or packed into the depressions so as to completely fill the cavity and then finished to match the adjacent surface.
 - .10 Fins, unsightly ridges, or other imperfections shall be chipped or rubbed off flush with the surface.
 - .11 Mortar patches in excess of 25 mm shall be applied in layers not exceeding 25 mm with a 30 minute interval between the placing of layers.
 - .12 The surface of the patch shall be textured equivalent to the adjacent concrete.
 - .13 Honeycomb areas or cavities over 25 mm in diameter shall not be repaired until inspected by the Departmental Representative.
 - .14 Where honeycombing has occurred in non-structural elements, the affected area shall be removed and filled with mortar as previously described.
 - .15 Where honeycombing has occurred in structural elements, the corrective method of treatment shall be carried out as directed by the Departmental Representative.
 - .16 All concrete and mortar shall be cured and protected in accordance with CSA A23.1.
 - .2 Smooth form finish:
 - .1 A Smooth Form Finish shall be a uniform, high quality concrete which has been homogeneously placed and thoroughly compacted.

- .2 A Smooth Form Finish shall be uniform in colour, pattern and texture.
- .3 All exposed bridge components and curbs, sidewalks shall have a Smooth Form Finish. Top of wide curb on bridge structures to have a transverse light broom finish to produce a textured, non-slip surface with a smooth edge at each side of each joint. The width of the smooth edge shall match that of the CIP sidewalks on the approach and the joint shall be pro-fitted with a 6mm radius using a concrete edger.
- .4 If the concrete, after form stripping and the basic treatment, does not exhibit such finish, the Contractor shall perform any or all of the following operations, in order to obtain a Smooth Form Finish:
 - .1 Cut out all corrodible metal within 25 mm of the surface and repair the cavities as indicated in basic treatment.
 - .2 Remove fins and other projections to leave a smooth, plane surface.
 - .3 Remove stains, rust marks or other blemishes which detract from the specified uniformity of appearance.
- .3 Open surfaces:
 - .1 The finished surface of concrete placed for such items as bridge decks, approach slabs, and curbs shall conform to the lines, grades and elevations shown on the contract drawings.
 - .2 Joints shall be rounded using a 6 mm radius edging tool.
 - .3 The finished surface shall not vary more than 3 mm under a 3 m straight edge and shall be lightly broomed transversely to produce a textured, non-slip surface.
- .7 Dampproof membrane:
 - .1 All dampproofing material shall conform to CAN/CGSB-37.2-M88.
- .8 Concrete sealer and coatings:
 - .1 Apply concrete sealers/coatings as described in Section 07 92 00 – Concrete Joint Sealer.
- .9 Placing and finishing concrete bridge deck:
 - .1 Immediately prior to placement of deck concrete, the existing concrete surfaces and any formwork shall be cleaned and thoroughly moistened. The Contractor shall also moisten the reinforcing steel with water at the request of the Departmental Representative.
 - .2 The concrete shall be textured by means of a burlap drag, broom or approved alternative.
 - .3 There shall be no application of water or cement to the concrete surface for finishing purposes.
 - .4 Deck concrete shall be water cured as indicated in Item 03.30.3.2.5.3 of this specification. During freezing temperatures, water curing shall be terminated 12 hours prior to the end of the protection period.

3.3 SURFACE TOLERANCE

- .1 Concrete tolerance to CSA A23.1.

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 - SUBMITTALS:
 - .1 Concrete pours.
 - .2 Slump tests.
 - .3 Air content.
 - .4 Compressive strength at 7 and 28 days.
- .2 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Departmental Representative in accordance with CSA-A23.1/A23.2. Testing of concrete shall be paid by Departmental Representative:
 - .1 Ensure testing laboratory is certified to CSA A283.
- .3 Ensure test results are distributed to all parties.
- .4 Departmental Representative will take additional test cylinders as required. Cure cylinders on job site under same conditions as concrete which they represent.
- .5 Non-Destructive Methods for Testing Concrete: in accordance with to CSA A23.1/A23.2.
- .6 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

3.5 VERIFICATION

- .1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in PART 2 - Products and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 02 41 16 - Structure Demolition.
- .4 Section 03 20 00 - Concrete Reinforcing.
- .5 Section 03 30 00 - Cast-In-Place Concrete.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA International):
 - .1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Divert unused plasticizers, water-reducing agents and air-entraining agent's materials from landfill to official hazardous material collections site as reviewed by the Departmental Representative.
- .4 Unused plasticizers, water-reducing agents and air-entraining agent's materials must not be disposed of 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 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-In-Place Concrete.
- .2 Reinforcing steel: in accordance with Section 03 20 00 - Concrete Reinforcing.

Part 3 Execution

3.1 CONSTRUCTION

- .1 Do concrete Work in accordance with Section 02 41 16 - Structure Demolition and Section 03 30 00 - Cast-In-Place Concrete.
- .2 Place concrete at temperatures limits to CSA-A23.1/A23.2.
- .3 The Departmental Representative shall be notified of the intent to place the concrete at least 10 Business Days prior to the commencement of the placement. The work shall not proceed until the surface preparation has been inspected by the Departmental Representative.
- .4 Only the finishing machine and buggies used to place concrete shall be allowed on the abrasive blast cleaned portion of the deck.
- .5 Areas of reinforcing steel, existing concrete and/or formwork shall be protected at all times during placing operations from the dropping of the bonding agent or concrete from placing equipment or other sources, except at the intended point of discharge. Any such material shall be immediately removed.
- .6 Equipment transporting concrete and runways used by equipment transporting concrete shall not be supported by deck reinforcing steel.
- .7 Placement of concrete shall not begin until the trial run procedure as specified is complete and permission to place concrete has been given in writing by the Departmental Representative. In the case of unexpected interruptions during placing operations, a construction joint shall be formed by either chopping or sawcutting at the direction of the Departmental Representative and all new concrete shall be covered with polyethylene film. Portions of the concrete with incomplete or unsatisfactory consolidation or finishing shall be removed.
- .8 Concrete shall not be placed when the air or deck temperature is below 10 °C or likely to fall below 10 °C or is above 30 °C or likely to rise above 30 °C during the duration of the placing operations.
- .9 Longitudinal construction joints shall be permitted only where specified in the Contract Documents.
- .10 Concrete shall not be placed adjacent to longitudinal joints in concrete overlay less than 36 hours old. At temperatures less than 10 °C, the Departmental Representative may extend this time requirement.
- .11 Neither construction traffic nor highway traffic shall be permitted on the finished surface of the overlay concrete until the curing period has elapsed.
- .12 When air temperature falls below 5 degrees C, comply with cold weather requirements.
- .13 Maintain temperature of concrete during discharge between 10 degrees C and 18 degrees C unless permitted otherwise by Departmental Representative:
 - .1 Maintain temperature of mix below maximum temperature of 18 degrees C by adding ice to mix which does not alter design water-cement ratio.

- .14 Immediately prior to wetting the deck surface, all dust and loose material shall be removed from the prepared surface of the existing deck concrete by compressed air.
- .15 Immediately prior to placing concrete, thoroughly wet down substrates with clean water:
 - .1 The deck surface shall be maintained in a wet condition for a period of one hour prior to the application of the bonding agent. Excess water shall be removed from the surface using compressed air, immediately prior to application of the bonding agent.
- .16 A thin coating of cement-sand bonding agent shall be brushed into the prepared surface. All vertical and horizontal surfaces against which concrete will be placed shall receive a thorough even coating with no excess of bonding agent in any areas. Excess fine aggregate separated from the bonding agent mixture after application shall be removed from the deck surface. The rate of application of the bonding agent shall be such that the brushed material does not become dry prior to being covered with overlay. Bonding agent not used within 30 minutes after mixing shall not be used.
- .17 The concrete shall be placed on the deck and struck off slightly above final grade using concrete rakes.
- .18 Ensure that rate of placing is sufficient to complete proposed placing, finishing and curing operations within scheduled time.
- .19 Ensure that experienced finishing machine operators and concrete finishers are provided to finish deck.
- .20 Buggies used for transporting and placing the concrete may be hand operated or motorized. Motorized concrete buggies shall not be greater than 0.5 cubic metres capacity.
 - .1 Limit rate of placing to that which can be finished before beginning of initial set.
- .21 Immediately after concrete has been placed and consolidated, strike off surface:
 - .1 Correct immediately improper adjustment and operation which results in unsatisfactory consolidation and smoothness.
 - .2 Unsatisfactory performance may be cause for rejection of equipment and removal of concrete in place.
- .22 Finishing bridge deck slab: when concrete has hardened sufficiently to prevent dislodgement of coarse aggregate particles, give surface uniform broom finish free from porous spots, irregularities, depressions, small pockets or rough spots.

3.2 PROTECTION

- .1 Protection and curing for concrete placed between October 1 and May 1 comply with following requirements in addition to cold weather requirements of CSA-A23.1/A23.2:
 - .1 Protect concrete with windproof shelter of canvas or other material to allow free circulation of inside air around fresh concrete.
 - .2 Do not let walls of shelter touch formwork.
 - .3 Provide sufficient space for removal of formwork for finishing.

- .4 Use heating equipment approved by Departmental Representative.
- .5 Vent products of combustion outside protective shelter: equipment to be capable of keeping inside air at constant temperature sufficiently high to maintain concrete at following curing temperatures:
 - .1 For initial 3 days: minimum temperature of 15 degrees C, maximum of 27 degrees C at concrete surfaces.
 - .2 For concrete abutments, solid piers, footings: cure at 10 degrees C for additional 4 days.
 - .3 For superstructure: maintain concrete at 10 degrees C for additional 14 days.
- .6 Keep concrete surfaces continually moist while protected.
- .7 Provide fogging equipment to allow for mist spray curing before start of bridge deck pour.
- .2 Unformed surfaces: cure with burlap and water:
 - .1 Place two layers of damp burlap, presoaked by immersion in water for a period of 24 hours immediately prior to placement shall be place on surface of concrete overlay within 2 to 4 m from the finishing operation.
 - .2 Overlap each strip by minimum 150 mm and secure against displacement by wind.
 - .3 Maintain burlap in place and keep thoroughly wet for seven days after placement.
- .3 Formed surfaces:
 - .1 No additional curing will be required if formwork is left in place for seven days or more.
 - .2 If formwork removed in less than seven days, cure in manner specified for unformed surfaces for remainder of seven day period.
- .4 During curing period, only uncover areas needed for finish treatment. Re-cover and continue curing.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .3 Section 02 41 16 - Structure Demolition.
- .4 Section 03 20 00 - Concrete Reinforcing.
- .5 Section 03 30 00 - Cast-In-Place Concrete.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 ASTM International:
 - .1 ANSI/ACI 117-81, Tolerances for Concrete Construction and Materials.
 - .2 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .3 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .4 ASTM C494/C494M-13, Standard Specification for Chemical Admixtures for Concrete.
 - .5 ASTM C1017/C1017M-13, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .6 ASTM D1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - .7 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .8 CAN3-A266.1-M78, Air-Entraining Admixtures for Concrete.
 - .9 CAN3-A266.4-M78, Guidelines for the use of Admixtures in Concrete.
 - .10 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .11 ASTM C920 Specifications for Elastomeric Joint Sealants.
 - .12 ASTM C 1299 Guide for use in Selection of Liquid-Applied Sealants.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 At least 4 weeks prior to beginning Work, provide Departmental Representative with:

- .1 Samples of materials if requested.
- .2 Provide two copies of WHMIS MSDS for all materials.
- .3 Provide two copies of manufacturer's performance specification and application instructions for each repair type.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic in designated containers.

Part 2 Products

2.1 MATERIALS

- .1 High Strength Patching Mortar:
 - .1 The high strength mortar patching compound shall be a one component, add water only, hydraulic cement based, polymer modified, and silica-fume enhanced, fibre-reinforced mortar suitable for form and pour applications:
 - .1 Minimum Physical Requirements.
 - .2 Compressive Strength @ 3 Days 24 MPa.
@ 7 Days 28 MPa.
@ 28 Days 34 MPa.
 - .3 Modulus of Rupture 7.5 MPa.
 - .4 Bond Strength with Concrete >1.4 MPa.
 - .5 Rapid Chloride Permeability < 980 Coulombs.
 - .6 Salt Scaling 0.08 g/cm².
 - .7 Freeze/Thaw Durability < 1% weight loss.
 - .2 Acceptable Products:
 - .1 MasterEmaco S 488CI by BASF.
 - .2 Planitop X by Mapei.
 - .3 Sikatop 123 Plus (with Sika Fibres) by Sika.
 - .4 Approved equivalent.
- .2 Reinforcing Rustproofing/Bonding Agent:
 - .1 The reinforcing rustproofing compound shall be a two component (dry component A, liquid component B), corrosion inhibiting compound suitable for both anodic and cathodic corrosion sites.
 - .2 The following are the minimum physical properties which shall be the standards for selecting a reinforcing rustproofing compound:
 - .1 Compressive Strength 30 MPa.
 - .2 Adhesion to Steel 3.5 MPa.

- .3 Freeze/Thaw Resistance 0% loss.
- .4 Resistance to Chloride Penetration 430-520 Coulombs.
- .3 Acceptable products:
 - .1 MasterEmaco P 124 by BASF.
 - .2 Corr-Bond by Euclid.
 - .3 Sikatop Armetec 110.
 - .4 Approved equivalent.

Part 3 Execution

3.1 PREPARATION

- .1 Obtain Departmental Representative's approval before Patching Mortar and applying sealant.
- .2 Provide 24 hours minimum notice prior to placing of concrete and sealant.

3.2 GENERAL

- .1 Remove all deteriorated concrete as indicated in the details on the drawings. Sandblast, dirt and other bond inhibiting materials to achieve sound concrete with exposed aggregate. Straight lines with a vertical edge of minimum 10 mm must be provided around the perimeter of the patch by saw cutting.
- .2 Remove deteriorated concrete as indicated on the Contract Drawings. Remove concrete to a minimum depth of 50mm or 100mm behind exposed reinforcing bars. Remove loose rust from the surface of the reinforcing bars using a wire brush or other mechanical means.
- .3 If there is rust evident on the rebar at the junction where it meets the existing concrete, with the approval of the Department Representative, remove an additional 100 mm of concrete along the rebar.
- .4 Do not apply patching compounds when the ambient temperature is expected to go below 4°C within the next 24-hour period or when rain is imminent. Use hot weather concreting precautions when applying in temperatures exceeding 25°C or under sunny or windy conditions.
- .5 Mix the high strength patching compound as per the Manufacturer's written instructions. Do not over mix.
- .6 Thoroughly saturate the surface to be patched with clean potable water to obtain a saturated surface dry substrate. Apply two coats of reinforcing rustproofing/bonding agent prior to placing high strength patching materials. Install formwork as detailed. Pour mortar into formwork before bonding agent dries. Fully vibrate formwork to ensure the mortar fills all voids.
- .7 Wet cure for 24 hours and then air dry cure. Protect against rapid surface evaporation under hot, sunny and windy conditions by using a surface evaporation retarder or wetting

the surface prior to the final set. Curing compounds may be used as per the Manufacturer's written instructions.

3.3 PLACEMENT OF MORTAR

- .1 Placement of products are to follow manufacturer's written instructions.

3.4 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse or recycling.
- .3 Dispose of waste in accordance with applicable local, provincial and federal regulations.

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 This section details the requirements for the fabrication and erection of metal railings for structures, including posts, anchors, fasteners and ancillaries.

1.2 RELATED REQUIREMENTS

- .1 Section 01 31 19 - Project Meetings.
- .2 Section 01 33 00 - Submittal Procedures.
- .3 Section 01 35 29.06 - Health and Safety Requirements.
- .4 Section 01 35 43 - Environmental Procedures.
- .5 Section 01 74 11 - Cleaning.
- .6 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7 Section 03 30 51 – Concrete for Bridge Decks.
- .8 Section 05 50 00 – Metal Fabrications.

1.3 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.4 REFERENCES

- .1 American Association for State Highway and Transportation Officials (AASHTO):
 - .1 AASHTO Standard Specifications for Highway Bridges-17th Edition 2002.
- .2 ASTM International:
 - .1 ASTM F3125M-15a, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength Metric.
- .3 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 CSA S16-14, Design of Steel Structures.
 - .5 CSA S269.1-16(R2003), Falsework for Construction Purposes.
 - .6 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
 - .7 CSA W59-18, Welded Steel Construction, (Metal Arc Welding).
 - .8 CSA W47.1 for Steel Railings.

- .4 Standards Council of Canada
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

1.5 SUBMISSIONS AND DESIGN REQUIREMENTS

- .1 One month prior to the start of fabrication, submit to the Departmental Representative the following information in respect to the Fabricator:
 - .1 Verification of CSA W47.1 certification.
 - .2 Proposed welding procedures to be stamped and approved by Canadian Welding Bureau.
 - .3 General outline of schedule for fabrication.
 - .4 Material test reports for all materials.
 - .5 Valid Canadian Welding Bureau certification for each welder and welding operator for the positions and processes intended.
 - .6 Submit manufacturer's instructions, printed product literature and data sheets for structural steel and include product characteristics, performance criteria, physical size, finish and limitations.
 - .7 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.
 - .8 Submit description of methods, temporary bracing and strengthening, sequence of erection and type of equipment proposed for use in erecting structural steel.
- .2 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .3 Shop drawing review by the Departmental Representative is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that the Departmental Representative approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Fabricator submitting the shop drawings, and such review shall not relieve the Fabricator of the responsibility for meeting all requirements of the Contract Documents. The Contractor shall be responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or construction and for the installation of work.
- .4 Each drawing submitted to bear signature and stamp of qualified professional engineer registered or licensed in Province of Nova Scotia, Canada.
- .5 Indicate shop and erection details including shop splices, cuts, copes, connections, holes, bearing plates, threaded fasteners and welds. Indicate welds by CSA W59 welding symbols.
- .6 The Contractor shall submit four complete sets of shop drawings showing full details and erection/assembly of all components of the railings to the Departmental Representative for approval at least two weeks prior to commencing fabrication.

1.6 QUALITY CONTROL

- .1 Visual Inspection: Contractor shall be responsible for visual inspection of all welds regardless of any additional inspection required in the Contract Documents. Such inspection shall be carried out by the Contractor's inspection personnel.

- .1 Inspection shall be completed by a certified welding inspector certified in accordance with CSA W178.2 or in conformance with requirements of AWS QC1.
- .2 An inspection report shall be submitted to the Departmental Representative for records.
- .2 Testing: completion of non-destructive (ultrasonic examination) testing for all areas as shown on the Contract Drawings.
 - .1 Non-destructive (ultrasonic examination) will be completed by the Departmental Representative. The Contractor shall provide in writing, 5 days notice of when the components are ready for testing.
 - .2 Test Reports: submit at the request of the Departmental Representative; certified test reports showing compliance with specified performance characteristics and physical properties.
- .3 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Provide protective blocking for lifting, transportation and storing:
 - .1 Exercise care during fabrication, transportation and erection so as not to damage members.
 - .2 Do not notch edges of members.
 - .3 Do not cause excessive stresses.
- .3 Mark mass on members weighing more than 3 tonnes.
- .4 Ensure that no portion of steel comes into contact with ground.
- .5 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address:
 - .1 Provide Departmental Representative with delivery schedules minimum 7 days prior to shipping.

Part 2 Products

2.1 METAL TRAFFIC BARRIER

- .1 Materials shall be according to the barrier specified on the Contract Documents. Modification of the barrier material shall not be made without the written permission of the Departmental Representative.

2.2 BARRIER WALL RAILING

- .1 TL-4 Steel Barrier.
 - .1 Steel, unless otherwise approved, shall be according to CSA G40.21.
 - .2 Posts and plates shall be Grade 350 W.
 - .3 HSS rails shall be ASTM A500, Grade C.
- .2 Welding materials: to CSA W59.
- .3 Welding electrodes: to CSA W48 Series.
- .4 High strength Type 1 bolts, nuts and washers: to ASTM A325M. Bolts to ASTM A490M approved by Departmental Representative. Bolt assemblies to be galvanized.
- .5 Anchor bolts: to ASTM A307 or better.
- .6 Stud shear connectors: to CSA W59, Clause 5.5.6 and Appendix H, or better.
- .7 All steel surfaces shall be protected by hot dipped galvanizing. Hot dip galvanizing: to CAN/CSA G164, minimum zinc coating of 763 g/m².

2.3 ANCHORAGE ASSEMBLY

- .1 Anchor bolts and anchorage plates shall be as specified on the Contract Documents. The anchorage shall be hot dipped galvanized according to CAN/CSA G164. The anchorage assembly shall be supplied with the bolts installed in a template.

2.4 GROUT

- .1 Grout shall be non-shrink cement-based grout or non-staining, non-shrink epoxy based grout as specified in the Contract, or as approved by the Departmental Representative.

2.5 ZINC-RICH COATING

- .1 Zinc-rich coating shall be according to CAN/CGSB 1.181.

2.6 MATERIALS

- .1 Structural steel, excluding HSS members and sole plates: to CSA G40.20/G40.21, grade and types 350W.
- .2 All plates: to CSA G40.21M Grade 300W.
- .3 All HSS members to CSA G40.20 Class C (cold-formed, non-stress-relieved) or ASTM A500 Grade C.
- .4 High strength bolts, nuts and washers: to ASTM F3125M. Bolts to ASTM F3125M approved by Departmental Representative.
- .5 Anchor bolts, washers and nuts: to ASTM F3125M or approved alternative.
- .6 Welding electrodes: to CSA W48 series.
- .7 Hot dip galvanizing: to CAN/CSA G164, minimum zinc coating of 762 g/m².
- .8 Bearings: elastomer bearing pads of neoprene, grade 50 to CAN/CSA S6-14.

Part 3 Execution

3.1 GENERAL

- .1 Railing components shall be protected from damage and distortion during handling, transportation, storage and installation.
- .2 When bedding grout is placed under post bases to obtain the proper grade and alignment, the grout shall have a minimum thickness of 5 mm and a maximum thickness of 15 mm. The mixing, surface preparation, installation and curing shall be according to the manufacturer's written instructions. A rubber pad as indicated on the Contract Drawings shall also be provided beneath each barrier post.
- .3 The work shall include installation of the anchorage assemblies.
- .4 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for structural steel installation in accordance with manufacturer's written instructions:
 - .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 FABRICATION OF RAILINGS

- .1 General:
 - .1 The railing system components shall be fabricated according to the details specified. Field modification shall only be done when approved by the Departmental Representative.
 - .2 When welding is required, the fabricator shall be certified according to CSA W47.1 for steel railings.
- .2 Steel Components:
 - .1 Unless otherwise specified in the contract, fabrication and welding shall be according to this Specification.
 - .2 All flame cut edge shall be as smooth and regular as those produced by edge planing and shall be free of slag.
 - .3 When galvanized surface is damaged, the exposed steel shall be immediately cleaned of all rust, oil and grease and coated with a 75 µm maximum thickness of zinc-rich paint. After erection, the surface shall be given a second coating of zinc-rich paint of the same thickness. All repair areas to match in appearance with entire railing system.

3.3 PREPARATION

- .1 Clean steel surfaces as directed by Departmental Representative when staining or defacing occurs.

- .2 Verify elevations of curbs and location of anchor bolts before erection of structural steel; report discrepancies to Departmental Representative.
- .3 Work near river banks or embankments in accordance with written instructions from 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 receipt of written approval from Departmental Representative.
 - .2 Ensure reamed holes are 2 mm maximum larger than bolt size used.
- .5 Place anchor bolts at elevations and locations indicated:
 - .1 Protect holes against entry of water and foreign material.

3.4 INSTALLATION

- .1 Do falsework in accordance to CSA S269.1.
- .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.
- .4 High strength bolting: in accordance with CAN/CSA S6. Use 'turn-of-nut' tightening method.
- .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 rivet or bolt unless otherwise specified by Departmental Representative.
 - .3 Centre-to-centre distance between any two holes of group to vary by not more than 1 mm from dimensioned distance between such holes.
 - .4 Centre-to-centre distance between any two groups of holes to vary not more than maximum of the following:

Centre-to-Centre distance in metres	Tolerance in plus or minus mm
less than 10	1
10 to 20	2
20 to 30	3

- .5 Correct mispunched or misdrilled members only as directed by Departmental Representative.

- .7 Shop splices:
 - .1 Use complete joint penetration groove welds finished flush.
 - .2 Details of butt joints to CSA W59.
 - .3 Use only as approved by Departmental Representative.
- .8 Field splices: to approval of Departmental Representative.
- .9 Mark members in accordance with CSA G40.20/G40.21:
 - .1 Do not use die stamping.
 - .2 Place marking at locations hidden when viewed from exterior after erection when steel is to be left in unpainted condition.
- .10 Match marking: shop mark splices.
- .11 Protect exposed concrete surfaces of substructures from staining due to weathering of unpainted steel as follows:
 - .1 Protect top surfaces of concrete with waterproof cover and drain away from vertical faces.
 - .2 Use galvanized anchors for anchorage to concrete.
 - .3 Submit details of installation and methods of support to Departmental Representative for review prior to commencing protection work.
- .12 All bolts to be detailed and installed with threads excluded from shear planes.

3.5 ALIGNMENT

- .1 The railing shall be installed to the elevations and alignment shown on the Contract Drawings and approved shop drawings with a tolerance of ± 6 mm and with no kinks or other visible breaks in alignment throughout the length of the installation.
- .2 After construction is complete, barrier posts to be plumb in transverse direction of bridge and perpendicular to deck/curbs in longitudinal direction.

3.6 ANCHORAGES

- .1 General: Anchorages shall be accurately and securely located.
- .2 Anchorages Installed Before Concrete Placement:
 - .1 Anchorage assemblies as shown on the Contract Drawings shall be used to secure the bridge railing posts to the concrete. Components shall be installed prior to placing concrete and shall be securely tied to reinforcing steel. Anchorage assemblies shall be positioned with templates and installed securely in the formwork to maintain the position of the anchors during placement of concrete.
 - .2 Hi-tensile bolts and plate washers shall be given a heavy coating of white non-staining grease.
 - .3 Properly sized and detailed plate washers are required to safely transfer anchor tension loads across the slotted hole in the barrier post base plate. Plate washers for barrier posts anchorages are to be fabricated as per the details provided on the Contract Drawings.

- .4 Ensure that adequate thread extension is detailed for the anchor bolt assemblies such that the base plate, plate washer and nut can be fully installed at each barrier post location. The anchor bolt nuts shall be capable of being fully threaded onto the anchor bolts.

3.7 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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29.06 - Health and Safety Requirements.
- .3 Section 01 74 11 - Cleaning.
- .4 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .5 Section 05 12 33 – Structural Steel for Bridges.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 ASTM International:
 - .1 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A269-08, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 CSA International:
 - .1 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.
 - .3 CAN/ CSA S6-14, Canadian Highway Bridge Design Code.
 - .4 CSA S16-09, Design of Steel Structures.
 - .5 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
 - .6 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
- .3 Environmental Choice Program:
 - .1 CCD-047-98(R2005), Architectural Surface Coatings.
 - .2 CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.
- .4 Health Canada / Workplace Hazardous Materials Information System (WHMIS):
 - .1 Material Safety Data Sheets (MSDS).

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sections and stud shear connectors and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements:
 - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Nova Scotia.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.5 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .4 Packaging Waste Management: remove for reuse by manufacturer of pallets, crates, padding and packaging materials.

1.7 WASTE MANAGEMENT DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 MATERIALS

- .1 Deck drain outlets: HSS members to CSA G40.20 Class C (cold-formed, non-stress-relieved) or ASTM A500 Grade C.
- .2 Armour angles: to CSA G40.20/G40.21, Grade 400W.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Stud shear connectors: to CSA W59, Clause 5.5.6 and Appendix H.
- .6 Hot dip galvanizing: to CAN/CSA G164, minimum zinc coating of 762 g/m².

2.2 FABRICATION

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

2.3 FINISHES

- .1 Galvanizing: hot dipped galvanizing with zinc coating 762 g/m² to CAN/CSA-G164.

Part 3 Execution

3.1 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .5 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CAN/CSA S6-14 or welded field connection.
- .7 Deliver items over for casting into concrete with setting templates to appropriate location and construction personnel.

- .8 Touch-up galvanized surfaces and existing drain outlets with zinc rich primer where burned by field welding.
- .9 Install items as per Contract Drawings / Reviewed Shop Drawings.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.3 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 03 30 00 - Cast-In-Place Concrete.
- .3 Section 32 12 13.16 – Asphalt Tack Coat.
- .4 Section 32 12 16 - Asphalt Paving.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) - Standard Specification – (Latest Edition) - Division 5 – Section 9 – Waterproofing Concrete Bridge Decks
- .2 CGSB 37-GP-50M, Hot Applied Rubberized Asphalt for Roofing and Waterproofing.

1.4 SUBMITTALS

- .1 Submit as per Section 01 33 00 – Submittal Procedures.
- .2 Latest edition of Manufacturer’s literature including performance data and installation procedures.
- .3 Manufacturer list of five (5) significant highway bridge structure projects with the same materials in North America submitted, completed and performing properly for more than ten (10) years under similar climate/traffic conditions.
- .4 Manufacturer to provide the Departmental Representative with contact information for each of the five (5) bridges referenced.
- .5 Submit test results for water absorption test of the protection board one (1) week prior to installation.
- .6 A sample of the waterproofing membrane shall be tested and approved prior to incorporation into the Work. Samples shall also be taken randomly from the heating and mixing kettle throughout the duration of the contract.
- .7 Copy of Applicator’s certification issued by the manufacturer stating that the Applicator is a qualified installer of the manufacturer’s system.
- .8 The Contractor shall give a minimum of 48 hours’ notice, in writing, prior to commencement of any waterproofing operations.
- .9 When the asphalt riding surface is stripped from the existing concrete structure deck, the Contractor shall give at least one week's notice to the Departmental Representative in writing.

1.5 QUALITY CONTROL

- .1 Protection board: protection board shall be tested using the Water Absorption Test. Two (2) specimens of protection board 150mm x 50mm shall be cut. The specimens shall be oven dried to constant mass of $60^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The mass of the specimens before and after drying shall be recorded. The specimens shall then be submerged horizontally under 25mm of water three (3) times as follows:
 - .1 First immersion: the water temperature shall be $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and the duration of the immersion shall be 4 hours.
 - .2 Second immersion: the water temperature shall be $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and the duration of the immersion shall be 20 hours.
 - .3 Third immersion: the water temperature shall be $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and the duration of the immersion shall be 80 hours.
- .2 After each immersion the specimens shall be towel dried and the mass recorded.
- .3 The percent mass loss or gain from the original oven dry mass shall be recorded.
- .4 Departmental Representative may take samples for testing at any time during installation of the waterproofing system.

Part 2 Products

2.1 MATERIALS

- .1 Tack Coat for Bridge Deck Surface: liquid asphalt primer in accordance with Section 32 12 13.16 – Asphalt Tack Coat.
- .2 Hot Applied Rubberized Asphalt Waterproofing Membrane: to be hot applied, rubberized asphalt conforming to CGSB 37-GP-50M and as certified by the manufacturer. Waterproofing to conform to the following physical requirements:

<u>Test</u>	<u>Specification (mm)</u>
Cone Penetration at 25°C	110 (max)
Cone Penetration at 50°C	160 (max)
Flow at 60°C	3 (max)
- .3 The waterproofing membrane shall be supplied to the job site in cakes, in the manufacturer's sealed and labeled containers, ready for melting and application.
- .4 Protection Board: to be formed of asphalt and fillers between two sheet materials. Boards to be uniform over its entire area to the thickness specified and free from perforations when applied:
 - .1 Protection board shall be so packaged as to permit shipping, handling and storage without damage to the contents.
 - .2 Protection board shall be formed of asphalt and fillers between two sheet materials. The board shall be of uniform thickness and free from penetrations when applied.

- .3 Thickness of the protection board shall be $3.6\text{mm} \pm 0.4\text{mm}$. Width of the board shall be $1000\text{mm} \pm 150\text{mm}$ and the length of the board shall be $1500\text{mm} \pm 150\text{mm}$. Board shall have straight edges, square corners and edges free of burrs and breakaways.
- .4 Notwithstanding the size tolerance above, all sheets shall be of the same length and width with a tolerance of $\pm 5.0\text{mm}$ and of uniform thickness within a tolerance of $\pm 0.25\text{mm}$.
- .5 The protection board shall have a water absorption of 5.0% maximum and shall show no deterioration or loss of mass during the Water Absorption Test.

Part 3 Execution

3.1 GENERAL

- .1 Waterproofing required for bridge deck and approach slabs.
- .2 All waterproofing operations shall be carried out when the air and concrete surface temperature are both 5°C or higher.
- .3 The applicator shall be approved by both the Departmental Representative and the manufacturer of the waterproofing system. Perform the work in strict conformance with the manufacturer's written instructions and this specification. In the event there is a discrepancy between the manufacturer's written instructions and this specification, the more stringent requirement shall prevail. The Departmental Representative shall have sole discretion on these matters.
- .4 Perform all of the operations involved in waterproofing in sequential order, such that there are no delays between individual operations other than those necessary to meet the requirements of these specifications.
- .5 Do not plug drainage holes through the deck by either waterproofing membrane or protection boards or asphalt concrete.
- .6 Waterproofing operations shall not commence until the Departmental Representative has approved all preparation work.
- .7 Ensure silane sealer applied to bridge deck is compatible with waterproofing membrane.

3.2 SURFACE PREPARATION

- .1 The surface of the concrete shall be completely treated by abrasive blast cleaning, or such methods as approved by the Departmental Representative to ensure that sound, laitance-free concrete is exposed. If a curing compound had been used on the concrete surface, it shall be completely removed. Abrasive blast cleaning shall also remove all dirt, debris, oil, etc., from deck resulting from phased construction method/vehicles driving on unpaved bridge deck during construction.
- .2 The flatness of the surface shall be checked after the surface preparation has been completed. Areas that do not meet a 3mm in 3m planeness shall be ground by the Contractor.

- .3 All dirt and debris shall be swept off and disposed of before tack coating. Immediately prior to the application of the tack coat, the concrete surface shall be cleaned with a jet of oil-free compressed air to remove all dust and foreign material.

3.3 TACK COATING OF PREPARED CONCRETE DECK

- .1 A tack coat of Liquid Asphalt Primer shall be field-applied to the concrete deck at a rate of 0.25 L/m² with approved equipment which shall provide a uniform application at the required rate. The tack coat shall be applied when the concrete is dry and clean.
- .2 Waterproofing equipment shall not be permitted upon the tack coat until it has fully cured.

3.4 HEATING AND MIXING HOT APPLIED MEMBRANE

- .1 Cakes of the waterproofing membrane shall be melted on the job site in a double boiler oil heat transfer type mechanically agitated heating and mixing kettle. This unit shall keep the contents continuously agitated until the material can be drawn free flowing and lump free from the mixing kettle at a temperature within the range recommended by the manufacturer. The kettle shall be equipped with functional permanently installed dial type thermometers to measure the temperature of the melted compound and the oil.

3.5 APPLICATION OF MEMBRANE AND MEMBRANE REINFORCEMENT

- .1 Waterproofing membrane shall not be applied until the tack coat of liquid asphalt primer has cured completely, and is free of any surface moisture and dirt. The waterproofing shall be applied within the temperature range recommended by the manufacturer in the following sequence:
 - .1 Apply the waterproofing along the edge of the deck for a width of 300mm and up to face of the curbs or barrier walls to a height of 80mm.
 - .2 Place a sheet of rubber membrane reinforcement (minimum 150mm wide by 1.2mm thick) up the face of the curbs or barrier walls to a height of 40mm while the waterproofing is still tacky.
 - .3 Apply waterproofing over the rubber membrane reinforcement in each location.
 - .4 Apply the waterproofing to the tack coated deck, so as to form a uniform film having a thickness of 5 ± 1 mm, unless otherwise specified and approved by the Departmental Representative.

3.6 APPLICATION OF PROTECTION BOARD

- .1 Protection boards shall be laid on the waterproofing membrane while the surface is still tacky with the length of the board transverse to the deck centerline. Materials or substances shall not be applied to remove the tackiness prior to installation of the protection board. The protection boards shall be placed with edges overlapping 25mm both longitudinally and transversely, unless otherwise approved by the Departmental Representative. The protection board edge shall be within 6mm of all curbs, drain verticals and expansion joint verticals. Protection boards shall be placed such that the longitudinal (direction of traffic flow) joints are, staggered a minimum of 150mm. The board shall remain free from perforations when applied.

3.7 PAVING OF DECK

- .1 Asphalt concrete paving shall be placed within 48 hours of the completion of waterproofing unless otherwise directed by the Departmental Representative.
- .2 Asphalt concrete shall be placed without disturbing or damaging the waterproofing system. Immediately remedy any disturbance or damage to the waterproofing system before continuing with paving operations.

3.8 SEALING INTERFACE BETWEEN ASPHALT CONCRETE AND CURB

- .1 Within 24 hours of asphalt concrete paving of the deck, the interface between the asphalt concrete and the face of the curb shall be sealed by pouring waterproofing along the joint such that the material extends 25 to 50mm from the face of the curb and to a thickness of 2 to 4mm above the asphalt concrete.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .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 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 NCHRP 244, Concrete Sealers for the Protection of Bridge Structures.

1.4 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 information on 3 projects where the product has been used on a bridge with similar environmental conditions to this project and has been in use for over 5 years. Information to include project name, owner's contact information and brief description of the project.
- .4 Submit samples in accordance with Section 01 33 00 – Submittal Procedures. Samples shall demonstrate the colour and texture of the coating product.
- .5 Submit drawing indicating locations of coloured coating application.

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. Store coating products in temperatures above 4°.

1.6 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 sealer 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.

- .4 Divert unused coating material from landfill to official hazardous material collections site approved by Departmental Representative.

1.7 WASTE MANAGEMENT

- .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.

1.8 WASTE MANAGEMENT

- .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 Concrete coating system shall be a waterborne, highly flexible, high performance waterproofing coating for protection of new concrete formulated with internally cross-linked acrylic copolymer. The coating system shall be highly breathable yet waterproof, resistant to carbon dioxide diffusion, exceptionally UV light resistant, unaffected by wetting/drying and freeze/thaw, and dirt resistant. The coating system shall also have excellent chemical resistance in an acid environment, long term adhesion and durability, no chalking or leaching, and a high resistance to water ponding.
 - .1 The concrete coating system shall consist of a primer coat followed by a coloured top coat. Colour of the primer coat to be a contrast to the top coat.
 - .2 The coating colour shall be 241P Parchment. Provide colour swatches to Departmental Representative for acceptance prior to placing order.

Part 3 Execution

3.1 APPLICATION

- .1 Apply concrete coating to the crash blocks (all four sides) and the exterior edge of the curbs along the full length of the bridge structure. The curb coating shall be terminated at the top edge of the 25 x 25 chamfer at the top of the curbs, leaving the top surface and the inside edge of both the narrow and wide curbs uncoated. The coating shall also be applied to the outside edges of the bridge deck, the soffit of the bridge deck from the girders' exterior web lines to the outside edges of the bridge deck and the visual surface of the exterior girders from deck soffit to underside of bottom bulb for the full length of the bridge. The exposed surfaces of the wingwalls and abutments, projecting down to an elevation as achievable at finished grade to the approval of the Departmental Representative.

- .1 Do not apply if rain is imminent.
- .2 Surface ambient temperature must not be less than 7°C or above 32°C during 24 hours after the application.
- .3 Fresh concrete must be cured for ten (10) days prior to application.
- .4 Prepare surface for coating in accordance with manufacturer's recommendations.
- .5 Install to manufacturer's recommendations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .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.
- .5 Section 03 30 51 – Concrete Bridge Decks.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 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.

1.4 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.
- .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 applicable to Grande Anse Bridge Rehabilitation. 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.

1.5 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.

1.6 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.

1.7 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 sealer 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.
- .4 Divert unused sealer material from landfill to official hazardous material collections site 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.

1.8 PROJECT CONDITIONS

- .1 Environmental Limitations: conform to manufacturer's written instructions.
 - .1 Do not install 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.

1.9 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 Clear penetrating silane sealer to be a clear water repellant silane sealer which prevents water and chloride intrusion into the concrete and conforms to the following requirements:
 - .1 Penetration into concrete: 3 - 6mm.
 - .2 Surface appearance: no visual change after application.
 - .3 Water vapour transmission: 100% transmitted (NCHRP 244).
 - .4 Chloride absorption reduction: 80% improvement over control.
 - .5 Water adsorption: 90% improvement over control (NCHRP 244).
 - .6 Ensure silane sealer compatible with waterproofing membrane.

Part 3 Execution

3.1 JOINT SEALANT APPLICATION

- .1 Apply clear penetrating sealant to the following:
 - .1 To top surface of concrete bridge deck.
 - .2 To top surface of the bridge girder bearing seat at both abutments.
- .2 Do not apply if surface ambient temperature is 4°C or below or when humidity is over 90%.
- .3 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.
- .4 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.
- .5 Ensure joint surfaces are dry and frost free.
- .6 Prepare surfaces in accordance with manufacturer's directions.
 - .1 Remove laitance, form-release agents, dust, and other contaminants.
- .7 Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.
- .8 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.
- .9 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. Use gauge to ensure uniform depth to achieve correct profile, coverage, and performance.
- .10 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.
- .11 Curing: to manufacturer's recommendations.
- .12 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 sealants without disturbing seal.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 45 00 – Quality Control.
- .3 Section 01 74 11 - Cleaning.
- .4 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .5 Section 32 12 16 – Asphalt Paving.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 American Society for the Testing of Materials
 - .1 ASTM A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
 - .2 ASTM A588, Standard Specification for High-Strength Low-Alloy Steel, up to 50 ksi Minimum Yield Point, with Atmospheric Corrosion Resistance
- .2 CSA International
 - .1 CSA G40.21 (2013), General Requirements for Rolled or Welded Structural Quality Steel
 - .2 CSA S6-14, Canadian Highway Bridge Design Code
- .3 Canadian General Standards Board
 - .1 CGSB 1-GP-171, Coating, Inorganic Zinc

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 The Contractor shall submit the shop drawings for the sealed expansion joint assembly.
- .3 The Contractor shall submit proof of certification for the welders conducting the Work, prior to commencing the Work.
 - .1 All welders shall be certified by the CWB to CSA W47.1 specification.

Part 2 Products

2.1 MATERIALS

- .1 All materials shall be supplied by the Contractor.

- .2 The approved expansion joint assemblies to be supplied shall be one of the following or an approved equivalent:
 - .1 Arrow LS-300
 - .2 D.S.Brown CV-3000.
 - .3 Wabo CompressionSeal WA-300
 - .4 Goodco Z-Tech ZT-300HR
- .3 Appropriate embedded steel with anchor studs shall be supplied with the chosen expansion joint assemblies.
- .4 All steel surfaces, with the exception of anchor studs, shall be sandblasted to a white metal finish and coated with an approved inorganic zinc coating conforming to CGSB 1-GP-171B Type 1 (100 $\mu\text{m} \pm 12 \mu\text{m}$ thick) or zinc metalized in accordance with CSA G189 (125 μm thick).
- .5 The design loading for sealed expansion joint assemblies and for centre beams shall be CL-625 plus the dynamic load allowance, and all stresses shall be within the limits specified in CSA S6.
- .6 All steel used for extrusions, edge beams and support bars shall conform to the minimum requirements of CSA G40.21 – Grade 350A or ASTM A588, unless grades of higher yield strength are required to satisfy the stresses resulting from the loading specified:
 - .1 All other steel components shall conform to the minimum requirements of CSA G40.21 – Grade 300W.
- .7 Welded anchor studs, when required, shall be the size indicated in the Contract Documents and shall be made from steel meeting the requirements of ASTM A108.
- .8 Sealed expansion joint assemblies shall be stored at least 150 mm off the grounds in a manner to maintain the cross slope and avoid permanent distortion.

Part 3 Execution

3.1 INSTALLATION

- .1 The Contractor shall carry out the Work as indicated in the Contract Documents and/or as specifically directed by the Departmental Representative.
- .2 A representative for the expansion joint assembly(s) manufacturer or supplier shall be present when modular expansion joints are installed:
 - .1 All materials, anchor bolt spacing and recessed formed to receive the assemblies shall meet the representative's approval before the Contractor may place the assemblies.
- .3 All welding shall conform to the requirements of CSA W59.
- .4 The steel portions of the expansion joint assemblies shall be fabricated in one piece in the fabricating shop, unless otherwise specified.

- .5 Portions of inorganic zinc coating, damaged in the field, shall be mechanically cleaned and recoated in the field.
- .6 Spacing hardware shall be released with 2 hours maximum of the placing of the adjacent concrete.
- .7 The steel portions of the expansion joint assemblies shall be fabricated to the dimensions indicated in the Contract Documents and are subject to the tolerances indicated in Table 1.

Table 1. Expansion Joint Fabrication Tolerances

Dimensions	Face of curb to back of curb	± 6
	Face to face of curbs	± 6
Crown		± 1 mm in 1 m

- .8 The expansion joint assemblies shall be installed in the position indicated in the Contract Documents and are subject to the tolerances indicated in Table 2.

Table 2. Expansion Joint Installation Tolerances

Elevation	- 3 mm
This tolerance shall not be considered additive with the tolerances presented in	
Joint	± 3 mm

3.2 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.

3.3 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by sealed expansion joint assembly installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 78 00 – Closeout Submittals.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 REFERENCES

- .1 Manual of Uniform Traffic Control Devices for Canada (MUTCD-C) – (most recent version).
- .2 American Association of State Highway and Transportation Officials (AASHTO):
 - .1 Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, (5th Edition).
- .3 ASTM International:
 - .1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A276-10, Standard Specification for Stainless Steel Bars and Shapes.
 - .3 ASTM B209M-10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate Metric.
 - .4 ASTM B210M-05, Standard Specification for Aluminum-Alloy Drawn Seamless Tubes Metric.
 - .5 ASTM B211M-03, Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod and Wire Metric.
- .4 Canadian General Standards Board (CGSB):
 - .1 CGSB 62-GP-9M-80, Prefabricated Markings, Positionable, Exterior, for Aircraft Ground Equipment and Facilities.
 - .2 CGSB 62-GP-11M-78, Marking Material, Retroreflective, Enclosed Lens, Adhesive Backing and Amendment.
- .5 CSA International:
 - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA O80 Series-08, Wood Preservation.
 - .3 CSA O121-08, Douglas Fir Plywood.
 - .4 CSA W47.2-11, Certification of Companies for Fusion Welding of Aluminum.
 - .5 CAN/CSA-Z809-08, Sustainable Forest Management.
- .6 The Master Painters Institute (MPI):

- .1 Architectural Painting Specification Manual - current edition.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings in accordance with Section 01 33 00 Submittal Procedures.
- .3 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for traffic signage, including product characteristics, performance criteria, physical size, finish and limitations.
- .4 Sustainable Design Submittals:
 - .1 Wood Certification: submit manufacturer's Chain-of-Custody Certificate number for CAN/CSA-Z809 or FSC or SFI certified wood.
- .5 Indicate dimensions, sizes, assembly, anchorage and installation details for each furnishing specified.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with section with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .4 Develop Waste Reduction Workplan related to Work of this Section.

1.6 DESIGN REQUIREMENTS

- .1 Sign supports to be capable of withstanding summation of following loads:
 - .1 Wind load in any direction of 0.60 kPa on signboards and 0.60kPa on sign supports and appurtenances.
 - .2 Dead load of signboards, sign supports and appurtenances.
 - .3 Ice load of 0.25kPa on one face of signboards and around surface of all structural members and appurtenances.
- .2 Structural deflections and vibration in accordance with American Association of State Highway and Transportation Officials (AASHTO), "Specifications for the Design and Construction of Structural Supports for Highway Signs".

Part 2 Products

2.1 MATERIALS

- .1 Sawn Timber Posts:
 - .1 Acceptable Material:
 - .1 Accepted species: Eastern Hemlock, Red Pine, Mixed Hardwood (Birch, Maple, Oak or Ash.
 - .2 Type: pressure treated in accordance with CAN/CSA-O80 Series.
 - .3 Grade: in accordance NST & IR Standards.
 - .2 Dimensions: As shown on drawings.
- .2 Fasteners: Bolts, nuts, washers and other hardware for roadside sign to be cast aluminum alloy, or galvanized steel.

2.2 SIGNBOARDS

- .1 Aluminum sheet: to ASTM B209M, precut to required dimensions. Thickness to be 1.6 mm for signboards up to 750 mm wide. Thickness to be 2.1 mm for sign boards 750 to 1200 mm wide. Use 1.0 mm thickness for refurbishing existing sign panel.
- .2 Aluminum extrusions: to ASTM B211M, 150 mm or 300 mm panels suitable for bolting together.
- .3 T-shape stiffeners for signboards: to ASTM B210M.
- .4 Connecting straps and brackets: to ASTM B209M.
- .5 Aluminum materials: to ASTM B209M.
- .6 Xylene thinner: to CAN/CGSB 1.94.
- .7 Chemical conversion coating for aluminum: to CGSB 31GP101Ma.
- .8 Primer for aluminum: to CAN/CGSB 1.132.
- .9 Finish paint: to CAN/CGSB 1.59.
- .10 Silk screen ink.
- .11 Transparent or opaque colours: to CGSB 1GP12c, and as indicated.
- .12 Reflective sheeting and tape: to CGSB 62GP11M. Adhesive, class of reflectivity and colour as indicated.
- .13 Transparent tape: flexible, smooth surfaced and moisture resistant tape.

2.3 FABRICATION

- .1 Signboards:
 - .1 Aluminum blanks:
 - .1 Degrease, etch and bonderize with chemical conversion coating.
 - .2 Clean surfaces with xylene thinner. Dry.

- .3 For non-reflective signs, spray face with one coat vinyl pretreatment coating and two finish coats of required colour.
- .4 For aluminum signboards that are to be painted before installation, spray and bake face of signboards with two coats of enamel in accordance with CAN/CGSB-1.104.
- .5 Cut and apply in accordance with Manufacturer's instructions.
- .6 Apply adhesive coated material with heat lamp vacuum applicator or by squeeze roll application method. Apply pressure sensitive material with roller or squeegee.
- .7 Edge wrap sheeting on each extrusion prior to bolting extrusions. Match pieces of sheeting from different rolls for each signboard to ensure uniform appearance and brilliance by day and night.
- .8 Reflective signboard faces may be prepared using silk screen transparent ink.
- .2 Reflective background sheeting and lettering.
- .3 Non-reflective lettering and symbols: cut from vinyl film as specified in CGSB62-GP-9M, or paint using required colour of finish paint or silk screen transparent ink.
- .4 Clean signboards completely and apply transparent tape over top edge and extending 25 mm minimum down back and front of signboard.
- .2 Sign identification:
 - .1 Apply sign number and date of installation with 25mm high stencil painted black letters on lower left back face of each signboard.
- .3 Hardware:
 - .1 All hardware and fasteners shall be double tip galvanized.

Part 3 Execution

3.1 INSTALLATION

- .1 All regulatory and warning signs shall be new and mounted on new sign supports.
- .2 All Parks Canada signs shall be salvaged and reposted on new sign supports.
- .3 Posts:
 - .1 Set posts by instrument for alignment, and locations as indicated and as directed by Departmental Representative.
 - .2 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 Backfill around posts using excavated material and compact in uniform layers not exceeding 150 mm compacted thickness.
 - .4 Cut off tops of posts as indicated, with tops parallel to grade of pavement edge.

- .5 Worker protection: workers must wear gloves respirators dust masks long sleeved clothing eye protection protective clothing when handling, drilling, sawing, cutting or sanding preservative treated wood and applying preservative materials.
- .6 Treat cut tops with two coats of 2% copper napthenate wood preservative.
- .4 Signboard:
 - .1 Fasten signboards to supporting posts and brackets as indicated.
 - .2 Use T-shape aluminum stiffeners to join portions of sign panel on site. Cover face of T-stiffener with material identical to face of sign panel.

3.2 PROTECTION

- .1 Place temporary covering on signboards where indicated. Covering to be capable of withstanding rain, snow, and wind and be non-injurious to signboard. Replace deteriorated covering and remove covers as directed by Departmental Representative.

3.3 CORRECTING DEFECTS

- .1 Correct defects, identified by Departmental Representative, in sign message, consistency of reflectivity, colour or illumination. Correct angle of signboard and adjust luminaire aiming angle for optimum performance during night conditions to approval of Departmental Representative.

3.4 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.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by traffic signage installation and salvage operations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 American Society for Testing and Materials (ASTM) – Most recent edition:
 - .1 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
 - .2 ASTM C117, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .3 ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .4 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .5 ASTM 127, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
- .2 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR):
 - .1 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) - Standard Specification – (Latest Edition) – Division 3 – Granular Materials.
 - .2 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) – TPW TM-1.
 - .3 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) – TPW TM-3.
- .3 Nova Scotia Environment and Labour:
 - .1 Pit and Quarry Guidelines.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

- .2 Samples:
 - .1 Allow continual sampling by the Owner during production.
 - .2 Provide the Owner with access to source and processed material for sampling.
 - .3 Install sampling facilities at discharge end of production conveyor, to allow the Owner to obtain representative samples of items being produced. Stop conveyor belt when requested by the Owner to permit full cross section sampling.

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, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.
- .2 Granular Sub-Base:
 - .1 See Section 32 11 16.01.
- .3 Granular Backfill:
 - .1 Conform to Granular Sub-Base, Section 32 11 16.01.
- .4 Granular base course:
 - .1 See Section 32 11 23.
- .5 Bedding Material:
 - .1 Conform to Aggregate Base Course, Section 32 11 23.
- .6 Embankment Fill, Widening:
 - .1 Widening to be constructed to grades and elevations on provided drawings.
 - .2 Approved Fill material to be provided by Contractor.
 - .3 Use of material subject to approval by Departmental Representative.
- .7 Rock Fill:
 - .1 Produced from quarry stone and of such sizes as may be approved or specified. All pieces of stone shall be sound and subject to approval.

- .2 Physical Properties: Rock fill shall conform to the following physical properties:

Property	Test Method	Rock Fill
Absorption % max.	ASTM C 127	2.00
LA Abrasion % max	ASTM C 131	40

- .3 Construction Methods:

- .1 Rock Fill shall be machine placed and compacted as directed by the Departmental Representative.

- .4 The stone must be crushed quarry stone and conform to the grading specified below.

Sieve Size, μm	Percent Passing by Weight
200,000	100
150,000	90 - 100
112,000	25 - 35
80,000	0 - 20
20,000	0 - 10

- .8 Common Borrow:

- .1 Common Borrow for embankment widening shall consist sand and gravel conforming to the grading specified below.

Sieve Size μm	Percent Passing by Weight
150,000	100
14,000	15 - 65
80	2 - 8

- .2 Use of material subject to approval by Departmental Representative.

2.2 SOURCE QUALITY CONTROL

- .1 Inform the Owner of proposed source of aggregates and provide access for sampling at least two (2) weeks minimum before starting production.
- .2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

- .3 Advise the Owner at least two (2) weeks minimum in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

Part 3 Execution

3.1 PREPARATION

- .1 Aggregate Source Preparation:
 - .1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as approved by authority having jurisdiction.
 - .2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.
 - .3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
 - .4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.
 - .5 Trim off and dress slopes of waste material piles and leave site in neat condition.
 - .6 Provide silt fence or other means to prevent contamination of existing watercourse or natural wetland features.
- .2 Processing:
 - .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
 - .2 Blend aggregates, as required, include reclaimed materials that meet physical requirements of specification is permitted in order to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes, as specified:
 - .1 Use methods and equipment approved in writing by the Departmental Representative.
 - .3 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate.
 - .4 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.

.3 Handling:

- .1 Handle and transport aggregates to avoid segregation, contamination and degradation.

.4 Stockpiling:

- .1 Stockpile aggregates in sufficient quantities to meet project schedules.
- .2 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
- .3 Stockpile aggregates on ground but do not incorporate bottom 200 mm of pile into Work.
- .4 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
- .5 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by the Departmental Representative within 48 h of rejection.
- .6 Do not cone piles or spill material over edges of piles.

3.2 CLEANING

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 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 REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 35 29.06 – Health and Safety Requirements.
- .3 Section 01 35 43 – Environmental Procedures.
- .4 Section 01 74 11 – Cleaning.
- .5 Section 01 74 21 – Construction/Demolition Waste Management and Disposal
- .6 Section 31 23 33.01 – Excavating, Trenching and Backfilling.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 REFERENCES

- .1 Nova Scotia Department of Transportation and Infrastructure Renewal – Standard Specification – (Latest Edition) – Division 2 – Earthworks, Section 1 - Clearing.
- .2 Nova Scotia Department of Transportation and Infrastructure Renewal – Standard Specification – (Latest Edition) – Division 2 – Earthworks, Section 2 - Grubbing.
- .3 Nova Scotia Department of Transportation and Infrastructure Renewal – Standard Specification – (Latest Edition) – Division 2 – Earthworks, Section 3 – Roadway and Drainage Excavation.
- .4 Canadian Environmental Protection Act (Available on-line Government of Canada Website).
- .5 Nova Scotia Environmental Act and Regulations.
- .6 Nova Scotia Department of Environment:
 - .1 Erosion and Sedimentation Control Handbook for Construction Sites – Section 2.2 Guidelines for Preparing Erosion and Sedimentation Control Plans.
- .7 Occupational Health & Safety Act – Province of Nova Scotia.

1.4 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 hand cutting to not more than specified height above ground of designated trees and disposing of felled trees and debris.
- .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.
- .5 Grubbing consists of removal and disposal of all stumps, roots, embedded logs, humus, root mat and topsoil from areas of excavations and embankments to not less than 300 mm below the existing ground surface.
- .6 Organic stripping consists of existing soil and organic material that has been grubbed from the site during grading operations. The intent for this project is to reuse the organic stripping as material for final landscaping treatments along the roadway embankments and other areas as directed by the Departmental Representative.

1.5 STORAGE AND PROTECTION

- .1 Prevent damage to fencing, trees, landscaping, natural features, utility lines, underground utilities, water courses, root systems of trees, benchmarks, and existing site fixtures which are to remain.
 - .1 Repair damaged items to the approval of Departmental Representative.
 - .2 Replace trees designated to remain, if damaged, as directed by Departmental Representative.

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.

Part 2 Products

2.1 MATERIALS

- .1 Not Used.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 All installation and maintenance of temporary erosion and sedimentation control shall be completed in accordance to the latest version of the Standard Specification, Nova Scotia Department of Transportation and Infrastructure Renewal – Division 7 – Environmental Protection, Section 1- Sediment Barriers, and Section 2 – Flow Check and Section 01 35 43 Environmental Procedures.
- .2 Provide temporary erosion and sedimentation control measures (silt fencing and erosion control structures) 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.
- .3 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .4 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 PREPARATION

- .1 Inspect site and verify with Departmental Representative, items designated to remain.
- .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.
 - .2 When utility lines which are to be removed are encountered within area of operations, notify utility in ample time to minimize interruption of service. The Departmental Representative is to be provided copies on all correspondence.
- .3 Notify utility authorities before starting clearing and grubbing.
- .4 Keep roads and walks free of dirt and debris.

3.3 CLEARING

- .1 Clearing is not permitted during nesting season; all clearing work is to be completed before **May 15**. Approval from Departmental Representative must be given prior to commencement of clearing operations.

- .2 Clear areas as indicated and approved by the Departmental Representative. Generally, the areas to be cleared shall extend to a width of 3 m outside of the excavation and embankment slope lines.
- .3 Clearing includes felling, trimming and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush and rubbish occurring within cleared areas.
- .4 Clear as directed by the Departmental Representative, by cutting at height of not more than 300 mm above ground.
- .5 All timber materials must be chipped by mechanical means and spread evenly within the cleared area as directed by the Department Representative.
- .6 The maximum chip size shall be no more than 300 mm long by 75 mm in thickness.
- .7 Cut off branches and cut down trees overhanging area cleared as directed by the Departmental Representative.
- .8 Cut off unsound branches on trees designated to remain by the Departmental Representative.
- .9 Any Timber identified for isolated tree removal must be; cut to 1200 mm lengths and are to be dispersed into the woods on the floor for natural decomposition, as directed by Departmental Representative.

3.4 GRUBBING

- .1 The Contractor shall carry out the Work as indicated in the Contract Documents and/or as directed by the Departmental Representative.
 - .1 The Work shall include dealing with stump height over 0.3 m, and with brush, slash and pieces of timber lying on the ground, due to clearing activities.
- .2 Grubbing shall be carried out by tub grinding or similar equipment, such that the roots, stumps and topsoil are ground up and blended together.
 - .1 In cut sections, and in fill sections where the Subgrade is 2.5 m of the original ground, grubbing shall be carried out to a width 1.5 m from the clearing line or as otherwise directed by the Departmental Representative.
- .3 Grubbing shall not be carried out in fill sections where the Subgrade is more than 2.5 m above the original ground, except as approved by the Departmental Representative where foundation excavation or stream diversions for Structures are to be carried out.
 - .1 Grubbing shall not be carried out in swamps and other areas where the underlying material is to be wasted, as indicated in the Contract Documents or by the Departmental Representative.
- .4 The Contractor shall be responsible, at his/her own expense, to carry out any remedial measures necessary to redress any areas grubbed beyond the specified limits, including but

not limited to extra shaping, hydroseeding and/or mulching of the exposed ground, and removal of trees which have fallen as a result of root severance due to the over-width grubbing.

- .5 Grounded up roots, stumps, and topsoil shall be neatly stockpiled at an approved location and shall be screened and processed prior to being placed along embankments prior to hydroseeding and dry mulch.
- .6 Approved grubbed materials shall be temporally stockpiled at a designated area within Cape Breton Highlands National Park at the former Pleasant Bay pit, located at Sta. 33+350 (see Site Plan provided in **Appendix I**) at the approval of the Departmental Representative.
- .7 No materials removed during grubbing shall be permitted to be placed within 30 m of a Culvert, Bridge or any other Structure.

3.5 STOCKPILING

- .1 Handle grubbing/topsoil material only when it is dry and warm.
- .2 Stockpile(s) shall not be located where they shall inhibit orderly construction and completion of ditches and slopes, block or inhibit natural drainage, or be a potential source of siltation to watercourses.
- .3 Stockpiling shall be carried out such that the maximum recovery of the material is assured.
- .4 Stockpiles shall be dry mulched in accordance with Section 32 92 19.16.
- .5 Cover topsoil that has been piled for long term storage, with trefoil or grass to maintain agricultural potential of soil.
- .6 Protect any stockpiles from contamination and compaction.

3.6 REMOVAL AND DISPOSAL

- .1 Remove all organic stripped grubbing and topsoil material to a depth not less than 300 mm below existing ground surface.
 - .1 The Contractor is required to survey the stripped surface immediately following this activity.
- .2 Stockpile organic stripping material on site as indicated by Departmental Representative for reuse in final treatment.
- .3 Any excess grubbing material identified by the Departmental Representative as surplus to the Work shall be transported, stockpiled and protected at Fishing Cove Long Trail storage site (Sta. 24+500).
- .4 Burning of grubbed materials shall not be permitted.

- .5 Protect stockpiled organic stripping material with erosion and sedimentation controls.

3.7 PREPERATION OF GRADE AND PLACEMENT

- .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 with scrapers establishing natural contours and eliminating uneven areas and low spots, ensuring positive drainage to the approval of Departmental Representative.

3.8 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 REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 35 29.06 - Health and Safety Requirements.
- .3 Section 31 23 33.01 – Excavating, Trenching and Backfilling.

1.2 REFERENCES

- .1 Definitions:
 - .1 Rock: any solid material in excess of 1.00 m³ and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. Frozen material not classified as rock.
 - .2 PPV: peak particle velocity.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Sustainable Standards Certification:
 - .1 Construction Waste Management: submit copy of Waste Management Plan for project highlighting recycling and salvage requirements.
 - .2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.
 - .3 Erosion and Sedimentation Control: submit copy of Erosion and Sedimentation Control Plan for project highlighting implementation measures.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Collect and separate plastic packaging corrugated cardboard in accordance with Waste Management Plan.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Ensure emptied containers are sealed and stored safely.

Part 2 Products

2.1 MATERIALS

- .1 Not used.

Part 3 Execution

3.1 ROCK REMOVAL

- .1 Perform excavation in accordance with Erosion and Sedimentation Control Plan.
- .2 Co-ordinate this section with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Remove rock to alignments, profiles, and cross sections as indicated.
- .4 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.
- .5 Excavate rock to horizontal surfaces with slope not to exceed 5%.
- .6 Prepare rock surfaces which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces.
- .7 Excavate trenches to lines and grades to minimum of 300 mm below pipe invert indicated. Provide recesses for bell and spigot pipe to ensure bearing will occur uniformly along barrel of pipe.
- .8 Cut trenches to widths as indicated.
- .9 Use pre-shearing or other smooth wall drilling unless specified otherwise or directed by Departmental Representative.
- .10 Remove boulders and fragments which may slide or roll into excavated areas.
- .11 Correct unauthorized rock removal at no extra cost, in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.2 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.

3.3 PROTECTION

- .1 Prevent damage to surroundings and injury to persons.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Excavation for levelling and rough grading and including the trenching for the installation of culverts under Section 33 42 13 – Pipe Culverts.

1.2 RELATED REQUIREMENTS

- .1 Section 01 35 43 – Environmental Procedures.
- .2 Section 02 41 13 – Selective Site Demolition.
- .3 Section 31 24 13 – Roadway Embankments.
- .4 Section 31 32 19.01 – Geotextiles.
- .5 Section 32 11 16.01 – Granular Sub-base.
- .6 Section 33 42 13 – Pipe Culverts.
- .7 Section 33 42 13.01 – Precast Concrete Box Culverts.

1.3 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.4 REFERENCES

- .1 American Society for Testing and Materials International (ASTM): latest edition:
 - .1 ASTM C117, Standard Test Method for Material Finer Than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422, Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
 - .5 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian Standards Association (CSA International); latest edition:
 - .1 CAN/CSA-A3000, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .1 CSA-A3001, Cementitious Materials for Use in Concrete.

- .2 CAN/CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- .3 Nova Scotia Department of Transportation and Infrastructure Renewal – Standard Specification – (Latest Edition) – Division 2 - Earthworks, Section 3 – Roadway and Drainage Excavation.
- .4 Nova Scotia Department of Transportation and Infrastructure Renewal – Standard Specification – (Latest Edition) – Division 5 - Structures, Section 12 – Underground Drainage Systems.
- .5 Canadian Environmental Protection Act (Available on-line Government of Canada Website).
- .6 Nova Scotia Environmental Act and Regulations.
- .7 Nova Scotia Department of Environment:
 - .1 Erosion and Sedimentation Control Handbook for Construction Sites – Section 2.2 Guidelines for Preparing Erosion and Sedimentation Control Plans.
- .8 Occupational Health & Safety Act – Province of Nova Scotia.

1.5 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 m³ and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m³ bucket. Frozen material not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature up to required depth, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .3 Topsoil:
 - .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .7 Fill material: rock fill meeting the requirements of specified in Section 31 05 16, maximum size 200 mm in any dimension.

- .8 Unsuitable materials:
- .1 Weak, chemically unstable, and compressible materials.
- .2 Frost susceptible materials:
- .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136.
- .2 Table:
- | 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.
- .9 Backslope: the slope in a cut between the invert of the roadside ditch and the point where the slope intersects original ground.
- .10 Rock Face: the vertical or near vertical face between the top of the existing rock surface and the designated rock or ditch grade line.

1.6 QUALITY ASSURANCE

- .1 Qualification Statement: submit proof of insurance coverage for professional liability.
- .2 Where the Consultant is employee of the Contractor, submit proof that Work by the Consultant is included in Contractor's insurance coverage.
- .3 Submit design and supporting data at least two (2) weeks prior to beginning Work.
- .4 Design and supporting data submitted to bear stamp and signature of qualified Professional Engineer registered or licensed in the Province of Nova Scotia.
- .5 Keep design and supporting data on site.
- .6 Engage services of a qualified Professional Engineer who is registered or licensed in the Province of Nova Scotia in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.
- .7 Do not use soil material until written report of soil test results are reviewed and approved by the Departmental Representative.
- .8 Health and Safety Requirements:
- .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

1.8 EXISTING SITE CONDITIONS

- .1 Contractor to visit site prior to submission of Tender.

Part 2 Products

2.1 MATERIALS

- .1 Granular Backfill: properties to Section 31 05 16 – Aggregate Materials.
- .2 Bedding Material: properties to Section 31 05 16 - Aggregate Materials.
- .3 Geotextile: woven material with properties to 31 32 19.01 – Geotextiles.

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 sediment and erosion control plan, specific to site, that complies with the Nova Scotia Environment Act and Regulations, in accordance with the Nova Scotia Erosion and Sedimentation Control Handbook for Construction Sites or requirements of authorities having jurisdiction, whichever is more stringent.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

- .1 Remove obstructions, debris, ice and snow, from surfaces to be excavated within limits indicated.

3.3 PREPARATION/PROTECTION

- .1 Protect existing features in accordance with applicable local regulations.
- .2 Keep excavations clean, free of standing water, snow, ice and loose soil.

- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to the Departmental Representative approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are required to remain undisturbed.

3.4 STOCKPILING

- .1 Stockpiling of fill materials will not be permitted within Park Boundaries.
 - .1 Stockpile of fill materials generated by roadway excavation shall not be stockpiled within Park Boundaries.
 - .2 Stockpile granular materials in manner to prevent segregation.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.5 DEWATERING AND HEAVE PREVENTION

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for the Departmental Representative's approval 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.
- .5 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures to approved collection areas and in a manner not detrimental to public and private property, 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.

3.6 EXCAVATION

- .1 Advise the 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 directed by the Departmental Representative.
- .3 Complete mass site excavation as specified in Section 31 24 13, Items 3.3.1, 3.3.2 and 3.3.3 and 3.3.4.
- .4 All surplus excavated material shall be disposed of by the Contractor outside of Park limits. All costs related to disposing of the surplus material to be borne by the Contractor.
- .5 One lane traffic must be kept at all time during construction and two lane traffic must be reinstated during non-construction hours.
- .6 Keep excavated and stockpiled materials safe distance away from edge of trenches as directed by the Departmental Representative.
- .7 Restrict vehicle operations directly adjacent to open trenches.
- .8 Dispose of surplus excavated and stockpiled material off site as directed by the Departmental Representative.
- .9 Stockpiled material will not be permitted within the clearing limits at the end of any work days.
- .10 Do not obstruct flow of surface drainage or natural watercourses.
- .11 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .12 Notify the Departmental Representative when bottom of excavation is reached.
- .13 Obtain the Departmental Representative's approval of completed excavation.
- .14 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by the Departmental Representative.
- .15 Correct unauthorized over-excavation as follows:
 - .1 Fill over excavated space with approved fill compacted to not less than 100% of Standard Proctor maximum dry density.
 - .2 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.
- .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 the Representative.
- .17 Install geotextiles in accordance with Section 31 32 19.01 – Geotextiles.

3.7 FILL TYPES AND COMPACTION

- .1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698:
 - .1 Embankments: compact to 98%.
 - .2 Backfilling: compact to 98%.

3.8 BEDDING AND SURROUND OF UNDERGROUND SERVICES

- .1 Place and compact granular material for bedding and surround of underground services as specified in Section 33 42 13 – Pipe Culverts.
- .2 Place bedding and surround material in unfrozen condition.

3.9 BACKFILLING

- .1 Do not proceed with backfilling operations until completion of following:
 - .1 The Departmental Representative has inspected and approved installations.
 - .2 The Departmental Representative has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 Removal of concrete formwork.
 - .5 Removal of shoring and bracing; 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.
- .4 Place backfill material in uniform layers not exceeding 200 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 200 mm.
 - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from the Departmental Representative.
 - .2 If approved by the Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by the Departmental Representative.

- .6 Place fill in areas as indicated.
- .7 Consolidate and level unshrinkable fill with internal vibrators.
- .8 Install drainage system in backfill as directed by the Departmental Representative.
- .9 All approved common borrow material for the Work shall be obtained by the Contractor from outside of Park limits.

3.10 RESTORATION

- .1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 31 11 00 - Clearing and Grubbing.
- .2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .3 Section 31 23 19.01 – Geotextiles.
- .4 Section 31 37 00 – Rip-Rap.

1.2 MEASUREMENT PROCEDURES

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 Definitions:
 - .1 Rock Excavation: excavation of:
 - .1 Material from solid masses of igneous, sedimentary or metamorphic rock which, prior to removal, was integral with parent mass. Material that cannot be ripped with reasonable effort from Caterpillar D9L or equivalent to be considered integral with parent mass.
 - .2 Boulder or rock fragments measuring in volume one (1) cubic metre or more.
 - .2 Common Excavation: excavation of materials that are not Rock Excavation or Stripping.
 - .3 Unclassified Excavation: excavation of whatever character other than stripping encountered in the work.
 - .4 Free Haul: distance that excavated material is hauled without compensation. Free haul distance to be unlimited.
 - .5 Stripping: excavation of organic material covering original ground.
 - .6 Over Haul: authorized hauling in excess of free haul distance that excavated material is moved.
 - .7 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to top of subgrade.
 - .8 Waste Material: material unsuitable for embankment, embankment foundation or material surplus to requirements.
 - .9 Borrow Material: material obtained from areas outside right-of-way and required for construction of embankments or for other portions of work.
- .2 Reference Standards:
 - .1 American Society for Testing and Materials International, (ASTM):

- .1 ASTM D698-07e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
- .2 Nova Scotia Department of Transportation and Infrastructure Renewal - Standard Specification – (Latest Edition) - Division 2 – Earthworks, Section 3 – Roadway and Drainage Excavation.

1.4 PROTECTION

- .1 Protect excavations from freezing.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to the Departmental Representative's approval.
- .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.
- .5 Protect buried services that are required to remain undisturbed.

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Adhere to regulations of authority having jurisdiction when blasting is required.
 - .2 Adhere to Provincial and National Environmental requirements when potentially toxic materials are involved.
- .2 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

Part 2 Products

2.1 MATERIALS

- .1 Embankment materials require approval by the 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 Borrow material:
 - .1 Obtain from borrow pit approved by the Departmental Representative.
 - .2 Material shall meet the requirements of NSTIR Specifications – Division 2, Earthworks, Section 5 – Borrow.

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 vibrating plate 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 EXCAVATING

- .1 General:
 - .1 Notify the Departmental Representative when waste materials are encountered and remove to depth and extent directed.
 - .2 Excavation limits as provided in contract drawings, unless directed otherwise directed by the Departmental Representative. In the event that undercut is required as directed by the Departmental Representative, compact top 150 mm below undercut to minimum 95% maximum dry density. ASTM D698 (AASHTO T99). Final/top 150 mm shall be compacted to 98% SP. Replace with approved rock fill material and compact.
 - .3 Treat ground slopes, where subgrade is on transition from excavation to embankment, at grade points as directed by the Departmental Representative.
- .2 Drainage:
 - .1 Maintain profiles, crowns and cross slopes to provide good surface drainage.
 - .2 Provide ditches as work progresses to provide drainage.
 - .3 Construct interceptor ditches as indicated or as directed before excavating or placing embankment in adjacent area.

- .3 Rock excavation:
 - .1 Notify the Departmental Representative, when material appearing to conform to classification for rock is encountered. Provide 12-hour notification.
 - .2 All rock excavation is to be completed by ripping or jack-hammering.
- .4 Borrow Excavation:
 - .1 Completely use in embankments, suitable materials removed from existing roadway excavations before taking material from borrow areas.
 - .2 Obtain embankment materials, in excess of what is available from cut areas, from designated borrow areas:
 - .1 The Departmental Representative to designate extent of borrow areas and allowable depth of excavation.
 - .2 Remove waste and stripping material from borrow pits to designated locations.
 - .3 Slope edges of borrow areas to minimum 2:1 and provide drainage as directed.
 - .4 Trim and leave borrow pits in condition to permit accurate measurement of material removed.

3.5 EMBANKMENTS

- .1 Scarify or bench existing slopes in accordance with Nova Scotia Department of Transportation and Infrastructure Renewal - Standard Drawing – Benching of Embankment Slopes, File No. S-2009-016, located in **Appendix F**.
- .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 except in areas authorized.
- .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 loose thickness. The Departmental Representative may authorize thicker lifts if specified compaction can be achieved and if material contains more than 25% by volume stone and rock fragments larger than 100 mm.
- .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 subgrade elevation.
- .7 In the event that undercut is required as directed by the Departmental Representative, rock fill material shall be placed in the top 750 mm to subgrade. Material shall be placed in maximum 500 mm lifts using a vibratory roller of at least 11 tonnes mass.
- .8 Deductions from excavation will be made for overbuild of embankments.

3.6 SUBGRADE COMPACTION

- .1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.
- .2 Compact each layer to minimum 95% maximum dry density, ASTM D698 (AASHTO T99) except top 150 mm of subgrade. Compact top 150 mm to 98% maximum dry density.
- .3 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.

3.7 FINISHING

- .1 Shape entire roadbed to within 25 mm of design elevations.
- .2 Finish slopes, ditch bottoms and borrow pits true to lines, grades and drawings where applicable. Scale slope by removing loose fragments, for cut slopes in bedrock steeper than 1:1.
- .3 Remove rocks over 150 mm in dimension from slopes and ditch bottoms.
- .4 Hand finish slopes that cannot be finished satisfactorily by machine.
- .5 Round top of backslope 1.5 m both sides of top of slope.
- .6 Run tractor tracks over slopes exceeding 3 m in height to leave tracks parallel to centreline of highway.
- .7 Trim between constructed slopes and edge of clearing to provide drainage and free of humps, sags and ruts.

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 acceptance by the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.
- .2 Section 01 74 11 – Cleaning.
- .3 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .4 Section 31 24 13 – Roadway Embankments.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM), most recent edition:
 - .1 ASTM D 4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - .2 ASTM D 4595, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
 - .3 ASTM D 4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
 - .4 ASTM D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - .5 ASTM D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - .6 ASTM D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
- .2 Canadian General Standards Board (CGSB), most recent edition:
 - .1 CAN/CSA-G40.21, General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit product information of proposed product a minimum of 2 weeks prior to beginning work.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

Part 2 Products

2.1 MATERIAL

- .1 Physical properties as indicated in Table 1 – Requirements of non-woven geotextile materials.
- .2 Geotextile: non-woven synthetic fabric, supplied in rolls:
 - .1 Width: 3.5 m minimum.
 - .2 Length: 79 m minimum.
 - .3 Composed of: minimum 85% by mass of polypropylene and/or polyester, with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 30 days.
- .3 Securing pins and washers: to CAN/CSA-G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m² to CAN/CSA G164.
- .4 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

Table 1- Requirements of Non-Woven Geotextiles

Property	Unit	ASTM	N2
Tearing Resistance (Trapezoid Method)	N	D4533	250
Grab Tensile Strength (Both Directions)	N	D4632	700
Elongation at Break	%	D4632	50
Apparent Opening Size	µm	D4751	50 to 250
UV Stabilization @ 500 hrs	% Ret.	D4355	70
Permittivity	sec ⁻¹	D4491	1.25 to 2.75
Puncture CBR	N	D6241	1700

Part 3 Execution

3.1 INSTALLATION

- .1 Place geotextile material, at locations directed by the Departmental Representative, by unrolling onto graded surface and retain in position with securing pins or fill.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .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 300 mm over previously laid strip.
- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .6 After installation, cover with overlying layer within 4 hours of placement.
- .7 Replace damaged or deteriorated geotextile to approval of the Departmental Representative.
- .8 Place and compact soil layers in accordance with Section 31 23 33.01 – Excavating, Trenching and Backfilling.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning:
 - .1 Leave Work area clean at end of each day.

3.3 PROTECTION

- .1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 31 32 19.01 - Geotextiles.
- .2 Section 33 42 13 – Pipe Culverts.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 REFERENCES

- .1 Nova Scotia Department of Transportation and Infrastructure Renewal - Standard Specification – (Latest Edition) – Division 3 – Granular Materials, Section 6 – Loose Laid Rip-Rap.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Place materials defined as hazardous or toxic in designated containers.
- .2 Fold up metal banding, flatten and place in designated area for recycling.
- .3 Divert left over aggregate materials from landfill to local facility for reuse as approved by Departmental Representative.
- .4 Divert left over geotextiles to local plastic recycling facility as approved by Departmental Representative.

Part 2 Products

2.1 STONE AND ARMOUR ROCK

- .1 Random Rip-Rap:
- .2 Hard, durable, angular quarry stone, free from seams, cracks or other structural defects, to meet the size distribution for use intended, as shown on contract drawings. (See table “Random Rip-Rap Grading Limits” next page.).
- .3 Random Rip-Rap for each rock shall have both thickness and breadth greater than or equal to one-third of its length.
- .4 .4 Random riprap shall consist of clean, hard, sound, durable rock, having a density of not less than 2.6 t/m³ and angular surfaces such that the rocks interlock when placed.
- .5 Rock when tested by the Micro-Deval test method in accordance with MTO LS - 618, shall have a Micro-Deval loss not greater than 25%.

- .6 Rock when tested by the Freeze/Thaw test method in accordance with MTO LS - 614, shall have a Freeze/Thaw loss not greater than 15%.

2.2 GEOTEXTILE FILTER

- .1 Geotextile: as indicated on Plans and in accordance with Section 31 32 19.01 – Geotextiles, Type N2.

Part 3 Execution

3.1 PLACING

- .1 Rip-Rap shall be machine placed.
- .2 Where Rip-Rap is to be placed on slopes and at the ends of culverts, excavate trench at toe of slope to dimensions as indicated.
- .3 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.
- .4 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.
- .5 Place Rip-Rap to thickness as indicated.
- .6 Place stones in manner approved by the Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.

Random Rip-Rap Grading Limits

Mass	Size (Note 1)	Finer by Mass (%)								
(kg)	(mm)	R-A (Note 2)	R-5	R-25	R-50	R-100	R-250	R-500	R-1000	R-2000
6000	1600									100
4000	1400									70 - 90
3000	1300								100	
2000	1100								70 - 90	40 - 55
1500	1000							100		
1000	900							70 - 90	40 - 55	
750	820						100			
500	710						70 - 90	40 - 55		
300	600					100				
250	570						40 - 55			
200	530					70 - 90				0 - 15
150	480				100					
100	420				70 - 90	40 - 55			0 - 15	
75	380			100						
50	330			70 - 90	40 - 55			0 - 15		
25	260			40 - 55			0 - 15			
15	220	100	100							
10	190		70 - 90			0 - 15				
5	150		40 - 55		0 - 15					
2.5	120	0		0 - 15						
0.5	70		0 - 15							
Thickness (mm) (Note 3)		300	300	500	600	800	1100	1400	1600	2200
Note 1		Approximate diameter (for information only)								
Note 2		Random riprap for abutment and slope protection								
Note 3		Measured perpendicular to the prepared surface								

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 31 05 16 - Aggregate Materials.

1.2 DESCRIPTION

- .1 This section specifies requirements for supplying, producing and placing crushed gravel or quarry stone as a granular subbase (Type 2 Gravel, Except for gradation adjustment) to lines, grades and typical cross sections indicated, or as directed by Departmental Representative.

1.3 REFERENCES

- .1 Nova Scotia Transportation and Infrastructure Renewal:
 - .1 Nova Scotia Transportation and Infrastructure Renewal (NSTIR), Division 3 Section 2.
- .2 ASTM International – Most recent edition:
 - .1 ASTM C117, Standard Test Methods for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .3 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D422, Standard Test Method for Particle-Size Analysis of Soils.
 - .5 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
 - .6 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .3 Ministry of Transportation of Ontario:
 - .1 LS-618 Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
- .4 Nova Scotia Environment and Labour:
 - .1 Pit and Quarry Guidelines.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

Part 2 Products

2.1 MATERIALS

.1 Granular Sub-Base: to meet NSTIR Type 2 Gravel and the following requirements:

- .1 Granular Sub-Base to be crushed gravel or quarried, crushed rock.
- .2 Gradations to be within limits as follows:

Sieve Size, <i>μm</i>	Type 2 - Percent Passing by Weight
80,000	100
56,000	70 – 100
28,000	50 – 80
14,000	35 – 65
5,000	20 – 50
160	3 – 10
80	2 – 5

.3 Granular Sub-Base to be supplied by Contractor.

.2 Reclaimed Asphalt Product (RAP):

- .1 The contractor shall not incorporate RAP into Granular Sub-Base

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of subgrade are acceptable for Granular Sub-Base installation in:

- .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 approval to proceed from Departmental Representative.

3.2 PLACING

- .1 Place Granular Sub-Base after subgrade is inspected and approved by the Departmental Representative.
- .2 Construct Granular Sub-Base to depth and grade in areas indicated on the plans or as directed by the Departmental Representative.
- .3 Ensure no frozen material is used in placing.
- .4 Place material only on clean unfrozen surface, properly shaped and compacted and free from snow or ice.
- .5 Begin spreading Sub-Base material on crown line or high side of one-way slope.
- .6 Place Granular Sub-Base materials using methods which do not lead to segregation or degradation.
- .7 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. The Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .8 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .9 Remove and replace portion of layer in which material has become segregated during spreading.

3.3 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 100% maximum dry density in accordance with ASTM D698.
- .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. If aggregate is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by the Departmental Representative.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.4 CLEANING

- .1 Leave work area clean at end of each day.

3.5 SITE TOLERANCES

- .1 Finished Sub-Base surface to be within 25 mm of elevation as indicated but not uniformly high or low.

3.6 PROTECTION

- .1 Maintain finished Granular 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 REQUIREMENTS

- .1 31 05 16 – Aggregate Materials.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 DESCRIPTION

- .1 This section specifies requirements for supplying, producing and placing crushed gravel or crushed quarried stone as Type 1 granular base (except for gradation adjustment), to lines, grades and typical cross sections indicated, or as directed by Departmental Representative.

1.4 REFERENCES

- .1 Nova Scotia Transportation and Infrastructure Renewal:
 - .1 Nova Scotia Transportation and Infrastructure Renewal (NSTIR), Standard Specification Division 3 Section 2.
- .2 American Society for Testing and Materials (ASTM) – Most recent edition:
 - .1 ASTM C117, Standard Test Methods for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .3 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
 - .4 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .5 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
 - .6 ASTM D2922- Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods.
- .3 Ministry of Transportation of Ontario:
 - .1 LS-618 Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.

.4 Nova Scotia Environment and Labour:

.1 Pit and Quarry Guidelines.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

Part 2 Products

2.1 MATERIALS

.1 Granular base: to meet NSTIR Type 1 Gravel and the following requirements:

.1 Crushed gravel or rock consisting of hard, durable, angular particles, free from clay lumps, cementation, organic material, and other deleterious materials.

.2 Type 1 gravel shall be produced from quarried rock source.

.3 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117:

Sieve Size, <i>µm</i>	Type 1 - Percent Passing by Weight
20,000	100
14,000	50-85
5,000	20-50
160	5-12
80	3-5

.4 Plasticity Index: to ASTM D4318, Maximum 3.

.5 Los Angeles Abrasion: to ASTM C131. Max. % loss by weight: 40.

.6 Crushed particles: 100% of particles by mass to have at least 2 freshly fractured face.

.2 Reclaimed Asphalt Product (RAP):

.1 The contractor shall not incorporate RAP into Aggregate Base Course.

.3 Shoulder Material:

- .1 RAP shall be supplied by Parks Canada from stockpile located at PCA's salt storage yard.

Part 3 Execution

3.1 INSPECTION OF UNDERLYING SUB-BASE

- .1 Place granular base after surface is inspected and approved by Departmental Representative.

3.2 PLACING

- .1 Construct granular base to depth and grade in areas indicated on the plans or as directed by the Departmental Representative.
- .2 Ensure no frozen material is used in placing.
- .3 Place material only on clean unfrozen surface, properly shaped and compacted and free from snow and ice.
- .4 Begin spreading base material on crown line or high side of one-way slope.
- .5 Place granular base materials using methods which do not lead to segregation or degradation.
- .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.
- .8 Shoulder material (RAP) shall be placed as indicated on the Contract Drawings.
- .9 Compacted shouldering to be flush with asphalt concrete surface.
- .10 Place, hand rake and compact new shoulder material under and behind guiderail.

3.3 COMPACTION EQUIPMENT

- .1 Vibratory compaction equipment must be used and capable of obtaining required densities on aggregates on project.

3.4 COMPACTING

- .1 Density of granular base course will be determined according to ASTM D2922.

- .2 Compaction equipment to be capable of obtaining required material densities.
- .3 Compact to density not less than 100% maximum dry density in accordance with ASTM D698:
 - .1 Compaction of RAP for shoulder material shall be based on attained maximum density as determined from a test rolling strip.
- .4 Shape and roll alternately to obtain smooth, even and uniformly compacted base.
- .5 Apply water as necessary during compacting to obtain specified density. If aggregate is excessively moist, aerate by scarifying with suitable equipment until moisture content is corrected.
- .6 In areas not accessible to rolling equipment, compact to specified density with vibratory mechanical tampers approved by the Departmental Representative.
- .7 Equipment:
 - .1 Compaction equipment to be capable of obtaining required material densities.
 - .2 Efficiency of equipment not specified to be proved at least as efficient as specified equipment at no extra cost and written approval must be received from the Departmental Representative before use.
 - .3 Equipped with device that records hours of work, not motor running hours.

3.5 FINISH 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.
- .2 Density of Granular Base Course will be determined according to ASTM2922.
- .3 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.6 CLEANING

- .1 Leave Work area clean at end of each day.

3.7 PROTECTION

- .1 Maintain finished base in condition conforming to this section until succeeding material is applied or until acceptance by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 32 12 16 – Asphalt Paving.

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM) – Most Recent Edition:
 - .1 ASTM D140/D140M, Standard Practice for Sampling Bituminous Materials.
- .2 Nova Scotia Transportation and Infrastructure Renewal:
 - .1 Nova Scotia Transportation and Infrastructure Renewal (NSTIR), Division 4 Section 1.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for asphalt tack coat and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit two - 1 L samples of asphalt tack coat material proposed for use in new, clean, airtight, sealed, wide mouth plastic lined cans to Departmental Representative, at least 2 weeks prior to beginning Work.
 - .2 Sample asphalt tack coat material to: ASTM D140.
 - .3 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work to ASTM D140.

1.4 QUALITY ASSURANCE

- .1 Submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this Section.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

Part 2 Products

2.1 MATERIALS

- .1 To NSTIR, Standard Specification, Division 4 Section 1, Table 4.1.1 grade: RS-1.

- .2 Water: clean, potable, free from foreign matter.

Part 3 Execution

3.1 EQUIPMENT

- .1 Equipment required for Work of this Section to be in satisfactory working condition and maintained for duration of Work.
- .2 Pressure distributor:
 - .1 Designed, equipped, maintained and operated so that asphalt material can be:
 - .1 Maintained at a temperature not less than 20 °C nor more than 70°C.
 - .2 Applied uniformly on variable widths of surface up to 5 m.
 - .3 Applied at readily determined and controlled rates from 0.1 to 5.4 L/m² with uniform pressure, and with allowable variation from any specified rate not exceeding 0.1 L/m².
 - .4 Distribute in uniform spray without atomization at temperature required.
 - .2 Equipped with nozzle spray bar capable of being raised or lowered.
 - .3 Equipped with hand application wand.
 - .4 Cleaned if previously used with incompatible asphalt material.

3.2 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt tack coat installation in accordance with manufacturer's written instructions:
 - .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 approved to proceed by Departmental Representative.

3.3 APPLICATION

- .1 All milled and unmilled asphalt concrete surfaces to be tack coated before placement of new Hot Mix Asphalt (HMA).
- .2 Tack coat to be applied between lifts of new HMA.
- .3 Apply asphalt tack coat only on clean and dry surface.
- .4 Dilute asphalt emulsion as per manufacturer's recommendations.
- .5 Departmental Representative Tack coat to be applied at a rate of 0.14 l/m² unless otherwise directed by Departmental Representative.
- .6 Apply asphalt tack coat evenly to pavement surface.

- .7 Paint contact surfaces of curbs, gutters, and like structures with thin, uniform coat of asphalt tack coat material.
- .8 Apply asphalt tack coat only when air temperature greater than 10 °C and when rain is not forecast within 2 hours minimum of application.
- .9 Apply asphalt tack coat only on unfrozen surface.
- .10 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.
- .11 Keep traffic off tacked areas until asphalt tack coat has set.
- .12 Re-tack contaminated, or disturbed areas as directed by Departmental Representative.
- .13 Permit asphalt tack coat to break before placing asphalt pavement.
- .14 Inspect tack coat application to ensure uniformity:
 - .1 Re-spray areas of insufficient or non-uniform tack coat coverage as directed by Departmental Representative.
 - .2 Ensure tack coating performed using hand held devices is consistent in appearance with adjacent areas of machine applied material.

END OF SECTION

Part 1 General

1.1 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.2 DESCRIPTION

- .1 This section covers asphalt concrete on reconstructed roadbed and bridge and shall meet the general requirement of Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) Type “D-HF” except where noted. It also covers the construction of asphalt concrete for gutters and other required asphalt work. Asphalt paving of the bridge has additional requirements in Section 32 12 18 of these specifications.

1.3 REFERENCES

- .1 Nova Scotia Transportation and Infrastructure Renewal:
 - .1 Nova Scotia Department of Transportation and Infrastructure Renewal, Division 4, Section 2, Performance Graded Asphalt Binder (PGAB).
 - .2 Nova Scotia Transportation and Infrastructure Renewal, Division 4, Section 4, Asphalt Concrete Hot Mixed – Hot Placed (Method Specification).
 - .3 Nova Scotia Transportation and Infrastructure Renewal, Division 4, Section 8, Asphalt Concrete Paving of Bridge Decks.
 - .4 Nova Scotia Department of Transportation and Infrastructure Renewal, Division 4, Section 19, Asphalt Concrete End Product Specification (EPS).
 - .5 Nova Scotia Department of Transportation and Infrastructure Renewal, Test Method TPW TM-2, Modified Petrographic Analysis.
 - .6 Nova Scotia Department of Transportation and Infrastructure Renewal, Test Method TPW TM-3, Fractured Particle Test.
- .2 AASHTO, most recent edition:
 - .1 AASHTO T283 - Standard Method of Test for Resistance of Compacted Bituminous Mixture to Moisture Induced Damage.
 - .2 AASHTO MP1, Standard Specification for Performance Graded Asphalt Binder.
 - .3 AASHTO R29, Grading or Verifying the Performance Grade of an Asphalt Binder.
 - .4 AASHTO TP33 - Standard Test Method for Uncompacted Void Content of Fine Aggregate.

- .5 AASHTO M156, Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- .6 AASHTO M332, Performance Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test.
- .3 ASTM International, most recent edition:
 - .1 ASTM C88, Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
 - .2 ASTM C117, Test Method for Material Finer than 0.075 mm Sieve in Mineral Aggregates by Washing.
 - .3 ASTM C127, Test Method for Specific Gravity and Absorption of Coarse Aggregate.
 - .4 ASTM C128, Test Method for Specific Gravity and Absorption of Fine Aggregate.
 - .5 ASTM C131, Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .6 ASTM C136, Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .7 ASTM D2041, Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures.
 - .8 ASTM D2419, Test method for Sand Equivalent Values of Soils and Fine Aggregate.
 - .9 ASTM D2726, Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
 - .10 ASTM D2950, Standard Test Method for Density of Bituminous Concrete in place by Nuclear Methods.
 - .11 ASTM D3203, Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
 - .12 ASTM D4469, Standard Method for Calculating Percent Asphalt Absorption by the Aggregate in an Asphalt Pavement Mixture.
 - .13 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
 - .14 ASTM D6927, Standard Test Method for Marshall Stability and Flow of Asphalt Mixtures.

- .15 ASTM D6928, Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro Deval Apparatus.
- .16 ASTM D7428, Standard Test Method for Resistance of Fine Aggregate to Degradation by Abrasion in the Micro Deval Apparatus.
- .4 Asphalt Institute, Manual Series No. 2 (MS-2), Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types, Seventh Edition.
- .5 Nova Scotia Environment and Labour:
 - .1 1981 Asphalt Paving Plant Regulation.

1.4 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00-Submissions/Shop Drawings.
- .2 At least 4 weeks prior to commencing work, submit samples of following materials proposed for use:
 - .1 One 4 L container of asphalt cement.

1.5 MATERIAL CERTIFICATION

- .1 At least 4 weeks prior to commencing work, submit viscosity-temperature chart for asphalt cement to be supplied showing kinematic viscosity in mm²/s versus temperature range from 105° to 175° C.
- .2 At least 4 weeks before commencing work, submit refinery's test data and certification that asphalt cement meets the required Performance Graded (PG) grade, including the specific gravity of the asphalt cement.

1.6 SUBMISSION OF MIX DESIGN

- .1 Samples of aggregate for mix design shall be derived from stockpiles not less than 1000 tonnes of each of fine and coarse aggregate.
- .2 The Contractor shall submit, in writing, asphalt concrete mix design and trial mix test results to Departmental Representative for review at least 2 weeks prior to commencing work. The mix design shall contain the job mix formula which shall include the following:
 - .1 Grade, supplier and specific gravity of asphalt cement.
 - .2 Asphalt cement content.
 - .3 Gradation of each aggregate.
 - .4 Specific gravity and absorption of each aggregate.

- .5 Percentage of each aggregate.
- .6 Combined mix gradation.
- .7 Marshall stability and flow.
- .8 Mix bulk specific gravity.
- .9 Mix maximum theoretical density.
- .10 Percentage voids in mineral aggregate (VMA).
- .11 Percentage air voids.
- .12 Percentage voids filled with asphalt (VFA).
- .13 Percentage of absorbed asphalt cement.
- .14 Tensile Strength ratio (TSR, AASHTO T283).
- .15 Other specified physical properties of the aggregates.

1.7 DELIVERY AND STORAGE

- .1 Deliver and stockpile aggregates. Stockpile outside of park boundaries, a minimum 50% of total amount of aggregate required before commencing asphalt concrete operations.
- .2 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.
- .3 Stockpile fine aggregate separately from coarse aggregate.
- .4 Provide approved storage, heating tanks and pumping facilities for asphalt cement.
- .5 There will be no separate payment for mobilization and demobilization to site.

Part 2 Products

2.1 MATERIALS

- .1 Asphalt Binder: Performance Graded Asphalt Binder PGS58-28, in accordance with NSTIR Special Provision Specification, Division 4 – Performance Graded Asphalt Binder (PGAB) SPS, issued October, 2018.
- .2 The contractor shall be not be permitted to incorporate RAP into the Type “D-HF” asphalt mix:

- .3 Aggregate shall be produced from crushed quarried stone.
- .4 The total aggregate incorporated in the asphalt mix shall meet the following gradation requirements.

Sieve Designation	Cumulative % Passing Surface, Type "D-HF"
28 000	
20 000	
14 000	100
10 000	95 - 100
5 000	55 - 70
2 500	25 - 55
315	5 - 20
80	2 - 7

- .5 Aggregate Physical Properties:
- .1 Coarse aggregate is aggregate retained on 5000 µm sieve and fine aggregate is aggregate passing 5000 µm sieve when tested to ASTM C136.
- .2 Fine aggregate angularity: AASHTO TP33, Min 45%.
- .3 Sand equivalent: to ASTM D2419, Min: 50%.
- .4 Sodium sulphate soundness: to ASTM C88, Max loss by mass:
- .1 Coarse aggregate: 15%.
- .2 Fine aggregate: 10%.
- .5 Los Angeles abrasion: to ASTM C131, Max loss by mass, 30%.
- .6 Absorption: to ASTM C127 and C128. Max by mass:
- .1 Coarse aggregate: 1.75%.
- .2 Fine aggregate: 2.00%.
- .7 Micro Deval abrasion, coarse aggregate: to ASTM D6928, Max loss by mass, 17%.
- .8 Micro Deval abrasion, fine aggregate: to ASTM D7428, Max loss by mass, 18%.
- .9 Flat and elongated particles: to ASTM D 4791 (with length to thickness ratio greater than 4): Max by mass, 10%.

- .10 Crushed fragments: to TPW TM-3, Min. 100% of particles by mass to have at least 2 freshly fractured faces. Material to be crushed from quarried aggregate source.
- .11 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.
- .12 Petrographic Analysis: TPW TM-2 Modified Petrographic Analysis, Max. 135.
- .6 Mineral Filler:
 - .1 Finely ground particles of limestone, hydrated lime, Portland cement or other approved non-plastic mineral matter, thoroughly dry and free from lumps.
 - .2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed to improve mix properties.
 - .3 Mineral filler to be dry and free flowing when added to aggregate.
- .7 Anti-Stripping Agents:
 - .1 Do not use anti-strip agent without the approval of the Departmental Representative.
 - .2 Approval for the use of a liquid anti-stripping agent will only be granted should the testing (AASHTO T283) yield a long term TSR of the mix with anti-stripping is equal to or greater than 0.80.
 - .3 Requirements for liquid anti-stripping agent will also be based on past history of aggregates, and visual examination of test specimens.
 - .4 No additional payment shall be made for the use of anti-stripping agent in the mix.

2.2 ASPHALT CONCRETE MIX

- .1 Mix Design
 - .1 Mix design and Job Mix Formula to be provided by Contractor.
 - .2 Design mix by Marshall Method to requirements below and as directed by Departmental Representative:
 - .1 Compaction blows on each face of test specimens: 75.
 - .2 Mix Properties:

Property	Surface Type "D-HF"
Marshall Stability at 60°, kN, min	7.5
Marshall Flow Value, mm	2 - 4
Air Voids, %	2.5 - 4.0
Voids in Mineral Aggregate (VMA), % min	15.0
Voids Filled with Asphalt (VFA), %	65 - 78
Asphalt Stripping Test, % min	80

- .3 Asphalt cement content shall be determined by mix design.
- .4 Preparation and submission of an Asphalt Design Mix Formula (including all supporting documentation) is the responsibility of the Contractor.
- .5 The Contractor shall use professional engineering services and a qualified testing laboratory to assess the aggregate materials, asphalt binders, blending sands, mineral fillers, anti-stripping agents and asphalt cement rejuvenation agents proposed for use and to carry out the design of the asphalt concrete mix.
- .6 Measure physical requirements as follows:
 - .1 Marshall stability and flow value: to ASTM D6927.
 - .2 Compute void properties on basis of bulk specific gravity of aggregate (to ASTM D2041 and ASTM D2726). Make allowance for volume of asphalt cement absorbed into pores of aggregate.
 - .3 Air voids: to ASTM D3203.
 - .4 Asphalt Stripping: to AASHTO T283.
- .7 Do not change job-mix without prior approval of Departmental Representative. Should change in material be proposed, submit new job-mix to Departmental Representative for approval.
- .3 Job Mix Formula (JMF):
 - .1 Job Mix Formula to be established by Contractor, submitted and approved by Departmental Representative. Changes to the Job Mix to be approved by Departmental Representative.
 - .2 Contractor to submit a Job Mix Formula with production targets for the following parameters:

- .1 Gradation on the 5000µm and 80 µm sizes.
- .2 Asphalt cement content.
- .3 JMF Permissible Variation from Design Mix Formula:
 - .1 Gradation, 5000µm sieve size 5.0.
 - .2 Gradation, 80µm sieve size 1.0%.
 - .3 Asphalt cement, “D-HF” mix 0.35%.
- .4 Asphalt mix tolerances:
 - .1 Allowable variations from the JMF shall not exceed the limits provided in Section 2.2.4.
 - .2 Mix air voids to conform to Section 2.2.1.2.
 - .3 Permissible variation from Job Mix Formula:
 - .1 Gradation, 5000µm sieve size 6.0%.
 - .2 Gradation, 80µm sieve size 2.0%.
 - .3 Asphalt cement, “D-HF” mix 0.3%.
 - .4 Permissible variation of asphalt concrete temperature at discharge from plant, 5°C.

2.3 PLANT AND MIXING REQUIREMENTS

- .1 Feeder lines for loading asphalt cement to the asphalt tanks shall be elevated and drained and the use of diesel fuel to clean asphalt cement pump feeder lines is not permitted. When necessary to use diesel to flush lines and pump, all flushed material shall be collected and not permitted to enter asphalt cement tanks or dumped on the ground.
- .2 Batch and continuous mixing plants:
 - .1 Heat asphalt cement and aggregates to mixing temperatures specified as per the approved mix design. Do not heat asphalt cement above 164°.
 - .2 Before mixing, dry aggregates to a moisture content not greater than 0.5% by mass or to a lesser moisture content if required to meet mix design requirements.
 - .3 Based on current asphalt cement viscosity and specific gravity data measured at the plant, the required temperature of completed asphalt at the plant and at the paver is to be determined based on the consideration of current hauling and placing conditions.

- .4 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Aggregate will not be fed directly to the plant from the crusher.
- .5 Feed cold aggregates to plant in proportions that will ensure continuous operations.
- .6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.
- .7 Store hot screened aggregates in a manner to minimize segregation and temperature loss.
- .8 Maintain temperature of materials within plus or minus 5°C of specified mix temperature during mixing.
- .9 Mixing time:
 - .1 In batch plants, wet mixing shall continue as long as necessary to obtain a thoroughly blended asphalt concrete but not less than 30 s or more than 75 s.
 - .2 In continuous mixing plants, mixing time shall be not less than 45 s.
 - .3 Do not alter mixing time unless directed by Departmental Representatives.
- .3 Dryer drum mixing plant:
 - .1 Feed aggregates to burner end of dryer drum by means of a multi-bin cold feed unit and blend to meet job-mix requirements by adjustments of variable speed feed belts and gates on each bin.
 - .2 Meter total flow of aggregate by an electronic weigh belt system with an indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate and asphalt cement entering mixer remain constant.
 - .3 Provide for easy calibration of weighing systems for aggregates without having material enter drum.
 - .4 Make provisions for conveniently sampling the full flow of aggregate from the cold feed.
 - .5 Provide screens or other suitable devices to reject oversize particles or lumps of aggregates from cold feed prior to entering drum.
 - .6 Provide a system interlock which will stop all feed components if either asphalt or aggregate from any bin stops flowing.

- .7 Accomplish heating and mixing of asphalt concrete in an approved parallel flow dryer-mixer in which aggregate, and asphalt cement enter drum at burner end and travel parallel to flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt cement. Equip systems with automatic burner controls and provide for continuous temperature sensing of asphalt concrete at discharge, with a printing recorder that can be monitored by plant operator. Submit printer record of mix temperatures at end of each week.
- .8 Mixing period and temperature to produce a uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves plant to be less than 0.5%.
- .4 Temporary storage of hot asphalt concrete:
 - .1 Provide storage of sufficient capacity to permit continuous operation and designed to prevent segregation.
 - .2 Do not keep in storage bins in excess of 3 h.
 - .3 While producing asphalt concrete for this project, do not produce it for other users unless separate storage facilities are provided for materials supplied to this project.
- .5 Asphalt Storage Tank Dip Measurements
 - .1 The Contractor shall take dip measurements from asphalt cement storage tanks on a daily basis as well prior to starting and after finishing the production of asphalt mix for this project.
 - .2 The tank dip measurements shall be provided to the Departmental Representative, including charts indicating the volume of asphalt cement in the tank at the time of each measurement.

Part 3 Execution

3.1 EQUIPMENT

- .1 General: All equipment used on this project shall be in top operating condition because the project is located on a roadway with very steep grades and sharp curves.
- .2 Pavers: Mechanical grade controlled self-powered pavers capable of spreading asphalt concrete within specified tolerances, true to line, grade and crown indicated:
 - .1 Pavers to be equipped with automatic screed controls, as recommended by manufacturer for control on longitudinal grade and transverse slope.
 - .2 Pavers to be equipped with joint matching shoe to operate with longitudinal grade control.

- .3 Transverse slope control shall be capable of operating from either side of paver.
- .4 Pavers to be equipped with an approved 12 m ski:
 - .1 Where such ski is a flexible unit, it shall be equipped with a spring tensioned wire extending between brackets fitted on and slightly above each end of ski.
 - .2 Sensing grid shall ride on wire and not on ski.
 - .3 Equivalent paving technology may be submitted for approval by Departmental Representative.
- .3 Rollers: Sufficient number of rollers of type and mass to obtain specified density of compacted mix:
 - .1 Vibrator rollers:
 - .1 Minimum drum diameter: 1200 mm.
 - .2 At least one pneumatic roller shall be used.
- .4 Haul trucks: of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
 - .1 Boxes with tight metal bottoms.
 - .2 Covers (tarps) of sufficient size and weight to completely cover and protect asphalt concrete when truck fully loaded.
 - .3 In cool weather for long hauls, insulate entire contact area of each truck box.
 - .4 Truck tailgate assemblies must be such that they do not strike paver hoppers when emptying into the hopper.
- .5 Hand tools:
 - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
 - .2 Tamping irons having mass not less than 12 kg and a bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative, may be used instead of tamping irons.
 - .3 Straight edges, 3 m in length, to test finished surface.
- .6 Material Transfer Vehicle: Transfer asphalt concrete from haul units to spreader with an approved Material Transfer Vehicle.

3.2 PREPARATION

- .1 Apply tack coat in accordance with Section 32 12 15 – Asphalt Tack Coat prior to paving.
- .2 Verify all grades prior to paving.

3.3 TRANSPORTATION OF ASPHALT CONCRETE

- .1 Transport asphalt concrete to job site in vehicles clean of foreign material.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, at least once a day or as required. Elevate truck bed and thoroughly drain. No excess solution will be permitted. **Diesel fuel is not permitted.**
- .3 Schedule delivery of asphalt concrete for placing in daylight, unless Departmental Representative approves artificial lighting.
- .4 Deliver asphalt concrete to paver at a uniform rate and in an amount within capacity of paving and compacting equipment.
- .5 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place asphalt concrete at temperature within range as directed by Departmental Representative but not less than 135°.
- .6 Tarpaulins or other coverings for trucks must be of sufficient mass to prevent rapid cooling of asphalt concrete surface.

3.4 PLACING

- .1 Obtain approval of asphalt base and existing surface from the Departmental Representative and tack coat prior to placing asphalt.
- .2 Place asphalt concrete to thickness, grades and lines as indicated or as directed by Departmental Representative.
- .3 Placing Conditions:
 - .1 Place asphalt concrete only when air temperature is above 5°C and rising.
 - .2 When temperature of surface on which asphalt concrete is to be placed falls below 10°C, provide extra rollers as necessary to obtain required compaction before cooling.
 - .3 Do not place asphalt concrete when pools of standing water exist on surface to be paved, or during rain, or when surface is damp.
- .4 Place asphalt concrete in compacted lifts of thickness as indicated on drawings.
- .5 Spread and strike off asphalt concrete with self-propelled mechanical finisher.

- .6 Place individual mats so that the days paving leaves minimal exposed longitudinal cold joint (<100 m).
- .7 Construct longitudinal joints and edges true to design.
- .8 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
- .9 Correct irregularities in alignment left by paver by trimming directly behind machine.
- .10 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess asphalt concrete forming high points. Fill and smooth dips with asphalt concrete.
- .11 Do not broadcast asphalt concrete over surface.
- .12 The forward speed of the paver shall be regulated by capacity of the plant and the rollers but shall not exceed a forward speed of 10m/min.
- .13 When hand spreading is used:
 - .1 Approved wood or steel forms, rigidly supported to ensure correct grade and cross section, may be used. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.
 - .2 Distribute material uniformly. Do not broadcast material.
 - .3 During spreading operation, thoroughly loosen and uniformly distribute asphalt concrete by lutes or covered rakes. Reject asphalt concrete that has formed into lumps and does not break down readily.
 - .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
 - .5 Provide heating equipment to keep hand tools free from asphalt. Avoid high temperatures which may burn asphalt concrete. Do not use tools at a higher temperature than temperature of asphalt concrete being placed.

3.5 COMPACTING

- .1 Compact asphalt concrete continuously using established rolling pattern.
- .2 Do not change rolling pattern unless asphalt concrete changes or lift thickness changes. Change rolling pattern only as directed by Departmental Representative.
- .3 General:
 - .1 Provide at least three rollers or as many additional rollers as necessary to achieve specified pavement density.

- .2 Start rolling operations as soon as asphalt concrete can bear mass of roller without undue displacement of asphalt concrete or cracking of surface.
 - .3 Operate roller slowly initially to avoid displacement of asphalt concrete. For subsequent rolling do not exceed 5 km/h for static steel – wheeled rollers and 8km/h for pneumatic – tired rollers.
 - .4 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 30 impacts per meter of travel.
 - .5 Overlap successive passes of roller by at least one-half width of roller and vary pass lengths.
 - .6 Keep wheels of roller slightly moistened with water to prevent pick-up of asphalt concrete but do not over-water and do not use diesel fuel.
 - .7 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
 - .8 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
 - .9 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high side.
 - .10 Where rolling causes displacement of asphalt concrete, loosen affected areas at once with lutes or shovels and restore to original grade of loose asphalt concrete before re-rolling.
 - .11 Do not refuel rollers on fresh asphalt concrete.
- .4 Breakdown rolling:
- .1 Commence breakdown rolling with static steel wheeled roller vibratory roller immediately following rolling of transverse and longitudinal joint and edges.
 - .2 Operate rollers as close to paver as necessary to obtain the specified density without causing undue displacement.
 - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. Exceptions may be made when working on steep slopes or super-elevated sections.
 - .4 Use only experienced roller operators for this work.
- .5 Second rolling:

- .1 Use pneumatic-tired or combination pneumatic-tired and steel wheel rollers and follow breakdown rolling as closely as possible and while paving asphalt concrete temperatures allows maximum density from this operation.
- .2 Rolling shall be continuous after initial rolling until asphalt concrete placed has been thoroughly compacted.
- .6 Finish rolling:
 - .1 Use static finish roller to remove roller marks and achieve smooth driving surface.
- .7 The minimum asphalt compaction shall be 92.5% of Theoretical Maximum Relative Density (TMRD), in accordance with ASTM D3203, for full payment.
- .8 The Contractor will supply additional compaction equipment if required density is not achieved.
- .9 Gutters will be compacted with vibratory compactors which operate perpendicular to the direction of the gutter.

3.6 JOINTS

- .1 General:
 - .1 Trim vertical face to provide true surface and cross section against which new pavement may be laid. Remove loose particles.
 - .2 Paint joint face with tack coat emulsified asphalt cement prior to placing of fresh asphalt concrete.
 - .3 Overlap previously laid strip with spreader by 100 mm.
 - .4 Rake fresh asphalt concrete against joint and thoroughly tamp and roll.
 - .5 Remove surplus material from surface of previously laid strip. Dispose of surplus material as directed by Departmental Representative.
 - .6 Do not throw surplus material on freshly screened mat surface.
- .2 Transverse Joints:
 - .1 Carefully construct and thoroughly compact transverse joints to provide a smooth riding surface.
 - .2 Hold transverse joints to a minimum. When paving single width and maintaining traffic, construct one lane no farther than one-half total paving day.

- .3 Stagger joint locations 1.5 to 3.0 m. Schedule each day's paving operation to terminate adjacent lanes in any one area to within above specified joint locations.
- .4 Offset transverse joint in succeeding course by at least 600 mm.
- .3 Longitudinal Joints:
 - .1 Before rolling, carefully remove with a lute or rake and discard coarse aggregate in asphalt concrete overlapping joint.
 - .2 Roll longitudinal joints directly behind paving operation.
 - .1 Do not allow the temperature of the longitudinal to drop below 80°C before placing the adjoining lane.
 - .2 Joint heaters shall be required by the Departmental Representative if joint temperatures drop below 80°C before placing the next lane.
 - .3 Adjacent mat must be placed along any section of previously placed mat within three hours.
 - .3 Adjacent mats must be completed such that the maximum length of exposed joint is 100 m at the end of each day.
 - .4 When rolling with static roller, shift roller cover onto previously placed lane in order that no more than 150 mm of roll rides on edge of newly laid lane, then operate roller to pinch and press fines gradually across joint. Continue rolling until a thoroughly compacted neat joint is obtained.
 - .5 When rolling with vibratory roller, have most of drum width ride on newly placed lane with remaining 100 to 150 mm extending onto previously placed and compacted lane.
 - .6 When abutting lane is not placed in same day, or when joint is distorted during day's work by traffic or other means, carefully trim edge of lane to line and paint with a thin coating of asphalt before abutting lane is placed.
 - .7 Ensure joints are offset at least 150 mm from those in lower layers.

3.7 FINISH TOLERANCES

- .1 Finished asphalt concrete to be within 6 mm of design elevation but not uniformly high or low.
- .2 Finished asphalt concrete not to have irregularities exceeding 6 mm when checked with a 3 m straight edge placed in any direction.

3.8 TEMPORARY MARKINGS

- .1 The Contractor shall place temporary pavement markings before sunset following each day's work. Marking material, type and location shall be approved by the Departmental Representative.

3.9 DEFECTIVE WORK

- .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form a true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking or rippling. Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.10 QUALITY ASSURANCE/PAYMENT ADJUSTMENT

- .1 Quality Assurance testing for payment adjustment to be performed by Departmental Representative.
- .2 Smoothness:
 - .1 Rate adjustment for smoothness will be based on average IRI measured per 100 m per lane on surface course of asphalt concrete.
 - .2 Smoothness testing will be performed by Departmental Representative, using a Class 1 Inertial Laser Profiler.
 - .3 Rate adjustments will be applied to 100 m sections as follows:

IRI (mm/m)	Rate Adjustment (\$/100m Section)
0.00-0.30	\$400
0.31-0.50	\$350
0.51-0.60	\$300
0.61-0.70	\$250
0.71-0.80	\$200
0.81-0.90	\$150
0.91-1.00	\$50
1.01-1.10	\$00
1.11-1.20	\$-60
1.21-1.30	\$-190
1.31-1.40	\$-310
1.41-1.50	\$-440
1.51-1.60	\$-570
1.61-1.70	\$-720

IRI (mm/m)	Rate Adjustment (\$/100m Section)
1.71-1.80	\$-870
1.81-1.90	\$-1040
1.91-2.00	\$-1220
2.01-2.20	\$-1430
2.21-2.50	\$-1980
2.51-3.00	\$-3200
>3.00	Mandatory Repair

- .4 Any 100 m having an average IRI above 1.50 mm/m is deemed an optional repair and the Departmental Representative will decide on course of action.
- .5 Any 100 m section having an average IRI above 3.00 mm/m is considered a mandatory repair.
- .6 Repair will consist of milling and replacing the full depth and width of the surface, as determined by Departmental Representative. Repairs due to smoothness deficiencies are not paid by the Department.
- .3 Mix Tolerance:
 - .1 Loose mix samples will be collected every 800 tonnes by Departmental Representative, with a minimum of one (1) per day.
 - .2 Mix tolerances as per Section 2.2, if two consecutive samples deviate from the tolerances set forth in Section 2.2, the Departmental Representative may direct contractor to cease production until corrective action is taken to remedy production problems.
 - .3 Departmental Representative will determine sampling locations.
- .4 Asphalt Compaction:
 - .1 Compaction will be based on the average compaction of three (3) cores from stratified random locations each day of paving as determined by the Departmental Representative:
 - .1 At the discretion of the Departmental Representative, asphalt compaction cores for days with asphalt production of less than 300 tonnes may be combined with successive days when determining subplot locations.
 - .2 Theoretical maximum density will be based on the average of the day's loose mix samples.
 - .3 Payment adjustments as per the following table. Pay adjustments will be calculated based on daily compaction results:

Average Compaction (% of maximum theoretical density)	Adjustment \$/Tonne
>93.0	+0.50
92.5-93.0	+0.25
92.5	0.00
92.0-92.4	-0.25
91.5-91.9	-1.00
91.0-91.4	-2.00
90.5-90.9	-4.00
90.0-90.4	-6.00
89.5-89.9	-11.00
89.0-89.4	-16.00
<89.0	Reject

- .4 Reject hot mix asphalt will not be paid by Department and contractor will bear the cost of repairs, only original contract quantity will be paid.
- .5 Rejected hot mix asphalt will not be paid by Department and contractor will bear the cost of repairs.
- .6 Rejected asphalt to be removed and replaced.

END OF SECTION

Part 1 General

1.1 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 – Payment Procedures

1.2 RELATED REQUIREMENTS

- .1 Section 07 11 00 – Bridge Deck Waterproofing.
- .2 Section 32 12 13 – Asphalt Tack Coat.
- .3 Section 32 12 16 - Asphalt Paving.

1.3 REFERENCES

- .1 Nova Scotia Transportation and Infrastructure Renewal (NSTIR):
 - .1 Division 4, Section 8, Asphalt Concrete Paving of Bridge Decks

1.4 SUMMARY

- .1 This section consists of the application of asphalt concrete on the bridge deck and immediate approaches at the Grande Anse River Bridge after the waterproofing membrane and tack coat are applied.

Part 2 Products

2.1 MATERIALS

- .1 Asphalt Tack Coat: Rapid Setting Emulsified Asphalt RS-1 in accordance with Section 32 12 13 – Asphalt Tack Coat.
- .2 Asphalt Binder: Performance Graded Asphalt Binder PG58-28, in accordance with NSTIR Standard Specification, Division 4 Section 2 – Performance Graded Asphalt Binder (PGAB).
- .3 Asphalt Concrete: To requirements for Mix Type D-HF as provided in Section 32 12 16 of this specification.

Part 3 Execution

3.1 CONSTRUCTION

- .1 Equipment, transportation of mix, placing and compacting to be in accordance with Section 32 12 16 – Asphalt Paving except as noted in this Section.
- .2 Apply tack coat in accordance with Section 07 15 00 Bridge Deck Waterproofing.
- .3 Apply a tack coat of RS-1 emulsion to asphalt surface prior to placing the next lift of mix.

- .4 Place asphalt concrete paving of bridge deck and approach slabs in accordance with manufacturer's specifications of bridge deck waterproofing.
- .5 The deck shall be paved with Asphalt Mix Type D-HF at 2 lifts of 40 mm / lift.
- .6 Trucks or pavers shall not start, stop or turn too quickly on the deck as it could cause a rupture of the waterproofing. The paver shall travel at a maximum speed of 4 m per minute to provide maximum traction.
 - .1 Material Transfer Vehicle (MTV) shall be used in the placement of the surface lift of asphalt concrete on the bridge and approaches.
 - .2 If the plant providing asphalt mix for the paving of the bridge and approaches is located more than 100 km from the site, a Warm Mix additive shall be used in the asphalt mix.
- .7 Breakdown rolling of the asphalt concrete shall commence when the mat cools to 105°C, using a steel wheel roller weighing a minimum of 7 tonne. The steel wheel roller shall run off the deck to stop and turn. Vibratory rollers are not permitted to be used on bridge decks. Final rolling shall be performed with a pneumatic - tired roller, also running off the deck to stop and turn.
- .8 The final lift of asphalt mix shall provide a smooth transition between bridge and approaches.
 - .1 The transition from the roadway asphalt surface grade to the bridge deck asphalt grade shall require a smooth taper. The limits of the taper are shown on the project drawings and the taper should not exceed 1H:350V.
 - .2 The surface lift of asphalt on the bridge and approaches shall be placed as part of the roadway asphalt overlay paving.
 - .1 Temporary asphalt tapers will be required at the expansion joint to accommodate traffic until the surface asphalt lift is placed. These tapers shall extend for at least 2.0m on either side of the expansion joint and shall be removed immediately prior to placing the surface lift of asphalt.
 - .2 The thickness of the asphalt surface lift shall be tapered from 50mm at the start of the approach slabs to 40mm at the abutment centreline bearings at either end of the bridge deck, a distance of 7.3m.
- .9 Within 24 hours of paving of the deck and approach slabs, seal the interface between the asphalt concrete and the face of the curb by pouring waterproofing along the joint such that the material extends 25 to 50 mm from the face of the curb and to a thickness of 2 to 4 mm above the asphalt concrete.
- .10 Finish Tolerances and Defective Work to be in accordance with Section 32 12 16 – Asphalt Paving.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 REFERENCES

- .1 Nova Scotia Department of Transportation and Infrastructure Renewal – Standard Specification – (Latest Edition) – Division 2 – Earthworks, Section 9 Water for Compaction and Dust Control.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

Part 2 Products

2.1 MATERIALS

- .1 Water: to Departmental Representative's approval. All water required for roadway dust control must be acquired from outside the Park boundaries.
- .2 Use of salt water source for dust control is not permitted.

Part 3 Execution

3.1 APPLICATION

- .1 Apply water with equipment approved by Departmental Representative.
- .2 The initial application rate shall be 1.4 to 1.7 L/m² and subsequent applications if required shall be 0.6 to 0.8 L/m², or as directed by the Departmental Representative.
 - .1 Do not permit ponding or surface runoff.
- .3 Apply water with distributors equipped with means of shut-off and with spray system to ensure uniform application.

- .4 Application equipment shall be calibrated to provide the proper application rate.
- .5 Do not apply in periods of rain.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning:
 - .1 Leave Work area clean at end of each day.

END OF SECTION

Part 1 General

1.1 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.
- .2 No separate payment for:
 - .1 Painted Arrows
 - .2 Stop Bars
 - .3 Cross-hatching
 - .4 Symbols and Letters
 - .5 Parking Stall Lines

1.2 STANDARD

- .1 All work of this section shall comply with the requirement of the most recent version of Nova Scotia Department of Transportation and Infrastructure Renewal - Standard Specification – (Latest Edition) - Division 6 – Miscellaneous, Section 6 – Non-Coning Traffic Paint, except as amended herein.

1.3 REFERENCES

- .1 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) - Standard Specification – (Latest Edition) - Division 6 – Miscellaneous, Section 6 – Non-Coning Traffic Paint.
- .2 All pavement lines and markings shall be applied and performed in accordance with the Transportation of Canada (TAC) Manual on Uniform Traffic Control Devices for Canada (MUTDC), Part C.
- .3 Temporary Workplace Traffic Control Manual (TWTCM) (most recent version)

Part 2 Products

2.1 MATERIALS

- .1 Per the most recent version of the NSTIR- Standard Specification – (Latest Edition) - Division 6 – Miscellaneous, Section 6 – Non-Coning Traffic Paint.

Part 3 Execution

3.1 GENERAL

- .1 As per the requirements of the most recent version of the NSTIR- Standard Specification – (Latest Edition) - Division 6 – Miscellaneous, Section 6 – Non-Coning Traffic Paint, and in conformance with the Contract Documents.

- .1 The Contractor shall coordinate and complete pavement pre-marking. The pre-markings are to be accepted by the Departmental Representative prior to installation.

.2 TRAFFIC CONTROL

- .1 Traffic control shall be provided as per the NSTIR's TWTCM (latest edition).

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 REFERENCES

- .1 Nova Scotia Department of Transportation and Infrastructure Renewal - Standard Specification – (Latest Edition) – Division 7 – Environmental Protection, Section 5 – Hydroseeding.
- .2 Nova Scotia Department of Transportation and Infrastructure Renewal - Standard Specification – (Latest Edition) – Division 7 Section 6 – Dry Mulching.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for seed, mulch, tackifier, fertilizer, liquid soil amendments and micronutrients.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Submit in writing ten (10) days prior to commencing work:
 - .1 Volume capacity of hydraulic seeder in litres.
 - .2 Amount of material to be used per tank based on volume.
 - .3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.
- .4 Samples:
 - .1 Submit 0.5 kg container of each type of fertilizer used.
- .5 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

- .6 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
 - .1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.
 - .2 Inoculant containers to be tagged with expiry date.
- .3 Storage and Handling Requirements:
 - .1 Store fertilizer off ground and in accordance with manufacturer's recommendations.
 - .2 Replace defective or damaged materials with new.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with good environmental practice.
- .2 Divert unused fertilizer from landfill to official hazardous material collections site approved by the Departmental Representative.
- .3 Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

1.7 WARRANTY

- .1 For hydroseeding, 12 months warranty period is extended to 1 full growing season.
- .2 Contractor hereby warrants that hydroseeding will remain free of defects in accordance with General Conditions CCDC GC 12.3, but for 1 full growing season.
- .3 End-of-warranty inspection will be conducted by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations:
 - .1 Seed mixture: "Nova Scotia Highway Seed Mix":
 - .1 Mixture composition:
 - .1 40% Creeping Red Fescue.
 - .2 15% Timothy.
 - .3 15% Tall Fescue.
 - .4 10% Kentucky Blue Grass.
 - .5 10% Alsike Clover.
 - .6 5% Red Top.
 - .7 5% Perennial Rye.
 - .2 Mulch: specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:
 - .1 Type I mulch:
 - .1 Made from wood cellulose fibre.
 - .2 Organic matter content: 95% plus or minus 0.5%.
 - .3 Value of pH: 6.0.
 - .4 Potential water absorption: 900%.
 - .2 Type II mulch:
 - .1 Made from straw, processed to produce fibre lengths of 15 mm minimum and 25 mm maximum. Greater proportions of ingredients to be straw.
 - .3 Tackifier: water soluble vegetable carbohydrate powder.
 - .4 Water: free of impurities that would inhibit germination and growth.
 - .5 Fertilizer:
 - .1 To Canada "Fertilizers Act" and "Fertilizers Regulations".
 - .2 Complete synthetic, slow release with 35% of nitrogen content in water-insoluble form.
 - .6 Inoculants: inoculant containers to be tagged with expiry date.

Part 3 Execution

3.1 WORKMANSHIP

- .1 Do not spray onto structures, signs, guide rails, fences, plant material, utilities and other than surfaces intended.

- .2 Clean-up immediately, any material sprayed where not intended, to satisfaction of the Departmental Representative.
- .3 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.
- .4 Protect seeded areas from trespass until plants are established.

3.2 PREPARATION OF SURFACES

- .1 Fine grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.
- .2 Cultivated areas identified as requiring cultivation to depth of 25 mm.
- .3 Ensure areas to be seeded are moist to depth of 150 mm before seeding.

3.3 PREPARATION OF SLURRY

- .1 Measure quantities of materials by weight or weight-calibrated volume measurement satisfactory to the Departmental Representative. Supply equipment required for this work.
- .2 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.
- .3 After all materials are in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry.

3.4 SLURRY APPLICATION

- .1 Hydraulic seeding equipment:
 - .1 Slurry tank.
 - .2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.
 - .3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.
 - .4 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".
- .2 Slurry mixture application:
 - .1 Apply fertilizer, mulch and seeded slurry with hydraulic seeder at rate of 275 Kg per 100 square metres evenly in one pass.
- .3 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed:

- .1 Using correct nozzle for application.
- .2 Using hoses for surfaces difficult to reach and to control application.
- .4 Blend application 300 mm into adjacent grass areas or sodded areas to form uniform surfaces.
- .5 Re-apply where application is not uniform.
- .6 Remove slurry from items and areas not designated to be sprayed.
- .7 Protect seeded areas from trespass satisfactory to the Departmental Representative.
- .8 Remove protection devices as directed by the Departmental Representative.

3.5 MULCH

- .1 Dry mulch in accordance with the Nova Scotia Transportation and Infrastructure Renewal Standard Specification (Latest Edition).
- .2 Dry Mulch shall consist of local straw.
- .3 Dry Mulch shall be applied through blowing.

3.6 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following operations from time of seed application until acceptance by the Departmental Representative.
- .2 Grass Mixture:
 - .1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
 - .2 Fertilize seeded areas 10 weeks after germination provided plants have mature true leaves. Spread half of required amount of fertilizer in one direction and remainder at right angles; water in well.

3.7 ACCEPTANCE

- .1 Seeded areas will be accepted by the Departmental Representative provided that:
 - .1 Seeded areas are free of rutted, eroded, bare or dead spots.
 - .2 Areas have been fertilized.
- .2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.8 MAINTENANCE DURING WARRANTY PERIOD

- .1 Perform following operations from time of acceptance until end of warranty period:

- .1 Repair and reseed dead or bare spots to satisfaction of Departmental Representative.

3.9 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 03 20 00 – Concrete Reinforcing.
- .3 Section 31 05 16 - Aggregate Materials.
- .4 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .5 Section 31 24 13 - Roadway Embankment.
- .6 Section 31 32 19.01 – Geotextiles.
- .7 Section 31 37 00 – Rip-Rap.
- .8 Section 32 11 16.01 – Granular Sub-base.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 DESCRIPTION

- .1 The Work in this section includes the supply of all labour, supervision, materials, plant, equipment, and transportation necessary for the installation of pipe culverts as shown on the Drawings, per the Specifications, and as directed by the Departmental Representative, complete in every respect. All new culverts shall be reinforced concrete pipes.

1.4 SECTION INCLUDES

- .1 Materials and installation for pipe culverts.

1.5 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM):
 - .1 ASTM C14M-99, Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (Metric).
 - .2 ASTM C76M-02, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).
 - .3 ASTM C117-95, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .4 ASTM C136-01, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

- .5 ASTM C144-02, Standard Specification for Aggregate for Masonry Mortar.
- .6 ASTM C443M-02, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
- .7 ASTM D698-00a, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m³).
- .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 Canadian Standards Association (CSA International):
 - .1 CAN/CSA-A3000-08, Cementitious Materials Compendium:
 - .1 CAN/CSA-A5-98, Portland Cement.
 - .2 CAN/CSA-A257 Series-09, Standards for Concrete Pipe.
 - .3 CAN/CSA G401-07, Corrugated Steel Pipe Products.
- .4 Nova Scotia Department of Transportation and Infrastructure Renewal - Standard Specification – (Latest Editions) – Division 2 – Earthworks – Section 12 – Foundation Excavation.
- .5 Nova Scotia Department of Transportation and Infrastructure Renewal - Standard Specification – (Latest Editions) – Division 3 – Granular Materials – Section 2 – Gravel Type 1, 1S, 2 & M.
- .6 Nova Scotia Department of Transportation and Infrastructure Renewal - Standard Specification – (Latest Editions) – Division 5 – Structures – Section 12 – Underground Drainage Systems.

1.6 SUBMITTALS

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Inform the Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of bedding materials and provide access for sampling.
- .3 Submit to Departmental Representative for testing, at least 4 weeks prior to beginning Work, samples of materials proposed for use.
- .4 Submit manufacturer's test data and certification at least 4 weeks prior to beginning Work.
- .5 Certification to be marked on pipe.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in suitable locations as to not interfere with the work and protect it from damage.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .2 Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.
- .3 Divert unused aggregate materials from landfill to facility for reuse as approved by Departmental Representative.
- .4 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 CONCRETE PIPE

- .1 Reinforced concrete pipe: to CSA A257.
- .2 Rubber gaskets for joints: to CSA A257.
- .3 Cement mortar joint filler:
 - .1 Portland cement: to CSA A3000 - type 10.
 - .2 Sand: to ASTM C144.
 - .3 Mortar: one part by volume of cement to two parts of clean, sharp sand mixed dry. Add sufficient water after mixing to give optimum consistency for hand application.

2.2 MATERIALS

- .1 Precast and Cast-in-place concrete features to be designed by Contractor per manufacturer recommendations subject to the approval of the Departmental Representative.
- .2 Pipe designs (classes, thickness, bolt configurations, etc.) to be by manufacturer.
- .3 Precast Concrete pipe with beveled end sections and precast concrete cut-off walls are required in accordance with the contract drawings.

2.3 GRANULAR BEDDING

- .1 Granular bedding and backfill material to Section 31 05 16 - Aggregate Materials.

Part 3 Execution

3.1 TRENCHING

- .1 Do trenching Work in accordance with the contract drawings and NSTIR Standard Specifications.
- .2 Obtain the Departmental Representative's approval of trench line and depth prior to placing bedding material or pipe.

3.2 BEDDING

- .1 Place bedding in accordance with the contract drawings, NSTIR Standard Specifications or the manufacturer specifications; whichever is the most stringent.
- .2 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.
- .3 Place minimum thickness of 300 mm of approved granular material on bottom of excavation and compact to minimum 95% maximum density to ASTM D698.
- .4 Shape bedding to fit lower segment of pipe exterior so that width of at least 50% of pipe diameter is in close contact with bedding and to camber as indicated or as directed by the Departmental Representative.
- .5 Place bedding in unfrozen condition.

3.3 LAYING CONCRETE PIPE CULVERTS

- .1 Begin at downstream end of culvert with flanged end of first pipe section facing upstream.
- .2 Ensure first and last pipe sections are properly positioned and secured in cut-off wall.
- .3 Ensure barrel of each pipe is in contact with shaped bed throughout its length.
- .4 Allow water to flow through pipes during construction only as permitted by Departmental Representative.

3.4 JOINTS: CONCRETE PIPE CULVERTS

- .1 Joints may be made with rubber gaskets, bituminous jointing compound or Portland cement mortar:
 - .1 Rubber gasket joints:
 - .1 Install in accordance with manufacturer's written recommendations.
 - .2 Ensure that tapered ends are fully entered into flanged ends.
 - .2 Bituminous filled joint:

- .1 Make joint with excess of filler to form continuous bead around outside of pipe and finish smooth on inside.
- .3 Mortar joints:
 - .1 Prepare mortar as specified herein.
 - .2 Clean pipe ends and wet with water before joint is made.
 - .3 Place mortar in lower half of flanged end of pipe section in place.
 - .4 Apply mortar to upper half of tapered end of pipe section being installed.
 - .5 Join pipe ends and force joint up tight, taking care to ensure inner surfaces of abutting pipe sections are flush and even.
 - .6 Clean inside of pipe and annular space between ends of pipes after each joint is made.
 - .7 Fill joint with mortar and finish smooth and even.
 - .8 For pipes 800 mm or less diameter, fill joints before mortar in joints has set.
 - .9 For pipes over 800 mm diameter, postpone filling joint until backfilling has been completed. Re-clean joints before applying mortar.

3.5 BACKFILLING

- .1 Place backfill in accordance with contract drawings, NSTIR Standard Specifications and to the Approval of the Departmental Representative.
- .2 Backfill around and over culverts as indicated or as directed by the Departmental Representative.
- .3 Place backfill material, approved by the Departmental Representative in 150 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.
- .4 Compact each layer to 95% maximum density to ASTM D698 taking special care to obtain required density under haunches.
- .5 Protect installed culvert with minimum 900 mm cover (or as recommended by the Manufacturer) of compacted fill before heavy equipment is permitted to cross. During construction, width of fill, at its top, to be at least twice diameter or span of pipe and with slopes not steeper than 2:1.
- .6 Place backfill in unfrozen condition.

3.6 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.

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END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 03 20 00 – Concrete Reinforcing.
- .3 Section 31 05 16 - Aggregate Materials.
- .4 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .5 Section 31 24 13 - Roadway Embankment.
- .6 Section 31 32 19.01 – Geotextiles.
- .7 Section 31 37 00 – Rip-Rap.
- .8 Section 32 11 16.01 – Granular Sub-base.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM C76M, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).
 - .2 ASTM C443M, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).
 - .3 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - .4 ASTM C1433, Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers.
- .2 CSA International
 - .1 CAN/CSA A3000, Cementitious Materials Compendium.
 - .2 CAN/CSA A257 Series, Standards for Concrete Pipe and Manhole Sections.

1.4 ACTION AND INFORMATION SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 The Contractor shall submit, shop drawings for each precast concrete box culvert, containing but not limited to, the following information.

- .3 Station of culvert, name of watercourse, and Parks Canada Contract number and description;
- .4 General layout showing all box culvert sections and appurtenances;
- .5 Length and weight (mass) of individual sections;
- .6 Joint details (including gap, gasket, connection plates and waterproofing);
- .7 Proposed construction joints (if sections not cast monolithically);
- .8 Location and type of inserts and lift devices (including location where rebar and/or mesh will be cut for lifting anchors);
- .9 Location of reinforcing steel;
- .10 Bar schedules for all reinforcing steel;
- .11 Itemized supply list;
- .12 Detail showing year of fabrication embedded in the headwalls;
- .13 Concrete design strength, age of test, form removal strength and shipping strength;
- .14 Two sets of design calculations; and
- .15 Location of manufacturing plant. Product Data:
- .3 The proposed mix proportions (design), shall be submitted to the Departmental Representative for review at least 14 Days before concrete production is due to start.
 - .1 The Contractor shall submit a production schedule to the Departmental Representative.
 - .2 The Contractor shall submit to the Departmental Representative the proposed method and sequence to be employed for the curing and protection of the precast concrete sections.
- .4 The Contractor shall submit, in advance of the commencement of the Work, the manufacturer's certification that the materials to be supplied for the fabrication meet the specified requirements.
- .5 Samples:
 - .1 Inform Departmental Representative at least 2 weeks before beginning Work, of proposed source of bedding and backfill materials and provide access for sampling.
- .6 Certification: To be marked on pipe.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with this Section and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory

packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

- .1 Store materials in accordance with manufacturer's recommendations.
- .2 Store and protect pipes from damage.
- .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 CONCRETE BOX CULVERT PIPE

- .1 All materials shall be supplied by the Contractor.
- .2 Concrete shall meet the requirements of CSA A23.1 and CSA A23.2.
 - .1 Exposure Class shall be C-1.
 - .2 Air content shall be 5 to 8%.
- .3 Joint waterproofing material shall be Rub'r-Nek, size per joint seal manufacturer's written recommendation, or approved equivalent.
- .4 Exterior joint wrap shall be 300 mm wide Conwrap, ConSeal CS-212 or approved equivalent, with primers recommended by the manufacturer.
- .5 The calcium nitrite corrosion inhibitor shall conform to the following:
 - .1 The dosage rate shall be 15 l/m³.
 - .2 The corrosion inhibiting calcium nitrite admixture shall contain between 30% to 36% calcium nitrite by weight of solution.
 - .3 The calcium nitrite shall be added at the concrete ready-mix plant and verification shall be provided to the Departmental Representative for the quantity of the calcium nitrite added to each batch of concrete.
 - .1 Acceptable verification shall include, but is not necessarily limited to, printouts from computerized batch plants or printouts from computerized admixture dispensing units.
 - .2 Verification shall be provided on the delivery slip.
- .6 Dowels for attachment of cut-off walls to box culverts shall be 25M deformed reinforcing steel bars.
- .7 Reinforcing steel shall be rebar conforming to Section 03 20 00 – Concrete Reinforcing and/or welded deformed steel wire fabric conforming to ASTM A1064.
 - .1 Welding of reinforcing steel, including tack welding, is prohibited unless otherwise indicated on the Contract Documents.
- .8 Weirs, baffles and headwalls shall be reinforced and secured to the culvert by method approved by the Departmental Representative and moist cured for a minimum of 72 hours.
 - .1 When drilled holes and dowels are used to attach weirs/baffles to the invert and

- headwalls to boxes, the holes shall be drilled to a minimum depth of 100 mm, and the dowels shall be secured with an epoxy or acrylic adhesive such as Epcon A7 or approved equivalent.
- .2 Reinforcement shall be placed in both faces of weirs, baffles, headwalls and cut-off walls.
- .1 The maximum spacing of reinforcing steel for cut-off walls, headwalls and weirs/baffles shall be 300 mm.
- .3 The concrete for precast weirs, baffles, headwalls and cut-off walls shall have an air content of 5 to 8%.
- .4 Weirs, baffles, headwalls and cut-off walls shall be made with the same concrete requirements as the culvert.
- .9 Non-shrink grout shall conform to ASTM C1107.
- .10 Levelling sand shall be clean, non-plastic, free of deleterious materials and shall be a natural or manufactured crusher dust obtained from crushing bedrock.
- .1 Sand (including crusher dust) shall meet the specified grading limits, when tested in accordance with ASTM C136:
- .1 Gradation to:
- | ASTM
Sieve Size | Percent Passing |
|--------------------|-----------------|
| 9.5 mm | 100 |
| 4.75 mm | 95 – 100 |
| 2.36 mm | 80 – 100 |
| 1.18 mm | 50 – 90 |
| 600 µm | 25 – 65 |
| 300 µm | 10 – 35 |
| 75 µm | 2 – 10 |
- .11 Lifting anchorage devices shall be Dayton Superior Swift Lift Systems or equivalent, of sufficient capacity for handling and placing the culvert sections.
- .12 Rigid sheets (boards, plywood, sheet metal or similar) for placing under joints shall be of sufficient durability so as to allow adjacent culvert sections to slide into place.
- .1 The supplied rigid sheets shall be of a length to extend beyond each side of the box culvert.
- .13 Reinforcing supports shall be made of plastic, stainless steel or galvanized steel with a minimum of 25 mm of cover.
- .14 Side for spacers shall be made entirely of plastic or entirely of stainless steel.

2.2 GRANULAR BEDDING AND BACKFILL

- .1 Granular bedding and backfill material to Section 31 05 16 - Aggregate Materials and following requirements:

- .1 Type 2 gravel material in accordance with Section 32 11 16.01 – Granular Sub-Base

2.3 WATERPROOFING

- .1 The waterproofing system shall be a manufactured waterproofing membrane system consisting of a primer, a membrane, a mastic and a protection board and shall be used on concrete box culverts. The waterproofing shall cover the top and full depth on the sides.
 - .1 Protection board shall be Vibraflex Type 70 or IKO 1/8" Protecto Board or approved equivalent and having a maximum absorption of 3%.

Approved Waterproofing Systems

Manufacturer	Product
W. R. Grace & Co. of Canada	Bituthene 4000
Soprema Inc.	Colphene 3000
Royston Laboratories	H P Membrane
Protecto Wrap Company	Jiffy Seal 140/160

- .2 Materials shall be stored at least 100 mm off the ground in a weatherproof enclosure.

Part 3 Execution

3.1 GENERAL

- .1 The Contractor shall carry out the Work as indicated in the Contract Documents and/or as specifically directed by the Departmental Representative.
- .2 The Contractor shall comply with the requirements of CSA A23.4 and ASTM C1433 with respect to fabrication, transportation, storage and delivery of the precast concrete box culvert sections.
 - .1 Reinforcing steel bars shall have a minimum concrete cover of 55 mm \pm 10 mm.
 - .2 At joints, the minimum concrete cover shall be 13 mm for all longitudinal steel from the end of the bell and spigot.
 - .3 For circumferential steel, in the bell and spigot, the minimum concrete cover shall be 13 mm and the maximum concrete cover shall be 50mm.
- .3 All aspects of precast concrete work shall comply with CSA A23.1 and CSA A23.4 and shall be to the satisfaction of the Departmental Representative.
- .4 Manufacture of the box culvert sections shall not commence until the shop drawings have been reviewed by the Departmental Representative.
 - .1 The Departmental Representative's written notice of review of the shop drawings shall in no way relieve the manufacturer of the responsibility for correctness of dimensions, size of components and details of fabrication in accordance with Clause 1.3.2.

- .5 The Contractor shall ensure that the manufacturer notifies the Departmental Representative at least 5 days in advance of the commencement of any phase of the manufacture.
 - .1 The Departmental Representative shall have the right to inspect the manufacture of the precast sections, and the authority to order the Work to stop if it does not conform to the Plans, Shop Drawings or Specifications.
 - .2 The manufacturer shall ensure that safe working conditions exist for the Departmental Representative.
- .6 Shop drawings may show a design with wall and slab thicknesses different from those on the Plans, but the inside dimensions (ID) of the span and the rise shall not be less than those indicated on the Plans.
- .7 The cured culvert sections shall be fitted horizontally at the plant to a gasket-free gap of 10 mm or less, and the joints so fitted shall be sequentially numbered on the outside of each unit, to ensure proper fit at the Work Site.

3.2 CULVERT DESIGN

- .1 Box culvert design shall be in accordance with the latest editions of CAN/CSA-S6 for the worst-case loading of either 0.7 m of earth fill or finished grade plus 1.0 m of earth fill.
 - .1 Earth fill material shall have a design density of 2.15 t/m³ and a soil structure interaction factor of 1.15.
- .2 The live loading shall conform to CL-625 live loading.
- .3 Box culvert design shall be carried out using the "CHBDC" design option contained within the latest edition of the "BOXCAR" software sponsored by the American Concrete Pipe Association.

3.3 FORMS

- .1 Forms shall be of a configuration to ensure compliance with the allowable tolerances.
- .2 Forms shall be clean and free of mortar prior to application of form coating.
- .3 Forms shall be complete and inspected by the Departmental Representative before placing of concrete shall be permitted.
- .4 Permanently exposed sharp edges shall be chamfered with triangular fillets, 19 mm by 19 mm, made of steel, plastic, or clear straight-grained wood placed on the side exposed to concrete.
- .5 The minimum cover over form snap-ties shall be 50 mm and the voids shall be filled to their entire depth with an approved cement grout mix

3.4 MATERIALS TESTING

- .1 Sampling, test cylinders and air content tests shall be performed by the manufacturer in accordance with CSA A23.2.
 - .1 A strength test is defined as a minimum of 2 cylinders broken at the specified age, with additional cylinders broken at earlier dates for production purposes.

- .2 For dry-cast precast concrete sections, air content shall be tested on every section and a strength test shall be taken on every second section.
- .3 For wet-cast precast concrete sections, air content and one strength test shall be taken on every section.
- .4 If superplasticizers are added, the air content test shall be performed after the addition of the superplasticizer.

3.5 FINISHING OF CONCRETE SURFACES

- .1 All surfaces of the precast concrete sections shall receive an "Ordinary Surface Finish" in accordance with the following:
 - .1 All surface voids larger than 12mm in diameter and cavities, or holes visible upon the removal of the formwork, shall be filled to their entire depth with an approved cement grout mix of cement and fine sand from the same source as used in the concrete and incorporate a latex bonding agent.
 - .2 All objectionable fins, projections, offsets, streaks or other surface imperfections shall be totally removed to the Departmental Representative's satisfaction.
 - .3 If the concrete surface does not adequately fulfill the requirements for Ordinary Surface Finish, the Contractor shall, as directed by the Departmental Representative, entirely remove certain designated portions, or all of the concrete, and replace with new concrete.
- .2 Immediately after the removal of forms, any part of the work which displays defects shall be clearly marked and the Contractor shall notify the Departmental Representative of the location and extent of the defect.
 - .1 The Contractor shall submit a repair procedure for approval.
 - .1 Cement washes of any kind shall not be used.
 - .2 All defects shall be finished smooth, uniformly colour matched and flush with the adjacent surface.
- .3 All ridges occurring at junctions of form panels shall be ground smooth.
- .4 Exposed ends of lifting devices that have been cut off shall be painted with an approved coating to prevent rusting.

3.6 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for precast concrete box culvert installation in accordance with manufacturer's written instructions.
 - .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.

3.7 PREPARATION

- .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, according to requirements of authorities having jurisdiction and sediment and erosion control plan or requirements of authorities having jurisdiction, whichever is more stringent.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.8 TRENCHING

- .1 Do trenching Work in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Obtain Departmental Representative's approval of trench line and depth prior to placing bedding material or precast concrete box culvert.
- .3 Dewater excavation, as necessary, to allow placement of culvert bedding in dry conditions.

3.9 CULVERT PLACEMENT

- .1 Following placement and backfilling of the cut-off wall, the top horizontal surface of the cut-off wall shall be "battered" with a 25 mm layer of non-shrink grout and the bevelled end section shall be immediately set into place on the cut-off wall.
- .2 With the end section in place, the Contractor shall core drill 30mm diameter holes through the end section and to a nominal depth of 150 mm into the top of the cut-off wall.
- .3 The 25M dowels shall be inserted and secured into place using an epoxy or acrylic adhesive such as Epcon A7 or an approved equivalent.
- .4 The Contractor shall place a minimum thickness of 50 mm of bed levelling sand, compacted and raked or screeded to provide a uniform bedding surface, over the entire foundation area of the culvert.
- .5 A rigid sheet shall be installed flush with the bed levelling material surface and centred under each joint of the culvert sections, such that when sections are joined, sand and other materials are prevented from entering and contaminating the joint.
- .6 Precast concrete box culvert sections shall be erected in the sequence indicated on the manufacturer's shop drawings.
 - .1 Deviation from the manufacturer's shop drawings shall not be permitted without the written authorization of the Departmental Representative.
- .7 Culverts sections shall be joined in a straight line using industry methods, with the bell end up grade. Each culvert section shall be set into place and positioned together as recommended by the manufacturer of the lifting device.

- .1 After final alignment of each box culvert section by overhead means, homing shall be performed by jacking or winching with “come-alongs” attached to the inner anchors while the box culvert section is still suspended.
- .2 Boxes that are subsequently moved after the gasket joint seal has been compressed, will require re-installation with a replacement gasket.
- .8 The maximum joint gap between any two box culvert sections shall be 20 mm uniformly across the joint with the sections in straight alignment.
 - .1 Sections set to a joint gap greater than 20 mm shall be removed and reset to the specified gap.
 - .2 Sections which cannot be reset as Clause 3.9.7 shall be rejected.
- .9 After satisfactory placement of the culvert sections, all anchor pockets shall be filled with non-shrink grout.
- .10 Joint seal and exterior wrap material and appurtenances shall be installed in accordance with the manufacturer's specifications.
 - .1 Joint seal shall be placed around the entire joint.
- .11 No traffic or Equipment shall be allowed to cross over the installed box culvert until a minimum of 1000 mm of backfill material has been placed over the box culvert in the area of crossing.
- .12 Shoring, bracing, sheeting, pumps, temporary roads and/or bridges that are necessary for the Work shall be employed, maintained and removed by the Contractor.
- .13 Allow water to flow through pipes during construction only as permitted by Departmental Representative.

3.10 WATERPROOFING

- .1 All concrete surfaces shall be dry and free of foreign materials prior to priming.
 - .1 Any primed surfaces left overnight shall be re-primed prior to membrane application.
- .2 The Contractor shall prepare the area and install the waterproofing system in accordance with the manufacturer's installation specifications and instructions.
- .3 For all waterproofing applications, the following shall apply:
 - .1 The membrane shall be protected with the specified protection board, adhered to the waterproofed surface.
 - .2 Any protection board which is to be left exposed for more than 48 hours shall be protected from sunlight exposure in accordance with the manufacturer's instructions.
- .2 All exposed edge terminations shall receive a troweled bead of mastic.
- .3 For concrete box culverts:
 - .1 The membrane shall be applied in strips perpendicular to the long axis of the culvert.

- .2 The protection board shall be applied over the top of the waterproofing system, on both the top and sides and adhered to the membrane by placing gobs of the mastic at 600 mm centres between the two surfaces.
- .3 Apply a neoprene strip over the joints once they are waterproofed to protect them from puncture when backfilled.
- .4 The protection boards shall be butted tightly and shall be oriented vertically when coverage of the sides is specified and in all cases shall completely cover the applied waterproofing system.

3.11 BACKFILLING

- .1 Backfilling: as specified in Section 31 23 33.01 – Excavating, Trenching and Backfilling.
- .2 No backfill shall be placed in the excavation until the excavation has been approved by the Departmental Representative, including but not limited to the dimensions of the excavation and the character of the foundation materials.
 - .1 Material over 75 mm in size shall not be placed within 300 mm of the culvert.
 - .2 Backfill shall be placed in lifts of not more than 200 mm in thickness fir vibratory plate or rammer-type compactors and not more than 300 mm in thickness for vibratory rollers.
 - .3 Backfill shall be compacted to a minimum of 100% of the Standard Proctor Density in accordance with ASTM D698.
 - .4 Backfilling of box culverts shall proceed simultaneous and evenly on both sides of the box culvert and shall never exceed 600 mm in differential elevation.

3.12 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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .3 Section 32 11 16.01 – Granular Sub-Base.
- .4 Section 32 11 23 – Aggregate Bases Courses.

1.2 MEASUREMENT FOR PAYMENT

- .1 See Section 01 29 00 - Payment Procedures.

1.3 STANDARD

- .1 All work of this section shall comply with the requirement of the most recent version of the Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) - Standard Specification – (Latest Edition) - Division 5 – Section 6 – Steel Guard Rail Systems and Wooden Guide Posts, except as amended herein.

1.4 REFERENCES

- .1 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) - Standard Specification – (Latest Edition) - Division 5 – Section 6 – Steel Guard Rail Systems and Wooden Guide Posts

Part 2 Products

2.1 MATERIALS

- .1 Per the most recent version of the Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) - Standard Specification – (Latest Edition) - Division 5 – Section 6 – Steel Guard Rail Systems and Wooden Guide Posts.

Part 3 Execution

3.1 GENERAL

- .1 As per the requirements of the most recent version of the Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) - Standard Specification – (Latest Edition) - Division 5 – Section 6 – Steel Guard Rail Systems and Wooden Guide Posts.

- .2 150 mm x 150 mm posts and blocks will not be permitted. All posts and blocks shall be 200 mm x 200 mm.
- .3 Bury both ends of guard rail, as per NSTIR standard drawing (HS520).
- .4 Roadside barrier at concrete bridge approach, as per NSTIR standard drawing (HS521).
- .5 2 – 100 mm 20d galvanized spike toe nails are required through the block into each post.
- .6 Cutting of posts is not permitted without approval of the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .3 Section 03 20 00 – Concrete Reinforcing.

1.2 MEASUREMENT PROCEDURES

- .1 See Section 01 29 00 – Payment Procedures.

1.3 REFERENCES

- .1 Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) - Standard Specification – (Latest Edition) - Division 5 – Section 8 – Precast Portland Cement Concrete, Reinforced and Prestressed.

1.4 REQUIREMENTS

- .1 Locate any buried utilities at the site prior to performing the work.
- .2 Minimum sling angle to be 60 degrees unless noted otherwise.
- .3 Contractor to handle precast units ensuring equal load distribution.
- .4 Contractor responsible for ensuring all lifting rope, spreader beams, shackles, rope fittings and master links meet required safe working loads.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 The Contractor shall submit for approval, in advance of the work, the type of form coating proposed.
- .3 The Contractor shall submit, in advance of the work, the manufacturer's certification that the materials supplied meet the specified requirements.
- .4 The Contractor shall submit concrete mix design proportions and appropriate mix design test data.
- .5 Submittals are required in accordance with any cross-referenced Item forming part of this Item.

- .6 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Nova Scotia.
 - .2 The shop drawings shall show concrete barrier shape, steel reinforcement size and placement details, bar bending schedule, barriers' connection system, anchorages of concrete barriers to the ground, and details of the lifting devices for removing the precast barrier element from the form and for installation of the precast concrete barriers.

Part 2 Products

2.1 MATERIALS

- .1 Precast F-Shape Concrete Barriers shall meet NSTIR F-Shape Barrier specifications.
- .2 All reinforcing steel shall be grade 400W and conform to CAN/CSA G30.18.
- .3 All welded wire mesh shall have a $F_y = 485$ MPa and conform to ASTM A1064-10.
- .4 Minimum concrete strength to be 21 MPa at time of stripping.
- .5 Concrete materials and methods of construction to CAN/CSA A23.1 and methods of test for concrete to CAN/CSA A23.2.
- .6 Concrete curing shall be in accordance with CAN/CSA A23.1.
- .7 Concrete requirements:
 - .1 Concrete exposure class: F1
 - .2 28-day minimum compressive strength = 45 MPa.
 - .3 Air content: 5-8%
 - .4 Maximum water-to-cement materials ratio = 0.4
 - .5 Nominal aggregate size 13 mm.

Part 3 Execution

3.1 BARRIER CONNECTIONS

- .1 The precast concrete barrier connections shall be JJ Hook system.
 - .1 The maximum joint gap between barrier sections shall be 25 mm.
 - .2 Where the joint gap exceeds the above tolerances, barrier sections shall be removed and reset to meet the specified tolerance, at the Contractor's expense.

3.2 FINISHING OF CONCRETE SURFACES

- .1 The top of the precast section shall have a smooth wood float finish, and all permanently exposed surfaces shall be true and smooth.
- .2 Small surface voids due to entrapped air shall be filled with an approved cement mixture. All ridges at junctions of form panels and all bottom edges shall be ground smooth.
- .3 No patching of defects other than minor surface imperfections shall occur without the Departmental Representative's approval.

3.3 TOLERANCES

- .1 Allowable tolerances for the concrete dimensions of the barriers shall be ± 3 mm.

3.4 HANDLING, STORAGE AND SHIPPING

- .1 Precast concrete units shall be handled and transported with care to avoid damage. Any damage to units resulting for handling, storage and shipping will not be accepted and must be replaced with new units at no additional cost. Lifting devices or holes shall be consistent with industry standards. Lifting shall be accomplished with methods or devices intended for this purpose as indicated on shop drawings.
 - .1 Upon request, the Contractor shall provide documentation on acceptable handling methods for the barriers.
- .2 Precast concrete sections shall be stored in a manner that will minimize potential damage.
- .3 Transportation and delivery of the barriers shall be in compliance with CSA A23.4 and CSA A251.
 - .1 The barriers shall be stored and transported in an upright position at all times and be lifted by the inserts or other approved devices
 - .2 Barriers shall not be shipped until the specified 28-Day compressive strength has been reached.
 - .3 During transportation, the barriers shall be supported on a dry firm base with truck bolsters or battens no less than 100 mm wide and padded with 50 mm of rubber to prevent chipping of the concrete.

3.5 GENERAL

- .1 Where required, extend the roadway shoulder to the widths as indicated on the Contract Drawings. All materials shall be placed and compacted under the supervision of the Departmental Representative.
- .2 Contractor shall ensure proper care during installation in not to damage the existing retaining wall during placement and anchorage.
- .3 The Contractor shall install the barrier sections as indicated in the Contract Drawings and/or as directed by the Departmental Representative.

- .4 Barrier sections in association with all connections shall be supplied by the Contractor.
- .5 Barriers shall be joined together by JJ hook connection system. Connections shall be tight as practicable to limit deformation and rotation of the barriers.
- .6 Barrier sections shall be installed level in the transverse direction to the specified alignments and joined together to form a continuous structure.
- .7 Each precast concrete barrier sections shall be anchored to the roadway to prevent lateral movement of the barrier.
- .8 Existing Jersey Barrier removed must be replaced with new Precast F-Shape Concrete Barriers at the end of the day, prior to opening both lanes to public. A Temporary F-Shape Barrier may be approved following request by Contractor and acceptance by Departmental Representative.
- .9 Existing Jersey Barriers are to be removed, hauled and stored at the Parks Canada Pleasant Bay Salt Storage yard as per the direction of the Departmental Representative.

END OF SECTION

PCA

APPENDICES

Project No. 1114

Pleasant Bay to North Mountain

February 2019

KM 33.17 to 38.74

Appendix A

Geotechnical Report (2018)

The Table below summarizes the pavement structure thickness along this Contract:

Pavement Thickness Summary

Auger Probe No.	Station	Asphalt Thickness (mm)	Granular Thickness (mm)
AP01	Sta. 33+650	230	380
AP02	Sta. 34+420	203	407
AP03	Sta. 34+900	216	394
AP04	Sta. 35+400	146	464
AP05	Sta. 36+080	196	414
AP06	Sta. 36+600	203	407
AP07	Sta. 37+080	172	438
AP08	Sta. 37+600	222	388
AP09	39+060	203	407
AP10	38+600	216	394

STATEMENT OF GENERAL CONDITIONS

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Stantec Consulting Ltd. and the Client. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Stantec Consulting Ltd.'s present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Stantec Consulting Ltd. is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state or province of execution for the specific professional service provided to the Client. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Stantec Consulting Ltd. at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Stantec Consulting Ltd. must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Stantec Consulting Ltd. will not be responsible to any party for damages incurred as a result of failing to notify Stantec Consulting Ltd. that differing site or subsurface conditions are present upon becoming aware of such conditions.

PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Stantec Consulting Ltd., sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Stantec Consulting Ltd. cannot be responsible for site work carried out without being present.

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

<i>Rootmat</i>	- vegetation, roots and moss with organic matter and topsoil typically forming a mattress at the ground surface
<i>Topsoil</i>	- mixture of soil and humus capable of supporting vegetative growth
<i>Peat</i>	- mixture of visible and invisible fragments of decayed organic matter
<i>Till</i>	- unstratified glacial deposit which may range from clay to boulders
<i>Fill</i>	- material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

<i>Desiccated</i>	- having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
<i>Fissured</i>	- having cracks, and hence a blocky structure
<i>Varved</i>	- composed of regular alternating layers of silt and clay
<i>Stratified</i>	- composed of alternating successions of different soil types, e.g. silt and sand
<i>Layer</i>	- > 75 mm in thickness
<i>Seam</i>	- 2 mm to 75 mm in thickness
<i>Parting</i>	- < 2 mm in thickness

Terminology describing soil types:

The classification of soil types are made on the basis of grain size and plasticity in accordance with the Unified Soil Classification System (USCS) (ASTM D 2487 or D 2488) which excludes particles larger than 75 mm. For particles larger than 75 mm, and for defining percent clay fraction in hydrometer results, definitions proposed by Canadian Foundation Engineering Manual, 4th Edition are used. The USCS provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing cobbles, boulders, and non-matrix materials (organic matter or debris):

Terminology describing materials outside the USCS, (e.g. particles larger than 75 mm, visible organic matter, and construction debris) is based upon the proportion of these materials present:

<i>Trace, or occasional</i>	Less than 10%
<i>Some</i>	10-20%
<i>Frequent</i>	> 20%

Terminology describing compactness of cohesionless soils:

The standard terminology to describe cohesionless soils includes compactness (formerly "relative density"), as determined by the Standard Penetration Test (SPT) N-Value - also known as N-Index. The SPT N-Value is described further on page 3. A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
<i>Very Loose</i>	<4
<i>Loose</i>	4-10
<i>Compact</i>	10-30
<i>Dense</i>	30-50
<i>Very Dense</i>	>50

Terminology describing consistency of cohesive soils:

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by *in situ* vane tests, penetrometer tests, or unconfined compression tests. Consistency may be crudely estimated from SPT N-Value based on the correlation shown in the following table (Terzaghi and Peck, 1967). The correlation to SPT N-Value is used with caution as it is only very approximate.

Consistency	Undrained Shear Strength		Approximate SPT N-Value
	kips/sq.ft.	kPa	
<i>Very Soft</i>	<0.25	<12.5	<2
<i>Soft</i>	0.25 - 0.5	12.5 - 25	2-4
<i>Firm</i>	0.5 - 1.0	25 - 50	4-8
<i>Stiff</i>	1.0 - 2.0	50 - 100	8-15
<i>Very Stiff</i>	2.0 - 4.0	100 - 200	15-30
<i>Hard</i>	>4.0	>200	>30

ROCK DESCRIPTION

Except where specified below, terminology for describing rock is as defined by the International Society for Rock Mechanics (ISRM) 2007 publication "The Complete ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 1974-2006"

Terminology describing rock quality:

RQD	Rock Mass Quality
0-25	Very Poor Quality
25-50	Poor Quality
50-75	Fair Quality
75-90	Good Quality
90-100	Excellent Quality

Alternate (Colloquial) Rock Mass Quality	
Very Severely Fractured	Crushed
Severely Fractured	Shattered or Very Blocky
Fractured	Blocky
Moderately Jointed	Sound
Intact	Very Sound

RQD (Rock Quality Designation) denotes the percentage of intact and sound rock retrieved from a borehole of any orientation. All pieces of intact and sound rock core equal to or greater than 100 mm (4 in.) long are summed and divided by the total length of the core run. RQD is determined in accordance with ASTM D6032.

SCR (Solid Core Recovery) denotes the percentage of solid core (cylindrical) retrieved from a borehole of any orientation. All pieces of solid (cylindrical) core are summed and divided by the total length of the core run (It excludes all portions of core pieces that are not fully cylindrical as well as crushed or rubble zones).

Fracture Index (FI) is defined as the number of naturally occurring fractures within a given length of core. The Fracture Index is reported as a simple count of natural occurring fractures.

Terminology describing rock with respect to discontinuity and bedding spacing:

Spacing (mm)	Discontinuities	Bedding
>6000	Extremely Wide	-
2000-6000	Very Wide	Very Thick
600-2000	Wide	Thick
200-600	Moderate	Medium
60-200	Close	Thin
20-60	Very Close	Very Thin
<20	Extremely Close	Laminated
<6	-	Thinly Laminated

Terminology describing rock strength:

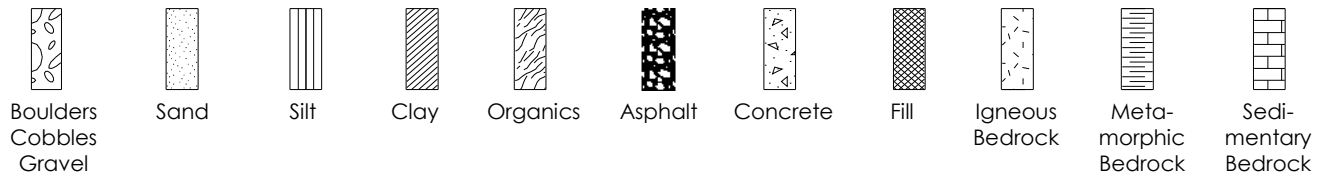
Strength Classification	Grade	Unconfined Compressive Strength (MPa)
Extremely Weak	R0	<1
Very Weak	R1	1 – 5
Weak	R2	5 – 25
Medium Strong	R3	25 – 50
Strong	R4	50 – 100
Very Strong	R5	100 – 250
Extremely Strong	R6	>250

Terminology describing rock weathering:

Term	Symbol	Description
Fresh	W1	No visible signs of rock weathering. Slight discoloration along major discontinuities
Slightly	W2	Discoloration indicates weathering of rock on discontinuity surfaces. All the rock material may be discolored.
Moderately	W3	Less than half the rock is decomposed and/or disintegrated into soil.
Highly	W4	More than half the rock is decomposed and/or disintegrated into soil.
Completely	W5	All the rock material is decomposed and/or disintegrated into soil. The original mass structure is still largely intact.
Residual Soil	W6	All the rock converted to soil. Structure and fabric destroyed.

STRATA PLOT

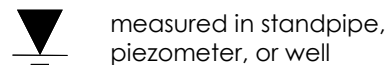
Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.



SAMPLE TYPE

SS	Split spoon sample (obtained by performing the Standard Penetration Test)
ST	Shelby tube or thin wall tube
DP	Direct-Push sample (small diameter tube sampler hydraulically advanced)
PS	Piston sample
BS	Bulk sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond coring bits.

WATER LEVEL MEASUREMENT



measured in standpipe, piezometer, or well



inferred

RECOVERY

For soil samples, the recovery is recorded as the length of the soil sample recovered. For rock core, recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

N-VALUE

Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 140 pound (63.5 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (300 mm) into the soil. In accordance with ASTM D1586, the N-Value equals the sum of the number of blows (N) required to drive the sampler over the interval of 6 to 18 in. (150 to 450 mm). However, when a 24 in. (610 mm) sampler is used, the number of blows (N) required to drive the sampler over the interval of 12 to 24 in. (300 to 610 mm) may be reported if this value is lower. For split spoon samples where insufficient penetration was achieved and N-Values cannot be presented, the number of blows are reported over sampler penetration in millimetres (e.g. 50/75). Some design methods make use of N-values corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-values presented on the log.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to 'A' size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone one foot (300 mm) into the soil. The DCPT is used as a probe to assess soil variability.

OTHER TESTS

S	Sieve analysis
H	Hydrometer analysis
k	Laboratory permeability
y	Unit weight
G _s	Specific gravity of soil particles
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct Shear
C	Consolidation
Q _u	Unconfined compression
I _p	Point Load Index (I _p on Borehole Record equals I _p (50) in which the index is corrected to a reference diameter of 50 mm)

	Single packer permeability test; test interval from depth shown to bottom of borehole
	Double packer permeability test; test interval as indicated
	Falling head permeability test using casing
	Falling head permeability test using well point or piezometer

[illegible]



AUGER PROBE RECORD

AP02

CLIENT PARKS CANADA AGENCYPROJECT No. 133348023LOCATION CBHNP: PLEASANT BAY TO NORTH MOUNTAINBOREHOLE No. AP02DATES: BORING 2018/01/20 WATER LEVEL Not Encountered

DATUM _____

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				Undrained Shear Strength - kPa		Water Content & Atterberg Limits	
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD	20	40	60	80
0		Station 34+420 Right					mm					
		ASPHALT: 203mm - four lifts in good condition - microseal lift between second and third lifts				Core						
		GRANULAR SUBBASE / BASE: brown to light brown silty sand with gravel - dry			AS	01						
		SUBGRADE: light brown silty sand with gravel - some cobbles - moist			AS	02						
1					AS	03						
		- tan - moist			AS	04						
2												
		END OF AUGER PROBE										
3												

△ Unconfined Compression Test
□ Field Vane Test
✕ Fall Cone

■ Remoulded



AUGER PROBE RECORD

AP03

CLIENT PARKS CANADA AGENCYPROJECT No. 133348023LOCATION CBHNP: PLEASANT BAY TO NORTH MOUNTAINBOREHOLE No. AP03DATES: BORING 2018/01/20 WATER LEVEL Not Encountered

DATUM _____

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				Undrained Shear Strength - kPa		Water Content & Atterberg Limits	
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD	20	40	60	80
0		Station 34+900 Left					mm					
		ASPHALT: 216mm - good condition										
		GRANULAR SUBBASE / BASE: reddish brown silty sand with gravel - dry				AS 01						
		SUBGRADE: brown to light brown silty sand - dry				AS 02						
1						AS 03						
		- moist - occasional cobbles				AS 04						
2						AS 05						
		- tan - frequent cobbles										
		END OF AUGER PROBE										
3												

△ Unconfined Compression Test
□ Field Vane Test ■ Remoulded
✕ Fall Cone

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				Undrained Shear Strength - kPa										
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD											
					20 40 60 80														
					Water Content & Atterberg Limits														
					Dynamic Penetration Test, blows/0.3m														
					Standard Penetration Test, blows/0.3m														
					10 20 30 40 50 60 70 80 90														
0		Station 35+400 Right					mm												
		ASPHALT: 146mm - good condition			CORE														
		GRANULAR SUBBASE / BASE: reddish brown silty sand with gravel - dry		AS	01														
		SUBGRADE: brown to light brown silty sand with gravel - occasional cobbles - dry		AS	02														
1		- brown silty sand		AS	03														
2		- light brown		AS	04														
		- tan		AS	05														
		END OF AUGER PROBE																	
3																			
									△ Unconfined Compression Test										
									□ Field Vane Test ■ Remoulded										
									✕ Fall Cone										



AUGER PROBE RECORD

AP05

CLIENT PARKS CANADA AGENCYPROJECT No. 133348023LOCATION CBHNP: PLEASANT BAY TO NORTH MOUNTAINBOREHOLE No. AP05DATES: BORING 2018/01/20 WATER LEVEL Not Encountered

DATUM _____

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				Undrained Shear Strength - kPa		Water Content & Atterberg Limits	
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD	20	40	60	80
0		Station 36+080 Left					mm					
		ASPHALT: 196mm - good condition - good bond between lifts										
		GRANULAR SUBBASE / BASE: reddish brown silty sand with gravel - dry			AS	01						
		SUBGRADE: reddish to light brown silty sand with gravel - dry - occasional cobbles			AS	02						
1												
					AS	03						
2		- light brown - frequent cobbles			AS	04						
		- tan - some cobbles			AS	05						
		END OF AUGER PROBE										
3												

△ Unconfined Compression Test
□ Field Vane Test ■ Remoulded
✕ Fall Cone



AUGER PROBE RECORD

AP06

CLIENT PARKS CANADA AGENCYPROJECT No. 133348023LOCATION CBHNP: PLEASANT BAY TO NORTH MOUNTAINBOREHOLE No. AP06DATES: BORING 2018/01/20 WATER LEVEL Not Encountered

DATUM _____

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				Undrained Shear Strength - kPa		Water Content & Atterberg Limits	
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD	20	40	60	80
0		Station 36+600 Right						mm				
		ASPHALT: 203mm - good condition										
		GRANULAR SUBBASE / BASE: reddish brown silty sand with gravel - dry				AS 01						
		SUBGRADE: red to light brown silty sand - dry - some cobbles				AS 02						
1		- light brown - occasional cobbles				AS 03						
		- increased silt content - some cobbles				AS 04						
2		- tan				AS 05						
		END OF AUGER PROBE										
3												

△ Unconfined Compression Test
□ Field Vane Test ■ Remoulded
✕ Fall Cone

CLIENT **PARKS CANADA AGENCY**

PROJECT No. 133348023

LOCATION CBHNP: PLEASANT BAY TO NORTH MOUNTAIN

BOREHOLE No. AP07

DATE: BORING 2018/01/19 WATER LEVEL Not Encountered

DATUM _____

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				Undrained Shear Strength - kPa									
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD										
									Water Content & Atterberg Limits Dynamic Penetration Test, blows/0.3m Standard Penetration Test, blows/0.3m									
									<div style="text-align: right;"> W_P W W_L </div>									
									<div style="text-align: center;"> 10 20 30 40 50 60 70 80 90 </div>									
0		Station 37+080 Left					mm											
		ASPHALT: 172mm - good condition				CORE												
		GRANULAR SUBBASE / BASE: reddish brown silty sand with gravel - dry			AS	01												
		SUBGRADE: reddish to light brown silty sand with gravel - dry - occasional cobbles			AS	02												
1		- increased silt content			AS	03												
2					AS	04												
		END OF AUGER PROBE																
3																		

△ Unconfined Compression Test □ Field Vane Test ■ Remoulded
 ✕ Fall Cone



AUGER PROBE RECORD

AP08

CLIENT PARKS CANADA AGENCYPROJECT No. 133348023LOCATION CBHNP: PLEASANT BAY TO NORTH MOUNTAINBOREHOLE No. AP08DATES: BORING 2018/01/19 WATER LEVEL Not Encountered

DATUM _____

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				Undrained Shear Strength - kPa		Water Content & Atterberg Limits	
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD	20	40	60	80
0		Station 37+600 Right					mm					
		ASPHALT: 222mm - four lifts; two bottom lifts in solid condition - good bond between lifts										
		GRANULAR SUBBASE / BASE: reddish brown silty sand with gravel - dry			AS	01						
		SUBGRADE: brown to light brown silty sand with gravel - dry - increased silt content										
1					AS	02						
		- light brown										
					AS	03						
2												
		- frequent cobbles			AS	04						
		END OF AUGER PROBE										
3												

△ Unconfined Compression Test
□ Field Vane Test ■ Remoulded
✕ Fall Cone



AUGER PROBE RECORD

AP09

CLIENT PARKS CANADA AGENCYPROJECT No. 133348023LOCATION CBHNP: PLEASANT BAY TO NORTH MOUNTAINBOREHOLE No. AP09DATES: BORING 2018/01/19 WATER LEVEL Not Encountered

DATUM _____

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				Undrained Shear Strength - kPa		Water Content & Atterberg Limits	
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD	20	40	60	80
0		Station 38+060 Left					mm					
		ASPHALT: 203mm - multiple lifts in good condition - good bond between lifts				CORE						
		GRANULAR SUBBASE / BASE: brown silty sand - dry			AS	01						
		SUBGRADE: brown to light brown silty sand with gravel - dry - some cobbles				AS	02					
1		- light brown				AS	03					
						AS	04					
2		- very dense				AS	05					
		END OF AUGER PROBE										
3												

△ Unconfined Compression Test
□ Field Vane Test
✕ Fall Cone

■ Remoulded



AUGER PROBE RECORD

AP10

CLIENT PARKS CANADA AGENCYPROJECT No. 133348023LOCATION CBHNP: PLEASANT BAY TO NORTH MOUNTAINBOREHOLE No. AP10DATES: BORING 2018/01/19 WATER LEVEL Not Encountered

DATUM _____

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				Undrained Shear Strength - kPa		Water Content & Atterberg Limits	
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD	20	40	60	80
0		Station 38+600 Right						mm				
		ASPHALT: 216mm - multiple lifts in good condition						CORE				
		GRANULAR SUBBASE / BASE: reddish brown silty sand with gravel - dry			AS	01						
		SUBGRADE: brown silty sand with gravel - dry - some cobbles										
1					AS	02						
		- increased silt content - occasional cobbles										
					AS	03						
2												
					AS	04						
		END OF AUGER PROBE										
3												

△ Unconfined Compression Test
□ Field Vane Test ■ Remoulded
✕ Fall Cone



AUGER PROBE RECORD

AP11

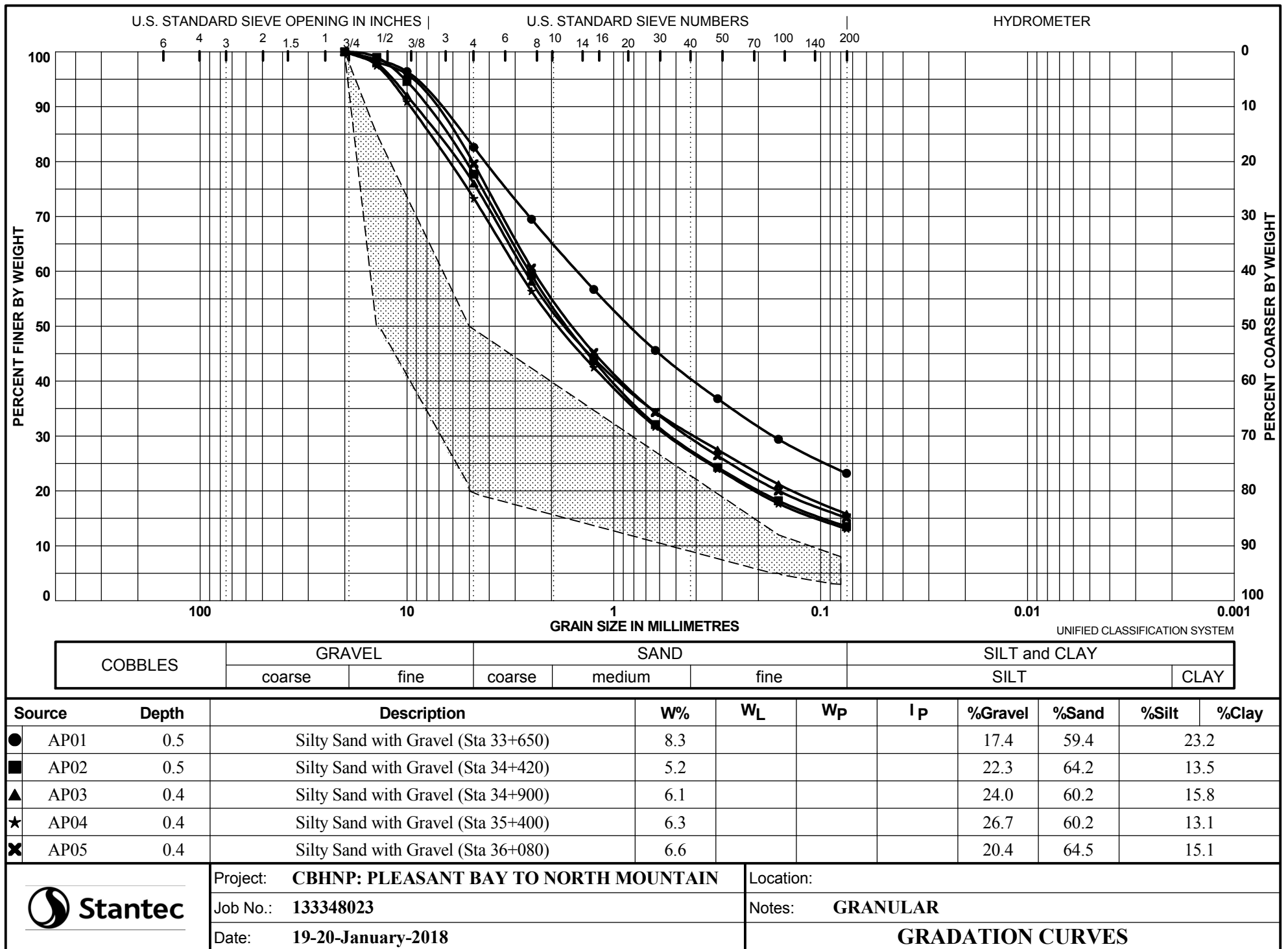
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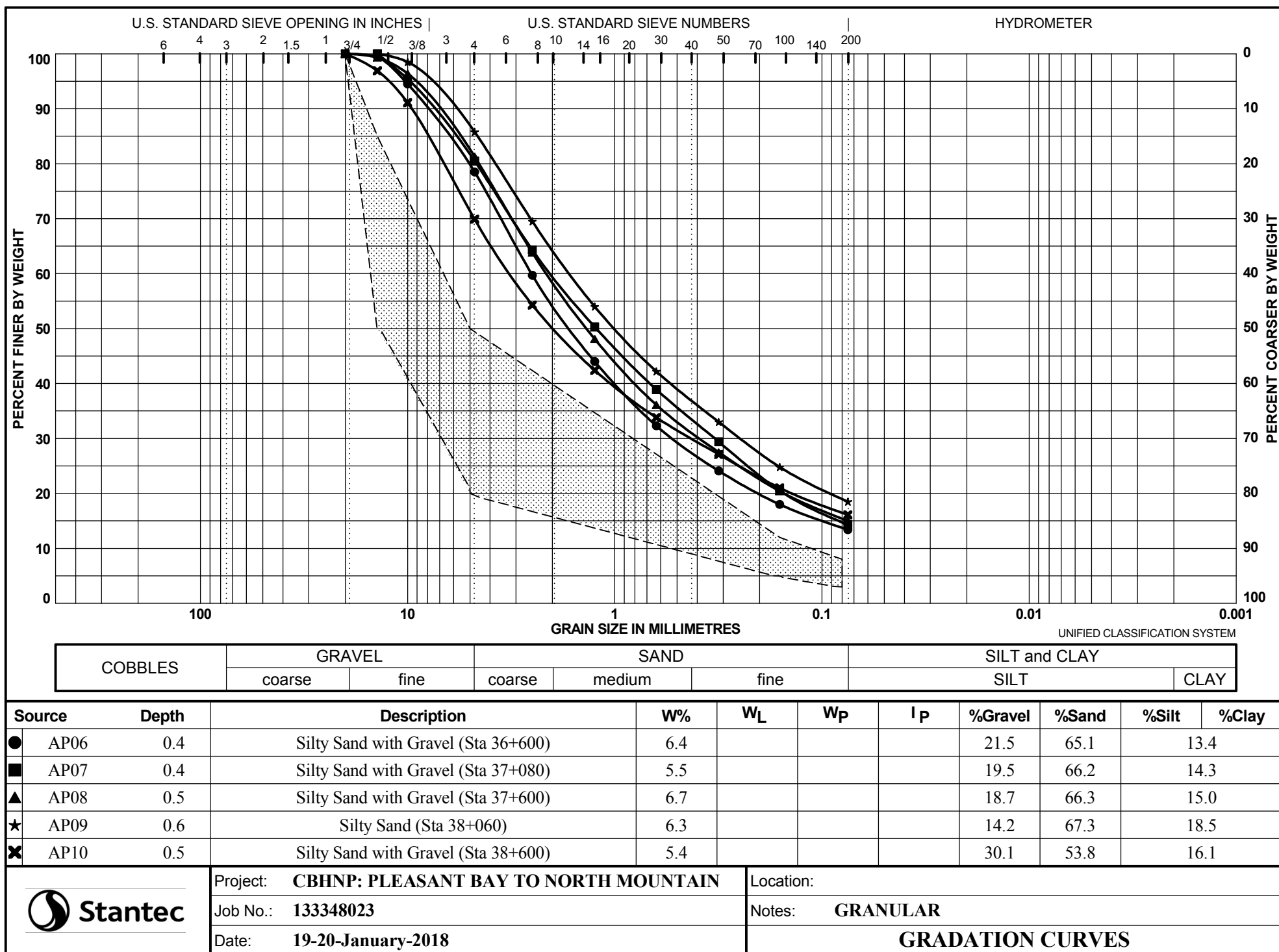
DATUM _____

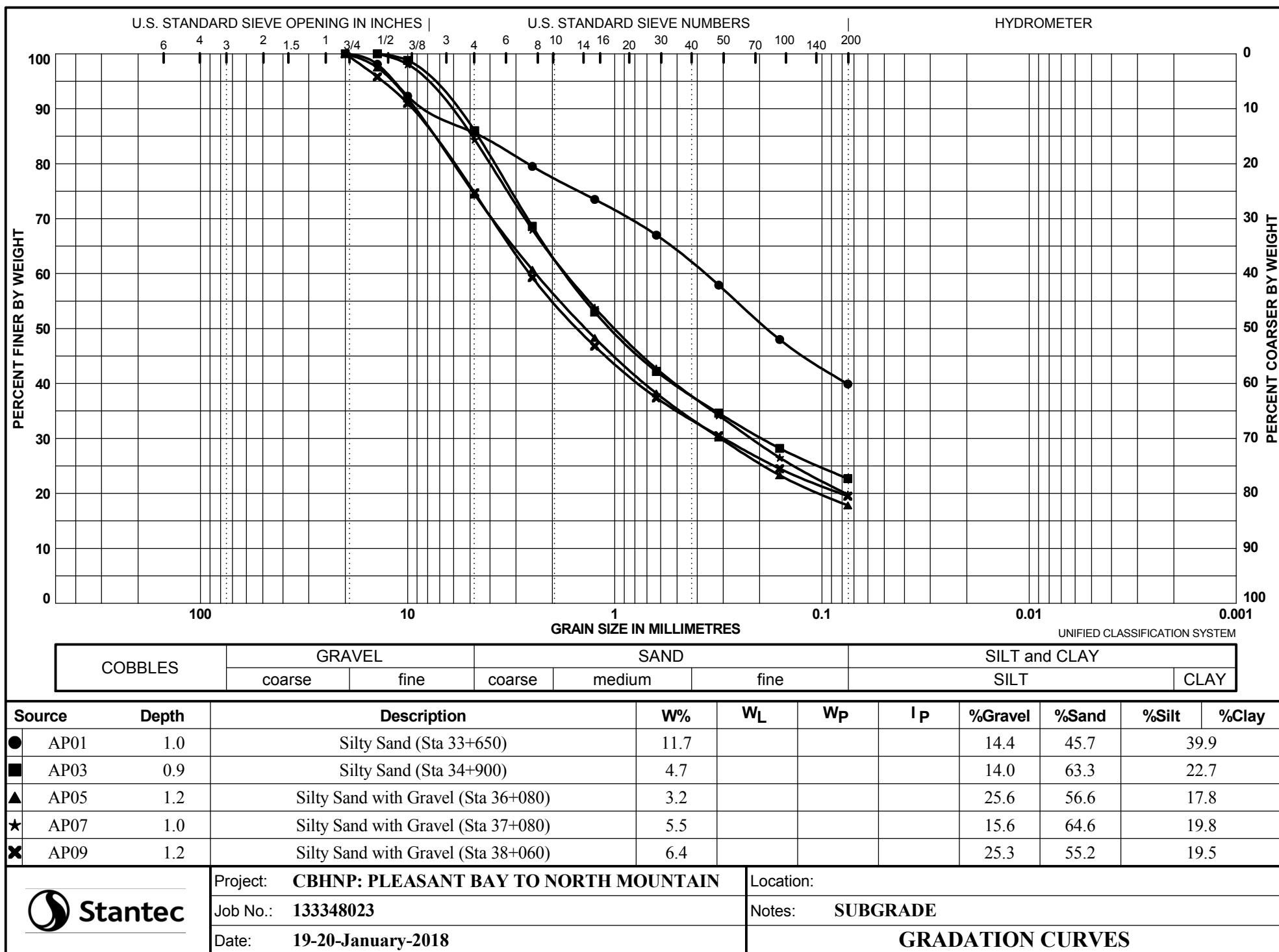
DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				Undrained Shear Strength - kPa		Water Content & Atterberg Limits	
					TYPE	NUMBER	RECOVERY	N-VALUE OR RQD	20	40	60	80
0		Lone Shieling Parking Lot					mm					
		ASPHALT: 83mm - single lift in good condition										
		GRANULAR SUBBASE / BASE: reddish brown silty sand with gravel										
					AS	01						
1		SUBGRADE: brown silty sand - dry - occasional cobbles										
					AS	02						
2		END OF AUGER PROBE										
3												

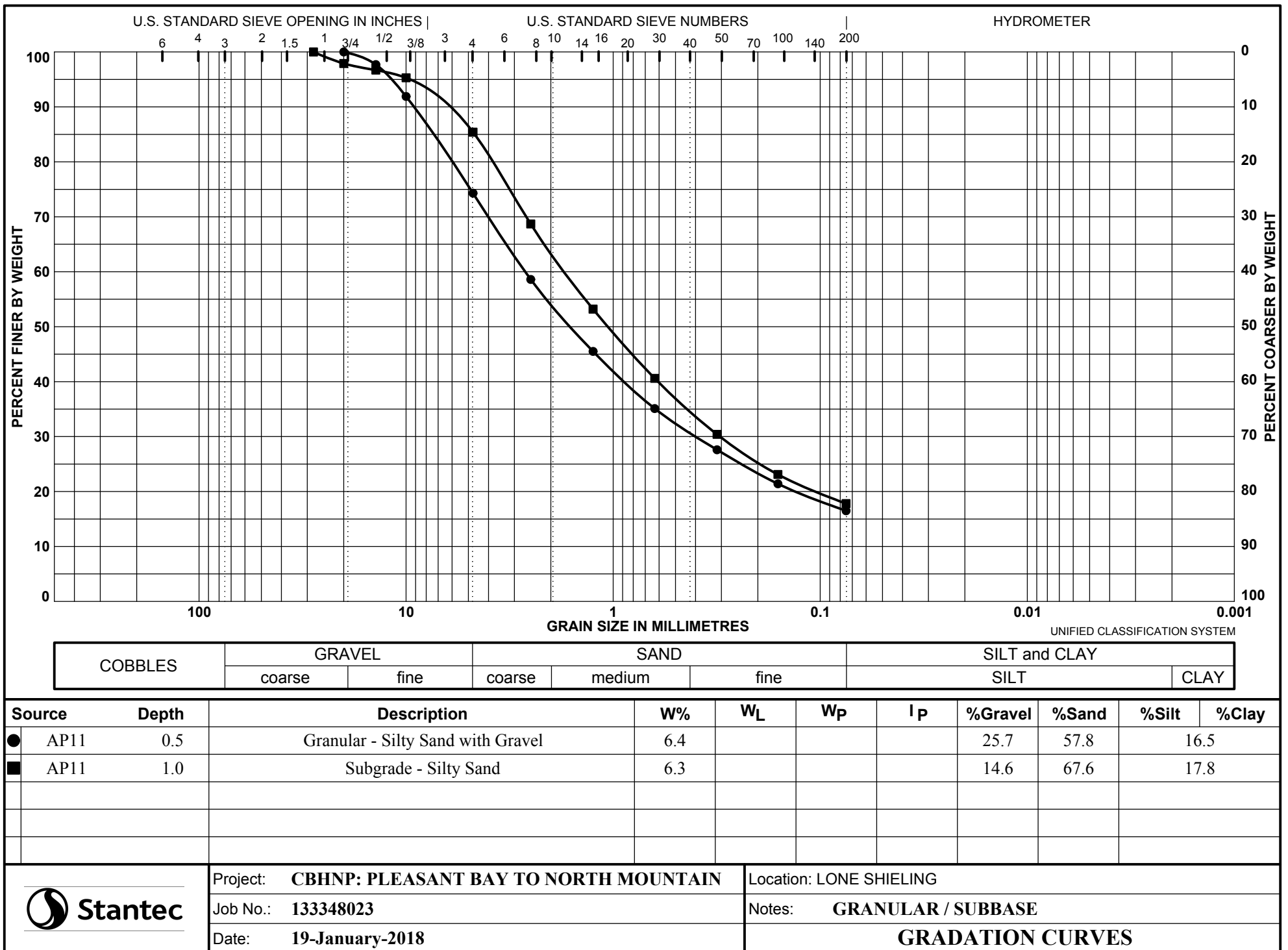
△ Unconfined Compression Test
□ Field Vane Test
✕ Fall Cone

■ Remoulded











Stantec Consulting Limited
130 Somerset Street
Saint John, NB E2K 2Xk
Ph: (506)634-2185 Fax: (506)634-8104

GRAIN SIZE ANALYSIS ASTM C136, ASTM C117



CERTIFIED TESTING LABORATORY

PROJECT NO: **133347150**

CLIENT: **Parks Canada Agency**

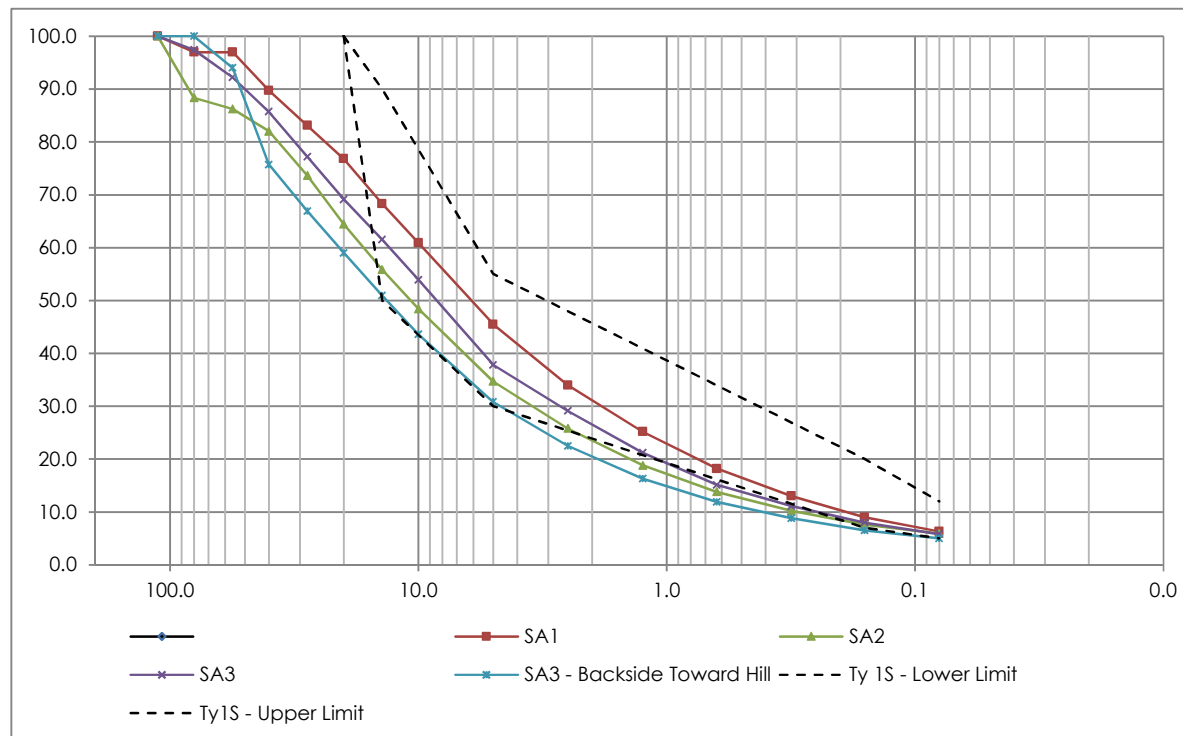
PROJECT: **Pleasant Bay to North Mountain**

SAMPLE NO: **SA1, SA2, SA3, SA3-Backside toward Hill**

SAMPLE DESCRIPTION: **Granular**

SOURCE: **Stockpile**

DATE RECEIVED: **23-Jan-18**



Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.

C:\Users\ymblanchard\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\79CBESBX\sieves_stockpile.xlsx

Specifications

112	100	100	100	100		
80	97	88.3	97.4	100		
56	97	86.2	92.2	94		
40	89.7	82	85.7	75.7		
28	83.1	73.6	77.2	66.9		
20	76.8	64.4	69.1	59	100	100

14	68.3	55.8	61.5	50.9	50	90
10	60.9	48.4	53.9	43.6		
5	45.5	34.7	37.8	30.8	30	55
2.5	34	25.8	29.1	22.5		
1.25	25.2	18.8	21.2	16.3		
0.63	18.2	13.8	15.1	11.9		
0.315	13	10.2	11.1	8.8		
0.16	9	7.6	8	6.5	7	20
0.08	6.3	5.9	5.8	5	5	12

Appendix B

Parks Canada National Best Management Practices – Roadway, Highway, Parkway and Related Infrastructure (May 2015).



Parks
Canada

Parcs
Canada

Parks Canada National Best Management Practices

Roadway, Highway, Parkway and Related Infrastructure

Canada



Parks Canada National Best Management Practices for Roadway, Highway, Parkway and
Related Infrastructure

Approved by

Original signed by Mike Wong

Mike Wong, Executive Director Natural Resource Conservation Branch

Original signed by Calvin Mercer

Calvin Mercer, Associate Vice-President Asset Management and Project Delivery

July 23, 2015

Date



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Introduction

The Parks Canada National Best Management Practices for Roadway, Highway, Parkway and Related Infrastructure will allow an identified suite of project activities to be undertaken in such a manner that there will not be resulting significant adverse environmental effects.

The Best Management Practice (BMP) pathway is applied when there is a suite of routine, repetitive projects (e.g. paving) or activities (e.g. de-watering), with well understood and predictable effects. This fulfils Park's Canada's obligations under the *Canadian Environmental Assessment Act 2012* as a manager of federal land, see the [Guide to the Parks Canada EIA Process](#). The BMP maximizes efficiency through creation of a pre-approved impact assessment for the defined suite of projects, to which standard mitigation and environmental management measures can be applied.

The impact assessment officer (IAO) will review a proposed project and advise the functional manager of the project if and how this BMP should be applied. The IAO's advice will be based on whether the project falls within the scope of the BMP, and whether application of the mitigation measures in the BMP will adequately address potential adverse effects of the project.

Project Managers are responsible to ensure all mitigation measures applicable to the project are added to the terms and conditions of any permits or contracts issued for the project.

The Impact Assessment Officers must ensure the project, EIA pathway applied and determination are recorded in the Parks Canada National Impact Environmental Assessment [Tracking System](#).

Scope of Application

This BMP outlines the impact assessment of repetitive and routine projects on roadways, highways and parkways. If a project involves some or all of below activities, and the initial assessment of site and project indicate "the project is unlikely to result in significant adverse environmental effects" the BMP can be applied. Projects that this BMP would likely be applied to include:

- The proposed maintenance or repair of an **existing** sidewalk, or parking lot.
- The proposed maintenance or repair of an **existing** road, including pull-off areas, that would be carried out on the existing right of way¹.

Activities included in the scope of this BMP are:

1. Project Design
2. General Activities
 - Worksite Conditions/Staging/Laydown
 - Equipment operations
 - Fuel storage and refueling

¹ Highway Footprint or Right of Way (ROW): The permanent physical intrusion of a highway or freeway, including the road surface, shoulders, side slopes, drainage ditches and/or storm drainage ponds (Transport Canada, 2008).



- Site Clean Up/Waste Disposal
- 3. Asphalt Production and Handling
 - Asphalt Plant Operation
 - Gravel Crushing and Washing
 - Oiling of Truck Boxes
 - Clean Up and Disposal of Waste Products
- 4. Concrete Handling
 - Operation, maintenance and inspection of Onsite Temporary Concrete Washout Facility
 - Removal of Temporary Concrete Washout Facilities
 - Onsite concrete management
- 5. Paving, Resurfacing and Grading
 - Grading
 - Paving and Resurfacing
 - Pavement Marking and Barrier and Guardrail Reinstatement
- 6. Barriers and Guardrails
 - Repair, replacement and upgrades of barriers and guardrails
- 7. Vegetation Removal
 - Vegetation Removal
 - Grubbing
 - Brushing
 - Disposal of Vegetation Debris
 - Integrated Pest Management
- 8. Excavation, Soil Stripping and Overburden Removal
 - Excavation
 - Soil Stripping
 - Topsoil Salvage
 - Excavated Material Storage
 - Excess Material and Waste (overburden removal)
- 9. Slope Stabilization, Drilling and Blasting
 - Slope stabilization-scaling, hydraulic hammers
 - Drilling and blasting for Slope Stabilization and Geotechnical Investigations
- 10. Soil and Vegetation Restoration
 - Topsoil Replacement
 - Soil Amendments
 - Seedbed Preparation
 - Species Selection
 - Seed Lot Selection
 - Seed Mixture Composition
 - Seeding
 - Alternatives to Seeding
 - Reclamation Standards
 - Reclamation Plot Evaluation
 - Time Limits



10. Drainage Structures
 - Drainage structures
 - Culverts
11. Bridge Maintenance
 - Bridge Cleaning
 - Bridge Repairs Using Treated Wood Products
 - Bridge and Structure Painting
12. Water Withdrawal and Dewatering
 - Water Withdrawal
 - Pump Screens
 - Dewatering

Exceptions

This BMP is not suitable for the following project activities as they would require supplemental assessment and/or mitigations:

- Work that may impact aquatic or terrestrial wildlife habitat connectivity, such as fences or culverts;
- Elongation of culverts; realigning water courses; dredging; or work below the high water mark of a fish bearing water body;
- Bridge projects needing work to occur below the High-Water Mark¹, with permanent; alteration to the water course, such as replacement of piers/abutments or permanent installation of structures on the bed of a water body;
- Greater than 10% increase in land use footprint (e.g. gravel pit expansion); and,
- Work which might adversely impact any potential or established Aboriginal and Treaty rights or traditional use².

If the project has the potential to have an adverse effect on the critical habitat of a species at risk (with endangered, threatened, or extirpated status) this BMP does NOT apply. The project will require a separate environmental impact analysis.

If the project has the potential for residual adverse effects on a listed species at risk (including effects to individuals and residence of the individuals) this BMP does NOT apply, the project will require a separate environmental impact analysis.

Note: If there is any uncertainty regarding potential adverse effects to species at risk, consult a member of the [National Office Species Conservation team](#).

¹ High-water Mark is the usual or average level to which a body of water rises at its highest point and remains for a sufficient time so as to leave a mark on the land. (Fisheries and Oceans, 2015). Upper Controlled Water Elevation (UCWE) is used as definition of High-water Mark in managed waterways.

² Parks Canada must engage in additional and separate consultations with Aboriginal groups if there is a possibility of a project adversely affecting established or potential Aboriginal or Treaty rights. This is required to fulfill federal government responsibilities in upholding the honour of the crown. If there is uncertainty regarding the need for Aboriginal consultation with respect to a project, refer the matter to Parks Canada Legal Services for advice. Guidance on consultation may be sought from the [Aboriginal Affairs Secretariat](#) and from the guidance document "[A Handbook for Parks Canada Employees on Consultation with Aboriginal Peoples](#)".



Approved geographic area of application

This BMP is intended for use in all Parks Canada administered protected heritage places with roadways, highways and parkways.

Components of the environment that may be affected

Potential effects from projects of this type are well understood and predictable. They include:

Water Resources:

- Adverse modifications to surface drainage patterns
- Reduced water quality due to increased erosion, sedimentation, transportation of debris and contamination (i.e. from leaks and accidental spills, etc.)

Soil/Land Resources:

- Change in slopes, landforms, and landscape
- Soil compaction and rutting
- Slope instability, due to increased soil exposure and improper excavation and storage
- Soil contamination

Air quality:

- Decreased ambient air quality (i.e. from dust, equipment emissions, etc.)
- Increased ambient noise levels
- Temporary increased levels of CO₂ and other pollutants
- Temporary increased localized temperatures from paving and equipment operation.

Flora and Fauna:

- Damage to and/or removal of vegetation in immediate or adjacent areas
- Introduction of non-native species populations, or expansion of existing populations
- Wildlife sensory disturbance causing displacement/preferred habitat avoidance
- Wildlife habituation/attraction to artificial food sources
- Impeded/altered wildlife movement
- Damage to nests/disruption of nesting animals
- Mortality from project activities

Cultural Resources:

- Adverse effects on the heritage value or character-defining elements of a cultural resource
- Impacts to archaeological resources (known or potential)



Mitigation Measures

To use the document efficiently, keep the activity mitigation lists that apply to the project expanded and collapse the other activities by clicking on the section titles, print this as a pdf or paper document and include with the EIA determination record. This will reduce the overall size and scope of the mitigations to present to contractors and project managers.

Choose all that apply to project. Each title is hyperlinked to the related section.

Module

-
1. [Project Design](#)
 2. [General Activities](#)
 3. [Asphalt Production and Handling](#)
 4. [Concrete Handling](#)
 5. [Paving, Resurfacing, Grading](#)
 6. [Barriers and Guardrails](#)
 7. [Vegetation Removal](#)
 8. [Excavations, Soil Stripping and Overburden Removal](#)
 9. [Slope Stabilization, Drilling and Blasting](#)
 10. [Soil and Vegetation Restoration](#)
 11. [Drainage Structures](#)
 12. [Bridge Maintenance](#)
 13. [Water Withdrawal and Dewatering](#)



1. Project Design

When upgrades to infrastructure are planned opportunities to decrease the environmental impacts of long term operation should be considered in the engineering design. Some examples are: directing runoff into vegetated areas rather than directly into surface waters to decrease pollution in surface waters, increasing the span length of bridges during replacements to allow for terrestrial wildlife passage underneath and converting smaller culverts to larger culverts or clear span bridges to allow for better fish passage and less restricted flows.

2. General Activities Mitigations Module

Construction activities involve the use of laydown/staging areas, equipment operations, storage and handling of hazardous materials. Potential adverse effects include: destruction of vegetation, erosion and sedimentation, constriction for wildlife movements and introduction/spread of non-native vegetation.

Work Site Conditions/Staging/Laydown

- 2.1. All employees must attend a briefing with an Impact Assessment Officer (IAO) or Surveillance Officer (SO) before beginning work at the site review and explain the mitigations that are conditions of the project approvals.
- 2.2. Minimize vegetation-clearing activities and ground disturbance by staging on existing hardened areas wherever possible.
- 2.3. Avoid or terminate activities on site that attract or disturb wildlife. Vacate the area and stay away from the immediate location if wildlife display aggressive behaviour or persistent intrusion.
- 2.4. Control materials that might attract wildlife (e.g. petroleum products, human food and garbage).
- 2.5. Notify the SO immediately about dens, litters, nests, carcasses (road kills), wildlife activity or encounters on or around the site or crew accommodation. Other wildlife-related encounters are to be reported to SO within 24 hours.
- 2.6. Delineate the work zone; clearly mark the limits to active construction and the access and egress locations.
- 2.7. When work involves the disturbance of soils or the use of erodible materials (e.g. sands, topsoil), prevent the transport of sediment by the installing of appropriate erosion and sediment control.
- 2.8. An Erosion and Sedimentation Management Plan shall be prepared for the components of the work undertaken in proximity to watercourses, wetlands or riparian environments. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger. The ponds shall also be designed to handle 1:5 year storm events, with overflow spill capacity for 1:10 year storm events and emergency spillway capacity for 1:100 year storm events. All components require regular maintenance to ensure effectiveness.

Equipment Operations

- 2.9. Equipment movements and workers' private vehicles shall be restricted to the 'footprint' of the construction area.



- 2.10. Ensure machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species, noxious weeds and soils from off-site.
- 2.11. Operate machinery on land above the high water mark, on ice, or in another manner that minimizes disturbance to the banks and bed of any water body.
- 2.12. Limit machinery crossing (fording) a stream or watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure in compliance with the *Fisheries Act*.
- 2.13. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.
- 2.14. Use temporary crossing structures or other practices to cross streams or water bodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds.

Fuel Storage and Refueling/Emergency Plans

- 2.15. A Spill Response Plan will be prepared and detail the containment and storage, 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. The Plan shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.
- 2.16. Spill kits shall be provided at re-fuelling, lubrication, and repair locations that are capable of dealing with 110% of the largest potential spill and shall be maintained in good working order. Site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
- 2.17. 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. Measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double-lined fuel tanks can prevent spills into the environment.
- 2.18. Hazardous or toxic products shall be stored no closer than 100 metres from streams, wetlands, water bodies or waterways.
- 2.19. Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The SO shall be notified immediately of any spill. In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.
- 2.20. 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 proponent. The site will be inspected to ensure completion to the expected standard and to the satisfaction of Parks Canada.

Site Clean Up/Waste Disposal

- 2.21. Clean tools and equipment off-site to prevent the release of wash water that may contain deleterious substances.



- 2.22. Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site.
- 2.23. Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried or discarded at the construction site or elsewhere in Parks Canada protected heritage places. These wastes shall be contained and removed in a timely and approved manner and disposed at an appropriate waste landfill site located outside the Parks Canada protected heritage place. Construction waste storage containers, shall be emptied when 90% full. Waste containers will have lids, be wildlife proof if there attractants and waste loads shall be covered while being transported.
- 2.24. Sanitary facilities, such as a portable container toilet, shall be provided and maintained in a clean condition.

3. Asphalt Production and Handling Mitigations Module

Asphalt is a common building material for transportation infrastructure. Its production requires the use of gravel, water, and petroleum products, and associated project activities include transportation, storage and handling of these materials. Installation of asphalt plants is common within the larger parks where gravel extraction is undertaken.

Timing of Works

- 3.1. Asphalt works are preferably undertaken during periods of dry weather as this allows easier control of contaminated runoff and sediment.
- 3.2. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.

Operation of Asphalt Plants

- 3.3. Asphalt plant operation must comply with all environmental pollution control regulations, including provincial regulations, and the plant operational plan.
- 3.4. Spoil piles and stock piles will be at least 30 meters from the edge of any water body.
- 3.5. There must be enough room between the stockpiles and the asphalt plant for a loader in the event of a spill at the asphalt plant.
- 3.6. A containment berm with an associated liner made of occlusive material (e.g. plastic of a thickness approved by the SO) and covered with absorbent sand or clay shall be installed under the asphalt storage tank to ensure containment of 110% of the tank's capacity.
- 3.7. The proponent shall be responsible for the purchase and safe delivery/storage/handling of asphalt cement and emulsions to the asphalt plant site.
- 3.8. Excess hot mix or reject new asphalt shall be temporarily stored in the containment area sufficient to prevent runoff of petroleum into soils or surface waters as directed by the SO, and removed from the Parks Canada protected heritage place, prior to project completion.



- 3.9. Every effort will be made to recycle waste asphalt, either as a base course, or by recycling waste asphalt through the asphalt plant according to engineering specifications. Old cured ground asphalt material shall be removed, recycled, or stored for future recycling at an approved operational gravel pit or asphalt plant site. Stockpiles must be further than 30 metres from any surface waters.
- 3.10. Remaining stockpiles will be removed or incorporated into reclamation plans for the gravel pits or asphalt plant sites.
- 3.11. Asphalt to be removed must be sampled and analyzed to determine possible lead contamination. Contaminated asphalt will be transported to an approved waste disposal facility. A receipt of delivery is to be provided to the SO.
- 3.12. Proponent should protect containment/catchment areas and drip trays at the asphalt plant from rainfall since, if contaminated, all of the collected water will require disposal of at an approved disposal facility at the expense of the Proponent.
- 3.13. Dyking and ponding will be required to control the rate and quality of runoff from the plant site.
- 3.14. Ensure that the water in the settling ponds remains clean of petroleum products. Any contaminated water will require disposal at an approved disposal facility at the expense of the Proponent.

Gravel Crushing and Washing

- 3.15. Where possible within engineering constraints, asphalt materials should be recycled to reduce the need for new gravel.
- 3.16. Gravel will be obtained from an approved operational borrow pit only. For gravel obtained from a borrow pit within a protected heritage place or borrow pit, gravel extraction within the footprint of the disturbed area of the approved operational borrow pit is permitted.
- 3.17. Gravel will not be crushed within 30 meters of any water body.
- 3.18. If water for cleaning is extracted from a watercourse, refer to [water withdrawal section](#) of this BMP.
- 3.19. If gravel requires washing, the water used will not be returned directly to any watercourse.
- 3.20. Water free from chemical contaminants will be discharged into ground where further erosion and runoff into surface water is prevented. Discharging into well vegetated ground surface, at a rate which prevents erosion can often provide increased absorption and reduction of sediment load.
- 3.21. Contaminated water must be treated to meet CCME guidelines or transported outside of the Parks Canada protected heritage place for disposal at an approved facility.
- 3.22. For waste removed from the park a detailed receipt of delivery to an approved facility will be provided to the SO.

Oiling of Truck Boxes

Trucks for hauling asphalt mixture shall have tight, clean, smooth metal beds that have been sprayed with a minimum amount of thin fuel oil to prevent the mixture from adhering and causing waste asphalt.

- 3.23. Truck boxes may be oiled only when absolutely necessary.



- 3.24. Oiling will take place in a bermed area, consisting of a plastic underlay with 15 centimetres overlay of clean gravel. Oil contaminated gravel will be hand collected (so as to prevent tearing of the plastic) from the bermed area daily, and put through the asphalt plant.
- 3.25. Vehicle covers shall be securely fastened.

Air Quality Mitigations

- 3.26. Asphalt plants should be 500 meters from buildings with human habitation.
- 3.27. Emissions from the asphalt plant and paving project equipment will comply with End Product Specifications (EPS) emission control standards and other provincial emissions regulations. Stack test results provided to the ESO by the operator or surveillance contractor may be required when the asphalt plant is at full capacity to ensure the plant is operating within the required standards. If the plant is not operating within the appropriate levels, production will cease until the requirements are met.
- 3.28. Sludge removed from the clarifier that is free of chemical contamination will be contained to prevent fine dust particles from becoming airborne during windy periods.
- 3.29. Unannounced stack tests will be conducted throughout the project. If the plant does not meet requirements, operation will cease until the requirements can be met.

Disposal and Clean Up of Other Waste Products

- 3.30. To ensure regular clean-up of waste asphalt and petroleum spills, a defined clean up schedule will be established during the preconstruction meeting.
- 3.31. Leaks will be collected in drip-trays, the collected material will either be removed from the park, or recycled back through the Asphalt Plant. For any material removed outside the park to an approved facility, a detailed receipt will be provided to the ESO.
- 3.32. Used oil, filters, grease cartridges, oil cans and other waste products of plant servicing will be collected and disposed of at the nearest industrial waste facility.

4. Concrete Handling Mitigations Module

Concrete is a common construction material used in transportation infrastructure. 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.

Onsite Temporary Concrete Washout Facility

- 4.1. Temporary concrete washout facilities shall be located a minimum of 30m from storm drain inlets, open drainage facilities, and watercourses.
- 4.2. 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.
- 4.3. Straw bales, wood stakes, and sandbag materials can be used to construct temporary containment walls or “barriers”.



- 4.4. 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.
- 4.5. The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.
- 4.6. Perform washout of concrete mixer trucks in designated areas only.
- 4.7. Wash concrete from mixer truck chutes into approved concrete washout facility or collect in an impermeable bag for disposal.
- 4.8. Pump excess concrete in concrete pump bin back into concrete mixer truck.
- 4.9. Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed offsite.
- 4.10. 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.

Maintenance and Inspection of Temporary Concrete Washout Facilities

- 4.11. Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 100 mm (4 inches) for above grade facilities and 300 mm (12 inches) for below grade facilities.
- 4.12. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition.
- 4.13. Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
- 4.14. Temporary concrete washout facilities shall be inspected for damage (i.e. tears in PVC liner, missing sand bags, etc.).
- 4.15. Onsite concrete waste storage and disposal procedures should be monitored at least weekly or as directed by the ESO.

Removal of Temporary Concrete Washout Facilities

- 4.16. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and restored.

Onsite Concrete Management

- 4.17. Rolling concrete mixers with surplus concrete in amounts less than one cubic metre of wet concrete may waste this concrete in the grade right-of-way as directed by the Parks Canada Representative in areas that drain well away from watercourses. Surplus amounts in excess of one cubic metre are to be returned to the batching yard.
- 4.18. Water contaminated in the placing of cement and curing of concrete shall be contained and removed from the site to an approved disposal facility.
- 4.19. The concrete batching plant must be operated pursuant to applicable dust, air emission, and water quality control regulations.



- 4.20. Waste, solidified concrete from rolling concrete mixers in amounts less than 1 cubic meter and waste solidified concrete from construction pour shall be buried in the grade within 48 hours of the pour, subject to approval and direction from the Departmental Representative

5. Paving, Resurfacing, Grading Mitigations Module

Highway surface management activities are undertaken to ensure public safety on Parks Canada Agency highways by maintaining clean, level, and unbroken road surface conditions through activities such as pavement cleaning, patching, application of surface treatments, and pavement crack sealing. Grading is used to address drainage issues, vegetation encroachment, potholes and rough surfaces.

Timing of Works

- 5.1. Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of contaminated runoff and sediment.
- 5.2. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.

Grading

- 5.3. During grade construction conducted close to any watercourse, water body or wetland ensure materials are not pushed, fall or are eroded into the water or wetlands.
- 5.4. No grade building shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest. Any material inadvertently falling outside the work limits will be removed promptly in a manner that does not damage trees or vegetation.
- 5.5. Materials shall be placed at storage sites or on the grade without spillage outside the work limits. Any material inadvertently falling outside the work limits will be removed promptly in a manner that does not damage trees or vegetation.
- 5.6. Retain a 30 metre vegetated buffer around water bodies or install runoff management structures.
- 5.7. If possible grade roads early in the spring before vegetation develops seed heads or late in season after vegetation has set seed and is dormant to minimize non-native vegetation propagation.
- 5.8. Ensure gravel or road bed material is free of weeds and comes from an approved operational gravel source free of other contaminants.

Paving and Resurfacing

- 5.9. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface waters.
- 5.10. Minimize application of seal coats in wet conditions. Attempt to apply only to dry surfaces and not prior to (within 24 hrs.) or during rainfall. If unforeseen rain arrives ensure runoff from recently seal coated surfaces are prevented from entering surface waters.
- 5.11. For asphalt handling and management see the [Asphalt Mitigation Module](#) of the BMP.



Pavement Marking and Barrier and Guardrail Reinstatement

- 5.12. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface water. Pavement marking shall be undertaken pursuant to standard methods applied in National Parks for control of paint products, both in transport and handling. The Contractor shall present a description of methods to be employed for transporting and controlling paint and hazardous products, application of paint, cleaning of equipment, containment and disposal of waste paint and cleaning products, etc. the satisfaction of the Parks Canada Representative.
- 5.13. Where concrete barriers or guard rails are temporarily removed, for highway improvements, temporary glow posts shall be installed, at 20.0 m intervals on straight sections and at 10.0 m intervals on curves and shall remain in place until permanent barrier system has been installed.

6. Barriers and Guardrails Mitigations Module

Repair, installation and upgrade of barriers and guardrails involves laydown/staging areas, equipment operations, minor excavation (e.g., for barrier post holes) and use of concrete. Potential adverse effects include destruction of vegetation and erosion and sedimentation.

Timing of Works

- 6.1. Where excavation is required, schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 6.2. If the work schedule requires working in the rain, appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

Repairs, Replacement and Upgrades

- 6.3. An Erosion and Sedimentation Management Plan shall be prepared for the components of the work undertaken within 100m of watercourses, wetlands or riparian environments. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger.
- 6.4. Where use of concrete is required for guardrail post holes, Concrete Handling Mitigations apply.
- 6.5. If vegetation removal is required for barrier or guardrail works, Vegetation Removal Mitigations apply.
- 6.6. Where concrete barriers or guardrails are temporarily removed, temporary glow posts shall be installed, at 20.0 m intervals on straight sections and at 10.0 m intervals on curves and shall remain in place until permanent barrier system has been installed.

7. Vegetation Removal Mitigations Module

Roadside vegetation management activities include mowing, brushing, and landscape maintenance activities undertaken to maintain clear sight lines for highway users, control noxious weeds, facilitate effective drainage, and reduce possible fire hazards. Mature timber



may need to be removed for improving road alignments, improving sight lines or replacing or repairing associated infrastructure. Grubbing (stump and root removal) may be required to prepare the ground surface for other activities.

Timing Windows

- 7.1. Vegetation clearing can negatively impact nesting birds and/or bats in spring and summer. Avoid all vegetation removal during this time. If vegetation removal is scheduled to occur within these times a qualified professional biologist/ecologist should further clarify the species presence and timing particular to the work site and any occupied bird nests, eggs, or nests of species protected under the Migratory Bird Convention Act (MBCA). See [appendix on regulatory guidance for further detail on the MBCA and SARA](#).
- 7.2. If a nest is found during the pre-work surveys, the vegetated area will be left intact with a suitable sized buffer of shrubs/trees around it until the young have fledged and left the nest. Size of buffer species dependent, to be determined in consultation with professional biologist or park ecologist.
- 7.3. Grass mowing and trimming should not occur during peak spring or fall reptile/amphibian migrations and hatching. Consult a local biologist/ecologist for site and species specific timing windows.

Vegetation Removal Mitigations

- 7.4. Vegetation removal should be limited to the minimum Clear Zone Distance¹ dependent on type and size of road and maximum height needed to meet the road safety objectives.
- 7.5. Minimize full removal and retain vegetation when possible to reduce erosion.
- 7.6. Prior to the commencement of any vegetation removal, the worksite must be surveyed for species at risk. If species at risk are found, work must be stopped until site-specific mitigations to address potential adverse effects are developed.
- 7.7. Survey vegetation for non-native species, clear vegetation areas with non-native vegetation in spring and early summer to avoid further spread and development of the non-native seed bank.
- 7.8. Clearing activities shall be avoided during nesting seasons for birds, reptiles and amphibian species in the project area.
- 7.9. If wildlife is observed during work, if possible, give animals the opportunity to escape the work area to the surrounding forest or elsewhere to seek new shelter.
- 7.10. Avoid ground vegetation removal during dry, windy periods to prevent erosion of topsoil and reduction of air quality with dirt/dust.
- 7.11. Retain 30 metre vegetated buffer around water bodies, where disturbance is necessary and unavoidable restoration is required.
- 7.12. Debris will not be deposited in water bodies.
- 7.13. Ensure tree limbs/stumps are flush cut as close to the ground or stem as possible.

¹ A clear zone is an unobstructed, traversable roadside area designed to enable a driver to stop safely or regain control of a vehicle that has accidentally left the roadway. The selection and design of appropriate clear zone dimensions is project-specific and should be the responsibility of professionals trained in roadside design.



- 7.14. Logs and 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, waterways or water bodies.
- 7.15. During the grubbing component, stumps, roots, imbedded logs and other non-soil debris shall be pulled and shaken free of loose soil and rocks before transport to a designated pit.
- 7.16. Where possible preserve identified wildlife trees by limbing or topping if they are not assessed as hazard trees.

Disposal of Vegetation Debris

- 7.17. All vegetation debris must be removed as soon as possible from the right-of-way, either by transporting off-site for disposal or piling and burning on-site.
- 7.18. All vegetation containing non-native species will be piled and burnt or bagged and removed off site to disposal facility.
- 7.19. Piles will be made where trees are felled, piles will be 1.2-1.8 (4 to 6 feet) in diameter and no more than 1.2 m (4 feet) high (approximately 1 to 3 trees per pile) or as instructed by local fire and vegetation specialists.
- 7.20. Piles are to be located so that they do not scorch surrounding live trees and measures must be in place to ensure that fires do not spread (i.e., conduct burning on snow or on mineral soil).
- 7.21. Piles will be left until fall for burning to allow for curing of green fuels.
- 7.22. Provincial regulations for air quality must be met.
- 7.23. Where fire fuel loading is not a concern vegetation debris of limited amounts will be dragged in the forest to mimic natural tree fall.
- 7.24. If removal or burning are not feasible a chipper may be used for less than 50 boles per hectare. Chip depth is to be a maximum of 5 cm (2 inches), spread over area no greater of 5m x 5m per hectare so as to not cover underlying vegetation, prevent new native seedlings from sprouting, and cause soil/seed bank sterilization. Spreading of chips may extend beyond these parameters with permission from Parks Canada.
- 7.25. To facilitate chipping of woody debris, all trees/shrubs/vines can be left temporarily along the road shoulders and laid facing the same direction.
- 7.26. In some cases, logs from newly cut trees may be set aside for use elsewhere as directed by local park site managers and the ESO.
- 7.27. Store removed vegetation on already disturbed areas to minimize disturbance area.
- 7.28. In appropriate areas re-establish native vegetation where it has been completely removed/damaged.

Integrated Pest Management

- 7.29. A Field Unit Integrated Pest Management Plan (IPMP) must be completed and approved prior to the use of herbicides to ensure the most effective and least harmful substances are properly used.



8. Excavations, Soil Stripping and Overburden Removal

Mitigations Module

Construction projects often involve excavations. To successfully complete reclamation 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. See section of this BMP for [Soil and Vegetation Restoration](#).

Timing of Works

- 8.1. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 8.2. If the work schedule requires working in the rain, appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

Excavation

- 8.3. 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.
- 8.4. All sediment control measures must be in place before starting work in the vicinity of rivers, water bodies, watercourses, and wetlands.
- 8.5. Special precautions may have to be taken during excavation in the vicinity of intermittent or active drainage channels.
- 8.6. Excavation plans must be compared to local archaeological resource inventories, if available. If no archaeological information is available for the work area, an Archaeological Overview Assessment (AOA) may be required to determine the archaeological potential of the work area. Based on the results from the AOA, an Archaeological Impact Assessment might be required. It would be time and cost efficient to refer the plan to Parks Canada's Terrestrial Archaeology section before conducting any excavation to determine the appropriate course of action.
- 8.7. If cultural resources (eg. archaeological resources) are discovered, immediately cease work, and alert SO.
- 8.8. 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
- 8.9. Backfill and compact excavations as soon as possible. Optimize degree of compaction to minimize erosion and allow for re-vegetation.
- 8.10. All trenches or ditches left unattended overnight must be fenced or covered to prevent wildlife entrapment.

Soil Stripping

- 8.11. Strip topsoil under dry conditions, whenever possible.
- 8.12. No stripping shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest.



- 8.13. In the event of a work program shutdown during inclement weather (e.g. winter conditions unfavourable for construction, heavy rain events, construction delays, etc.) erosion control of bared soils or excavated material stockpiles is required.
- 8.14. 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.
- 8.15. Work within a 100 metre buffer from the high water mark of waterways or wetlands will require a site specific sediment and erosion control plan.
- 8.16. An erosion control plan is also needed to control dust generated from the construction site.

Topsoil Salvage

- 8.17. Salvage topsoil at all excavation sites for reclamation purposes.
- 8.18. Usually the upper 15 cm of soil, below the sod layer if present, is considered topsoil, where depths exceed 15cm salvage the entire depth of topsoil.
- 8.19. Remove stumps and woody debris from topsoil, wherever possible.

Excavated Material Storage

- 8.20. 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 (e.g., geo-textile) to separate soil components where space is limited.
- 8.21. Topsoil may be stored on hardened surfaces, geo-textile material or directly on undisturbed vegetation. If storage occurs on vegetation, material recovery by hand may be required.
- 8.22. Cover all stockpiled material with heavy-duty plastic or filter cloth to prevent erosion during precipitation events.
- 8.23. Topsoil should be stockpiled on the uphill side of the disturbance on sloped terrain.
- 8.24. Construct barricades to prevent losses on steep terrain ($>18^\circ$, 3:1) and within 100m of watercourses.

Excess Materials and Waste (Overburden Removal)

- 8.25. Remove excess excavated material from site where it cannot be used for the final grading of the area. Site specific arrangements must be made for disposal locations and procedures of overburden.
- 8.26. Surplus excavated material may be used to fill depressions around the project site providing topsoil is stripped before filling, with approval from SO.

9. Slope Stabilization, Drilling and Blasting Mitigations Module

Where standard excavation is not sufficient, scaling, hydraulic hammers, drilling units or trim blasting are used to break up rock or soil for removal. Accumulations of debris in ditches reduce their effectiveness at trapping rock fall and reduce public safety. Ditches will be cleaned using a loader and back hoe. Guardrails and rock fences may be temporarily removed to permit this activity.



Timing of Works

- 9.1. Time any vegetation removal work should adhere to the Migratory Bird windows for the area.
- 9.2. Time work to reduce impact to mammals, amphibians and reptiles using rock faces during sensitive life stages such as birthing and rearing of young. This often occurs during the spring. Confirm timing windows with local wildlife ecologists.
- 9.3. Avoid ditch clearing during wet periods and wait until ditches are dry to reduce impacts to amphibians and reptiles and limit sedimentation.

Slope Stabilization-Scaling, Hydraulic Hammers

The use of hydraulic hammers attached to excavators is considered the ideal solution for rock disintegration. It avoids rock blasting where the parent rock is no longer rippable by the excavator's bucket but still has enough planes of weakness for economical operation and effective use of the hydraulic hammer. Scaling is the manual removal of loose material on rock slopes using pry bars, hydraulic press, brooms, shovels and power equipment operated by personnel using roped access to a rock face.

- 9.4. For vegetation clearing refer to the [vegetation removal mitigation module](#) of this BMP.
- 9.5. For slope-stabilization in soils, please refer to the Excavation section.
- 9.6. Survey the work site for cultural resources such as rock art (ex. pictographs, petroglyphs, etc. prior to the work commencing, establish site specific mitigations for their protection.
- 9.7. Measures shall be taken to control dust as much as possible during the removal and falling of rock materials down slope.
- 9.8. Placement of rip rap and backfill on shorelines shall be undertaken without contacting the watercourse, wetted margins and must not be below the High Water Mark.
- 9.9. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately sized, clean rock is used, and rock is installed at a similar slope to maintain a uniform bank.
- 9.10. Direct concentrated surface water (runoff) away from cut and fill slopes.
- 9.11. Immediately stabilize banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through vegetation restoration with native species suitable for the site-refer to [soil and vegetation restoration section of BMP](#).

Drilling and Blasting for Slope Stabilization and Geotechnical Investigations

Trim blasting is used for controlled blasts in which explosive charges are placed in predetermined pattern of holes drilled into the rock face and then detonated. Potentially unstable masses of rock can sometimes be stabilized using rock bolts and long steel rods drilled into the rock to bind it together. Drilling is a common method of investigation to obtain geotechnical reports required for engineering design.



Drilling

- 9.12. Debris from drilling will be contained (screened or settle out) so it will not cover the surrounding area or enter any water course. All debris will be removed, [see section on overburden removal](#) for further mitigations.
- 9.13. The cuttings from all drilling will be contained so they can be removed entirely from the site. If contaminated, the cuttings are to be disposed at an approved waste disposal facility.
- 9.14. Control of spoil and sediment loaded water is required on the drill site. Dyking will be required to retain the deposit on non-vegetated surfaces. If contaminated, the spoil pile must be disposed at an approved waste disposal facility.
- 9.15. During aquifer tests, the water must be piped so it does not erode any soil or any part of the ground. If the water from the tests is piped to a creek, stream, or river, the pipe is to be situated so that there is no erosion of the stream bank or bed. If any sand or similar material is discharged during the aquifer test, care must be taken that the sand does not cover any vegetation.
- 9.16. All test wells will be filled in after the testing is completed. The proponent will be responsible for rectifying any future problems associated with any of the wells or test wells.

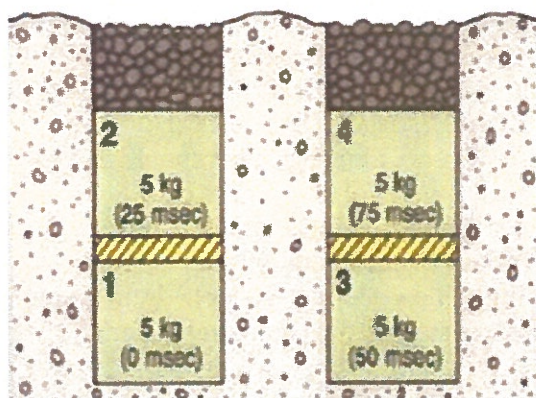
Blasting

- 9.17. The Parks Canada Representative will identify a magazine location for explosives should a factory site or "ready-to-use" explosives storage site be required
- 9.18. The blasting supervisor will ensure no damage to infrastructure, people, surrounding vegetation or wildlife by mitigating risk of fly rock.
- 9.19. Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.
- 9.20. If explosives are required as part of a project (e.g., removal of structures such as piers, pilings, footings; removal of obstructions such as beaver dams; or preparation of a river or lake bottom for installation of a structure such as a bridge or culvert), the potential for impacts to fish and fish habitat will be minimized by implementing the following measures:
 - Time in water work requiring the use of explosives to prevent disruption of vulnerable fish life stages, including eggs and larvae, by adhering to appropriate fisheries [timing windows](#).
 - Isolate the work site to exclude fish from within the blast area by using bubble/air curtains (i.e., a column of bubbled water extending from the substrate to the water surface as generated by forcing large volumes of air through a perforated pipe/hose), cofferdams or aquadams.
 - Remove any fish trapped within the isolated area and release unharmed beyond the blast area prior to initiating blasting.
 - Minimize blast charge weights used and subdivide each charge into a series of smaller charges in blast holes (i.e. Decking) with a minimum 25 millisecond (1/1000 seconds) delay between charge detonations (see Figure 1).



- Back•fill blast holes (stemmed) with sand or gravel to grade or to streambed/water interface to confine the blast.
- Place blasting mats over top of holes to minimize scattering of blast debris around the area.
- Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products. Remove all blasting debris and other associated equipment/products from the blast area.

Figure 1: Sample Blasting Arrangement



Per Fig. 1: 20 kg total weight of charge; 25 msecs delay between charges and blast holes and decking of charges within holes. (Fisheries and Oceans Canada, 2015)

10. Soil and Vegetation Restoration Mitigations Module

Almost all projects activities included in this BMP will require some ecological restoration- *the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed*. The restoration plan can be a simple application of the following mitigations and can be at the site or both at the site and in concert with another site designated to offset the permanent impact of a project. For disturbance areas greater than a hectare a restoration plan is required. The restoration works can be often be considered projects in and of themselves. Soil and vegetation restoration must apply the principles of effective, efficient and engaging solutions.

Timing Windows

- 10.1. Develop restoration plan as part of the project scoping and specifications prior to project approvals.



- 10.2. Vegetation restoration is most effective if seeded in the fall, this allows for full scarification of the seed over the winter and adequate moisture available. Spring and early summer will also work, consider using seed that requires shorter scarification times for these applications. Transplants will do best in the spring and summer and will require adequate watering.

Topsoil Replacement

- 10.3. Implement restoration plan for the disturbed area immediately following completion of construction.
- 10.4. Replace topsoil to all areas immediately following fine grading.
- 10.5. Do not compact topsoil.
- 10.6. Where insufficient topsoil is available imported soil may be used as a last resort. Imported topsoil must be certified completely free of non-native seeds and compost developed from sewage treatment plants. Methods of improving vegetation succession using locally sourced, weed and contaminant free materials are preferred.
- 10.7. Slopes to be seeded should be no steeper than 2 horizontal to 1 vertical (2:1) and covered with a minimum of 5 cm (2 inch) of topsoil. Finish grading should always follow top soil placement.
- 10.8. Where remaining soils are unstable due to steepness or soil characteristics, immediate installation of sod or erosion control blanket is required.
- 10.9. Methods of bioengineering such as terracing, willow staking, live pole drain systems should be assessed as solutions where soils are steeper or remain unstable.

Soil Amendments

Fertilizer Application

- 10.10. Avoid use of fertilizer to limit non-native vegetation growth and allow for local species to use available nutrients.
- 10.11. If needed use locally sourced mycorrhizae compost teas to improve vegetative success.

Topsoil substitute

- 10.12. Apply an organic cellulose only amendment as a soil substitute if reclamation standards are not being met within the defined time frame.
- 10.13. Determine the type of organic amendment based on the site-specific requirements (e.g., peat moss, compost).

Seedbed Preparation

- 10.14. The seedbed will be scarified by hand or, with the approval of the SO, by machine on large areas (i.e., roadbeds) where it is accessible and appropriate.
- 10.15. The seedbed will be scarified if seeding takes place more than 7 days after final grading or if there has been a rainfall between final grading and the seeding date.



- 10.16. The cleats of a tracked vehicle or a harrow device will be used, where possible, to prepare an adequate seedbed with seedling safe-sites (microsites) substantially free of soil crusts.
- 10.17. Align cleat marks at right angles on slopes to trap seed and sediment and reduce erosion.

Species Selection

- 10.18. When selecting species and varieties:
 - Use species of local native plant communities.
 - Species viability in proposed environment and climatic conditions.
 - Capability to effectively control erosion, where required.
 - Adaptation to the variable site conditions of undulating topography.
 - Consider palatability of some species to herbivores and avoid growing attractants in areas of increased risk to wildlife and visitors.
 - Variable life expectancy to produce variable, delayed die-out of seeded species and replacement with indigenous native plants.

Seed Lot Selection

- 10.19. Select seed lots based on indigenous species variety and quality (guaranteed weed seed free content and highest purity and germination), consult with vegetation restoration specialist or fire/vegetation ecologist.
- 10.20. Reject any seed lots containing any seed of undesirable crop or weed species.

Seed Mixture Composition

- 10.21. The proportion of each species should be calculated to provide an adequate quantity of pure live seed (PLS) per unit area of each key component.
- 10.22. Aim for density of about 140 seedlings/m² at the end of the first growing season to provide adequate ground cover and allow native species to re-colonize the site over time.
- 10.23. Consider that parameters such as seed lot purity, seed germination, seedling establishment, seed size and seeding method affect the final stand composition.

Seeding

- 10.24. Use approved native seed mixes developed for site-specific conditions for various elevations.
- 10.25. Seed and stabilize (e.g. mulch/tackifier) bare areas as soon as possible after disturbance, preferably as soon as a significant area is graded and finished and before the next rain event. If there is a risk of seedling mortality as a result of fall frost stabilize until appropriate growing conditions exist.
- 10.26. Use sod in high traffic areas or places that need extra erosion control. Source sod grown from native species (often called fescue sod) and ensure adequate anchoring and watering is in place.
- 10.27. Use temporary seeding when outside the seeding dates for permanent vegetation
- 10.28. Apply a seed mixture which is appropriate for the climate, soil, and drainage conditions of the site.
- 10.29. Apply seed at a rate appropriate to the seed mixture, seeding method and existing vegetation conditions.



- 10.30. Conduct broadcast seeding under calm wind conditions. Hydro-seeding is acceptable where access is available.
- 10.31. Do not exceed 30 kg/ha for the broadcast method, ensure seed is integrated with the soil by light rake or harrow. Broadcast method seeding rate is 25 kg/ha (2.5g/m²) (e.g., 1x25 kg bag will cover 10,000m² or 1 hectare).
- 10.32. For hydro-seeding do not exceed 75 kg/ha with light mulch rates (500 kg/ha- of mulch with hydro-seeding) and 150 kg/ha with heavy mulch rates (1500 kg/ha of mulch with hydro-seeding).
- 10.33. Do not increase the seeding rate to compensate for poor seedbed conditions.
- 10.34. Monitor temporary erosion control measures to prevent seed loss.
- 10.35. Some seeding procedures may have to be completed or repeated in subsequent years.

Alternatives to Seeding

- 10.36. Use topsoil seed bank in small areas when there is no risk of erosion or competition from invasive species (i.e., natural regeneration).
- 10.37. Use native transplants in areas where conventional seeding applications are not applicable or where slope stability is an issue.
- 10.38. Use conventional forestry planting methods for container grown transplants, see website for guidance.

Reclamation Standards

- 10.39. Minimum standard for plant density is 25 plants/m², with 90% frequency.
- 10.40. Minimum standard for plant cover is 80% ground cover, with 90% frequency.
- 10.41. Minimum standard for plant community composition standard is 50% cover and 90% frequency of native species.
- 10.42. Exclude species designated as weeds in the work sites from the plant density standard consult local vegetation ecologist for current site specific non-native vegetation management program.
- 10.43. Rock, plant litter and non-vascular species are included in the cover standard.
- 10.44. Remaining plant cover of seeded native species is acceptable.

Reclamation Plot Evaluation

- 10.45. Select any site within reclamation area measuring 10 x 10 m, providing 100 plots of 1 square meter.
- 10.46. Measure the plant density, cover and composition in each of the 100 square meter plots.
- 10.47. The reclamation standard will have been met if 90 of the 100 plots match or exceed the criteria.
- 10.48. No fertilizer will be applied one year before the reclamation standard is evaluated.

Time Limits

- 10.49. Inspect site annually during the growing season.
- 10.50. Minimum reclamation standard, as above, to be met within one season post planting.
- 10.51. Apply amendments annually, depending on reclamation progress.



- 10.52. Re-seed site if the plant density standard is not expected to be achievable within 5 years.
- A new restoration plan will be prepared and implemented when reclamation standards have not been met after 5 years.

11. Drainage Structures Mitigations Module

Drainage structures on roadway, highway and parkways are structures such as culverts, ditches and drains. Drainage structure management activities are undertaken to ensure that surfaces are safe and efficiently drained, water is efficiently channeled to ditches and watercourses, and erosion of highways and adjacent properties is prevented. These mitigations include the cleaning and maintenance of drainage structures and related hardware, as well as the repair or replacement of existing and installation of new drainage structures.

Timing of Works

- 11.1. Time work in water to respect **timing windows** to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. Contact your local aquatics specialists and DFO offices for further information on **timing windows** in your region.
- 11.2. 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.
- 11.3. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 11.4. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

Drainage Structures

- 11.5. Isolate your work area from any flowing water that may be present. Ensure any flows are temporarily diverted around the portion of the ditch or watercourse where you are working.
- 11.6. Select appropriate equipment and work access routes to reduce damage to riparian vegetation and watercourse banks when using earth-moving equipment.
- 11.7. For smaller scale debris and sediment removal activities, remove materials by hand.
- 11.8. To assist with bank stability and invasive plant prevention, leave topsoil and root systems intact on channel banks surrounding your work area.
- 11.9. Ensure any works to repair damaged structures retain the pre-repair channel conditions (e.g., streambed profile, substrate, channel cross section) and do not constrict the stream width.
- 11.10. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

Culverts

If a proposed culvert crosses a stream where fish are present, the crossing should be designed or upgraded to provide fish passage and avoid interference with fish habitat. To mitigate the



impact of culverts on fish movement technical assessment of the water flows and fish species is required to establish a culvert design that will allow for passage of fish. Often there are regional or provincial best practices available online and qualified professionals can assist with designs. Some best management practices for installation or replacement of culverts follows.

Culvert Design and Alternatives

Utilize alternative crossing structures (e.g. clear span bridges, lock blocks and concrete decks) as a replacement for culverts, where possible.

- 11.11. Ideally, crossings should have natural streambed material through them to allow continuous substrate that matches the streambed below and above the crossing. Open bottom crossings are ideal for maintaining natural substrate.
- 11.12. Utilize a single large culvert design over a multiple culverts design (i.e. several smaller culverts) to reduce debris blockage and increased fish and wildlife passage, where hydrologically feasible
- 11.13. Design culvert bottoms to be placed at least 30cm below the stream bed elevation to ensure culverts remain passable by fish and wildlife by preventing culverts from becoming perched.
- 11.14. A minimum water depth of 200 mm should be provided throughout the culvert length. To maintain this water depth at low flow periods an entrance/downstream pool can be constructed. In some cases, an upstream pool may also be necessary.
- 11.15. The culvert slope should follow the existing streambed slope where possible.
- 11.16. The culvert, inlet(s) and outlet(s) should be adequately protected with rip-rap to prevent erosion and scour around the culvert during high runoff events. The following measures should be incorporated when using replacement rock to stabilize the culvert:
 - Place appropriately-sized, clean rocks into the eroding bank area by hand or machinery operating outside the water course.
 - Do not obtain rocks from below the ordinary high water mark of any water body.
 - Where possible, install rock at a slope similar to the stream bank to maintain a uniform stream profile and natural stream alignment. Otherwise, install the rock at the closest slope required to ensure it is stable.
 - Ensure rock does not interfere with fish passage or constrict the channel width.
- 11.17. Trash racks should not be used near the culvert inlet. Accumulated debris may lead to severely restricted fish passage and potential injuries to fish. Where trash racks cannot be avoided in culvert installations, they must only be installed above the water surface indicated by bank full flow. A minimum of 9 inches clear spacing should be provided between trash rack vertical members. If trash racks are used, a long term maintenance plan must be provided along with the design, to allow for timely clearing of debris.
- 11.18. Natural or artificial supplemental lighting should be considered in new or replacement culverts that are over 150 feet in length.
- 11.19. Ensure designs locate culvert structures in areas that minimize impacts to riparian vegetation and associated wildlife.



Culvert Installation

- 11.20. It may be necessary to exclude fish from the immediate construction site while a culvert is being installed. If this practice is necessary, fish shall be salvaged by a qualified aquatics professional from within the exclusion area.
- 11.21. If dewatering is required refer to the [dewatering mitigation module](#) of this BMP for appropriate mitigations.
- 11.22. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.
- 11.23. Remove any old structures to a suitable upland disposal facility away from the riparian area and floodplain to avoid waste material from re-entering the watercourse

Wildlife Considerations for Culverts

At times, culverts are placed along portions of highways that bisect wetlands or specific habitats that support an abundance of wildlife. Consider building natural rock ledges through culverts to allow for small and medium-sized animals to walk on during periods of high flow.

12. Bridge Maintenance Mitigations Module

Bridge structure management activities include the cleaning and painting of bridge structures as well as the repair, rehabilitation, and replacement of bridge elements including decks, railings, abutments, and bearings. Works may include asphalt, concrete works, chipping, painting, grouting, timber truss, abutment and piling maintenance. These activities help ensure bridge structures remain structurally sound and safe for public use.

Timing of Works

- 12.1. Time work in water to respect [timing windows](#) to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. Contact your local aquatics ecologists, provincial jurisdictions and DFO offices for further information on [timing windows](#) in your region.
- 12.2. 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.
- 12.3. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
- 12.4. Cover or otherwise contain stockpiled materials during heavy rain events or extended absences.
- 12.5. If the work schedule requires working in the rain, the area of work must be isolated with appropriate sediment controls installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

Bridge Cleaning

- 12.6. Schedule bridge-cleaning activities to coincide with the watercourse's spring freshet when possible. At freshet or during periods of high flow a large watercourse will often have its highest background levels of sediment. At this time, the introduction of a small amount of sediment to a watercourse (from bridge cleaning) will have a lower risk of potential impact when considered against those high natural background levels.



- 12.7. If works are planned outside the freshet or if your region does not experience a freshet, discuss the protocol and timing of these works with your local aquatics ecologist and/or DFO Officer.
- 12.8. Dry sweep and collect loose material off bridge surfaces before washing the bridge. Adequately seal drains and any open joints on the bridge deck before sweeping or washing to prevent material or sediment-laden wash water from entering any watercourse
- 12.9. If dry sweeping and preventing direct runoff to waterway is not a feasible way to clean the surface, discussion and planning with local aquatic ecologists will be required.
- 12.10. Use water alone. If your cleaning activities require degreasers or any other chemical, approval for use must be obtained from local aquatics specialists and/or DFO.
- 12.11. Contain any wash water or runoff to the bridge deck. Direct wash water towards the bridge approaches and away from the watercourse, then to a vegetated area or contained settling area (e.g., dry ditch channel unconnected to a watercourse) where it can infiltrate.
- 12.12. If superstructure cleaning is undertaken above or on the bridge deck level, prevent potentially harmful materials from entering into road drains. Block deck drains with suitable barriers (e.g., polyethylene or drain blocks) to prevent direct discharge to a watercourse, or re-route runoff through temporary piping onto adjacent settling pond or structure, using a hydro vacuum would be another option.
- 12.13. If water for cleaning is extracted from a watercourse, refer to [water withdrawal section](#) of this BMP.

Repairs Using Treated Wood Products

- 12.14. Untreated wood products are recommended, if treated wood is to be used, ensure it has been treated with a wood preservative appropriate for the project. Refer to the [Parks Canada Guide for the Use, Handling and Disposal of Pressure Treated Wood 2009](#) and any further updates from [Parks Canada Real Property – Environmental Management](#).
- 12.15. If treated timber must be cut to size, ensure cutting takes place away from the bridge and watercourse. Sawdust from treated wood is harmful to aquatic organisms and must be prevented from entering any watercourse.
- 12.16. Wood preservatives should be applied in a contained area and not be applied over or within 200m of water.

Bridge and Structure Painting

- 12.17. Ensure paint flakes, abrasive grits and abrasive/paint flake mixtures do not enter the watercourse as they may leach toxic heavy metals into receiving waters and/or be ingested by fish.
- 12.18. Install ground covers and/or vertical drapes such as sheets of plastic or air-permeable cloth (e.g., burlap or canvas) prior to removal activities to capture falling debris. Floating barges may be deployed in watercourses to capture falling debris, such as paint flakes and dust.
- 12.19. Waste materials collected during removal and application of protective coating operations (e.g., blasting abrasives, paint particles, rust and grease) should be



collected and retained for disposal at appropriate locations. Waste materials must not be deposited into watercourses or riparian areas.

- 12.20. Use hydro blasting or manual techniques, where possible, when removing road dirt, soluble salts and loose paint to minimize impacts to the watercourse.
- 12.21. Use water without cleaning agent additives if grease film removal is necessary.
- 12.22. Avoid use of toxic liquid paints, primers, solvents, degreasers and rust inhibitors.
- 12.23. Minimize spill potential by storing, mixing and transferring paints and solvents on land.

13. Water Withdrawal and Dewatering Mitigations Module

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 local project sites. Dewatering can allow sites to be effectively dry during construction, reducing the impact of sediment laden water entering fish bearing waters.

Timing Windows

- 13.1. As a general guide to prevent taking more water than aquatic system can support, limit total take of water to less than 5 successive days and less than 10 days in any period of 30 days.
- 13.2. Avoid water withdrawal during breeding seasons of amphibians and reptiles to avoid destruction of egg masses, consult local aquatics ecologist for site specific guidance.

Water Withdrawal

- 13.3. Water should not be withdrawn from a wetland or stream less than 5 metres wide at the surface or a lake less than one hectare in area.
- 13.4. 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 the 90% exceedence flow (eg. 1 in 10 chance in a given year).
- 13.5. No permanent or semi-permanent works for water withdrawal should be placed in the stream channel.
- 13.6. 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.

Pump Screens

- 13.7. In freshwater, fish-bearing waters design and installation of intake end-of-pipe fish screens:
 - Locate screen in areas and depths of water with low concentrations of fish throughout the year away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.
 - Orient the screen face in the same direction as the flow of water.
 - Ensure openings in the guides and seals are less than the opening criteria to make “fish tight”.



- 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.
- Provide structural support to the screen panels to prevent sagging and collapse of the screen. Large cylindrical and box type screens should have a manifold installed to ensure even water velocity distribution across the screen surface. The end of the structure should be made of solid materials and the end of the manifold capped.
- Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where debris loading (woody material, leaves, algae mats, etc.) is a concern. A 150 mm (6 in.) spacing between bars is typical.
- Provision should be made for the removal, inspection, and cleaning of screens.
- Ensure regular maintenance and repair of cleaning apparatus, seals, and screens to prevent debris fouling and impingement of fish.
- Pumps must be shut down when fish screens are removed for inspection and cleaning.

Dewatering

- 13.8. A site specific dewatering plan is required be provided before commencing a pump-out sump to dewater excavation sites with specific details on how and where the water will be discharge.
- 13.9. Site specific mitigations may be required depending on the conditions of the discharge area, freezing conditions operation, overflow avoidance, decanting and settlement pond reclamation.
- 13.10. Water containing suspended materials shall not be pumped into watercourses, drainage systems or on to land, except with the permission of the SO.
- 13.11. Soil and vegetation erosion protection is required for water pumped on to land.



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Appendix 1 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 in 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 Bird Convention Act – Environment 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 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 projects or activities to be addressed by the BMP 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 C

Best Management Practices (Mitigation), Works In and Around Waterbodies

Grande Anse Bridge Rehabilitation



Best Management Practices (Mitigation)

Works In and Around Waterbodies

Grande Anse Bridge Replacement



Environmental Components That May Be Affected

Water Resources

- Contamination of a waterbody from machinery leaks or spills, discharges or spills of toxic or deleterious substances like equipment oils and fuels, wood waste and sediment which can kill fish, frogs, salamanders, insects, and other aquatic organisms.
- Disturbance of streambed sediments resulting in increased sedimentation of waterbodies.
- The BC Ministry of Water, Land and Air Protection (2004) indicate that the introduction of fine sediments directly from digging activity in the waterbody and indirectly from run-off from exposed soils can have severe negative impacts on all life stages of fish and other aquatic life and their habitats including:
 - Reduction of the availability and quality of aquatic habitats through the in-filling of critical types of habitats (e.g., pools and riffles, spawning habitats);
 - Loss of interstitial spaces between spawning gravels used to shelter eggs, alevin, juvenile fish, and other aquatic organisms;
 - Impacts to species health through the clogging and abrasion of gills and smothering of eggs and juveniles;
 - Reduction of water clarity and visibility which impairs the ability of aquatic life to find food, mates, and escape predators;
 - Elimination of critical food items such as insects and aquatic invertebrates through smothering and loss of habitat; and
 - Death of fish, amphibian, insects, vegetation and other aquatic organisms.
- Installation of traditional mooring systems with chains in contact with bottom sediment (concrete anchor blocks) can re-suspend and redistribute particles and make direct physical contact with or damage organisms and benthic habitat.
- Increased turbidity from sediment re-suspension, reduces habitat quality for seagrass and other species dependent on high light levels in the nearshore water column.
- Halo dead zones around chain moorings are well documented and occur from vessels and moorings swinging in response to tides, winds, and currents.

Terrestrial Resources

- Soil contamination from waste (e.g., garbage, litter, sewage, fuel).
- Operation of heavy machinery can result in soil compaction and modify slopes, landforms and landscapes.
- Disturbed areas may become prone to soil erosion, loss of topsoil, exposure of subsoils and decreased bank stability, which may lead to increased sedimentation in waterbodies and facilitate the establishment of invasive species.

Flora and Fauna

- Physical damage/loss of vegetation, contributing to: loss of fish, herptile or any wildlife habitat connectivity, increased flows and waterbody power, temporary or permanent loss or alteration of habitat (riparian and aquatic).
- Work in wetlands can lead to loss of wetland function as well as habitat fragmentation and a reduction in flood level protection.
- Disruption to wildlife, (e.g. migration, or foraging times).
- Removal and/or destruction of riparian vegetation and shoreline woody debris may alter cover, food production, movement patterns and the structure of fish or herptile habitat.
- Disruption, displacement, injury or mortality of SAR and destruction or damage to their habitat.
- Most amphibians and some reptiles migrate to specialized aquatic areas to reproduce and many spend much of their lives in riparian areas.
- Shore stabilization works can create vertical barriers to amphibian and reptile movement, and may disturb the foreshore habitats required for breeding or basking.
- Potential impacts to salvaged animals in dewatering projects include: injury, stress, cannibalism, desiccation, and mortality.
- Increased mortality for herptiles can occur while crossing roads and other modified landscapes when attempting to return to capture sites.
- Noise (shock) from driving pilings and sheet piles (installation of cofferdam) can also impact fish in the vicinity and/or disrupt or displace other wildlife.

Cultural Resources

- Natural riparian areas as well as waterbodies have a high likelihood of cultural resource presence due to their proximity to water sources. Work in those areas can:
 - (1) Adversely affect value or character-defining elements of a cultural resource or heritage place;
 - (2) Displace or destroy archaeological resources (known or potential); and,
 - (3) Impact or destroy submerged cultural resources.

Visitor Safety and Experience

- Reduced quality of visitor experience due to noise and presence of construction equipment.
- Reduced accessibility to portions of the site where work is taking place.
- Hazard to visitors and staff due to construction activities (e.g., heavy equipment and hand tool operation, tree removal).
- In-water works, shoreline works and related activities, cofferdam, mooring or swimming buoys can constitute a public safety hazard or hazard to navigation.

Mitigation Measures

Mitigation measures will be used where appropriate. Slight modifications may be required to ensure all potential impacts are mitigated and to provide project-specific clarifications. The Impact Assessment Officer (IAO) will review a proposed project and advise the functional manager of the project if and how BMPs should be applied. The IAO's advice will be based on whether the project falls within the scope of the BMP, and whether application of the mitigation measures in the BMP will adequately address potential adverse effects of the project. The IAO will also be responsible for adding any required supplemental mitigations to ensure site specific considerations are addressed. Project Managers are responsible for ensuring all mitigation measures applicable to the project are added to the terms and conditions of any permits or contracts issued for the project.

Project Planning

1. Clearly identify specific to the site and adapt project design/schedule accordingly.
2. All work will comply with DFO [Measures to Avoid Causing Harm to Fish and Fish Habitat](#). The latter provides specific mitigation measures on: *Project planning, Erosion and sediment control, Shoreline/bank re-vegetation and stabilization, Fish protection and Operation of machinery.*
3. In the case of future contradiction between measures listed in this BMP and in the DFO website, the DFO measures should be respected.
4. Maintain compliance with the [Species at Risk Act](#); identify species at risk, critical habitat and residences.
5. Maintain compliance with the [Migratory Birds Convention Act](#), consult the *Parks Canada Guidance on Managing Migratory Birds*.
6. Identify and protect important herptile habitats—such as aquatic breeding sites for amphibians, caves and seepage areas for salamanders, turtle nesting grounds, or snake hibernacula.
7. Complete in-water works when water levels are lowered.
8. Projects likely to interfere with navigation (e.g., work performed from a barge) must comply with the [Navigation Protection Act](#) (See PCA “[Factsheet: Navigation Protection Act](#)”)
9. If work must be completed during summer months, [choose a time period](#) that minimizes risk to all species at the site.
10. Should conditions at the work site indicate there are unforeseen negative impacts to fish, wildlife, cultural or visitor experience resources, all work shall cease immediately, and the designated Parks Canada staff consulted to determine next steps.
11. Any equipment operating in water bodies must be cleaned prior to entering the water and inspected daily for leaks.
12. Proof this mitigation was applied may be requested before equipment is permitted into the protected heritage place.
13. Boats or equipment used in-water will be cleaned and inspected for invasive alien species following work.

14. If invasive species are a serious problem consider more effective cleaning methods as suggested by National Oceanic and Atmospheric Administration (NOAA) on [Preventing Invasive Species: Cleaning Watercraft and Equipment](#).
15. Debris shall not be allowed to enter waterbodies and must be retrieved to the extent possible if it does.
16. If a barge is used, minimise disturbance to the foreshore from the spuds and prop scour and ensure sufficient water is present to prevent the barge from grounding.
17. Prior to demolition or repair work on bridges or any other physical work, an assessment must be conducted for regulated materials such as asbestos, lead, treated wood, florescent bulbs, light ballasts, transformers and other electronic components, mercury and PCBs.
18. All regulated materials must be properly managed and disposed/recycled at an approved disposal facilities.

Erosion and Sediment Control

19. An Erosion and Sediment Control Plan (ESCP) that covers all construction and restoration periods must be prepared. It should be scaled to the scope and associated risks of the project but can include consideration of :
 - a. Project design and spatial concept of environmental sensitivities (e.g. watercourses, wetlands, steep slopes etc.);
 - b. Erosion prevention procedures (e.g., project schedule, minimization of work area, site management, ground cover measures);
 - c. Sediment control measures (e.g. sediment fences, check dams, sediment traps, etc.) including specifications and typical drawings of sediment control structures;
 - d. Detailed plans for in-water works including site isolation measures and project timelines;
 - e. Water management plans including site control, equipment necessary and proposed dewatering locations;
 - f. Location of erosion and sediment control measure applications;
 - g. Monitoring of prevention and control measures and corrective actions (e.g., repairs);
 - h. Removal of non-biodegradable materials once site is stabilized.
20. Avoid soil disturbing activities during periods with saturated soils, periods of high rainfall intensity, runoff, high winds, or wet snow.
21. Temporarily stop work when wet ground conditions contribute to erosion and sediment transport.
22. Erosion and sediment control products made of 100% biodegradable materials (e.g., jute, sisal or coir fiber) should be used when possible.
23. Ensure backing materials are also biodegradable. Products should also be selected to reduce potential for wildlife entanglement/attraction and prevent introduction of invasive alien species.
24. All products must be approved by Parks Canada and installed prior to commencement of work.
25. Regularly inspect and maintain erosion and sediment control structures during all phases of the project including during periods of construction inactivity or shutdown and until the site has been stabilised.
26. In the event of erosion and sediment control measure malfunction, work must be stopped until measures are adjusted to address the problem.
27. Plan project activities to minimize soil handling and limit equipment movement over exposed soils and steep or unstable slopes prone to erosion.

28. Minimize the length of time soils are exposed and complete work in one area before commencing work in another area.
29. If vegetation clearing is scheduled early due to timing windows, maintain soil stability by delaying grubbing until just prior to construction activities.
30. Ensure rock, riprap, or other materials placed on the banks or within the active channel or floodplain of the waterbody is inert and free of silt, overburden, debris, or other substances deleterious to aquatic life.
31. Excavated material and debris must be stored in a stable area, above the HWM or active floodplain and 15m from drainage features and/or the top of steep slopes. Protect excavated material from re-entering the waterbody, (i.e. cover with erosion blankets, seed or plant with native vegetation).
32. Following completion of work, prior to removal of sediment and erosion control measures, all disturbed surfaces and shorelines shall be stabilized and/or re-vegetated as soon as possible. Plant species/seed mix must be approved by Parks Canada.
33. Remove accumulated sediments prior to removing erosion control products. Silt or debris accumulated around a temporary cofferdam must be removed prior to withdrawal of cofferdam.

Riparian Vegetation

34. Avoid sensitive features and any associated restricted activity areas identified by the field unit.
35. Should additional sensitive features be found, work must be stopped and the designated Parks Canada contact notified to determine next steps.
36. Minimize clearing in riparian areas as much as possible to maintain vegetative buffer at shoreline, cover and windbreaks. When practical, prune or top vegetation instead of grubbing/uprooting.
37. Minimize removal of natural woody debris, rocks, sand or other materials from the banks of waterbodies and avoid any disturbance below the High Water Mark.
38. Clearly identify the clearing zone and mark significant specimen trees to ensure they are avoided.
39. Avoid felling trees across a waterbody unless there is no other alternative due to safety reasons (e.g., to protect fallers or buildings).
40. Damage to the banks and the bed of the waterbody must be prevented when removing the felled tree. If possible, leave and anchor the trunk, letting it remain as large woody debris within the riparian zone.
41. Ensure tree limbs/stumps are flush cut as close to the ground or stem as possible.
42. Move logs and other salvage materials to a storage site outside the riparian zone, minimize the spread of debris or damage to other standing trees or landscape resources outside the marked clearing and storage area.
43. All vegetation debris must be removed as soon as possible from the right-of-way.
44. Store removed vegetation on disturbed areas to minimize disturbance area.
45. Debris should not be deposited in water bodies
46. Where vegetation has been removed/damaged, re-establish with native vegetation as soon as possible.

Shoreline Stabilisation

47. Avoid high-risk inclines with unstable slopes.
48. Keep excavation to a minimum to maintain vegetative cover; where possible maintain vegetated buffer at shoreline.

49. Stabilize slopes as appropriate for local site conditions; possible methods include: grading to a stable slope, hard and soft designs or combinations of designs using riprap, armour stone, revetments, erosion control blanket, brush bundles, etc.
50. Geotextile shall be used as a separator between riprap and soil in areas where soil may erode from beneath the riprap due to high flows.
51. Ensure effective surface drainage at the end of the project, this may require re-establishment of, or improvement to, the original site drainage.
52. When herptiles are present, consider these conservation gain measures:
 - a. Create gradually sloped shorelines using a minimum 1:3 but preferably 1:15 (vertical to horizontal) slope ratio when stabilizing the shoreline.
 - b. Avoid creating deep, permanent water bodies with steep embankments.
 - c. Use 'soft armoring' shoreline techniques like plants, logs, root wads, and/or vegetative mats.
 - d. Replace 'hard' shorelines (e.g., concrete retaining walls, rip-rap) with vegetation to create more natural shorelines (i.e., 'soft armoring' techniques).

Cofferdams

53. Fish passage and downstream flow through the area must be maintained. Consider the temporary channel diversion option.
54. Give preference to types of cofferdams that minimize encroachments into fish habitats.
55. When rocks are used to build the cofferdam, use clean materials and prioritize the installation of a membrane to ensure the structure is watertight.
56. If pile driving is required, start it gradually at the beginning of daily activities, and after activities have been stopped for more than two hours, to allow any fish present to leave the area.
57. Install measures (e.g., bubble curtains) to isolate and protect fish and other aquatic life from noise and physical disturbance prior to the commencement of any pile driving operations.
58. If conducting pile driving work during the winter, inspect foreshore substrates to determine whether frozen substrate conditions and machine pads are required to minimize foreshore disturbance.
59. Take all necessary measures to minimize fine particle suspension and transport when installing and removing cofferdams. Use clean materials, 5 mm and over (concrete blocks, riprap, sheet pile, etc.), with no fine particles.
60. Turbidity curtains must be used when constructing or removing cofferdams:
 - a. Place curtains according to specifications as close to the cofferdam as possible to minimize sedimentation impacts;
 - b. Turbidity curtains should not be used as a primary or secondary settling area for dewatering activities;
 - c. Place the curtain at the shoreline or cofferdam and move into desired location to prevent fish from being trapped inside. Ensure the edges are tight to the shoreline to reduce the risk of sediment getting out or fish getting in.
61. Follow Transport Canada requirements to ensure all in-water equipment (e.g. cofferdam; turbidity curtain) are clearly identified.
62. Silt or debris accumulated around a temporary cofferdam must be removed prior to withdrawal of cofferdam.

- 63. All cofferdam materials should be removed from the waterbody and disposed at an approved facility or recovered for future use.
- 64. Ensure no equipment, materials or debris originating from the work is left in the waterbody or causes an obstruction to navigation.

Temporary Diversion Channel/By-Pass

- 65. Ensure work area is appropriately isolated to prevent sediment laden water from entering downstream.
- 66. Size diversion channel appropriately to accommodate peak flows including consideration of increased flow from rain events.
- 67. Temporary diversions should be excavated from the downstream end toward the upstream point of diversion, where a “plug” of earth should be left to prevent the entry of streamflow into the diversion before channelization.
- 68. The channel should be lined with plastic weighted down with crushed stone or other permeable material and staked into the top of the channel slopes.
- 69. Once the channel has been lined and the lining secured, the “plug” of earth referred to earlier can be slowly removed.
- 70. The permeable material lining the diversion should be kept in good state of repair to ensure streamflow does not get under or behind the channel liner and cause erosion of the channel banks and subsequent downstream sedimentation.
- 71. Constant maintenance of temporary diversion channels may be required.
- 72. The temporary diversion should be filled in and stabilized to prevent erosion when no longer in use; all construction materials will be removed off site and disposed of as appropriate.
- 73. Use water diffusers and/or settling pools to reduce the energy, power and erosion potential of streams diverted by hose or pipe.
- 74. Once project is complete, restore the waterbody to its original configuration and stabilize bank to prevent erosion at the temporary diversion site.

Pumping Activities

- 75. If pumping water into a settling basin or land-based bladder, any fish or any animal in the area to be dewatered must be captured alive and released upstream of the work area.
- 76. Apply measures from [Module 9: Fish and Amphibian Salvage](#).
- 77. Install protective measures to prevent fish from gathering around the dam and pump in-take.
- 78. Submersible pumps used for dewatering should be placed in the low point of the work area. If there is high turbidity, pre-filter water that goes to the pump and try to eliminate unnecessary sources of sediment to the dewatering area.
- 79. Determine the maximum flow rate for dewatering activities and ensure discharged pumped water does not cause additional erosion.
- 80. If pumps are used to route waterbodies around cofferdams for more than one day, the pump operation should be monitored during periods of inactivity.
- 81. Pump water into settling pond, into adequately vegetated areas to filter sediments or filter by other physical means, such as filter press, before allowing water to re-enter the waterway.
- 82. Monitor discharge water quality on a regular basis.

83. Should there be any observable turbidity at the discharge point, work should halt until the source is determined and additional mitigation measures are applied.
84. If the area is likely to contain fish, ensure the fish screen complies with DFO:
[Fish protection Measures to avoid causing harm to fish and fish habitat including aquatic species at risk](#).

Re-watering of worksite

85. Ensure all construction material/debris is removed from the site with minimal disturbance and disposed at an approved facility.
86. Remove any excess sediment sources and cap with clean rock or gravel as appropriate.
87. Sediment control measures and exclusion fencing must be removed in a way that prevents the escape or re-suspension of sediments.

Fish and Herptile Salvage

88. Capture and relocation of any species listed as endangered or threatened under SARA is NOT covered by this BMP and will require an approval from PCA or DFO. Consult the [SARA-Compliant Authorization Decision Tool](#) (found under “IA and the *Species at Risk Act*”) for detailed information.
89. Apply [DFO Measures to Avoid Causing Harm to Fish and Fish Habitat Including Aquatic Species at Risk](#) and obtain any applicable permits from DFO prior to undertaking salvage work.
90. Fish and amphibian salvage must be completed before work starts and may need to be repeated if flooding occurs on the site.
91. As water levels drop in the work area, monitor the deeper pools where fish are congregating.
92. Start fishing early and monitor the water level closely as it can drop quickly.
93. If safe, seine or dip nets can be used, or electrofishing can be performed to remove the fish.
94. A certified professional is required to remove fish with specialized equipment where conditions dictate.
95. Round gobies or other invasive species found during dewatering activities, should NOT be returned to the waterbody, alert the designated Parks Canada staff to their presence and abundance.
96. Herptile salvage must begin at least two weeks prior to project commencement.
97. Salvaged herptiles shall be immediately transported to a nearby site within the same general habitat; minimize handling and transit time.
98. Salvage techniques include: hand capture using aquarium nets; overturning rocks; hand sweeps along bank edges, through gravel beds, in and along log jams; and visual survey of pools or unbaited aquatic traps. Electrofishing is not recommended.
99. Temporary exclusion fencing can be installed to prevent salvaged individuals from returning to the work area during construction, but must be removed on completion of the project.

Wharves, Docks, Launch Ramps

100. Minimize disruption to habitat by ensuring removal activities do not include dredging, blasting and/or placement of fill below the high water mark.
101. Ensure existing rocks and logs in the aquatic environment remain in place.
102. Remove existing structures and/or pilings in a manner that prevents foreshore disturbance and/or sediment generation.
103. If piles cannot be pulled out, cut or break off any piles as close to the waterbody bottom as possible.

104. Remove any old structures or pilings to a suitable upland disposal site away from riparian vegetation to avoid waste material from re-entering the watercourse.
105. Remove debris by hand, where possible.
106. Only clean material, free of particulate matter, shall be placed in the water.
107. During installation/replacement of new cribs under a boathouse, at least 50% of the total boathouse length must be clear unobstructed open spans to allow for water circulation and fish movement.
108. Space elevated decks and walkways to allow light penetration to the foreshore.
109. Avoid use of Styrofoam (polystyrene) buoyancy billets, they are friable and deposit plastic particles into the receiving environment.
110. If used, Styrofoam® floats must be fully enclosed in a protective coating to prevent breakdown of the material during use, seasonal removal, and reinstallation.
111. Decking on docks, floats, piers and gangways should use open grid material to allow light infiltration to the water column.
112. This can be accomplished through spacing of deck materials, or by using porous deck materials such as ThruFlow decking which allows 40% of light to pass through the deck surface and enter the water column.
113. Do not use rubber tires as floatation system components for floating dock sections as they are known to release extracts toxic to fish and aquatic invertebrates.
 - a. use inert or untreated materials (e.g. fir, cedar, hemlock) as supports for structures to be submerged in water. Treated lumber must not be used as it may contain compounds that can be released into the water and become toxic to the aquatic environment. Treated wood must be handled, installed, and disposed of according to the [Parks Canada Guide for the Use, Handling and Disposal of Pressure Treated Wood 2009](#) or contact the Parks Canada [Environmental Management Team](#) for advice.
114. Cut, seal and stain (non-toxic) all lumber away from the water and ensure it is completely dry before use near water.
115. Ensure plastic barrel floats are free of any chemicals inside and outside before they are placed in water.

PCA

APPENDICES

Project No. 1114

Pleasant Bay to North Mountain

February 2019

KM 33.17 to 38.74

Appendix D

Environmental Protection Plan Template Document

Company Logo

Project Name

Parks Canada Contract No. XX-XXXX

Environmental Protection Plan (EPP)

YYYY-MM-DD

Prepared by:

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- D Instream Work Plans or other
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Acronyms Used in This Report

Populate this list with any acronyms used in the Environmental Protection Plan (EPP). This would include Parks Canada Agency (PCA) terminology like Environmental Surveillance Office (ESO) or Field Units (FU). In the body of the report use the non- abbreviated form followed by the acronym in brackets when introducing a term. Consecutive uses are to use the acronym.

ACM	Asbestos Containing Material
BMP	Best Management Practice
BIA	Basic Impact Analysis
DIA	Detailed Impact Analysis
DR	Departmental Representative
EIA	Environmental Impact Analysis
EPP	Environmental Protection Plan
ESO	Environmental Surveillance Officer
ESC	Erosion & Sediment Control
GWM	General Wildlife Measures
LOS	Line of Sight
MBCA	Migratory Bird Convention Act
MBNS	Migratory Bird Nest Survey
NTU	Nephelometric Turbidity Units
PCA	Parks Canada Agency
PCB	Polychlorinated Biphenyl
PVC	Polyvinyl Chloride
SARA	Species at Risk Act
SDS	Safety Data Sheets
TSS	Total Suspended Solids
UWR	Ungulate Winter Range
QEP	Qualified Environmental Professional

Document Number	XXX-XXX	Rev X
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Revision Record

Rev	Description	Originator	Checker	Approved	Date
X	Title of Document	Author	Reviewer	Y/N	yyyy-mm-dd

1. Project Description

1.1. Background

State the name of the project, consultant, contractor and QEP. Provide a brief description of key elements & related activities. Reference the approval document for the PCA environmental assessment: either a Detailed Impact Assessment (DIA), Basic Impact Assessment (BIA), or Best Management Practices (BMPs). Ensure that procedures described in this EPP are consistent with that approval.

1.2. Location

Include a figure or refer to a map in the appendices which outlines the entire project footprint including any off-site requirements. Emphasis should be placed on any areas that are considered environmentally sensitive and are thus subjective to greater scrutiny under the provisions of the EPP.

1.3. Scope

Summarize the Project activities and describe any activities that are required to successfully complete the project that were not covered in the environmental approval.

1.4. Project Components

Methodically list and detail the phases or major construction activities to be undertaken by the Contractor, with emphasis on tasks considered to carry higher environmental risk. Consider all elements that were identified during completion of the DIA, BIA or BMP-based projects.

1.4.1. List construction or related activities to be undertaken

1.4.2. List construction materials to be used and their source location

1.5. Schedule and Timing Windows

Describe how project scheduling has been planned to avoid or reduce potential impacts to sensitive environmental resources. Key project elements bearing environmental risks that require detailed planning and scheduling considerations should be featured such as works to be conducted in or around water.

1.5.1. General Schedule

1.5.2. Least Risk Work Periods and Timing Windows

1.6. Existing Environmental Resources

Provide a brief synopsis of environmental resources occurring within the project footprint and primary environmental considerations.

Summarize all (if any) sensitive fauna / flora / ecosystems which occur within or near the project footprint based on previous findings from the DIA, BIA and Project Description. If any at risk ecosystems are present, a specific plan mitigating any foreseeable impacts through the implementation of BMPs or mitigations as listed in the DIA, or BIA must be included in the EPP.

1.6.1. Fauna

1.6.2. Flora

1.6.3. Ecosystems

1.6.4. Aquatic Resources

Summarize all previously identified sensitive aquatic habitat occurring in and around the project footprint based on previous findings from the DIA, BIA or Project Description. Recap major features such as watercourses or wetlands including known fish presence. Instream Work Plans, as applicable, can be included as an Appendix and discussed further under the Water Management section.

2. Environmental Protection Plan

2.1. Objective

*State the purpose for which the EPP was created. The EPP describes site specific environmental protection measures and obligations that **must** be upheld and implemented for successful completion of the project.*

2.2. Environmental Briefing and Training

Refer to the person(s) responsible for training construction personnel. Discuss how the briefing will be documented and achieved to confirm that all personnel onsite have attended the briefing.

2.3. Awareness and Communication

In this section, describe how any updates to the EPP and its content will be communicated to site personnel. Describe ongoing measures to train workers.

2.4. Roles & Responsibilities

2.4.1. Parks Canada Agency Environmental Surveillance Officer (ESO)

The PCA ESO is responsible for communicating the environmental expectations of the project and ensuring that the standards identified in the DIA/BIA are upheld. The PCA ESO will work closely with the Departmental Representative to maintain the integrity of the EPP and assess the effectiveness of the applied BMPs. Discuss and/or list the specific responsibilities of the PCA ESO.

2.4.2. Contractor

The Contractor is tasked with the delivery of a quality product that meets or exceeds the environmental considerations identified prior to construction. Stress the importance of start-up and daily job planning meetings to successfully accomplish this objective. Discuss and/or list the general environmental obligations to be upheld by the Contractor including any additional details specified in tender documents.

2.4.3. Qualified Environmental Professional

Level of effort required by the QEP is to be in accordance with Contract Documents and may vary per project. QEP may be required to perform daily on-site environmental monitoring services during the Project activities. QEP will be required to monitor conditions in the vicinity of the Project to ensure compliance with the EPP and environmental approval documents. QEP is to work with the contractor, PCA ESO and Departmental Representative in ensuring all environmental obligations are met and standards are upheld.

2.4.4. Departmental Representative

On behalf of PCA, the DR is generally responsible for overseeing project construction to confirm compliance with technical, operational and environmental provisions as defined in applicable legislation, regulations, guidelines, contract documents and specifications, the site specific EPP and standard BMPs. Discuss and/or list the specific roles in which the DR will assume during the construction of the project.

2.5. Environmental Monitoring, Reporting and Compliance

Outline the required QEP monitoring frequency for the project and provide a reporting template as an Appendix. Discuss how potential non-compliance items will be documented.

Note that ESO and Departmental Representative monitoring for environmental compliance may not be as frequent and thorough as required by the contractor / QEPs.

2.5.1. Daily Reporting

2.5.2. Incident Reporting

2.5.3. Non-Compliance Reporting

2.6. Environmental Suspension Order

Discuss the authority and responsibility of the ESO, DR or QEP to suspend works with the potential to harm the environment, that is in contravention of the DIA, BIA, BMP approvals or any federal act. Outline the protocol and describe the reporting process for suspension.

2.7. Contact List

All communication from the Contractor / QEP is to go through the Departmental Representative, unless it is an emergency then PCA Dispatch can be contacted and the Departmental Representative immediately notified.

Table 1. Contact List

Project Personnel	Name	Company	Phone Number
Project Manager		PCA	Office: Mobile:
Environmental Surveillance Officer		PCA	Office: Mobile:
Departmental Representative		PCA	Office: Mobile:
Project Manager		Contractor	Office: Mobile:
Superintendent		Contractor	Office: Mobile:
Qualified Environmental Professional		Contractor	Office: Mobile:
Health and Safety Supervisor		Contractor	Office: Mobile:
PCA Dispatch Office		PCA	Office: Radio:

3. Permits, Approvals and Authorizations

Highlight permitting requirements and other items required for compliance. Include a list of environmental notices, permits, and approvals received prior to construction, as well as any permit requires that are the responsibility of the Contractor.

3.1.1. Restricted Activity Permits

3.1.2. DFO or other permits

4. Mitigations and Best Management Practices

Address the requirements of the environmental approvals and provide mitigations in the form of management plans to meet all conditions and restrictions. Mitigations must be accompanied with specific references to applicable PCA BMPs and environmental approvals.

4.1. Vegetation Management Plan

Detail the practices that will be implemented to minimize impacts both inside and outside the project footprint in terms of vegetation clearing.

4.1.1. Tree and Vegetation Removal

4.1.2. Noxious Weed and Invasive Plant Handling

4.1.3. Vegetation Replanting and Site Restoration

4.2. Erosion & Sediment Control Plan

Develop a phased ESC plan expansive to all stages of construction. This plan must be specifically adapted to the scope of the project and should acknowledge any previously identified environmental sensitivities. Discuss monitoring protocols and the frequency of inspections.

4.3. Soil Management

Develop a stringent protocol for the event of contaminated soil and outline BMPs which will be implemented to adequately contain contaminated soils to the site. Include methods for management of stockpiles and temporary storage or excavated materials and other items.

4.3.1. Stockpiles and temporary storage

4.3.2. Chance-find Contaminated Soils

4.4. Water Management Plan

This section should complement the ESC plan and must describe how the Contractor intends to manage all sources and quality of water within the project footprint. If instream works are relevant to this project, this section must outline strategies to dewater and divert flows to isolate work areas to maintain relatively dry conditions within the work area.

Instream Work Plans (IWPs) need to be site specific to the culvert / watercourse. Include equipment to be used, methodology, staging plans and QEP involvement. IWPs can be included as an Appendix.

4.4.1. Working in or Around Water

4.4.2. Fish and Fish Habitat

4.4.3. Surface & Ground Water

4.4.4. Handling Suspect Contaminated Water

4.4.5. Water Quality

4.4.6. Water Quality Monitoring

i. Turbidity Monitoring

ii. pH Monitoring

4.5. Wildlife & Human Conflict Management Plan

Detail strategies which will be implemented to prevent unnecessary interactions with wildlife. Prescribe detailed mitigative procedures for items such as handling food wastes and training workers.

4.5.1. Nest Survey

4.5.2. Fish Survey and Salvage

4.5.3. Amphibian and Wildlife Survey and Salvage

4.6. Waste Management Plan

Outline the procedures for handling and disposing of waste materials generated as a result of construction or uncovered by chance.

4.6.1. General Construction Waste

4.6.2. Special or Hazardous Waste

4.6.3. Concrete Materials Handling

i. CO₂ Diffuser Kits

4.6.4. Waste Water

4.6.5. Contamination Prevention

4.7. Air Quality & Dust Control Plan

Provide technical guidance to reduce the emission of fine particulate matter and greenhouse gases into the surrounding environment.

4.8. Noise and Vibration Management Plan

In this section, indicate mitigative practices to minimize noise and vibration generated by construction activities.

4.8.1. Noise

4.8.2. Vibration

4.9. Spill Procedure & Mitigation Plan

Specify spill prevention measures that will be employed to avoid or minimize potential contamination of the soil, groundwater, and surface water (overland flow). Provide a systematic procedure which will be implemented should a spill of fuel, oils, PCB, lubricants, chemicals or other harmful substances occurs at a work site. Specify the location and contents of suitable spill abatement kits

4.9.1. Fuel and Hazardous Material Storage

4.9.2. Spill Prevention

i. Refuelling Plan

4.9.3. Hydrocarbon Products

4.9.4. Spill Response Plan

Include the appropriate PCA Dispatch number for reporting spills and list the minimum spill volume that would trigger an immediate call to Dispatch for reporting (as per Project Specifications and Environmental approval documents).

4.9.5. Spill Abatement Kits

4.10. Fire Response Plan

Provide BMPs to reduce the risk of fire, especially if the project occurs in a particularly vulnerable area, during seasonally dry conditions, and involves activities that may spark or emit heat.

4.11. Site Restoration Plan

Provide details for restoring the site to its natural pre-disturbance conditions, as applicable to the works.

4.12. Cultural Management Plan

4.12.1. Existing Archaeological Sites

4.12.2. Archaeological Accidental Finds

4.13. Visitor Experience

Provide mitigative measures to maintain visitor experience during active construction and upon completion of the Project. Consider strategies that limit disturbance and are least likely to cause inconvenience as well as utilizing construction methods, products and materials that will not negatively impact visitor experience.

5. References

(Examples)

Canada, Government of (Canada). 2004. An Invasive Alien Species Strategy for Canada (S.C. 2004).

Canada, Government of (Canada). 2002. Species at Risk Act (S.C. 2002, c. 29).

Canada, Government of (Canada). 1994. Migratory Birds Convention Act (S.C. 1994, c. 22).

Canadian Council of Ministers of the Environment (CCME). (1999). Canadian water quality guidelines for the protection of aquatic life. In Canadian Environmental Quality Guidelines, 1999. Canadian Council of Ministers of the Environment, Winnipeg.

Canadian Wildlife Service Advice to Industry on Migratory Bird Active Nest Surveys. 2008. Available at the following link: <https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=8D910CAC-1>

Department of Fisheries and Oceans (DFO). 1995. Freshwater Intake End-of-Pipe Fish Screen Guideline. Communications Directorate, Department of Fisheries and Oceans. Ottawa, Ontario. 28 pp.

Fisheries and Oceans Canada et al, 2012. Fish-stream Crossing Guidebook: Revised Edition. Access via: <http://wwwwww.for.gov.bc.ca/HFP/Fish/Fish-Stream%20Crossing%20Print.pdf>

Fisheries and Oceans Canada, 2013. Measures to Avoid Causing Harm to Fish and Fish Habitat. Access via: <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-measures/index-eng.html>

Wright, D.G. and G.E. Hopky, Department of Fisheries and Oceans. 1998. Guidelines for Use of Explosives in or Near Canadian Fisheries Waters. Access via: http://www.dsao.net/Resources/DFO%20fact%20sheets/explos_e.pdf

Appendix A – Environmental Briefing Record

Appendix B – Daily Reporting Template

Appendix C – Incident Reporting Template

Appendix D – Instream Work Plans or other

Appendix E - Restricted Activity and other Permits

Appendix F - QEP Resume

PCA

APPENDICES

Project No. 1114

Pleasant Bay to North Mountain

February 2019

KM 33.17 to 38.74

Appendix E

Material Disposal Site Release Form

APPENDIX E

Material Disposal Site Release

RELEASE

IN CONSIDERATION of the delivery and unloading of fill material, **THE UNDERSIGNED** hereby for themselves, their administrators, successors and assigns release and forever discharge **Parks Canada Agency** from any and all action, causes of action, claims and demands for upon or by reason of any damage to property which heretofore has been or hereafter may be sustained in consequences of the material delivered in the County of _____, Nova Scotia on or about the _____ day of _____ 20 ____.

THE UNDERSIGNED hereby affirm the disposal site is not a wetland. Further, **THE UNDERSIGNED** hereby agrees the surplus excavated material shall not be placed in a wetland unless specifically permitted by the Nova Scotia Department of Environment and Labour. The **Contractor and/or recipient** of the surplus excavated material will be held responsible for all environmental permitting and liability.

AND FOR THE SAID CONSIDERATION, the undersigned agree not to make claim or take proceedings against any other person or corporation who might claim contribution or indemnity under the provisions of any statute or otherwise.

WITNESS this _____ day of _____, 20 ____.

X _____ X _____
Witness (please print) Signature of Witness

IN THE PRESENCE OF:

X _____ X _____
Resident (please print) Contractor (please print)

X _____ X _____
Signature of Resident Signature of Contractor

Address of Resident:

Civic number, Road name, City/town/village, Postal Code

Location of Material Disposal: (if different from resident's address)

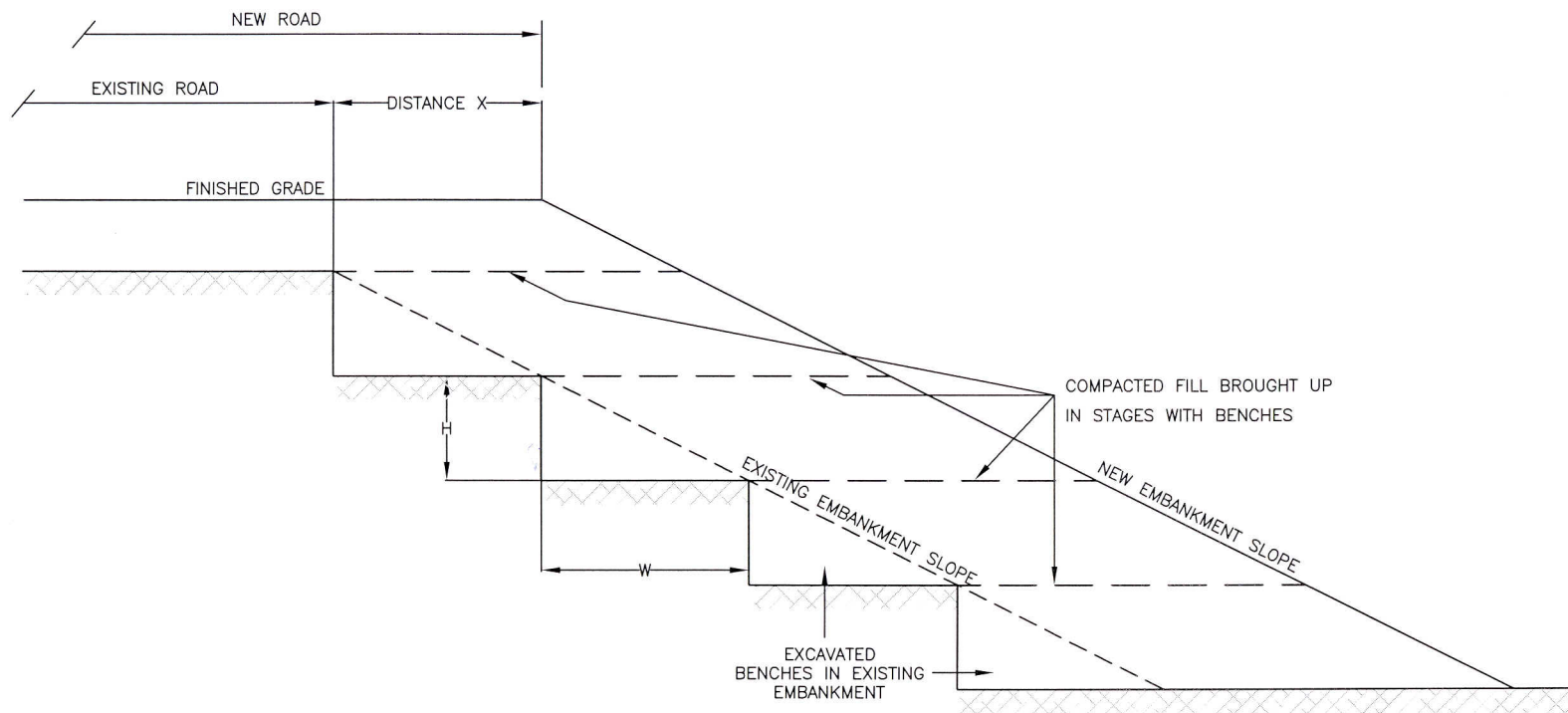
Civic number, Road name, City/town/village, Postal Code

Appendix F

NSTIR Standard Drawings

NSTIR Detail Drawings

The contract drawings reference the following detail drawings from the Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification – Highway Construction and Maintenance (Latest Edition). The details are provided for reference only and do not necessarily constitute a complete compilation of applicable standards.



MAXIMUM BENCH HEIGHT & WIDTH DIMENSIONS

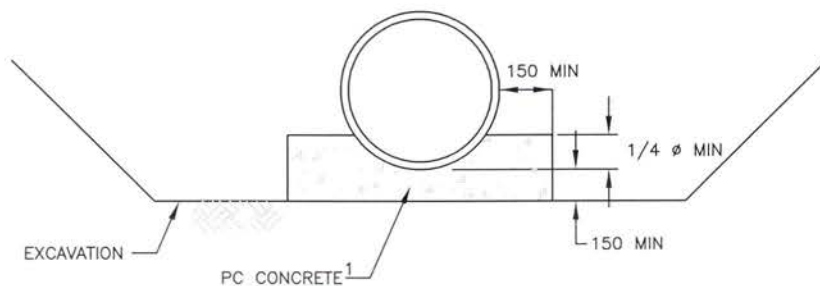
EXISTING SLOPES	FILLS $\geq 4.0\text{m}$	FILLS $< 4.0\text{m}$
3:1 TO 2:1	W=2.5m H=VARIES	W=1.25m H=VARIES
2:1	W=VARIES H=1.25m	W=VARIES H=0.75m

NOTES:

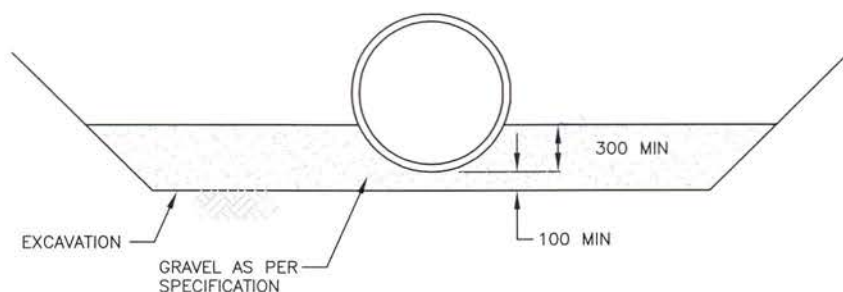
1. THIS STANDARD APPLIES TO WIDENING OF EMBANKMENTS WHEN DISTANCE $X \geq 1.0\text{m}$ AT FINISHED GRADE LEVEL OF NEW ROADBED.
2. BENCHING NOT REQUIRED ON SLOPES FLATTER THAN 3:1 OR WHERE FIELD CONDITIONS SHOW IT UNNECESSARY AS DETERMINED BY THE ENGINEER.
3. BENCHES TO BE EXCAVATED ONE LEVEL AT A TIME AND COMPACTED FILL BROUGHT UP BEFORE NEXT LEVEL IS EXCAVATED.

Philip Cochran
 Manager Highway Planning and Design
[Signature]
 Director Highway Engineering Services
[Signature]
 Executive Director Highway Engineering and Construction

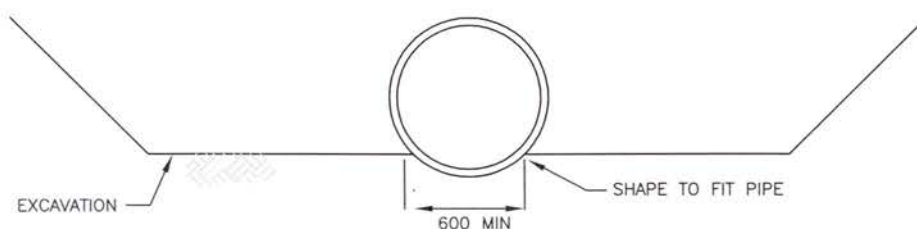
BENCHING OF EMBANKMENT SLOPES



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

Philip Cohen
 Manager Highway Planning and Design

[Signature]
 Director Highway Engineering Services

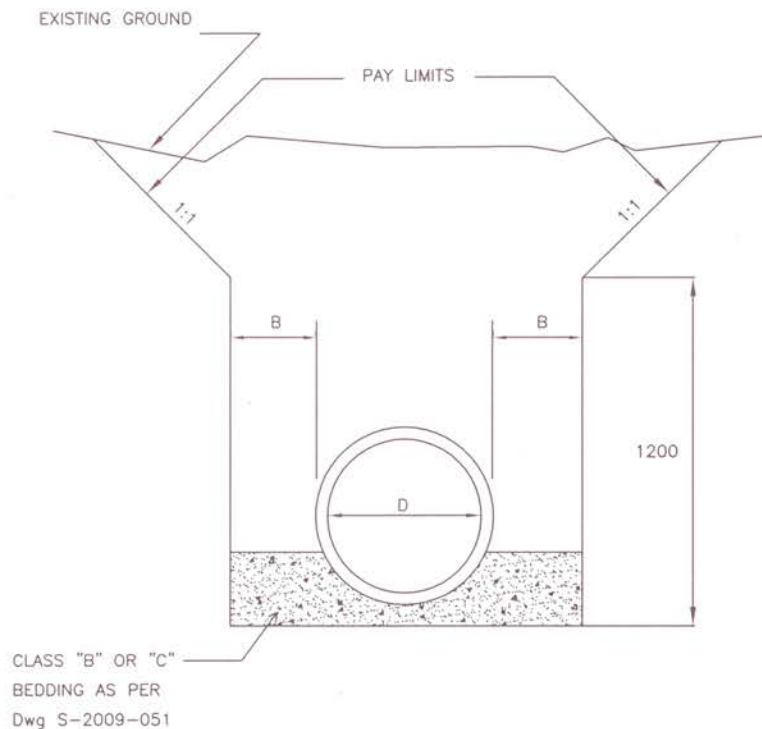
[Signature]
 Executive Director Highway Engineering and Construction

NOVA SCOTIA

Transportation and Infrastructure Renewal

No. REVISION

BEDDING FOR CONCRETE PIPE
HS506



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

Paul Colman
 Manager Highway Planning and Design

[Signature]
 Director Highway Engineering Services

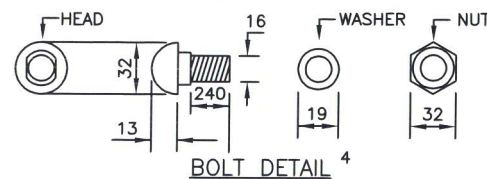
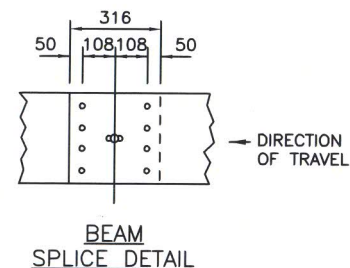
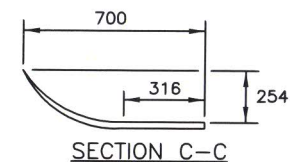
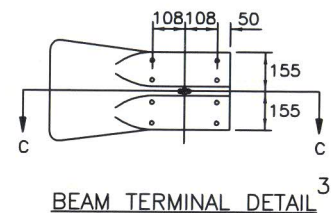
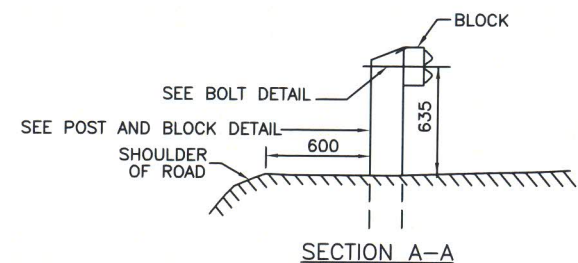
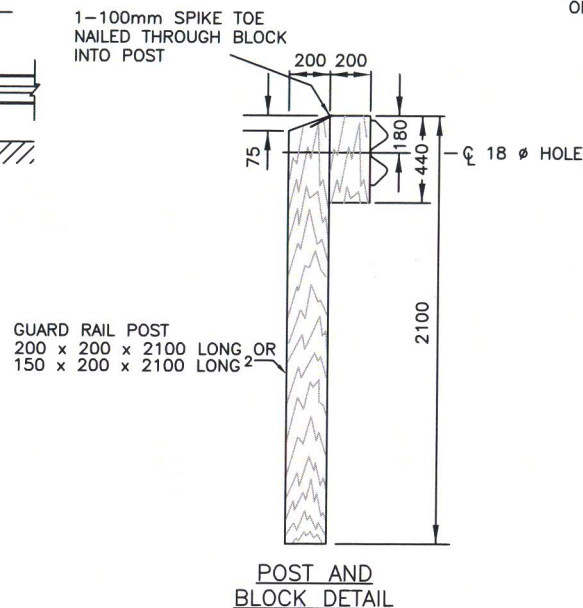
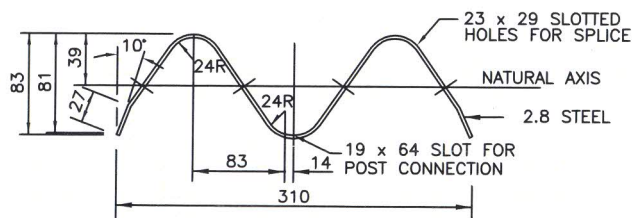
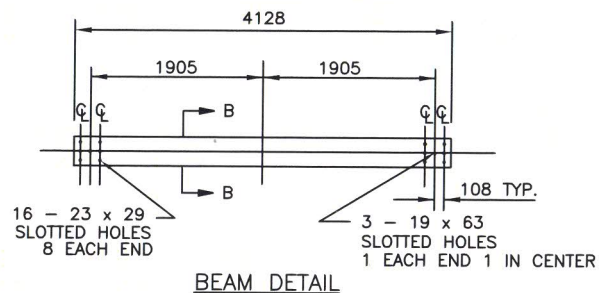
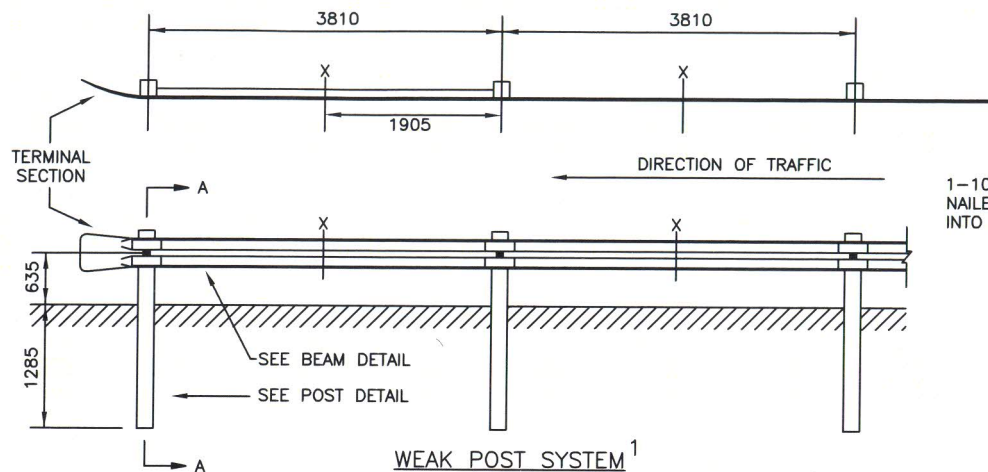
[Signature]
 Executive Director Highway Engineering and Construction

NOVA SCOTIA

Transportation and Infrastructure Renewal

No.	1	HS # ADDED TO TITLE
REVISION		

**FOUNDATION EXCAVATION LIMITS
 FOR CULVERTS HS-528**



- 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. FOR STRONG POST SYSTEM BOLT LENGTH SHALL BE 440mm.
 5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Burkhard
 Manager Highway Planning and Design
Barrie
 Director Highway Engineering Services
McArthur
 Executive Director Highway Engineering and Construction

GUARD RAIL AND POST DETAILS
HS518

NOVA SCOTIA
 Transportation and Infrastructure Renewal

3	UPDATED TO AAHSTO STANDARD. JAN15
2	BEAM SPLICE DETAIL MODIFIED /SEP10
1	DETAILS, NOTES, TITLES /FEB 10
No.	REVISION

Scale : N.T.S.
 Drawn by : M.LABRECHE
 Checked by : J.RAE
 Date of Plan : AUG2009
 File No. : S-2009-071

Figure 10 illustrates the projection of a normal rail section parallel to the shoulder. The diagram shows a horizontal line representing the 'EDGE OF PAVEMENT'. Above this, a solid line represents the 'NORMAL RAIL SECTION PARALLEL TO SHOULDER'. A dashed line represents the 'PROJECTION OF NORMAL RAIL SECTION PARALLEL TO SHOULDER'. A vertical line segment of length 1.35 is shown on the right, representing the height of the shoulder. A horizontal distance of 22.81 is marked between a point 'A' on the pavement edge and the vertical line. Various points are marked with 'X' along the rail section, and a small 'Y' is marked on the dashed line.

PLAN - FILL OR CUT
DIVIDED HIGHWAY⁵

TRAFFIC FLOW

3 STANDARD BEAM ELEMENTS

1.32

0.15

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.

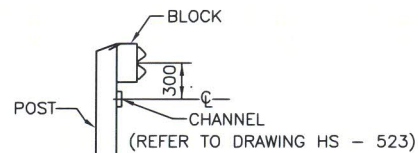
Executive Director Highway Engineering and Construction



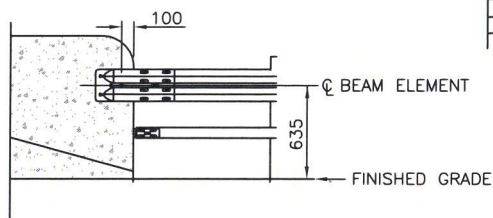
NOVA SCOTIA
Transportation and Infrastructure Renewal

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
No.	REVISION

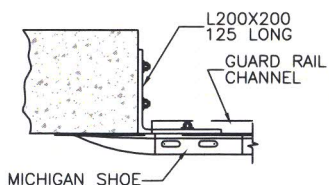
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 Drawn by : M.LABRECHE
 Checked by : J.RAE
 Date of Plan : AUG2009
 File No. : S-2009-072



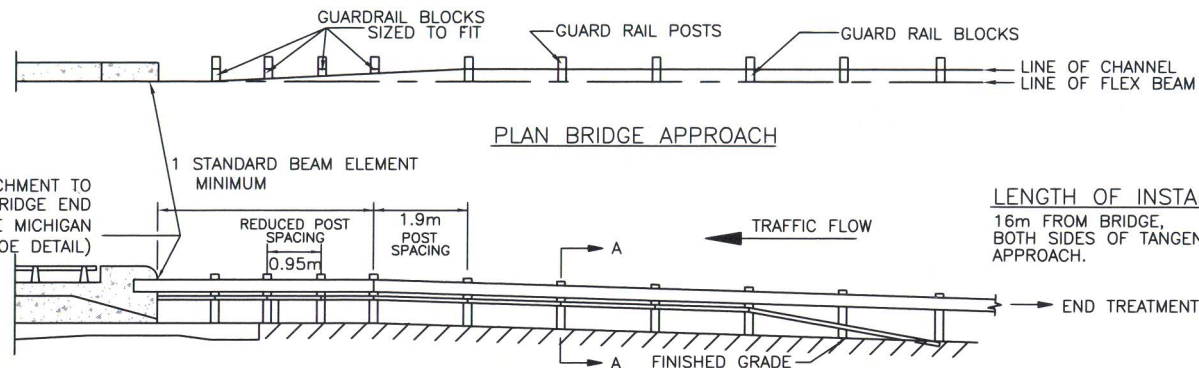
SECTION A-A



ELEVATION END BLOCK CONNECTION



PLAN END BLOCK CONNECTION

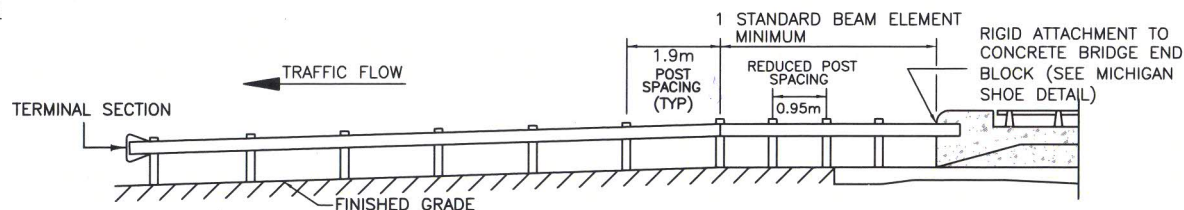


PLAN BRIDGE APPROACH

LENGTH OF INSTALLATION
16m FROM BRIDGE,
BOTH SIDES OF TANGENT
APPROACH.

ELEVATION - ROADSIDE BARRIER AT CONCRETE BRIDGE

- TWO WAY TRAFFIC AT ALL FOUR CORNERS OF BRIDGE
- DIVIDED HIGHWAY AT APPROACH TO BRIDGE ONLY



ELEVATION - ROADSIDE BARRIER AT CONCRETE BRIDGE (NO CHANNEL)

- DIVIDED HIGHWAY AT DEPARTURE OF BRIDGE ONLY

NOTES:

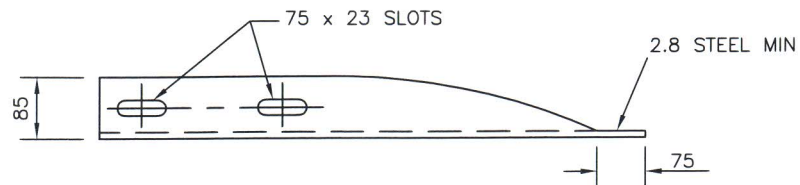
1. SEE BEAM DETAIL, BEAM TERMINAL DETAIL, BEAM SPLICE DETAIL, POST AND BLOCK DETAIL, BOLT DETAIL, NOTE 2, NOTE 3, NOTE 4 ON STANDARD DRAWING S-2009-071.
2. SEE STANDARD DRAWING S-2009-072 FOR END TREATMENT.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

5	GUARDRAIL RAISED 35mm ON BLOCK DETAIL-FEB 2015
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
No.	REVISION

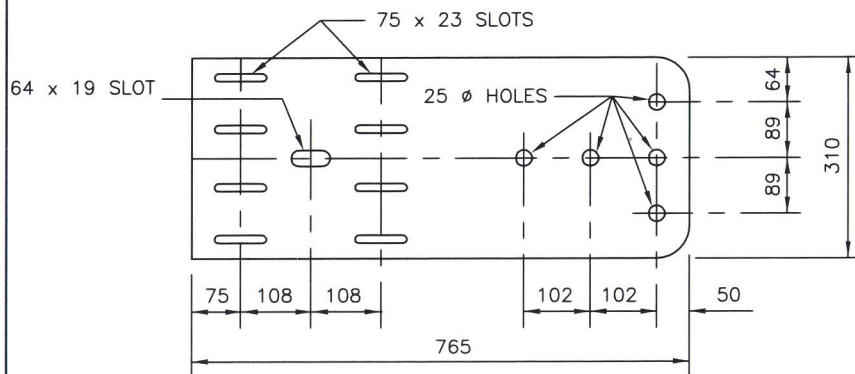
Scale : N.T.S.
Drawn by : M.LABRECHE
Checked by : J.RAE
Date of Plan : AUG2009
File No. : S-2009-073

B. Labreche
Manager Highway Planning and Design
J. RAE
Director Highway Engineering Services
M. Labreche
Executive Director Highway Engineering and Construction

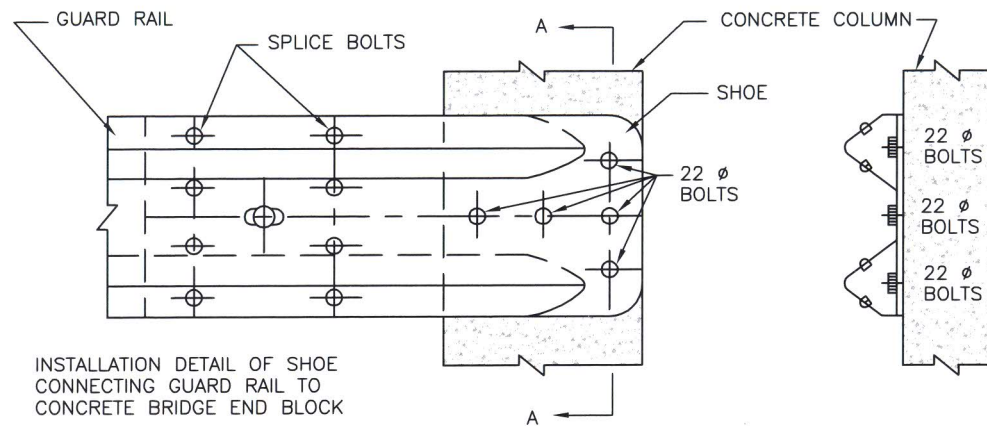
**ROADSIDE BARRIER AT CONCRETE
BRIDGE APPROACH HS521**



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.

Burkley
Manager Highway Planning and Design

Ben
Director Highway Engineering Services

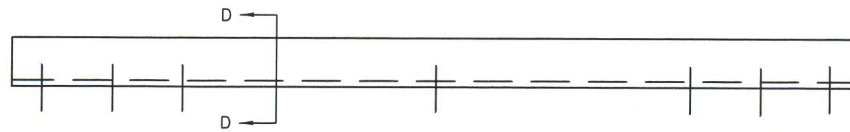
John Hadcroft
Executive Director Highway Engineering and Construction

NOVA SCOTIA
Transportation and Infrastructure Renewal

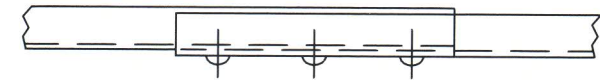
No.	REVISION
2	ADDITIONAL 25ø HOLE
1	"HS" # ADDED TO TITLE

Scale : N.T.S.
Drawn by : M.LABRECHE
Checked by : J.RAE
Date of Plan : NOV2015
File No. : S-2009-074

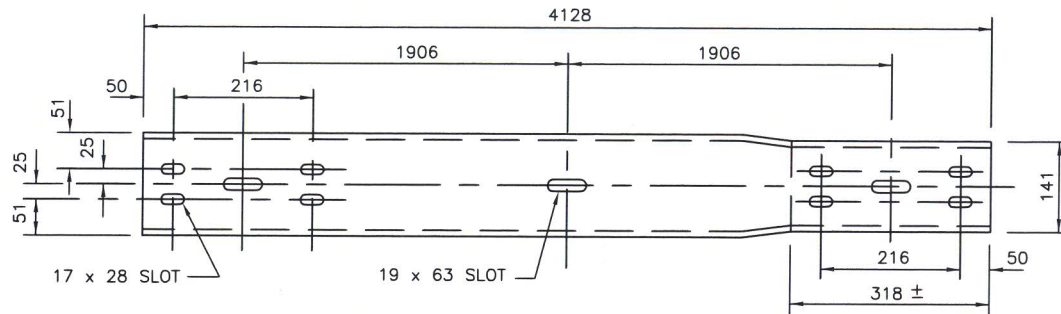
**MICHIGAN SHOE DETAIL
HS522**



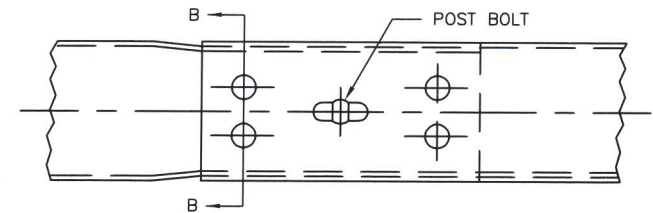
PLAN



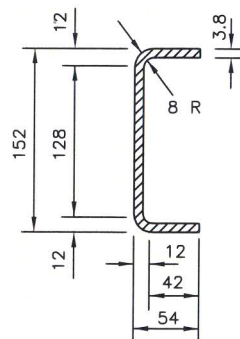
PLAN



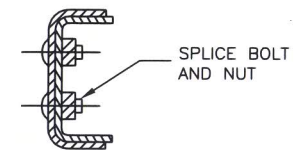
ELEVATION



ELEVATION



COLD ROLLED CHANNEL DETAIL



SECTION B-B

SWAGGED SPLICE DETAIL

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

B. Labreche
Manager Highway Planning and Design

B. Labreche
Director Highway Engineering Services

R. Buckle
Executive Director Highway Engineering and Construction

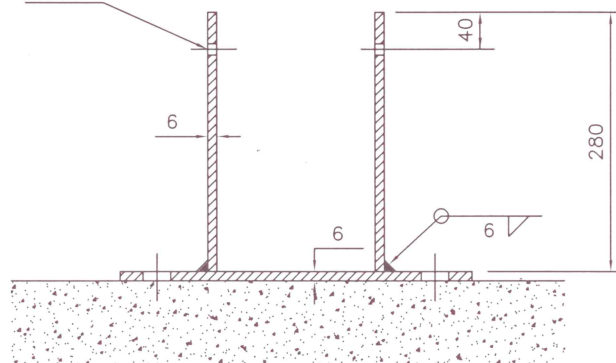
NOVA SCOTIA
Transportation and Infrastructure Renewal

1	HS # ADDED TO TITLE
No.	REVISION

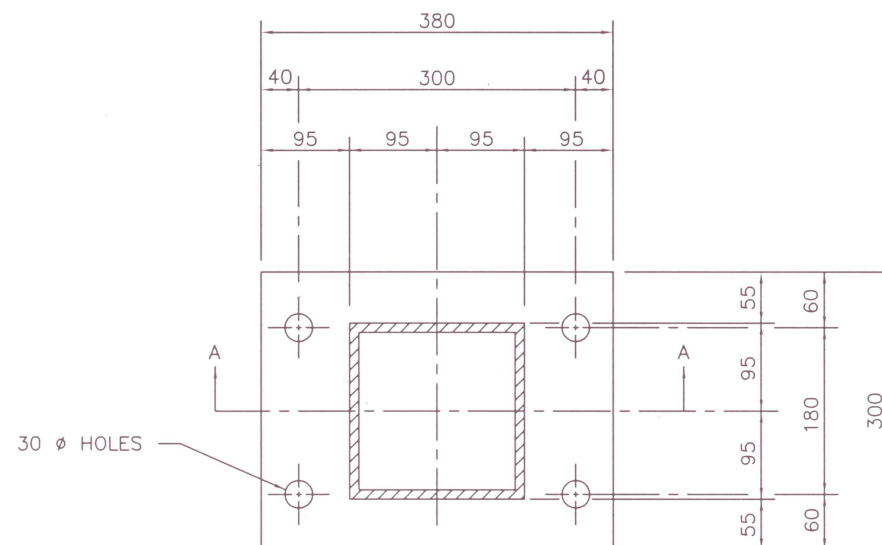
Scale : N.T.S.
Drawn by : M.LABRECHE
Checked by : J.RAE
Date of Plan : AUG2009
File No. : S-2009-075

GUARDRAIL CHANNEL DETAIL
HS523

19 Ø HOLES FOR
16 Ø LAG BOLTS
100 LONG.



SECTION A-A



PLAN

NOTES:

1. BASE PLATE IS HELD IN PLACE BY WEDGE ANCHORS (RED HEAD PHILLIPS ANCHORS WS-7860 OR EQUIVALENT) INSTALLED TO MANUFACTURER'S SPECIFICATIONS.
2. ANCHORS ARE 22mmØ x 150mm LONG WITH 100mm EMBEDMENT.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Paul Cohen
Manager Highway Planning and Design

[Signature]
Director Highway Engineering Services

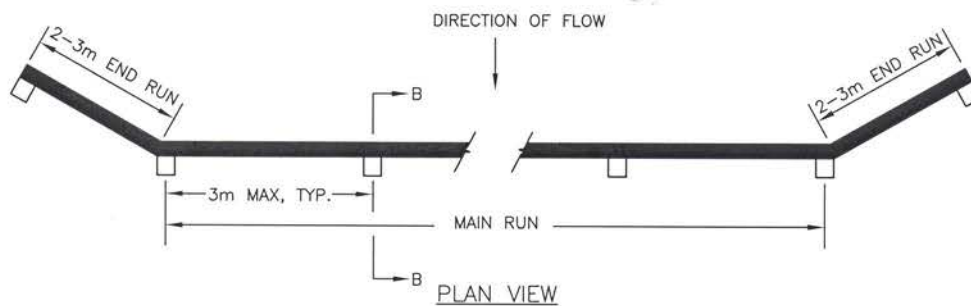
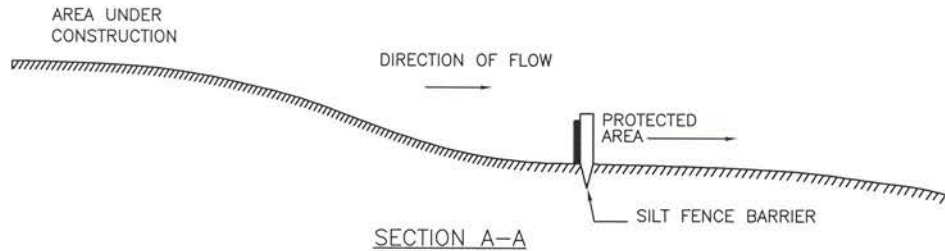
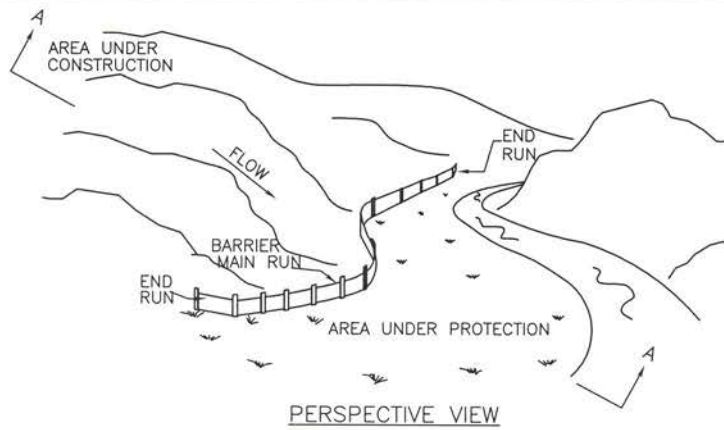
[Signature]
Executive Director Highway Engineering and Construction

NOVA SCOTIA
Transportation and Infrastructure Renewal

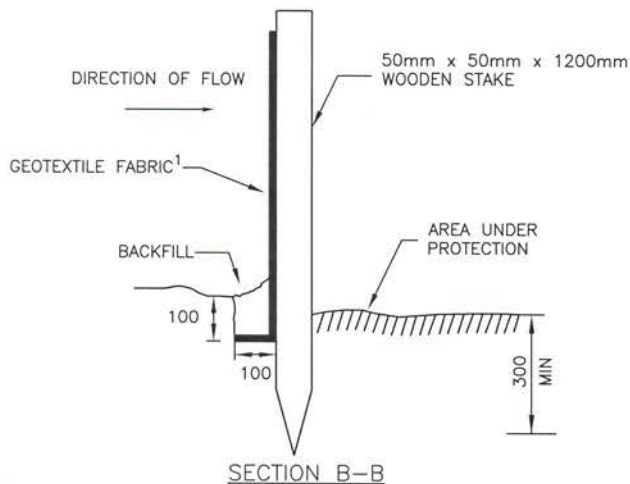
No.	REVISION
1	HS # ADDED TO TITLE

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Drawn by : M.LABRECHE
Checked by : J.RAE
Date of Plan : AUG2009
File No. : S-2009-078

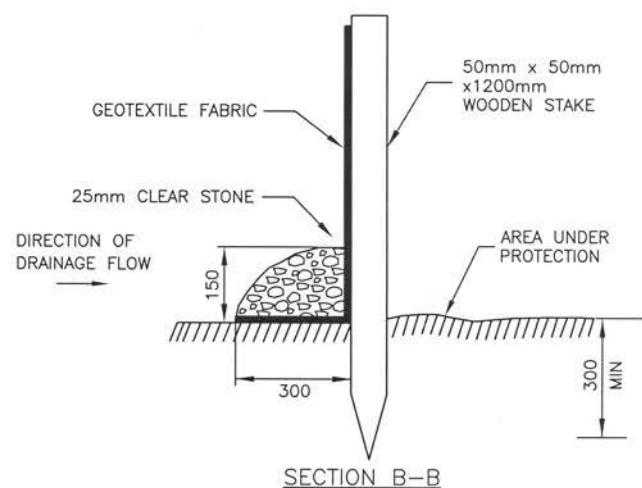
**GUARDRAIL ANCHOR BASE
ON CONCRETE HS-525**



OPTION #1



OPTION #2³



NOTES:

1. OVERALL HEIGHT OF FABRIC IS 0.9m WITH 20cm BURIED LEAVING 0.7m ABOVE GROUND LEVEL.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
3. OPTION 2 PERMITTED IN AREAS WHERE CONSTRUCTION OF TRENCH IS DIFFICULT TO EXCAVATE.

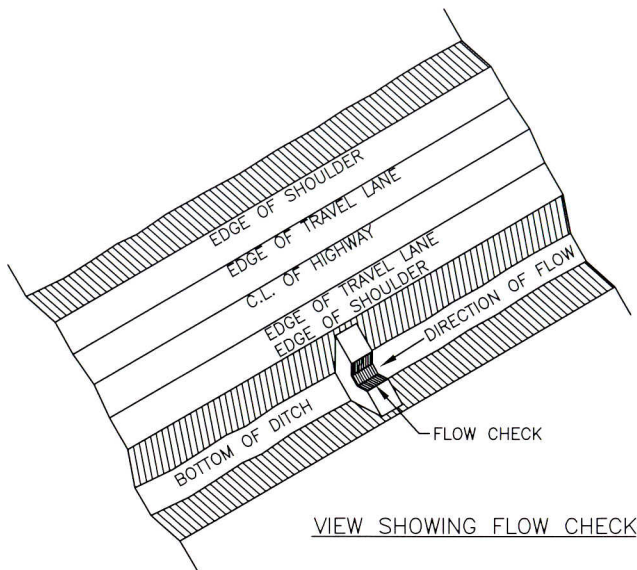
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 Drawn by : M.BARTEAUX
 Checked by : B.PETT
 Date of Plan : AUG2009
 File No. : S-2009-132

Christina Na
 Manager Environmental Services
[Signature]
 Director Highway Engineering Services
[Signature]
 Executive Director Highway Engineering and Construction

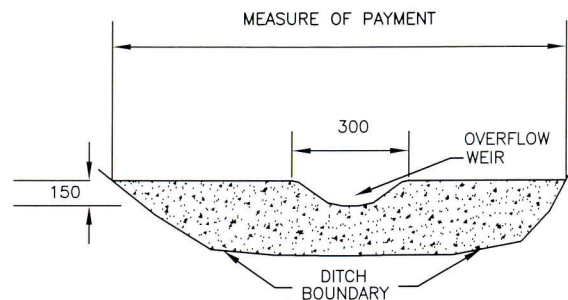
NOVA SCOTIA
 Transportation and Infrastructure Renewal

1	Added Option 2 and Notes -APR 2011
No.	REVISION

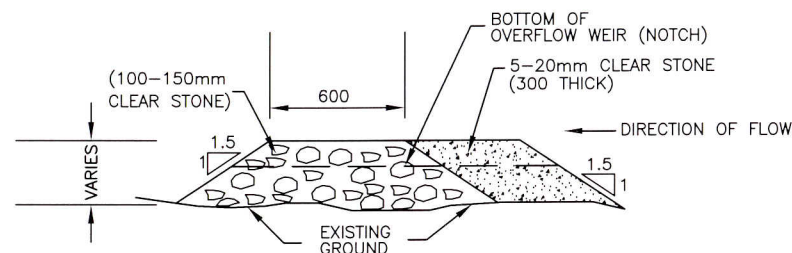
**SEDIMENT CONTROL FENCE
 FOR SHEET FLOW HS702**



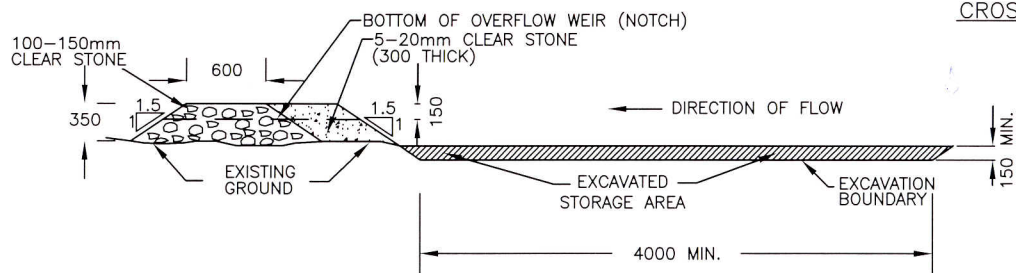
VIEW SHOWING FLOW CHECK



FLOW CHECK NOTCH



CROSS SECTION OF CONSTRUCTION



CROSS SECTION OF FINISHED FLOW CHECK

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED

Ulysses Au
Manager Environmental Services

[Signature]
Director Highway Engineering Services

[Signature]
Executive Director Highway Engineering and Construction


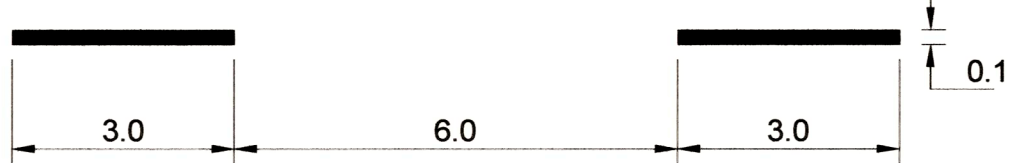
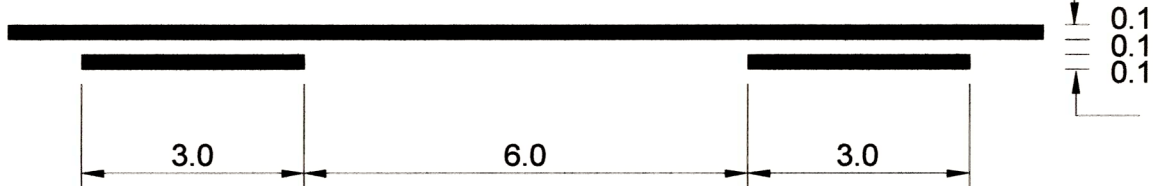


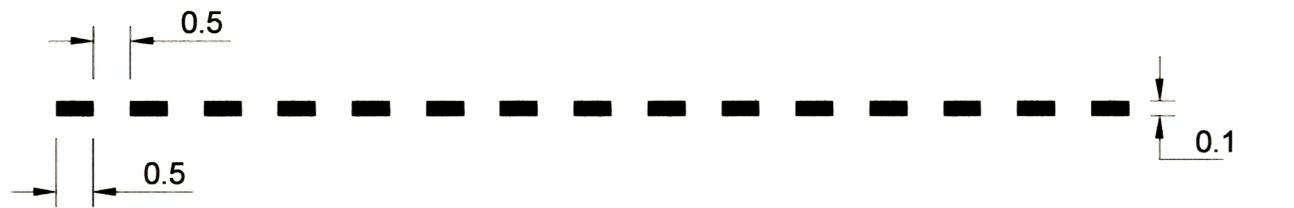



ROCK FLOW CHECKS
HS707

NOVA SCOTIA
Transportation and Infrastructure Renewal


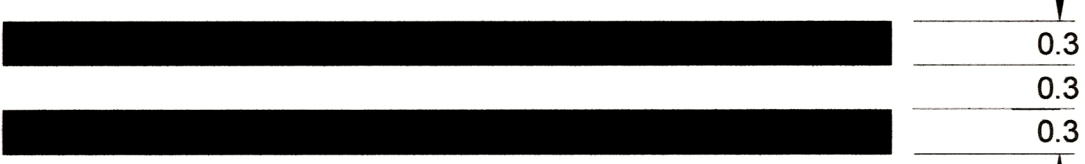

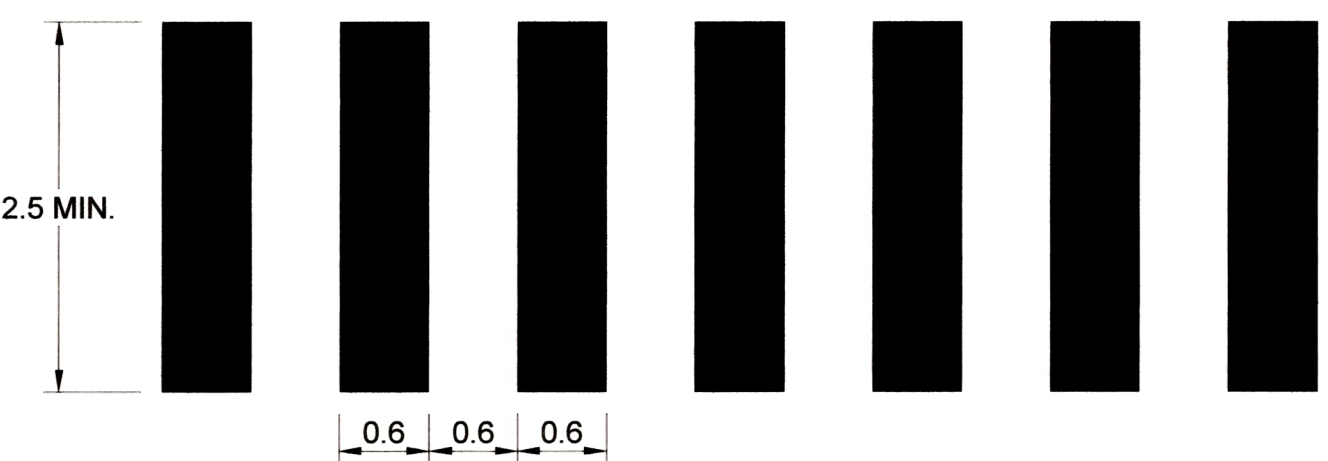


No.	REVISION

Scale : N.T.S.
Drawn by : M.BARTEAUX
Checked by : B.PETT
Date of Plan : AUG2009
File No. : S-2009-138

PATTERNS OF LONGITUDINAL LINES


NAME OF LINE	DIMENSIONS (m)	USE
SOLID		<ul style="list-style-type: none">EDGELINES (WHITE OR YELLOW)DIRECTIONAL DIVIDING LINES (YELLOW)LANE LINES PROHIBITING LANE CHANGES (WHITE)
BROKEN		<ul style="list-style-type: none">DIRECTIONAL DIVIDING LINES (YELLOW)LANE LINES (WHITE)
SIMULTANEOUS SOLID AND BROKEN		<ul style="list-style-type: none">DIRECTIONAL DIVIDING LINES (YELLOW)TWO-WAY LEFT TURN LANES (YELLOW)
DOUBLE SOLID		<ul style="list-style-type: none">DIRECTIONAL DIVIDING LINES (YELLOW)
WIDE SOLID		<ul style="list-style-type: none">EDGELINES AT GORE AREAS OF 100 SERIES HIGHWAYS AND IN OTHER CRITICAL AREAS (WHITE ON RIGHT, YELLOW ON THE LEFT)
DASHED 0.5m		<ul style="list-style-type: none">GUIDING LINES (E.G. INTERSECTION MOVEMENTS) (YELLOW OR WHITE BASED ON THE COLOUR OF LINE BEING EXTENDED)
DASHED 1.8m		<ul style="list-style-type: none">LANE LINES IN ROUNDABOUTS (WHITE)
DASHED 3.0m		<ul style="list-style-type: none">CONTINUITY LINES IN MERGING AND DIVERGING AREAS (WHITE)LANE LINES FOR LEFT TURN AND RIGHT TURN BAYS AND TAPERS (WHITE)
WIDE DASHED 3.0m		<ul style="list-style-type: none">CONTINUITY LINES IN MERGING AND DIVERGING AREAS ON 100 SERIES HIGHWAYS (WHITE)

PATTERNS OF TRANSVERSE LINES

NAME OF LINE	DIMENSIONS (m)	USE
STOP		<ul style="list-style-type: none">INTERSECTION STOP LINES (WHITE)
DOUBLE STOP BAR		<ul style="list-style-type: none">RAILWAY CROSSINGS (WHITE) (OPTIONAL SEE S-2013-312 FOR CONDITIONS)
PARALLEL CROSSWALK		<ul style="list-style-type: none">PEDESTRIAN CROSSWALKS (WHITE)
ZEBRA CROSSWALK		<ul style="list-style-type: none">SCHOOL CROSSWALKS (WHITE)MID-BLOCK CROSSWALKS (WHITE) <p>MUST BE APPLIED USING HIGH FRICTION MATERIAL</p>
ROUNDABOUT YIELD BAR 0.6 m		<ul style="list-style-type: none">ROUNDABOUT YIELD BAR FOR SINGLE LANE ENTRY (WHITE)
ROUNDABOUT YIELD BAR 1.8 m		<ul style="list-style-type: none">ROUNDABOUT YIELD BAR FOR MULTI-LANE ENTRY (WHITE)

(ADAPTED FROM MUTCDC FIGURE C1-1)

Designed by:	
Surveyed by:	
Drawn by: R. Hird	
Checked by: P. Hill	
Approved by:	

	DEC 9, 2014
Manager Traffic Engineering and Road Safety	Date
	DEC 9, 2014
Director, Highway Engineering Services	Date

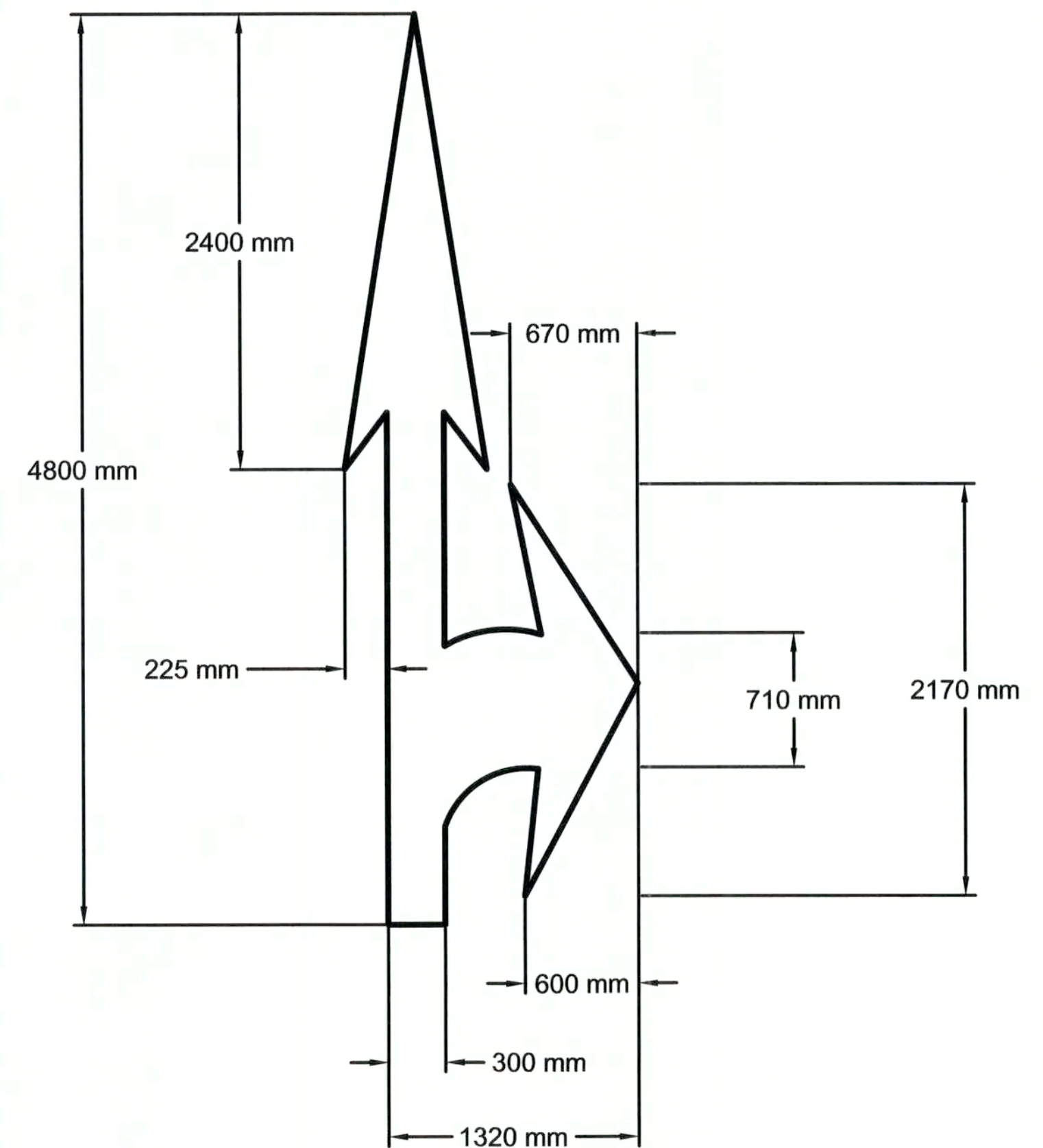
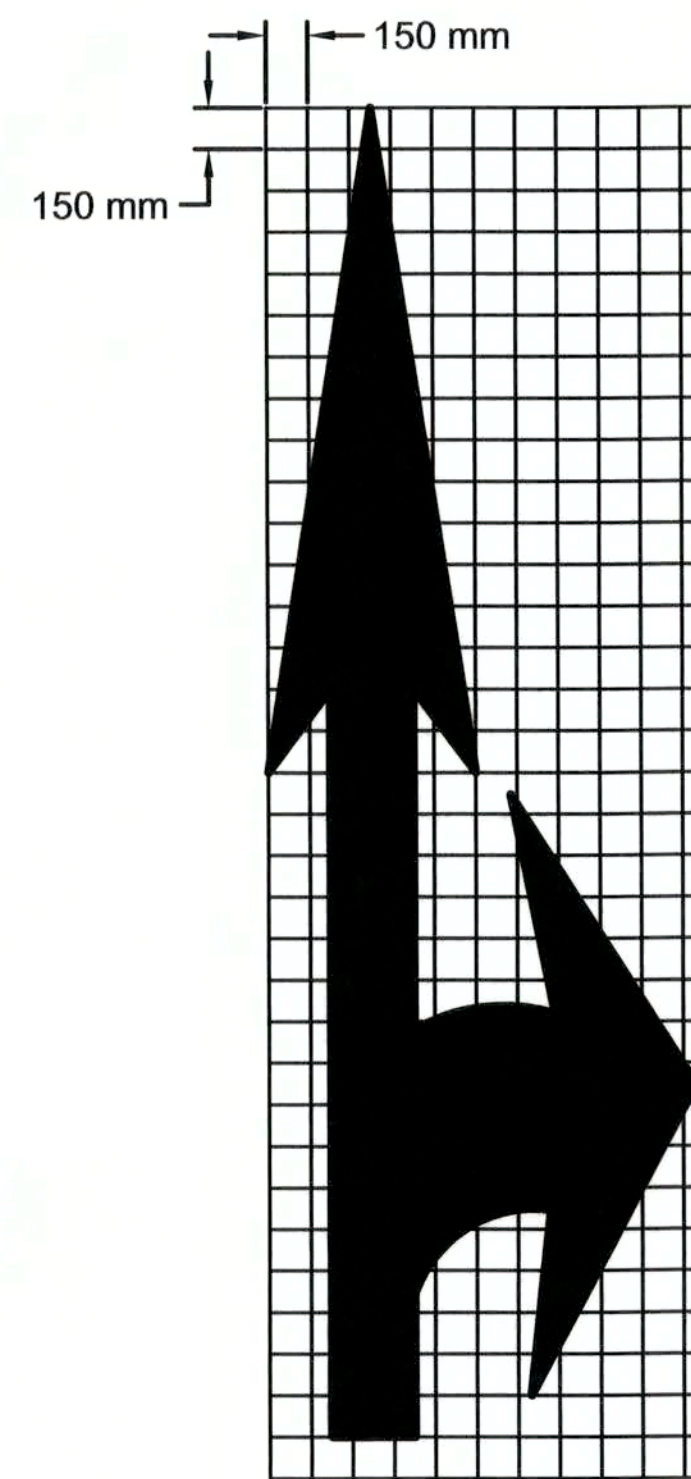
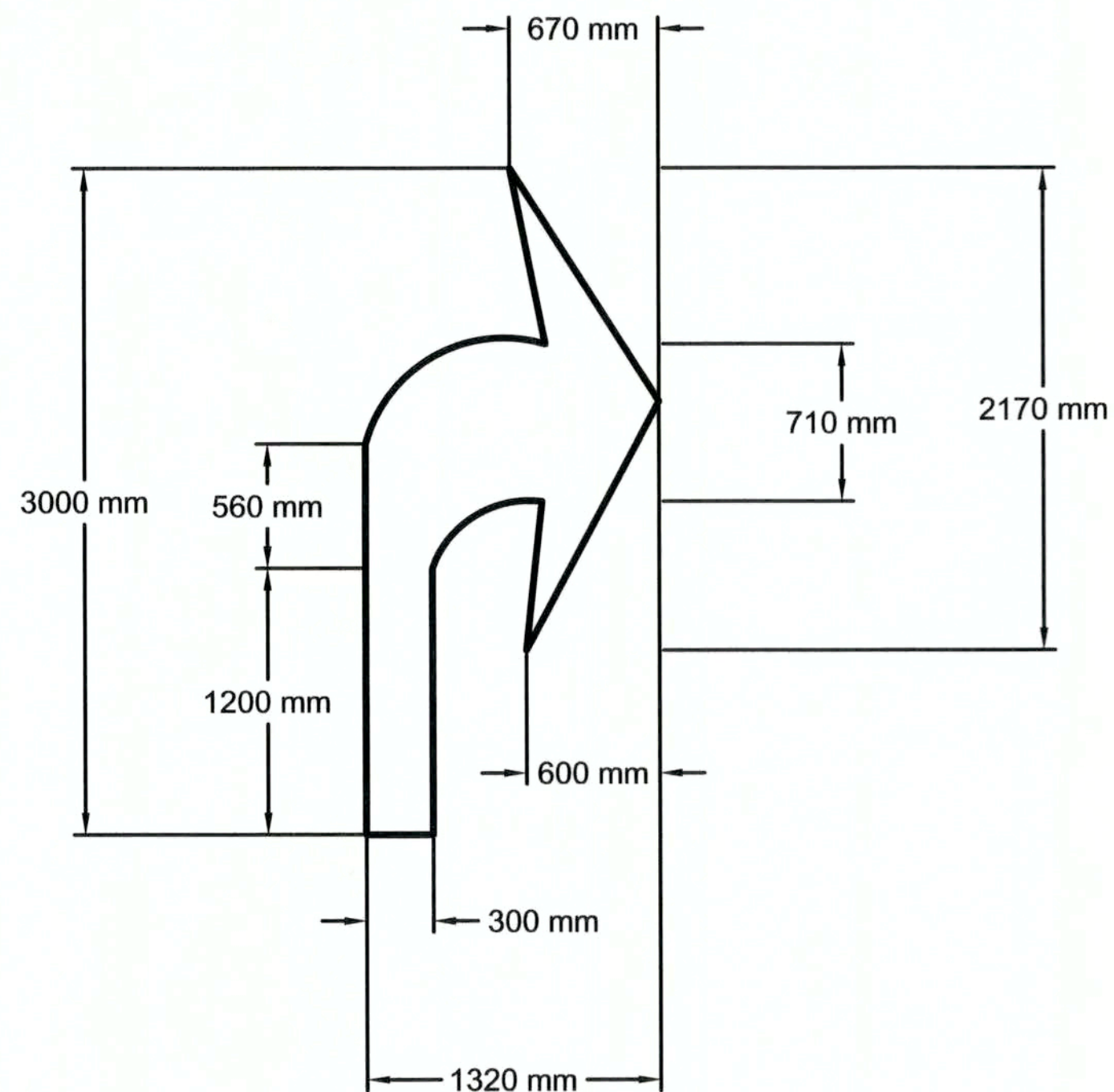
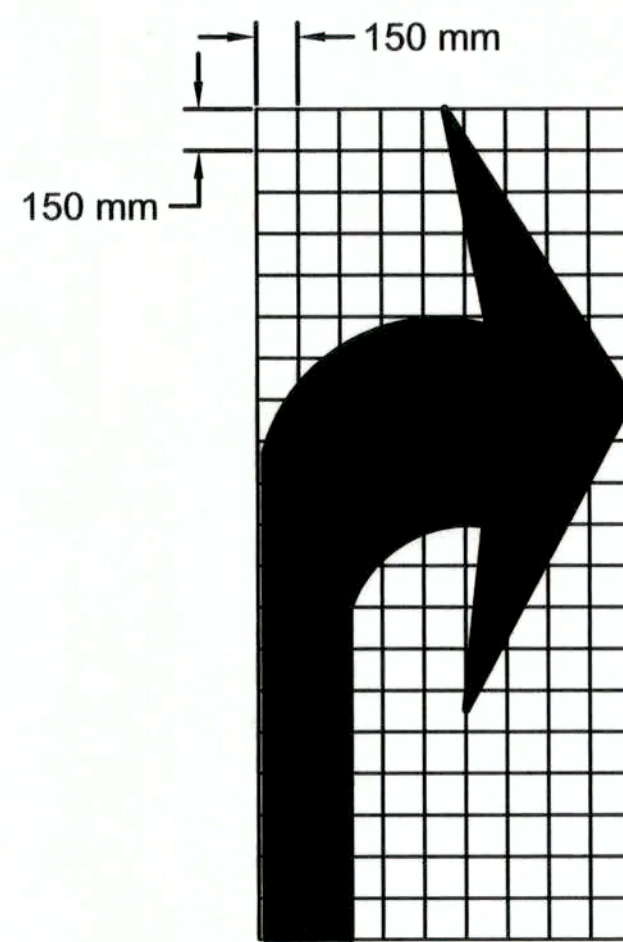
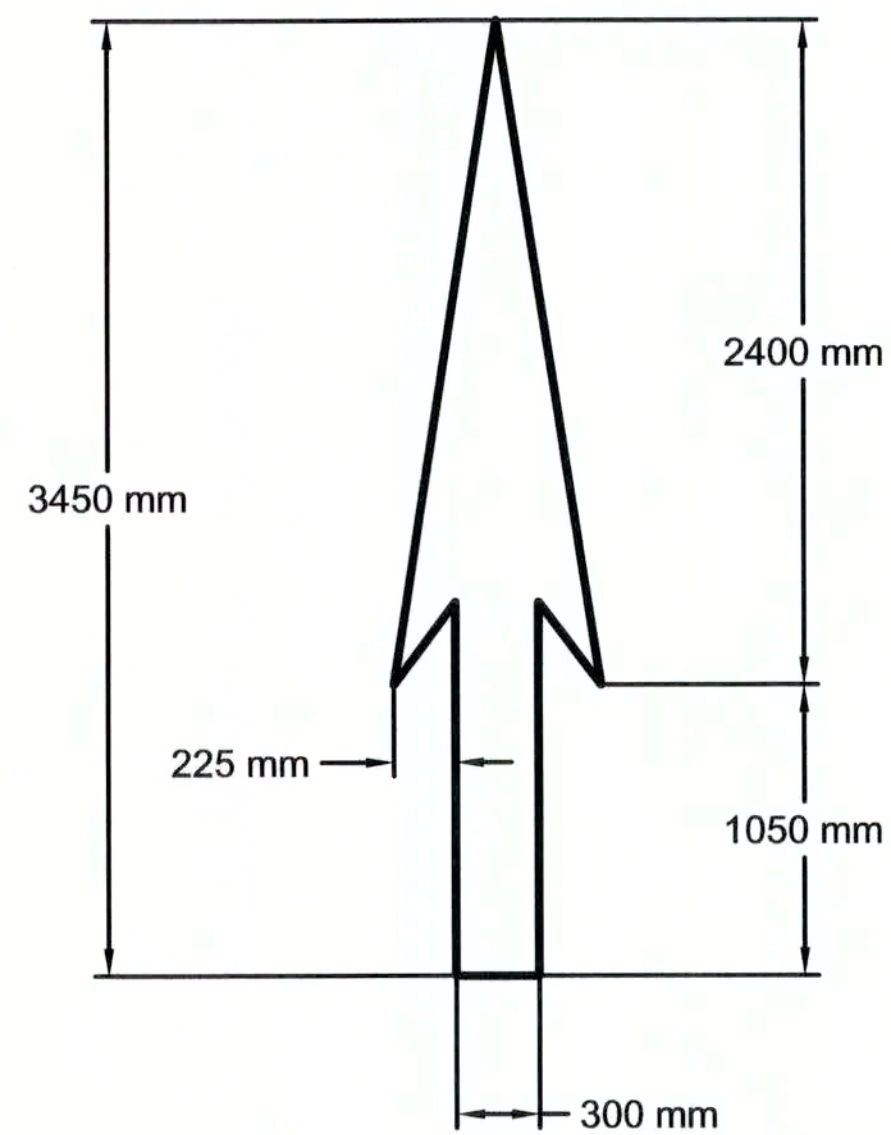
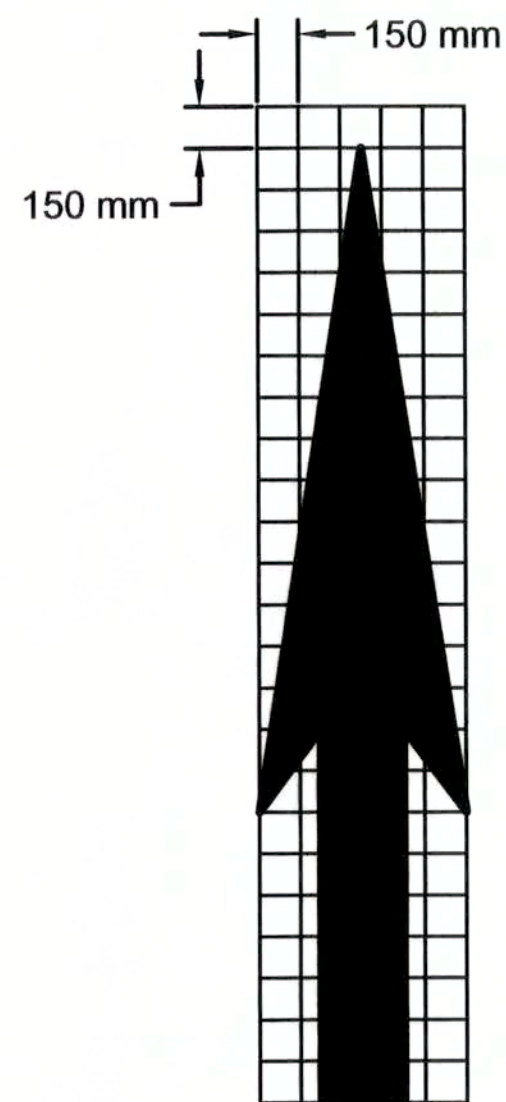
1	Nov 10, 2014	Added Zebra Crosswalk Markings
MK.	DATE	REVISION



Scale:	NTS
Date:	Dec 2013
File No.:	S-2013-300
Sheet No.:	1 of 1


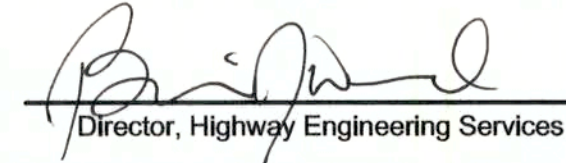
HIGHWAY PAVEMENT MARKINGS

PATTERNS OF LINES



- 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:	
Surveyed by:	
Drawn by: R. Hird	
Checked by:	
Approved by:	

	13 Dec 13
Manager Traffic Engineering Services	Date
	13 Dec 13
Director, Highway Engineering Services	Date

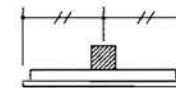
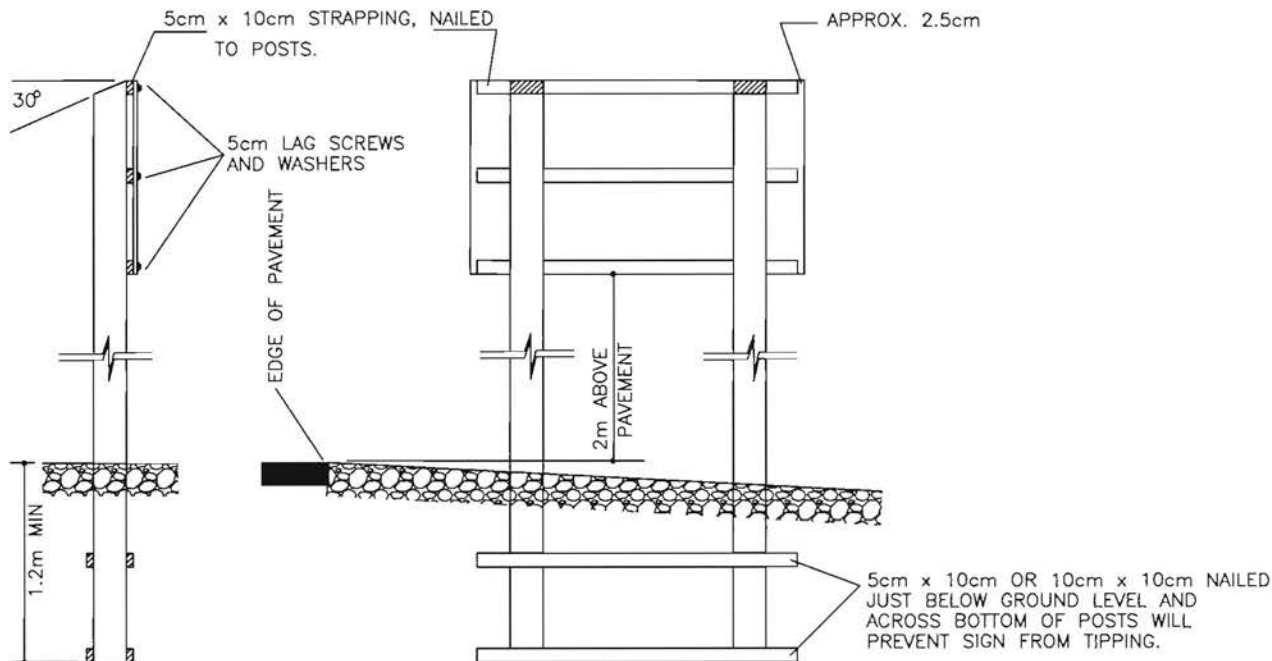
MK.	DATE	REVISION



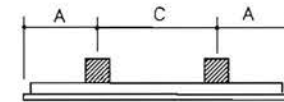
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Date:	Dec 2013
File No.:	S-2013-301
Sheet No.:	1 of 1

HIGHWAY PAVEMENT MARKINGS

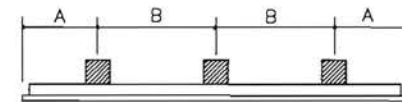
DIRECTIONAL ARROW SYMBOLS



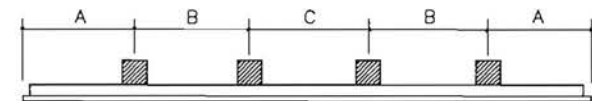
ONE POST



TWO POST



THREE POST



FOUR POST

POST SPACING DIAGRAMS
(NOT TO SCALE)

SEE STANDARD PLAN S-2011-101 FOR POST SPACING

NOTES:

1. STRAPPING BEHIND SIGN ARE TO BE PAINTED THE SAME COLOUR AS THE SIGN.
2. SIGN POSTS TO BE PAINTED WHITE UNLESS PRESSURE TREATED.
3. SIGN SIZE SHOWN ON POST CHART ARE HEIGHT x LENGTH.
4. SEE CHART FOR NUMBER, SIZE AND SPACING OF POSTS.
5. SIGNS TO BE INSTALLED ON BACK SLOPE WHENEVER POSSIBLE.
6. FOR LARGER SIGNS USE MAXIMUM END SPACE OF 45cm AND MAXIMUM POST SPACING OF 120cm WITH 15cm x 15cm POSTS.
7. SEE STANDARD PLAN S-2011-101 FOR POST SPACING.
8. FOR SIGN OFFSET FROM THE LANE LINE, CONTACT THE DISTRICT TRAFFIC SUPERVISOR OR THE PROVINCIAL SIGNING OFFICER.

No.	REVISION

Scale : N.T.S.
 Drawn by : B.STORRIE
 Checked by : P.HILL
 Date of Plan : MAY2011
 File No. : S-2011-100

Manager Traffic Engineering Services

Director Highway Engineering Services

Executive Director Highway Engineering and Construction

**WOOD SIGN STRUCTURE
ASSEMBLY DETAILS**

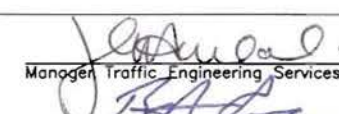
Sign Size	# of Posts	Post Size	Post Spacing		
			A	B	C
60 x 30 cm	1	10 x 10 cm	30 cm		
90 x 30 cm	1	10 x 10 cm	45 cm		
60 x 45 cm	1	10 x 10 cm	30 cm		
90 x 45 cm	1	10 x 10 cm	45 cm		
60 x 60 cm	1	10 x 10 cm	30 cm		
90 x 60 cm	1	10 x 10 cm	45 cm		
75 x 75 cm	1	10 x 10 cm	40 cm		
90 x 75 cm	1	10 x 10 cm	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:

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


 Manager Traffic Engineering Services


 Director Highway Engineering Services


 Executive Director Highway Engineering and Construction

WOOD SIGN STRUCTURE POST SPACING CHART

PCA

APPENDICES

Project No. 1114

Pleasant Bay to North Mountain

February 2019

KM 33.17 to 38.74

Appendix G

PCA's Pleasant Bay Salt Storage Yard – RAP Stockpile Yard

PLEASANT BAY SALT STORAGE FACILITY (STA. 36+450) RAP STOCKPILE YARD

STOCKPILE LOCATIONS

PILE 1 – APPRX. VOL.
1,105 m³ (1,658 t)

PILE 1 – APPRX. VOL.
1,860 m³ (2,790 t)

PILE 3 – APPRX. VOL.
720 m³ (1,080 t)

RAP STOCKPILES

- EXISTING STOCKPILES OF RAP MATERIAL TO BE USED FOR SHOULDERING IN AREAS AS INDICATED IN THE CONTRACT DOCUMENTS.
- MATERIAL IS TO BE SCREENED AND PROCESSED PRIOR TO PLACEMENT.
- APPROXIMATELY 3,000 t HAS BEEN ALLOCATED FOR USE ON THIS PROJECT. THE REMAINING BALANCE OF APPROXIMATELY 2,500 t IS TO REMAIN FOR FUTURE PARK USE.
- CONTRACTOR IS REQUIRED TO SURVEY STOCKPILES PRIOR TO USE TO CONFIRM LISTED VOLUMES AS PROVIDED.

NOTES:

1. CONTRACTOR'S ACTIVITIES SHALL NOT IMPEDE DAILY WORK ACTIVITIES OF PARKS STAFF WITHIN THE YARD.
2. AREA TO BE REINSTATED AND GRADED TO THE APPROVAL OF THE DEPARTMENTAL REPRESENTATIVE.
3. APPROPRIATE TRAFFIC CONTROL SIGNAGE, BARRICADES AND CLOSURE SIGNS ARE REQUIRED DURING CONSTRUCTION ACTIVITIES.

Appendix H

Grande Anse River Bridge Inspection Photos, (July 2015) and 1959 Original Design Drawings, “Grande Anse River Bridge, Mile 24.75 – Cabot Trail Cape Breton Highlands National Park, N.S.”



East Abutment Wall – Areas of medium scaling (Fair) with local spalls below bearings with medium corrosion of reinforcing steel (Poor). Note rust stains and indication of water run-off from bridge deck.



East Abutment Wall – Local area of spalling (Poor) with medium corrosion of reinforcing steel (Poor)



West Abutment Wall – Local area of severe scaling (Poor) below repair to bearing area



West Abutment Wall – Wide crack (Poor) with spalled portion and deposits caused by run-off from deck



West Ballast Wall – Medium corrosion of reinforcing (Poor) with active wet area



East Ballast Wall – Active wet area with leachate deposits on soffit (Poor)



SW Wingwall – Medium spall likely caused by ice flow (Poor)



NE Wingwall – Active water run-off from bearings. Cracking with efflorescence below previous repair. (Fair)



SE Wingwall - Active water run-off from bearings with dark staining (Fair)



NW Wingwall – Active water run-off from bearings with dark staining (Fair)



SW Wingwall – Active water run-off from bearings with dark staining (Fair)



East Abutment Bearings – Medium spall beneath bearing block of South most girder (Poor). Note debris.



East Abutment Bearings – Medium cracks with leachate deposits through repair to bearing of South most girder (Fair).
Missing nut at anchor bolt (Poor).



East Abutment Bearings – Proximity of deck drain to bearings. Accumulation of debris on top of abutment wall



West Abutment – Fixed bearings condition provided by anchors bolt dowels



View of East approach, looking East. Diagonal crack directly above expansion joint.



View of East approach, looking West. Note medium transverse crack (Fair) and light wheel track rutting (Good).



View of West approach, looking West. Diagonal crack directly above construction joint at fixed bearings.



Railings– Typical severe corrosion of anchor bolt heads (Poor). Light spalls in concrete



2nd beam from North – Light spalling on vertical face with medium corrosion of reinforcement (Poor)



3rd beam from North – Light spalling at bottom of East end of girder (Poor). Debris is from disintegration of deck soffit directly above beam.



4th beam from North – Severe disintegration of bottom end of beam at East abutment (Poor)



Coating system of railing – Paint system is fully compromised likely due to weathering and continued polymerization (Poor). Medium corrosion of railings and posts.



Deck Soffit/Curb – Spalling and severe disintegration at South side fascia (Poor). Railing compromised



Deck Soffit/Curb – Severe scaling and disintegration of South side deck fascia (Poor)



Deck Soffit/Curb – Very severe disintegration at North side deck fascia (Poor). Railing compromised.



Deck Soffit – Severe spall in soffit of thickened deck edge at East abutment (Poor)



Deck Soffit – Severe spall in soffit of thickened deck edge at East abutment (Poor). Bond break paper has likely been dislodged during previous asphaltting.



Deck Soffit – Severe spall in soffit of thickened deck edge at East abutment (Poor). Wide cracks with leaching at previously repaired area due to deterioration of old concrete.



Deck Wearing Surface – Signs of water ponding at North side curb of deck. Appears worst at mid-span due to long-term deflection of concrete beams and re-asphalting.



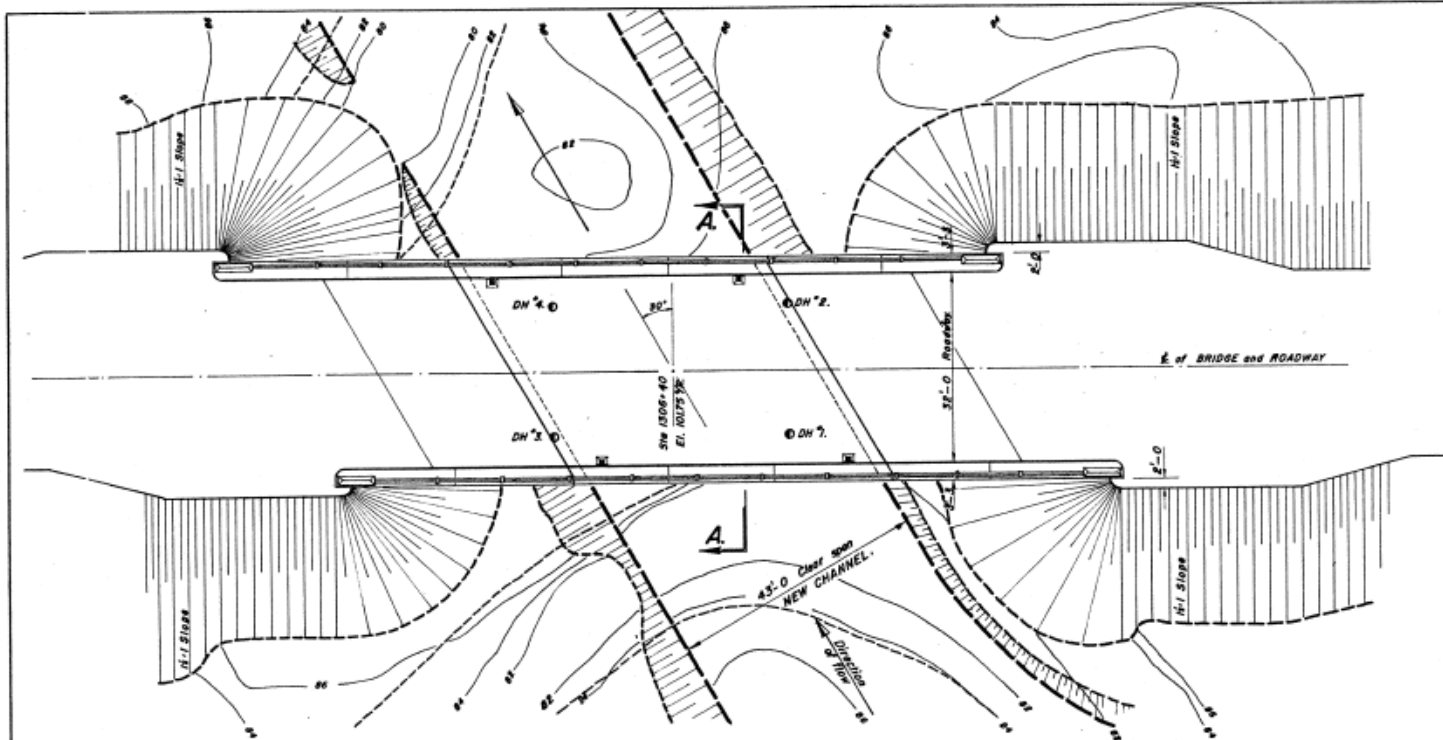
Waterway – Looking downstream (towards South). Aggradation in front of the East abutment and degradation at West abutment.



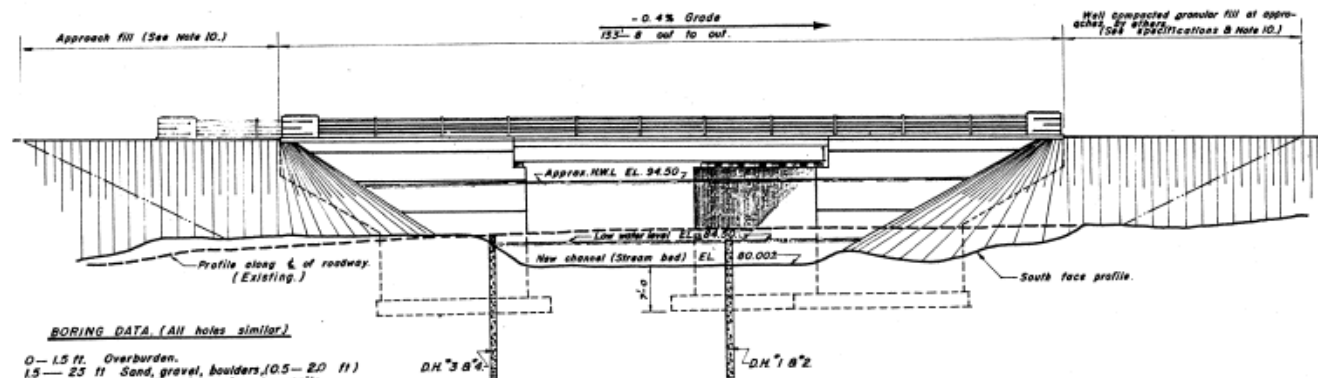
Curb, South side – Medium Disintegration near mid-span of bridge (Fair), likely caused by water ponding and frost action. Abrasions at exposed corner of curb, likely caused by snow plow.



Curb, North side – Medium Disintegration near mid-span of bridge (Fair), likely caused by water ponding and frost action. Rust staining of curb caused by run-off from rails.

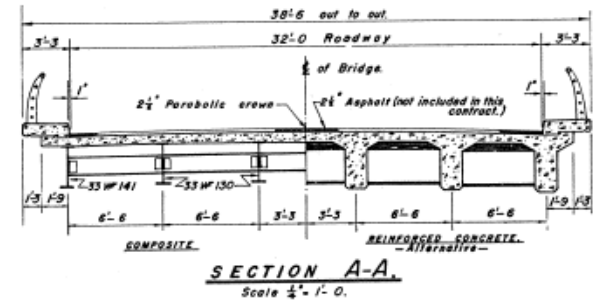
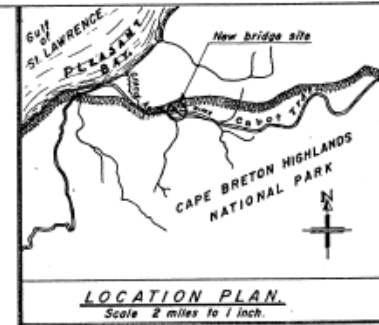


PLAN
Scale 1" = 10'-0"



ELEVATION
Scale 1" = 10'-0"

BORING DATA (All holes similar)
0—1.5 ft. Overburden.
1.5—25 ft. Sand, gravel, boulders (0.5—2.0 ft.)
composed mainly of red granite.



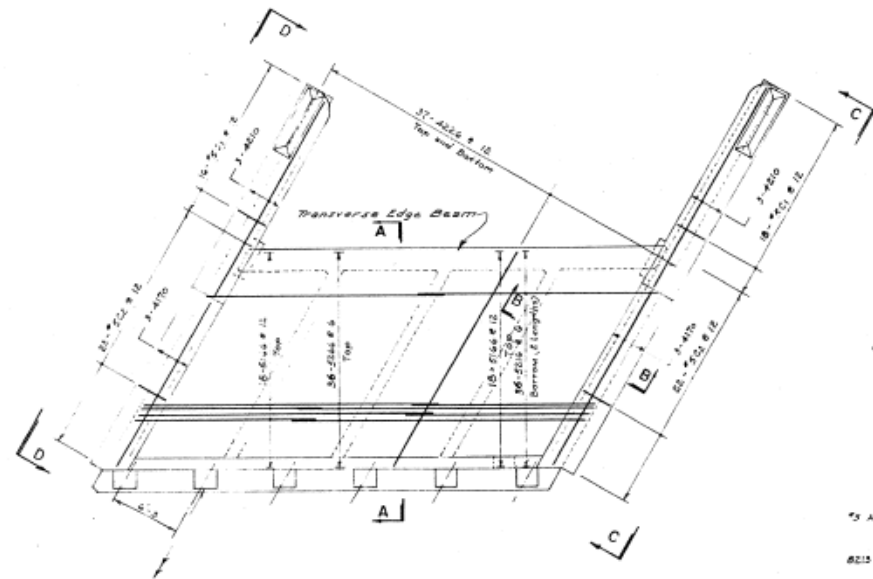
GENERAL NOTES:

1. Loading H-20-S16.
2. Concrete—All concrete shall have a minimum compressive strength of 3000 psi at 28 days.
3. Reinforcing steel—Hard grade or intermediate grade rail or billet steel, deformed bars.
4. Structural steel—Shall conform to C.S.A. G40.4. The design fabrication and erection of structural steel shall be in accordance with the C.S.A. specifications for Steel Highway Bridges S6.
5. All exposed edges to be chamfered 1' unless otherwise noted.
6. No construction work shall be commenced until permanent bench marks have been established and checked by the engineer.
7. No field welding except by permission of the engineer in writing.
8. Concrete cover to reinforcing steel shall be 2" except as noted.
9. No construction joints allowed except those shown on plans, unless approved by the engineer in writing.
10. All bridge approach fill must be well compacted as per specifications for embankment construction.
11. Asphalt surfacing and channel excavation not included in this contract.
12. No fill is to be placed against abutments until they are completed.
13. Channel excavation by others.

LIST OF DRAWINGS:

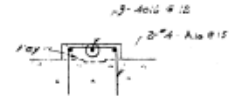
1. GENERAL LAYOUT.
2. ABUTMENTS.
3. ABUTMENT REINFORCING (Cont'd DWG. 7).
4. COMPOSITE DECK.
5. REINFORCED CONCRETE DECK (Alternative).
6. STANDARD HANDRAIL.
7. REINFORCING STEEL SCHEDULE.
8. WINDWALL REINFORCING.

NO.	REVISIONS	NAME	DATE
DEPARTMENT OF PUBLIC WORKS CANADA DEVELOPMENT ENGINEERING BRANCH STRUCTURES DIVISION			
GRANDE ANSE RIVER BRIDGE MILE 24.75 CABOT TRAIL CAPE BRETON HIGHLANDS NATIONAL PARK NOVA SCOTIA.			
GENERAL LAYOUT.			
JOB SUPERVISOR	H. HAWTH.	DESIGN	L. L.
APPROVED	DATE 9/12/19	DRAWN	S. B.
K. S. Thompson		TRACED	S. B.
CHIEF STRUCTURES DIVISION		PROJECT NO.	SD—III.
APPROVED	DATE 9/12/19	SHEET 1 OF 7	
E. J. L. L.		SHEET 1 OF 7	

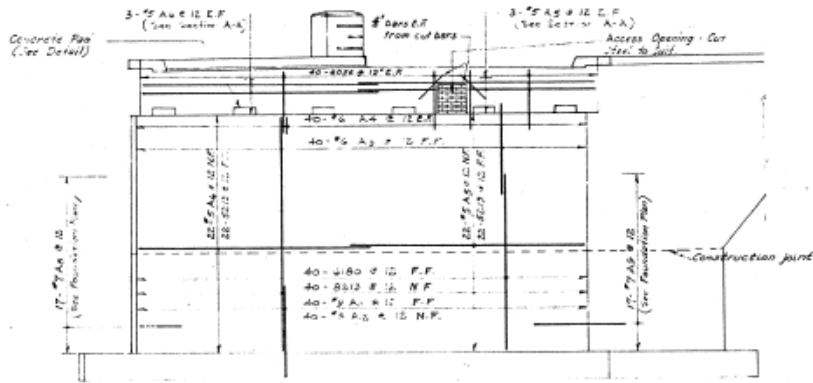


PLAN

Scale 1/4" = 1'-0"

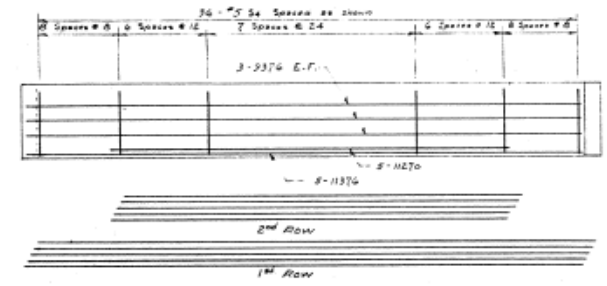


CONCRETE PAD
Composite Deck - Dwg. No. 4



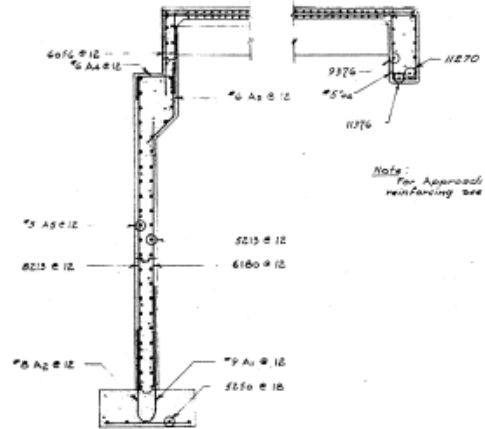
FRONT ELEVATION

Scale 1/4" = 1'-0"



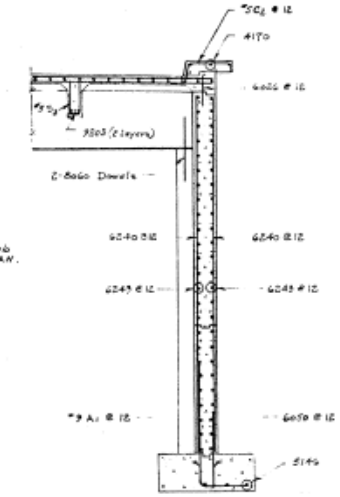
TRANSVERSE EDGE BEAM

Scale 1/4" = 1'-0"



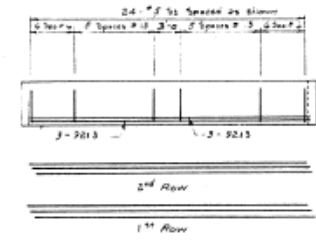
SECTION A-A

Scale 1/4" = 1'-0"



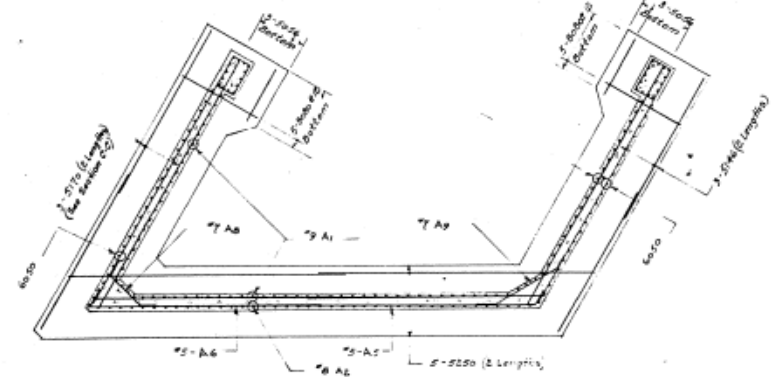
SECTION B-B

Scale 1/4" = 1'-0"



LONGITUDINAL BEAMS

Scale 1/4" = 1'-0"

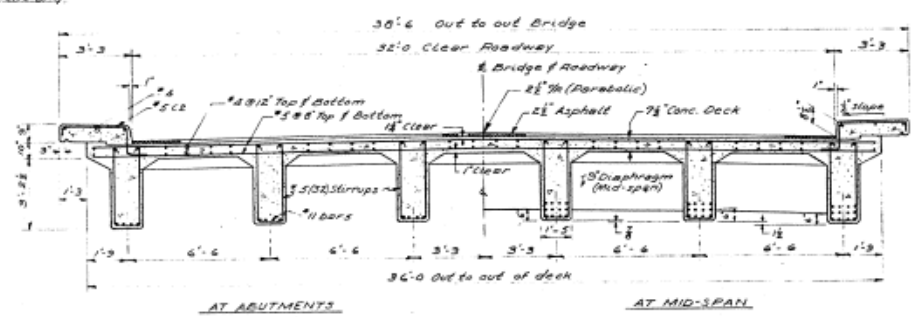
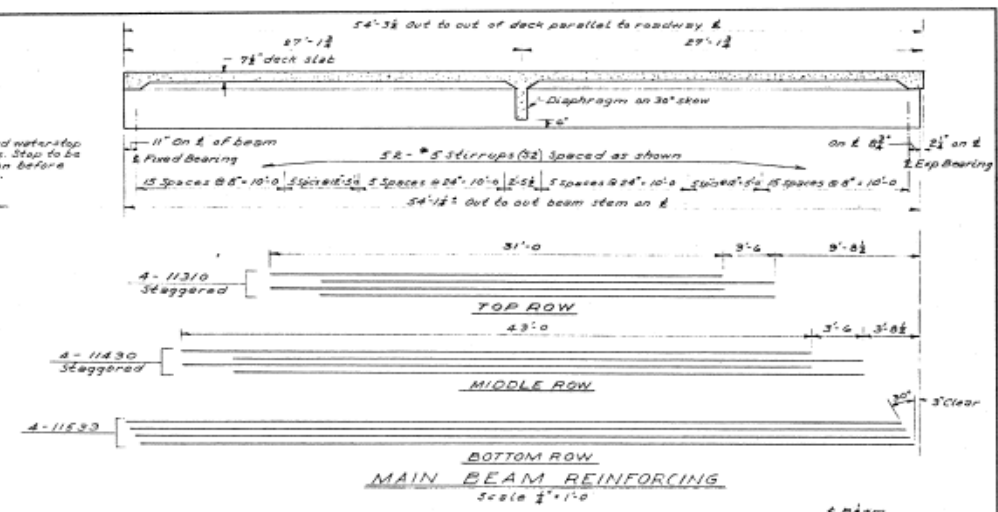


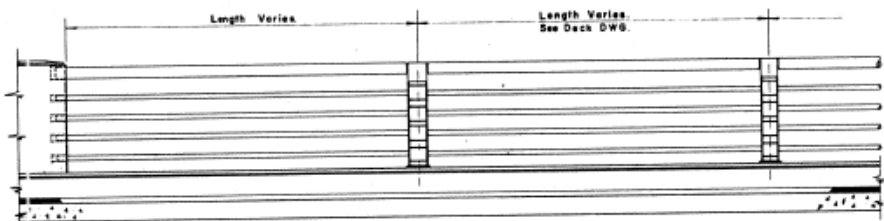
FOUNDATION PLAN

Scale 1/4" = 1'-0"

NOTE:
This Dwg. to be read in conjunction
with Dwg. No. 7.

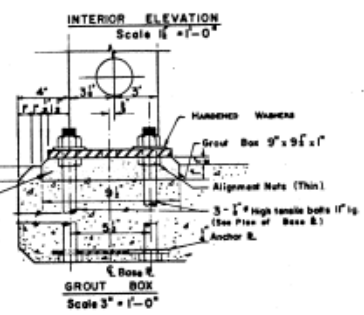
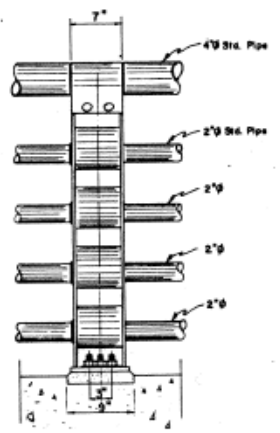
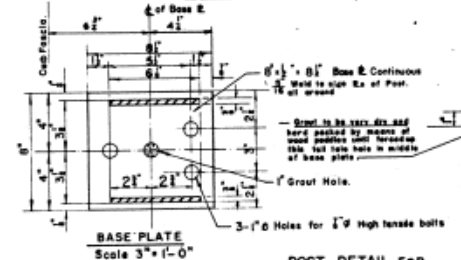
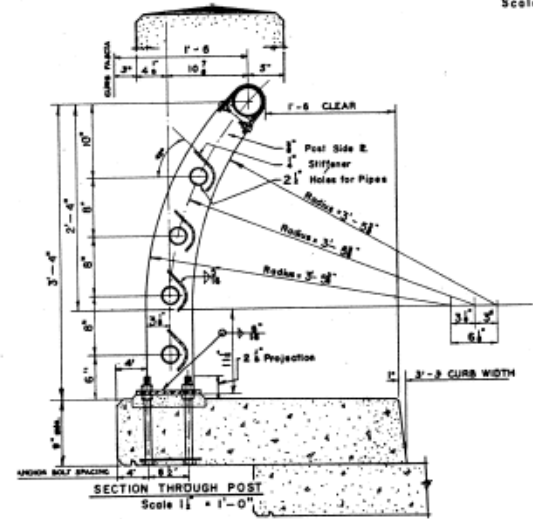
NO.		REVISIONS		NAME		DATE	
<p>DEPARTMENT OF PUBLIC WORKS CANADA DEVELOPMENT ENGINEERING BRANCH STRUCTURES DIVISION</p> <p>GRANDE ANSE RIVER BRIDGE MILE 24.75 CABOT TRAIL CAPE BRETON HIGHLAND NATIONAL PARK NOVA SCOTIA</p> <p>ABUTMENT REINFORCEMENT</p>							
JOB SUPERVISOR	DATE	DESIGN	CHECK	DESIGN	CHECK	DESIGN	CHECK
APPROVED	9/12/79	DESIGN	CHECK	DESIGN	CHECK	DESIGN	CHECK
<p>CHIEF STRUCTURES DIVISION APPROVED</p>				<p>PROJECT NO. 50-111</p>			
<p>DATE 9.12.79</p>				<p>SHEET 3 of 7</p>			



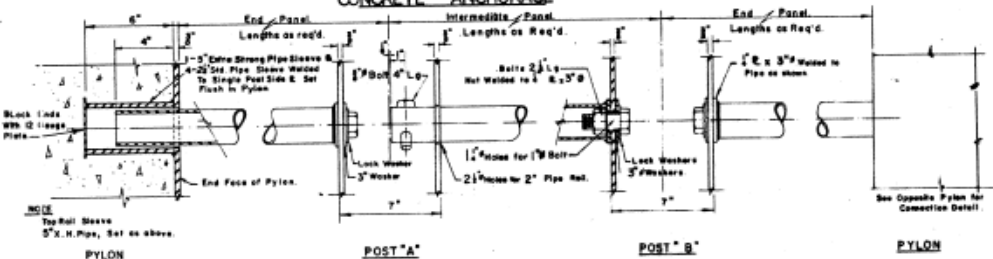


INTERIOR ELEVATION OF POSTS AND RAILINGS.

Scale 1" = 1'-0"

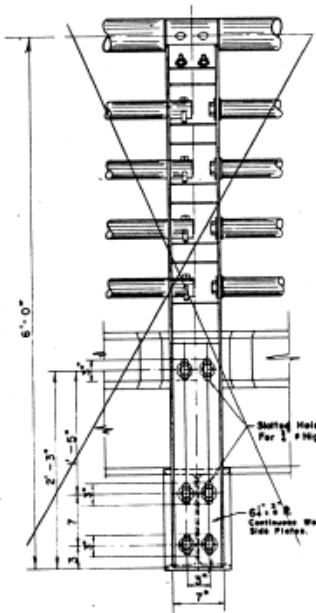


POST DETAIL FOR CONCRETE ANCHORAGE



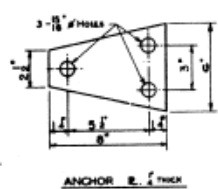
TYPICAL RAIL CONNECTIONS - PYLON TO PYLON

Scale 3" = 1'-0"



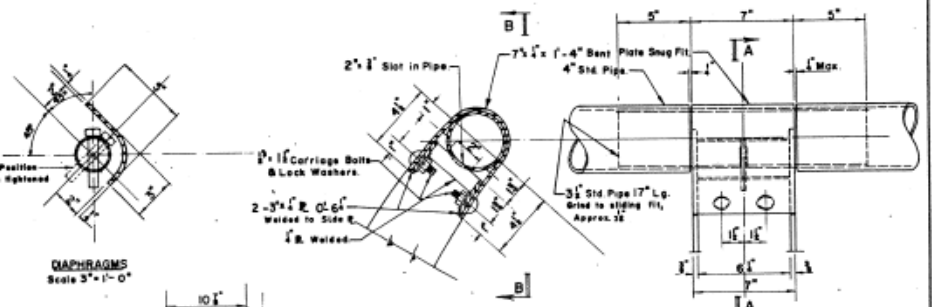
EXTERIOR ELEVATION

Scale 1 1/2" = 1'-0"



ANCHOR

POST DETAIL for STEEL STRUCTURES.

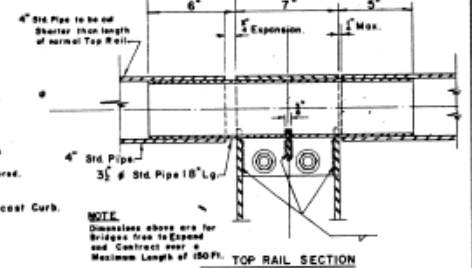


SECTION A-A

TOP RAIL CONNECTION.

Scale 3" = 1'-0"

ELEVATION B-B



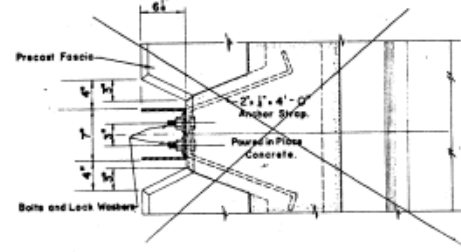
LOWER RAIL CONNECTION

POST "C" EXPANSION POST DETAIL.

Scale 3" = 1'-0"

SECTIONAL ELEVATION

Scale 1 1/2" = 1'-0"



PLAN

Scale 1 1/2" = 1'-0"

REVISIONS		DATE
DEPARTMENT OF PUBLIC WORKS CANADA DEVELOPMENT ENGINEERING BRANCH STRUCTURES DIVISION		
GRANDE ANSE RIVER BRIDGE, MILE 24.75, CABOT TRAIL, CAPE BRETON HIGHLANDS NATIONAL PARK, N.S.		
STANDARD HANDRAIL LEVEL BRIDGE		
JOB SUPERVISOR S. STAMER	DESIGN V.S.T. DATE 20/1/57	DRAWN C.M.P.
CHECKED W.M.D.	PROJECT NO. SD-111	SHEET 6 OF 7
CHIEF ENGINEER G. H. STAMER		



2 This drawing to be read in Conjunction
with drawing N^o. 3

No.	REVISIONS		NAME	DATE	
DEPARTMENT OF PUBLIC WORKS					
CANADA					
DEVELOPMENT ENGINEERING BRANCH					
STRUCTURES DIVISION					
GRANDE ANSE RIVER BRIDGE					
MILE 24.75 CABOT TRAIL					
CAPE BRETON HIGHLANDS NATIONAL PARK					
NOVA SCOTIA					
REINFORCING STEEL SCHEDULE					
AND					
WINGWALL REINFORCING					
JOB SUPERVISOR	H. Hewitt	DRAWN	C.R. Mac	CHECKED	Z.L.B.
APPROVED	DATE 9/20/89	DRAWN	L.B.P.	CHECKED	L.B.P.
		TRACED	L.B.P.	CHECKED	L.B.P.
CHIEF STRUCTURES DIVISION		PROJECT NO.		SD-III	
APPROVED	DATE 9-20-89				
E. Gidman		SHEET 7 OF 7			

PCA

APPENDICES

Project No. 1114

Pleasant Bay to North Mountain

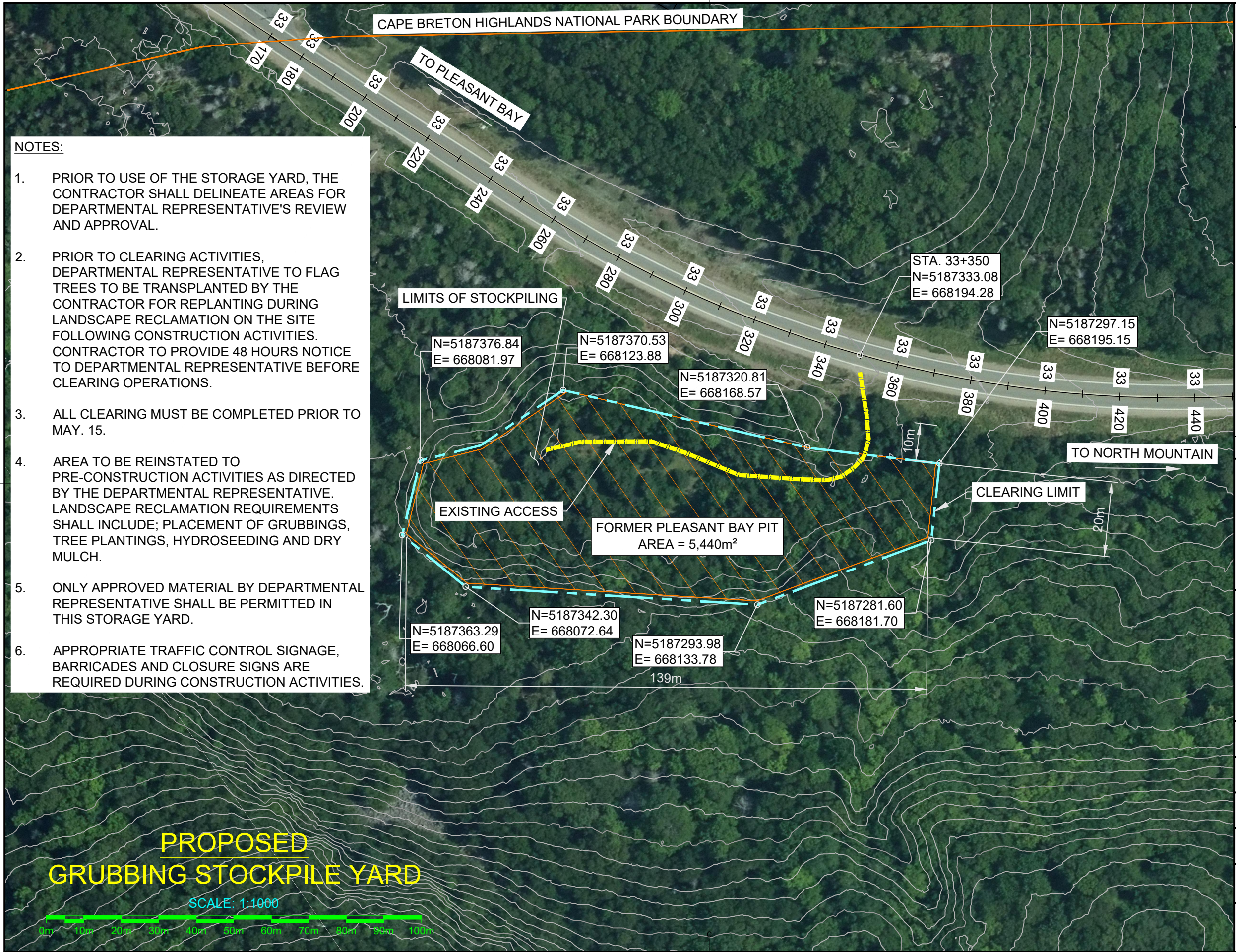
February 2019

KM 33.17 to 38.74

Appendix I

Site Plan – Pleasant Bay Grubbing Stockpile Yard

U:\133348023_PCA_671\04_drawings\1_civil\sketch_files\20190206_pleasant_bay_pit_area\133348023SK_pleasant_bay_pit_area.dwg



NOTES:

1. PRIOR TO USE OF THE STORAGE YARD, THE CONTRACTOR SHALL DELINEATE AREAS FOR DEPARTMENTAL REPRESENTATIVE'S REVIEW AND APPROVAL.
2. PRIOR TO CLEARING ACTIVITIES, DEPARTMENTAL REPRESENTATIVE TO FLAG TREES TO BE TRANSPLANTED BY THE CONTRACTOR FOR REPLANTING DURING LANDSCAPE RECLAMATION ON THE SITE FOLLOWING CONSTRUCTION ACTIVITIES. CONTRACTOR TO PROVIDE 48 HOURS NOTICE TO DEPARTMENTAL REPRESENTATIVE BEFORE CLEARING OPERATIONS.
3. ALL CLEARING MUST BE COMPLETED PRIOR TO MAY. 15.
4. AREA TO BE REINSTATED TO PRE-CONSTRUCTION ACTIVITIES AS DIRECTED BY THE DEPARTMENTAL REPRESENTATIVE. LANDSCAPE RECLAMATION REQUIREMENTS SHALL INCLUDE; PLACEMENT OF GRUBBINGS, TREE PLANTINGS, HYDROSEEDING AND DRY MULCH.
5. ONLY APPROVED MATERIAL BY DEPARTMENTAL REPRESENTATIVE SHALL BE PERMITTED IN THIS STORAGE YARD.
6. APPROPRIATE TRAFFIC CONTROL SIGNAGE, BARRICADES AND CLOSURE SIGNS ARE REQUIRED DURING CONSTRUCTION ACTIVITIES.



revisions		date
project		projet
CABOT TRAIL REHABILITATION PLEASANT BAY TO NORTH MOUNTAIN CBHNP		
drawing		dessin
SITE PLAN PLEASANT BAY GRUBBING STOCKPILE YARD STA. 33+350		
designed	RMB	conçu
date	FEB. 07, 2019	
drawn	CCP	dessiné
date	FEB. 07, 2019	
approved	RMB	approuvé
date	FEB. 07, 2019	
Tender		Soumission
PCA Project Manager	Administrateur de projets PCA	
project number	1114	no. du projet
drawing no.		no. du dessin
Appendix I		