GEMTEC
Consulting Engineers and Scientists

Parks Canada Agency

North Mountain Repairs

Technical Specifications

ISSUED FOR TENDER

May 2022

GEMTEC Project #: 100003.006

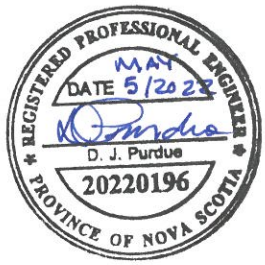
Specifications
Issued for Tender

Parks Canada Agency

Cabot Trail
North Mountain Repairs

Cape Breton Highlands National Park

Project No. 2245



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END OF SECTION

LIST OF DRAWINGS

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Public Act (Nova Scotia), Pit and Quarry Guidelines, Asphalt Paving Plant Regulations, Environmental Construction Practice Specifications, Forest Improvement Act, National Parks Act and Regulations and Canadian Environmental Protection Act.

1.2 DESCRIPTION OF WORK

.1 The work will be carried out on the Cabot Trail within the boundaries of Cape Breton Highlands National Park (CBHNP) from Station 38+500 to 41+000.

.2 The Contractor must restrict roadway construction to one work area with a maximum length of 1.0 kilometer, excluding culvert work.

.3 Work on this project consists generally of the following:

.1 Carry out a preconstruction survey to:

.1 Establish 20 m stationing and placement of an offset stake at each 20 station on which is written the chainage and centerline offset. Remove all stakes at completion of work.

.2 Record the direction, start station, and end station of all pavement marking passing lanes within the project limits. Establish offset stake at each location and re-establish prior to new pavement marking.

.3 Establish the layout of pavement markings, delineation and arrows etc. prior to line stripping. Provide Departmental Representative with drawings of new layout locations prior to pavement marking.

.4 The preconstruction survey is considered incidental to Contract.

.2 Supply and operation of traffic control for duration of the project, including signs, traffic control personnel, temporary traffic signals and pilot vehicle including means of transporting cyclist and their bicycles thru the traffic control zone.

.3 The Contractor shall develop an Environmental Protection Plan (EPP) for submission and approval prior to starting work based on the Parks Canada's document. *Parks Canada Preapproved Routine Impact Assessment (PRIA) Roads and Related Infrastructure (2019)*, attached in Appendix A.

.4 Removal and disposal of noted existing culverts and replacement with new culverts.

.1 Supply, placement and compaction of bedding, surround and backfill/sub-grade materials around culverts.

.2 Cleaning debris out of noted existing culverts.

.3 Ditching at inlets and outlets of noted existing culverts. Ensure positive drainage.

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

.6 Cold milling of the existing asphalt concrete (including asphalt gutters) and reuse/disposal as required.

.7 Excavation of roadway as required.

.8 Compact and proof roll new subgrade surface.

.9 Supply, placement, compaction and grading of gravel sub-base and asphalt base in roadway pavement structure in noted distress areas.

.10 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.

.11 Supply and placement of new asphalt gutters.

.12 Removal and reinstate existing post guide rail and posts as required.

.13 Remove existing culverts and install new culverts (complete with inlet and outlet details) as noted in the drawings.

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

.15 Supply and place hydroseeding and dry mulch on disturbed embankment slopes.

.16 Supply and installation of temporary and permanent pavement markings.

.4 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.

.5 The Contractor must be aware that other construction work may be being performed at several different locations near the project site during the time frame of this contract and that coordination with other Contracts will be required. No claims for delay will be accepted due to other construction work in the area. Other projects in the area include:

.1 Still Brook Culvert Replacement (near Black Brook)

.2 KM74.8 Culvert Replacement (approx.. 2.7km East of Warren Brook)

1.3 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, site signage or structures are continuously kept in a condition satisfactory to Departmental Representative.

1.4 CODES

.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 (Department of Transportation & 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 Highway Act (Nova Scotia).

1.5 WORK WITHIN PARK BOUNDARIES

.1 The project is within a National Park, and it is essential that all 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, 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 Confirm that contracted Work meets the standards outlined in the contract specification and drawings.
- .4 Confirm that no damage will be done to aerial or underground electrical/ communications cables.
- .5 All sources of aggregate and asphalt cement must be submitted to the Departmental Representative for approval prior to the pre-construction meeting.
- .6 The Contractor is responsible to follow the Provincial requirements regarding the following:
  - .1 Pit and Quarry Guidelines
  - .2 Environmental Construction Practice specifications.
- .7 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.

1.6 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each of following:

- .1 Contract drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Reviewed Shop Drawings.
- .5 Change orders.
- .6 Other modifications to Contract.
- .7 Field Test Reports.
- .8 Copy of Approved Work Schedule.
- .9 Health and Safety Plan and Other Safety Related Documents.
- .10 Plan Locating Underground Utilities.
- .11 Other Documents as Specified.
- .12 Environmental Control Plan.
- .13 Record drawings (kept up to date on a daily basis).

1.7 SITE CONDITIONS

.1 The Contractor will be responsible to visit the roadway and review existing site conditions.

.2 For geotechnical and borehole information, refer to Appendix B. Any interpretations of its finding will be made at the Contractor's own risk and the Department Representative will not be held responsible for the interpretation of this document.

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

1.8 WASTE DISPOSAL

.1 All waste generated from this project will be disposed of outside of Park boundaries.

1.9 WORK SCHEDULE

.1 Provide to the Departmental Representative in writing and within 5 working days after Contract award, a detailed construction schedule and traffic control plan. The schedule shall show proposed work to be undertaken and anticipated completion dates for each category of work in the Unit Price Table.

.2 After receiving the Contractor's 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, methods of construction, environment protection methods and traffic control.

.3 Complete all cutting and patching areas within the Park prior to the operation.

.4 The final completion date shall be **June 30, 2022**.

.5 If the Contractor has completed the Work identified in the Contract prior to **June 30, 2022** to the satisfaction of the Departmental Representative, Parks Canada will pay the Contractor an amount equal to the fee of **$10,000.00** per calendar day multiplied by the number of days the Contractor has completed the Work and is no longer occupying the site. The maximum amount payable by Parks Canada to the Contractor shall be **$50,000.00**. No allowances shall be made for days of inclement weather, equipment breakdown or any reasons outside of the Contractor's control.

.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 and traffic control plan, the work will be so scheduled to meet the time restraints and have the project completed on time.

1.10 PARTIAL OCCUPANCY OR USE

.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.

1.11 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 All areas from equipment/material storage, stockpiling of materials, and employee parking etc. shall be to the approval of the Departmental Representative.
.2 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 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.

.9 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

.10 Contractor to obtain all necessary permits and/or approvals to perform work and to comply with all permit requirements and conditions. All permits and/or approvals are incidental to the work.

1.12 PROJECT MEETINGS

.1 The Contractor will arrange project meetings at the call of the Departmental Representative and assume responsibility for setting times and recording and distributing minutes in accordance with Section 01 31 19 – Project Meetings.

1.13 SETTING OUT OF WORK

.1 Contractor shall carry out all layouts.

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

.3 Contractor shall supply such devices as straight edges and templates required to facilitate Departmental Representative's inspection of work.

.4 Provide coordinates, elevations and dimensions in the field, as required by the Departmental Representative

.5 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 centreline offset, edge of pave, rounding, etc.

1.14 EXISTING SERVICES

.1 The Contractor shall confirm all inverts and critical elevations in the field prior to construction.

.2 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.

.3 Carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to pedestrian and vehicular traffic.

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

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

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

.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 Ensure pedestrian and other traffic is not unduly impeded, interrupted or endangered by execution or existence of work or plant.

.10 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.

1.15 EXISTING ROADWAY SIGNS

.1 The Contractor shall note that existing warning, regulatory and information signs exist along the roadway within the project limits.

.2 These signs shall be protected from damage.

.1 If any damage occurs during construction, the Contractor shall bear the expense to immediately replace such damaged signs and/or posts to the satisfaction of the Departmental Representative.

.3 If the Contractor needs to temporarily remove the existing signs in order to complete their work, the removal and reinstatement shall be considered incidental.

1.16 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.

1.17 STANDARD HOURS

.1 The Contractor must maintain existing site hours for the work unless otherwise authorized by Departmental Representative.

.2 Work that involves temporary disruption of services will be scheduled through the Departmental Representative. Give Departmental Representative minimum 72 hours' notice of any disruption of services.

1.18 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.

1.19 MEASUREMENT OF QUANTITIES

.1 Linear: Items which are measured by metre or kilometre, such as pipe culverts 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 clearing to be made on actual flat or sloped surface.

.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.

1.20 PERMITS/AUTHORITIES

.1 The Contractor shall obtain, and pay for, permits from authorities as required for all operations and construction. He shall also comply with all pertinent regulations of all authorities having jurisdiction over the work. The Contractor shall provide copies of all permits to the Departmental Representative 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.

1.21 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.

1.22 WORK SEQUENCE

.1 The Contractor shall schedule their work progression in the following sequence:

.1 Culvert removals and replacement.

.2 Asphalt cold milling.

.3 Distressed area repairs.

.4 Repaving

.5 Removal and reinstatement of existing guide rail and posts.

1.23 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 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 materials. 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.

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 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services and provide for vehicle access at all times.

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

.4 No work camps or office facilities will be located within the boundaries of the Cape Breton Highlands National Park.

.5 Water: in accordance with Departmental Representative's approval.

.1 All water for cold milling and dust control to be obtained outside of the Park Boundaries.

.6 Temporary storage parking areas and turn around facilities for Contractor related equipment and vehicles will be limited to those areas agreed to and designated by the Departmental Representative.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to travelling public and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.4 EXISTING SERVICES

.1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.1 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 The Contractor should be aware and confirm location of buried utility lines in the approximate area of Station 38+643 to Station 38+725.

.2 Provide for pedestrian, cyclist and vehicular traffic.

1.5 SPECIAL REQUIREMENTS

.1 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.2 Keep within limits of work and avenues of ingress and egress.

.3 Work shall be conducted in accordance with Parks Canada PRIA (Appendix A).

.4 Special Move Permits (over-weight and over-dimension) from the Province shall be submitted to Departmental Representative for review and approval prior to activity.

.5 Blasting is prohibited.

.6 Provide survey layout with stakes on both sides of the road/alignment at 20 metre station intervals (top of back slope, toe of slope, subgrade, granulars, shoulders, etc.) with centreline offset.

.7 Maintenance work on Contractor/Sub-Contractor equipment is prohibited within the National Park.

.8 If native topsoil is encountered during excavation, the Contractor shall salvage and stockpile such that embankments and designated areas can be dressed with the salvaged topsoil at the end of project prior to hydroseeding and dry mulch.

.9 Maintain roadways, detours and site signage at all times during the Contract (i.e., dust control and free from potholes, bumps, PVMS, etc.)

.10 Guide rail shall be installed at the same locations from which existing guide rail was removed, unless noted otherwise on the Drawings or by the Departmental Representative.

.1 Where existing guide rail is to be removed and reinstated at the same location, the Contractor shall complete the installation within the same working day or provide full physical protection of the region with traffic barrier protection meeting the approval of the Departmental Representative.

.11 Work outside of normal working hours will require 48 hours written notice to the Departmental Representative. There are no restrictions on working weekends or statutory holidays. Normal working hours is defined as sunrise to sundown as defined by the nearest Environment Canada weather location.

.12 Work will not be permitted during the Cabot Trail Relay Race on May 28th and May 29th, 2022.

1.6 SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 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 $100,000.

.2 Do not include in the Contract Price, additional contingency allowances for products, installation, overhead or profit.

.3 Prime Cost Sum (PCS) provided for in the Lump Sum Arrangement Table is not a sum due to the Contractor. Rather, payment will be made against it for miscellaneous work not included in the unit price table under the General Conditions of the Contract.

.4 All work completed under PCS requires written approval from the Departmental representative. No payment will be made to the Contractor for work completed without prior written approval from the Departmental Representative. It is the Contractor's sole responsibility to advise the Departmental Representative if the agreed upset limit of the work will exceed the agreed upon amount and no claim against the Owner shall be brought forward after the completion of the work.

.5 Such work may include, but not be limited to:

.1 Drainage upgrades, excavation, granulars, pavements, guide rail and signage installation within Cape Breton Highlands National Park, NS.

.6 The Contract Price, and not Prime Cost Sum, includes Contractor's head office overhead and profit in connection with the Work.

.7 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.

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 DESCRIPTION

.1 Mobilization and Demobilization consists of the preparatory work and operations including, but not limited to, those necessary for the loading, transportation, unloading, and complete set-up of all plant, equipment, labour, materials, facilities and incidentals necessary to complete the work associated with the Contract, as well as, the decommissioning, loading, transportation, unloading and storage of all plant, equipment, excess materials, facilities and incidentals after the work associated with the Contract is complete.

.2 Any protective measures or movement of Contractor trailers necessitated by animal interactions and required by Parks Canada will be paid by the Departmental Representative and are not to be anticipated in the Lump Sum Contract Price for Mobilization and Demobilization.

1.2 RELATED REQUIREMENTS

.1 Section 01 11 00 - Summary of Work.

1.3 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 - Payment Procedures.

1.4 DESCRIPTION

.1 There shall be no change in the Lump Sum Price of this Item due to a change in Contract scope or an extension to the Contract Completion Date.

.2 The payments from the Lump Sum Price shall be full compensation for the Work under this Item regardless of the number of times the Contractor mobilizes.

.3 At no time shall the total of the amounts paid to the Contractor under this Item be greater than the Contractor’s Lump Sum Price.

.4 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 CONSTRUCTION

.1 The Contractor shall carry out the Work as indicated in the Contract Documents and/or as specifically directed by the Departmental Representative.

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 Provisional Items have been included in the event that they are required during construction. All Provisional Items must be approved by the Departmental Representative on a case-by-case basis. Compensation will not be considered if written approval is not sought in advance.

.4 There shall be no measurement or payment for Work carried out beyond the limits defined on the Drawings. In cases where the Work extends beyond the defined limits, theoretical lines and grades shall be used for measurement and payment purposes.

.5 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.

.6 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.

.7 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.

.8 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 materials is to be included in the Contractor's prices.

.9 All measurements for progress payment purposes shall be taken jointly by the Contractor and the Departmental Representative.

.10 Items which are measured by the metre shall be measured along centreline of installation unless otherwise indicated.

.11 Longitudinal, transverse and area measurements shall be made on the actual flat or sloped surface, depending on the item.

.12 In computing volumes of excavation, average end area method will be used unless otherwise directed by Departmental Representative.

.13 All volume measurements refer to in-place measures unless specified otherwise.

.14 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.

.15 There will be no payment for work carried out on weighed material in the absence of weight tickets.

.16 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:

.3 Lump Sum Item 1 - Section 01 21 00 - Prime Cost Sum

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

.2 This Item includes, but not limited to:

.1 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. Prime Cost Sum is not a sum due the Contractor.

.4 Lump Sum Item 2 - Section 01 25 20 - Mobilization and 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 is to be paid when all plant, equipment, labour, materials and incidentals necessary to complete the work and the site cleaned and left in condition to the satisfaction of the Departmental Representative and all other agencies having jurisdiction.

.2 Payment of only 5% of the total price tendered will be scheduled as outlined above. If the amount bid for mobilization and demobilization is greater than 5% of the total price tendered, payment of the remainder of the amount will be authorized when the Contract has been completed.

.5 Lump Sum Item 3 - 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 Preapproved Routine Impact Assessment - Roads and Related Infrastructure (2019) provided in **Appendix A**.

.3 Submission of the Environmental Protection Plan (EPP) as per the EPP Template Document, provided in **Appendix C**. The EPP shall be developed using this template document and is to be submitted to the Departmental Representative for review and approval.

.4 This item includes:

.1 Water control and fish rescue.

.6 Lump Sum Item 4 - 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 closure signs and notices.

.6 Provide sanitary facilities.

.7 Asphalt and Aggregate Lab facilities.

.8 Removal of temporary facilities from site as directed by the Departmental Representative.

.7 Unit Price Item 1 - Section 01 35 00.06 - Special Procedures for Traffic Control

.1 Unit of Measurement: Daily rate (Day).

.2 This Item includes:

.1 Traffic control persons and traffic accommodation person(s).

.2 Provision, installation, and maintenance of temporary traffic control devices, including temporary traffic lights, detour signs, construction signage, trail closure signage and barricades, 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, flashing light units, reflectors, F-shape barriers, traffic barrels, and TC-63 delineator drums (double weighted) etc.

.8 Unit Price Item 2 - Section 02 41 13 - Selective Site Demolition - Removal and Reinstatement of Guide 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: Dismantling, stockpiling, and reinstatement of guide rail, hardware, wooden guide posts and offset blocks as indicated in the Contract Documents.

.4 Guiderail removal and reinstatement at the following chainages:

.1 Chainage 39+803 to 39+825

.2 Chainage 39+878 to 39+905

.3 Chainage 40+050 to 40+075

.4 Chainage 40+100 to 40+120

.5 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.

.6 Requires limited excavation and re-compaction of downslope emergency repair areas adjacent to guide rails requiring reinstatement. Work to include excavation to a depth of 1.5 metres below existing grade, compaction of subgrade, and re-use and re-compaction of excavated materials to reinstate slopes. Additional 0-200 mm rock fill will be paid for separately under Section 31 05 16.

.7 At the guide rail, excavations shall be taken to a depth of 2.5 metres below existing grade. Work to include subgrade compaction, re-use and re-compaction of existing materials to finished grade. Additional 0-200 mm rock fill will be paid under Section 31 05 16. Additional Type I material will be paid for under Section 32 11 23.

.9 Unit Price Item 3 - Section 02 41 13.14 - Asphalt Pavement Removal

.1 Unit of Measurement: Square Metres (m^2).

.2 Method of Measurement: Horizontal measurement of surface area.

.3 This item includes: the supply of all necessary materials, labour and equipment required for the removal of asphaltic concrete pavement, regardless of depth removed or number of operations required. Payment will include all sawcutting, milling, removal, loading, hauling, stockpiling, disposal of surplus milled asphalt, key joints, temporary asphalt tapers and cleaning of remaining pavement surface. This item also includes removal of asphalt gutters and drainage swales.

.4 Milling of the asphalt will be required to allow for re-use in shoulder materials, parking lots, base asphalt and granulars as indicated.

.10 Unit Price Item 4 - Section 31 05 16 - Aggregate Materials - Rock Fill (200mm minus) - Supply and Placement

.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 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.

.11 Unit Price Item 5 - Section 31 05 16 - Aggregate Materials - Rock Fill (200mm minus) - Placement

.1 Unit of Measurement: Metric Tonne (t).

.2 Method of Measurement: Scale tickets signed by the Departmental Representative.

.3 This item includes: 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 Rock fill will be available at stockpile located approximately 2 km from the site. Contractor shall provide all equipment required to load rock fill. Contractor should be aware of Owners use of property and should not interfere with such use.

.5 There shall be no payment for extra 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.

.12 Unit Price Item 6 - Section 31 23 16.26 - Rock Removal (Provisional Item)

.1 Unit of Measurement: Cubic Metre (m^3).

.2 Method of Measurement: Average end area method between cross sections taken after rock is exposed to lines and elevations indicated. Boulders one cubic metre or larger will be classified as rock. Boulders removed from the excavation shall be measured along the three maximum perpendicular axis.

.3 For rock in trench, dimensions used to calculate end areas shall be theoretical trench width as indicated on the Drawings, and depth from surface of rock as exposed on sides of trench after excavation to bottom of specified bedding for each pipe in trench. Boulders larger than one cubic metre, any portion of which is within theoretical trench, will be classified as rock. Boulders removed from trench shall be measured along the three maximum perpendicular axis. Blasting will not be permitted in this Contract.

.4 This item includes: Excavation, hauling, placement and compaction to lines and elevations indicated, and disposal of surplus or unsuitable material. This item includes shoring, bracing, cofferdams, underpinning and de-watering of excavation if required.

.5 This is a provisional item that may or may not be required and must be approved by the Departmental Representative prior to use.

.13 Unit Price Item 7 - Section 31 23 33.01 - Excavating, Trenching and Backfilling

.1 Unit of Measurement: Cubic Metre (m^3).

.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, detours, asphalt removal, guide 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 This item includes for the removal, haulage and disposal of surplus rock material. The material shall be disposed of offsite at a location approved by the Departmental Representative.

.7 There shall be no payment for excavation beyond the limits indicated on the Drawings.

.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.

.14 Unit Price Items 8, 9 - Section 31 37 00 - Rip-Rap - R25, Rip-Rap - R250

.1 Unit of Measurement: Metric Tonne (t) for each size and type of Rip-Rap.

.2 Method of Measurement: Scale tickets signed by the Departmental Representative.

.3 This item includes: Supply, placement and compaction of Rip-Rap at culvert inlets, outlets, offtakes, and other areas as indicated on the Drawings at the direction of the Departmental Representative.

.4 No separate payment will be made for required geotextiles.

.15 Unit Price Item 10 - Section 32 11 23 - Shoulder Material - Reclaimed Asphalt Product (RAP)

.1 Unit of Measurement: Metric Tonne (t).

.2 Method of Measurement: To the theoretical lines and grades as indicated on the Drawings, along with scale tickets signed by the Departmental Representative.

.3 This item includes: Supply, haulage, processing, placement and compaction of shoulder material (RAP).

.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.

.16 Unit Price Item 11 - Section 32 11 16.01 - Granular Sub-Base - Type 2 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 sub-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 sub-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.

.17 Unit Price Item 12 - 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.

.18 Unit Price Item 13 - Section 32 12 16 - Asphalt Paving - Type “D–HF”

.1 Unit of Measurement: Metric Tonne (t).

.2 Method of Measurement: From scale and ticket generated and signed by the Departmental Representative.

.3 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.

.4 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.

.5 All asphalt milling required is incidental to the Work.

.19 Unit Price Item 14 - Section 32 12 16 - Asphalt Paving - Type “B–HF”

.1 Unit of Measurement: Metric Tonne (t).

.2 Method of Measurement: From scale and ticket generated and signed by the Departmental Representative.

.3 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.

.4 This item includes: Supply, loading, hauling, placement and compaction as indicated and all equipment, labour, materials required, **including the material transfer vehicle** and temporary pavement markings.

.5 All asphalt milling required is incidental to the Work.

.20 Unit Price Item 15 - Section 32 12 16 - Asphalt Paving - Asphalt Gutter

.1 Unit of Measurement: Linear Metre (m).

.2 Method of Measurement: Slope measure along centreline of swale/gutter.

.3 This item includes: Preparation, supply, loading, hauling, placement and compaction of new asphalt gutters including paved takeoffs as directed by the Departmental Representative.

.4 Construction of R-25 Rip-Rap aprons is incidental to the Work.

.21 Unit Price Item 16 - Section 32 17 23 - Pavement Markings - Longitudinal

.1 Unit of Measurement: Kilometre (km).

.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, pre-markings and all temporary markings. No additional payment for traffic control associated with the application of pavement markings shall be made.

.22 Unit Price Items 17, 18, 19, and 20 - Section 33 42 13 - Pipe Culverts - (Various Sizes) Concrete

.1 Unit of Measurement: Linear Metre (m) for each size and class of concrete 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 of existing culverts, which also includes downslope “elephant trunks” at Station 40+104 and Station 40+365.

.3 All required excavation, removal, and disposal of existing asphalt concrete at culvert replacement locations if prior to cold milling operations.

.4 Excavation of trench, supply and placement of all bedding, and backfill material to subgrade as indicated on the Drawings. Disposal of all existing 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 baffles as shown on the Drawings.

.7 Supply and installation of culvert tension assemblies and fittings as indicated on the Drawings.

.8 Supply and placement of cut-off walls as shown on the Drawings.

.9 Supply and placement of geotextiles, offtake channels and inlet and outlet treatments, aprons and pools as specified on the Drawings.

.11 This item does **not** include Rip-Rap requirements as this item is deemed to be included in the respective item.

.12 All culverts to have bevelled inlet and outlet sections

.13 All concrete pipe to meet strength Class 65-D.

1.3 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 Water for dust control.

.2 Access.

.3 Barricades.

.4 Clean-up.

.5 Cold weather protection and curing of materials.

.6 Consumables.

.7 Design, supply, fabrication, use and removal from site of all temporary works and erection equipment.

.8 Environmental protection and disposal of hazardous materials.

.9 Field measurements and sketches.

.10 Lost time due to weather.

.11 Obtaining any permits or approvals required.

.12 Protection of existing structures.

.13 Protection, relocation, moving, storage and final location of stored equipment.

.14 Provision of services.

.15 Reinstatement of damaged surfaces.

.16 Rental of equipment; products.
.17 Safety measures, equipment, and training.
.18 Scaffolding / staging.
.19 Security.
.20 Shoring and bracing.
.21 Any access equipment and time necessary for inspections and testing.
.22 Snow removal.
.23 Submissions.
.24 Temporary Surfacings.
.25 Weigh Scales and Scale person.
.26 Survey layout, staking and measurement.
.27 Transportation of equipment.
.28 Shop Drawings.
.29 Working Drawings.
.30 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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1	Section 31 05 16	Aggregate Materials
.2	Section 31 23 33.01	Excavating, Trenching and Backfilling
.3	Section 31 24 13	Roadway Embankments
.4	Section 32 11 16.01	Granular Sub-Base
.5	Section 32 11 23	Aggregate Base Courses
.6	Section 32 12 13.16	Asphalt Tack Coat
.7	Section 32 12 16	Asphalt Paving

.8 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.

1.4 MEASUREMENT FOR PAYMENT

.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 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 two 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 and Departmental Representative.

.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION 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 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.

.1 Schedule of Work: in bar (GANTT) Chart format.

.2 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.3 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.4 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.5 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.

.6 Monthly progress claims, administrative procedures, photographs, hold backs.

.7 Appointment of inspection and testing agencies or firms.

.8 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work and one week 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 two days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within three 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 Corrective measures and procedures to regain projected schedule.

.6 Revision to construction schedule.

.7 Progress schedule, during succeeding work period.

.8 Review submittal schedules: expedite as required.

.9 Maintenance of quality standards.

.10 Review proposed changes for effect on construction schedule and on completion date.

.11 Other business.

1.4 MEASUREMENT FOR PAYMENT

.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 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. 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 Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are coordinated.

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

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

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

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

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

1.2 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 drawings stamped and signed by professional engineer registered or licensed in Nova Scotia of Canada.

.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 coordinated, 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 Departmental Representative's review of each submission.

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

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

.7 Accompany submissions with transmittal letter, containing:

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

.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 Departmental Representative's review, distribute copies.

.10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by 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 one year of date of contract award for project.

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by 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 electronic copies of manufacturers' 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.

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

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

1.3 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 Departmental Representative's business address.

.3 Notify 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 Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

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

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

1.4 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, standard resolution, monthly with progress statement as directed by Departmental Representative.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints:

.1 Viewpoints and their location as determined by Departmental Representative.

1.5 WORK SCHEDULE

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

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

1.6 MEASUREMENT FOR PAYMENT

.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 31 24 13	Roadway Embankments
.2	Section 32 11 16.01	Granular Sub-base
.3	Section 32 11 23	Aggregate Base Courses
.4	Section 32 12 16	Asphalt Paving
.5	Section 33 42 13	Pipe Culverts

1.2 REFERENCES

.1 Nova Scotia Ministry of Transportation and Infrastructure Renewal

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

.2 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.

1.3 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 Maintain at least one (1) lane for continuous traffic flow at all times.

.3 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.

.4 Close lanes of road only after receipt of written approval from Departmental Representative.

.1 Before re-routing traffic erect suitable signs and devices to NSTIR Temporary Workplace Traffic Control Manual.

.5 Keep travelled way graded, free from pot holes and of sufficient width for required number of lanes of traffic.

.1 Provide 7 m wide minimum temporary roadway for traffic in two-way sections through Work and on detours.

.2 Provide 4.5 m wide minimum temporary roadway for traffic in one-way sections through Work and on detours.

1.4 INFORMATIONAL AND WARNING DEVICES

.1 Provide and maintain signs, flashing warning lights, variable message signs and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.

.1 Construction of temporary pads, if required for the placement of temporary traffic control devices or portable variable message signs shall be supplied by the Contractor. Temporary pad sites shall be approved by the Departmental Representative.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices to NSTIR Temporary Workplace Traffic Control Manual.

.3 Place signs, delineators, barricades and miscellaneous warning devices in locations recommended in NSTIR Temporary Workplace Traffic Control Manual.

.1 If situation on site changes, revise to approval of Departmental Representative.

.4 The Contractor shall provide a Temporary Workplace Signer (TWS), who has successfully completed the Temporary Workplace Traffic Control Training Course, to be on site at all times when active construction is taking place. The Temporary Workplace Signer will be responsible to assess condition, prepare, implement and review traffic control plans for construction. The Temporary Workplace Signer will be responsible for ongoing compliance with the NSTIR Temporary Workplace Traffic Control Manual and for ensuring the safe regulation of traffic and safe passage of pedestrians at temporary workplaces. The Temporary Workplace Signer is considered part of the Contractor's supervision and administration staff and compensation for the provision of this individual is considered incidental to the work.

.5 A traffic control plan and emergency response plan must be submitted for review by the Departmental Representative prior to the pre-construction meeting.

.6 Continually maintain traffic control devices in use:

.1 Check signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

.2 Remove or cover signs which do not apply to conditions existing from day to day.

1.5 CONTROL OF PUBLIC TRAFFIC

.1 The Contractor shall be responsible for the supply, installation and maintenance of Traffic Lights for the entirety of the Contract.

.2 Provide competent flag personnel who have a valid provincial license, trained in accordance with, and properly equipped to NSTIR Temporary Workplace Traffic Control Manual for situations as follows:

.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 a traffic control signal system is not in use.

.3 When workmen or equipment are employed on travelled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

.4 Where temporary protection is required while other traffic control devices are being erected or taken down.

.5 For emergency protection when other traffic control devices are not readily available.

.6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

.7 At each end of restricted sections where pilot cars are required.

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

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

1.6 OPERATIONAL REQUIREMENTS

.1 Existing conditions for traffic within right- of-way containing work in this Contract are indicated by following descriptions:

.1 Section within Park Boundaries within contract limits are asphalt concrete surfaced two lane undivided trunk roadway with posted speeds up to 80 km/h.

.2 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 and approved by Departmental Representative to protect and control public traffic, existing conditions for traffic may be restricted as follows:

.1 In accordance with NSTIR Temporary Workplace Traffic Control Manual.

.2 The maximum cumulative traffic delay associated with work carried out under this Contract shall not exceed 10 minutes through the Contract limits.

.3 Maintain existing conditions for traffic crossing right-of-way containing work except that, when required for construction under this Contract and when measures have been taken as specified herein and approved by Departmental Representative to protect and control public traffic.

.3 Temporary structures shall be constructed as indicated on approved shop drawing submitted to Departmental Representative. All existing dimensions to be verified prior to construction with any discrepancies reported to the Departmental Representative.

.4 The Contractor shall provide for services 24 hrs. per day, 7 days per week.

.5 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.

.6 Contact proper authorities in the event of an emergency, i.e., Contractor's Supervisor, Park Warden, and Departmental Representative.

1.7 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

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 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. - Updated 2013.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

.3 Submit electronic copies of Contractor's authorized representative's work site health and safety inspection reports to authority having jurisdiction and Departmental Representative.

.4 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Submit WHMIS MSDS - Material Safety Data Sheets.

.7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within seven days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within five days after receipt of comments from Departmental Representative.

.8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

.10 On-site Contingency and Emergency Response Plan: Address standard operating procedures to be implemented during emergency situations.

.11 Submit other data, information and documentation upon request as stipulated elsewhere in this Section.

1.3 FILING OF NOTICE

.1 File Notice of Project and any other required Notices with the Provincial Authorities prior to commencement of the work. Provide the Departmental Representative with a copy of the filed Notice(s) prior to commencement of the work.

1.4 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work. Have Contractor's site safety supervisor in attendance. Departmental Representative will advise of time, date and location of the meeting and will be responsible for recording and distributing the minutes.

.2 Conduct site specific occupational health and safety meetings as required by the Nova Scotia Occupational Health and Safety Act, and the Regulations made pursuant to the Act for the duration of the work.

.3 Record and post minutes of all meetings in plain view on the work site. Make copies available to Departmental Representative upon request.

.4 Conduct an orientation meeting with all workers prior to start-up of the Work to ensure everyone is aware of the Health and Safety issues for this specific project. Each new worker to receive the same orientation briefing prior to performing any work on this project.

1.6 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Continuous movement of public traffic through the construction site at all hours of the day and night.

.2 The above list shall not be construed as being complete and inclusive of all 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.

1.7 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.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 practices 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. 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 and in particular those which might endanger workers and Facility employees.

.3 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.

.4 Implement, maintain and enforce compliance with requirements of the Health and Safety Plan until final completion of work and demobilization from site.

.5 As work progresses, review and update Plan addressing additional health risks and safety hazards identified by on-going hazard assessments.

.6 Submit revised versions of Plan to Departmental Representative.

.7 Post a typed written copy, including all updates of the Health and Safety Plan in a common visible location at work site.

.8 Submission of the Health and Safety Plan, and updates to the Departmental Representative is for review and information purposes only. Its submission shall not be construed to imply approval by Departmental Representative, be interpreted as a warranty of being complete, accurate and legislate compliant and shall not relieve the Contractor of his legal obligations for the provision Health and Safety of the Construction Project.

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

1.8 RESPONSIBILITY

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

.2 Comply with Occupational Health and Safety Act, Occupational Safety General Regulations, N.S. Reg. Reg. 52/2013 as amended to O.I.C. 2014-405.

.3 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

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

.5 The Contractor is responsible to manage safety of the work site to ensure that any persons, including but not limited to, the general public circulating adjacent to the work operations are protected against harm due to the extent that they may be affected by conduct of the work.

.6 Prior to commencement of work, provide site safety orientation sessions for all workers and other authorized persons.

.7 The Contractor is responsible to ensure Contractor employees and sub-contractors accessing the work site are in possession of and wear appropriate personnel protective equipment (PPE).

1.9 UNFORESEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Health and Safety co-ordinator and follow procedures in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

1.10 HEALTH AND SAFETY CO-ORDINATOR

.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 pavement 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.

1.11 POSTING OF DOCUMENTS

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

1.12 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 may stop Work if non-compliance of health and safety regulations is not corrected.

1.13 BLASTING

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

1.14 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

1.15 SITE CONTROL AND ACCESS

.1 Control work site and entry points. Grant and allow entry to only workers and other persons so authorized. Immediately stop unauthorized persons from circulating within construction areas and remove from site.

.2 Implement procedures for granting permission to enter into work site to all persons who require access. Procedures to include the provision of a site safety orientation session.

.3 Delineate and isolate construction areas from other areas of site by use of appropriate means. Erect barricades, fences, hoarding and temporary lighting as required.

.4 Erect signage at entry points and at other strategic locations around site, clearly identifying construction area(s) as being "off limits" to unauthorized persons. Signage must be professionally made in both official languages or by use of well-understood graphic symbols.

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

.6 Ensure persons granted access are fitted and wear appropriate personnel protective equipment (PPE). Be responsible for the provision of such PPE to persons who require access to conduct work or perform inspections.

1.16 PROTECTION

.1 Provide temporary facilities for protection and safe passage of public pedestrians and vehicular traffic around adjacent work site.

.2 Provide safety barricades, lights and signage on work site as required to provide a safe working environment for workers.

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

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

1.17 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 the Work.

1.18 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 personal protective equipment (PPE) appropriate to function and task on site; the minimum requirements being hard hat, safety vest and safety footwear. Wear 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.

.1 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.

1.19 TOOLS AND EQUIPMENT SAFETY

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

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

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

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

1.20 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 Put all MSDS data sheets on site, in a common area, visible to workers.

1.21 PROJECT / SITE CONDITIONS

.1 The following are known or potential project related safety hazards at site:

.1 Highway Traffic.

.2 Fractured and loose rock overhead. Contractor should be aware that the potential for falling rocks exists.

.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.

1.22 ACCIDENT 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 $5,000.00.

.3 Required notification to Workers Compensation Board or other regulatory agencies as stipulated by applicable regulations.

1.23 MEASUREMENT FOR PAYMENT

.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 REFERENCES

.1 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 Erosion: A combination of processes in which materials of the earth's surface are loosened, dissolved, or worn away, and transported from one place to another by natural agents.

.3 Sedimentation: The addition of soils to water bodies by natural and human related activities.

.4 Storm Water Runoff: Precipitation that does not soak into the ground or evaporate, but flows along the ground surface as runoff.

.5 Erosion and Sediment Control Plan: Plan identifying the applicable stabilization and structural strategies that shall be employed to limit sediment and erosion during construction.

.6 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water and air; biological and cultural resources; and includes management of visual aesthetics, noise, solid, chemical, gaseous and liquid waste; radiant energy and radioactive material as well as other pollutants.

.7 Deleterious Substance: defined by the Fisheries Act as any substance that, if added to water, makes the water deleterious to fish or fish habitat or any water containing a substance in such quantity or concentration or has been changed by heat or other means, that if added to water makes that water deleterious to fish or fish habitat.

.8 Contaminant: means any solid, liquid, gas, micro-organism, odour, heat, sound, vibration, radiation or combination of any of them, present in the environment.

.9 Contaminants and Deleterious substances includes, but are not limited to: sediment or sediment-laden water, petroleum products, paints, thinners, heated water, concrete wash water, salt, heavy metals, wood preservatives, cleaning supplies, pesticides, wood and food waste, and fecal matter.

.10 Environmental incidents or emergencies include:

.1 Chemical or Petroleum spills;

.2 Poisonous or Caustic Gas Emission;

.3 Biological or Chemical Explosion;

.4 Hazardous Material Spill;

.5 Sewage Spill;

.6 Contaminated Water into Waterways;

.7 Explosion and Ammunition.

.2 Reference Standards:

.1 Parks Canada National Best Management Practices – Roadway, Highway, Parkway and Related Infrastructure.

.1 Document is included in Technical Specifications as Appendix A.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Prior to the pre-construction meeting, submit Environmental Protection Plan for review and approval by Departmental Representative.

.3 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.4 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.5 Include in Environmental Protection Plan:

.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.

.6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

.1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

.8 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 and methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.12 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.

.13 Waste Water Management Plan identifying methods and procedures for management discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water and dewatering of ground water.

.14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

1.3 SENSITIVE AREAS

.1 Site clearing, ground disturbance, and heavy equipment traffic shall not occur within Sensitive Areas unless absolutely required and authorized by Departmental Representative.

.2 Contractors must make all efforts to prevent contaminants and deleterious substances arising from their work from directly or indirectly entering those areas indicated as sensitive areas on drawings (e.g. watercourses and wetlands). This may include mitigative measures such as altering; work schedules, methods of undertaking the work, materials used, and installation of mitigative structures (e.g. sediment control fence, check dams, mulching, etc.).

.3 Failure to comply can lead to charges under various legislation, including the federal Fisheries Act, and the Nova Scotia Water Resources Protection Act.

1.4 FIRES

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

.2 Immediately report all fires to the Departmental Representative. The Contractor is held responsible to make all reasonable efforts to extinguish any fires on the site.

.3 The Contractor is required to comply with the Fire Protection Regulations of the National Parks Act.

.4 In accordance with these Regulations, the Park Superintendent may restrict activities, or access to work areas, in the interest of fire prevention.

.5 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.

.6 Vehicles and stationary equipment must be equipped with fire suppression equipment such as an operable fire extinguisher.

.7 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.

1.5 DISPOSAL OF WASTES

.1 Littering is prohibited.

.2 Dispose of rubbish and waste materials at authorized site.

.3 Do not dispose of waste, volatile or deleterious materials into waterways, wetlands, storm or sanitary sewers.

.4 All refuse from demolition is the property of the Contractor and shall be removed and disposed of in a legal manner.

.5 All Hazardous materials shall be sealed as dictated by authorities having jurisdiction, and disposed of off-site, unless otherwise instructed by the Departmental Representative.

.6 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).

1.6 DRAINAGE

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

.2 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

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

1.7 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as indicated.

.2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

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

1.8 WORK ADJACENT TO WETLANDS AND WATERCOURSES

.1 Construction equipment to be operated on land only.

.2 Use of borrow material from watercourses or wetlands is prohibited.

.3 Do not alter or draw any water from a watercourse or wetland without first obtaining necessary permits or approvals.

.4 Do not dump excavated fill, waste material or debris in watercourses or wetlands.

.5 Design and construct temporary crossings to minimize erosion to watercourse or wetland. All temporary crossings must be pre-approved by Departmental Representative prior to construction.

.6 Do not skid logs or construction materials across watercourses or wetland.

.7 Avoid indicated spawning beds when constructing temporary crossings of waterways.

.8 Do not blast under watercourses or wetland within 100 m of spawning beds without obtaining necessary permits or approvals.

.9 Provide a buffer zone in combination with appropriate erosion and sedimentation control when working adjacent to watercourses and wetlands. Consult with regulatory agencies.

1.9 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 Prior to the pre-construction meeting, prepare an Environmental Protection Plan, which addresses procedures to follow in the event of a pollution incident and ensure all staff are aware of these procedures. Provide copy of contingency plan to the Departmental Representative.

.4 Maintain temporary erosion and pollution control devices installed under this contract until the Work is completed as specified in the Project Documents.

.5 Remove temporary erosion and pollution control measures just prior to project completion unless directed otherwise. Chemicals used in dust control must have prior approval of the Departmental Representative.

.6 Control emissions from equipment to requirement of authority having jurisdiction.

.7 Provide temporary enclosures to protect environment from effects of abrasive blasting.

.8 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.9 Keep paved surfaces clean. Control dust by application of calcium chloride or water.

1.10 PETROLEUM, OIL AND LUBRICANT STORAGE

.1 Take precautions to avoid contamination of the site from Petroleum, Oil and Lubricants (POL’s).

.2 The management of POL’s and chemicals must meet with the requirements of the Nova Scotia Dangerous Goods and Hazardous Wastes Management Criteria and all other appropriate provincial and federal regulations to include but not be limited to the following:

.1 Temporary POL storage sites are to be located a minimum 200 m from any watercourse or wetland.

.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 The Departmental Representative 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.

.4 Storage of large amounts of fuel (more than 900 L) in the Park is not permitted.

.5 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.

1.11 REFUELING AND SPILL CONTAINMENT

.1 Take precautions to avoid contamination of the site from fuel. Keep and maintain hydrocarbon containment and cleanup materials on site for the duration of construction activities. Ensure that Contractor's personnel are trained in the proper use of such materials.

.2 Establish suitable fueling and maintenance areas and obtain approval from the Departmental Representative.

.3 Do not refuel or maintain equipment adjacent to or within 200 meters of any sensitive areas.

.4 Monitor on site vehicles for fluid leaks. Implement a preventative maintenance program to keep vehicles free from leaks.

.5 Refueling 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 Departmental Representative consent. The Contractor must submit plans for fuel management and a Spill Contingency Plan seven days prior to the start of the Work. The Contractor is expected to be prepared to effect the containment and cleanup of all spills related to the Work.

.6 Emulsion storage tanker and transfer of emulsion from tanker to spray vehicle are not permitted within National Park.

1.12 EQUIPMENT MOVEMENT AND MAINTENANCE

.1 Maintenance work on Contractor/Sub-Contractor equipment is prohibited within National Park.

.2 Waste oil and solvents are to be properly contained until they are removed from the site by qualified companies for recycling or disposal.

.3 Any leaking equipment must be taken out of service until repaired.

.4 Limit the number and length of temporary access and construction roads.

1.13 AIRBORNE POLLUTION AND PARTICULATE CONTROL

.1 Keep dust and inconvenience to site occupants to a minimum.

.2 Control emissions from equipment to local emission requirements.

.3 Do grading activities to minimize dusting. Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

1.14 NOISE CONTROL

.1 Operate construction equipment to prevent excessive noise.

.2 To reduce potential negative impacts on Park fauna (especially moose), noise control measures, such as properly functioning mufflers on equipment, must be in place.

1.15 BLASTING

.1 Blasting is prohibited.

1.16 SEWAGE DISPOSAL

.1 Provide and maintain temporary sanitary facilities for site personnel.

.2 Obtain all approvals required for the disposal of sanitary waste from any facilities, including offices, washrooms, and temporary site trailers.

.3 Remove sanitary facilities from site when no longer required.

1.17 FISHERIES AND WILDLIFE

.1 Wildlife shall not be fed or harassed.

.2 All refuse shall be disposed of at an approved facility to avoid the attraction of nuisance animals.

.3 In case of persistent wildlife encounters, the Contractor shall inform the Departmental Representative, who will notify Parks Canada of the situation. Care shall be taken to avoid the animal.

.4 All observed fish shall be removed from the isolated reach of the channel prior to dewatering operations.

1.18 UNFORESEEN SITE STOPPAGES

.1 If contaminated sites, heritage sites, archeological resources, or other unforeseen site conditions are encountered in the work site area, work will immediately cease until investigations are completed and permission to continue is granted from the Departmental Representative.

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.

1.20 NOTIFICATION

.1 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 Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.1 Take action only after receipt of written approval by Departmental Representative.

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

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

1.21 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 SEDIMENT CONTROL FENCE

.1 Provide and maintain sediment control fence where required or as directed, prior to construction. Coordinate locations with Departmental Representative. Do not remove control features until authorized by the Departmental Representative.

.2 Sediment Control fence: preassembled sediment control fence with industrial woven geotextile fabric pre-stapled to wood posts spaced as indicated.

2.2 EROSION CONTROL STRUCTURES

.1 Provide and maintain erosion control structures where required or as directed, prior to construction. Coordinate locations with Departmental Representative. Do not remove control features until authorized by the Departmental Representative.

.2 Geotextile: non-woven, needle-punched polyester filter fabric.

.3 Random rip-rap shall be supplied in accordance with Section 31 37 00 – Rip-rap.

.4 Construct erosion control structures to the cross sections indicated on the Project Documents.

Part 3 Execution

3.1 EROSION AND SEDIMENT CONTROL

.1 Install sediment control fence as per the manufacturer's instructions.

.1 In areas of potential sheet flow runoff where construction activity may cause the drainage run-off to transport sediment(s), and the Contract Documents do not provide for sediment control fences in these areas, the Contractor shall ensure that sediment control fences are properly located for effective runoff control.

.2 Erosion and sediment control structures (e.g. sediment control fencing, check dams) shall be installed prior to site disturbance activities; continually maintained and shall not be removed until the area is stabilized (which may not be until after all site activities are complete).

.1 The Contractor shall immediately repair any damage to erosion and sediment control structures or parts thereof.

.3 Any exposed soils which may pose a sedimentation issue will be stabilized or protected before a rain event unless otherwise agreed to by the Departmental Representative.

.4 During the course of the work, evaluation of the control features may indicate a requirement for additional features or modifications to existing control features. The Contractor will be required to implement these changes as necessary to meet the environmental protection objectives. Do not remove control features unless authorized by the Departmental Representative.

.5 Inspections of the erosion and sediment control works and any other measures by the Contractor shall occur after each rainfall and at least daily during periods of prolonged rainfall. The inspection reports shall be submitted to the Departmental Representative within 24 hours of completion.

.6 Plastic film (polyethylene) may be placed on areas where immediate protection is required. Generally plastic is used for temporary stream diversions although it can also be used to cover small stockpiles.

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 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

.3 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 31 23 33.01	Excavating, Trenching and Backfilling
.2	Section 31 24 13	Roadway Embankments
.3	Section 32 01 16.13	Reshaping Asphalt Pavement
.4	Section 32 11 16.01	Granular Sub-base
.5	Section 32 11 23	Aggregate Base Courses
.6	Section 32 12 16	Asphalt Paving
.7	Section 33 41 00	Storm Utility Drainage Piping
.8	Section 33 42 13	Pipe Culverts

1.2 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 Departmental Representative 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. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.

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

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

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and

irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection

1.4 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.

1.5 PROCEDURES

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in 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.

1.6 REJECTED WORK

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

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

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

1.7 REPORTS

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

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

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

1.9 MEASUREMENT FOR PAYMENT

.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 ACTION AND INFORMATIONAL SUBMITTALS

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

1.2 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.3 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, ramps, ladders, platforms and temporary stairs as required.

1.4 HOISTING

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

.2 Hoists to be operated by qualified operator.

1.5 SITE STORAGE / LOADING

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

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

1.6 CONTRACTOR’S CAMP

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

1.7 CONSTRUCTION PARKING

.1 Parking will be permitted in the area of the site provided it does not disrupt performance of Work and after obtaining agreement with the Departmental Representative.

.2 Provide and maintain adequate access to project site.

.3 Keep parking areas clean and maintained during period of Contract.

1.8 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

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

1.9 SANITARY FACILITIES

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

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

1.10 CONSTRUCTION SIGNAGE

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

.2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.

.3 Maintain approved signs and notices in good condition for duration of project, and dispose of off-site on completion of project or earlier if directed by Departmental Representative.

1.11 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Refer to Section 01 35 00.06 – Special Procedures for Traffic Control.

1.12 CLEAN-UP

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

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

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

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

1.13 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Government of Canada Weights and Measures Act 1985.

.2 Government of Canada Weights and Measures Regulations 1990.

1.2 CERTIFICATION

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

1.3 OPERATION

.1 Contractor shall provide a weigher at scale location to issue tickets and prepare a daily summary sheet to submit to Departmental Representative. Tickets shall include information to identify 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 fact on to scale platform.

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

Part 3 Execution

3.1 INSTALLATION

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

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

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

3.2 MAINTENANCE

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

.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 ACTION AND INFORMATIONAL SUBMITTALS

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

1.2 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.3 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations and open edges of structures, or as indicated in Contract Documents.

.2 Provide as required by governing authorities and as directed.

1.4 ACCESS TO SITE

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

1.5 PUBLIC TRAFFIC FLOW

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

.2 Contractor to provide automated temporary traffic control signals at all times during lane closures (24 hours a day, 7 days a week).

.3 One (1) lane to remain open at all times during construction with concrete jersey barriers along edge of excavation and embankment.

1.6 FIRE ROUTES

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

1.7 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.

1.8 MEASUREMENT FOR PAYMENT

.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 REFERENCES

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

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

.3 If there is question as to whether 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.

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

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

1.2 QUALITY

.1 Products, materials, equipment and articles 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 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions.

1.3 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

1.4 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

1.5 TRANSPORTATION

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

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

1.6 MANUFACTURER'S INSTRUCTIONS

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

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

1.7 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

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

1.8 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

1.9 REMEDIAL WORK

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

1.10 EXISTING UTILITIES

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

1.11 MEASUREMENT FOR PAYMENT

.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 REFERENCES

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

1.2 QUALIFICATION OF SURVEYOR

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

1.3 SURVEY REFERENCE POINTS

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

.2 The Contractor shall be satisfied, before commencing any Work, as to the meaning, intent and accuracy of any control points, control lines and benchmarks established by the Departmental Representative.

.1 Records of control point check surveys will contain all electronic survey files, reports and other relevant survey data showing closures.

.3 Should the Contractor discover or suspect any errors in any control points, control lines, benchmarks, and data provided by the Departmental Representative, the Contractor shall at once discontinue the affected work until such errors are investigated by the Departmental Representative and, if necessary, rectified.

.4 No separate payment will be made for layout work and the cost thereof will be considered incidental to the various items of work to be performed in the Contract.

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

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

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

1.4 SURVEY REQUIREMENTS

.1 The Contractor shall be responsible for establishing all secondary control points and/or lines, all slope stakes, the establishment of line and grades for subgrade and the various granular aggregate layers, layout by line and grade of all structures, culverts, and underground utilities, and shall perform all other layout and measurement necessary for the proper execution of the Contract.

.2 Secondary control point accuracy shall be:

.1 Minimum horizontal requirement is 3.0 cm ± 1:20,000 at a 95% confidence level.

.2 Minimum vertical requirement for a closed level loop is 0.008 times the square root of the distance leveled in kilometres.

.3 The staking of all works shall be of a sufficient accuracy and frequency for the Departmental Representative to carry out its quantity measurements and quality assurance program.

.4 On request of the Departmental Representative, the Contractor shall submit documentation to verify the accuracy of the layout work.

.5 Provide survey layout with stakes on both sides of the road/alignment at 20 metre station intervals (top of back slope, toe of slope, subgrade, granulars, shoulders, etc.) with centreline offset.

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

1.5 EXISTING SERVICES

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

1.6 RECORDS

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

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

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

1.7 SUBMITTALS

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

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

1.8 MEASUREMENT FOR PAYMENT

.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 PROJECT CLEANLINESS

.1 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.

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

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

.4 Dispose of waste materials and debris off site.

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

.6 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.7 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.8 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 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.

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

.7 Sweep and wash clean paved areas.

1.3 MEASUREMENT FOR PAYMENT

.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 CLEANING DURING CONSTRUCTION

.1 The Contractor shall ensure that adequate dust control is provided at all times during the Contract to avoid any hazardous situations and shall immediately implement any measures as directed by the Departmental Representative to control dust problems. Any damages or costs incurred as a result of excessive dust shall be paid for by the Contractor.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: 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's 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 in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Certificates required by jurisdictional authorities have been submitted.

.4 Work is complete and ready for Final Inspection.

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

1.2 MEASUREMENT FOR PAYMENT

.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 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review warranty requirements.

.2 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.

1.2 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative, one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.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 Departmental Representative.

1.3 RECORD DRAWINGS

.1 Departmental Representative will provide two sets of white prints for record drawing purposes.

.2 Maintain project record drawings and record accurately deviations from Contract documents.

.3 Record changes in red. Mark on one set of prints and at completion of project and prior to final inspection, neatly transfer notations to second set and submit both sets to the Departmental Representative.

.4 Record following information:

.1 Field changes of dimension, detail and elevation.

.2 Changes made by Change Order or Field Order.

.3 Other significant deviations which are concealed in construction and cannot be identified by visual inspection

.5 At completion of project and prior to final inspection, neatly transfer "as-recorded" records to second set of white prints using fine, red marker. Neatly print lettering and numbers in size to match original. Lines may be drawn free-hand but shall be neat and accurate. Add at each drawing title block note: "AS-RECORDED". Also, circle on List of Drawings each title and number of drawing marked with "as-recorded" records.

.6 Submit this set of "as-recorded" drawings to Departmental Representative.

.7 At the completion of construction the Contractor shall complete a topographic as-recorded survey of the project areas and submit the survey data in an acceptable form to the Departmental Representative.

.8 If project is completed without significant deviations from contract drawings, declare this in writing and submit to Departmental Representative in lieu of record drawings.

.9 The Departmental Representative will review the progress of the record drawings as part of each payment certificate authorization. Should the drawings not be properly updated, payment will be withheld for each payment certificate until the work is completed to the satisfaction of the Departmental Representative.

.10 Provide digital photos, if requested, for site records.

.11 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish road elevation.

.2 Measured horizontal and vertical locations of underground utilities, guiderail and appurtenances, referenced to permanent surface improvements.

.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.

1.4 FINAL SURVEY

.1 Submit final site survey certificate, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.5 MEASUREMENT FOR PAYMENT

.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 31 23 33.01 Excavating, Trenching and Backfilling

1.2 REFERENCES

.1 Definitions:

.1 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.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.

.2 Scheduling: meet project time lines without compromising specified minimum rates of material diversion.

.1 Notify Departmental Representative when unforeseen delays occur.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements: ensure Work is performed in compliance with applicable Provincial regulations.

1.6 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.

1.7 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 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 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 from site, prior to start of demolition Work, and dispose of in safe manner in accordance with applicable regulatory requirements.

1.8 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 EQUIPMENT

.1 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 Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.

.4 Culverts, pipe sewers, drains and catch basins removed shall become property of the Contractor and shall be disposed of outside the work site.

.5 Backfill:

.1 Backfill in areas as indicated and in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.4 REMOVAL OF GUIDE RAIL

.1 Guide rail, offset blocks, hardware and delineators shall be dismantled to individual components.

.2 The dismantling and removal shall be carried out in a manner so as to avoid damage to the adjacent and surrounding roadway.

.1 The Contractor shall be responsible, at their own expense, to repair any such damage resulting from the work.

.3 Dismantled guide rail, hardware and delineators shall become property of the Contractor and shall be disposed of outside the work site.

.4 The Contractor shall organize the work such that the removal and reinstatement of any length of guide rail section is completed in the same day.

3.5 REMOVAL OF GUIDE POSTS

.1 The removal shall be carried out in a manner so as to avoid damage to the adjacent and surrounding roadway.

.1 The Contractor shall be responsible, at their own expense, to repair any such damage resulting from the work.

.2 All materials shall become property of the Contractor and shall be disposed of outside the work site.

.3 The Contractor shall be responsible to completely backfill the hole resulting from the guide post removal with compacted Type 1S gravel, compact during placement and shall finish the backfilled area to match the surrounding grade.

.1 The Contractor shall fill and compact all holes left from post removal with before nightfall.

.4 The Contractor shall shape and grade the shoulder by removing excess materials that have accumulated over time and shall leave the work site in a uniform and consistent grade matching the adjacent surface.

3.6 REMOVAL OF PIPE CULVERTS

.1 Existing pipe culverts to be removed and replaced at locations noted.

.2 The Contractor to remove and dispose of pipe culverts off-site.

3.7 STOCKPILING

.3 Label stockpiles, indicating material type and quantity.

.4 Designate appropriate security resources/measures to prevent vandalism, damage and theft.

.5 Locate stockpiled materials convenient for use in new construction to eliminate double handling wherever possible.

.6 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.

3.8 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.

3.9 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.

3.10 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.

3.11 PROTECTION

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

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

1.2 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 EQUIPMENT

.1 The cold milling equipment shall be automatically controlled for grade and slope during the asphalt concrete removal operation. The surface remaining after cold milling 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.

.2 Saw-cutting equipment capable of creating smooth face.

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.

.2 Protection: protect existing pavement not designated for removal, signs, guiderail and structures from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

3.2 REMOVAL OF ASPHALT CONCRETE

.1 The Contractor shall advise the Departmental Representative at least 48 hours in advance of carrying out the cold milling operation. The cold milling operation shall be carried out in such a manner as to maintain an uninterrupted flow of traffic at all times.

.2 The cold milling operation shall be carried out in such a manner as to maintain an uninterrupted flow of traffic at all times.

.3 Remove existing asphalt pavement to lines and grades as indicated.

.4 The cold milling equipment shall be automatically controlled for grade and slope during the asphalt concrete removal operation.

.1 When existing pavement has been removed in advance of paving the joint area, the Contractor shall construct a smooth taper at the joint area to a slope of at least 50 horizontal to 1 vertical (50H:1V). The taper may be placed on tar paper and shall be removed just prior to paving the keyed area or as directed by the

Departmental Representative. The transverse joint shall be straight and have a vertical face when the taper is removed.

.2 The lanes shall be completed to the same location at the end of the day's cold milling.

.5 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.

.6 The Contractor shall take care in full depth removal not to contaminate the reclaimed asphalt pavement with the underlying aggregate materials or other materials.

.7 Suppress dust generated by removal process.

.8 The Contractor shall provide for the drainage of water from the cold milled surfaces as determined by the Departmental Representative.

.9 The surface remaining after cold milling 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.

.10 Immediately following the cold milling operation and prior to the traffic being allowed on the cold planed surface, the Contractor shall sweep the surface and remove any bonded asphalt concrete material left by the cold planning machine.

.1 All loose material remaining after cold milling shall be swept to a granular shoulder or picked up from paved shoulders, gutter and from under guiderail before reopening the work area to traffic.

.11 The Contractor shall continuously maintain the Work Site free of potholes and standing water and in a condition providing for the safe and efficient flow of traffic, from the time of removal, until such time as the new asphalt pavement is placed.

.1 Hot mixed asphalt pavement shall be placed in the potholes; cold mix or reclaimed asphalt pavement are acceptable only as a temporary repair.

.12 Proper stockpiling procedures shall be used and care taken not to contaminate or consolidate the reclaimed asphalt pavement stockpile.

.13 If the contract documents specify that the reclaimed asphalt pavement is to be used in a hot recycled asphalt mix, the reclaimed asphalt pavement shall be weighed prior to placement in the stockpile.

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.

.3 Immediately following the cold milling operation and prior to the traffic being allowed on the cold planed surface, the Contractor shall sweep the surface and remove any bonded asphalt concrete material left by the cold planning machine.

.1 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.

.2 All loose material remaining after cold milling shall be swept to a granular shoulder or picked up from paved shoulders, gutters or from under guide rail before reopening the work area to traffic.

.4 Cold milled asphalt pavement which is to be recycled in hot mix asphalt concrete under this contract may be stockpiled at designated asphalt plant site.

.1 Any excess RAP materials remaining after recycling in the new asphalt concrete base pavement or shouldering shall become property of the Contractor and shall be disposed of off-site.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 Aggregate materials shall be composed of crushed quarry stone. The materials shall be transported and placed upon the subgrade, subbase or shoulder and compacted as directed and in accordance with these specifications.

.2 The Contractor shall be responsible for Quality Control (QC) testing to ensure that all materials used meet the physical and production requirements of these specifications.

.3 The Department will conduct Quality Assurance (QA) testing for physical properties and production requirements.

1.2 RELATED REQUIREMENTS

.1	Section 31 24 13	Roadway Embankments
.2	Section 32 11 16.01	Granular Sub-Base
.3	Section 32 11 23	Aggregate Base Courses

1.3 REFERENCES

.1 Standard Specification – Highway Construction and Maintenance, Nova Scotia Department of Transportation and Infrastructure Renewal.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Samples:

.1 Provide Departmental Representative with access to source and processed material for sampling.

.2 The Contractor shall make available all equipment necessary for the Departmental Representative to obtain representative samples of the material proposed for supply. Allow continual sampling by Departmental Representative during production.

.3 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

Part 2 Products

2.1 MATERIALS

.1 Aggregate shall be composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the aggregate prone to decomposition or disintegration, or present any environmental hazard, from the presence of the parent material or its by-products, when exposed to the natural elements after placement in the Work.

.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, unless existing select fill is acceptable to Departmental Representative.

.4 Aggregate Base Course:

.1 See Section 32 11 23.

.5 Bedding Material:

.1 Conform to Aggregate Base Course, Section 32 11 23.

.6 Rock Fill (Placement):

.1 Material to be obtained from Parks Canada stockpile located 2 km from the project site.

.7 Rock Fill (Supply and Placement):

.1 Produced from quarry stone mined from a parent bedrock insitu source 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	25

.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

2.2 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 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 Departmental Representative 4 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 Off-site quarry.

.2 Processing:

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, as required, including 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 specified.

.1 Use methods and equipment approved in writing by Departmental Representative.

.3 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.

.4 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.

.1 Use only equipment approved in writing by Departmental Representative.

.5 Stockpiling:

.1 Stockpiling of aggregates on-site will not be permitted unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

.4 Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 hours of rejection.

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 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 Definitions:

.1 Rock: any solid material in excess of 1.00 m^3 and which cannot be removed by means of heavy-duty mechanical excavating equipment with 0.95 to 1.15 m^3 bucket. Frozen material not classified as rock.

.2 PPV: peak particle velocity.

1.4 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.

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 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 Rock removal will be by means of mechanical hammer. Blasting will not be permitted.

.2 Perform excavation in accordance with Erosion and Sedimentation Control Plan.

.3 Coordinate this section with Section 01 35 29.06 - Health and Safety Requirements.

.4 Remove rock to alignments, profiles, and cross sections as indicated.

.5 Use rock removal procedures to produce uniform and stable excavation surfaces. Minimize overbreak, and to avoid damage to adjacent structures.

.6 Excavate rock to horizontal surfaces with slope not to exceed 5%.

.7 Prepare rock surfaces which are to bond to concrete, by scaling, pressure washing and broom cleaning surfaces.

.8 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.

.9 Cut trenches to widths as indicated.

.10 Use pre-shearing or other smooth wall drilling unless specified otherwise or directed by Departmental Representative.

.11 Remove boulders and fragments which may slide or roll into excavated areas.

.12 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 RELATED REQUIREMENTS

.1	Section 02 41 13	Selective Site Demolition
.2	Section 32 11 16.01	Granular Sub-base
.3	Section 33 41 00	Storm Utility Drainage Piping
.4	Section 33 42 13	Pipe Culverts

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

- .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 (12,400 ft-lbf/ft^3) (600 kN-m/m^3).
- .5 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA International)

- .1 CAN/CSA-A3000, Cementitious Materials Compendium.
- **.2** CSA-A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete**.**

1.3 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

- .1 Rock: solid material in excess of 1.00 m^3 and which cannot be removed by means of heavy duty mechanical excavating equipment with 0.95 to 1.15 m^3 bucket. Frozen material not classified as rock.
- .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Topsoil:

- .1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.3 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.4 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.5 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.6 Unsuitable materials:

.1 Weak, chemically unstable, 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 C136: Sieve sizes to CAN/CGSB-8.2.

.2 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

.7 Unshrinkable backfill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Preconstruction Submittals:

.1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.

.2 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field and clearance record from utility authority, as required.

.3 Samples:

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

.2 Inform Departmental Representative at least 2 weeks prior to beginning Work, of proposed source of fill materials and provide access for sampling.

1.5 EXISTING CONDITIONS

.1 Buried services:

.1 Before commencing work establish location of buried services on and adjacent to site.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

.3 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.4 Prior to beginning excavation Work, notify utility companies to establish location and state of use of buried utilities and structures. Utility companies to clearly mark such locations to prevent disturbance during Work.

.5 Confirm locations of buried utilities by careful test excavations.

.6 Maintain and protect from damage, water, electric, telephone and other utilities and structures encountered.

.7 Where utility lines or structures exist in area of excavation, the Contractor must obtain a clearance report from the utility before starting work. Any costs for such Work are considered incidental and will not be paid for.

.8 Record location of maintained, re-routed and abandoned underground lines.

.9 Confirm locations of recent excavations adjacent to area of excavation.

.2 Existing buildings and surface features:

.1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, fencing, service poles, wires, pavement, survey bench marks and monuments which may be affected by Work.

.2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

.3 Where required for excavation, cut roots or branches as directed by Departmental Representative.

1.6 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 MATERIALS

.1 Backfill:

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

.2 Unshrinkable backfill: proportioned and mixed to provide:

.1 The maximum percentage passing the 80 μm sieve shall not exceed 9%.

.2 The Portland cement content shall be 25 kg/m^3.

.3 The slump at point of discharge shall be minimum 150 mm.

.4 The specified compressive strength at 28 days shall be maximum 1.0 MPa.

.5 The use of fly ash, in addition to the noted Portland cement content, may be used in such proportion so as not to exceed the specified compressive strength.

.6 Coarse aggregates, if used in the mixture, are exempt from evaluation for contribution to alkali aggregate reactivity (AAR).

.3 Geotextiles: to Section 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 requirements of authorities having jurisdiction and sediment and erosion control plan, specific to site, 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, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement neatly along limits of proposed excavation in order that surface may break evenly and cleanly in accordance with Section 02 41 13 - Selective Site Demolition.

3.3 PREPARATION/PROTECTION

.1 Protect existing features in accordance applicable local regulations.

.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 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 Stockpile fill materials in areas designated by Departmental Representative.

.1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from moisture and contamination.

.3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.5 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.06 - Health and Safety Requirements and Health and Safety Act for the Province of Nova Scotia.

.2 Obtain permit from authority having jurisdiction for temporary diversion of watercourse.

.3 Construct temporary Works to depths, heights and locations as indicated or directed by Departmental Representative.

.4 During backfill operation:

.1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.

.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

.5 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.6 Upon completion of substructure construction:

.1 Remove cofferdams, shoring and bracing.

.2 Remove excess materials from site and restore watercourses as directed by Departmental Representative.

3.6 DEWATERING AND HEAVE PROTECTION

.1 Keep excavations free of water while Work is in progress.

.2 Provide for 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 and in 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.

3.7 EXCAVATION

.1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.

.2 Excavate to lines, grades, elevations and dimensions as specified or shown on the Drawings.

.3 Remove paving and other obstructions encountered during excavation in accordance with Section 02 41 13 - Selective Site Demolition.

.4 Excavation must not interfere with bearing capacity of adjacent foundations.

.5 Do not disturb soil within branch spread of trees or shrubs that are to remain.

.1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.6 Trenches for piping, conduit, and related excavations shall be of sufficient width and depth at all points to allow pipes to be laid, joints to be formed, and appurtenant structures to be built in a workmanlike manner, and when needed, to allow for sheeting and shoring, pumping, draining, and for removing and replacing all materials unsuitable for foundations.

.7 Excavate trenches so pipe can be laid to the alignment and depth required. Unless otherwise authorized by Departmental Representative in writing, excavation length to be not more than pipe length that can be laid and backfilled in one day. Brace and drain trench so workers may work safely and efficiently.

.8 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

.9 Restrict vehicle operations directly adjacent to open trenches.

.10 Dispose of surplus and unsuitable excavated material off site.

.11 Do not obstruct flow of surface drainage or natural watercourses.

.12 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.13 Notify Departmental Representative when bottom of excavation is reached.

.14 Obtain Departmental Representative approval of completed excavation.

.15 Found excavated surfaces on solid undisturbed ground. If the excavated surface is unsuitable, the Departmental Representative will determine what work is required to secure a proper foundation. If such work is due solely to the nature of the ground, then the Departmental Representative will measure the work, but if such work is due to any act or default of the Contractor in carrying out of the Works, resulting in disturbance of natural ground conditions, then the Contractor shall execute such work at no additional cost to the Contract.

.16 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.17 Correct unauthorized over-excavation with approved select backfill compacted to minimum of 95% of the maximum dry density in accordance with ASTM D698.

.18 Hand trim, make firm and remove loose material and debris from excavations.

.1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

.2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

.19 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

3.8 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:

.1 Departmental Representative has inspected and approved installations.

.2 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 Backfilling around installations:

.1 Place bedding and surround material as specified elsewhere.

.2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.

.3 Place layers simultaneously on both sides of installed Work to equalize loading.

.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative.

.2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.

.5 Backfill trench from top of bedding to top of subgrade with layers of approved material.

.6 Place backfill in 150 mm layers and compacted to a minimum of 95% of the maximum dry density in accordance with ASTM D698. Thoroughly compact each layer before placing next layer.

.7 During backfilling, keep trenches free of water at all times and controlled so as to prevent surface water running into excavated areas. Remove silty materials, which become wetted and subsequently liquid or extremely plastic.

.8 Place unshrinkable backfill in areas as indicated. Consolidate and level unshrinkable backfill with internal vibrators.

.9 Install filter system in backfill as indicated as directed by Departmental Representative.

3.9 RESTORATION

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

.2 Replace topsoil as directed by Departmental Representative.

.3 Reinstate pavements disturbed by excavation to thickness, structure and elevation which existed before excavation.

.4 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.5 Use temporary plating to support traffic loads over unshrinkable backfill for initial 24 hours.

.6 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

.7 Dispose of surplus material off-site, unless otherwise directed by the Project Documents.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16 — Aggregate Materials / Rock Fill

.2 Section 32 11 16.01 — Granular Sub-base

.3 Section 32 11 23 — Aggregate Base Courses

1.2 REFERENCES

.1 Definitions:

.1 Rock: insitu bedrock, and naturally occurring boulders that are 1 m^3 or larger in volume. Frozen material will not be classified as rock.

.2 Common material: excavated soil which is not rock, unsuitable or topsoil.

.3 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to top of subgrade.

.4 Borrow Material: material obtained from areas off of Parks Canada property and required for construction of embankments or for other portions of work.

.5 Topsoil: material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.6 Unsuitable material: all material which is not suitable for use in work and must be disposed of as directed by the Departmental Representative.

.7 Surplus material: excavated material not required for re-use.

.8 Subgrade: the surface of mass excavation and embankment finished to lines and elevations indicated.

.2 Reference Standards:

.1 ASTM International

.1 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort ((12,400ft-lbf/ft^3 (600kN-m/m^3)).

.2 Standard Specification – Highway Construction and Maintenance, Nova Scotia Department of Transportation and Infrastructure Renewal.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

Part 2 Products

2.1 MATERIALS

.1 Embankment materials require approval by Departmental Representative.

.2 Granular Sub-base – in accordance with Section 32 11 16.01 – Granular Sub-base.

.3 Aggregate Base – in accordance with Section 32 11 23 – Aggregate Base Courses.

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 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 requirements of authorities having jurisdiction and sediment and erosion control plan, specific to site, that complies with requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.2 Protection of in-place conditions:

.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 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.

3.5 EXCAVATING

.1 Notify Departmental Representative when waste materials are encountered and remove to depth and extent directed.

.2 Excavate all types of materials to lines and elevations indicated and as necessary for construction.

.3 Notify Departmental Representative if in doubt as to definition of material.

.4 Select method of excavation, support, and dewatering unless otherwise indicated or directed. Protect property and structures from damage.

.5 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial regulations whichever is more stringent.

.6 Where Subgrade requires undercutting, sub-excavation shall be carried out to the specified depth below subgrade on a plane parallel to the Subgrade cross-slope.

.7 Excavate as required to carry out work.

.1 Do not disturb soil or rock below bearing surfaces.

.2 Notify Departmental Representative when excavations are complete.

.3 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.

.8 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.

.9 Handle materials in a manner that will not endanger the public, personnel, property or the work. Do not reduce sight distances, or obstruct roadways or utilities. Do not obstruct flow of surface drainage or natural watercourses

.10 Hauling of common excavation over Granular Sub-Base and Aggregate Base Courses shall not be permitted, unless authorized.

.11 The Contractor shall shape ditches to the lines and grades specified, and any grade conditions that would cause water to pond shall be removed.

.12 Take care to protect granular material from the elements.

.13 Prior to the placement of any fill, the exposed subgrade surface must be allowed to dry and shall be proof rolled and compacted. The subgrade preparation should occur during dry weather. The Contractor is expected to work the fill materials including scarifying and drying as required to achieve a moisture content sufficient to achieve the specified minimum compaction.

.14 All excavated materials shall become property of the Contractor and shall be disposed of outside the work site.

.15 Obtain appropriate permits and written approval of Departmental Representative before proceeding with blasting.

.16 Borrow Excavation:

.1 Completely use in embankments, suitable materials removed from right-of-way excavations before taking material from borrow areas.

3.6 DEWATERING

.1 Keep bottom of excavation free of water by draining or pumping.

.2 Dewater excavation in a manner which will not endanger stability of the work.

.3 Dispose of water from excavation in a manner that is not injurious to property, public health or any operation of the work. Prevent water pumped out of an excavation from entering a watercourse or wetland. Discharge from pumped water shall be in a well vegetated area in excess of 30 metres from a watercourse or wetland.

.4 Take precautions to prevent uplift of pipe or structures.

3.7 EMBANKMENTS

.1 Scarify or bench existing slopes in side hill or sloping sections to ensure proper bond between new materials and existing surfaces.

.1 Method used to be to be pre-approved in writing by Departmental Representative.

.2 Break up or scarify existing road surface prior to placing embankment material.

.3 Do not place material which is frozen nor place material on frozen surfaces except in areas authorized by Departmental Representative.

.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. 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 200 mm within 300 mm of subgrade elevation.

.7 Deductions from excavation will be made for overbuild of embankments.

3.8 COMPACTION

.1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.

.2 Deposit, spread, and level, embankment material in layers 200 mm maximum thickness before compaction.

.1 Compact each layer of embankment until compaction equipment achieves no further significant consolidation.

.2 Ensure required compaction for each layer before placing any material for next layer.

.3 Use specialized compaction equipment supplemented by routing, hauling, and leveling equipment over each layer of fill.

.4 Obtain written approval from Departmental Representative before using specialized compaction equipment such as tamping rollers, vibratory rollers, or other alternate compaction equipment that produces the required results.

.5 Compact each layer to minimum 95% maximum dry density: ASTM D698 except top 150 mm of subgrade.

.1 Compact top 150 mm to 100% maximum dry density.

.6 Add water or dry as required to bring moisture content of materials to level required to achieve specified compaction.

3.9 PROOF ROLLING

.1 The subgrade shall be proof rolled by means of a vibratory roller with a minimum static mass of 8 tonnes and dynamic mass of 20 t.

.2 Obtain written approval from Departmental Representative to use non-standard proof rolling equipment.

.1 If use of non-standard proof rolling equipment is approved, Departmental Representative to determine level of proof rolling.

.3 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.4 Where proof rolling reveals areas of defective subgrade:

.1 Remove subgrade material to depth and extent as directed by Departmental Representative.

.2 Backfill excavated subgrade with granular sub-base material and compact in accordance with Section 32 11 16.01 - Granular Sub-Base.

.3 Replace with new materials in accordance with this Section at no extra cost.

3.10 FINISHING

.1 Finished subgrade surface to be within plus or minus 25 mm of established grade and cross section but not uniformly high or low.

.2 Finish slopes and ditch bottoms 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.

3.11 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.

3.12 PROTECTION

.1 Maintain finished surfaces in condition conforming to this section until acceptance by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 24 13 — Roadway Embankments

.2 Section 33 42 13 — Pipe Culverts

1.2 REFERENCES

.1 ASTM International

- .1 ASTM D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- .2 ASTM D4595, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
- .3 ASTM D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- .4 ASTM D4716, Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
- .5 ASTM D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- .6 ASTM D5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-4.2 No. 11.2-M89, Textile Test Methods - Bursting Strength - Ball Burst Test.
- .2 CAN/CGSB-148.1, Method of Testing Geosynthetics
  - .1 No.2, Methods of Testing Geosynthetics - Mass per Unit Area.
  - .2 No.3, Methods of Testing Geosynthetics - Thickness of Geotextiles.
  - .3 No.6.1, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
  - .4 No.7.3, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
  - .5 No. 10, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

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 geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit following samples 2 weeks prior to beginning Work.

.1 Minimum length of 1 m of roll width of geotextile.

.2 Methods of joining.

.4 Test and Evaluation Reports:

.1 Submit copies of mill test data and certificate at least 2 weeks prior to start of Work.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Storage and Handling Requirements:

.1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect geotextiles from direct sunlight and UV rays.

.3 Replace defective or damaged materials with new.

1.5 MEASUREMENT FOR PAYMENT

.1 Item is incidental to the placement of riprap. No separate payment will be entertained.

Part 2 Products

2.1 MATERIAL

.1 Geotextile: synthetic fibre fabric, supplied in rolls.

.1 Width: 4.69 m minimum.

.2 Composed of minimum 85% by mass of polypropylene and resistant to ultraviolet degradation and to biological and chemical environments normally found in soils.

.2 The plastic yarn of the geotextile and the threads used in sewing operations shall consist of a long chain synthetic polymer composed of at least 85% by mass of propylene, ethylene, ester, amide or vinylidene-chloride, and shall contain stabilizers or inhibitors added to the base plastic to make the filaments resistant to deterioration by ultraviolet and heat exposure.

.3 Thread for the seams shall be equal to or better than the geotextile in resistance to chemical and biological degradation and both factory and field sewn or sealed seams shall have a grab tensile strength equal to 90% of that of the geotextile.

2.2 WOVEN GEOTEXTILES

.1 Physical properties:

.1 Thickness to CAN/CGSB-148.1, No.3.

.2 Mass per unit area to ASTM D6261: minimum 203 g/m^2.

.3 Grab tensile strength and elongation in any principal direction to ASTM D4632

.1 Breaking force: minimum 1330 N, wet condition.

.2 Elongation at future: maximum 15%.

.3 Puncture resistance: 0.533 kN

.4 Tear resistance: 0.533 kN

.4 UV Stability: 70% @ 500h

.2 Hydraulic properties:

.1 Apparent opening size (AOS) to ASTM D4751, 0.425 mm.

.2 Filtration opening size (FOS) to CAN/CGSB-148.1 No.10.

.3 Permittivity to ASTM D4491, 0.05 sec^{-1}.

.4 Permeability: minimum 3.3 x 10^{-2} cm/sec.

2.3 NON-WOVEN GEOTEXTILES

.1 Physical properties:

.1 Thickness to CAN/CGSB-148.1, No.3.

.2 Mass per unit area to ASTM D6261: minimum 136 g/m^2.

.3 Grab tensile strength and elongation in any principal direction to ASTM D4632

.1 Breaking force: minimum 670 N, wet condition.

.2 Elongation at future: maximum 50%.

.3 Puncture resistance: 0.289 kN

.4 Tear resistance: 0.290 kN

.4 UV Stability: 70% @ 500h

.2 Hydraulic Properties:

.1 Permittivity to ASTM D4491, 1.6 sec^{-1}

.2 Apparent opening size (AOS) to ASTM D4751, 0.150 mm

.3 Water Flow rate to ASTM D4491, 75 l/sec/m^2

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for geotextile material 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.

3.2 INSTALLATION

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with sandbags.

.2 The areas to be covered with geotextile shall be prepared by shaping the ground to present a uniform and regular surface free from bumps and depressions.

.1 Geotextile shall not be placed on stumps, brush, limbs, ice or other material that may tear or puncture the fabric.

.2 The geotextile shall be placed so as to create a surface that is 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 The manufacturer's installation procedures shall be the standard of installation that shall be applied except as follows:

.1 Where more than one width of fabric is used, the fabric shall be joined by sewing or by an overlap of at least 600 mm and all overlap joints shall be securely held in place.

.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 The Contractor shall immediately repair damaged geotextile to approval of Departmental Representative.

.1 The damaged area shall be covered with a patch of the same fabric type extending a minimum of one metre beyond the perimeter of the damaged area.

.8 Place and compact soil layers in accordance with Section 31 24 13 – Roadway Embankments.

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.

3.4 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 32 11 16.01 Granular Sub-base

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM C127, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.

.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.

.2 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification – Highway Construction and Maintenance, Division 3, Section 12.

1.3 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 MATERIALS

.1 Hard, durable, field or quarry rock, free from splits, seams, or defects likely to impair its soundness during during handling or by the actions of water and ice. Shale, slate or rocks with thin foliations shall not be acceptable. The greatest dimension of each rock shall not exceed two times the least dimension. The minimum density of the rock shall be 2.650 kg/m^3, to meet following size distribution for use intended.

.2 Rock when tested by for abrasion in accordance with ASTM C131, shall have a Los Angeles abrasion loss not greater than 35%.

.3 Rock when tested by for absorption in accordance with ASTM C127, shall have a maximum absorption of 1.5%.

.4 Rip-rap:

Mass	**Approximate Diameter**	**Finer by Mass (%)**				
(kg)	(mm)	R-5	R-25	R-50	R-100	R-250
750	820					100
500	710					70 - 90
300	600				100	
250	570					40 - 55
200	530				70 - 90	

150	480			100		
100	420			70 - 90	40 - 55	
75	380		100			
50	330		70 - 90	40 - 55		
25	260		40 - 55			
15	220	100				0 - 15
10	190	70 - 90			0 - 15	
5	150	40 - 55		0 - 15		
2.5	120		0 - 15			
0.5	70	0 - 15				
Thickness (mm)		300	500	600	800	1100

.1 Armour Stone:

.1 Stone sizes in accordance with dimensions shown on Drawings.

.2 R2 to NSTIR Standard Specification.

.2 Supply rock spalls or cobbles to fill open joints.

2.2 GEOTEXTILE FILTER

.1 Geotextile: in accordance with Section 31 32 19.01 - Geotextiles.

Part 3 Execution

3.1 PLACING

.1 Where rip-rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.

.2 Fine grade area to be rip-rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.

.3 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.

.4 Machine place rip-rap to thickness and details as indicated.

.5 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.

.6 Tamp rip-rap mixed during placement.

.7 The Contractor shall place rip-rap material such that the underlying materials and any abutting structures are not damaged.

.1 The Contractor shall be responsible, at his/her own expense to repair any such damage to the work

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16 — Aggregate Materials

.2 Section 31 24 13 — Roadway Embankments

1.2 REFERENCES

.1 ASTM International

- .1 ASTM C117, Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C127, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
- .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 D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).
- .6 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

.3 Nova Scotia Department of Transportation and Infrastructure Renewal

- .1 TPW TM-1, Test Method for the Resistance of Coarse Aggregate to Degradation in the Micro-Deval Apparatus.
- .2 TPW TM-3, Test Method for the Determination of Percent Fractured Particles in Processed Coarse Aggregate.

.4 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification – Highway Construction and Maintenance, Division 3, Section 2.

.5 Nova Scotia Department of Environment and Labour

- .1 Pit and Quarry Guidelines.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with 31 05 16 - Aggregate Materials.

1.5 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 MATERIALS

.1 Granular sub-base: material in accordance with Section 31 05 16 - Aggregate Materials and following requirements:

.1 Approved hard, durable crushed quarried r.

.2 The aggregate shall be free from flat, elongated or other objectionable pieces and shall be approved by the Departmental Representative prior to utilization.

.3 Gradations to be within limits specified when tested in accordance with ASTM C117 and C136. Sieve sizes to CAN/CGSB-8.2.

.1 Gradation to:

Sieve Size, µm	Percent Passing
	Type 2
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

.4 Gravel materials shall conform to the following physical properties:

Property	Test Method	Type 2
Absorption % max.	ASTM C127	1.75
LA Abrasion % max	ASTM C131	40
Plasticity Index max	ASTM D4318	3
Micro-Deval % max	TPW	20

.5 Reclaimed Asphalt Product (RAP):

.1 The Contractor may incorporate RAP into the virgin granular material.

.2 Sub-base gravels may contain up to 20% by weight, RAP.

.3 Final blended product to meet gradation specified in 2.1.1.3.1.

.4 To avoid agglomeration of crushed RAP, it should be blended as soon as possible with conventional aggregate into a homogeneous mixture. However, blended material that is stockpiled for a considerable period of

time, particularly in warm weather, may harden and require re-crushing and rescreening before it can be incorporated into granular sub-base applications.

.5 Blended RAP-aggregate stockpiles should not be allowed to remain in place for extended time periods because the stockpiled material is likely to become overly wet, possibly requiring some drying prior to use.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of existing substrate are acceptable for granular sub-base installation.

.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 PLACING

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

.2 Construct granular sub-base to depth and grade in areas indicated.

.3 The Contractor shall satisfy himself that the existing grade has been constructed to the lines and grades as indicated in the Contract Documents prior to the commencement of the Work.

.4 Ensure no frozen material is placed.

.5 Place material only on clean unfrozen surface, free from snow and ice.

.6 Aggregate materials shall not be placed on inundated, soft, muddy, potholed rutted or frozen surfaces. Any ruts or potholes which appear in advance of travel surface placement shall be eliminated by scarifying, shaping or compacting, or if necessary by excavating unsuitable material and placing and compacting new material of the same quality.

.7 Granular sub-base materials shall conform to the properties and specified gradation requirements for the class of material specified.

.1 If the material incorporated into the Work does not conform with the specified properties and/or gradation, the Contractor shall cease hauling from the source of supply and shall immediately rectify the problem to the satisfaction of the Departmental Representative.

.2 Any material found to be non-conforming to the specified material shall be removed from the Work.

.8 Begin spreading granular sub-base material on crown line or on high side of one-way slope.

.9 Place material using methods which do not lead to segregation or degradation of aggregate.

.10 Granular sub-base materials shall be shaped with a blade grader while being compacted.

.11 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

.1 Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

.12 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.13 Remove and replace that portion of layer in which material becomes segregated during spreading.

3.3 COMPACTION

.1 Compaction Equipment:

.1 Ensure compaction equipment is capable of obtaining required material densities.

.2 Compact to a minimum of 100% of the Standard Proctor 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 compacting to obtain specified density.

.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Departmental Representative.

.6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.4 PROOF ROLLING

.1 The top of granular sub-base shall be proof rolled using a standard roller of 45,400 kg gross mass with four pneumatic tires each carrying 11,350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.

.2 Obtain written approval from Departmental Representative to use non-standard proof rolling equipment.

.1 If use of non-standard proof rolling equipment is approved, Departmental Representative to determine level of proof rolling.

.3 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.4 Where proof rolling reveals areas of defective granular sub-base:

.1 Remove sub-base and subgrade material to depth and extent as directed by Departmental Representative.

.2 Backfill excavated subgrade and sub-base with granular sub-base materials and compact in accordance with this Section.

.3 Excavate and replace with new materials in accordance with this Section at no extra cost.

3.5 SITE TOLERANCES

.1 Finished base surface to be within plus or minus 25 mm of established grade and cross section but not uniformly high or low.

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.

3.7 PROTECTION

.1 Maintain finished sub-base in condition conforming to this section until succeeding base is constructed, or until granular sub-base is accepted by Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1	Section 02 41 13.14	Asphalt Paving Removal
.2	Section 31 05 16	Aggregate Materials
.3	Section 31 24 13	Roadway Embankments
.4	Section 32 11 16.01	Granular Sub-base

1.2 REFERENCES

.1 ASTM International

- .1 ASTM C117, Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C127, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
- .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 D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).
- .6 ASTM D4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.

.3 Nova Scotia Department of Transportation and Infrastructure Renewal

- .1 TPW TM-1, Test Method for the Resistance of Coarse Aggregate to Degradation in the Micro-Deval Apparatus.
- .2 TPW TM-3, Test Method for the Determination of Percent Fractured Particles in Processed Coarse Aggregate.

.4 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification – Highway Construction and Maintenance, Division 3, Section 12.

.5 Nova Scotia Department of Environment and Labour

- .1 Pit and Quarry Guidelines.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with 31 05 16 - Aggregate Materials.

1.5 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 MATERIALS

.1 Aggregate base and shoulder material: material in accordance with Section 31 05 16 - Aggregate Materials and following requirements:

.1 Approved hard, durable crushed quarried rock.

.2 The aggregate shall be free from flat, elongated or other objectionable pieces and shall be approved by the Departmental Representative prior to utilization.

.3 Gradations to be within limits specified when tested in accordance with ASTM C117 and C136. Sieve sizes to CAN/CGSB-8.2.

.1 Gradation to:

Sieve Size, µm	Percent Passing	
	Type I	Type 1S
28 000	-	-
20 000	100	100
14 000	50 – 85	50 – 90
5 000	20 – 50	30 – 55
1 250	-	-
160	5 – 12	7 – 20
80	3 – 5	5 – 12

.4 Gravel materials shall conform to the following physical properties:

Property	Test Method	Type 1	Type 1S
Absorption % max.	ASTM C127	1.75	1.75
LA Abrasion % max	ASTM C131	40	40
Plasticity Index max	ASTM D4318	3	3
Micro-Deval % max	TPW	20	35

.2 Reclaimed Asphalt Product (RAP):

.1 The Contractor may incorporate RAP into the virgin granular material.

.2 Base gravels may contain up to 20% by weight, RAP.

.3 Final blended product to meet gradation specified in 2.1.1.3.1.

.4 To avoid agglomeration of crushed RAP, it should be blended as soon as possible with conventional aggregate into a homogeneous mixture. However, blended material that is stockpiled for a considerable period of time, particularly in warm weather, may harden and require re-crushing and rescreening before it can be incorporated into granular base applications.

.5 Blended RAP-aggregate stockpiles should not be allowed to remain in place for extended time periods because the stockpiled material is likely to become overly wet, possibly requiring some drying prior to use.

.3 Shoulder Material:

.1 Shoulder material shall be RAP generated from cold milling on this project under Section 02 41.13.14 – Asphalt Paving Removal.

.2 RAP to meet gradation of Type 1S specified in 2.1.1.3.1.

Part 3 Execution

3.1 AGGREGATE BASE (TYPE 1) PLACING

.1 Place aggregate base after sub-base surface is inspected and approved in writing by Departmental Representative.

.2 Construct aggregate base to depth and grade in areas indicated.

.3 The Contractor shall satisfy himself that the existing grade has been constructed to the lines and grades as indicated in the Contract Documents prior to the commencement of the Work.

.4 Ensure no frozen material is placed.

.5 Place material only on clean unfrozen surface, free from snow and ice.

.6 Aggregate materials shall not be placed on inundated, soft, muddy, potholed rutted or frozen surfaces. Any ruts or potholes which appear in advance of travel surface placement shall be eliminated by scarifying, shaping or compacting, or if necessary by excavating unsuitable material and placing and compacting new material of the same quality.

.7 Aggregate base materials shall conform to the properties and specified gradation requirements for the class of material specified.

.1 If the material incorporated into the Work does not conform with the specified properties and/or gradation, the Contractor shall cease hauling from the source of supply and shall immediately rectify the problem to the satisfaction of the Departmental Representative.

.2 Any material found to be non-conforming to the specified material shall be removed from the Work.

.8 Begin spreading base material on crown line or on high side of one-way slope.

.9 Place material using methods which do not lead to segregation or degradation of aggregate.

.10 Aggregate base materials shall be shaped with a blade grader while being compacted.

.11 Place material to full width in uniform layers not exceeding 150 mm compacted thickness.

.1 Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.

.12 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.

.13 Remove and replace that portion of layer in which material becomes segregated during spreading.

3.2 COMPACTION

.1 Compaction Equipment:

.1 Ensure compaction equipment is capable of obtaining required material densities.

.2 Compact to a minimum of 100% of the Standard Proctor Density in accordance with ASTM D698.

.3 Shape and roll alternately to obtain smooth, even and uniformly compacted base.

.4 Apply water as necessary during compacting to obtain specified density.

.5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved in writing by Departmental Representative.

.6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 PROOF ROLLING

.1 The top of aggregate base course shall be proof rolled using a standard roller of 45,400 kg gross mass with four pneumatic tires each carrying 11,350 kg and inflated to 620 kPa. Four tires arranged abreast with centre to centre spacing of 730 mm.

.2 Obtain written approval from Departmental Representative to use non-standard proof rolling equipment.

.1 If use of non-standard proof rolling equipment is approved, Departmental Representative to determine level of proof rolling.

.3 Make sufficient passes with proof roller to subject every point on surface to three separate passes of loaded tire.

.4 Where proof rolling reveals areas of defective aggregate base course:

.1 Remove base, sub-base and subgrade materials to depth and extent as directed by Departmental Representative.

.2 Backfill excavated subgrade and sub-base with granular sub-base materials and compact in accordance with Section 32 11 16.01 - Granular Sub-base.

.3 Backfill excavated base with aggregate base course materials and compact in accordance with this Section.

.4 Excavate and replace with new materials in accordance with Section 32 11 16.01 - Granular Sub-base and this Section at no extra cost.

3.4 SHOULDER MATERIAL PLACEMENT

.1 The placement of shoulder material shall be carried out in a manner so as to avoid damage to the adjacent and surrounding roadbed.

.1 The Contractor shall be responsible, at their expense, to repair any damage to the adjacent and/or abutting finished surfaces resulting from this work.

.2 Shoulder material shall be placed by equipment specifically designed for that purpose.

.1 Any shoulder spreader considered for the work shall be constructed so that it shall not place any shoulder material on the pavement.

.2 Shoulder material shall not be bladed onto the roadway foreslope.

.3 Shoulder material shall be compacted to a minimum of 100% of the Standard Proctor Density in accordance with ASTM D698 and shall be shaped with a blade grader while being compacted.

.4 On secondary roads with narrow shoulders it may be not be safe or practical to utilize standard compaction equipment.

.1 At the discretion of the Departmental Representative, alternate methods of compaction and/or target densities may be approved for shoulder material in these situations.

.5 Shoulder material placed by the Contractor in the vicinity of guide rail posts and sign posts shall be hand raked to the satisfaction of the Departmental Representative.

.6 The shaping of the material shall be continued until it is well compacted, free from ruts, waves and undulations.

3.5 SITE TOLERANCES

.1 Finished base surface to be within plus or minus 10 mm of established grade and cross section but not uniformly high or low.

3.6 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.

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 ASTM International

.1 ASTM D140/D140M, Standard Practice for Sampling Bituminous Materials.

.2 ASTM D244, Standard Test Methods and Practices for Emulsified Asphalts.

.3 ASTM D977, Standard Specification for Emulsified Asphalt.

.4 ASTM D2397, Standard Specification for Cationic Emulsified Asphalt.

.2 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification - Highway Construction and Maintenance.

.3 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification – Highway Construction and Maintenance, 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 - 4 L samples of asphalt tack coat material proposed for use in new, clean, airtight, sealed, wide mouth jars to Departmental Representative, at least 2 weeks prior to beginning Work.

.2 Sample asphalt tack coat material to: ASTM D 140.

.3 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into Work to ASTM D 140.

1.4 QUALITY ASSURANCE

.1 Upon request from, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this Section.

.2 Any contamination of the emulsified asphalt and/or deviation from this specification shall be corrected to the satisfaction of the Departmental Representative and at no cost to the Owner.

.3 Such deficiencies may be noted from samples of emulsified asphalt taken by the Departmental Representative. Any necessary remedial measures shall be done by the Contractor at no expense to Parks Canada and to the satisfaction of the Departmental Representative.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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 in clean, dry, well-ventilated area.

.2 Store and protect asphalt tack coat.

.3 Replace defective or damaged materials with new.

.4 Deliver, store and handle materials in accordance with ASTM D 140.

.5 Provide, maintain and restore asphalt storage area.

1.6 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 MATERIALS

.1 Tack coat shall conform to the specifications for RS-1 as detailed in NSTIR Standard Specification, Division 4, Section 1, Table 4.1.1.

2.2 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 Shall be a self-powered pressure asphalt distributor, capable of applying the asphalt tack coat uniformly, at the established rate, in one application, over the full required width. It shall consist of a fully insulated tank, permanently and rigidly mounted on a truck or trailer, capable of accurately maintaining any speed required for spraying.

.2 The distributor shall be provided with the following minimum equipment:

.1 Proper hand spray attachments to uniformly apply emulsion to any areas missed by the distributor.

.2 An efficient and positive means of heating the asphalt tack coat uniformly to any selected temperature up to 100ºC, and maintaining the contents constantly at this temperature without any local overheating and including a satisfactory method of circulating the contents during the entire heating process.

.3 An approved thermometer with a minimum range of 10ºC to 100ºC, graduated in intervals of not more than 10ºC, so placed as to accurately

show the temperature of the distributor contents, and to be accessible to the Departmental Representative.

.1 An approved tachometer, driven from a fifth wheel, mounted so that it is readily visible to the driver so that it clearly and accurately registers distances traveled when spraying emulsion, and so that it enables the driver to maintain a constant speed required to ensure the specified rate of application of the emulsion.

.4 A pressure gauge indicating the pressure in the spray bar within 15 kPa.

.5 A rear mounted spray bar set parallel to the surface to be sprayed, and capable of adjustment to provide any required spraying widths from 2.5 m to 3.5 m. The distributor shall be equipped with a spray bar heating and circulating device, to ensure uniform viscosity and pressure of the emulsified asphalt at each nozzle, both before and during spraying operations. The spray bar shall be provided with a positive shut-off to prevent dripping

.3 The circulating system shall also be provided with a strainer to prevent clogging of the bar and nozzles. The spray bar height shall be adjustable and shall be set at such a height that the spray fan from any nozzle overlaps the spray fan from the adjacent nozzle by two-thirds for triple-lap so that a uniformly sprayed surface will result. This height shall be set when the distributor is one-half full, and shall be changed only when permitted by the Departmental Representative.

.4 Spray bar nozzles shall be designed and set so as to ensure uniform fan shaped sprays. The nozzles shall not be set so as to produce such a fine mist that the asphalt tack coat will blow away and not provide an even spread. All spray nozzles shall be of the same shall be provided with valves capable of instant full opening and positive cut-off. All spray nozzles shall be set in the bar so that the nozzle slots make the same horizontal angle (30º) with the longitudinal axis of the bar. Before work commences, and periodically as required during spraying operations, the nozzles on the spray bar shall be removed, cleaned sufficiently to remove all congealed asphalt and to free the nozzle opening. Each nozzle shall be inspected and approved by the Departmental Representative and reinstalled on the spray bar at the correct angle.

.5 A strainer shall be provided in the filling line to prevent entry of foreign material into the tank.

.6 A sampling cock shall be fitted on the spray bar or circulating line, and shall be readily accessible to allow samples of the emulsion to be obtained directly from the distributor.

.7 The distributor shall be checked for calibration by the Departmental Representative before being used on the work.

.8 An alternate means of application may be permitted for small or isolated areas at the discretion and approval of the Departmental Representative.

Part 3 Execution

3.1 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 after receipt of written approval to proceed from Departmental Representative.

3.2 APPLICATION

.1 Apply asphalt tack coat only on clean and dry surface.

.1 Immediately prior to the application of the asphalt tack coat, the Contractor shall clean surfaces to be tacked by means of a rotary power broom or hand brooms to remove all dirt, sand, dust or other objectionable matter.

.2 Apply asphalt tack coat only on unfrozen surface.

.3 The Contractor shall apply a uniform cover of the RS-1 asphalt tack coat on the milled surface and on the new Type B-HF asphalt surface with a distributor at a rate of 140 ml/m^2, or as directed by the Departmental Representative, and at a temperature not less than 20ºC nor more than 70ºC.

.4 Paint contact surfaces of curbs, gutters, headers, manholes and like structures with thin, uniform coat of asphalt tack coat material.

.5 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.

.6 Hot mix asphalt shall not be placed upon the asphalt tack coated areas until the asphalt tack coat has dried to a condition of tackiness.

.7 No more tack coat shall be applied than can be covered with asphalt concrete wearing surface in any one day.

.8 Asphalt tack coat application widths shall be such that approximately one-half the pavement width is left open to traffic with no tack coat applied.

.1 Asphalt tack coat applications shall be strictly limited in length, to minimize the inconvenience to the public and shall be kept within the asphalt concrete work area.

.2 The Contractor shall be responsible to reinstate any asphalt tack coat surface which becomes fouled due to weather and/or traffic.

.3 Control traffic in accordance with Section 01 35 00.06 - Special Procedures for Traffic Control.

.9 Keep traffic off tacked areas until asphalt tack coat has set.

.10 Re-tack contaminated or disturbed areas as directed by Departmental Representative.

.11 Submit summary report within 7 days minimum of date of application and include information as follows:

.1 Total area tack coated.

.2 Quantity of tack coat used.

.3 Mean application rate.

.4 Actual product quantity used when using equipment on pressure distributors.

.5 Dipstick measurements or electronic printouts are acceptable.

.12 Carry out measurements in presence of Departmental Representative upon request.

.13 The Contractor shall protect through traffic and adjacent highway/structure appurtenances from any asphalt tack coat overspray.

.1 The Contractor shall be responsible to remove any asphalt tack coat adhering to these surfaces.

.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

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 DESCRIPTION

.1 This section covers asphalt concrete paving on reconstructed and asphalt cold milled roadbeds and shall meet the general requirement of Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) Type “B-HF” and “D-HF” except where noted. It also covers the construction of asphalt concrete gutters and other required asphalt work.

1.2 RELATED REQUIREMENTS

.1	Section 02 41 13.14	Asphalt Paving Removal
.2	Section 31 05 16	Aggregate Materials
.3	Section 32 12 13.16	Asphalt Tack Coat

1.3 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

.1 Where reclaimed asphalt pavement (RAP) is to be incorporated into mix, use only material obtained from this contract in accordance with Section 02 41 13 - Selective Site Demolition.

1.4 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASHTO)

- .1 AASHTO M156, Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
- .2 AASHTO MP1, Standard Specification for Performance Graded Asphalt Binder.
- .3 AASHTO PP6, Standard Practice for Grading or Verifying the Performance Grade of an Asphalt Binder.
- .4 AASHTO T245, Standard Method of Test for Resistance to Plastic Flow of Asphalt Mixtures Using Marshall Apparatus.
- .5 AASHTO T283, Standard Method of Test for Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage.

.2 Asphalt Institute (AI)

- .1 AI MS-2, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.

.3 ASTM International

- .1 ASTM C88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
- .2 ASTM C117, Standard Test Method for Material Finer Than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.
- .3 ASTM C123, Standard Test Method for Lightweight Particles in Aggregate.
- .4 ASTM C127, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.

.5 ASTM C128, Standard Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate.

.6 ASTM C131, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

.7 ASTM C136, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

.8 ASTM C207, Standard Specification for Hydrated Lime for Masonry Purposes.

.9 ASTM D75, Standard Practice for Sampling Aggregates.

.10 ASTM D140,Standard Practice for Sampling Bituminous Materials.

.11 ASTM D2041, Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures.

.12 ASTM D2419, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

.13 ASTM D2726, Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.

.14 ASTM D2950, Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.

.15 ASTM D3549, Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.

.16 ASTM D3665, Standard Practice for Random Sampling of Construction Materials.

.17 ASTM D4469, Standard Practice for Calculating Percent Asphalt Absorption by the Aggregate in an Asphalt Pavement Mixture.

.18 ASTM D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.19 ASTM D6926, Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus.

.20 ASTM D6927, Standard Test Method for Marshall Stability and Flow of Asphalt Mixtures.

.21 ASTM D7113, Standard Test Method for Density of Bituminous Paving Mixtures in Place by the Electromagnetic Surface Contact Methods.

.22 ASTM E178, Standard Practice for Dealing With Outlying Observations.

.4 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification – Highway Construction and Maintenance, Division 4 - Pavements.

.5 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification – Highway Construction and Maintenance, Division 4, Section 2 – Performance Graded Asphalt Binder (PGAB).

.6 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification – Highway Construction and Maintenance, Division 4, Section 19 – Asphalt Concrete End Product Specification (EPS).

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit viscosity-temperature chart for asphalt cement to be supplied showing Kinematic Viscosity in centistokes, temperature range 105 to 175°C 4 weeks prior to beginning Work.

.2 At least 4 weeks before commencing work, submit refinery's test data and certification that asphalt cement meets requirements of this section which also includes the specific gravity of the asphalt cement.

.3 Samples:

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks prior to beginning Work.

.2 Submit samples of following materials proposed for use 4 weeks prior to beginning Work.

.1 One 5 L container of asphalt cement.

.2 50 kg of each aggregate to be used in the asphalt mix.

.4 Test and Evaluation Reports:

.1 Submit manufacturer's test data and certification that asphalt cement meets specification requirements.

.2 Submit asphalt concrete mix design and trial mix test results to Departmental Representative for approval at least 4 weeks prior to beginning Work.

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 course aggregate.

.2 The Contractor will submit, in writing, asphalt concrete mix design and trial mix test results to Departmental Representative for review at least 4 weeks prior to commencing work. The mix design shall contain the Job Mix Formula which shall include the following:

.1 Type and specific gravity of asphalt cement.

.2 Asphalt cement content.

.3 Specific gravity and absorption of each aggregate.

.4 Percentage of each aggregate.

.5 Gradation of Job Mix Formula.

.6 Marshall Stability and flow, kN.

.7 Bulk Specific Gravity, kg/m^3.

.8 Maximum theoretical density, kg/m^3.

.9 Percentage voids in mineral aggregate.

.10 Percentage air voids.

.11 Percentage voids filled with asphalt.

.12 Percentage of absorbed asphalt cement.

.13 TSR (AASHTO T283).

1.7 DELIVERY, STORAGE AND HANDLING

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

.2 Deliver and stockpile aggregates in accordance with Section 31 05 16 - Aggregate Materials. Stockpile minimum 50% of total amount of aggregate required before beginning asphalt mixing operation.

.3 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.

.4 Stockpile fine aggregate separately from coarse aggregate, although separate stockpiles for more than two mix components are permitted.

.5 Provide approved storage, heating tanks and pumping facilities for asphalt cement.

.6 Submit to Departmental Representative copies of freight and waybills for asphalt cement as shipments are received.

.7 Stockpile crushed RAP separately in accordance with Section 31 05 16 - Aggregate Materials.

.8 Protect and cover stockpiles of crushed RAP from rain to approval of Departmental Representative in accordance with erosion and sedimentation control plan.

.9 There will be no separate payment for mobilization and demobilization to site.

1.8 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 MATERIALS

.1 Performance graded asphalt cement: to AASHTO PP6, PG 58-28 Grade.

.2 The Contractor may incorporate RAP into the Type “B-HF” asphalt mix:

.1 RAP shall be free of contamination and shall be processed in such a manner that all particles pass the 20 mm sieve before mixing.

.2 RAP stockpiles shall conform to the following requirements:

.1 Stockpiles shall be constructed in a conical manner to reduce moisture accumulation.

.2 Material handling equipment shall not be permitted to operate on the stockpile.

.3 Stockpiles shall be constructed on a properly prepared sloped surface in order to provide positive drainage.

.3 RAP shall be stored in a separate bin.

.4 A maximum of 25% RAP may be incorporated into the Type “B-HF” asphalt mix.

.5 Only RAP produced from this project is permitted in the mix.

.3 The physical requirements of asphalt concrete containing RAP shall conform to the Nova Scotia Department of Transportation and Infrastructure Renewal's Standard Specification for Asphalt Type "B-HF" as outlined in Division 4 Section 4 – Asphalt Concrete Hot Mixed, Hot Placed.

.4 Aggregate shall be crushed quarried stone.

.5 Aggregate: The aggregate shall meet the following gradation requirements:

Sieve Designation	Cumulative % Passing Surface, Type D-HF	Cumulative % Passing Base, Type B-HF
28 000		100
20 000		95 - 100
14 000	100	70 - 90
10 000	95 - 100	60 - 75
5 000	55 - 70	35 - 58
2 500	25 - 55	25 - 45
315	5 - 20	3 - 20
80	2 - 7	2 - 6.5

.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 When dryer drum plant or plant without hot screening is used, process fine aggregate through 5000 µm sieve and stockpile separately from coarse aggregate.

.3 Fine Aggregate Angularity: AASHTO TP33, Min 45%.

.4 Sand equivalent: to ASTM D2419, Min: 50.

.5 Sodium Sulphate soundness: to ASTM C88, Max % loss by mass:

.1 Coarse aggregate: 15.

.2 Fine aggregate: 10.

.6 Los Angeles abrasion: ASTM C131. Max % loss by mass, 30.

.7 Absorption: to ASTM C127. Max % by mass:

.1 Coarse aggregate: 1.75.

.2 Fine aggregate: 2.00.

.8 Flat and elongated particles: ASTM D 4791 (with length to thickness ratio greater than 4): Max % by mass 10%.

.9 Crushed fragments: at least 100% of particles by mass to have at least 2 freshly fractured faces. Material to be crushed from quarried aggregate source.

.10 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

.11 Petrographic Analysis: TPW TM-2 Modified Petrographic Analysis, maximum 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:

.1 Requirements for Liquid anti-stripping agent will also be based on past history of aggregates, and visual examination of test specimens.

.2 No additional payment shall be made for the use of anti-stripping agent in the mix.

.8 Water: to approval of Departmental Representative.

2.2 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 type and weight to obtain specified density of compacted mix.

.4 Vibratory rollers:

.1 Drum diameter: 1200 mm minimum.

.5 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:

.1 Boxes with tight metal bottoms.

.2 Vehicles shall be equipped with tarpaulins of water repellant material with a maximum mesh size of 0.5 mm when stretched, a minimum melting point of

200ºC and of sufficient size to completely cover truck bodies from edge of box to edge of box and overlap the tailgate. Tarps shall be in good condition and shall have no holes or tears. The tarps shall be securely tied down so there is no visible opening between the truck box and tarp.

.3 Vehicles shall also be equipped with wind deflectors at the front of the truck box. If it is raining or if the temperature of the asphalt concrete drops more than 10ºC between the time of leaving the plant and placing on the road, tarpaulins shall be used. Tarpaulins shall be used at any other time at the Engineer's request

.4 Use only trucks which can be weighed in single operation on scales supplied.

.6 Hand tools:

.1 Lutes or rakes with covered teeth for spreading and finishing operations.

.2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm^2 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, 4.5 m in length, to test finished surface.

.7 Material Transfer Vehicle: Transfer asphalt concrete from haul units to spreader with an approved Material Transfer Vehicle.

2.3 MIX DESIGN

.1 Mix Design and Job Mix Formula to be provided by Contractor.

.2 Mix Design: by Marshall Method to requirements below and as directed by Departmental Representative:

.1 Compaction blows on each face of test specimens: 75.

.1 Design of Mix: by the Marshall Method to the requirements below and submit to the Departmental Representative for approval:

Property	Surface, Type D-HF	Base, Type B-HF
Marshall Stability kN (min)	7.5	7.5
Marshall Flow Value, mm	2 - 4	2 - 4
Air Voids, %	2.5 - 4.0	2.5 - 4.0
Voids in Mineral Aggregate, %, min	15	13
VFA %, min	65 - 78	65 - 78
Stripping Test, % min	80	80

.2 Asphalt cement content shall be determined by mix design.

.3 On this contract, the Contractor may incorporate 20 ± 5% RAP into the Asphalt Concrete Type B-HF:

.1 Preparation and submission of an Asphalt Design Mix Formula (including all supporting documentation) for the asphalt mixture containing RAP, is the responsibility of the Contractor.

.2 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.

.3 RAP from this project to be used.

.4 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 D4469). Make allowance for volume of asphalt cement absorbed into pores of aggregate.

.3 Air voids: to ASTM D3203.

.4 Stripping: to AASHTO T283.

.5 Do not change job-mix without prior approval of Departmental Representative. Should change in material be proposed, submit new to Departmental representative for approval. When change in material source proposed, new job-mix formula to be approved by Departmental Representative.

.6 Return plant dust collected during processing to mix in quantities acceptable to Departmental Representative.

.3 Mix design to be approved in writing by Departmental Representative.

.4 Do not change job-mix without approval of Departmental Representative.

2.4 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 Individual cold feed bins are required for the RAP and no intermingling of materials shall be permitted.

.3 RAP shall not be directly exposed to open flame during and/or after introduction into the plant.

.4 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 160ºC.

.2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders.

.1 Do not load frozen materials into bins.

.3 Feed cold aggregates to plant in proportions to ensure continuous operations.

.4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.

.5 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. Heat to temperature required to meet mixing temperature after combining with RAP.

.6 Where RAP is to be incorporated into mix:

.1 Feed from separate cold feed bin specially designed to minimize consolidation of material.

.1 Provide 50 mm scalping screen on cold feed to remove oversized pieces of RAP.

.2 Ensure positive and accurate control of RAP cold feed by use of hydraulic motor or electric clutch and equip with anti-rollback device to prevent material from sliding backward on feed belt.

.3 Combine RAP and new aggregates in proportions as specified. Dry mix thoroughly, until uniform temperature within ± 5ºC of mix temperature is achieved prior to adding new asphalt cement.

.1 Do not add new asphalt cement where temperature of dried mix material is above 160ºC.

.5 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.

.6 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Aggregate will not be fed directly to the plant from the crusher.

.7 Feed cold aggregates to plant in proportions that will ensure continuous operations.

.8 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job-mix requirements.

.9 Store hot screened aggregates in a manner to minimize segregation and temperature loss.

.10 Maintain temperature of materials within plus or minus 5ºC of specified mix temperature during mixing.

.11 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.

.12 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 Where RAP is to be incorporated into mix, dryer drum mixer is to be designed to prevent direct contact of RAP with burner flame or with exhaust gases hotter than 180ºC.

.3 Meter total flow of aggregate and RAP 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, RAP and asphalt cement entering mixer remain constant.

.4 Provide for easy calibration of weighing systems for aggregates without having material enter drum.

.5 Make provisions for conveniently sampling the full flow of aggregate from the cold feed.

.6 Provide screens or other suitable devices to reject oversize particles or lumps of aggregates from cold feed prior to entering drum.

.7 Provide a system interlock which will stop all feed components if either asphalt or aggregate from any bin stops flowing.

.8 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.

.9 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%.

.10 For drum mix plants processing RAP, the mixing time shall be adjusted so that all heat transfer occurs in the drum.

.13 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 hours.

.14 While producing asphalt concrete for this project, do not produce it for other users unless separate storage and pumping facilities are provided for materials supplied to this project.

.15 Asphalt mix tolerances:

.1 Contractor to submit a Job Mix Formula with production targets for the following parameters:

.1 Gradation on the 5000µm and 80µm sieve.

.2 Asphalt cement content.

.2 Permissible variation from Job Mix Formula:

.1	Gradation on the 5000µm sieve size	6.0%
.2	Gradation on the 80µm sieve size	2.0%
.3	Asphalt cement, B-HF mix	0.40%
.4	Asphalt cement, D-HF mix	0.30%

.3 Permissible variation of asphalt concrete temperature at discharge from plant, 5ºC.

2.5 ASPHALT GUTTER

.1 When gutter mix is placed in conjunction with road paving using the road spreader or spreader attachment the asphalt binder type and amount will be as specified for the Type D-HF mix.

.1 The production, transportation and placement of the asphalt concrete shall conform to the requirements of this Section.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for asphalt paving.

.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.

3.2 PREPARATION

.1 When paving over existing asphalt surface, clean pavement surface to approval of Departmental Representative.

.1 When levelling course is not required, patch and correct depressions and other irregularities to approval of Departmental Representative before beginning paving operations.

.2 Apply tack coat in accordance with Section 32 12 13.16 - Asphalt Tack Coat prior to paving.

.3 Prior to laying mix, clean surfaces of loose and foreign material.

3.3 TRANSPORTATION OF MIX

.1 The Contractor shall use a Material Transfer Vehicle (MTV) for the placement of all asphalt concrete.

.1 No unit cost adjustments will be applied to asphalt concrete placed using a material transfer vehicle.

.2 Material transfer vehicles shall be self-propelled equipment capable of transferring asphalt concrete from the hauling equipment into the paver, and shall have the following characteristics:

.1 Minimum storage capacity of 20 t;

.2 A conveyor system to transfer asphalt concrete from the hauling equipment to the paver hopper insert; and

.1 An auger system in the MTV or paddle mixers in the hopper insert to remix the asphalt concrete prior to discharge from the hopper insert.

.2 Transport mix to job site in vehicles cleaned of foreign material.

.3 Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product, at least daily or as required.

.1 Raise truck bed and thoroughly drain, and ensure no excess solution remains in truck bed.

.4 Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light for night placing.

.5 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation.

.1 Do not dribble mix into trucks.

.6 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.

.7 Deliver loads continuously in covered vehicles and immediately spread and compact.

.1 Deliver and place mixes at temperature within range not less than 135°C.

.8 Tarpaulins or other coverings for trucks must be of sufficient mass to prevent rapid cooling of asphalt concrete surface

3.4 PLACING

.1 Obtain Departmental Representative's approval of existing surface prior to placing asphalt.

.2 Place asphalt concrete to thicknesses, grades and lines 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 material is to be placed falls below 10°C, provide extra rollers as necessary to obtain required compaction before cooling.

.3 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.

.4 Place asphalt concrete in compacted lifts of thickness as indicated on Drawings.

.5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.

.6 Place individual strips no longer than 500 m unless approved by Departmental Representative.

.7 Spread and strike off mixture with self-propelled mechanical finisher.

.8 Place individual mats so that the days paving leaves minimal exposed longitudinal cold joint (<10m).

.9 Construct longitudinal joints and edges true to line markings. Lines for paver to follow will be established by Departmental Representative parallel to centreline of proposed pavement. Position and operate paver to follow established line closely.

.10 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.

.11 Correct irregularities in alignment left by paver by trimming directly behind machine.

.12 Correct irregularities in surface of pavement course directly behind paver.

.1 Remove excess material forming high spots using shovel or lute.

.1 Fill and smooth indented areas with hot mix.

.2 Do not broadcast material over such areas.

.2 Do not throw surplus material on freshly screeded surfaces.

.1 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 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section.

.1 Use measuring blocks and intermediate strips to aid in obtaining required cross-section.

.2 Distribute material uniformly without broad casting material.

.3 During spreading operation, thoroughly loosen and uniformly distribute asphalt concrete by lutes or covered rakes.

.1 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.

.1 Control temperature to avoid burning material.

.2 Do not use tools at higher temperature than temperature of mix being placed.

.14 Irregularities in the horizontal alignment and grade along the outside edge of the asphalt concrete shall be corrected by the addition or removal of mix before the edge is rolled.

.15 Paving of intersections, extra widths and other variations from standard lane alignment and as defined in the Contract, whether by hand spreading or machine laying, shall be carried out concurrently with the machine laying operation of the regular mat, unless otherwise approved by the Departmental Representative.

3.5 COMPACTING

.1 Do not change rolling pattern unless mix changes or lift thickness changes.

.1 Inform Departmental Representative prior to making changes to rolling pattern.

.2 General:

.1 Provide at least 3 rollers and as many additional rollers as necessary to achieve specified pavement density.

.2 Start rolling operations as soon as placed mix can bear weight of roller without excess displacement of material or cracking of surface.

.3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel-wheeled and pneumatic tired rollers. Do not exceed 8 km/h for finish rolling.

.4 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 25 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing not to exceed compacted lift thickness.

.5 Overlap successive passes of roller by 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 material 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.

.1 Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.

.10 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.

.11 Do not refuel rollers on fresh asphalt concrete.

.3 Breakdown rolling:

.1 Begin breakdown rolling with vibratory roller immediately following rolling of transverse and longitudinal joint and edges.

.2 Operate rollers as close to paver as necessary to obtain adequate 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.

.4 Intermediate rolling:

.1 Use pneumatic-tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.

.2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.

.3 Conduct rolling operations in close sequence.

.5 Finish rolling:

.1 Use static finish roller to remove roller marks and achieve smooth driving surface.

.6 All asphalt concrete shall be compacted to 92.5% of Theoretical Maximum Relative Density (TMRD) in accordance with ASTM D3203.

.7 The Contractor will supply additional compaction equipment if required density is not achieved.

.8 Gutters will be compacted with vibratory compactors which operate perpendicular to the direction of the gutter.

.9 Upon completion of placing and shaping, the asphalt concrete for gutter shall be compacted to 94% of the theoretical maximum relative density or to the satisfaction of the Departmental Representative.

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.

.7 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.

.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.

.3 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.

.4 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.

.5 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 tack before abutting lane is placed.

.6 Ensure joints are offset at least 150 to 200 mm from those in lower layers.

3.7 FINISH TOLERANCES

.1 Finished asphalt surface 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, spacing and type shall be approved by the Departmental Representative.

3.9 SURFACE DEFECTS

.1 The finished surface of any pavement course shall have a uniform texture and be free of visible signs of poor workmanship and bumps and/or dips exceeding 3 mm as measured with a 3 m straight edge.

.2 Any obvious defects, as determined by the Departmental Representative, shall be cause for rejection of the pavement course.

.1 Multiple defects within a 10 metre section shall be considered as one defect.

.2 If a defect is continuous beyond 10 metres it shall be considered as one defect.

.3 Defects shall include but not necessarily be limited to the following:

.1 Segregated areas;

.2 Ravelling;

.3 Roller marks;

.4 Cracking or tearing;

.5 Improper matching of longitudinal and transverse joints;

.6 Tire marks;

.7 Sampling locations not properly reinstated;

.8 Improperly constructed patches;

.9 Contaminant on the mat;

.10 Flushed areas; and

.11 Pneumatic-tired roller pickup.

.4 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required.

3.10 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.

3.11 QUALITY ASSURANCE/PAYMENT ADJUSTMENT

.1 Quality Assurance testing for payment adjustment to be performed by Departmental Representative.

.2 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 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification – Highway Construction and Maintenance, Division 4, Section 19, Clause 3.2, if two consecutive samples deviate from the tolerances set forth in Section 3.2, 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.

.3 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.

.2 Theoretical maximum density will be based on the average of the day's loose mix samples.

.3 Payment adjustment as per the following table.

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

.4 Rejected hot mix asphalt will not be paid by Department and Contractor will bear the cost of repairs.

.5 Rejected asphalt to be removed and replaced.

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.

3.13 ASPHALT GUTTER

.1 The Contractor shall construct asphalt concrete gutter as and where directed according to the Drawings or to such other dimensions approved by the Departmental Representative.

.2 Where the gutter is to be placed on a granular base the base material shall be graded to the shape of the gutter and then compacted as detailed in Section 32 11 23 – Aggregate Base Courses.

.3 In areas where the gutter is to be placed subsequent to road surface paving, tack coat conforming to the requirements of Section 21 12 13.16 – Asphalt Tack Coat shall be applied to the edge of the previously placed asphalt concrete pavement at a rate of 500 to 800 ml/m^2 before the asphalt concrete gutter is placed.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM D711, Standard Test Method for No-Pick-Up Time of Traffic Paint.

.2 ASTM D868, Standard Practice for Determination of Degree of Bleeding of Traffic Paint.

.3 ASTM D1155, Standard Test Method for Roundness of Glass Spheres.

.4 ASTM D1210, Standard Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage.

.5 ASTM D1214, Standard Test Method for Sieve Analysis of Glass Spheres.

.6 ASTM D1309, Standard Test Method for Settling Properties of Traffic Paints during Storage.

.7 ASTM E1347, Standard Test Method for Color and Color-Difference Measurement by Tristimulus Colorimetry.

.2 Canadian General Standards Board

.1 CGSB 1-GP-1-71, Method of Testing Paints and Pigments

.3 Nova Scotia Temporary Workplace Traffic Control Manual.

.4 Transportation Association of Canada, Manual of Uniform Traffic Control Devices for Canada.

.5 Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification – Highway Construction and Maintenance.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature and data sheets for pavement markings 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.

.3 Samples:

.1 Submit to Departmental Representative following material sample quantities at least 3 weeks prior to commencing work.

.1 A one litre sample of each of the yellow and white paint, in sealed air tight containers, and a 25 kg bag of the reflectorizing glass beads. Once the Contractor has selected the paint and glass bead suppliers and the Departmental Representative has approved the materials to be used, the

Contractor shall be responsible for additional testing costs should they change suppliers.

.2 Samples may be taken from shipments at any time. At the discretion of the Departmental Representative, the samples may be tested and analyzed by an independent authority or otherwise. Results obtained from the analysis showing non-conformity to this specification shall be cause for rejection of all or a portion of the shipment.

.2 Mark samples with name of project and its location, paint manufacturer's name and address, name of paint, MPI specification number and formulation number and batch number.

.4 Submit scaled and surveyed drawing for existing highway line markings as outlined under Clause 3.1.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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 in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Disposal of empty containers according to Environmental Regulations shall be the responsibility of the Contractor.

1.4 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 MATERIALS

.1 Paint:

.1 To Nova Scotia Department of Transportation and Infrastructure Renewal Standard Specification – Highway Construction and Maintenance, Division 6, Section 6.

.2 Glass Beads:

.1 The beads shall be true spheres and their surface shall be smooth, lustrous and free from cavities and scratches. The beads shall be manufactured from glass of a composition designed to be resistant to the effects of traffic wear and weathering. No foreign material shall be contained in or among the beads.

.2 The glass beads shall be colourless to the extent that they do not impart a noticeable hue to the paint.

.3 The index of refraction of the glass beads shall not be less than 1.50 when tested in accordance with Method 49.1 of CGSB 1-GP-71.

.4 A minimum of 75% by mass of the glass beads shall be true spheres. The percentage of true spheres shall be determined by one of the following methods:

.1 by counting the beads under 50X and 100X magnification as follows:

.1 Glass beads larger than #50 sieve size inclusive shall be counted under 50X magnification (see gradation requirements).

.2 Glass beads smaller than #50 sieve size shall be counted under 100X magnification.

.3 Approximately 1000 beads contained loosely in a culture dish shall be counted under reflected light for each sieve specified to determine the percentage by mass of perfectly round spheres.

.4 by ASTM D1155.

.2 Failure to meet roundness requirements by either method will be cause for rejection.

.5 The surface of the beads shall be smooth, lustrous and free from film scratches and pits. Not more than 25% of the true spheres shall have imperfections in the form of milkiness, air inclusions, dark specks and incipient fractures. These properties shall be determined using Method 149.1 of CGSB 1-GP-71.

.6 The glass beads shall meet the following gradation requirements:

.1 Gradation to:

Sieve Opening, µm	Percent Passing
850	100
600	80 – 100
300	20 – 35
150	0 – 8
75	0 – 2

.2 Tests for gradation shall be made in accordance with ASTM D1214. The sample size shall not be less than 50 g or more than 100 g.

.7 The beads shall not agglomerate during storage and application. They shall be treated in such a manner as to overcome the effect of water, both as a vapour and a liquid, on the beads before the beads are added to the paint stripe. They shall flow freely from dispensing equipment at any time when surface and atmosphere conditions are satisfactory for painting. Moisture resistance shall be tested by the method described as follows:

.1 A 100 g sample of glass beads shall be placed in a 500 ml beaker and an equivalent volume of distilled water shall be added to the beaker. The beaker shall then stand for 5 minutes at the end of which time the water shall be carefully poured off and the glass beads transferred to a clean dry beaker and allowed to stand for 5 minutes. The beads shall then be poured slowly into a standard 125 mm glass funnel having a stem of 125 mm length and 10 mm inside diameter.

.2 The beads shall flow through the stem without stoppage. Slight initial agitation to start the flow through the funnel at the beginning of the test is permissible.

.8 When the glass beads are exposed to atmospheric conditions, humidity, diluted acid or alkali solutions or paint film constituents, there shall be no dulling of the surface which would adversely affect reflective properties of the beads.

.1 Calcium chloride resistance shall be determined in the following manner:

.1 Place 10 g of beads in a 100 ml beaker;

.2 Cover the sample with 500 ml of calcium chloride (1.0 Normal Solution);

.3 Let the beads soak for three hours;

.4 Rinse the beads three times with 100 ml of distilled water and dry;

.5 Examine the beads under a microscope and compare them with an untreated sample.

.2 Dulling of the surface or other detrimental effects shall constitute failure of this test.

.9 The glass beads shall be furnished in clean, durable, waterproof bags containing 25 kg each. Bags shall be of one of the following types:

.1 woven polypropylene, lined inside with a sprayed polyethylene coating of 0.25 mm thickness

.2 285 gram jute, with polyethylene liner of 0.50 mm

.3 22.67 kg basis weight, multi-walled kraft paper, with polyethylene liner of 0.50 mm thickness.

.4 These bags shall be able to withstand handling and storage between packaging and application of the beads, and shall be constructed so as to avoid contamination of the beads with foreign materials. Both ends of the bags shall be securely sealed to prevent leakage.

.5 Bags of glass beads shall be supplied on nonreturnable wood pallets, 40 - 60 bags per pallet, and shall be lashed or secured to the pallet.

Part 3 Execution

3.1 PAVEMENT MARKING DRAWINGS

.1 Where a pavement marking drawing is provided, the Contractor is required to paint markings as indicated on the Drawing. Where a pavement marking drawing is not provided, the Contractor is to accurately inventory existing markings by topographic survey methodologies. Departmental Representatives' approval of the Contractor's inventory drawing is required prior to the cold milling of the existing asphalt pavement. In locations where a pavement marking drawing is not provided, the following shall apply to assist the Contractor in establishing uniformity in the development of pavement marking drawings/descriptions. This checklist should be used as a guide to ensure that all of the basic elements are covered.

.1 For locations which require a scaled and surveyed drawing:

.1 The Contractor shall submit a pavement marking drawing that is to a 1:500 scale. Drawings shall be submitted in PDF form and printed to either an 11 x 17 or A-1 size. The pavement marking drawing shall be produced from a survey and shall inventory the existing pavement markings. The Contractor shall be responsible for including any revisions as directed by the Departmental Representative. The inventory shall include pavement markings at the project limits, except for continuous center or lane lines.

.2 The pavement marking drawing shall be submitted no later than 10 business days before scheduled cold milling.

.3 The pavement marking drawing shall include:

.1 Project name, highway, limits, tender number and date.

.2 Indicate north arrow and scale.

.3 Use a legend to define all symbols.

.4 Show colours, sizes and configurations of existing pavement markings (arrows, solid/dashed lines, hatching, bicycle symbols, etc.).

.5 Dimension individual lane widths, bike lane widths, length/width of hatching, stop bar setbacks, etc.

.6 Layout pavement markings in accordance with the Manual of Uniform Traffic Control Devices for Canada, unless otherwise indicated.

3.2 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive pavement markings previously installed under other Sections or Contracts are acceptable for product installation in accordance with MPI instructions prior to pavement markings installation.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Pavement surface: dry, free from water, frost, ice, dust, oil, grease and other deleterious materials.

.2 Proceed with Work only after unacceptable conditions have been rectified.

3.3 EQUIPMENT REQUIREMENTS

.1 The Contractor shall supply a mobile highway striping truck which is capable of striping centre, lane and edge lines and of applying overlay-type glass beads to the wet painted line by means of pressurized bead dispensers. The truck shall be fitted with a paint heater capable of heating paint to any temperature up to 80^{o}C and maintaining a constant temperature during spraying operations.

3.4 APPLICATION

.1 Pavement markings: layout by Contractor.

.2 Traffic line painting shall include centerline painting, lane line painting and edge line painting. The term centerline shall be used to describe any of the standard line combinations separating opposing traffic lanes on two-lane, two-way traffic highways and shall include the following:

.1 Single skip lines;

.2 Single skip and single solid lines;

.3 Double solid lines;

.4 Single solid line (Occasionally a narrow local low volume road may have a single solid centerline).

.3 All such centerlines shall be yellow in colour.

.4 The term lane line shall be used to describe any line separating lanes of traffic travelling in the same direction and may be either a single white skip line or a single white solid line.

.5 The term edge line shall be used to describe any line which defines the shoulder edge of the outside traffic lanes. On two-lane highways, edge lines shall be white in colour. On divided highways the edge line on the right in the direction of traffic flow shall be a single solid white line, the one on the left a single solid yellow line.

.6 Symbols, hatching and letters to dimensions and colours indicated.

.7 The width of painted lines shall be 11.5 cm. Paint shall be heated to a temperature sufficient to enable it to dry when applied to the road, in a time frame short enough to avoid the use of traffic cones for protection of vehicles and the painted line itself. Paint shall be applied at a rate to achieve in one pass a minimum dry film thickness (dft) of 255 μm. Overlay-type reflectorizing glass beads shall be dispensed from the paint striping truck by means of a pressurized bead dispenser to the wet painted line at the rate of 700 g/L of paint applied.

.8 All lines are to be true with clearly defined edges and without noticeable overspray of adjacent road surfaces.

.9 No painting shall be carried out when visible moisture is present on the road surface.

.10 Lines not painted in accordance with these specifications shall be repainted by the Contractor at the expense of the Contractor.

.11 The Contractor shall inform the Department's Representative of the Contractor's daily schedule to enable the representative to be present as they deems it necessary during loading and painting operations.

3.5 TRAFFIC CONTROL

.1 Traffic Control shall be the responsibility of the Contractor and shall be carried out in accordance with the NSTIR's Temporary Workplace Traffic Control Manual.

3.6 TRAFFIC LINES

.1 All pavement lines and markings shall be in accordance with the Transportation Association of Canada's Manual of Uniform Traffic Control Devices for Canada (MUTCDC).

3.7 TOLERANCE

.1 Paint markings: within plus or minus 12 mm of dimensions indicated.

.2 Remove incorrect markings in accordance with Section 32 01 11.01 - Pavement Cleaning and Marking Removal.

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 OF COMPLETED WORK

.1 Protect pavement markings until dry.

.2 Repair damage to adjacent materials caused by pavement marking application.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 31 05 16 Aggregate Materials

.2 Section 31 23 33.01 Excavating, Trenching and Backfilling

.3 Section 32 11 16.01 Granular Sub-Base

1.2 REFERENCES

.1 AASHTO

.1 AASHTO M196, Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains.

.2 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/ft^3 (600 kN-m/m^3)).

.4 ASTM F667, Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings.

.5 ASTM F679, Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.

.6 ASTM F794, Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.

.7 ASTM F949, Standard Specification for Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings.

.8 ASTM D3034, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.3 CSA International

.1 CAN/CSA A3000, Cementitious Materials Compendium.

.2 CAN/CSA A257 Series, Standards for Concrete Pipe and Manhole Sections.

.3 CAN/CSA B182.2, PSM Type Polyvinylchloride (PVC) Sewer Pipe and Fittings.

.4 CAN/CSA B182.4, Profile Polyvinylchoride (PVC) Sewer Pipe and Fittings.

.5 CAN/CSA B182.8, Profile Polyethylene (PE) Storm Sewer and Drainage Pipe and Fittings.

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 pipes and bedding and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Inform Departmental Representative at least 2 weeks before beginning Work, of proposed source of bedding materials and provide access for sampling.

.4 Certification: to be marked on pipe.

.5 Test and Evaluation Reports:

.1 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.

1.4 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.

1.5 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 CORRUGATED ALUMINUM ALLOY PIPE

.1 Corrugated aluminum alloy pipe shall conform to AASHTO M196.

.2 The nominal wall thickness for corrugated aluminum alloy pipe shall be:

Diameter (mm)	Wall Thickness (mm)
300	2
300	2
500	2
600	2
800	2.8
900	2.8
1000	2.8
1200	3.5

.3 The couplers shall be corrugated band couplers or universal dimple couplers complete with angle flanges and bolted connectors. Couplers shall be 600mm wide for all pipe sizes. If corrugated couplers are used the pipe ends shall be re-corrugated to accept the coupler.

2.2 CONCRETE PIPE

.1 Reinforced concrete pipe: to CAN/CSA A257 and shall be one of three classes: 65D, 100D or 140D as specified in the contract tender items.

.2 Rubber gaskets for joints: to CAN/CSA A257.

.3 Pipe up to 1800 mm nominal ID shall have a minimum 70 mm diameter lift hole at the centre of gravity, and shall be equipped with a tapered concrete or rubber plug that does not protrude beyond the inside wall of the pipe.

2.3 CORRUGATED HIGH-DENSITY POLYETHYLENE PIPE

.1 High Density Polyethylene (HDPE) Pipe shall be double walled, with a smooth interior surface, conforming to CAN/CSA-B182.8.

.1 HDPE shall have a minimum stiffness of 320 kPa.

.2 HDPE Pipe supplied for use as Driveway Culvert Pipe shall have an open end area equivalent to or greater than the open end area for the corresponding diameter of corrugated steel pipe.

.2 Joints: Bell and spigot with integrated gasket.

2.4 POLYVINYL CHLORIDE (PVC) Pipe

.1 Pipe: To CAN/CSA-B182.2 and B182.4, ASTM D3034, F679, F794 and F949.

.2 PVC pipe shall not be utilized for culvert installations.

.3 Joints: Bell and spigot with locked-in rubber gaskets.

2.5 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.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for pipe 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.

3.2 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.

3.3 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 pipe.

3.4 BEDDING

.1 Dewater excavation, as necessary, to allow placement of culvert bedding in dry condition.

.2 Place 200 mm minimum thickness of approved granular material on bottom of excavation and compact to 95% minimum of maximum density to ASTM D698.

.3 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 Departmental Representative, free from sags or high points.

.4 Place bedding in unfrozen condition.

3.5 LAYING CORRUGATED ALUMINUM ALLOY CULVERTS

.1 Begin pipe placing at downstream end.

.2 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.

.3 Lay pipe with outside circumferential laps facing upstream and longitudinal laps or seams at side or quarter points.

.4 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.

3.6 JOINTS: CORRUGATED ALUMINUM ALLOY CULVERTS

.1 Corrugated aluminum alloy pipe:

.1 Match corrugations or indentations of coupler with pipe sections before tightening.

.2 Tap couplers firmly as they are being tightened, to take up slack and ensure snug fit.

.3 Insert and tighten bolts.

3.7 LAYING CONCRETE PIPE CULVERTS

.1 Pipes shall be joined in a straight line using standard industry methods, proceeding from the downstream end of culvert with bell end of first pipe section facing upstream. Each pipe section shall be set into place and positioned together as recommended by the lifting device manufacturer.

.2 The maximum joint gap between pipe sections shall be 13 mm for pipes up to 1500 mm diameter and 20 mm for pipes of 1800 mm diameter and larger.

.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.

.5 Lifting anchor recesses shall be entirely grouted in with non-shrink grout.

3.8 JOINTS: CONCRETE PIPE CULVERTS

.1 Joints may be made with rubber gaskets.

.1 Rubber gasket joints:

.1 Install in accordance with manufacturer's written recommendations.

.2 Ensure that tapered ends are fully entered into flanged ends.

3.9 LAYING PVC AND CORRUGATED HIGH-DENSITY POLYETHYLENE PIPE CULVERTS

.1 Begin laying at downstream end of culvert.

.2 Install pipe in trench by lowering.

.3 Ensure bottom of pipe is in contact with shaped bedding throughout pipe length.

.4 Allow water to flow through pipes during construction only as permitted by Departmental Representative.

3.10 JOINTS FOR HIGH-DENSITY POLYETHYLENE CULVERTS

.1 Install couplings in accordance with manufacturer's instructions.

3.11 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 REFERENCES

.1 American Association of State Highway and Transportation Officials (AASHTO)

.1 AASHTO M180, Standard Specification for Corrugated Sheet Steel Beams for Highway Guardrail.

.2 ASTM International

.1 ASTM A123/A123M-[09], Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

.3 ASTM A780, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

.3 CSA International

.1 CAN/CSA O80 Series, Wood Preservation.

.2 CAN/CSA G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA S136, North American Specification for the Design of Cold-formed Steel Structural Members.

.4 CSA W59, Welded Steel Construction (Metal Arc Welding).

.4 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber.

.5 American Wood Preservers' Association (AWPA)

1.2 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 guide rail, wood, and coatings and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit product name and manufacturer's specification for the preservative to be applied to the post field cuts and zinc-rich paint to repair minor damage to galvanized coating, and to coat cut ends and field drilled holes.

.3 Submit manufacturer's certification, for all galvanized metals, that the materials supplied meet the specified requirements.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance 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 Store and protect guide rails from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.4 MEASUREMENT FOR PAYMENT

.1 See Section 01 29 00 – Payment Procedures.

Part 2 Products

2.1 MATERIALS

.1 Steel W-beam guide rail as indicated and as follows:

.1 Steel rail and terminal sections: manufactured from open hearth, electric furnace or basic oxygen semi-spring steel sheet and hot dip galvanized after fabrication.

.1 To AASHTO M180, class A Type 2 zinc coated.

.2 The steel beam shall be in accordance with the cross-section and dimensions as shown on the contract drawings.

.2 Rails shall be punched for splice and post bolts in strict conformity with the AASHTO Standard to the designated number and centre-to-centre spacing of posts. No punching, cutting or welding will be permitted on site.

.3 Bolts, nuts and washers: to ASTM A307, hot dip galvanized to CSA G164.

.4 If any guide rail installation requires curved W-beam rails, the Contractor shall form these to the radius specified by the Departmental Representative prior to galvanizing.

.5 Each beam element shall be identified by the following marking in accordance with AASHTO M 180:

.1 Name or brand of manufacturer,

.2 Identification symbols or code for heat,

.3 Number and coating lot,

.4 AASHTO specification number, and

.5 Class, type, and thickness

.6 The rails and terminal elements shall be manufactured according to the following standards:

.1 Mechanical properties of the base metal for the rails shall conform to the following requirements:

.1 Minimum Yield Point: 345 MPa

.2 Minimum Tensile Strength: 483 MPa

.3 Minimum Elongation: 12% in 50 mm length

.2 Sheet thickness shall be in accordance with Table 2 (Class A, Type 2) of AASHTO Standard M180 of the latest edition, with a nominal base metal thickness of 2.82 mm (2.59 mm minimum).

.7 Welding for the fabrication of terminal elements shall conform to the requirements of CSA-W59.

.2 Posts and Blocks as indicated and as follows:

.1 The acceptable species for guide rail posts and blocks shall be:

.1 Eastern hemlock

.2 Red Pine

.2 The posts shall be sound and rot-free, and shall conform with the requirements for No. 1 Structural Posts and Timbers, graded in accordance with the National Lumber Grading Authority (NLGA) Standard Grading Rules for Canadian Lumber. Posts and blocks shall be subject to inspection by the Departmental Representative when the bundles are opened immediately prior to use.

.3 The dimensions of eastern hemlock or red pine (softwood) guide rail posts shall be 200 x 200 x 2100 mm, unless specified otherwise. Matching softwood blocks shall be 200 x 200 x 440 mm. The tops of wooden posts shall be cut as specified.

.4 Post delineators shall be supplied by the Contractor.

.5 Prior to pressure-treating, posts and blocks shall be incised on all four sides and dried to their fibre saturation point of 25 to 30% at 25 mm depth.

.6 For pressure treating, preservative treatment of posts and blocks shall be chromated copper arsenate (CCA). For field cut surfaces, preservative shall be 2% copper napthenate wood preservative, applied in two coats.

.7 Treatment shall be completed in accordance with requirements of CSA-080. The penetration and retention of preservatives shall conform to the requirements of CSA Standard O80.14, Table 1, Minimum Retention of Preservatives in Pressure Treated Wood for Highway Construction, under the headings “Post-Guardrail, Guide, Sign and Sight” for posts, and “Bridge Hand Rails, Guard Rails and Posts” (not in contact with ground or water). The Departmental Representative may verify the penetration and retention of the preservative by the assay method.

.3 Bolts, Nuts and Washers:

.1 All bolts, nuts and washers shall conform to ASTM A307 and shall be hot dip galvanized conforming to CAN/CSA G164.

.4 Hot Dip Galvanizing:

.1 Hot dip galvanized coating shall be smooth, free of beading or sharp projections at edges. Coating adherence shall prevent the peeling of any portion of the zinc coating so as to expose the base metal by cutting or prying with a stout knife under considerable pressure (bond check). A magnetic gauge will be used for checking thickness, in accordance with ASTM E316.3.

.2 Warped or otherwise deformed rails and terminal elements will be rejected, as will those with injurious defects or excessive roughness of the zinc coating. When the rail is laid on a flat surface, the warpage shall not be greater than 50 mm.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for guide rail 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.

.2 Prior to commencing work, the Departmental Representative shall locate in the field all proposed areas for installing new guide rail including special or curved installations. These locations shall be reviewed by the Contractor, with the Departmental Representative, to confirm locations and extents. The Contractor shall contact the Departmental Representative 24 hours prior to any work being done.

3.2 ERECTION

.1 Set posts by instrument for alignment, and locations as indicated and as directed by Departmental Representative.

.2 The Contractor shall erect steel guide rail in accordance with the following NSTIR Standard Drawings:

- .1 HS518 Guard Rail and Post Details
- .2 HS519 Guard Rail Post Details
- .3 HS520 Steel Beam Guard Rail Buried End Treatment

.3 Guide rail installations designated as “strong post” require a post spacing of 1.905 m and the W-beam railing shall be blocked out at posts in accordance with NSTIR Standard Drawing HS518.

.4 To maintain consistency throughout a project, only one size post and block shall be used on any one section of a contract. 200 x 200 x 440 mm blocks shall only be used with 200 x 200 x 2100 mm posts.

.5 Unsuitable material at the bottom of the holes excavated for guide rail shall be replaced with granular material, as directed by the Departmental Representative. The Contractor shall thoroughly compact the bottom of the hole. The guide rail posts shall rest directly and solidly on the bottom of the hole at the time of installation.

.6 Excavated material which is unsuitable for use as a backfill shall be substituted with granular material, as directed by the Departmental Representative. Backfill shall be thoroughly compacted, in layers not exceeding 150 mm, for the full depth of the excavation. For augured post installation, hand compaction of backfill in layers not exceeding 150 mm is acceptable.

.7 Care shall be taken during the transport, treatment and handling of posts and blocks to prevent damage. Any damage occurring to the posts and blocks prior to delivery and

during delivery and installation shall be repaired to the satisfaction of the Departmental Representative and shall be considered as incidental to construction for the purpose of payment.

.8 No alterations to treated posts and blocks shall be permitted without the approval of the Departmental Representative. Blocks shall not be manufactured from posts. Any exposed cuts shall be treated with two coats of 2% copper napthenate wood preservative. Field applied wood preservative which comes in contact with any galvanized components shall be removed immediately.

.9 Guide rail and guide posts shall be installed plumb, and set according to alignment and grade, regardless of the material encountered, as shown on the drawings or as directed by the Departmental Representative. The rail elements shall be erected to produce a smooth continuous rail paralleling the line and grade of the highway surface as directed by the Departmental Representative. All rail elements shall be lapped in the direction of traffic.

.10 Standard W-beam rail sections shall not be modified to suit post locations; posts shall be located to match W-beam pre-punched bolt hole locations. If Contractor wishes to use two crews, on a given section, the crews shall work from the middle of the job outwards to avoid modifications of standard W-beam rail sections due to varying post spacings. Only at the approval of the Departmental Representative, can holes be drilled or cuts be made to W-beam rail sections. Holes and cut ends shall be treated with a zinc-rich paint that has been approved by the Departmental Representative. Bolts shall be tightened to a torque of 100 Nm.

.11 Two 50 mm x 75 mm delineators are required for each post. A white delineator shall be placed on the side of the post facing traffic; a yellow delineator shall be placed on the opposite side. The delineators shall be located at the edge of the post nearest the road, vertical, with the top 75 mm below the lowest point of the guide rail panel. The delineators shall be attached with galvanized nails.

.12 All damage to pavement, shoulders, ditches, slopes, lawns and any other surfaces and areas within or outside of the project limits, arising from the Contractor's work, shall be repaired to the satisfaction of the Departmental Representative, within five working days, at the expense of the Contractor.

.13 Surplus excavated material and debris shall be removed from the site by the Contractor, at his expense.

.14 All end termination of guide rail installations shall be buried as shown on NSTIR Standard Drawing HS520 in these specifications, unless otherwise directed by the Departmental Representative.

3.3 TOUCH UP

.1 The Contractor shall take all necessary precautions to eliminate damage to galvanizing.

.2 Galvanized steel-touch up:

.1 Cut ends, field drilled holes (permitted on bridge approach/departure elements only) and other areas where the galvanizing has minor damage shall be repaired with a minimum of two coats of zinc-rich paint according to ASTM A780, at no additional cost to the Contract. The coating thickness for the repair shall at least comply with the requirements of AASHTO M180 respecting hot dip galvanizing.

Major abrasions shall be repaired by re-galvanizing. The method to be used for repair of any damage shall be approved by the Departmental Representative before such work is commenced. The Contractor, at his cost, shall carry out the repair or replace components to the satisfaction of the 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 guide rail installation.

END OF SECTION

Part 1 General

1.1 ENVIRONMENTAL REQUIREMENTS

.1 Operation of construction equipment in water is prohibited.

.2 Do not operate construction equipment in or adjacent to watercourses or wetlands.

.3 Do not alter or draw any water from a watercourse or wetland without first obtaining necessary permits or approvals.

.4 Do not use watercourse beds or banks or wetlands for borrow material.

.5 Do not dump excavated fill, waste material or debris in watercourses or wetlands.

.6 Design and construct temporary crossings to minimize erosion to watercourse or wetland. All temporary crossings must be pre-approved by Departmental Representative prior to construction.

.7 Do not skid logs or construction materials across watercourses or wetland.

.8 Avoid spawning beds when constructing temporary crossings of watercourses without obtaining written approval of the Departmental Representative.

.9 Underwater blasting within 100 m of indicated spawning beds is not permitted.

.10 Provide a buffer zone in combination with appropriate erosion and sedimentation control when working adjacent to watercourses and wetlands. Consult with regulatory agencies.

1.2 MEASUREMENT FOR PAYMENT

.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 EXISTING CONDITIONS

.1 Maintain existing flow pattern in natural watercourse and wetland systems.

.2 In natural systems maintain existing riffle pool and step pool patterns.

.3 In wetland systems, maintain existing hydrological conditions.

3.2 SITE CLEARING AND PLANT PROTECTION

.1 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, according to requirements of authorities having jurisdiction and sediment and erosion control plan, specific to site, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

.2 Minimize disturbance to vegetated buffer zones and protect trees and plants on site and adjacent properties where indicated.

.3 Wrap trees and shrubs adjacent to construction work, storage areas and trucking lanes in burlap.

.4 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.5 Leave cuttings from trees and other vegetation on site as brush piles to allow for natural degradation.

.1 Secure large piles with degradable materials to prevent interference with watercourse.

.6 Remove only trees that may offer future blockage problems as instructed by Departmental Representative.

.7 Leave roots mass and stumps in place.

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

3.3 DRAINAGE AND PUMPING

.1 Pumping water containing suspended materials into watercourse or wetland is prohibited. Discharge location shall be minimum 30 metres from any watercourse or wetland unless pumped through a filter bag connected to the pump discharge.

.2 Establish rock chute spillways to accommodate safe surface water entry to watercourse or wetland as directed by Departmental Representative.

.3 Install drop pipe inlet system as instructed by Departmental Representative.

.4 All fish occupying a reach of watercourse to be dewatered or abandoned must be rescued and relocated out of harm’s way prior to any permanent or temporary dewatering operation in accordance with regulatory guidelines.

3.4 SITE RESTORATION

.1 Establish vegetated buffer zones with suitable vegetation to minimum 3 m along edge of watercourse banks as determined by Departmental Representative.

.2 Plant vegetation natural to area, suitable for application without requirement for fertilizers, pesticides and other chemicals.

.3 Control stream bank erosion in lower section of watercourse with irregular shaped rip rap underlain with non-toxic recycled content of size determined by Departmental Representative.

.4 Control stream bank erosion in upper section of watercourse by planting suitable vegetation as directed by Departmental Representative.

.1 Ensure planting occurs within 15 days after work on watercourse is complete.

END OF SECTION

APPENDIX A

Parks Canada Preapproved Routine Impact Assessment (PRIA) – Roads and Related Infrastructure

Preapproved Routine Impact Assessment
Roads and Related Infrastructure

Parks Canada National Office
IAA 2019

Preapproved Routine Impact Assessments (PRIA) are pre-determined environmental management and mitigation measures for a defined class of routine, repetitive projects or activities with well understood and predictable effects. Approved PRIAs are an acceptable Impact Assessment pathway as they fulfill Parks Canada's obligations under the *Impact Assessment Act* (IAA) 2019 as a manager of federal lands.

This PRIA applies to the repair and modification of roads or related infrastructure. Routine maintenance with no beginning and end, such as ongoing vegetation maintenance or snow removal is not included in this PRIA. Environmental concerns from ongoing maintenance can be addressed in a Field Unit Standard Operating Procedure.

Incorporating conservation gains and environmental design in the project is encouraged for all Parks Canada projects. This and other proactive planning and design mitigations should be discussed at an early stage. Examples are:

- Impacts of design on wildlife mortality and connectivity (e.g., need for wildlife crossing structures or other mechanisms to reduce mortality at known hotspots).
- Conservation gains as a way to maintain habitat permeability.
- Greening Operations such as designing with materials that have a lower carbon footprint.
- Need for a Reclamation Plan that clearly identifies the goals and objectives, timelines, and budget for the project.

This PRIA shall not be used as is without input from the Parks Canada **Impact Assessment (IA) Practitioner**. The IA Practitioner will first review the PRIA to determine what mitigations apply and what additional information or mitigations are required for the project. This can be done by completing the site-specific tables and adding mitigations to module 1: Site-specific mitigations. Internal specialists (e.g., vegetation, fish, species at risk, reclamation) should be consulted as required. Modules or mitigations that do not apply to the project can only be deleted by the PC IA Practitioner.

Those responsible for project delivery (i.e., external proponents, Field Unit staff, Highway Engineering Services or their contractors) are responsible for implementing the PRIA mitigations and other permit conditions.

Definitions:

Cultural Resource is a human work, an object, or a place that is determined, on the basis of its heritage value, to be directly associated with an important aspect or aspects of human history and culture. The heritage value of a cultural resource is embodied in tangible and/or intangible character-defining elements.

Designated Parks Canada staff refers to a Parks Canada employee on the site that has decision making authority for the project (i.e., not a consultant or contractor). This person is responsible for contacting any Parks Canada specialists as required during the construction period, including the IA Practitioner.

Drainage structures include culverts, ditches, manholes, catch basins, curbs and drains.

Fish habitat means water frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas (subsection 2(1) of the Fisheries Act).

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 is used as the definition of high water mark in managed waterways.

Protected heritage place refers to federal land, submerged land and water, as well as buildings and structures administered by Parks Canada, including National Historic Sites of Canada and historic canals administered by Parks Canada, National Parks of Canada and National Park Reserves of Canada, National Marine Conservation Areas of Canada (including National Marine Conservation Area Reserves of Canada, Saguenay-St. Lawrence Marine Park and Fathom Five Marine Park) and any national urban parks or other places of heritage value identified in the future.

Qualified environmental professional is someone who has qualifications, certification and/or direct experience in the appropriate discipline of practice (e.g., designated professional status, knowledge and direct field experience in a specified skill or area of expertise relevant to the project).

Related infrastructure includes but is not limited to existing parking lots, existing gravel pits, pull-off and traffic ponding areas, bridges, retaining walls, avalanche control structures, signage, guardrails, concrete barrier (aka "Jersey barrier"), drainage structures or service lines. Sidewalks, boardwalks or their associate railings are not considered as roads and related infrastructure (refer to Frontcountry Areas PRIA).

Service lines include underground and aboveground service lines for water, sanitary waste, storm water, natural gas, power and communication. Utilities (water, sanitary sewer, storm water, natural gas) that are provided in pipes are usually located under or adjacent to roadways.

Subsoil is the layer of soil directly below the topsoil. It contains mainly mineral soils, with very little organic matter. It includes the 'B' horizon and sometimes 'C' horizon material. In this document, salvaging of subsoil refers to salvaging all or enough of the B horizon to help promote plant growth after reclamation.

Topsoil is the surface layer of soil, including 'O' horizon and 'A' horizon as defined by the Canadian System of Soil Classification. It contains the organic matter that provides an adequate medium for the germination and growth of plants. It contains the soil seed bank and the majority of soil microorganisms and is used in soil salvage.

Water body includes a lake, a canal, a reservoir, an ocean, a river and its tributaries and a wetland, up to the annual high water mark, but does not include sewage or waste treatment lagoon, a mine tailings pond, an artificial irrigation pond, a dugout or a ditch that does not contain fish habitat as defined in subsection 2(1) of the *Fisheries Act*.

Scope of Application

Scope of Application	This PRIA includes repair and modification of existing roads, parkways and related infrastructure.
	
	Activities included in this PRIA are:
	• Activities that most projects have in common, such as:
	  ○ The management of wildlife, invasive alien species, cultural resources, visitor experience, dust control and noise, work in or near water, erosion and sediment control, establishment and operation of staging and laydown sites, fuel storage and refuelling, emergency planning, site clean-up and waste management and site reclamation activities.
	
	• Specific activities such as:
	  ○ Asphalt production and handling
	  ○ Concrete handling and washout facilities
	  ○ Paving, resurfacing and grading
	  ○ Roadside vegetation removal
	  ○ Excavation, soil stripping and overburden removal
	  ○ Slope stabilization, drilling and blasting
	  ○ Demolition
	  ○ Drainage structures
	  ○ Bridge
	  ○ Water withdrawal and dewatering
	  ○ Fish, amphibian and reptile salvage

Conditions and Exceptions	This PRIA does NOT apply to the following: Location: • Project work in previously undisturbed areas[1] required to build and maintain the road and associated infrastructure (e.g., expansion of a parking lot or gravel pit). • The project results in residual adverse effects to sensitive natural or cultural resources (e.g., nests, dens and roosts, fish spawning areas, cultural resources, riparian areas, wildlife corridors, rare ecotypes, or areas of management concern).

[1] Some examples of disturbance are filling, excavating, stripping, grubbing, grading, bulldozing, compaction or blasting. Disturbance may extend only a few metres or tens of metres from the shoulder, depending on site history.

	General:
	• The project results in residual adverse effects on migratory birds or their nests.
	  ○ Refer to the draft- Parks Canada Guidance on Reducing Risk to Migratory Birds and associated draft- Conservation Measures to Minimize Impacts to Migratory Birds During the Nesting Period.
	
	• The project results in residual adverse effects on an individual, a residence or the critical habitat of a listed species listed under the *Species at Risk Act*.
	  ○ Determine if mitigations are needed to ensure no residual adverse effects to species at risk. Such mitigations should be included in the Supplementary Mitigations section.
	
	• The project is likely to require an approval[1] under the *Canadian Navigable Waters Act* (s. 5(1)).
	  ○ In cases where the project proposes to construct, place, alter, rebuild, remove or decommission works (including temporary work such as a cofferdam) that are in, on, under, through or across any navigable water, there may be a requirement to apply to Transport Canada, for scheduled waterways, or go through the public resolution process, for unscheduled waters. Verify if the project is a "major works" in any navigable water or "works" in Navigable Waters Listed on the Schedule.
	
	• The project is likely to require an authorization[2] under the *Fisheries Act* (s.35(1) or 36(3)).
	  ○ In cases where impacts to fish and fish habitat cannot be avoided, a request for review must be sent to Fisheries and Oceans Canada's Fish and Fish Habitat Protection Program Office.
	
	• The project involves the removal of or causes damage to cultural resources of heritage value, for example, heritage buildings designated by the Federal Heritage Buildings Review Office, archaeological sites, historical and archaeological objects, or cultural landscapes.
	
	• The project involves the removal of or causes damage to paleontological resources.

[1] Check if your project is a major works in any navigable water or works in navigable waters listed on the Schedule: https://www.tc.gc.ca/eng/programs-623.html

[2] DFO project review process to determine whether an authorization is required: https://www.dfo-mpo.gc.ca/pnw-ppe/reviews-revues/request-review-demande-d-examen-002-eng.html

	• The project adversely effects sites of significance to Indigenous peoples or current access and use of areas where hunting, fishing or gathering rights are exercised by Indigenous peoples.
Other considerations	Use of the PRIA may not be appropriate in circumstances where: • The project may adversely effect aquatic or terrestrial wildlife habitat connectivity. • The project results in loss of wetland function[1] as defined by the Federal Policy on Wetland Conservation (1991).
Approved geographic area of application	This PRIA may be used within all Parks Canada administered protected heritage places.
Parks Canada Specialists	Impact Assessment: If there are any questions on how to apply this PRIA, consult a member of the Impact Assessment Team. Species at Risk: If there is any uncertainty regarding potential adverse effects to species at risk, consult a member of the Species Conservation Team. Environmental Management: If there are questions on environmental management issues (e.g., treated wood, contaminated sites, hazardous materials or greening operations), consult a member of the Environmental Management Team. Cultural Resources: If there is any uncertainty regarding potential adverse effects to known or potential cultural resources (terrestrial and/or underwater), consult a member of the Cultural Management Team or, if applicable, the local Field Unit specialist.

[1] Wetland functions include the natural processes and derivation of benefits and values associated with wetland ecosystems, including economic production (e.g. peat, agricultural crops, wild rice, peatland forest products), fish and wildlife habitat, organic carbon storage, water supply and purification (groundwater recharge, flood control, maintenance of flow regimes, shoreline erosion buffering), and soil and water conservation, as well as tourism, heritage, recreational, educational, scientific and aesthetic opportunities.

Valued Components and Effects Analysis

Water Quality and Riparian/Fish Habitat	• Reduced water quality due to transportation of debris and contamination (e.g., from leaks and accidental spills) and introduction of fine sediments directly from activity in the waterbody. • Introduction of deleterious substances from structure maintenance (e.g., sediments, oils, de-icing chemicals, painted chips, treated wood debris, cement-based products, wood preservatives, epoxies, paints or sealants). • Localized changes to surface water hydrology. • Disruption of flow, habitat damage (including erosion), changes to stream channel or death of fish from maintenance and repairs.
Soil/Land Resources	• Soil contamination from wastes (e.g., garbage, litter, sewage, fuel). • Incidental increased disturbance footprint. • Soil compaction and rutting. • Soil erosion, loss of topsoil and exposure of subsoil. • Change in slopes, landforms and landscape.
Air/Noise Quality	• Short-term decreased ambient air quality (e.g., dust, aggregate from paved surfaces, asphalt plant, equipment emissions). • Increased ambient noise level. • Temporary increased levels of CO2 and other pollutants. • Temporary increased localized temperatures from paving and equipment operation.
Wildlife and Vegetation	• Introduction of disease, invasive alien species (IAS), wildlife attractants, or expansion of existing IAS populations in disturbed areas. • Wildlife sensory disturbance causing displacement/preferred habitat avoidance. • Habitat destruction or alteration (e.g. loss of nests, dens, burrows, aquatic environments). • Wildlife habituation/attraction to artificial food sources. • Impeded/altered wildlife movement. • Damage to nests/disruption of nesting animals. • Injury or mortality from project activities. • Damage to and removal of vegetation, disturbance of adjacent natural areas, root exposure and physiological distress.
Cultural Resources	• Adverse effects to the heritage value or character-defining elements of a cultural resource or a heritage place. • Impacts to archaeological resources (known or potential: (terrestrial and/or underwater) from displacement, compaction or destruction, resulting in loss of heritage value. • Impacts to cultural landscapes, buildings, archaeological sites, engineering works, objects.
Visitor Experience and Safety	• Reduced quality of visitor experience due to noise, visual impacts 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.

Site Specific Valued Components

(to be completed by Parks Canada IA Practitioner)

Instruction to IA Practitioner: Identify site-specific valued components that require special consideration (e.g., waterbodies, sensitive habitats, species at risk or known cultural resources) or specific concerns such as aggressive invasive alien species.

The following is a list of site-specific valued components and areas of concern for this project:
site-specific valued component *site-specific concern (e.g., invasive alien species)*

Instruction to IA Practitioner: Complete this table and copy it to site-specific mitigation in module 1 given that restricted activity periods vary by species and site.

Site-specific Restricted Activity Periods			
Species	**Applicable**	**Date of Restricted Activity Period**	**Notes or Supplemental Mitigations**
Bird breeding and migration	☐	[....]	
Fish spawning and migration	☐	[....]	
Mammal maternity season or hibernation	☐	[....]	
Reptile migrations, nesting and hatching	☐	[....]	
Amphibian migrations, nesting and hatching	☐	[....]	
Other	☐	[....]	

*If useful, complete the Environmental Timing Windows Table (Appendix).

Instruction to IA Practitioner: Answer these questions to help identify missing site specific mitigations or information. If required, add all the supplemental mitigations in site-specific mitigations in module 1 and additional information in the Appendix.

Check list questions to identify site specific mitigations	Check when supplemental mitigation is added to module 1	Check when information is attached in an appendix
Planning		
Is wildlife awareness training required?	☐	☐
Are pre-construction surveys required?	☐	☐
Invasive alien species		
Are additional mitigations for invasive alien species required?	☐	☐
Are site specific invasive alien species protocols attached in the appendix?	☐	☐
Cultural resources		
Are additional mitigations for cultural resources required?	☐	☐
Are cultural resource documents attached in the appendix?	☐	☐
Is cultural resource awareness training required?	☐	☐
Work in or near water		
Are DFO measures to protect fish and fish habitat required? If so, attach in the appendix or add them in supplemental mitigations.	☐	☐
Is the Fish and Fish Habitat Protection Program letter of advice required? If so, attached in the appendix.	☐	☐
Are applicable DFO standards and codes of practice required? If so, attach in the appendix.	☐	☐
Are additional mitigations required for work in or near water (other than DFO information)? If so, add them in supplemental mitigations.	☐	☐
Is an Erosion and Sediment Control Plan required? If so, determine the scale and scope.	☐	☐
Is an in-stream work plan or specific in-water section in Environmental Protection Plan required?	☐	☐
Are additional site-specific mitigations required for drainage structures?	☐	☐
Is a site-specific dewatering plan required?	☐	☐
Are additional fish, amphibian or reptile salvage mitigations required?	☐	☐
Vegetation		
Are approved Reclamation or Environmental Protection Plans required?	☐	☐
Do Field Unit reclamation guidelines exist? If so, attach in the appendix.	☐	☐
Does an approved site-specific seed mix (es) and/or planting species list exist within the Field Unit? If so, attach in the appendix.	☐	☐

Do appropriate site-specific seed mix(es) and/or plantings[1] need to be determined?	☐	☐
Are there revegetation goals appropriate to the ecoregion existing, or required?[2]	☐	☐
Others		
Are there noise management considerations for this project?	☐	☐
Are additional site-specific mitigations for larger scale manual cement mixing activities required?	☐	☐
Are additional site-specific mitigations needed for drilling and blasting?	☐	☐
Are the applicable mitigations from the Geotechnical and Environmental Investigations PRIA attached in the appendix?	☐	☐

[1] If there is no approved species list within the Field Unit, consider the following conditions when selecting plant materials:

- Revegetation with native species is preferred unless otherwise directed by Parks Canada.
- Use species relatively common within local native plant communities.
- Source seeds from local growers to ensure local adaptation wherever possible (within the ecoregion, ecozone, province or as per *Principles and Guidelines for Ecological Restoration in Canada's Protected Natural Areas*).
- Avoid the use of cultivars unless there are no wild species available.
- Consider species' viability in proposed environment and climatic conditions.
- Use species that rapidly establish to effectively control erosion, where required.
- Consider palatability of some species to wildlife and avoid growing attractants in areas of increased risk to wildlife and visitors. Avoid palatable species for roadside reclamation. For additional information see the Parks Canada Guidance on Revegetation to Reduce Wildlife Risk. ADD LINK?

[2] As an example, general reclamation goals for Banff National Parks are:

- <20% Bare soil (>80% Native vegetative cover)
- No new IAS species present (does not include species that were present pre-disturbance)
- No increase in IAS present prior to disturbance (similar plant cover/m^2)
- >80% survival of live plantings
- No erosion issues.

Mitigation Measures

1. General Activities

Site-specific mitigations

Parks Canada IA Practitioner:

1.1. Add site-specific restricted activity periods and all supplementary mitigation(s) not mentioned in subsequent modules that are required to ensure all potential impacts are mitigated:

a) ...
b) ...

Delivery

1.2. Apply additional mitigation measures mentioned above or attached in protocol as identified the Parks Canada IA Practitioner.

Wildlife

Planning

1.3. Schedule work to avoid restricted activity periods. Refer to site-specific mitigation.
1.4. Provide wildlife awareness training to on-site workers if required by field unit policy or site-specific advice.
1.5. Prior to the commencement of structural work or vegetation removal, complete any pre-work surveys that are required (e.g., invasive alien species, species at risk, migratory birds). Develop a site and species specific mitigation strategy to be implemented in the event that survey results are positive.

Delivery

1.6. Conduct any vegetation clearing outside applicable restricted activity periods, unless otherwise directed.
1.7. If unexpected nests, species at risk or other wildlife are found, cease work in the immediate area and contact designated Parks Canada staff for further direction.
1.8. Control materials that might attract wildlife (e.g., petroleum products, human food and garbage) as part of the waste management plan.
1.9. Never approach or harass wildlife (e.g., feeding, baiting, luring). If wildlife is observed at or near the work site, allow the animal(s) the opportunity to leave the work area.
1.10. Immediately alert designated Parks Canada staff or emergency dispatch of any potential wildlife conflict (e.g., aggressive behaviour, persistent intrusion, etc.), encounters on or around the site or crew accommodation, distress or mortality.
1.11. Conduct activities during daylight hours and avoid critical foraging times (i.e., dusk and dawn) unless otherwise approved by designated Parks Canada staff.
1.12. Minimize the time excavations remain open. Slope the sides to no greater than 1:1 and ensure that wildlife and humans can safely exit it. Cover or fence smaller excavations when left unattended to reduce the potential for wildlife injury.

Invasive Alien Species (terrestrial and aquatic)

Planning

1.13. Develop an appropriate approach to mitigate the establishment and/or spread of invasive alien species (IAS) on the site. If IAS are a serious issue, more effective methods should be detailed in accordance with:
    - an approved integrated pest management plan; and
    - guidance from Parks Canada specific protocols (e.g., Whirling disease protocol).

Delivery

1.14. Wash all construction equipment from outside the Parks Canada protected heritage place prior to arrival to minimize risk of introducing IAS, noxious weeds and soils from off-site. Proof that equipment was washed outside the protected heritage place may be requested before equipment is permitted into the protected heritage place.
1.15. Control IAS in parking or staging areas as needed to reduce the spread of invasive plants or seeds.
1.16. Work in uninfested sites before moving to infested sites.
1.17. Ensure machinery already in the protected heritage place is in a clean condition and maintained free of IAS before moving to new sites, within or beyond the protected heritage place.
1.18. Use caution during loading of trucks and transport of any IAS and plant materials to minimize loss of materials (e.g., cover materials during transport).
1.19. Avoid mowing invasive plants after seed set if it is likely to spread seeds of non-native vegetation.
1.20. Soil, gravel, erosion and sediment control products or other applicable materials shall not be imported from outside the protected heritage place without approval from the designated Parks Canada staff.
1.21. If organic material cannot be used in the construction site, it may be used in other parts of the protected heritage place with approval by the designated Parks Canada staff.
1.22. Minimize ground disturbance, vegetation removal and bare soil exposure (e.g., cover stockpiled material with tarps, plant seeds or plants, cover with natural mulch/ground coverings).
1.23. Stabilize and revegetate disturbed areas as soon as possible. If there is insufficient time remaining in the growing season, stabilize the site to prevent erosion and vegetate the following spring.
1.24. Before and after the use of equipment in waterbodies, clean, drain and dry it on land, to prevent the introduction or spread of aquatic invasive/non-indigenous species.
1.25. If aquatic invasive species are found during dewatering activities, note their presence and abundance and contact the designated Parks Canada staff to ensure compliance with the *Aquatic Invasive Species Regulations*.

Cultural Resources

Planning

1.26. Work with a Cultural Resource Management Advisor and specialists (e.g., archaeologists, historians, and built heritage advisors) to assess the impact of the work/project to cultural resources and on cultural landscapes or character-defining viewscapes and identify necessary mitigation measures.
    - 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 may be required.

- Cultural Resource Identification may be necessary for resources that have the potential to be cultural resources but have not been evaluated yet.

1.27. Work with a Parks Canada archaeologist to compare excavation plans to local archaeological resource inventories if available.

Delivery

1.28. Apply additional mitigation measures as identified by a Parks Canada archaeologist and/or cultural resource management advisor for the immediate area of work.
1.29. Provide on-site workers with appropriate cultural resource awareness training if required.
1.30. Avoid cultural resources (including archaeological sites) unless authorized by designated Parks Canada staff.
1.31. If cultural resources (i.e., structural remains and/or artifact concentrations) are encountered, cease work in the immediate area, secure the site and contact the designated Parks Canada staff for further direction.

Visitor Experience

Planning

1.32. Ensure traffic accommodation plans are consistent with field unit standards, where they exist.
1.33. Consider minor additions to project scope to achieve benefits for visitor experience and safety associated with the road (e.g., including pullouts when paving the road).

Delivery

1.34. Close and mark the work site and safety hazards with appropriate signage while active construction, repair or maintenance is underway; consider temporary detours or reroutes as appropriate.
1.35. If closing the area is not possible, maintain a safe working distance between work activities and visitors. If traffic control is required, use flaggers or other standardized traffic management approaches to direct traffic through the construction/hazard area.
1.36. Keep visitor access trails and roads outside the construction area free of construction materials, waste, machinery and equipment.

In or Near Water Works

Planning

1.37. Determine if DFO measures to protect fish and fish habitat, a DFO Fish and Fish Habitat Protection Program letter of advice, or other water-related mitigations are needed. If so, add them either as supplemental mitigations, or as an appendix to the PRIA.
1.38. To protect aquatic habitat, a 30 m buffer zone is generally required from a waterbody, in which no activities[1] can occur. However, the appropriate buffer zone will be determined based on site-specific conditions by qualified Parks Canada staff or upon the advice of DFO. Where appropriate, the buffer should also apply to storm drain inlets and outlets.

[1] E.g., refueling; storage of hazardous products; long-term stockpiling of soil, aggregate or asphalt; establishment of concrete washout facilities; removal of vegetation.

1.39. Plan in-water work to respect site-specific restricted activity periods to protect fish, amphibians or reptiles, including their eggs, juveniles, spawning or migrating adults and/or the organisms upon which they feed or as directed by the designated Parks Canada staff.

1.40. When appropriate, an in-stream work plan, or a specific section for work in and around water in an Environmental Protection Plan can be developed by a qualified professional (see reference) and is subject to approval by the IA Practitioner.

Delivery

1.41. Work shall comply with *Fisheries Act* and, if provided, mitigations in the letter of advice from the DFO Fish and Fish Habitat Protection Program attached in Appendix.

1.42. Implement erosion and sediment control measures to protect waterbodies, wetlands and riparian environments.

Erosion and Sediment Control

Planning

1.43. A site specific Erosion and Sediment Control Plan[1] (ESCP) must be approved in advance of starting work in the vicinity of waterbodies, wetlands or riparian environments. It must cover all construction and reclamation periods.

1.44. The ESCP must be developed by a qualified environmental professional and is subject to approval by the PC IA Practitioner.

Note:
It is likely that the final details of the plan will be provided later in the process or be modified as each work site is encountered depending on timing of work, site condition, and equipment used. However, typical requirements should be stated early.
Potential considerations are:

- Project design and spatial concept of environmental sensitivities (e.g. water bodies, riparian, wetlands, steep slopes);
- Erosion prevention (avoidance) procedures (e.g., project schedule, minimization of work area, site management, ground cover measures);
- Sediment control (minimization) measures (e.g., sediment fences, check dams, sediment traps) including specifications and typical drawings of sediment control structures;
- Detailed plans for in-water works including site isolation measures and project timelines;
- Water management plans including site control, equipment necessary and proposed dewatering locations;
- Location of erosion and sediment control measures;
- Monitoring of prevention and control measures and corrective actions (e.g., repairs);
- Removal of non-biodegradable materials once site is stabilized.

[1] Parks Canada AI practitioner has to determine the project risk and sensitivity of the environment and provide ESCP scale and scope, including whether the ESCP may be included within a general Environmental Protection Plan.

Delivery

1.45. Provide a briefing about the ESCP for all crew members on site and ensure they are aware of the mitigations.
1.46. Plan project activities to minimize soil handling and limit equipment movement over exposed soils and steep or unstable slopes prone to erosion.
1.47. If sediment ponds are required, ensure runoff that may reach streams meets CCME turbidity standards.
1.48. Avoid activities that contribute to soil compaction and use practices that roughen and decompact soils to promote infiltration.
1.49. Use erosion and sediment control products, including backing, that are made of 100% biodegradable materials (e.g., jute, sisal or coir fiber) when possible.
1.50. Erosion and sediment control products should be selected to reduce potential for wildlife entanglement/attraction and prevent introduction of invasive alien species.
1.51. Avoid straw-based erosion control unless authorized by designated Parks Canada staff. The use of hay is not permitted due to risk of introducing invasive species.
1.52. All products must be approved by designated Parks Canada staff and installed prior to commencement of work.
1.53. In the event of erosion and sediment control measure malfunction or of deleterious substance, including sediment, run off (current or impending), work shall stop until measures are adjusted to address the problem.
1.54. Minimize the length of time soils are exposed and complete work in one area before commencing work in another area.
1.55. If vegetation clearing is scheduled early due to restricted activity periods, maintain soil stability by delaying grubbing until just prior to construction activities.
1.56. Store excavated material and debris in a stable area above the high water mark or active floodplain and, where possible, 30 m from drainage features and/or the top of steep slopes.
1.57. Protect excavated material from entering a waterbody (e.g., cover with erosion blankets or tarps, seed, or plant with native vegetation).
1.58. Maintain effective sediment and erosion control measures until complete revegetation of disturbed areas is achieved unless directed otherwise by designated Parks Canada staff.

Staging and Laydown Sites

Planning

1.59. Identify key contacts and their respective roles and responsibilities prior to work starting, and communicate this to all on-site workers.

Parks Canada Key Contacts	Roles and Responsibilities	Contacts
Emergency Dispatch:		

Delivery

1.60. Ensure all on-site staff attend a briefing with designated Parks Canada staff before beginning work at the site to review and explain mitigations.
1.61. Delineate the work zone by clearly marking with stakes, flagging tape or other means to limit active construction and define access and egress locations. Remove completely when the project is completed.

1.62. Identify staging areas, material/equipment drop sites, and parking areas. Locate these areas within an existing disturbed footprint (e.g., roadways, gravel surface, previously disturbed areas with high resiliency) or other site as approved by designated Parks Canada staff.
1.63. Use existing roadways, trails, identified disturbed areas or other areas as approved by designated Parks Canada staff for site access.

Noise Management

Planning

1.64. Identify noise limits (e.g., location, time of year), especially near areas of high use by park visitors (e.g., campgrounds, picnic areas) or in vicinity to sensitive areas and wildlife and incorporate into plans and specifications.

Delivery

1.65. Maintain equipment and heavy machinery in good working order (e.g., adequate muffler, regular maintenance).
1.66. Use the noise attenuation devices provided with certain equipment or tools (e.g., compressor side panels).
1.67. Shut off motorized equipment if it is not used for an extended period of time (e.g., lunch break).
1.68. Whenever possible, locate stationary equipment away from noise-sensitive areas or in such a way as to reduce the impact on the ambient noise level.

Fuel Storage and spills

Planning

1.69. A Spill Contingency and Response Plan must be submitted and approved by designated Parks Canada staff prior to starting work.

Note:
The Spill Response Plan must, at minimum, include the following information:

- List of products and materials that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement, sand blasting agents, paint, solvents and hydrocarbons;
- Required equipment on site and location of spill kits;
- Spill prevention procedures (i.e., containment and storage of materials, security, handling, use and disposal of empty containers, surplus products or waste generated in the application of these products in accordance with all applicable federal and provincial legislation);
- Fueling and fuel storage procedures;
- Spill response procedures (i.e., containment, clean-up, disposal of contaminated materials, etc.);
- Spill reporting procedures; and
- Up-to-date emergency response contact list including contact information for reporting spills.

Delivery

1.70. Ensure drip trays are placed under equipment when not in use.

1.71. Retain spill kits sufficient to contain and clean up 110% of the site's largest possible fuel or chemical spill at each location of potential spills, including all sites where equipment is working.
1.72. Provide a briefing about the Spill Response Plan for all crew members on site and ensure they are aware of the location and use of spill kits and containment devices.
1.73. 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 waterbody or soils.
1.74. Take timely and effective action to stop, contain and clean-up all spills if the site is safe to enter. Immediately notify the designated Parks Canada staff of any spill. In the event of a major spill, stop all other work and devote all personnel to spill containment and clean-up. Remediate the site to pre-spill conditions.
1.75. Dispose of contaminants at an approved facility. A detailed receipt of delivery to an approved facility may be requested by the designated Parks Canada staff.

Dust Management

Delivery

1.76. For dust control from all project activities, use only water that is free of waste and organic matter. Chemical dust suppressants shall not be used unless directed otherwise by designated Parks Canada staff, in accordance with Parks Canada health and safety and environmental policies.
1.77. Dust control materials should be applied to pre-wetted surfaces.

Site Clean Up/General Waste Management

Delivery

1.78. Clean tools and equipment outside of protected heritage places to prevent the release of wash water that may contain deleterious substances, unless otherwise directed by designated Parks Canada staff.
1.79. Remove all salvageable, non-combustible and non-hazardous materials and reuse or recycle it to the greatest extent possible.
1.80. Contain and remove all waste in a timely and approved manner, and dispose of it at an approved disposal facility outside the protected heritage places unless otherwise directed.
1.81. Empty construction waste storage containers when 90% full. Provide lids for waste containers, ensure they are wildlife proof if there are attractants, and cover waste loads during transport (including waste containers and truck loads).
1.82. Separate on site any hazardous material[1] and pollutants such as fuels and solvents. Dispose of contaminated materials at provincially or territorially certified disposal sites.
1.83. If present, service portable sanitary facilities on a regular basis and dispose of accumulated waste at a sanitary waste disposal facility. Provide adequately sized portable facilities and manage them to ensure waste is not discharged to the environment.

[1] E.g., asphalt shingles, creosote treated wood, asbestos, lead paint, molds, animal excrement, paints, automotive products, electrical equipment...

1.84. Collect waste materials created during the application or removal of protective coatings (e.g., sandblasting abrasives, paint particles, rust and grease) and retain them for disposal at appropriate locations.

Site Reclamation

Planning

1.85. Post-construction reclamation activities must be detailed in an approved Reclamation Plan, Environmental Protection Plan or other project document prior to construction.

Note:

- Discuss reclamation early in the project scoping and design stage and include in project budget and contract specifications.
- Appropriate site-specific reclamation goals should be determined for the project, depending on the nature of the site and level of disturbance. For most road projects, a Reclamation Plan will outline revegetation methods to achieve a previous state. In certain cases, a Restoration Plan may outline methods to restore ecological integrity or realize additional conservation gains.
- Reclamation Plans should outline any plans for non-native vegetation management, topsoil management, plant materials, revegetation methods, monitoring and maintenance.
- Follow any Field Unit reclamation guidelines where they exist or set revegetation goals appropriate to the ecoregion. As an example, general reclamation goals for Banff National Parks are:
  - <20% Bare soil (>80% Native vegetative cover)
  - No new IAS species present (does not include species that were present pre-disturbance)
  - No increase in IAS present prior to disturbance (similar plant cover/m^2)
  - >80% survival of live plantings
  - No erosion issues.

Delivery

1.86. Implement Reclamation Plans for the disturbed area immediately following completion of construction. Long delays between vegetation removal and revegetation should be avoided. For some projects, revegetation in smaller phases should be considered to minimize soil exposure.

Subsoil and Topsoil Placement:

Planning

1.87. Assess methods of bioengineering such as terracing, willow staking, or live pole drain systems where soils are steeper or remain unstable.

1.88. Avoid use of fertilizer to limit non-native vegetation growth and allow for local species to use available nutrients. Any use of compost, foreign soils, fertilizers, locally sourced mycorrhizae compost and soil amendments must be approved by designated Parks Canada staff.

1.89. Place and grade topsoil before winter.

Delivery

1.90. Excavate, conserve, store and replace existing site topsoil unless otherwise directed by designated Parks Canada staff. Soil imports from other project sites or outside of the

protected heritage place is not generally recommended. However, if required, it must be approved by designated Parks Canada staff.

1.91. Salvage site topsoil using a "two lift" method and store topsoil and subsoil separately for improved reclamation success.

1.92. Compact backfill or allow it to settle to prevent depressions.

1.93. Replace topsoil to all areas immediately following fine grading.

1.94. Do not compact topsoil by driving repeatedly over the site. Keep topsoil "rough and loose" or as directed by designated Parks Canada staff.

1.95. Where remaining soils are unstable due to steepness or soil characteristics, install erosion controls immediately or apply a hydraulic erosion control product to the target areas.

Revegetation:

Planning

1.96. Determine the appropriate site-specific seed mix(es) and/or plantings.

Note:
If there is no approved species list within the Field Unit, consider the following conditions when selecting plant materials:

- Revegetation with native species is preferred unless otherwise directed by Parks Canada.
- Use species relatively common within local native plant communities.
- Source seeds from local growers to ensure local adaptation wherever possible (within the ecoregion, ecozone, province or as per *Principles and Guidelines for Ecological Restoration in Canada's Protected Natural Areas*).
- Avoid the use of cultivars[1] unless there are no wild species available.
- Consider species' viability in proposed environment and climatic conditions.
- Use species that rapidly establish to effectively control erosion, where required.
- Consider palatability of some species to wildlife and avoid growing attractants in areas of increased risk to wildlife and visitors. Avoid palatable species for roadside reclamation. For additional information see the Parks Canada Guidance on Revegetation to Reduce Risk to Wildlife.

1.97. Schedule construction so that seeding or planting can coincide with seasonal planting windows (i.e., spring or fall).

1.98. Salvage of native plants is preferred over purchase of commercial plugs or container stock where possible.

Delivery

1.99. Do not use seed that is coated (including "ultra-coating") unless approved by the designated Parks Canada staff.

1.100. Ensure seed certificates are approved by the designated Parks Canada staff prior to seeding.

[1] Cultivar: a cultivated plant variety that has been selectively bred for certain specific characteristics (hardiness, stature, colour, etc.), e.g. Big Bluestem 'Niagara' (*Andropogon gerardii* 'Niagara').

1.101. Ensure seed mix(es) and any species substitutions are approved by the designated Parks Canada staff.
1.102. Unless otherwise directed, seed certificates must include both the common and scientific name following the CANADENSYS nomenclature system; indicate if the seed is a cultivar, ecovar, or wild native species; geographic origin (seed source); date of collection; method of seed storage; germination, viability and vigour; and indicate all other species occurring including agronomic, weed, and native species; and date of the analysis. The contact information for the Seed Supplier shall be included.
1.103. Broadcast seeding is the preferred method of seeding native seeds, where terrain and soil conditions permit.
1.104. If using Hydraulic Erosion Control Products (HECP or hydromulch) apply over top of native seed already in place, where possible. Avoid using native seeds in tank mixes unless specified by the designated Parks Canada staff.
1.105. For hydroseeding and hydromulching, thoroughly clean and rinse tanks to remove any unwanted species. All tank additions (e.g., hydro-mulch, tackifier, soil amendments) must be pre-approved by the designated Parks Canada staff.
1.106. For hydroseeding or hydromulching, ensure that full coverage and minimum depth are attained for erosion protection, and depth is consistent across site. Trees and established existing vegetation are not to be covered with mulch.
1.107. Seed and stabilize 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, unless otherwise directed.
1.108. Do not perform seeding under adverse field conditions such as frozen soils, excessively wet or dry soil, ice or standing water, heavy rain, or high winds.
1.109. In cases where mulching is necessary to assist with seed establishment, apply it immediately after seeding.
1.110. Apply seed at a rate appropriate to the seed mixture, seeding method and existing vegetation conditions or as directed by the designated Parks Canada staff.
1.111. Do not seed on hardened (compacted), crusted or mechanically rutted surfaces.
1.112. Following broadcast seeding, rake soil to set seed in place and reduce foraging; this may be completed by hand or light harrow for larger areas.
1.113. Protect seeded area against erosion or damage as appropriate for the specific site (e.g., erosion control blanket, hydro-mulching, mulching).
1.114. Some seeding procedures may have to be completed or repeated in subsequent years as per the Reclamation Plan.
1.115. Ensure live plants (e.g., transplants, plugs, container stock) are watered-in well and receive sufficient moisture until established, and through any periods of extended drought. Provide regular watering unless there is sufficient rainfall.

Monitoring and Control:

1.116. Schedule site inspections to monitor reclamation progress for an appropriate timeframe following construction to ensure establishment of vegetation.
1.117. Vegetation and IAS establishment will be assessed and minimum standards met before Certificate of Completion is issued.

2. Asphalt Production and Handling

Operation of Asphalt Plants

Planning

2.1. Select low volatile organic compounds[1]-emitting asphalt products in paving activities or maintenance operations (e.g., emulsified asphalt) when appropriate.
2.2. Asphalt works should be undertaken during periods of dry weather whenever possible as this allows easier control of contaminated runoff and sediment.
2.3. If the work schedule requires working in the rain, install appropriate sediment and erosion controls 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. Stop paving if deleterious substances are running off (or are obviously going to run off).
2.4. Asphalt plant operation shall comply with all environmental pollution control regulations, including provincial regulations, and the plant operational plan.
2.5. Ensure asphalt plant emissions do not exceed the limits set by provincial emission regulation.
2.6. Asphalt plants should be located at least 500 m from buildings with human habitation.
2.7. Determine acceptable operating hours of operation and, if applicable, local noise standards.
2.8. Determine stockpile areas or disposal/re-use plans for rejected asphalt.

Delivery

2.9. Provide enough room between the stockpiles and the asphalt plant for a loader in the event of a spill at the asphalt plant.
2.10. Install a containment berm with an associated liner made of occlusive material (e.g., plastic of a thickness approved by the designated Parks Canada staff) and covered with absorbent sand or clay under the bitumen storage tank to ensure containment of 110% of the tank's capacity. Dyking and ponding may be required to control the rate and quality of runoff from the plant site.
2.11. If excess or reject new asphalt product is stockpiled during significant rainfalls, contain all runoff as directed by the designated Parks Canada staff.
2.12. Make every effort to recycle waste asphalt, either as a base course, or by recycling waste asphalt product through the asphalt plant according to engineering specifications. Old cured ground asphalt material shall be removed and recycled, or stored for future recycling at an approved operational gravel pit or asphalt plant site.
2.13. Protect containment/catchment areas and drip trays at the asphalt plant from rainfall. If contaminated, dispose of all collected water at an approved disposal facility.
2.14. Ensure that the water in the settling ponds remains clean of petroleum products. Dispose of any contaminated water at an approved disposal facility.
2.15. Contain sludge removed from the clarifier to prevent fine dust particles from becoming airborne during windy periods.

[1] VOC-emitting asphalt

Gravel Crushing and Washing

Planning

2.16. Where possible within engineering constraints, recycle asphalt materials to reduce the need for new gravel.

Delivery

2.17. If water for cleaning is extracted from a waterbody, refer to module 11: Water Withdrawal and Dewatering.

2.18. If gravel requires washing, wash water shall not be deposited directly into any waterbody.

2.19. Discharge water free from chemical contaminants onto the 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.

2.20. Contaminated water shall be treated to meet CCME guidelines or transported outside of the protected heritage place for disposal at an approved facility.

2.21. Ensure there are no vertical faces on gravel stockpiles, to prevent nesting by bank swallows or similar species.

Oiling of Truck Boxes

Planning

2.22. Ensure trucks used for hauling asphalt mixture have tight, clean, smooth metal boxes. Acceptable lubrication to prevent asphalt product from adhering include a minimum amount of thin fuel oil or, where oil is prohibited, a non-petroleum lubricant.

Delivery

2.23. Oil truck boxes only when absolutely necessary.

2.24. Oil truck boxes in a bermed area, consisting of a plastic underlay with 15 cm overlay of clean gravel. Hand-collect oil-contaminated gravel (to prevent tearing of the plastic) from the bermed area daily, and put through the asphalt plant.

Disposal and Clean Up of Other Waste Products

Planning

2.25. During the preconstruction meeting, establish a defined schedule to ensure regular clean-up of waste asphalt and petroleum spills.

Delivery

2.26. Refer to module 1: General Activities-Site Clean Up/General Waste Management.

2.27. Collect leaks in drip-trays. Remove the collected material from the protected heritage place and dispose of at appropriate facility, or recycle it through the asphalt plant.

2.28. Collect used oil, filters, grease cartridges, oil cans and other waste products of plant servicing, and dispose of them at the nearest, approved industrial waste facility.

3. Concrete Handling and Washout Facilities

Delivery

3.1. Prevent wash water, concrete, debris and sediment used in roads, barriers, guardrails or other-related infrastructure from directly or indirectly entering water by establishing and maintaining effective separation of the concrete work from the storm drain inlets, open drainage facilities, and waterbodies.

Onsite Temporary Concrete Washout Facility

Delivery

3.2. Ensure the size and number of pits or bermed areas used as concrete washout facilities are sufficient to contain liquid and concrete waste, are in flat areas, and are not in sensitive environments.

3.3. Wood stakes and sandbag materials may be used to construct temporary containment walls or "barriers." Products should also be selected to reduce potential for wildlife entanglement/attraction and prevent introduction of invasive alien species. Avoid straw bales unless authorized by designated Parks Canada staff.

3.4. Line the facility with polyethylene sheeting that is a minimum of 10 mil thick and free of holes, tears or other defects.

3.5. Ensure soil under the washout structure is free of rocks or other debris that may cause tears or holes in the plastic lining material.

3.6. Wash excess concrete from mixer trucks, chutes or bins into approved concrete washout facilities or collect in an impermeable bag for disposal. Return large quantities of excess concrete to the batch plant for disposal.

3.7. If concrete batching plants are located in the protected heritage place, they must be operated pursuant to applicable dust, air emission, and water quality control regulations.

3.8. Backfill and restore depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities.

Concrete Washout Facilities

Delivery

3.9. Maintain temporary concrete washout facilities with adequate holding capacity, including a final freeboard of at least 100 mm.

3.10. Remove concrete from washout facilities when hardened. Dispose of it outside the park in compliance with provincial and federal regulations, or, where approved by designated Parks Canada staff, bury it in the grade or crush and mix it with aggregate.

3.11. Clean existing facilities, or ensure new facilities are ready for use, once the washout is 75% full.

3.12. Inspect temporary concrete washout facilities daily and after heavy rains to check for leaks, identify any damage to plastic linings and sidewalls (e.g., tears in PVC liner, missing sand bags) and determine whether they have been filled to over 75 percent capacity.

Concrete Application

Planning

3.13. Determine site specific mitigation measures for larger scale manual mixing activities (around >20 litres) including buffer zones, drip trays, and daily surveillance requirements.

Delivery

3.14. Perform concrete cutting operations in a way to pick up all saw cutting residue.
3.15. Collect wash water when cleaning areas and equipment used during concrete activities and dispose of wash water with slurry.
3.16. Do not dump unused wet concrete on bare ground to harden at construction sites.

Concrete Work In or Near Water

Delivery

3.17. During concrete delivery for works near water, where the 30 m buffer zone cannot be observed (e.g., bridge work), establish extra measures to prevent spills into the environment (e.g., collection/drip trays and berms lined with impervious material (such as plastic and a layer of sand), and double-lined fuel tanks).
3.18. Use anti-leaching concrete for projects that are likely in contact with a waterbody. Provide all workers with proper training on handling and application of anti-leaching concrete.
3.19. Maintain complete isolation of all cast-in-place concrete and grouting from fish-bearing waters until significantly cured.
3.20. If concrete materials are found to be entering waterbodies, monitor turbidity and pH and have a CO_2 diffusion system in place to neutralize pH levels.
3.21. If working below the water table without anti-leaching concrete, implement effective isolation, dewatering and other methods to keep the toxic product from entering the water.

4. Paving, Resurfacing and Grading

Grading

Delivery

4.1. Do not grade or allow material to spill outside of the delineated work area, within 1 m of the forest drip line, or in a stream, waterbody or wetland. Any material inadvertently falling outside the work limits will be removed promptly in a manner that does not damage vegetation or water quality.

4.2. Avoid grading following seed set if it is likely to spread seeds of non-native vegetation.

Paving and Resurfacing

Delivery

4.3. Paving should not be undertaken during steady rain to prevent entry of concrete, asphalt, or patching and sealing compounds directly or indirectly in water.

4.4. Minimize changes to the surface that could negatively affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface waters.

4.5. Follow manufacturer guidelines and methods for proper use in the handling and application of sealants or other compounds.

4.6. Minimize application of seal coats or tack in wet conditions:

- Apply seal coats only to dry surfaces and not within 2 hr of rainfall
- Apply tack coats only if no rain is expected prior to covering the tack-coated surface with asphalt. If unforeseen rain arrives ensure runoff from recently seal coated surfaces are prevented from entering surface waters.

Pavement Marking and Barrier, Concrete Barrier and Guardrail Reinstatement

Delivery

4.7. If pressure treated wood is used, follow procedures in the Parks Canada Treated Wood Management Guidelines (Draft 2019).

4.8. Undertake pavement marking pursuant to standard methods applied in the protected heritage place for control of paint products, both in transport and handling.

4.9. A plan for the transport and control of paint and hazardous products (e.g., application of paint, cleaning of equipment, containment and disposal of waste paint and cleaning products) must be approved by designated Parks Canada staff.

5. Roadside Vegetation Removal

This module covers the occasional or project-specific (i.e., non-routine) cutting or removal of vegetation within the existing footprint of the roadway. Such vegetation often includes trees and large shrubs, and is typically done to prepare for construction. This work may also include deferred vegetation management (i.e., non-routine sightline maintenance). This PRIA does not include significant vegetation removal projects (e.g., kilometres of roadside tree removal or removing trees through the use of skidders) or routine roadside vegetation management activities.

General

Planning

5.1. Flag clearing areas. Clearing plans shall be approved by designated Parks Canada staff.
5.2. Do not clear vegetation during high or extreme fire weather index without the approval of designated Parks Canada staff. Work may be delayed to prevent risk of wildfire.
5.3. Identify and preserve trees with obvious wildlife use (e.g., snags with cavity nests, large trees with stick nests) unless assessed as hazard trees. If felling is unavoidable, designated Parks Canada staff consultation and approval is required.
5.4. Consider potential wildlife impacts (e.g., impacts of clearing Milkweed on Monarchs) when planning the extent of vegetation removal along roadways.
5.5. Identify individual trees to be salvaged for later use. Temporarily transplant trees for use following construction.

Delivery

5.6. Vegetation clearing should be conducted using methods that minimize ground disturbance, promote effective reclamation and minimize the potential for the establishment and spread of non-native vegetation.
5.7. Clear the minimum of area necessary; trees should be removed only if necessary for project completion or visitor/staff safety. Minimize full removal and retain vegetation when possible to reduce erosion.
5.8. If removal of riparian vegetation is unavoidable, use manual methods and directionally fall trees as far as possible from watercourses. Designated Parks Canada staff consultation and approval is required.
5.9. Protect roots of trees to drip line to prevent disturbance or damage. Avoid traffic, dumping and storage of materials over the root zone.
5.10. When felling trees, take precautions to minimize damage to surrounding vegetation.
5.11. When removing individual branches, employ pruning techniques to minimize risk of tearing the bark and harming the tree; ensure that only branch tissue is removed and stem or trunk tissue is left undamaged.
5.12. Cut stumps flush with the ground, and leave ground cover undisturbed to promote slope stability. If clearing operations are conducted during snow cover, revisit the site after snowmelt to flush cut stumps.
5.13. Grub only if the removal of stumps is required to achieve project goals.
5.14. Ensure grubbing and stripping do not damage trees and roots beyond clearing limits.
5.15. On steep slopes, avoid grubbing and stripping unless otherwise directed.
5.16. During grubbing, shake stumps, roots, imbedded logs and other non-soil debris free of loose soil and rocks before transport.

Disposal of Vegetation Debris

Planning

5.17. Adhere to all federal and provincial policies with regards to the transport of wood beyond park boundaries.
5.18. Set aside logs for use elsewhere if directed by the designated Parks Canada staff.
5.19. Where fire fuel loading is not a concern, consider placing limited amounts of vegetation debris in the forest to mimic natural tree fall, using it as a natural erosion control method along stream banks or large side slopes, or including it in site restoration. Such uses must be approved by designated Parks Canada staff.

Delivery

5.20. Debris shall not be disposed of in waterbodies.
5.21. Remove all vegetation debris as soon as possible from the work site, either by transporting off-site for disposal or as directed by the designated Parks Canada staff.
5.22. Convey logs and other salvage materials to storage sites without spreading debris or damaging standing trees or other features outside the marked clearing or storage limits. Do not skid material through wetlands, waterways or water bodies.
5.23. Any burning of debris must be approved by the designated Parks Canada staff. If approved:
    - Make burn piles where trees are felled or as directed by designated Parks Canada staff. Limit piles to 1.8 m in diameter and no more than 1.2 m high, or as directed by the designated Parks Canada staff.
    - Locate burn piles to prevent scorching of surrounding live trees. Adopt measures to ensure that fires do not spread (e.g., burn on snow or on mineral soil).
5.24. Mulch or chip vegetation only where the quantity of mulch will not cover underlying vegetation, prevent new native seedlings from sprouting, or cause soil or seed bank sterilization. Approval from designated Parks Canada staff for mulching/chipping will be determined based on reclamation objectives, non-native vegetation, and fire hazard mitigations.
5.25. If mulching is used to clear vegetation, rough mulching is the preferred option.

6. Excavations, Soil Stripping and Overburden Removal

Excavation

Planning

6.1. Trenches to be dug for service lines should follow an existing utility corridor where possible.

Delivery

6.2. Minimize changes to the ground surface that negatively affect infiltration and runoff characteristics and maintain or re-establish effective surface drainage on completion of the project.

6.3. Do not spill materials outside the work limits. If any material inadvertently falls outside the work limits, remove it promptly in a manner that does not damage trees or vegetation.

6.4. Backfill and compact excavations as soon as possible.

6.5. In the event of a work program shutdown during inclement weather (e.g., winter conditions unfavourable for construction, heavy rain events) establish sediment and erosion control and a contingency planning for bared soils or excavated material stockpiles.

Soil Salvage

Planning

6.6. Plan the topsoil and subsoil salvage to minimize handling and traffic on soils.

Delivery

6.7. Salvage topsoil and subsoil at all excavation sites in separate layers or lifts for reclamation purposes. Topsoil shall not be removed from the site unless otherwise directed.

6.8. Store topsoil separately from subsoil. Never pile subsoil on top of topsoil.

6.9. Stumps and woody debris should be removed from topsoil, but retained for restoration where applicable and at the direction of the designated Parks Canada staff.

6.10. Stabilize and repair all eroded areas prior to surface preparation, as determined by the designated Parks Canada staff, using local material where possible.

6.11. For multi-lift procedures, place the final layer of organic material containing the seed bank last.

6.12. Unless otherwise directed, apply topsoil at a depth of 30-50 mm, or at the depth of the original site conditions[1]. Topsoil depths can be increased on gentler slopes and the surface should remain rough.

6.13. Do not allow equipment to compact topsoil after replacement, which should be timed to coincide with seeding or other revegetation work.

[1] When sites were lacking of topsoil prior to construction, returning to that condition can be approved by the by the designated Parks Canada staff

Storage of Excavated Materials

Planning

6.14. Identify soil storage locations when developing construction plans. During the winter (when ground is frozen) soil storage can occur on undisturbed areas. When soil is thawed, soil storage should be located on previously disturbed areas (e.g., pull outs, roads, trails, campsite, and staging area) so that no soil compaction occurs outside of the construction area, unless otherwise directed.

6.15. Plan to 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.

Delivery

6.16. Store stockpiled material on flat ground, away from drainage areas, waterbodies, subsoil, spoil material, construction activity and day-to-day operations unless otherwise directed; follow Erosion and Sediment Control Plan or Environmental Protection Plan.

6.17. Limit soil stockpile height to 2 m unless approved by designated Parks Canada staff.

6.18. Avoid topsoil loss. For example:

- Do not store soil in areas prone to high winds.
- Surround soil with berms or construct barricades in areas with steeper slopes.
- Cover and anchor stockpile with dark geotextile when storage will exceed a week.
- Plant approved native seed over topsoil stockpiles instead of using covers if approved by the designated Parks Canada staff.

6.19. If surplus topsoil is available after site reclamation:

- it may be used to fill depressions around the project site with approval from designated Parks Canada staff; or,
- make arrangements for disposal or stockpiling for other projects in consultation with the designated Parks Canada staff.

7. Slope Stabilization, Drilling and Blasting

Slope Stabilization-Scaling

Delivery

7.1. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, ensure that appropriately-sized, clean rock is used, and rock is installed at a similar slope to maintain a uniform bank.

7.2. Direct concentrated surface water (runoff) away from cut and fill slopes.

Drilling and Blasting for Slope Stabilization

Planning

7.3. The designated Parks Canada staff will identify a magazine location for explosives should a factory site or "ready-to-use" explosive storage site be required.

7.4. The blasting supervisor shall plan the work to ensure no damage to infrastructure, people, surrounding vegetation or wildlife by mitigating risk of fly rock.

7.5. Refer to the National Geotechnical and Environmental Investigations PRIA for drilling boreholes and excavation of test pits.

Delivery

7.6. When possible, contain cuttings from all drilling so they can be removed entirely from the site. If the cuttings are contaminated dispose of them at an approved waste disposal facility.

8. Demolition

Planning

8.1. Before undertaking the partial or complete demolition of existing infrastructure, prepare a demolition plan or a written procedure for partial demolition. This is subject to approval and direction from the designated Parks Canada staff.

8.2. If water lines and wells are of no further use, remove, cap or decommission them according to the appropriate federal or provincial legislation. Consult with designated Parks Canada staff to determine whether full excavation and removal of all subsurface infrastructure (e.g., pipes, cement structures, wires) is required. Backfill any excavation with clean and authorized topsoil.

8.3. Prior to commencement of demolition activities, identify water and septic systems, lines and/or fields and take precautions during the operation of heavy equipment to avoid damaging them.

Delivery

8.4. If undocumented contamination is found, cease work immediately and contact designated Parks Canada staff.

9. Drainage Structures

Drainage Structures

Planning

9.1. Plan design of new drainage structures ahead and incorporate into the project scope. Proposed drainage structures should be designed or upgraded to facilitate habitat connectivity for fish, amphibians, reptiles and other wildlife. Consideration should also be given to incorporating wildlife crossing features into drainage structures as appropriate (e.g., ledges or pathways) or to designing culverts to reduce the ability of beavers to dam them.

9.2. Consider installing the new culvert offset from the old one to allow the waterbody to continue flowing in its original path during construction, then shunt the stream to the new culvert upon completion.

Delivery

9.3. Ensure compliance with current DFO standards and codes of practice[1] (e.g., Interim code of practice: Culvert maintenance or Interim code of practice: Temporary cofferdams and diversion channels).

9.4. When removal of debris is required within culverts and around bridge piers and abutments, implement the following:

- Remove materials by hand when feasible.
- Limit removal of accumulated material (e.g., branches, stumps, woody materials, garbage) to the area within the culvert, immediately upstream of the culvert and to that which is necessary to retain culvert function and water flow.

9.5. Adequately protect the culvert, inlet(s) and outlets(s) with rip rap to prevent erosion and scour around the culvert during high runoff events.

9.6. Maintain natural streambed material through fish-bearing drainage structures to allow continuous substrate that matches the streambed below and above the crossing, unless otherwise directed.

[1] Code of practice may be included in appendix.

10. Bridge

Bridge Repairs

Delivery

10.1. Use of untreated wood products is recommended when feasible. If there is no alternative to using treated wood, ensure it has been treated with a wood preservative appropriate for the project. Follow procedures in the Parks Canada Treated Wood Management Guidelines (Draft 2019).

10.2. Avoid use of toxic paints, primers, solvents, degreasers and rust inhibitors.

10.3. Prevent entry of deleterious substance[1] directly or indirectly in water. For example:

- Establish and maintain effective separation of the work from the waterbody.
- Attach drop cloths or tarps (supported by webbing or netting if necessary) to prevent materials from entering the water, and inspect regularly for signs of failure.
- Stop work if deleterious substances are running off (or are obviously going to run off).
- If treated timber must be cut to size, ensure cutting takes place away from the bridge and waterbody. Sawdust must be prevented from entering any waterbody and removed from the park or otherwise disposed of as directed by the designated Parks Canada staff.

Bridge Cleaning

Planning

10.4. Schedule bridge-cleaning activities (not in-water work) to coincide with spring freshet when possible. At freshet[2] or during periods of high flow a large waterbody will often have its highest background levels of sediment.

10.5. 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 the designated Parks Canada staff in consultation with the aquatic specialist/parks ecologist and add as a supplemental mitigation.

Delivery

10.6. Use only water for cleaning. If your cleaning activities require degreasers or any other chemical, approval is required by the designated Parks Canada staff.

10.7. Comply with allowable levels of silica when using abrasives, as specified in national/provincial regulations. To the extent possible, use an abrasive with a less significant impact than silica.

10.8. Adequately seal drains and any open joints on the bridge deck before sweeping or washing

10.9. Inspect tarps, drain blocks, and wash water runoff areas regularly to ensure they are functioning. Repair as required.

10.10. Use hydro blasting or manual techniques, where possible, when removing road dirt, soluble salts and loose paint.

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[1] e.g., concrete, asphalt, paint, solvents, sandblast material, patching and sealing compounds

[2] Freshet: high water flow during spring thaw.

10.11. Dry sweep and collect loose material off bridge surfaces before washing the bridge.
10.12. If dry sweeping and preventing direct runoff to waterways is not a feasible way to clean the surface, alternate procedures shall be determined in consultation with the designated Parks Canada staff.
10.13. Contain any wash water or runoff to the bridge deck. Direct wash water towards the bridge approaches and away from the waterbody, then to a vegetated area or contained settling areas (e.g., dry ditch channels unconnected to a waterbody) where it can infiltrate.
10.14. 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 waterbody, or re-route runoff through temporary piping onto adjacent settling ponds or structure. Using a hydro vacuum would be another option.

11. Water Withdrawal and Dewatering

Water Withdrawal

Delivery

11.1. Select waterbodies than can sustain withdrawal without compromising sensitive species.
11.2. Follow the 10/90 rule for water withdrawal. This allows for up to 10% of the stream flow to be withdrawn, as long as the stream flow does not fall below the 90% exceedance flow.
11.3. If water withdrawal is approaching 10% of the stream flow, limit total take of water to less than 5 successive days and less than 10 days in any period of 30 days.
11.4. Ensure any flows are temporarily diverted around the portion of the ditch or waterbodies where work is being undertaken.
11.5. Ensure compliance with current DFO codes of practice (e.g., Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater).

Dewatering and Rewatering

Planning

11.6. Develop a site-specific dewatering plan before commencing a pump-out sump to dewater excavation sites, with specific details on how and where the water will be discharged and how turbidity will be managed.
11.7. Site-specific mitigations may be required depending on the conditions of the discharge area (including erodibility of soils), freezing conditions operations, overflow avoidance, decanting and settlement pond reclamation.

Delivery

11.8. Ensure compliance with current DFO codes of practice (e.g., Interim code of practice: Temporary cofferdams and diversion channels or Interim code of practice: End-of-pipe fish protection screens for small water intakes in freshwater).
11.9. Capture and relocate any fish trapped within an isolated/enclosed work area and safely relocate them to an appropriate location in the same water body. See module 12: Fish, Amphibian and Reptile Salvage.
11.10. Dewater gradually to reduce the potential for stranding fish.
11.11. Monitor discharge water quality on a regular basis. Should there be any observable turbidity at the discharge point, work should halt until the source is determined and additional mitigation measures are applied.
11.12. Establish soil and vegetation erosion protection when water is pumped onto land.
11.13. Remove any excess sediment sources and cap with clean rock or gravel as appropriate.
11.14. Remove sediment control measures and exclusion fencing in a way that prevents the escape or re-suspension of sediments.

12. Fish, Amphibian and Reptile Salvage

Planning

12.1. A qualified environmental professional is required to do the salvage. The salvage protocol must be submitted and approved by Parks Canada.

12.2. Consider time of year for salvaging activities such as cold weather and ice which can make it very hard on animals, salvagers, labourers and equipment.

Delivery

12.3. Capture and relocate any animal trapped within an isolated/enclosed work area and safely relocate them to an appropriate location in the same water body / environment. Refer to Invasive Alien Species Management should any invasive species be found.

12.4. Relocate any fish as per applicable permits for capturing and relocating fish.

12.5. During amphibian salvage, try to move the object they are on.

12.6. Complete salvage before work starts and, if appropriate, repeat if flooding occurs or if isolation is lost.

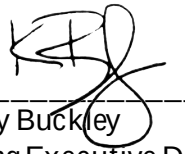
12.7. If temporary exclusion fencing is installed to prevent salvaged individuals from returning to the work area during construction, remove it upon completion of the project.

Approval

_____ May 6, 2021

Julie Tompa — Date

Director, Natural Resource Management Branch



_____ May 6, 2021

Kerry Buckley — Date

Acting Executive Director, Asset Management and Project Delivery Branch

Bibliography

British Columbia Ministry of Forests and Environment Lands and Parks. 2000. *Provincial Wildlife Tree Policy and Management Recommendations*. Government of British Columbia.

British Columbia Ministry of Transportation and Infrastructure. 2018. *Environmental best practices for highway maintenance activities 3rd ed.* Government of British Columbia.

British Columbia. 2019. Ministry of Transportation & Infrastructure. Best Practices for Managing Invasive Plants on Roadsides. A Pocket Guide For British Columbia's Maintenance Contractors.

Canadian Council of Minister of the Environment. *Water Quality Guidelines for the Protection of Aquatic Life Freshwater, Marine*. Accessed February 2021. https://ccme.ca/en/summary-table?lang=en&factsheet=219

Coordinated Technology Implementation Program. 2011. *Current and Innovative Solutions to Roadside Revegetation Using Native Plants*. Federal Highway Administration U.S. Department of Transportation.

Environment and Climate Change Canada. General nesting periods of migratory birds. Accessed February 2021.

Environment and Climate Change Canada. *Avoiding Harm to Migratory Birds*. Accessed March 2021.

Environmental Protection Agency Office of Water. Nonpoint Source Pollution: Technical Guidance and Tools Guidance. Accessed February 2021. https://www.epa.gov/nps/nonpoint-source-pollution-technical-guidance-and-tools

Fisheries and Oceans Canada. *Measures to protect fish and fish habitat*. Accessed February 2021. https://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures-eng.html

Fisheries and Oceans Canada. *Standards and codes of practice*. Accessed February 2021. https://www.dfo-mpo.gc.ca/pnw-ppe/practice-practique-eng.html

Government of Canada 1991. The Federal Policy on Wetland Conservation.

Parks Canada. 1994. Cultural Resource Management Policy. Government of Canada

Parks Canada. 2013. Best Management Practice for Roadside Vegetation Maintenance at Point Pelee National Park. Government of Canada.

Parks Canada. 2013. Best Management Practice for Routine Vegetation Trimming and Clearing Pukaskwa National Park. Government of Canada.

Parks Canada. 2015. National Best Management Practices. Roadway, Highway, Parkway and Related Infrastructure. Government of Canada.

Parks Canada. 2016. Waterton Lakes National Park. General Project Best Management Practices. Government of Canada.

Parcs Canada 2017. Remplacement de ponts et ponceaux sur la route de la promenade au Parc National de La Mauricie. Devis pour la protection de l'environnement. Habitat de niveaux 1, 2 et 3. Unité de gestion de la Mauricie et de l'Ouest du Québec. Gouvernement du Canada

Parks Canada 2017. Draft Guidance on Reducing Risk to Migratory Birds and associated Conservation Measures for Minimizing Impacts to Migratory Birds During the Nesting Period.

Parks Canada 2019. Parks Canada Directive on Impact Assessment. Government of Canada.

Parks Canada. 2019. Preapproved Routine Impact Assessment. Frontcountry Areas. Government of Canada.

Parks Canada. Draft 2019. Treated Wood Management Guidelines. Government of Canada.

Parks Canada. Draft. Reclamation guidelines. Banff National Park, Government of Canada.

Parks Canada and the Canadian Parks Council. 2008. Principles and Guidelines for Ecological Restoration in Canada's Protected Natural Areas. Government of Canada.

Soil Classification Working Group, 1998. The Canadian System of Soil Classification. 3rd Edition. Research Branch, Agriculture and Agri Food Canada, Publication 1646.

Appendix 1: Site-specific information

Example of Environmental Timing Windows Table

(to be deleted or adapted)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fish	AVOID INSTREAM WORK					Least risk window for work in and around freshwater, June 15 – Sept 15				AVOID INSTREAM WORK		
Birds	Reduced risk for harm to birds			AVOID VEGETATION REMOVAL Bird Nesting Period: April - Mid August					Reduced risk for harm to birds			
Bats	Bat in Hibernacula				Bats Nursing Pups						Bat in Hibernacula	
Turtles	Hibernation		Road Mortality		Nesting -avoid disturbance		Road Mortality		Hatchlings – avoid disturbing	Road Mortality	Hibernation	
Snakes	Avoid disturbance of Hibernacula				Road Mortality		Peak : breeding, live young Mitigate road mortality			Migration Road mortality	Avoid disturbance of Hibernacula	
Others:												

Appendix 2: 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 - 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 contractors, 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 must avoid causing serious harm to fish in compliance with the *Fisheries Act*. Advice is available in on the Fisheries and Oceans Canada (DFO) website.

The complete list of DFO measures to protect fish and fish habitat must be reviewed and those that are applicable to the work, undertaking or activity shall be implemented. If measures to protect fish and fish habitat can be followed, a request for project review is **not** required.

Depending on the level of detail required for a review and DFO response, the Parks Canada IA Practitioner may need to consider another IA pathway.

Migratory Birds Convention Act – Environment and Climate Change Canada

The purpose of this Act is to protect and conserve migratory birds - as populations and as 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 the end of August. This is a general nesting period that covers most federally protected migratory bird species. This period varies regionally across Canada mainly due to differences in species assemblages, climate, elevation and habitat type. Generally, the nesting period is delayed in more northerly latitudes, corresponding to vegetation development and food availability. (Environment Canada, 2014). To help with determining regionally relevant periods where nesting is likely to occur, Environment and Climate Change Canada has published 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.

For more information, including refining the regional nesting period, refer to the draft Parks Canada Guidance on Reducing Risk to Migratory Birds and draft Conservation Measures for Minimizing Impacts to Migratory Birds During the Nesting Period.

Species at Risk Act - Parks Canada, Environment and Climate Change Canada

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 IAA 2019 or successor legislation. If the projects or activities to be addressed by the PRIA could affect a listed species or its critical habitat, the IA Practitioner may need to consider another IA pathway.

APPENDIX B

Borehole Logs

BOREHOLE LOG EXPLANATION FORM

This explanatory section provides the background to assist in the use of the borehole logs. Each of the headings used on the borehole log, is briefly explained.

DEPTH

This column gives the depth of interpreted geologic contacts in metres below ground surface.

STRATIGRAPHIC DESCRIPTION

This column gives a description of the soil based on a tactile examination of the samples and/or laboratory test results. Each stratum is described according to the following classification and terminology.

Soil Classification*		Terminology	Proportion
Clay	<0.002 mm		
Silt	0.002 to 0.06 mm	"trace" (e.g. trace sand)	<10%
Sand	0.06 to 2 mm	"some" (e.g. some sand)	10% - 20%
Gravel	2 to 60 mm	adjective (e.g. sandy)	20% - 35%
Cobbles	60 to 200 mm	"and" (e.g. and sand)	35% - 50%
Boulders	>200 mm	noun (e.g. sand)	>50%

* Extension of MIT Classification system unless otherwise noted.

The use of the geologic term "till" implies that both disseminated coarser grained (sand, gravel, cobbles or boulders) particles and finer grained (silt and clay) particles may occur within the described matrix.

The compactness of cohesionless soils and the consistency of cohesive soils are defined by the following:

COHESIONLESS SOIL		COHESIVE SOIL	
Compactness	Standard Penetration Resistance "N", Blows / 0.3 m	Consistency	Standard Penetration Resistance "N", Blows / 0.3 m
Very Loose	0 to 4	Very Soft	0 to 2
Loose	4 to 10	Soft	2 to 4
Compact	10 to 30	Firm	4 to 8
Dense	30 to 50	Stiff	8 to 15
Very Dense	Over 50	Very Stiff	15 to 30
		Hard	Over 30

The moisture conditions of cohesionless and cohesive soils are defined as follows.

COHESIONLESS SOILS
Dry
Moist
Wet
Saturated

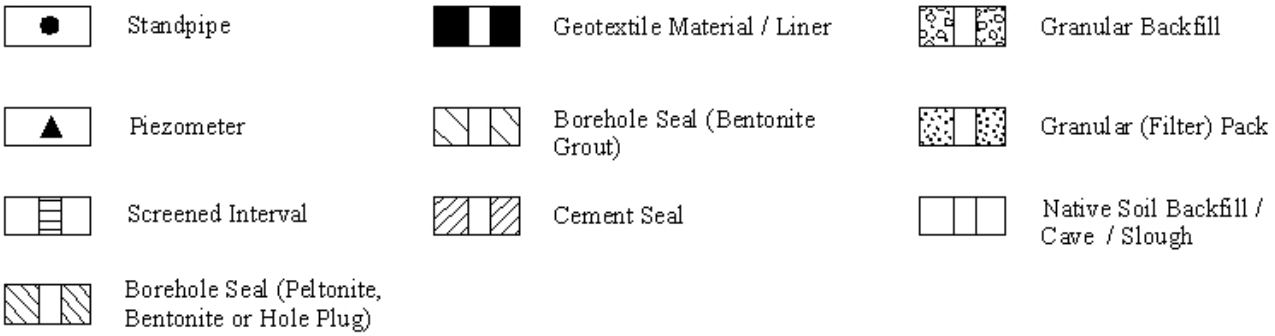
COHESIVE SOILS		
DTPL	-	Drier Than Plastic Limit
APL	-	About Plastic Limit
WTPL	-	Wetter Than Plastic Limit
MWTPL	-	Much Wetter Than Plastic Limit

STRATIGRAPHY

Symbols may be used to pictorially identify the interpreted stratigraphy of the soil and rock strata.

MONITOR DETAILS

This column shows the position and designation of standpipe and/or piezometer ground water monitors installed in the borehole. Also the water level may be shown for the date indicated.



Where monitors are placed in separate boreholes, these are shown individually in the "Monitor Details" column. Otherwise, monitors are in the same borehole. For further data regarding seals, screens, etc., the reader is referred to the summary of monitor details table.

SAMPLE

These columns describe the sample type and number, the "N" value, the water content, the percentage recovery, and Rock Quality Designation (RQD), of each sample obtained from the borehole where applicable. The information is recorded at the approximate depth at which the sample was obtained. The legend for sample type is explained below.

SS	=	Split Spoon	GS	=	Grab Sample
ST	=	Thin Walled Shelby Tube	CS	=	Channel Sample
AS	=	Auger Flight Sample	WS	=	Wash Sample
CC	=	Continuous Core	RC	=	Rock Core

$$\% \text{ Recovery} = \frac{\text{Length of Core Recovered Per Run}}{\text{Total Length of Run}} \times 100$$

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of core recovered, counting only those pieces of sound core that are 100 mm or more in length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD (%)
Very poor quality	< 25
Poor quality	25 - 50
Fair quality	50 - 75
Good quality	75 - 90
Excellent quality	90 - 100

TEST DATA

The central section of the log provides graphs which are used to plot selected field and laboratory test results at the depth at which they were carried out. The plotting scales are shown at the head of the column.

Dynamic Penetration Resistance - The number of blows required to advance a 51 mm diameter, 60º steel cone fitted to the end of 45 mm OD drill rods, 0.3 m into the subsoil. The cone is driven with a 63.5 kg hammer over a fall of 750 mm.

Standard Penetration Resistance - Standard Penetration Test (SPT) "N" Value - The number of blows required to advance a 51 mm diameter standard split-spoon sampler 300 mm into the subsoil, driven by means of a 63.5 kg hammer falling freely a distance of 750 mm. In cases where the split spoon does not penetrate 300 mm, the number of blows over the distance of actual penetration in millimetres is shown as $\frac{xBlows}{mm}$

Water Content - The ratio of the mass of water to the mass of oven-dry solids in the soil expressed as a percentage.

W_P - Plastic Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

W_L - Liquid Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

REMARKS

The last column describes pertinent drilling details, field observations and/or provides an indication of other field or laboratory tests that were performed.

BORING NUMBER BH 01

CLIENT Parks Canada
PROJECT NAME Cabot Trail - North and South Mountain
PROJECT NUMBER 151-06993
PROJECT LOCATION Cape Breton, Nova Scotia
DATE STARTED 7/28/15 **COMPLETED** 7/28/15
GROUND ELEVATION 37.48 m * **HOLE SIZE** 100 mm Diameter
DRILLING CONTRACTOR Logan Drilling
GROUND WATER LEVELS:
DRILLING METHOD Truck Mounted Drill Rig
AT TIME OF DRILLING ---
LOGGED BY L. Mattson **CHECKED BY** C. Rogers
AT END OF DRILLING ---
NOTES North Mountain STA. 38+547
AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEVATION (m)	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / □ FINES CONTENT (%) □ 20 40 60 80
		37.48	Asphalt (150 mm in thickness)					
		37.33	Type 1 (Base): Gravelly Sand, some silt, trace clay, Compact, moist, brown (approximately 150 mm in thickness)					
0.5		37.18	Type 2 (Sub base): Gravelly Sand, some silt, trace clay, Compact, moist, brown and pink (approximately 450 mm in thickness)		SS 1	22-17-14-20 (31)	88	
1.0		36.73	Fill (Subgrade): Gravelly Sand, some silt, trace clay, Compact, moist, brown		SS 2	29-24-30-20 (54)	100	
1.5		35.98	End of Borehole at 1.5 meters below ground surface. Groundwater was not observed at time of investigation. *Approximate ground surface elevations and station values are referenced to WSP Plan and Profile (Issued for RS2 review, September 2015).					
2.0								
2.5								
3.0								
3.5								
4.0								

GEOTECH BH COLUMNS PARKS CANADA - BOREHOLES FOR CABOT TRAIL.GPJ GINT STD CANADA.GDT 9/29/15

BORING NUMBER BH 01-1

CLIENT Parks Canada
PROJECT NAME Cabot Trail - North and South Mountain
PROJECT NUMBER 151-06993
PROJECT LOCATION Cape Breton, Nova Scotia
DATE STARTED 7/28/15 **COMPLETED** 7/28/15
GROUND ELEVATION 45.06 m * **HOLE SIZE** 100 mm Diameter
DRILLING CONTRACTOR Logan Drilling
GROUND WATER LEVELS:
DRILLING METHOD Truck Mounted Drill Rig
AT TIME OF DRILLING ---
LOGGED BY L. Mattson **CHECKED BY** C. Rogers
AT END OF DRILLING ---
NOTES North Mountain STA. 38+743
AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEVATION (m)	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / □ FINES CONTENT (%) □ 20 40 60 80
		45.06	Asphalt (175 mm in thickness)					
		44.885	Type 1 (Base): Gravelly Sand, some silt, trace clay, trace asphalt millings, Dense, moist, brown, black (approximately 150 mm in thickness)					
0.5		44.735	Type 2 (Sub base): Gravelly Sand, some silt, trace clay, Compact, moist, brown, pink (approximately 525 mm in thickness)		SS 1	15-15-26-26 (41)	92	
1.0		44.21	Fill (Subgrade): Gravelly Sand, some silt, trace clay, Loose, moist, brown and pink		SS 2	24-12-5-5 (17)	50	
1.5								
2.0								
2.5								
3.0		42.06	End of borehole at 3.0 meters below ground surface.					
			Groundwater was not observed at time of investigation.					
3.5			*Approximate ground surface elevations and station values are referenced to WSP Plan and Profile (Issued for RS2 review, September 2015).					
4.0								

GEOTECH BH COLUMNS PARKS CANADA - BOREHOLES FOR CABOT TRAIL.GPJ GINT STD CANADA.GDT 9/29/15

BORING NUMBER BH 02

CLIENT Parks Canada
PROJECT NAME Cabot Trail - North and South Mountain
PROJECT NUMBER 151-06993
PROJECT LOCATION Cape Breton, Nova Scotia
DATE STARTED 7/28/15 **COMPLETED** 7/28/15
GROUND ELEVATION 61.2 m * **HOLE SIZE** 100 mm Diameter
DRILLING CONTRACTOR Logan Drilling
GROUND WATER LEVELS:
DRILLING METHOD Truck Mounted Drill Rig
AT TIME OF DRILLING ---
LOGGED BY L. Mattson **CHECKED BY** C. Rogers
AT END OF DRILLING ---
NOTES North Mountain STA. 38+964
AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEVATION (m)	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
		61.2	Asphalt (100 mm in thickness)					
		61.1	Type 1 (Base): Gravelly Sand, some silt, trace clay, Compact, moist, brown (approximately 200 mm in thickness)		AU 1			
0.5		60.9	Type 2 (Sub base): Gravelly Sand, some silt, trace clay, Compact, moist, brown (approximately 450 mm in thickness)		AU 2			
1.0		60.45	Fill (Subgrade): Gravelly Sand, some silt, trace clay, Compact, moist, brown					
1.5		59.7	End of Borehole at 1.5 meters below ground surface. Groundwater was not observed at time of investigation. *Approximate ground surface elevations and station values are referenced to WSP Plan and Profile (Issued for RS2 review, September 2015).					
2.0								
2.5								
3.0								
3.5								
4.0								

GEOTECH BH COLUMNS PARKS CANADA - BOREHOLES FOR CABOT TRAIL.GPJ GINT STD CANADA.GDT 9/29/15

BORING NUMBER BH 03

CLIENT Parks Canada
PROJECT NAME Cabot Trail - North and South Mountain
PROJECT NUMBER 151-06993
PROJECT LOCATION Cape Breton, Nova Scotia
DATE STARTED 7/28/15 **COMPLETED** 7/28/15
GROUND ELEVATION 109.48 m * **HOLE SIZE** 100 mm Diameter
DRILLING CONTRACTOR Logan Drilling
GROUND WATER LEVELS:
DRILLING METHOD Truck Mounted Drill Rig
AT TIME OF DRILLING ---
LOGGED BY L. Mattson **CHECKED BY** C. Rogers
AT END OF DRILLING ---
NOTES North Mountain STA. 38+480
AFTER DRILLING ---

DEPTH (m)	GRAPHIC LOG	ELEVATION (m)	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY % (RQD)	▲ SPT N VALUE ▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
		109.48	Asphalt (125 mm in thickness)					
		109.355	Type 1 (Base): Gravelly Sand, some silt, trace clay, Compact, moist, brown (approximately 200 mm in thickness)		AU 1			
		109.155	Type 2 (Sub base): Sand, some gravel, some silt, trace clay, Compact, moist, brown (approximately 175 mm in thickness)		AU 2			● ☐
0.5		108.98	Fill (Subgrade): Gravelly Sand, some silt, trace clay, Compact, moist, brown to grey					
1.0								
1.5		107.98	End of borehole at 1.5 meters below ground surface. Groundwater was not observed at time of investigation. *Approximate ground surface elevations and station values are referenced to WSP Plan and Profile (Issued for RS2 review, September 2015).					
2.0								
2.5								
3.0								
3.5								
4.0								

GEOTECH BH COLUMNS PARKS CANADA - BOREHOLES FOR CABOT TRAIL.GPJ GINT STD CANADA.GDT 9/29/15

APPENDIX C

Environmental Protection Plan
(EPP) Template Document

APPENDIX D

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

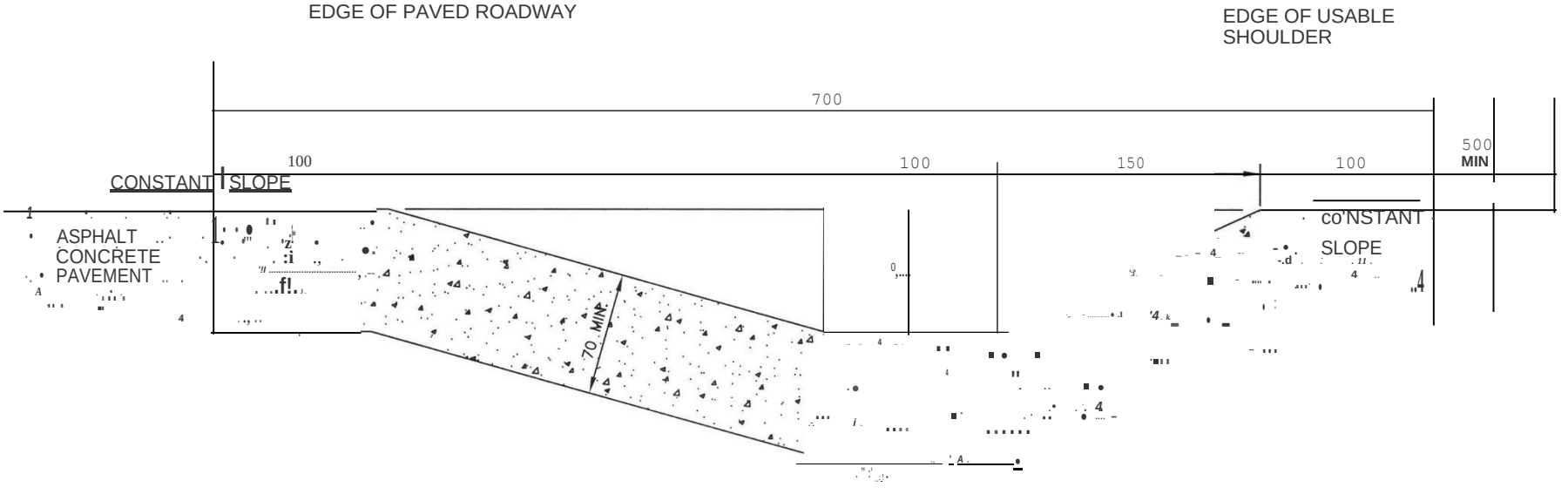
Location of Material Disposal: *(if different from resident's address)*

_____
Civic number, Road name, City/town/village, Postal Code

APPENDIX E

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 (2014). The details are provided for reference only and do not necessarily constitute a complete compilation of applicable standards.



NOTES

1. OFFTAKE GUTTERS ARE TO BE CONSTRUCTED AT LOCATIONS SPECIFIED BY THE ENGINEER AND ARE TO EXTEND TO THE EDGE OF SHOULDER AND DOWN THE SLOPE 1m **MINIMUM.**
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

Manager Highway Planning and Design

Director, Highway Engineering Services

Executive Director Highway Engineering and Construction

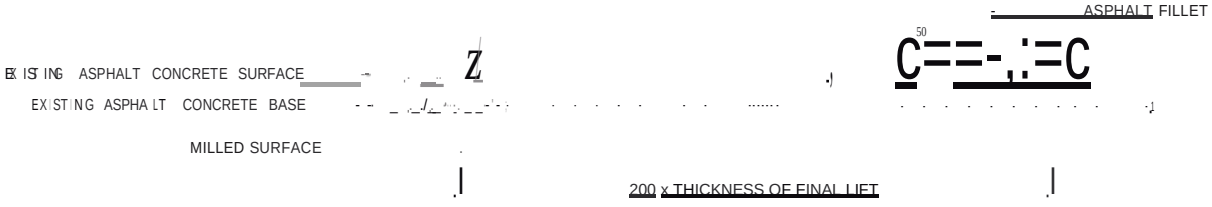
Novi?s

Transportation and InfrastructureRenewal

No.	REVISION
	HS # ADDED TO TITLE

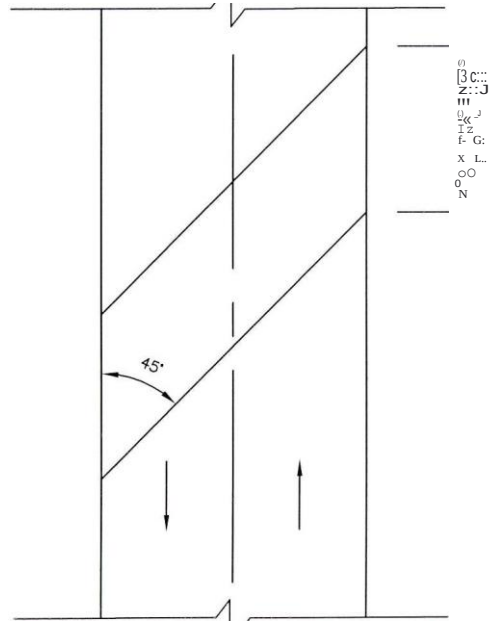
Scale :	N.T.S.
Drawn by	M.LABRECHE
Checked by	K.BODDY
Dote of Pion	AUG2009
File No. :	S-2009-023

ASPHALT CONCRETE GUTTER HS-403



STAGE 1

STAGE 2



PLAN VIEW

NOTES:

Nov?s&nn

Transportation and Infrastructur e Renewal

No.	REVISION

Scale	N.T.S.
Orawn by	M.LABRECHE
Checked by	K.BODDY
Date of Plan	AUG2009
File No.	S-2009-013

Manager Highway Planning and Design

Director Highway Engineering Services

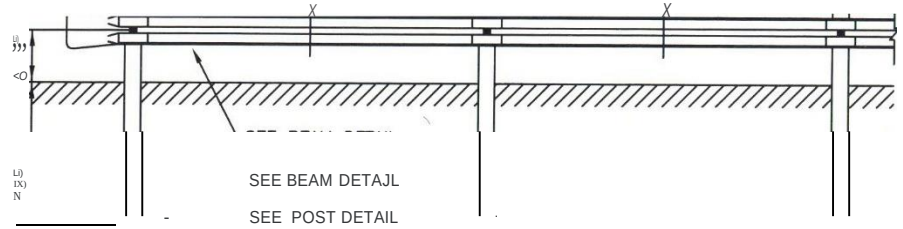
Executive Director Highway Engineering and Construction

TRANSVERSE ASPHALT CONCRETE KEY JOINT HS404

'905

TERMINAL SECTION

DIRECTION OF TRAFFIC



WEAK POST SYSTEM

1905 1905

B

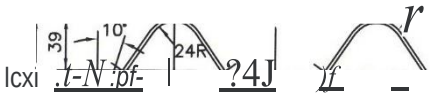
B

108 TYP.

16 - 23 x 29
SLOTTED HOLES
8 EACH END

3 - 19 x 63
SLOTTED HOLES
1 EACH END 1 IN CENTER

BEAM DETAIL



23 x 29 SLOTTED HOLES FOR SPLICE

NATURAL AXIS

2.8 STEEL

19 x 64 SLOT FOR POST CONNECTION

310

SECTION B-B

SPIKE TOE gmT ROUGH O. INTO POST

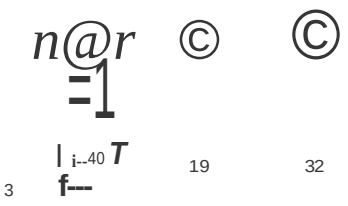
200

GUARD RAIL POST

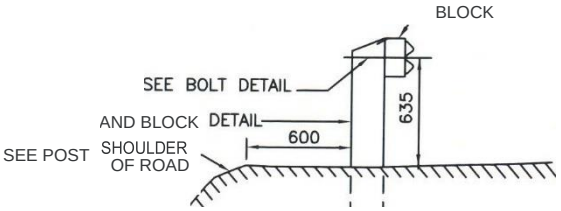
200 x 200 x 2100 LONG OR
150 x 200 x 2100 LONG2

POST AND BLOCK DETAIL

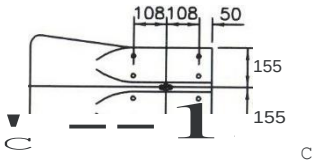
1 HEAD 16 WASHER NUT



BOLT DETAIL



SECTION A-A



BEAM TERMINAL DETAIL

SECTION C-C

316

- DIRECTION OF TRAVEL

BEAM SPLICE DETAIL

NOTES:
1 . FOR STRONG POST SYSTEM, ADD POST AT POINT X.
2. IF 150 x 200 x 2100 LONG POSTS ARE USED, THE MATERIAL IS TO BE HARDWOOD.
3. TERMINAL SECTION ONLY APPROPRIATE FOR 4-LANE DIVIDED HIGHWAYS.

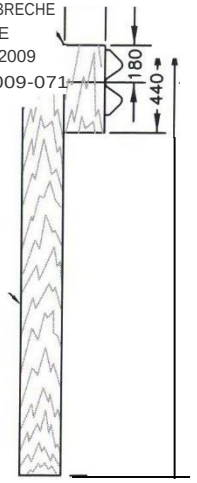
4. ALL BOLTS, NUTS AND WASHERS SHALL BE GALVANIZED BY THE HOT DIP PROCESS. BOLTS SHALL BE CAPABLE OF WITHSTANDING 106 kN IN SINGLE SHEAR. 16mm SQUARENUT AND 19mm ROUND WASHERS ARE TO BE USED. ONE WASHER FOR EACH 240mm x 16mm BOLT. BOLTS ARE TO HAVE 75mm THREADS. FOR STRONG POST SYSTEM BOLT LENGTH SHALL BE 440mm .

5. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.

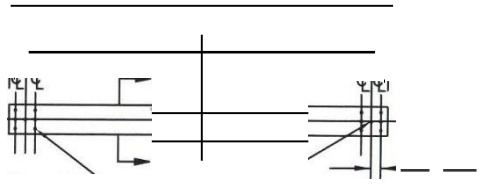
Novfs
Transportation and Infrastructure Renewal

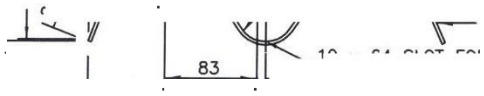
No.	REVISION
3	UPDATED TO AAHSTO STANDARD. JAN15
2	BEAM SPLICE DETAIL MODIFIED /SEP10
1	DETAJLS, NOTES TITLES / FEB 10

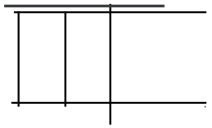
Scale :	N.T. S.
Drawn by	M.LABRECHE
Checked by	J.RAE
Date of Plan	AUG2009
File No. :	S-2009-071



GUARD RAIL AND POST DETAILS
HS518







Manager Highway Planning and Design

Director Highway Engineering Services

Executive Director Highway Engineering and Construction

POST OFFSET TABLE	
FILL OR CUT	
X	y3
3.81	0.04
7.62	0.15
11.42	0.34
15.22	0.60
19.02	0.94
22.81	1.35

NORw.L R·JL SE"10N PAR<LLEL TO SHOULDER

PRO.JE"10N OFNOR""-
TO SHOULDER
R·JL SECTION
EDGE OF PAVEMENT

A

TRAFFIC FLOW

PLAN - FILL OR CUT
DIVIDED HIGHWAY 5

22.81

3 STANDARD BEAM ELEMENT S

0.15
1.32
1.32

ELEVATION
DIVIDED HIGHWAY 5

1. FOR STRONG POST SYSTEM, ADD POST AT POINT "X"
2. THIS STANDARD DRAWING IS NOT APPLICABLE TO NEW 100 SERIES HIGHWAY CONSTRUCTION WHERE ENERGY ABSORBING GUARD RAIL TERMINALS (EAGRT} SYSTEMS ARE SPECIFIED.
3. MEASURED FROM FACE OF RAIL BASED ON NORMAL RAIL SECTION PARALLEL TO SHOULDER AT A.
4. GUARD RAIL MAY BE PLACED AS PRACTICABLE FROM EDGE OF SHOULDER. IN NO CASE MAY GUARD RAIL BE PLACED DOWN THE SLOPE.
5. FOR 2-LANE/ 2-WAY ROADWAYS, BURY BOTH ENDS OF GUARD RAIL
6. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.

Manager Highway Planning and Design

Director Highway Engineering Services

ve-i, l,ecto r A,gtiway Engineering and C"Construct

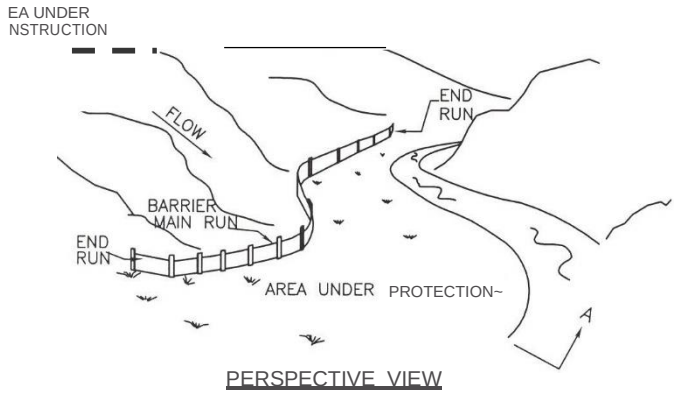
Nov.?s

Transportation and Infrastructure Renewal

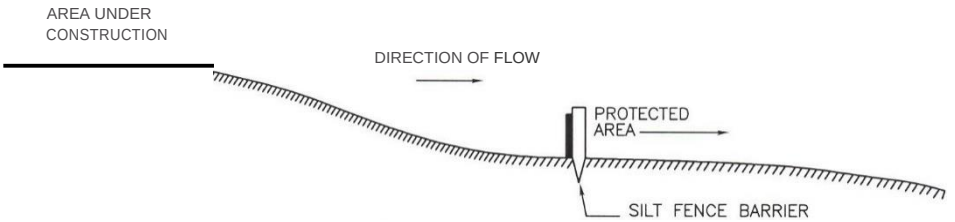
4 Addition of EAGRT note - Feb 12
3 Addition of
2 Addition of •X• for strana post system
1 Notes, Titles - Feb 10
No. REVISION

Scale : N.T.S.
Drawn by : M.LABRECHE
Checked by : J.RAE
Date of Plan AUG2009
File No. : S-2009-072

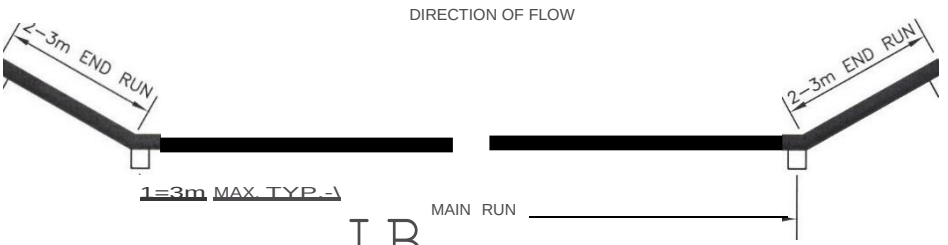
STEEL BEAM GUARD RAIL
END TREATMENT HS520



PERSPECTIVE VIEW



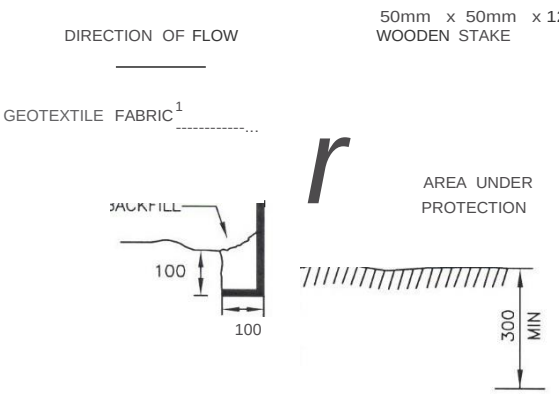
SECTION A-A



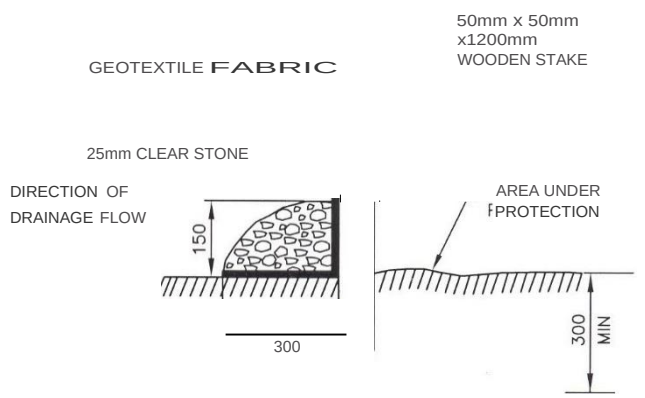
PLAN VIEW

OPTION #1

OPTION #2 [3]



SECTION B-B



SECTION B-B

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.

Scale	N.T.S.
Drawn by :	M.BARTEAUX
Checked by	B.PETT
Date of Plan	AUG2009
File No. :	S-2009-132

Manager Environmental Services

Director Highway Engineering Services

Executive Director Highway Engineering and Construction

NOVA SCOTIA
Transportation and Infrastructure Renewal

No.	REVISION
	Added Option 2 and Notes -APR 2011

SEDIMENT CONTROL FENCE FOR SHEET FLOW HS702