



Parks Canada Agency

Highway 430 Realignment and Reconstruction Project No. 1813 / 1845

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<u>SECTION</u>	<u>TITLE</u>	<u>PAGES</u>
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DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

00 21 10	List of Drawings	2
----------	------------------	---

DIVISION 01 – GENERAL REQUIREMENTS

01 11 00	Summary of Work	9
01 14 00	Work Restrictions	2
01 21 00	Allowances	1
01 25 20	Mobilization and Demobilization	1
01 29 10	Measurement and Payment	5
01 29 83	Payment Procedures for Testing Laboratory Services	1
01 31 19	Project Meetings	2
01 33 00	Submittal Procedures	5
01 35 29.06	Health and Safety	9
01 35 43	Environmental Procedures	9
01 45 00	Quality Control	3
01 52 00	Construction Facilities	4
01 54 30	Temporary Weigh Scales	2
01 55 26	Traffic Regulation	6
01 56 00	Temporary Barriers and Enclosures	3
01 61 00	Common Product Requirements	3
01 71 00	Examination and Preparation	2
01 74 11	Cleaning	2
01 74 21	Construction/Demolition Waste Management and Disposal	4
01 77 00	Closeout Procedures	2
01 78 00	Closeout Submittals	4

DIVISION 31 - EARTHWORK

31 05 16	Aggregate Materials	4
31 10 01	Geotechnical Instrumentation and Monitoring	3
31 11 00	Clearing and Grubbing	3

<u>SECTION</u>	<u>TITLE</u>	<u>PAGES</u>
-----------------------	---------------------	---------------------

DIVISION 31 – EARTHWORK (CONTINUED)

31 23 33.01	Excavating, Trenching and Backfilling	3
31 24 13	Roadway Embankments	9
31 24 13.06	EPS Geofoam Lightweight Fill Material	6
31 24 14	Fill Against Structure	2
31 32 19.01	Geotextile	3
31 32 19.02	Hydrocarbon Resistant Geomembrane	6
31 37 00	Armour Rip-Rap	2
31 37 20	Clear Stone	2

DIVISION 32 – EXTERIOR IMPROVMENTS

32 11 16.01	Granular Sub-Base	5
32 11 23	Aggregate Base Courses	5
32 15 60	Roadway Dust Control	1
32 91 21	Finish Grading & Soil Placement	4
32 92 19.16	Hydraulic Seeding	5
32 92 19.17	Dry Mulching	3
32 93 10	Planting of Trees, Scrubs & Goundcover	4

DIVISION 33 - UTILITIES

33 42 13	Pipe Culverts	5
----------	---------------	---

DIVISION 34 - TRANSPORTATION

34 71 13.25	Steel W Beam Guide Rail	3
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APPENDICES

Appendix A – Environmental Documents

Appendix B – Geotechnical Reports

1. List of Drawings

<u>DWG. No.</u>	<u>TITLE</u>
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CIVIL DICK'S BROOK

C1	Clearing Plan
C2	Proposed Conditions Sta. 0+060 to 0+380
C3	Proposed Conditions Sta. 0+380 to 0+700
C4	Proposed Conditions Sta. 0+700 to 0+920
C5	Grading Plan Near Brook
C6	East Approach Grading Plan Near Brook
C7	Grading and EPS Sections and Detail Near Brook
C8	Section (Sheet 1 of 6)
C9	Section (Sheet 2 of 6)
C10	Section (Sheet 3 of 6)
C11	Section (Sheet 4 of 6)
C12	Section (Sheet 5 of 6)
C13	Section (Sheet 6 of 6)
C14	Instrumentation Plan
C15	Miscellaneous Details
C16	Borehole Location Plan
C17	Borehole Logs (Sheet 1 of 4)
C18	Borehole Logs (Sheet 2 of 4)
C19	Borehole Logs (Sheet 3 of 4)
C20	Borehole Logs (Sheet 4 of 4)

CIVIL ROCKY BARACHOIS

RB-C1	Proposed Clearing Plan
RB-C2	Proposed Route 430 Sta. 9+976 to 10+220
RB-C3	Proposed Route 430 Sta. 10+220 to 10+460
RB-C4	Proposed Route 430 Sta. 10+460 to 10+700
RB-C5	Proposed Route 430 Sta. 10+700 to 10+812
RB-C6	Cross-Sections (Sheet 1 of 3)

CIVIL ROCKY BARACHOIS (CON'T)

RB-C7	Cross-Sections (Sheet 2 of 3)
RB-C10	Cross-Sections (Sheet 3 of 3)
RB-C11	Miscellaneous Sections and Details

CIVIL SHOAL COVE

L01A	Existing Conditions and Removals Sta. 22+920 to 23+300
L01B	Existing Conditions and Removals Sta. 22+740 to 22+920
L02A	Grading Plan Sta. 23+060 to 23+300
L02B	Grading Plan Sta. 22+920 to 23+060
L02C	Grading Plan Sta. 22+740 to 22+920
L03A	Landscape Finish Treatment Plan Sta. 22+920 to 23+300
L03A	Landscape Finish Treatment Plan Sta. 22+740 to 22+920

Part 1 General

1.1 PROJECT LOCATION

- .1 The project is located in Gros Morne National Park, Newfoundland and Labrador. The work is located at three locations on Highway 430, from east of Dick's Brook to west of Shoal Cove.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Parks Canada is preparing to realign / reconstruct sections of Highway 430, described as follows:
 - .1 Section of Highway 430 extending east and west from Dick's Brook Bridge to be realigned to the south of the existing road for a length of approximately 860 meters;
 - .2 Section of Highway 430 extending north and south of Rocky Barachois Bridge to be realigned to the east of the existing road for a length of approximately 500 meters; and
 - .3 Section of Highway 430 extending east and west of Shoal Cove Bridge to remediate slopes to the south of the existing road for a length of approximately 400 meters.
- .2 Work shall be carried out while maintaining 2 lanes of traffic during construction and providing temporary traffic control during all phases of construction. Slopes to receive landscape treatment as shown on the project drawings. In general, work shall include the following:
 - .1 Dick's Brook:
 - .1 Geotechnical instrumentation and monitoring of soil conditions as construction progresses.
 - .2 Phased construction of roadway embankments.
 - .3 Supply and placement of rigid expanded polystyrene (EPS) geofoam as light weight fill material in the construction of embankments.
 - .4 Armour rip rap slopes.
 - .2 Rocky Barachois;
 - .1 Construction of roadway embankments including widening of existing causeway approaches at Rocky Barachois Brook.
 - .2 Haulage of excess rock excavation for use in construction of roadway embankments at Dick's Brook.
 - .3 Maintaining access road to power line.
 - .3 Shoal Cove:
 - .1 Excavating and reshaping of old roadbed.
 - .2 Haulage of excess excavation for use in construction of roadway embankments at Dick's Brook.
 - .3 Haulage and placement of organic material.
- .3 The above listed work is subject to the following constraints during construction:

- .1 Work shall be in accordance with Basic Impact Analysis reports and accompanying documents completed for this project.
 - .1 In-water work will not be permitted from June 30 to September 30 when fish are migrating through the construction site.
 - .2 Clearing is not permitted during nesting season which is anticipated to be between May 30 and July 15.
- .2 In-water work is limited to dressing of the new slopes abutting Dick's Brook and construction of causeway embankments at Rocky Barachois.
- .3 Two traffic lanes must remain open at all times throughout construction, except as noted below:
 - .1 During delivery of equipment and materials, short duration single lane closures are acceptable with prior approval from the Departmental Representative.
 - .2 Contractor to provide approved traffic control plan for all construction phases, including those times during approved single lane closures.
- .4 Construction activities shall not detrimentally impact the surrounding environment or the waterway and shall respect allowable windows for in water work.
- .5 Excavation of clay material and construction of embankments at Dick's Brook shall be in accordance with project specifications.
- .4 The Contractor is responsible for the delineation of the construction zones and the existing highway.
- .5 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.
- .6 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. No claims shall be accepted due to other construction work in the area.

1.3 CONTRACT METHOD

- .1 Construct Work under combined unit price and lump sum items contract.

1.4 CODES AND STANDARDS

- .1 Perform work in accordance with National Parks Act, Code of Practice of the Department of Labour, as it pertains to Provincial traffic control requirements (Department of Transportation & Works) 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 at the date of Tender 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.

1.5 SITE CONDITIONS

- .1 The Contractor will be responsible to visit the site and review existing site conditions.
- .2 Before submitting a bid, it is recommended that bidders visit the site to review and verify the form, nature and extent of the work, materials needed, the means of access and the temporary facilities required to perform the Work.
- .3 Obtain prior permission from the Departmental Representative before carrying out such site inspection.
- .4 Contractors, bidders or those they invite to site are to review specification Section 01 35 29.06 – Health and Safety Requirements before visiting site. Take all appropriate safety measures for any visit to site, either before or after acceptance of bid.
- .5 Details of existing structures are for the Contractor to determine in considering use with over-weight and non-conforming vehicles in carrying out work on this project.
- .6 For geotechnical and borehole information, refer to the following reports:
 - .1 Geotechnical Investigation, Dick's Brook Bridge Replacement, Gros Morne National Park, File No: 163567, dated December 15, 2017, prepared by Harbourside Engineering Consultants.
 - .2 Geotechnical Investigation, Rocky Barachois Bridge Replacement, Gros Morne National Park, File No: 163545, dated August 31, 2017, prepared by Harbourside Geotechnical Consultants.

1.6 INTERPRETATION OF DOCUMENTS

- .1 Supplementary to the Order of Precedence article of the General Conditions of the Contract, the Division 01 Sections take precedence over the technical specification sections in other Divisions of the Specifications Manual.

1.7 TERM ENGINEER

- .1 Unless specifically stated otherwise, the term Engineer where used in the Specifications and on the Drawings shall mean the Departmental Representative as defined in the General Conditions of the Contract.

1.8 SITE SURVEY AND SETTING OUT WORK

- .1 Topographic surveys used in the preparation of these Contract Documents were provided by Design Point Engineering and Surveying Ltd. Refer to Drawings for survey details and control points.
- .2 A georeferenced CAD file of the site will be provided to the Contractor for use in layout. Parks Canada assumes no responsibility for the accuracy of this information.
- .3 Contractor to carry out all layout. The Contractor is responsible for the layout of grade stakes at every construction stage. Establish and maintain stakes at 20 m stationing and placement of offsets at 20 m stations (top of backslope, toe of slope, subgrade, granulars,

shoulders, etc.) on which is written chainage and centreline offset. All stakes to be removed at the completion of the work.

- .4 The Contractor shall assume full responsibility for and execute complete layout of work locations, lines and elevations indicated.
- .5 The Contractor shall supply such devices as straight edges and templates required to facilitate Departmental Representative's inspection of work.
- .6 The Contractor shall provide coordinates, elevations and dimensions in the field, as required by the Departmental Representative.

1.9 WORK WITHIN PARK BOUNDARIES

- .1 The project is within a national park and it is essential that lands remain as undisturbed as possible. The Contractor will be expected to use standards and methods beyond those for normal construction in order to protect the environment and ensure the aesthetics of the work. Contract limits shall be strictly adhered to and every precaution shall be taken to minimize environmental damage and disruption to vegetation, wildlife habitat, and structures or existing services, both on construction and storage sites.
 - .1 If any damage occurs during construction, the Contractor is responsible to bear the expense to immediately restore such damaged areas to the satisfaction of Departmental Representative.
 - .2 If Contractor fails to repair damage to the satisfaction of the Departmental Representative, the Departmental Representative may have repairs completed by others at the Contractor's expense.
 - .3 The Contractor shall ensure that contracted work meets the standards outlined in the contract specification and drawings.
 - .4 The Contractor shall ensure that no damage will be done to any existing utilities.
 - .5 All sources of aggregate and asphalt cement must be submitted to the Departmental Representative for approval at least two weeks prior to the start of any work.
 - .6 The Contractor is responsible to follow the Provincial requirements regarding the following:
 - .1 Pit and Quarry Guidelines
 - .2 Environmental Construction Practice Specifications
 - .7 The Contractor will make arrangements with authorities or owners of private properties for quarrying and transporting materials and machinery over their properties and be responsible for obtaining and paying of fees.
 - .8 Water extraction from within the Park boundaries is strictly forbidden. Water extraction may be permitted following detailed proposal submitted by the Contractor and subject to approval by the Field Unit Superintendent.
 - .9 Special move permits for over-weight and over-dimensional vehicles required to travel provincial highways must be secured by the Contractor and submitted to the Departmental Representative for review and approval prior to movement within Park boundaries.
 - .10 Production of rock material for this project may be extracted from the Cod Knotts Quarry located in Gros Morne National Park provided all material meets the project specifications. Any existing crushed rock located in the quarry at the

beginning of the project must be replaced upon completion of the project if used (what is on the ground now, has to be on the ground when the contractor leaves). No royalties or fees will be charged for use of the quarry. All work in the quarry will be in accordance with the Cod Knotts Quarry – Rock Extraction Plan. The contractor must co-operate with other contractors using the quarry in carrying out their respective works and carry out instructions from the Departmental Representative. Additional payments or schedule extensions due to work or scheduling conflicts with other contractors in the quarry will not be considered.

1.10 MAINTENANCE OF WORK DURING CONSTRUCTION

- .1 Maintain work during construction. Undertake continuous and effective maintenance work day by day, with adequate equipment and forces so that the roadway or structures are continuously kept in a condition satisfactory to the Departmental Representative. A mechanical sweeper is to be used to remove debris tracked onto the paved surfaces. Paved surfaces shall be swept regularly, and at least daily, to remove debris.

1.11 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 and Lump Sum items.
- .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 The final completion date shall be July 31, 2019 for all work on this project. In addition, the following interim completion dates shall apply:
 - .1 All work between Station 10+000 and Station 10+500 at Rocky Barachois is to be complete by November 30, 2018.
 - .2 All work at Shoal Cove must either be complete by September 30, 2018 or completely delayed until 2019 and completed by July 31, 2019.
- .4 Work must be undertaken without environmental impact to Dick's Brook, Rocky Barachois Brook, Shoal Cove Brook or Bonne Bay. In-water work will not be permitted from June 30 to September 30 when fish are migrating through the construction site.
- .5 Clearing is not permitted during nesting season which is anticipated to be between May 30 and July 15.
- .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 and the Environmental Protection Plan, Health and Safety Plan and Traffic Control Plan have been accepted by the Departmental Representative.

- .8 Following the pre-construction meeting and approval of the schedule, traffic control plan environmental protection plan and occupational health and safety plan, the work will be so scheduled to meet the time restraints and have the project completed on time.

1.12 CONTRACTOR'S USE OF SITE

- .1 Use of site: for execution of work within roadway right of way and those areas specified by the Departmental Representative.
- .2 The Departmental Representative will specify the areas for work and storage.

1.13 SANITARY SERVICES

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

1.14 PROJECT MEETINGS

- .1 Contractor will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.
- .2 After receiving the Contractor's schedule, traffic control plan, health and safety hazard assessment, and environmental protection plan, and prior to start of construction, a meeting involving Contractor, Departmental Representative and Parks Canada will be held at a place and time to be determined by the Departmental Representative. This meeting will review implications of the contract, design, schedule of work, health and safety, methods of construction, environmental protection methods and traffic control.

1.15 DEPARTMENTAL REPRESENTATIVE

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

1.16 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy each of the following:
 - .1 Contract drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed drawings.
 - .5 Change orders.
 - .6 Other modifications to Contract.
 - .7 Copy of approved work schedule.
 - .8 Field test reports
 - .9 Manufacturer's installation and application instructions.
 - .10 Site specific Health and Safety Plan and other safety related documents.
 - .11 Other documents as stipulated elsewhere in the Contract Documents.

1.17 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.

1.18 MEASUREMENT FOR PAYMENT

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

1.19 CUTTING AND PATCHING

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

1.20 RELICS, ANTIQUES AND WILDLIFE HABITAT

- .1 Protect relics, antiquities, wildlife habitat, items of historical or scientific interest such as cornerstones and contents, animal nesting sites, commemorative plaques, inscribed tablets, and similar objects found during course of work.
- .2 Give immediate notice to Departmental Representative and await Departmental Representative's written instructions before proceeding with work in this area.
- .3 Relics, antiquities and items of historical or scientific interest remain her Majesty's property.

1.21 NATIONAL PARKS ACT

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

1.22 MEASUREMENT OF QUANTITIES

- .1 Linear: Items which are measured by metre or kilometer are to be measured along centreline of installation unless otherwise shown on plans.
- .2 Area:
 - .1 Longitudinal and transverse measurements for areas to be measured horizontally.
- .3 Mass:
 - .1 Term "tonne" shall mean 1000 kg.
 - .2 Materials which are specified for measurement by mass shall be weighed on approved 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.
- .4 Time:
 - .1 Unless otherwise provided for elsewhere or by written authority of the 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 actual hours of operation. Devices which only measure hours of running of motor will not be accepted.

1.23 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.

1.24 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 Newfoundland and Labrador Department of Transportation and Works (NLDTW Specification Book Division 10).

1.25 PROTECTION

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

1.26 EXISTING SERVICES

- .1 Carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to pedestrian and vehicular traffic.
- .2 Before commencing work, establish location and extent of service lines in area of work and notify Departmental Representative of findings.
- .3 Submit Schedule to and obtain approval from Departmental Representative for any shut down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.
- .4 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .5 Record locations of maintained, re-routed and abandoned service lines.

- .6 Ensure that two (2) lanes of traffic are maintained throughout construction. Periods of reducing traffic to one lane with alternating two way traffic may be considered for short periods of time as outlined in the Project Specifications and / or subject to the approval of the Departmental Representative.
- .7 Ensure traffic is not unduly impeded, interrupted or endangered by execution or existence of work or plant.
- .8 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.
- .9 Verify locations of any underground utilities.

Part 2 Products

Not Used

Part 3 Execution

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, 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 Provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS

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

1.4 EXISTING SERVICES

- .1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.
 - .1 The Contractor shall obtain clearance reports from all utilities and ensure lines are not disturbed during the duration of this project. The Contractor will be required to coordinate their work with utility companies and schedule the works accordingly.
- .2 Provide for personnel, pedestrian and vehicular traffic

1.5 SPECIAL REQUIREMENTS

- .1 Work outside of normal working hours will require 48 hours written notice to the Departmental Representative. There are no restrictions on working on nights, weekends or statutory holidays.
- .2 The maximum cumulative traffic delay through the limits of construction shall not exceed 10 minutes.
- .3 Time work in-water in accordance with Basic Impact Analysis reports completed for the project and included in Appendix A. In-water work will not be permitted from June 30 to September 30 when fish are mitigating through the construction site.
- .4 Clearing is not permitted during nesting season which is anticipated to be between May 30 and July 15. Approval from the Departmental Representative must be given prior to commencement of clearing operation.
- .5 Water extraction from within the Park boundaries is strictly forbidden. Water extraction may be permitted following detailed proposal submitted by the Contractor and subject to approval by Departmental Representative.

- .6 Time work in-water in accordance with Basic Impact Analysis reports completed for the project and included in Appendix A.
- .7 Maintenance to vehicles and equipment is prohibited within the Park boundaries.
- .8 Blasting within the Park boundaries is not permitted without approval from the Departmental Representative.
- .9 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .10 Keep within limits of work and avenues of ingress and egress.

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 PROCEDURES

- .1 See Section 01 29 10 – Measurement and Payment

1.3 PRIME COST SUM

- .1 Include in Contract Price a total Prime Cost Sum of \$100,000.
- .2 Contract Price, and not Prime Cost Sum, includes Contractor's overhead and profit in connection with such prime cost allowance.
- .3 Prime Cost Sum provided for in the unit price table is not a sum due the Contractor. Rather, payment will be made against it for miscellaneous work not included in the unit price table ordered under GC 6.1 of the General Conditions.
- .4 Such work may include, but not be limited to:
 - .1 Earth work, granulars, asphalt concrete paving, cast-in-place reinforced concrete, erosion and sediment controls, removal and installation of guide rail, within Gros Morne National Park, NL.
- .5 Once a Prime Cost Sum has been agreed upon with Parks Canada, it shall be included as an item on the Project Schedule. This shall occur on the next update of the Project Schedule.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 11 00 – Summary of Work

1.2 DESCRIPTION

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

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 GENERAL

- .1 This section covers the measurement of Work done for payment purposes.
- .2 The estimated quantities shown in the Unit Price Table are provided for the purposes of comparing proposals, and are not guaranteed to be final, accurate or complete. Payment to the Contractor will be based on actual quantities of work completed in accordance with the drawings and specifications.
- .3 There shall be no measurement or payment for Work carried out beyond the limits defined on the Drawings.
- .4 The total of all Unit Prices and Lump Sum payments shall constitute full compensation for the entire Work of the Contract, as shown, specified, and intended.
- .5 The Contractor will only be entitled to payment when prior written authorization has been received from the Departmental Representative for utilization and then only to the extent of the work authorized by the Departmental Representative.
- .6 The unit and lump sum prices for all items in the Unit Price Table and Lump Sum Table shall represent the full compensation for the work of the item and shall include the cost of furnishing all materials, labour, tools, and equipment necessary to complete the work in accordance with the Contract, the Drawings and Specifications, and shall cover all costs of surety. Each item shall include all necessary supervision, plant and services, and all operations and allowances customary and necessary to complete each item and the Contract as a whole, notwithstanding the fact that not every such necessary operation is mentioned or included specifically for measurement.
- .7 Unless specified otherwise, all materials necessary to complete the items listed in the Unit Price Table, Lump Sum Table and the finished Work shall be new materials supplied by the Contractor and the cost of such material is to be included in the Contractor's prices.
- .8 All measurements for progress payment purposes shall be taken jointly by the Contractor and the Departmental Representative.
- .9 Items which are measured by the meter shall be measured along centreline of installation unless otherwise indicated.
- .10 Longitudinal and transverse measurement shall be made on the actual flat or sloped surface.
- .11 In computing volumes of excavation, average end area method will be used unless otherwise directed by Departmental Representative.
- .12 All volume measurements refer to in-place measures unless specified otherwise.
- .13 Materials which are specified for measurement by mass shall be weighed on scales approved by Departmental Representative refer to Section 01 54 30 – Temporary Weigh Scales. Units used to haul material being paid for by mass shall bear legible identification numbers plainly visible to scale person as it approaches and leaves scale-house.
- .14 Overhaul will not be paid on this Contract.

1.2 ITEMS – LUMP SUM TABLE

1. Prime Cost Sum

- .1 This item is an allowance to cover miscellaneous work which may occur during the work on the project. Payment will be made against it for miscellaneous work not included under items specified in the Lump Sum Table or Unit Price Table ordered under GC 6.1 of the General Conditions. Prime Cost Sum is not a sum due the Contractor.

2. Mobilization / Demobilization

- .1 Unit of Measurement is Lump Sum
- .2 50% of Lump Sum Contract Price for Mobilization and Demobilization to be paid when mobilization to site is complete. The remainder of the Lump Sum Price for Mobilization and Demobilization to be paid when work is complete and all materials, equipment, buildings, shops, offices, and other facilities have been removed from site and site cleaned and left in condition to the satisfaction of the Departmental Representative and all other Agencies having Jurisdiction.

3. Environmental Procedures

- .1 Unit of Measurement is Lump Sum
- .2 This item includes all environmental protection, sedimentation and erosion control measures required to complete the project, such as (but not limited to) diversion ditching, silt fences, temporary ground covers and rock flow checks in accordance with Parks Canada National Best Management Practices – Roadway, Highway, Parkway and Related Infrastructure. Also included is the periodic and general maintenance of all erosion control measures or as directed by the Departmental Representative.

4. Construction Facilities

- .1 Unit of Measurement is Lump Sum
- .2 This item includes the provision of construction facilities required to complete the project. This item includes:
 - Provide and maintain adequate access to project site.
 - Build and maintain temporary roads during period of Work.
 - Upon completion of the Work, rehabilitate any temporary roads to the satisfaction of the Departmental Representative.
 - Clean roads and parking areas where used by the Contractor or employees.
 - Provide, erect and maintain project identification site signs, Safety and Instruction signs and notices.
 - Provide sanitary facilities.
 - Construction site trailer(s).
 - Removal of temporary facilities from the site as directed by the Departmental Representative.

5. Regrading Roadbed (Shoal Cove)

- .1 Unit of Measurement is Lump Sum

- .2 This item includes all work in reshaping of the old roadbed at Shoal Cove Bridge as shown on the drawings and as directed by the Departmental Representative.

6. Other Items Not Included in the Unit Price Table

- .1 Unit of Measurement is Lump Sum
- .2 This item includes all other work considered incidental to the work and which are not specifically mentioned or accounted for in the Unit Price Table or other items in the Lump Sum Table, but are necessary to complete the work in accordance with the Contract, the Drawings, and Specifications. This item shall include but are not limited to the following; project layout and surveying, weigh scales, traffic control, permits and temporary haul roads.

1.3 ITEMS – UNIT PRICE TABLE

1. Clearing

- .1 Unit of Measurement is Hectare (ha)
- .2 This item includes cutting and disposal of all trees, brush, and vegetative growth from areas identified.

2. Grubbing

- .1 Unit of Measurement is Hectare (ha)
- .2 This item includes the removal, separation of topsoil, stockpiling and off-site disposal of all stumps, roots, visible rock fragments greater than 0.25 m³, downed timber, embedded logs, humus and root mat from areas identified.

3. Rigid Geofoam EPS 22

- .1 Unit of Measurement is Cubic Meter (m³)
- .2 This item includes the supply and installation of Rigid Geofoam EPS 22 to the lines and grades as indicated on the drawings and as directed by the Departmental Representative. This item shall also include the supply and installation of Hydrocarbon Resistant Membrane, sand and geotextile surrounding the Rigid Geofoam EPS 22.

4. Rigid Geofoam EPS 29

- .1 Unit of Measurement is Cubic Meter (m³)
- .2 This item includes the supply and installation of Rigid Geofoam EPS 29 to the lines and grades as indicated on the drawings and as directed by the Departmental Representative. This item shall also include the supply and installation of Hydrocarbon Resistant Membrane, sand and geotextile surrounding the Rigid Geofoam EPS 29.

5. Common Excavation Roadway and Drainage

- .1 Unit of Measurement is Cubic Meter (m³)
- .2 This item includes excavation of common material after removal of grubbing and topsoil and for placement and compacting of approved fill to lines and elevations indicated. This item shall also include the loading and transportation of material between sites and the supply and installation of geotextile as applicable.

6. Rock Excavation Roadway and Drainage

- .1 Unit of Measurement is Cubic Metre (m^3)
 - .2 This item includes excavation of rock material after removal of grubbing and topsoil and for placement and compacting of approved fill to lines and elevations indicated. This item shall also include the loading and transportation of material between sites and the supply and installation of geotextile as applicable.
7. Borrow (Rock Fill)
- .1 Unit of Measurement is Tonne (t)
 - .2 This item includes supply, loading, transportation, placement and compacting of approved Rock Fill material from areas off site, required for construction of embankments or for other portions of work, to lines and elevations indicated.
8. Waste Material Disposal (Off-Site Disposal)
- .1 Unit of Measurement is Cubic Meters (m^3)
 - .2 This item includes loading, transportation and offsite disposal of the excess and unsuitable material, in an environmentally responsible manner. Measurement shall be based on cross sections taken at the source of the material.
9. Fill Against Structure
- .1 Unit of Measurement is Tonne (t)
 - .2 This item includes supply, placement and compaction of fill to lines and elevations identified.
10. Armour Rip Rap
- .1 Unit of Measurement is Cubic Meter (m^3)
 - .2 This item includes supply and placement where indicated. This item also includes the supply and installation of geotextile material beneath the armour rip rap. Measurement shall be based on Contract Drawings.
11. Clear Stone
- .1 Unit of Measurement is Tonne (t)
 - .2 This item includes supply, placement and compaction of Clear Stone as indicated on the drawings and as directed by the Departmental Representative. This item also includes the supply and installation of geotextile material beneath the clear stone, if required.
12. Granular Sub-Base (Granular B)
- .1 Unit of Measurement is Tonne (t)
 - .2 This item includes supply, haulage, placement and compaction of Granular B material to the limits and at the locations indicated on the drawings. There will be no payment for extra thickness of 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, the appropriate weight will be deducted.
13. Aggregate Base Course (Granular A)
- .1 Unit of Measurement is Tonne (t)

- .2 This item includes supply, haulage, placement and compaction of Granular A material to the limits and at the locations indicated on the drawings. There will be no payment for extra thickness of aggregate 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, the appropriate weight will be deducted.

14. Hydraulic Seeding

- .1 Unit of Measurement is Square Metre (m²)
- .2 This item includes supply of all materials, preparation of surface, application and maintenance to areas identified.

15. Dry Mulch

- .1 Unit of Measurement is Square Meter (m²)
- .2 This item includes supply of all materials, preparation of surface, application and maintenance to areas identified.

16. HDPE Pipe – 600 mm diameter

- .1 Unit of Measurement is Meter (m)
- .2 This item includes supply of pipe, complete with fittings, and placement. This item also includes excavation, regardless of type, to position the pipe.

17. Steel W-Beam Guide Rail

- .1 Unit of Measurement is Meter (m)
- .2 This item includes supply of all materials including reflectors, installation, backfilling, compaction, disposal of excess material and reinstatement of disturbed surfaces. Measurement shall be based on linear measure of the completed sections, end to end (including buried sections).

18. Landscape Treatment 1

- .1 Unit of Measurement is Square Meter (m²)
- .2 This item includes placement of stockpiled organic material to depth indicated, supply and planting of trees, including planting soil, maintenance and guarantee. Hydro-seeding of Landscape Treatment 1 covered under Hydraulic Seeding.

19. Landscape Treatment 2

- .1 Unit of Measurement is Square Meter (m²)
- .2 This item includes placement of stockpiled organic material to depth indicated, supply and planting of trees/scrubs, including planting soil, maintenance and guarantee. Hydro-seeding of Landscape Treatment 2 covered under Hydraulic Seeding.

20. Landscape Treatment 3

- .1 Unit of Measurement is Square Meter (m²)
- .2 This item includes placement of stockpiled organic material. Hydro-seeding of Landscape Treatment 3 covered under Hydraulic Seeding.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

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

1.2 APPOINTMENT AND PAYMENT

- .1 Departmental Representative will appoint and pay for services of testing laboratory except as follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Testing, adjustment and balancing of equipment and systems.
 - .4 Mill tests and certificates of compliance.
 - .5 Tests specified to be carried out by Contractor under supervision of Departmental Representative.
 - .6 Additional tests specified as follows in the following paragraph.
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

- .1 Provide labour, equipment and facilities to:
 - .1 Provide access to Work 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 Departmental Representative 48 hours minimum in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

END OF SECTION

Part 1 General

1.1 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 4 days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
 - .2 Schedule of Work: to be in GANTT Chart format.
 - .3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.
 - .5 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
 - .6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
 - .7 PCA provided products.
 - .8 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
 - .10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
 - .11 Monthly progress claims, administrative procedures, photographs, hold backs.
 - .12 Appointment of inspection and testing agencies or firms.
 - .13 Insurances, transcript of policies.

1.2 PROGRESS MEETINGS

- .1 During course of Work, Departmental Representative will schedule progress meetings monthly.
- .2 Contractor, major Subcontractors involved in Work, and Departmental Representative are to be in attendance.
- .3 Departmental Representative will notify parties minimum 4 days prior to meetings.
- .4 Departmental Representative will record minutes of meetings and circulate to attending parties and affected parties not in attendance within 5 days after meeting.
- .5 Progress agenda to include the following:

- .1 Review, approval of minutes of previous meeting.
- .2 Review of Work progress since previous meeting.
- .3 Field observations, problems, conflicts.
- .4 Problems which impede construction schedule.
- .5 Review of off-site fabrication delivery schedules.
- .6 Corrective measures and procedures to regain projected schedule.
- .7 Revision to construction schedule.
- .8 Progress schedule, during succeeding work period.
- .9 Review submittal schedules: expedite as required.
- .10 Maintenance of quality standards.
- .11 Review proposed changes for effect on construction schedule and on completion date.
- .12 Other business.

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Refer to Technical Specifications which reference "SUBMITTALS" under PART 1 – GENERAL of each section.

1.2 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 co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify 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 is co-ordinated.
- .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.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Newfoundland and Labrador, Canada.
 - .1 When requested by the Departmental Representative, the Contractor shall provide CV and proof of Errors and Omissions insurance of the professional engineer who will be stamping drawings.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment,

indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

- .4 Allow ten (10) business days, unless otherwise noted, 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, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After 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 copy of product data sheets or brochures for requirements requested in specification Sections and as requested by the Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit electronic copy 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 accordance with specified requirements.
 - .2 Testing must have been within 2 years of date of contract award for project, unless otherwise noted.
- .13 Submit electronic copy of certificates for requirements requested in specification Sections and as directed 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 copy of manufacturer's instructions for requirements requested in specification Sections unless otherwise directed 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 copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Documentation of the testing and verification actions by manufacturer's representative to confirm compliance with manufacturer's standards and instructions.
- .16 Delete information not applicable to project.
- .17 Supplement standard information to provide details applicable to project.
- .18 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, electronic copy 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.
- .19 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of

responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

- .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.4 SAMPLES

- .1 Submit for review samples as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's site office.
- .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.

1.5 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.
- .3 Submit Certificates of Conformance to the Departmental Representative, stating that the component(s) has been installed in conformance with the approved shop drawings. Certificate of Conformance to bear the seal and signature of a Professional Engineer licensed in the province of Newfoundland and Labrador.
- .4 Certificates of Conformance required for, but not limited to, the following:
 - .1 All components where shop drawings are required (unless otherwise directed by the Departmental Representative).
 - .2 Dry film thickness of each coating of paint.
 - .3 As specified elsewhere in the Contract Documents.

1.6 PROCEDURES

- .1 Provide procedures required as specified in the Contract documents or as directed by the Departmental Representative.

1.7 OTHER SUBMISSIONS

- .1 Provide a construction schedule and cash flow forecasts updated every month.
- .2 Provide all other submissions as required by law and the Contract documents.

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS)
- .2 Government of Canada
 - .1 Canada Labour Code – Part II (entitled Occupational Health and Safety)
- .3 Province of Newfoundland and Labrador
 - .1 Occupational Health and Safety Act
 - .2 Occupational Health and Safety Regulations made pursuant to the Act
 - .3 Department of Transportation and Works (NLDTW) Traffic Control Manual (TCM).
- .4 Part 8 of the National Building Code
- .5 Municipal by-laws and ordinances.

1.2 DEFINITIONS

- .1 Competent Person: means a person who is:
 - .1 Qualified by virtue of personal knowledge, training and experience to perform assigned work in a manner that will ensure the health and safety of persons in the workplace;
 - .2 Knowledgeable about the provisions of occupational health and safety statutes and regulations that apply to the Work; and
 - .3 Knowledgeable about potential or actual danger to health and safety associated with the Work.
- .2 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.
- .3 Work site: where used in this section shall mean areas, located at the premises where Work is undertaken, used by Contractor to perform all of the activities associated with the performance of the Work.

1.3 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit site specific Health and Safety Plan: within 10 days of notification of Bid Acceptance and prior to commencement of work.
- .3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments. Revise plan as appropriate and resubmit within ten (10) working days after receipt of comments.

- .4 Submit revisions and updates made to the Contractor's Health and Safety plan during the course of the Work.
- .5 Submit records of Contractor's Health and Safety meetings when requested.
- .6 Submit Construction Safety Checklists after completion.
- .7 Submit copies of reports of directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .8 Submit copies of incident and accident reports.
- .9 Submit WHMIS MSDS – Material Safety Data Sheets.
- .10 Submit proof of Workers' Compensation Coverage through submission of Letter of Good Standing. Contractor must maintain good standing throughout the duration of the contract.
- .11 Contractor's responsibility for Health and Safety is not relieved in any way by the Department Representative's review or lack of review of these submittals.

1.4 COMPLIANCE REQUIREMENTS

- .1 Comply with the Occupational Health and Safety Act for the Province of Newfoundland and Labrador, and the Regulations made pursuant to the Act.
- .2 Comply with Canada Labour Code Part II, and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code.
- .3 Observe and enforce construction safety measures required by:
 - .1 2015 National Building Code of Canada, Part 8;
 - .2 Provincial Worker's Compensation Board;
 - .3 Municipal by-laws and ordinances.
- .4 In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed.
- .5 Maintain Workers Compensation Coverage for duration of Contract. Submit Letter of Good Standing to Departmental Representative upon request.
- .6 Medical Surveillance: Where prescribed by legislation or regulations, obtain and maintain worker medical surveillance documentation.

1.5 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons and environment adjacent to the site to the extent that they may be affected by the conduct of Work.
- .2 Comply with and enforce compliance by all workers, sub-contractors and other persons granted access to work site with safety requirements of Contract Documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.6 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 non-authorized persons from circulating within construction areas and remove from site.
- .2 Implement procedures for granting permission to enter onto 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, boarding and temporary lighting as required. See Section 01 56 00 – Temporary Barriers and Enclosures for minimum type of barriers acceptable.
- .4 Erect signage at entry points and at other strategic locations indicating restricted access and conditions of access. Signage must be professionally made in both official languages or by use of well understood graphic symbols.
- .5 Secure work site against entry when inactive or unoccupied and to protect persons against harm. Provide security guard as deemed necessary to protect site against entry.
- .6 Ensure persons granted access is 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.

1.7 PROTECTION

- .1 Provide temporary facilities for protection and safe passage of vehicular traffic around and adjacent to 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 over cost and schedule consideration for work.
- .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.

1.8 FILING OF NOTICE

- .1 File Notice of Project and other Notices with Provincial authorities prior to commencement of work.

1.9 PERMITS

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

1.10 HAZARD ASSESSMENTS

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

1.11 PROJECT/SITE CONDITIONS

- .1 The following are known or potential project related safety hazards at site:
 - .1 Running water, potential heavy flows.
 - .2 Highway traffic.
 - .3 Working over water.
 - .4 Heavy equipment.
 - .5 Slope stability and temporary shoring.
 - .6 Wildlife.
 - .7 Working at heights.
 - .8 Working overhead.
 - .9 Suspended scaffolding.
 - .10 Demolition.
 - .11 Exposure.
 - .12 Remote site.
- .2 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.
- .3 Include above items into the hazard assessment program specified herein.

1.12 SAFETY MEETINGS

- .1 Prior to commencement of work attend health and safety meeting conducted by Departmental Representative. Departmental Representative will advise of time and location. Ensure attendance of:

- .1 Superintendent of Work.
- .2 Designated Health and Safety Site Representative
- .3 Subcontractors.
- .2 Conduct regularly scheduled tool box and safety meetings during the Work in conformance with Occupational Health and Safety regulations.
- .3 Keep documents on site.

1.13 HEALTH AND SAFETY PLAN

- .1 Develop written site-specific Project Health and Safety Plan, based on hazard assessments, prior to commencement of work. Submit plan to Departmental Representative within 10 calendar days of Contract Award date.
- .2 Health and Safety Plan shall contain the following components:
 - .1 List of health risks and safety hazards identified by hazard assessments.
 - .2 Control measures used to mitigate risks and hazards identified.
 - .3 On-site Contingency and Emergency Response Plan as specified below.
 - .4 On-site Communications Plan as specified below.
 - .5 Name of Contractor's designated Health and Safety Site Representative and information showing proof of their competence and reporting relationship in Contractor's company.
 - .6 Names, competence and reporting relationship of other supervisory personnel used in the Work for occupational health and safety purposes.
 - .7 On-site Contingency and Emergency Response Plan shall include:
 - .1 Operational procedures, evacuation measures and communication process to be implemented in the event of an emergency.
 - .2 Evacuation plan: site layouts showing escape routes, marshalling areas. Details of alarm notification methods, fire drills, location of firefighting equipment and other related data.
 - .3 Name, duties and responsibilities of persons designated as Emergency Warden(s) and deputies.
 - .4 Emergency Contacts: name and telephone number of officials from Contractor, Sub-Contractors, federal and provincial departments having jurisdiction, local emergency resource organization.
 - .5 Harmonize plan with Facility's Emergency Response and Evacuation Plan. Departmental Representative will provide pertinent data including name of PCA and Facility Management contacts.
 - .8 On-site Communications Plan:
 - .1 Procedures for sharing of work related safety information to workers and Sub-Contractors, including emergency and evacuation measures.
 - .2 List of critical work activities to be communicated with Facility Manager which have a risk of endangering health and safety of Facility users.
 - .9 Address all activities of the Work including those of Sub-Contractors.

- .10 Review and update Health and Safety Plan regularly during the Work. Update as conditions warrant addressing additional health risks and safety hazards, such as whenever new trade or Sub-Contractors arrive at Work site.
- .11 Departmental Representative will respond in writing, where deficiencies or concerns are noted and may request re-submission of the Health and Safety Plan with correction of deficiencies or concerns.
- .12 Post copy of the Health and Safety Plan, and updates, prominently at Work site.

1.14 SAFETY SUPERVISION AND INSPECTIONS

- .1 Designate Health and Safety Site Representative to be present on site at all times during work, responsible for supervising health and safety and conducting safety inspections of work site.
- .2 Health and Safety Representative shall be assigned the responsibility and authority to:
 - .1 Implement, monitor and enforce daily compliance with health and safety requirements of the Work.
 - .2 Conduct site safety orientation session to persons granted access to the Work site.
 - .3 Ensure that persons allowed site access are knowledgeable and trained in health and safety pertinent to their activities at the site or are escorted by a competent person while on the Work site.
 - .4 Authority to stop and start work as deemed necessary for reasons of health and safety.
- .3 Conduct regularly scheduled safety inspections of work site as follows:
 - .1 Informal Inspections: carry out a minimum bi-weekly basis. Note deficiencies and remedial action taken in a log book or diary.
 - .2 Formal Inspections: carry out on a minimum monthly basis. Use standardized safety checklist forms. Prepare written report for each formal inspection. Document deficiencies, remedial action needed and assign responsibility for rectification to appropriate subcontractor or worker.
- .4 Cooperate with Facility's Health and Safety Site Coordinator responsible for the entire site or facility, should one be designated by Departmental Representative.
- .5 Maintain safety inspection documentation on site

1.15 TRAINING

- .1 Ensure that workers, subcontractors and other authorized persons granted access to site are effectively trained in occupational health and safety and practices pertinent to their assigned tasks.
- .2 Maintain employee records and evidence of training received.
- .3 Make training records readily available for review by Departmental Representative upon request.
- .4 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of Work immediately stop work and advise Department Representative verbally and in writing.

- .5 Follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative.

1.16 MINIMUM SITE SAFETY RULES

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

1.17 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by the Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative will stop Work if non-compliance of health and safety regulations are not corrected in a timely manner.

1.18 INCIDENT REPORTING

- .1 Investigate and immediately report to Departmental Representative incidents that:
 - .1 Require reporting to Provincial Department of Occupational Safety and Health, Workers' Compensation Board or to other regulatory agency.
 - .2 Medical aid injuries.
 - .3 Property damage in excess of \$10,000.00,
 - .4 Interruption to Facility operations resulting in an operational loss to a Federal department or client in excess of \$5,000.00,
 - .5 Required notification to Workers Compensation Board or other regulatory agencies as stipulated by applicable regulations.
- .2 Submit report in writing.

1.19 HAZARDOUS PRODUCTS

- .1 Comply with requirements of Workplace Hazardous Materials Information Systems (WHMIS).
- .2 Keep MSDS data sheets on site. Provide copies of all data sheets to Departmental Representative upon receipt of materials on site.

- .3 Post all MSDS data sheets on site, in a common area, visible to workers.

1.20 BLASTING

- .1 Blasting or other use of explosives is not permitted within the Park boundaries unless approved by the Departmental Representative.
- .2 Blasting, if approved by the Departmental Representative, shall be carried out in accordance with the Regulations made pursuant to the Newfoundland Occupational Health and Safety Act. The requirements as set out in the Occupational Health and Safety Act and Regulations are deemed to be minimum requirements and the Contractor shall conduct their operations in such a manner so as to comply with any and all other provincial and federal Act(s) or Regulations in effect at the time of blasting.

1.21 POWDER ACTUATED DEVICES

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

1.22 CONFINED SPACES

- .1 Abide by occupational health and safety regulations regarding work in confined spaces.
- .2 Safely for Inspectors:
 - .1 Provide PPE and training to Departmental Representative and other persons who require entry into confined spaces to perform inspections.
 - .2 Be responsible for efficacy of equipment and safety of persons during their entry and occupancy in the confined space.

1.23 POSTING OF DOCUMENTS

- .1 Post documents indicated herein and as required by Authority having jurisdiction.

1.24 RECORDS ON SITE

- .1 Ensure applicable items, articles, notices and orders are posted in a conspicuous location on Work site in accordance with Acts and Regulations of Province of Newfoundland and Labrador.
- .2 Post other documents as specified herein, including:
 - .1 Site specific Health and Safety Plan.
 - .2 WHMIS data sheets.
 - .3 Incident reports.
 - .4 Tool box and safety meeting minutes.
- .3 Make available to Departmental Representative, or authorized safety representative, for inspection upon request.

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 RELATED SECTIONS

- .1 Section 01 74 21 – Construction / Demolition Waste Management and Disposal

1.3 REFERENCES

- .1 National Parks Act.
- .2 Canadian Environmental Protection Act.
- .3 Newfoundland and Labrador Provincial Standards.
- .4 Guidelines for Protection of Freshwater Fish Habitat, DFO Canada.
- .5 Basic Impact Analysis (BIA) Dick's Brook Bridge Replacement, Parks Canada.
- .6 Basic Impact Analysis (BIA) Rocky Barachois Bridge Replacement, Parks Canada.
- .7 Basic Impact Analysis (BIA) Shoal Cove, Parks Canada.
- .8 Parks Canada National Best Management Practices Roadway, Highway, Parkway and Related Infrastructure.
- .9 Geotechnical Investigation, Dick's Brook Bridge, Gros Morne National Park, File No: 163567, dated December 15, 2017, prepared by Harbourside Geotechnical Consultants.
- .10 Geotechnical Investigation, Rocky Barachois Bridge Replacement, Gros Morne National Park, File No: 163545, dated August 31, 2017, prepared by Harbourside Geotechnical Consultants.

1.4 ENVIRONMENTAL PERFORMANCE

- .1 The Contractor shall comply with all mitigative measures, terms and conditions outlined in the attached Basic Impact Analysis Reports prepared by Parks Canada and Parks Canada National Best Management Practices Roadway, Highway, Parkway and Related Infrastructure. The BIAs and BMP are attached as Appendix A of this specification.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 An Environmental Briefing will be held prior to work commencing at the site, which will outline environmental factors to be considered during the work. It is mandatory that all current staff of the Contractor attend this meeting with the Departmental Representative and Environmental Protection Officer (EPO).
- .3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.

- .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .5 Environmental Protection Plan: include as applicable:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
 - .3 Names and qualifications of persons responsible for training site personnel.
 - .4 Descriptions of Environmental Protection Personnel Training Program.
 - .5 Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
 - .6 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
 - .1 Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
 - .7 Spill Contingency Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
 - .8 Non-Hazardous Solid Waste Disposal Plan identifying methods and locations for solid waste disposal including clearing debris and recycling of decommissioned bridge materials.
 - .9 Air Pollution Control Plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.
 - .10 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
 - .11 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

1.6 FIRES

- .1 Fires and burning of rubbish on site is not permitted.
- .2 The Contractor is required to comply with the Fire Protection Regulations of the National Parks Act.
- .3 In accordance with these Regulations, the Park Superintendent may restrict activities, or access to work areas, in the interest of fire prevention.
- .4 The Contractor's equipment must be in proper working condition, and be used in such a manner as to minimize the potential for ignition of vegetation.

- .5 Vehicles and stationary equipment must be equipped with fire suppression equipment such as an operable fire extinguisher.
- .6 If storage and/or operation of in-Park equipment during a high fire hazard season is of concern to the Park, the Contractor may be required to prepare and implement a Fire Suppression Contingency Plan.
- .7 The Departmental Representative and the Duty Warden of the Park must be contacted immediately in the event of a fire. The Contractor is held responsible to make all reasonable efforts to extinguish any fires on the site.

1.7 DRAINAGE

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

1.8 SITE CLEARING AND PLANT PROTECTION

- .1 Restrict vegetation removal to areas indicated or designated by Departmental Representative.
- .2 Sensitive areas should be cleared in a manner which will minimize disturbance to surface vegetation and soils. Areas such as stream crossings should only be cleared immediately prior to construction using light equipment.
- .3 Bulldozers, graders, and other clearing and grubbing equipment should not be operated outside of designated clearing boundaries and should have a restricted turning radius.
- .4 Vegetation and topsoil should not be removed to obtain fill for road construction purposes.
- .5 Whenever possible, organic debris and topsoil removed during grading operations should be stored for use during site restoration. Such stockpiles should be located well away from any stream or water body and should be covered with coarse material to minimize wind and water erosion.
- .6 Should cultural resources artifacts be unearthed or discovered during project excavation, work in that area should be stopped and the Departmental Representative contacted immediately.
- .7 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .8 Minimize stripping of topsoil and vegetation.

1.9 SITE SET-UP AND USE

- .1 All site activities related to construction are to be confined within the defined project boundaries.
- .2 Office trailer(s) will be permitted to be located within the boundaries of Gros Morne National Park. Location is subject to approval of the Departmental Representative.
- .3 Work sites will be equipped with appropriate and properly maintained sanitary facilities.
- .4 Garbage must be collected and removed daily from the worksite to keep the site sanitary and to prevent unwanted interactions with Park fauna (e.g. bears). All material must be removed, transported and disposed of in accordance with existing provincial-municipal and Park solid waste disposal guidelines, project waste management plan and/or regulations.
- .5 Temporary storage parking areas, and turn-a-round facilities for contractor-related equipment and vehicles will be limited to those areas agreed to and designated by the Departmental Representative.
- .6 To reduce potential negative impacts on Park fauna, noise control measures, such as properly functioning mufflers on equipment, must be in place.
- .7 Littering is prohibited.
- .8 Water extraction from within the Park boundaries is strictly forbidden. Water extraction may be permitted following detailed proposal submitted by the Contractor and subject to approval by Department Representative.

1.10 DISPOSAL OF WASTES

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

1.11 WORK ADJACENT TO WATERWAYS

- .1 In-water work will not be permitted from June 30 to September 30 when fish are mitigating through the construction site.
- .2 Do not operate construction equipment in waterways.
- .3 No fresh concrete, lime, cement, or other construction materials or debris is to enter the watercourse.
- .4 All heavy equipment to be used on the project site is to be cleaned of mud, soil or debris prior to being brought to the site, in good working order, without leaks of fuel, oil, grease or lubricants.
- .5 Fueling of equipment must not take place within 100 m of a watercourse.
- .6 The movements of fish through the project site will be unimpeded at all times.
- .7 Contractor is to have a copy of the environmental assessment (Basic Impact Analysis (BIA) Reports), Environmental Protection Plan and all applicable permits at the project site at all times.
- .8 Do not use waterway beds for borrow of material.

- .9 No excavated fill, waste material or debris from the removal of the existing bridge structure is to enter the watercourse.
- .10 Do not clean or drain equipment in waterways.
- .11 Blasting is prohibited within the Park boundaries unless approved by the Departmental Representative. Blasting, when approved, shall be in accordance with the project BIA and requires approval from the Department of Fisheries and Oceans, and shall be in accordance with the "Guidelines for Use of Explosives in Canadian Fisheries Waters" (DFO, April 1993).
- .12 Temporary diversion ditches, approved by the Departmental Representative are to be plastic lined.
- .13 Temporary storage sites for debris and soil generated from clearing operations should be deposited away from watercourses, should be surrounded by a natural vegetative buffer, should be screened from the road and should be selected by the Departmental Representative.
- .14 Dredged material is not to re-enter the waterway.
- .15 Design and construct temporary crossings to minimize erosion to waterways.
- .16 Do not skid logs or construction materials across waterways.

1.12 POLLUTION CONTROL

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

1.13 EARTH MOVEMENT

- .1 Clearing and grubbing of project site is to be kept to a minimum.
- .2 Where engineering requirements can be met, excavated materials from this project must be used for backfilling.
- .3 There are no borrow areas available in the Park.
- .4 All surplus excavated material must be removed from the Park as soon as possible and disposed of at an approved location and in an approved manner.
- .5 Any proposed sources of borrow material shall be approved by the Departmental Representative prior to start-up.
- .6 When vegetation must be removed, then the extent and duration of exposure should be kept to a minimum. Plan the phases of development so that only areas which are actively being developed are exposed.
- .7 Topsoil from excavated sections shall be stockpiled for subsequent application to side slopes requiring revegetation. Steep slopes on stockpiles should be avoided in order to prevent erosion.

- .8 Sediment traps, basins, or ponds, whether temporary or permanent, shall be installed before construction begins on the rest of the site.
- .9 Dust control measure will be necessary, especially when asphalt is removed. The use of chemical dust control agents must be pre-approved by the Departmental Representative.
- .10 Where there is potential for severe erosion and/or downstream siltation the Contractor shall cover excavations during major precipitation events as directed by Departmental Representative.

1.14 EROSION AND SEDIMENTATION CONTROL

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

1.15 HAZARDOUS MATERIALS

- .1 As part of the Environmental Protection Plan, the Contractor must submit a Fuel and Hazardous Materials Management and Spill Contingency Plan.
- .2 The management of fuels, lubricants and chemicals must meet with the requirements of the Newfoundland and Labrador Dangerous Goods and Hazardous Waste Management Criteria and all other appropriate provincial and federal regulations to include but not be limited to the following:
 - .1 Temporary fuel storage sites are to be located a minimum 200 m from any watercourse.
 - .2 Fuel storage containers must be accompanied by impermeable structures that would provide containment of 125% of the container capacity in the event of a leak or spill.
 - .3 Fueling and lubricating of equipment cannot be done closer than 100 m to any watercourse.
 - .4 All refuelling and lubricating operations should employ protection measures such as drip pans, to reduce the potential for escape of petroleum products to the environment.
- .3 No material toxic to fish or any aquatic life shall be permitted to enter any stream, river, or lake. This shall include, but not be limited to lubricants, fuels, testing fluids, insecticides, detergents, herbicides, cement, lime or concrete.
- .4 The Departmental Representative and the Park Warden must be immediately contacted after a spill of more than 10 L of fuel or lubricant, and after any amount of other chemical

products has escaped. All stained soil resulting from the Contractor's use of chemicals and fuel is to be cleaned up and disposed of at an approved disposal site.

- .5 Storage of large amounts of fuel (more than 900 L) in the Park is not permitted. Refuelling of on-line equipment from storage facilities located outside Park boundaries is strongly preferred. Storage of any fuel has to occur only in previously approved locations, and with Park consent. The Contractor is expected to be prepared to effect the containment and cleanup of all spills related to the Work.
- .6 Storage of hazardous material, including explosives, shall not be permitted within the Park, except for quantities which shall normally be expected to be utilized in a day of Work, and which are not permitted to stockpile.
- .7 Emulsion storage tanker and transfer of emulsion from tanker to spray vehicle are not permitted within National Park.
- .8 Equipment maintenance is not permitted within the Park boundaries.

1.16 TREATED WOOD

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

1.17 SITE DECOMMISSIONING

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

1.18 HISTORICAL/ARCHAEOLOGICAL CONTROL

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

1.19 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.

1.20 NON-COMPLIANCE OF ENVIRONMENTAL REQUIREMENTS

- .1 The failure to adhere to the environmental protection measures sited in the Special Activities Permit, the Basis Impact Analysis (BIA – File #CBFU 2018-003), or any clause in Section 01 35 43 of the specifications, and following the issuance of an environmental non-compliance notice, the Contractor is subject to a permanent retention of sums applicable as a fine for each infraction factually noted by the Departmental Representative or one of their agents. The fine sum per infraction is based on the total construction contract value as stated below:
 - .1 Total contract value < \$1 M = \$1,000
 - .2 Total contract value > \$1M < \$3M = \$2,000
 - .3 Total contract value > \$3M < \$5M = \$3,000
 - .4 Total contract value > \$5M = \$5,000
- .2 Any infraction that shall not be corrected by the following day shall be subject to an additional permanent retention of sums of the same amount. Each following day shall be subject to the same until the infraction is corrected. Additionally, any expense related to the damage caused to the environment shall be at the costs of the Contractor, notably any analysis, report and works required to manage restoration of fauna, flora and indemnities.
- .3 In the case of non-execution by the Contractor of repairs or damages, the Departmental Representative shall proceed with corrective works and will charge the Contractor the cost of such works and delays as permanent retention of sums.

Part 2 Products

Not Used.

Part 3 Execution

3.1 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 77 00 – Closeout Procedures
- .3 Section 01 78 00 – Closeout Submittals

1.2 DEFINITIONS

- .1 Quality Control (QC): The process of checking specific product or services to determine if they comply with relevant quality standards and identify ways to eliminate causes of unsatisfactory product or service performed.
- .2 Quality Assurance (QA): The process of ensuring that the Contractor's Quality Management Plan (QMP) (QC, non-conformances, etc.) is being followed. The results of the QA are provided as feedback to both the Contractor and the Departmental Representative. Where required, the Contractor shall implement changes to the project based on the feedback received from the QA process.

1.3 INSPECTION

- .1 Allow Departmental Representative adequate time and access to Work. If part of Work is in preparation at locations other than Place of Work, allow time and 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, until particular inspections or tests have been fully and satisfactorily completed and until such time as Departmental Representative gives permission to proceed. Pay costs to uncover 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, Contractor to 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.
- .5 The Departmental Representative shall participate in the taking of survey of all quantities with the Contractor responsible to complete the surveys in the presence of the Departmental Representative.

1.4 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged and coordinated by Departmental Representative for purpose of inspecting and/or testing portions of Work. These agencies include, but are not limited to, geotechnical instrumentation and

monitoring testing and inspection, aggregate tests and compaction tests. Cost of such services will be borne by Departmental Representative. The Contractor remains responsible for:

- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Mill tests and certificates of compliance.
 - .4 Tests as specified within various sections designated to be carried out by Contractor under the supervision of Departmental Representative.
- .2 Provide equipment and materials required for executing inspection and testing by appointed agencies.
 - .3 Employment of inspection/testing agencies does not relax responsibility of Contractor 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 additional cost to Contract. Contractor shall pay costs for retesting and re-inspection.

1.5 ACCESS TO WORK

- .1 Allow inspection/testing agencies access and required time to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.
- .3 Make good work disturbed by inspections and tests.

1.6 PROCEDURES

- .1 Notify appropriate agency and Departmental Representative sufficiently in advance of when work is ready for tests, in order for Departmental Representative to make attendance arrangements with Testing Agency. When directed by Departmental Representative, notify such agency directly.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Deliver in required quantities to Testing Agency. Submit with reasonable promptness and in an 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 on site for Testing Agency's exclusive use to store equipment and cure test samples.

1.7 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective or damaged products 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 damages to existing or new work, including work of other Contracts, resulting from removal or replacement of defective work.

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

1.8 TESTING BY CONTRACTOR

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

1.9 REPORTS

- .1 Submit the original and electronic copy of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

1.10 TESTS AND MIX DESIGNS

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

1.11 MILL TESTS

- .1 Submit mill test certificates as required of specification Sections or as requested by Departmental Representative.

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 35 29.06 – Health and Safety
- .3 Section 01 35 43 – Environmental Procedures
- .4 Section 01 55 26 – Traffic Regulation
- .5 Section 01 56 00 – Temporary Barriers and Enclosures

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
 - .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-0121-M1978 (R2003), Douglas Fir Plywood.
 - .3 CAN/CSA-S269.2-M1987 (R2003), Access Scaffolding for Construction Purposes.
 - .4 CAN/CSA-Z321-96 (R2001), Signs and Symbols for the Occupational Environment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings for all temporary structures which are required to be engineered. Shop drawings submitted to bear signature and stamp of qualified professional engineer registered or licensed in Province of Newfoundland and Labrador, Canada.

1.4 INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Identify areas which have to be gravelled to prevent tracking of mud.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove from site all such work after use.

1.5 SCAFFOLDING

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

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

1.6 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 cranes to be operated by qualified operator.

1.7 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.8 CONSTRUCTION PARKING

- .1 Parking will be permitted in the area of the site provided it does not disrupt performance of Work, interfere with normal traffic flow and only after obtaining agreement with the Departmental Representative. Parking will not be permitted within 3 m from the edge of pavement.
- .2 Provide and maintain adequate access to project site.
- .3 Keep parking areas clean and maintained during period of Contract.

1.9 SECURITY

- .1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.10 OFFICES

- .1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.
- .4 Departmental Representative's Site office.
 - .1 Provide separate temporary office trailer for Departmental Representative.
 - .2 Trailer to be minimum 6.1 m in length, with floor 0.3 m above grade, complete with 4 50% opening windows and one lockable door.
 - .3 Trailer to be insulated and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.
 - .4 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.
 - .5 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10 % upward light component.

- .6 Provide telephone and fax machine and communications hook-up for telephone, fax and internet. Capacity of internet to be suitable for business applications. Hardware and all communication connections to be maintained throughout the project.
- .7 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory, mirror and hand wash facility (chemical or potable water and soap) and maintain supply of paper towels and toilet tissue.
- .8 Equip office with 1 x 2 m table, 4 chairs, 6 m of shelving 300 mm wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.
- .9 Equip office with water cooler / filter and maintain supply of bottled water.
- .10 Maintain in clean condition.
- .11 If site office cannot provide telephone and internet connection, a second office within 3 km of the site is to be provided which conforms to all conditions including telephone and internet connection.

1.11 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.

1.12 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.

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Refer to Section 01 55 26 – Traffic Regulation.
- .2 Provide access and temporary relocated roads as necessary to maintain traffic.
- .3 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .4 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .5 Protect travelling public from damage to person and property.
- .6 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
- .7 Verify adequacy of existing roads and allowable load limit on these roads. Contractor responsible for repair of damage to roads caused by construction operations.
- .8 Construct access and haul roads necessary.

- .9 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
- .10 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
- .11 Dust control: adequate to ensure safe operation at all times.
- .12 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.
- .13 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- .14 Provide snow removal during period of Work.
- .15 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.14 CLEAN-UP

- .1 Remove construction debris, waste materials, packaging material from work site daily.
- .2 Clean dirt or mud tracked onto paved or surfaced roadways.
- .3 Store materials resulting from demolition activities that are salvageable.
- .4 Stack stored new or salvaged material not in construction facilities.

Part 2 Products

Not Used.

Part 3 Execution

3.1 GENERAL

- .1 Construct and maintain construction facilities in accordance with applicable Sections contained in these specifications.

3.2 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, watercourses, and walkways, according to requirements of authorities having jurisdiction.
- .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.

END OF SECTION

Part 1 General.

1.1 RELATED SECTIONS

- .1 Section 01 52 00 – Construction Facilities

1.2 REFERENCES

- .1 Government of Canada Weights and Measures Act 1985.
- .2 Government of Canada Weights and Measures Regulations 1990.

1.3 CERTIFICATION

- .1 Prior to use, Contractor shall have weigh scales certified as meeting requirements of Statutes of Canada, Weights and Measures Act. A copy of the inspection report to be provided to the Departmental Representative prior to work proceeding. Display certificate in a visible location.

1.4 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, and time of dispatch.
 - .1 Tickets shall not be issued to vehicles which exceed the vehicle's registered weight.

Part 2 Products

2.1 EQUIPMENT

- .1 Weigh scales: of sufficient capacity to weigh loaded vehicles in a single operation. The weigh scale shall be calibrated in SI units.
- .2 Scale house:
 - .1 To enclose mass indicator and where weigher can perform work and maintain records.
 - .2 Waterproof, one sliding window facing scale platform, one other window for cross ventilation, entrance door not to face on to scale platform.
- .3 Approved weigh tickets, in triplicate, with consecutive serial numbers shall be provided by Contractor.

Part 3 Execution

3.1 INSTALLATION

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

- .2 Remove scales and scale house when no longer required and as directed by Departmental Representative. Level approach ramps.
- .3 The work shall include installation of the anchorage assemblies.

3.2 MAINTENANCE

- .1 Maintain scale platform and scale mechanism clean and free from gravel, asphalt, snow, ice and debris.
- .2 Maintain approach ramps in good condition free from sags and ruts.
- .3 Have scales re-tested and re-certified if requested by Departmental Representative.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

- .1 This section is to provide traffic control as stipulated in the Newfoundland and Labrador Department of Transportation and Works (NLDTW) Traffic Control Manual (TCM).
- .2 Given the nature of the highway, its critical transportation link, effect on motorists, etc. it is imperative that Park personnel be kept notified as to the number of construction areas, their locations, duration of work, etc. This information must be provided by the contractor to the Park Communications staff on an ongoing basis.
- .3 A Traffic Control Plan must be approved by the Departmental Representative prior to commencing any work. Traffic Control Plan to be submitted prior to the pre-construction meeting.
- .4 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.
- .5 Two lanes of unrestricted access must be maintained throughout construction except for limited single lane closures, which must be approved by the Departmental Representative.

1.2 REFERENCE STANDARD

- .1 Regulate traffic in accordance with the Public Highways Act (Newfoundland and Labrador) as stipulated in the TCM distributed by the Newfoundland and Labrador Department of Transportation and Works (NLDTW).
- .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 DEFINITIONS

- .1 Traffic delay: period of time for which vehicle(s) is stopped or delayed in travelling through the contract limits due to the performance of Work on this project. Traffic delay applies to both single lane operation and road closure.
- .2 Road closure: period of time for which the road within the contract limits is not open to the public.

1.4 RELATED SECTIONS

- .1 Section 01 11 00 – Summary of Work
- .2 Section 01 35 29.06 – Health and Safety
- .3 Section 01 56 00 – Temporary Barriers and Enclosures

1.5 REFERENCES

- .1 Manual of Uniform Traffic Control Devices (MUTCD) for Streets and Highways.

- .2 Newfoundland and Labrador Department of Transportation and Works (NLDTW) Traffic Control Manual (TCM) – Latest Edition.

1.6 PROTECTION OF PUBLIC TRAFFIC

- .1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
- .2 When working on travelled way:
 - .1 Place equipment in position to present minimum of interference and hazard to travelling public.
 - .2 Keep equipment units as close together as working conditions will permit and preferably on same side of travelled way.
 - .3 Do not leave equipment on travelled way overnight.
- .3 Do not close any lanes of road without written approval of Departmental Representative. Before re-routing traffic, erect suitable signs and devices in accordance with instructions contained in TCM. Provide sufficient crushed gravel (50 mm thickness of Aggregate Base Course) to ensure a smooth riding surface during work.
- .4 Keep travelled way graded, free of pot holes and of sufficient width for required number of lanes of traffic.
 - .1 Provide detours as indicated and phasing of traffic throughout construction shall be carried out as indicated on the drawings, unless otherwise approved by the Departmental Representative.
 - .2 Traffic is not permitted to travel on subgrade or granular sub-base. A minimum 50 mm thickness of aggregate base course must be constructed prior to opening to traffic.
- .5 Ensure at least 2 lanes of traffic at all times except for limited single lane closures as approved by the Departmental Representative.
- .6 As indicated, provide well graded, gravelled detours or temporary roads to facilitate passage of traffic around restricted construction area. Provide and maintain signs and roadway.
 - .1 Do grading for detour in accordance with Section 31 24 13 – Roadway Embankments.
 - .2 Place and compact granular sub-base in accordance with Section 32 11 16.01 – Granular Sub-Base.
 - .3 Place and compact granular base in accordance with Section 32 11 23 – Aggregate Base Courses.
- .7 Provide and maintain reasonable road access and egress to property fronting along work under Contract and in other areas as indicated, unless other means of road access exists that meet approval of Departmental Representative.
- .8 All flag persons and traffic control personnel shall have successfully completed a traffic control training course. Proof of training for all persons shall be available on site at all times.

- .9 A mechanical sweeper is to be used to remove debris tracked onto the paved surfaces. Paved surfaces shall be sweep regularly, and at least daily, to remove debris.

1.7 INFORMATIONAL AND WARNING DEVICES

- .1 Provide and maintain NLDTW approved temporary: heavy barricades, signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project work which requires road user response.
- .2 All traffic signs are to be bilingual or symbolic.
- .3 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in TCM.
- .4 Place signs and other devices in locations recommended by TCM.
- .5 All flag persons and traffic control personnel shall have successfully completed a traffic control training course approved by the WorkNL. Proof of training for all persons shall be available on site at all times. The contractor shall provide an Accredited Sign Supervisor to be on site at all times when active construction is taking place. The Accredited Sign Supervisor will be responsible to supervise the placement and dismantling of all temporary condition signs and devices that indicate to the road user that highway construction activity exists and also to ensure that proper traffic control procedures are carried out in accordance with the TCM. The Accredited Sign Supervisor is considered part of the contractor's supervision and administration staff and compensation and the provision of this individual is considered incidental to the work.
- .6 A traffic control plan and emergency response plan must be approved by the Departmental Representative prior to commencing any work.
- .7 Continually maintain traffic control devices in use by:
 - .1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.
 - .2 Removing or covering signs which do not apply to conditions existing from day to day.

1.8 PORTABLE VARIABLE MESSAGE SIGNS

- .1 General
 - .1 It is a requirement that electronic signage (trailer mounted), Portable Variable Message Signs (4 PVMS), be employed at both ends of the work area (4 locations), notifying the general public that construction will be occurring along with anticipated delay times, etc. Notification signage is critical for this project, given the traffic volumes and potential for accidents to occur.
 - .2 PVMS shall be located at a safe distance away from traffic. Where temporary pads are required they shall be constructed to ensure water flow is not blocked.
- .2 Operating Characteristics
 - .1 The PVMS shall exhibit the following operating characteristics while in use:
 - .1 Light emitting diode (LED) technology or hybrid LED/Flip Disk Technology.

- .2 Antiglare polycarbonate sheeting.
 - .3 Solar powered.
 - .4 Capable of operating for 7 consecutive days on battery power supply with solar panels disconnected.
 - .5 Shall include all hardware and software necessary to facilitate reliable local and remote sign control.
 - .6 Programmable (25 message sequence for one week duration).
 - .7 Capable of displaying a multiphase message with variable dwell times for each phase.
 - .8 Text of message shall not scroll or travel horizontally or vertically across the face of the sign.
 - .9 Capable of displaying 3 lines of 8 characters, each character being approximately 457 mm high.
 - .10 Each character matrix comprised of 35 pixels, 5 wide by 7 high.
 - .11 Message visible from 500 metres away in all ambient light conditions.
 - .12 Message legible from 50 m to 300 m away in all ambient light conditions.
 - .13 Ability to raise the bottom of the display board a minimum of 1.5 metres above ground level.
 - .14 Flat black background on the display area when the pixels are in the off position.
 - .15 Trailer painted orange or yellow.
 - .16 Capability to accurately level the sign and aim it towards oncoming traffic.
 - .17 Photo sensor array to enable the luminance of the sign to be controlled both automatically and manually in relation to ambient light levels.
 - .18 Locking device to prevent rotation of the sign in winds up to 10-km/hour, while the sign is in display mode.
- .3 Trailer Mounting
- .1 The maximum dimensions of the Portable Variable Message Sign and trailer assembly while in display mode shall be as follows:
 - .1 Maximum overall height = 4.5 metres.
 - .2 Maximum overall width = 3.75 metres.
 - .3 Maximum overall length = 5.5 metres.
 - .4 Maximum gross unit weight = 2500 kilograms.
- .4 Conspicuity Markings
- .1 PVMS trailer assemblies shall require high reflectivity micro-prismatic fluorescent sheeting tape (or equivalent) (e.g. diamond grade or Type VII) (meeting ASTM standard E991 and ASTM E1247 for fluorescent materials). The reflectorized tape shall be of alternating, uniform white and orange or white and yellow sections. Sections of reflectorized tape shall be placed around the trailer frame, tongue or other outermost dimension, at uniform height and width such to reflect the light from the headlights of a vehicle approaching from any direction.

- .2 PVMS sign assemblies shall require high reflectivity micro-prismatic fluorescent sheeting type (or equivalent) (e.g. diamond grade or Type VII) (meeting ASTM standard E991 and ASTM E1247 for fluorescent materials). The reflectorized tape shall be construction orange in colour, and 13 mm in width. The tape shall surround the outside of the sign assembly on all sides and be uniform distance from the outmost pixels.

1.9 CONTROL OF PUBLIC TRAFFIC

- .1 Provide traffic control personnel who have a valid provincial license and are trained in accordance with, and properly equipped as specified in TCM manuals in following situations:
 - .1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.
 - .2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.
 - .3 When workers or equipment are employed on travelled way over brow of hills, around sharp curves or at locations where oncoming traffic would not otherwise have adequate warning.
 - .4 Where temporary protection is required while other traffic control devices are being erected or taken down.
 - .5 For emergency protection when other traffic control devices are not readily available.
 - .6 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.
 - .7 At each end of restricted sections where pilot vehicles are required.
- .2 All Traffic Control Personnel shall be equipped with portable radios only, not cellular devices, of sufficient range to ensure continuous communication within the traffic control zone. Flag persons using a cellular device shall be removed from the site immediately. PCA will not be held responsible for loss of time or delay incurred due to removal of such an individual.
- .3 All construction vehicles shall operate in accordance with and subject to traffic control restrictions and operations in place on the project.
- .4 In addition to traffic control during the normal hours of work, the contractor shall have a responsible person on site at all times to monitor that the traffic signage is working properly (including nights, weekends and holidays).

1.10 TRAFFIC MANAGEMENT PLAN REQUIREMENT

- .1 Contractor to provide a Traffic Control plan, prior to construction, for approval by the Departmental Representative. The Traffic Control plan shall be site specific and cover all temporary traffic conditions during construction on the project. The Traffic Control plan shall include:
 - .1 Personnel responsible (both contractor and sub-contractor), credentials and contact information;

- .2 Traffic Monitoring and Contacts, during work hours and after hours emergency contact;
- .3 Response to incidents;
- .4 Temporary conditions during construction, including equipment delivery and set-up, entering and exiting site, girder delivery and erection procedures;
- .5 Signage and additional traffic control measures.

1.11 OPERATIONAL REQUIREMENTS

- .1 Conduct operations as to create the minimum of inconvenience to traffic.
- .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 herein and approved in writing by Departmental Representative to protect and control public traffic, existing conditions for traffic may be restricted as follows:
 - .1 In accordance with TCM.
 - .2 The maximum cumulative traffic delay through the limits of construction shall not exceed 10 minutes.
 - .3 Closure plans shall be set in place by the Contractor to ensure the safe passage of emergency vehicles throughout the construction area within 15 minutes of being alerted by emergency response personnel. The 15 minute emergency response time shall be able to be met during all phases of construction and a dedicated on-site emergency phone line shall be set up by the Contractor to achieve this.
- .3 Temporary concrete (F-shape) barriers shall be installed in locations indicated on the drawings, where existing guide rail has been removed or where conditions warrant guide rail to protect the travelling public.

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 35 29.06 – Health and Safety
- .2 Section 01 55 26 – Traffic Regulation
- .3 Section 01 74 21 – Construction/Demolition Waste Management and Disposal

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
 - .2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-O121-M1978(R2003), Douglas Fir Plywood.
- .3 Newfoundland and Labrador Department of Transportation and Works (NLDTW)
 - .1 Traffic Control Manual (TCM)

1.3 INSTALLATION AND REMOVAL

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

1.4 HOARDING

- .1 Erect temporary site enclosures when and where required using 38 x 89mm construction grade lumber framing at 600mm centres and 1200 x 2400 x 13mm exterior grade fir plywood to CSA O121.
- .2 Apply plywood panels vertically as indicated flush and butt jointed.
- .3 Provide one or two lockable truck entrance gates and at least one pedestrian door if directed by Departmental Representative and conforming to applicable traffic restrictions on adjacent roads. Equip gates with locks and keys.
- .4 Erect and maintain pedestrian walkways if directed by Departmental Representative including roof and side covers, complete with signs and electrical lighting as required by law.
- .5 Paint public side of site enclosure in selected colours with one coat primer to CAN/CGSB 1.189 and one coat exterior paint to CGSB 1.59. Maintain public side of enclosure in clean condition.
- .6 Erect temporary site enclosure where and when required using new 1.2m high snow fence wired to rolled steel "T" bar fence posts spaced at 2.4 m on centre. Provide one lockable truck gate. Maintain fence in good repair.
- .7 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.5 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. Provide as required by governing authorities and as indicated.

1.6 WEATHER ENCLOSURES

- .1 Provide weather tight closures where and when required to facilitate construction operations.
- .2 Design enclosures to withstand wind pressure and snow loading.

1.7 DUST TIGHT SCREENS

- .1 Provide dust tight screens to localize and control dust generating activities, and for protection of workers and the environment.
- .2 Maintain and relocate protection until such work is complete.

1.8 ACCESS TO SITE

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

1.9 PUBLIC TRAFFIC FLOW

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

1.10 FIRE ROUTES

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

1.11 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.

1.12 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 General

1.1 PRECEDENCE

- .1 For Federal Government projects, Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.2 REFERENCES

- .1 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .2 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .3 Cost for such testing will be borne by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.
- .4 Conform to latest date of issue of referenced standards in effect on date of submission of Tenders, except where specific date of issue is specifically noted.

1.3 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 a cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations.

1.1 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.

- 1.2 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.

1.3 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.4 TRANSPORTATION

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

1.5 MANUFACTURER'S INSTRUCTIONS

- .1 Unless otherwise indicated in specifications install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.
- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.6 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify

Departmental Representative if required Work is such as to make it impractical to produce required results.

- .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.7 CO-ORDINATION

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

1.8 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.9 LOCATION OF FIXTURES

- .1 Inform Departmental Representative of conflicting installation. Install as directed.

1.10 PROTECTION OF WORK IN PROGRESS

- .1 Prevent overloading of parts of existing bridge.

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

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 78 00 – Closeout Submittals.

1.2 REFERENCES

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

1.3 QUALIFICATIONS OF SURVEYOR

- .1 Qualified registered land surveyor, licensed to practice in Newfoundland and Labrador, acceptable to Departmental Representative.

1.4 SURVEY REFERENCE POINTS

- .1 Existing horizontal and vertical working points are designated on drawings.
- .2 Locate, confirm and protect working points prior to starting site work. Preserve permanent reference points during construction.
- .3 Make no changes or relocations without prior written notice to Departmental Representative.
- .4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

1.5 SURVEY REQUIREMENTS

- .1 Establish permanent bench marks on site, as required, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2 Establish lines and levels, locate and lay out, by instrumentation.
- .3 Stake for grading, fill and topsoil placement.
- .4 Stake slopes and berms.
- .5 Establish pipe invert elevations.
- .6 Establish foundation elevations.
- .7 Establish lines and levels for mechanical and electrical work.
- .8 Special care shall be taken when setting girder bearing elevations and deck screed elevations.

1.6 EXISTING SERVICES

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

1.7 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.

1.8 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit name and address of Surveyor to Departmental Representative.
- .2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.
- .3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform with Contract Documents.

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 74 21 – Construction/Demolition Waste Management and Disposal

1.2 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Owner or other Contractors.
- .2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .3 Clear snow and ice from access to site, bank/pile snow in designated areas only.
- .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .5 Provide on-site containers for collection of waste materials and debris.
- .6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7 Dispose of waste materials and debris off site.
- .8 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .9 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .10 Provide adequate ventilation during use of volatile or noxious substances.
- .11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .12 A mechanical sweeper is to be used to remove debris tracked onto the paved surfaces. Paved surfaces shall be sweep regularly, and at least daily, to remove debris.

1.3 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .3 Remove waste products and debris including that caused by Owner or other Contractors, and leave Work clean and suitable for occupancy.
- .4 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.
- .5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .6 Inspect finishes and ensure specified workmanship and operation.

- .7 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .8 Remove dirt and other disfiguration from exterior surfaces.
- .9 Sweep and wash clean finished paved areas within the work site.
- .10 Clean downspouts and drainage systems.
- .11 Remove debris and surplus materials from site.
- .12 Remove snow and ice from access to site.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 General

1.1 WASTE MANAGEMENT GOALS

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

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures

1.3 REFERENCES

- .1 Newfoundland and Labrador's Solid Waste Resource Strategy.
- .2 Newfoundland and Labrador Environmental Act, Regulation 82 (Latest Issue), Used Oil Regulations.

1.4 DEFINITIONS

- .1 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
- .2 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .3 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .4 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .5 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
- .6 Salvage: removal of structural and non-structural structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .7 Separate Condition: refers to waste sorted into individual types.
- .8 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.

- .9 Waste Audit (WA): detailed inventory of estimated quantities of waste materials that will be generated during construction, demolition, deconstruction and/or renovation. Involves quantifying by volume/weight amounts of materials and wastes that will be reused, recycled or landfilled.
- .10 Waste Reduction Work Plan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials.

1.5 DOCUMENTS

- .1 Post and maintain in visible and accessible area at job site, one copy of following documents:
 - .1 Material Source Separation Plan
 - .2 Waste Reduction Workplan and any revisions to the document.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to project start-up:
 - .1 Submit 2 copies of completed Waste Reduction Work Plan (WRW).
 - .2 Submit 2 copies of Waste Source Separation Program (WSSP).

1.7 WASTE REDUCTION WORKPLAN (WRW)

- .1 Prepare and submit WRW prior to project start-up.
- .2 WRW identifies strategies to optimize diversion through reduction, reuse, and recycling of materials and comply with applicable regulations.
- .3 Structure WRW to prioritize actions and follow as first priority Reuse, then followed by Recycle.
- .4 Describe management of waste.
- .5 Post WRW or summary where workers at site are able to review content.

1.8 MATERIALS SOURCE SEPARATION PROGRAM (MSSP)

- .1 Prepare MSSP and have ready for use prior to project start-up. The Demolition Waste Audit (DWA), with related weigh bills and /or receipt must be submitted on a monthly basis with the Contractor's monthly Progress claim.
- .2 Implement MSSP for waste generated on project in compliance with approved methods and as reviewed by Departmental Representative.
- .3 Provide on-site facilities for collection, handling and storage of anticipated quantities of reusable and recyclable materials.
- .4 Locate containers in locations to facilitate deposit of materials without hindering daily operations.
- .5 Locate separated materials in areas that will minimize material damage.

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

1.9 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as specified in MSSP.
- .2 Unless specified otherwise, materials for removal become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .6 Separate and store materials produced during project in designated areas.
- .7 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
 - .1 On-site source separation is required.
 - .2 Remove co-mingled materials to off-site processing facility for separation.
 - .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.

1.10 DISPOSAL OF WASTES

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner and the like into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
 - .1 Number and size of bins.
 - .2 Waste type of each bin.
 - .3 Total tonnage generated.
 - .4 Tonnage reused or recycled.
 - .5 Reused or recycled waste destination.
- .4 Remove materials from deconstruction as deconstruction/disassembly work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

1.11 USE OF SITE FACILITIES

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

1.12 SCHEDULING

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 Products

Not Used.

Part 3 Execution

3.1 APPLICATION

- .1 Do Work in compliance with WRW.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Clean up Work area as work progresses.
- .2 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
- .3 Source separate materials to be reused/ recycled into specified sort areas.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 78 00 - Closeout Submittals.

1.2 INSPECTION AND DECLARATION

- .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 will perform inspection of Work to identify obvious defects or deficiencies.
 - .2 Contractor to correct Work accordingly.
 - .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 Work: complete and ready for final inspection.
 - .4 Final Inspection:
 - .1 When completion tasks are done, request final inspection of Work by Departmental Representative and Contractor.
 - .2 When Work is deemed incomplete according to Departmental Representative, complete outstanding items and request re-inspection.
 - .5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.
 - .6 Final Payment:
 - .1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.
 - .2 When Work deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.
 - .7 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.3 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment. Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with applicable sections of these specifications.
- .2 Waste Management: separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 45 00 – Quality Control
- .3 Section 01 71 00 – Examination and Preparation
- .4 Section 01 77 00 – Closeout Procedures

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide As-built documents and samples.
- .3 Provide final as-built survey.

1.3 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used correlate data into related consistent groupings.
 - .1 Identify contents of each binder on spine.
- .4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: provide a full sized paper copy of plans marked up with red ink to show changes made during construction. Title block must indicate as-built drawings and bear contractors name, stamp and signature.
 - .1 Bind in with text; fold larger drawings to size of text pages.
- .9 Provide 1:1 scaled CAD files in dwg format on CD.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

- .1 Table of Contents for Each Volume: provide title of project;
 - .1 Date of submission; names.
 - .2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.

- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data.
 - .1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain 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.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

- .1 Record information on set of opaque drawings.
- .2 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .3 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface features.
 - .2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

- .3 Field changes of dimension and detail.
- .4 Changes made by change orders.
- .5 Details not on original Contract Drawings.
- .6 References to related shop drawings and modifications.
- .4 Specifications: legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
 - .2 Changes made by Addenda and change orders.
- .5 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.7 FINAL SURVEY

- .1 Submit final site as-built survey plan in both electronic and paper format. Electronic format to be CAD and PDF copy of paper format. Paper format to be stamped and signed by qualified registered land surveyor, licensed to practice in Newfoundland and Labrador. Survey information to include all features within the extents of the site(s) and extend to existing ground / waterbed prior to construction. Streambed within the site is also to be surveyed. Maximum spacing between survey points not to exceed 10 meters.

1.8 WARRANTIES AND BONDS

- .1 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
 - .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
 - .4 Verify that documents are in proper form, contain full information, and are notarized.
 - .5 Co-execute submittals when required.
 - .6 Retain warranties and bonds until time specified for submittal.
- .2 Except for items put into use with Department Representative's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

Part 2 Products

Not Used.

Part 3 Execution

Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 61 00 – Common Product Requirements
- .2 Section 32 11 16.01 – Granular Sub-Base
- .3 Section 32 11 23 – Aggregate Base Courses
- .4 Section 31 37 20 – Clear Stone

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM D 4791-10, Standard Test Method for Flat Particles, Elongated Particles or Flat and Elongated Particles in Coarse Aggregate.
- .2 Newfoundland and Labrador Quarry Materials Act
 - .1 Consolidated Newfoundland and Labrador Regulation 804 – Quarry Materials Regulations (Revised 1996)

1.3 SOURCE APPROVAL

- .1 Provide copy of permit(s) for operation of pit/quarry.
- .2 Production of rock material for this project may be extracted from the Cod Knotts Quarry located in Gros Morne National Park provided all material meets the project specifications. All work in the quarry will be in accordance with the Cod Knotts Quarry – Rock Extraction Plan.
- .3 Inform Departmental Representative of proposed source of aggregates, provide current testing reports (dated within the last year) for physical properties of the proposed source of aggregates prepared by certified third party inspection agency for inspection and testing and provide access for sampling.
- .4 If, in opinion of Departmental Representative, aggregate from the proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate an alternative source or demonstrate that aggregate from source in question can be processed to meet specified requirements.
- .5 Should a change of aggregate source be proposed during work, advise Departmental Representative 1 week in advance of proposed change to allow sampling and testing.
- .6 Acceptance of an aggregate at source does not preclude future rejection if it is subsequently found to lack uniformity, or if it fails to conform to requirements specified, or if its field performance is found to be unsatisfactory.

1.4 SAMPLING

- .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Allow continual sampling by Departmental Representative during production.

- .3 Provide Departmental Representative with access to source and processed material for sampling.
- .4 Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross section sampling.
- .5 Provide front end loader or other suitable equipment including trained operator for stockpile sampling as necessary. Move samples to storage place as directed by Departmental Representative.
- .6 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.
- .7 Provide water, electric power and propane to Departmental Representative laboratory trailer at production site.

Part 2 Products

2.1 MATERIALS

- .1 Aggregate quality: sound, hard, durable aggregate free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in a deleterious manner for the use intended.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
 - .1 Greatest dimension to exceed three times least dimension.
- .3 Fine aggregate satisfying requirements of applicable section to be one, or a blend of following:
 - .1 Natural sand.
 - .2 Manufactured sand.
 - .3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
- .4 Coarse aggregates satisfying requirements of applicable section to be one of or a blend of the following:
 - .1 Crushed rock.
 - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
 - .3 Light weight aggregate, including slag and expanded shale.

Part 3 Execution

3.1 DEVELOPMENT OF AGGREGATE SOURCE

- .1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as approved by authority having jurisdiction.
- .2 Where clearing is required, leave a screen of trees between cleared area and roadways in accordance with permit(s) and all land-use or zoning regulations which may apply.

- .3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.
- .4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.
- .5 Trim off and dress slopes of waste material piles and leave site in neat condition.

3.2 STRIPPING OF TOPSOIL

- .1 Commence topsoil stripping of areas to be processed.
- .2 Avoid mixing topsoil with subsoil.
- .3 Stockpile in conformity with permit(s) and all land-use or zoning regulations which may apply. Stockpile height not to exceed 2 m.

3.3 PROCESSING

- .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
- .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative.
- .3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.
- .4 When operating in stratified deposits use excavation equipment and methods that will product uniform, homogeneous aggregate.

3.4 HANDLING

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

3.5 STOCKPILING

- .1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.
- .2 Stockpile aggregates in sufficient quantities to meet project schedules.
- .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
- .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into work.
- .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
- .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 hours of rejection.
- .7 Stockpile materials in uniform layers of thickness as follows:
 - .1 Maximum 1.5 m for coarse aggregates and base coarse aggregate.

- .2 Maximum 1.5 m for fine aggregate and sub-base aggregate.
- .3 Maximum 1.5 m for other aggregate.
- .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
- .9 Do not cone piles or spill material over edges of piles.
- .10 Do not use conveying stackers.
- .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.6 SOURCE ABANDONMENT

- .1 For temporary or permanent abandonment of aggregate source, rehabilitate source to condition meeting conformity with permit(s) and all land-use or zoning regulations which may apply.

END OF SECTION

Part 1 General

1.1 DESCRIPTION OF WORK

- .1 During construction, geotechnical instrumentation and monitoring equipment will be installed by Parks Canada Agency's geotechnical representative at the Dick's Brook site. Equipment including (but not limited to) vibrating wire piezometers, slope inclinometer casing, and settlement plates will be installed to monitor the behaviour of the fill.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 31 24 13 – Roadway Embankments

1.3 REFERENCES

- .1 Refer to instrumentation plan on Drawing C19.

Part 2 Products

2.1 INSTRUMENTATION

- .1 Instrumentation will be provided, installed, and monitored by Parks Canada Agency's geotechnical representative.
- .2 The contractor will place a protective layer of sand around the vibrating wire piezometer cables as detailed in Section 3.4
- .3 A 150 mm layer of Granular "A" shall be placed (by the contractor) below the settlement plates to provide a level surface for the equipment.

Part 3 Execution

3.1 INSTALLATION

- .1 The contractor is responsible for providing and maintaining access, providing and placing protective material around the equipment, avoiding damage to the equipment during construction, and cooperating with Parks Canada Agency and their representatives. The contractor shall perform site work to allow drill access to the instrumentation locations and provide a level surface for installation of the settlement plates.
- .2 Slope inclinometer casing, vibrating wire piezometers, and settlement plates will be supplied and installed by Parks Canada Agency's geotechnical representative. The installation will occur after the site has been cleared by the contractor.

- .3 A period of two weeks after clearing shall be allowed for the installation of the instrumentation before any fill is placed for the approach embankments.**
- .4 Additional settlement plates may be added after the counterforce berms (phase 1 fill) are complete. An allowance of two days should be provided to allow Parks Canada Agency's representative to place the equipment and take initial readings before work resumes at these locations.

3.2 SLOPE INCLINOMETER CASING

- .1 After the site has been cleared, slope inclinometer casing will be placed in boreholes advanced under the supervision of Parks Canada Agency's geotechnical representative.
- .2 The slope inclinometer casing will be extended upwards as additional fill is placed to allow access and regular (daily) readings. Granular "A" gravel shall be placed around the casing as each lift of fill is added. The Granular "A" shall extend 450 mm laterally from the inclinometer casing.
- .3 The contractor shall take care not to damage the casing when working near this equipment. The contractor shall coordinate readings and fill placement with Parks Canada Agency and their representatives.

3.3 SETTLEMENT PLATES

- .1 Settlement plates are comprised of square metal plates (approximately 600 mm by 600 mm) with a thickness of about 5 to 10 mm. A pipe of known length rises up from the plate and is extended as additional fill is placed. The elevation of the top of the pipe is monitored and the movement (settlement) of the plate is calculated.
- .2 A level area shall be prepared by the contractor to allow placement of the settlement plates. A layer of compacted Granular "A" gravel, 150-mm thick, shall be placed and compacted below each settlement plate to ensure the plate is initially level.
- .3 Settlement plates will be monitored as each lift of fill is placed throughout construction. They will be surveyed by a Parks Canada Agency representative on a frequent basis.

3.4 VIBRATING WIRE PIEZOMETERS

- .1 Vibrating wire piezometers will be placed in boreholes advanced under the supervision of Parks Canada Agency's geotechnical representative.
- .2 The piezometer cables will run horizontally from the ground surface from the boreholes in which the piezometers are installed to an area outside of the footprint of the fill (as indicated on the project drawings) for continued monitoring.
- .3 The piezometer cables will be placed in a bed of sand (placed by contractor) with a minimum cover of 300 mm (all directions) to protect the cables from damage. The contractor will coordinate this work with Parks Canada Agency and their representatives.

3.5 ACCESS AND PROTECTION

- .1 Access to the monitoring location (where the end of the cables from the piezometers are placed) shall be maintained throughout construction to allow monitoring of the instrumentation.
- .2 The contractor shall take care not to damage any monitoring equipment when placing fill or otherwise working near the instrumentation.
- .3 Equipment damaged by the contractor shall be repaired, replaced, or re-installed at the contractor's expense.

3.6 DELAYS DURING CONSTRUCTION

- .1 During construction, the instrumentation will be monitored by Parks Canada Agency's representative on a daily basis. If the collected data indicates signs of potential instability, the contractor will be directed by Parks Representative to stop placing fill until further readings are taken and analyzed. If the additional readings warrant action, a re-design of the embankment may be required including the use of additional EPS Geofoam. Compensation for any delays or time loss will be accommodated with an extension to the contract completion date of equivalent delays or time loss. Financial compensation for delays or time loss will not be considered. Unit item quantities will be adjusted to accommodate any re-design required.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 35 43 - Environmental Procedures
- .3 Section 01 74 21 – Construction / Demolition Waste Management and Disposal

1.2 DEFINITIONS

- .1 Clearing consists of cutting off trees and brush vegetative growth to not more than specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris.
- .2 Close-cut clearing consists of cutting off standing trees, brush, scrub, roots, stumps and embedded logs, removing at, or close to, existing grade and disposing of fallen timber and surface debris.
- .3 Clearing isolated trees consists of cutting off to not more than specified height above ground of designated trees, and disposing of felled trees and debris.
- .4 Underbrush clearing consists of removal from treed areas of undergrowth, deadwood, and trees smaller than 50 mm trunk diameter and disposing of fallen timber and surface debris.
- .5 Grubbing consists of excavation and disposal of all stumps, roots, embedded logs, humus, root mat and topsoil from areas of excavations and embankments to not less than specified depth below existing ground surface.
- .6 Organic stripping consists of existing soil and organic material that has been grubbed from the site during grading operations. The intent for this project is to reuse the organic stripping as material for final landscaping treatments.

1.3 STORAGE AND PROTECTION

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

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Consider felled timber from which saw logs, pulpwood, posts, poles, ties, or fuel wood can be produced as saleable timber.

Part 2 Products

Not Used.

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 Contractor's sediment and erosion control.
- .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 PREPARATION

- .1 Inspect site and verify with Departmental Representative, items designated to remain.
- .2 Locate and protect utility lines: preserve in operating condition active utilities traversing site.
 - .1 Notify Departmental Representative immediately of damage to or when unknown existing utility lines are encountered.
 - .2 When utility lines which are to be removed are encountered within area of operations, notify utility in ample time to minimize interruption of service. The Departmental Representative is to be provided copies on all correspondence.
- .3 Notify utility authorities before starting clearing and grubbing.
- .4 Keep roads and walks free of dirt and debris.

3.3 CLEARING

- .1 Clear all trees and underbrush by saw cutting. Mechanical brushers are not permitted.
- .2 Clearing is not permitted during nesting season which is anticipated to be between May 30 and July 15. Approval from the Departmental Representative must be given prior to commencement of clearing operation.
- .3 Clear areas as indicated and approved by the Departmental Representative. Generally, the areas to be cleared shall extend to a width of 3 m outside of excavation and embankment slope lines.
- .4 Clearing includes felling and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, rubbish and brush occurring within cleared areas.
- .5 Clear as indicated and as directed by Departmental Representative, by cutting at height of not more than 100 mm above ground.
- .6 Cut off branches and cut down trees overhanging area cleared as directed by Departmental Representative.

- .7 Cut off unsound branches on trees designated to remain as directed by Departmental Representative.

3.4 GRUBBING

- .1 Grub areas as indicated or as directed by the Departmental Representative. Generally, the areas to be grubbed shall extend to a width of 1.5 m outside of excavation and embankment slope lines.
- .2 Remove and dispose of all rootmat, stumps, embedded logs, humus, root mat and topsoil from areas of excavations and embankments to not less than 300 mm below existing ground surface.
- .3 Fill depressions made by grubbing with suitable material and to make new surface conform to existing adjacent surface of ground.

3.5 REMOVAL AND DISPOSAL

- .1 Remove cleared material off site as indicated by Departmental Representative.
- .2 Stockpile grubbed material on site as indicated by Departmental Representative for reuse in final surface treatment.
- .3 Protect stockpiled grubbed material with erosion and sedimentation controls.

3.6 FINISHED SURFACE

- .1 Leave ground surface in condition suitable for immediate grading operations to approval of Departmental Representative.

3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 35 43 – Environmental Procedures
- .3 Section 01 55 26 – Traffic Regulation
- .4 Section 31 05 16 –Aggregate Materials
- .5 Section 32 11 23 – Aggregate Base Courses

1.2 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock: solid material in excess of 0.3 m³. Frozen material not classified as rock.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation. Common excavation shall include removal of existing pipe with no reduction in material for the void

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit Traffic Control Plan for any lane reductions for review and approval by the Departmental Representative.

1.4 WASTE MANAGEMENT AND DISPOSAL

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

1.5 EXISTING CONDITIONS

- .1 Buried services:
 - .1 Before commencing work verify location of buried services on and adjacent to site, if applicable.
 - .2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

Part 2 Products

2.1 MATERIALS

- .1 Backfill material around structures shall be in accordance with Section 32 11 23 - Aggregate Base Courses.

Part 3 Execution

3.1 SITE PREPARATION

- .1 Cut pavement, if applicable, neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.2 STOCKPILING

- .1 Stockpile granular materials in manner to prevent segregation and for ready access in completing backfilling operation.
- .2 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.3 DEWATERING

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative review and approval details of proposed dewatering methods.
 - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

3.4 EXCAVATION

- .1 Advise Departmental Representative at least 7 days in advance of excavation operations.
- .2 Excavate to lines, grades, elevations and dimensions as indicated or as directed by Departmental Representative.
- .3 For trench excavation, one lane of travel must remain open at all times during the day and reinstate two lanes of traffic prior to completion of day's work.
- .4 Keep excavated and stockpiled materials safe distance away from edge of trench.
- .5 Restrict vehicle operations directly adjacent to open trenches.
- .6 Dispose of surplus and unsuitable excavated material off site.
- .7 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .8 Notify Departmental Representative when bottom of excavation is reached.
- .9 Obtain Departmental Representative approval of completed excavation.
- .10 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

3.5 BACKFILLING AND COMPACTION

- .1 Backfill around and over culverts as indicated or as directed by Departmental Representative.
- .2 Place granular backfill material, approved in writing by Departmental Representative, in 150 mm layers to full width, alternately on each side of culvert, so as not to displace it laterally or vertically.

- .3 Compact each layer to 95% corrected maximum dry density taking special care to obtain required density under haunches.
 - .1 The top 300 mm below subgrade elevation shall be compacted to a minimum 98% of the corrected maximum dry density.
 - .2 Backfill above subgrade elevation shall be compacted to a minimum 100% of the corrected maximum dry density.
- .4 Protect installed culvert with minimum 600 mm cover of compacted fill before heavy equipment is permitted to cross.
- .5 Place backfill in unfrozen condition.

3.6 RESTORATION

- .1 Reinstatement pavements disturbed by excavation to thickness, structure and elevation which existed before excavation as directed by the Departmental Representative.
 - .1 In areas for which there will be a delay in reinstating the pavement, upon approval of the Departmental Representative regarding the delay, a smooth riding granular surface is to be continually maintained free of depressions, pot holes and dust.
- .2 Upon completion of Work, remove waste materials and debris and correct defects as directed by the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 10 01 – Geotechnical Instrumentation and Monitoring
- .2 Section 31 11 00 – Clearing and Grubbing
- .3 Section 32 15 60 – Roadway Dust Control
- .4 Section 31 32 19.01 – Geotextiles

1.2 REFERENCES

- .1 Definitions:
 - .1 Rock Excavation: excavation of:
 - .1 Material from solid masses of igneous, sedimentary or metamorphic rock which, prior to removal, was integral with parent mass. Material that cannot be ripped with reasonable effort with a Caterpillar D9 crawler bulldozer or equivalent to be considered integral with parent mass.
 - .2 Boulder or rock fragments measuring in volume 1 cubic metre or more.
 - .2 Common Excavation: excavation of materials that are not Rock Excavation.
 - .3 Unclassified Excavation: excavation of materials regardless of type.
 - .4 Free Haul: distance that excavated material is hauled without compensation.
 - .5 Over Haul: authorized hauling in excess of free haul distance that excavated material is moved. Over Haul does not apply to this Contract.
 - .6 Embankment: material derived from usable excavation and placed above original ground or stripped surface up to top of subgrade.
 - .7 Waste Material: material unsuitable for embankment, embankment foundation or material surplus to requirements.
 - .8 Borrow Material: material obtained from areas outside right-of-way and required for construction of embankments or for other portions of work.
 - .9 Organic stripping consists of existing soil and organic material that has been grubbed from the site during grading operations. The intent for this project is to reuse the organic stripping as material for final landscaping treatments.
- .2 Reference Standards:
 - .1 ASTM International
 - .1 ASTM D698-12e2, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

- .2 When blasting has been approved, no blasting or use of storage of explosives shall be permitted on this Contract until the Contractor has provided proof of the following to the Departmental Representative:
 - .1 Valid Blaster's Journey Person Certificate and Certificates of Qualification identifying the Level of Qualification for the project requirements. An acceptable letter of extension of blasters certificate from the Industrial Training Division of the Provincial Department of Education is required when certificate expires (5 years max.). Certificate numbers and names are required for all blasters proposed for the project.
 - .2 Temporary Magazine license, when required.
 - .3 Explosive Vehicle Certificate, when required, issued by Transport Canada for transport of explosives regulated under the Transportation of Dangerous Goods Act.
 - .1 Valid Transportation of Dangerous Goods Training Certificate for all workers required to transport explosives.
 - .4 Blasters resume which clearly states and demonstrates:
 - .1 Minimum five (5) years of experience in handling, storage and detonation of explosives.
 - .2 Training at a blaster's school which is acceptable to the provincial government.
 - .5 That the Contractor has procured any blasting permit specific to the Contract required by any jurisdiction.
 - .6 Copy of Emergency Response Assistance Plan which has been filed with the Explosives Branch, Natural Resources Canada.
 - .7 Copy of Explosives Management Program.
 - .8 That the Contractor has in effect, adequate insurance with reasonable deductible to cover any anticipated loss that may occur through claims or otherwise that may occur.
 - .9 That the Contractor has conducted a pre-blast survey of any structure in the area that may be affected by the blasting. A copy of the pre-blast survey shall be provided to the Departmental Representative.
 - .10 The Contractor shall provide a copy of the blast design to the Departmental Representative, if requested to do so before a particular blast is made.
 - .11 The Contractor shall retain a qualified consultant to monitor ground vibration and air shock waves of all blasts. The monitoring results shall be provided to the Departmental Representative within 48 hours of the blast.
 - .1 Blasting is to be done in a manner that all three components of ground vibrations shall not exceed 12.5 mm/sec (0.5 in/sec) and air concussion as measured by peak over pressure shall not exceed 0.003 lbs/sq.in. or 128 decibels as measured in the ground adjacent to the nearest structure and any other structure where it is anticipated the values will be higher than at the nearest structure.
 - .12 The Contractor shall provide a copy of their public notification plan to inform the general public through radio and news media that blasting will be taking place in a particular area and the anticipated duration of work shall be specified.

1.4 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Adhere to regulations of authority having jurisdiction when blasting is required

Part 2 Products

2.1 MATERIALS

- .1 Embankment materials require approval by Departmental Representative.
- .2 Material used for embankment not to contain more than 3% organic matter by mass, frozen lumps, weeds, sod, roots, logs, stumps or other unsuitable material.
- .3 Borrow material:
 - .1 Obtain from sources such as quarry, or borrow pit as approved by Departmental Representative.
 - .1 Earth Embankment materials to consist of acceptable earth material and processed rock material free from objectionable quantities of organic matter, frozen soil, stumps, trees, moss, and other unsuitable materials.
 - .2 Rock Embankment material to consist of fragmented rock produced by drilling and blasting operations, and boulders which cannot be placed in layers as specified for Earth Embankments.

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 achieving required density of project materials.
 - .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.

3.3 WATER DISTRIBUTORS

- .1 Apply water with equipment capable of uniform distribution.

3.4 STRIPPING

- .1 Commence topsoil stripping of areas as directed by Departmental Representative after brush has been removed from these areas.
- .2 Strip topsoil to depths as directed by Departmental Representative. Do not mix topsoil with subsoil.
- .3 Stockpile in locations as directed by Departmental Representative.
 - .1 Stockpile height: not to exceed 2 m.
- .4 Remove clearing and grubbing debris from stripping.
- .5 Spread organic stripping, on completion of excavation and embankment construction, on slopes and trim or remove from site if quantity exceeds ability to grade on site.

3.5 EXCAVATING

- .1 General:
 - .1 Notify Departmental Representative when waste materials are encountered and remove to depth and extent directed.
 - .2 Sub-excavate rock 500 mm below subgrade in cut sections unless otherwise directed by Departmental Representative.
 - .1 Replace with approved embankment material or borrow material and compact to specified embankment density.
 - .3 Treat ground slopes, where subgrade is on transition from excavation to embankment, at grade points as directed by Departmental Representative.
- .2 Drainage:
 - .1 Maintain profiles, crowns and cross slopes to provide good surface drainage.
 - .2 Construct ditches as work progresses to provide drainage.
 - .3 Construct interceptor ditches as indicated or as directed before excavating or placing embankment in adjacent area.
- .3 Common (clay) excavation:
 - .1 In areas of common excavation which involve exposing clay material, work shall proceed in an expedient manner to complete the excavation and to cover the exposed clay surfaces within 48 hours of initial exposure as detailed on contract drawings. Work (excavation and cover) shall be scheduled during times when minimal precipitation is expected. The anticipated areas of excavation which involve exposing clay material are:
 - .1 The slope extending easterly from Dick's Brook (fore slope of future east abutment).
 - .2 Area extending from future east abutment easterly (see drawing no. C6 East Approach Grading Plan near Brook).
 - .2 Area shall not be grubbed, organic material shall be excavated with the underlining material for disposal.
 - .3 Area exposed shall be limited to that which can be excavated to final grade and covered within 48 hours of initial exposure.

- .4 Areas to receive geotextile and rock fill to be placed by end dumping of rock fill material which is advanced by pushing with a dozer the material over the geotextile in a lift thickness of 0.6 meters. Material is not to be dumped directly on the geotextile. Placement of material shall advance from the east towards Dick's Brook.
- .5 Slopes to receive fill against structure to be placed by end dumping of fill against structure material which is advanced by pushing with a dozer in a lift thickness of 0.15 meters until the slope is covered. Placement of material shall advance from bottom to top of slope. Construction traffic not permitted on slopes.
- .6 Areas covered with rock fill (0.6 m thickness) may not withstand construction traffic. Construct temporary haul road(s) as required to prevent distress to the rock fill covered areas.
- .4 Rock excavation:
 - .1 Notify Departmental Representative, when material appearing to conform to classification for rock is encountered, to enable measurements to be made to determine volume of rock. Provide a minimum of 12 hours notification.
 - .2 Blasting of rock is not permitted unless approved by the Departmental Representative.
 - .3 Reduce overbreak and increase stability of rock faces by using smooth blasting techniques.
 - .4 Use smooth blast and excavate short sections in rock cuts to determine optimum spacing of holes when requested by Departmental Representative.
 - .5 Stem holes as necessary to contain blast.
 - .6 Do not use prilled type ammonium nitrate and fuel oil (ANFO) explosives within 4 m of final cut line.
 - .7 Scale rock backslopes to achieve smooth, stable face, free of loose rock and overhangs to design backslope.
 - .8 Control blasting to minimize flying particles.
 - .9 No undrained pockets shall be left in the rock surface.
- .5 Borrow Excavation:
 - .1 Completely use in embankments, suitable materials removed from right-of-way excavations before taking material from borrow areas.
 - .2 Trim and leave borrow pits in condition to permit accurate measurement of material removed.

3.6 EMBANKMENTS

- .1 See Section 31 10 01 Geotechnical Instrumentation and Monitoring regarding timing required for installation and monitoring of equipment that is to be accommodated in the Contractor's schedule.
- .2 Construction of embankments shall not be grubbed unless directed by the Departmental Representative.
- .3 Construction of embankments on the west side of Dick's Brook shall commence with the placement of geotextile and the subsequent end dumping of rock fill material which is advanced by pushing with a dozer the material over the geotextile in a lift thickness of 1

meter. Material is not to be dumped directly on the geotextile. Placement of material shall advance from the east to the west edge of Dick's Brook. Each lift of material shall be completed in its entirety prior to beginning placement of the next lift of material unless otherwise authorized by the Departmental Representative.

- .4 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 pre-approved in writing by Departmental Representative.
- .5 Break up or scarify existing road surface prior to placing embankment material.
- .6 Place geotextile on prepared surface in accordance with Section 31 32 19.01 - Geotextile and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .7 Do not place material that is frozen nor place material on frozen surfaces except in areas authorized by Departmental Representative.
- .8 Maintain crowned surface during construction to ensure ready run-off of surface water.
- .9 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.
- .10 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 450 mm.
 - .2 Distribute rock material to fill voids with smaller fragments such that the interstices around rock are filled with fine material to form compact mass.
 - .3 Fill surface voids at subgrade level with rock spalls or selected material to form earth-tight surface.
 - .4 Do not place boulders and rock fragments with dimensions exceeding 150 mm within 500 mm of subgrade elevation.
- .11 Deductions from excavation will be made for overbuild of embankments.

3.7 COMPACTION

- .1 Break material down to sizes suitable for compaction and mix for uniform moisture to full depth of layer.
- .2 Deposit, spread, and blade smooth in successive uniform layers embankment material in layers 200 mm maximum thickness to the full width of the cross section.
 - .1 Ensure required compaction for each layer before placing any material for next layer.
- .3 Compact top 300 mm of subgrade in areas of excavation.
- .4 Use specialized compaction equipment supplemented by routing, hauling, and leveling equipment over each layer of fill.

- .5 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.
- .6 Compact each layer to minimum 95% of the Standard Proctor maximum dry density or the acceptable Control Strip Density except top 300 mm of subgrade.
 - .1 Compact top 300 mm in 150 mm layers to a minimum 98% of the Standard Proctor maximum dry density or the acceptable Control Strip Density.
- .7 Add water or dry as required to bring water content of materials to level required to achieve specified compaction.
- .8 For material containing less than 30% oversize (retained on 20 mm sieve) the test method shall be Standard Proctor Test – ASTM D698.
- .9 For maximum dry density for material containing more than 30% oversized shall be determined using method prescribed herein as Control Strip.
- .10 Control Strip Method:
 - .1 A Control Strip is a lift of material constructed on a 30 m section, minimum 3 m wide, of prepared surface selected by the Departmental Representative.
 - .2 A maximum dry density “Control Density” shall be established on a lift of material using the equipment and method of compaction as prescribed herein for construction of a Control Strip.
 - .3 A Control Strip shall be constructed at the beginning of work. One or more Control Strips shall be constructed whenever a change is made in the type or source of material or any change in the compaction equipment used. Each Control Strip shall remain in place and become a portion of the completed base course.
 - .4 To determine the Control Density, a minimum of six water content and density tests shall be taken at random locations by the Departmental Representative, using nuclear equipment. Test results shall be averaged to determine the in-place maximum dry density.
 - .5 The maximum compacted thickness of each layer shall not exceed 200 mm except when it can be demonstrated, in construction of the Control Strip, that adequate compaction of thicker lifts is possible.
 - .6 No additional lift shall be placed until the control density is determined and the compacted lift is approved by the Departmental Representative.
 - .7 The Control Strip water content shall be adjusted to produce necessary compaction as directed by the Departmental Representative. If the Control Strip compaction is being adversely affected by the water content of the soil, being either excessive or deficient, the Control Strip construction shall not continue until the water content is reduced or increased, to produce necessary compaction.
 - .8 The type and mass of the compaction equipment used shall be such that uniform density is obtained throughout the depth of the layer being compacted.
- .11 Minimum compaction equipment shall be a vibratory steel roller(s) weighing not less than 6 t, having a vibratory capacity of at least 1500 VPM with a minimum dynamic or centrifugal force of 8000 kg, operated in a vibratory mode, at a speed not exceeding 8 km/h.

- .12 Control Density Determination.
 - .1 A lift of material shall be spread over the entire Control Strip section. Once the Control Strip lift has been completely spread, the measurements of the Control Density shall commence and continue during repeated passes of the compaction equipment until a maximum dry density is achieved.
 - .2 A pass shall be one complete coverage of the Control Strip layer with the compaction equipment.
 - .3 Testing of the Control Strip shall be discontinued when the average dry density between each series of passes increases by less than 10 kg/m^3 , continually decreases, or remains constant.
- .13 The maximum dry density shall be the Control Density used to determine the percent compaction in other areas of the project for the same lift and thickness in other areas of the project for the same lift and thickness and same class of gravel as that used in the Control Section.

3.8 FINISHING

- .1 Shape entire roadbed to within 25 mm of design elevations with no depressions to hold water. Finish surface shall average design elevations and not uniformly high or low.
- .2 Finish slopes, ditch bottoms and borrow pits true to lines, grades and drawings where applicable. Scale slope by removing loose fragments, for cut slopes in bedrock steeper than 1:1.
- .3 Remove rocks over 150 mm in dimension from slopes and ditch bottoms.
- .4 Hand finish slopes that cannot be finished satisfactorily by machine.
- .5 Round top of backslope 1.5 m both sides of top of slope.
- .6 Run tractor tracks over slopes exceeding 3 m in height to leave tracks parallel to centreline of highway.
- .7 Trim between constructed slopes and edge of clearing to provide drainage and free of humps, sags and ruts.
- .8 Place organic stripping material to minimum depths:
 - .1 750 mm depth in areas of reinstated trees.
 - .2 300 mm depth in areas of reinstated scrubs.
 - .3 150 mm depth in areas of hydroseeding.
- .9 For details on finish grading refer to Section 32 91 21.
 - .1 In areas of reinstated trees and scrubs, prepare top 150 mm – 200 mm of placed organic stripping material to remove any waste wood in excess of 75 mm diameter.
 - .2 In areas of hydroseeding, prepare top 100 mm of placed organic stripping material to remove any waste wood in excess of 25 mm diameter.

3.9 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

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

3.10 PROTECTION

- .1 Maintain finished surfaces in condition conforming to this section until acceptance by Departmental Representative.
- .2 Provide silt fences and erosion protection as required to mitigate and prevent impacts to adjacent properties.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 This section includes all product design, labour, equipment and services necessary to complete the rigid expanded polystyrene (EPS) geofoam work in accordance with the contract documents.

1.2 RELATED SECTIONS

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 31 24 13.06 – Roadway Embankments
- .3 Section 31 32 19.01 - Geotextile
- .4 Section 32 11 23 - Aggregate Base Courses
- .5 Section 31 32 19.02 - Hydrocarbon Resistant Geomembrane

1.3 REFERENCES

- .1 ASTM C165 – Standard Test Method for Measuring Compressive Properties of Thermal Insulators
- .2 ASTM C203 – Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation
- .3 ASTM C303 – Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation
- .4 ASTM C578 – Specification for Rigid, Cellular Polystyrene Thermal Insulation
- .5 ASTM C7557 – Standard Practice for Sampling of Expanded Polystyrene Geofoam Specimens
- .6 ASTM D6817 – Standard Specification for Rigid Cellular Polystyrene Geofoam
- .7 ASTM D7180 – Standard Guide for Use of Expanded Polystyrene (EPS) Geofoam in Geotechnical Projects
- .8 ASTM D7557 – Standard Practice for Sampling of Expanded Polystyrene Geofoam Specimens

1.4 SYSTEM DESCRIPTION

- .1 This Section shall cover work of furnishing and installing EPS geofoam as lightweight fill for the construction of embankments.

1.5 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed design specifications, product design data and product literature indicating:
 - .1 Product performance criteria used to confirm capability to withstand specified requirements.
 - .2 Product transportation, storage, handling and installation requirements.
- .2 Samples:
 - .1 Submit samples for verification of product performance criteria a minimum of 4 weeks before placement
 - .1 Submit twenty-four (24) 50 x 50 x 50 mm samples of each proposed material.
- .3 Certificates:
 - .1 Submit certificate of compliance for material properties from manufacturer representing sampling in accordance with ASTM D7557.
 - .2 Provide proof of third party inspection program covering each product specified in this section confirming compliance.

Part 2 Products

2.1 MATERIALS

- .1 Required Physical Properties
 - .1 EPS blocks shall consist entirely of expanded polystyrene (EPS). The nominal size of each block shall be 2.44 m long by 1.22 m wide by 0.61 m deep. Alternative block sizes may be used upon approval of Parks Canada's representative provided that any increases in costs related to additional EPS or fill volumes (if applicable) shall be borne by the contractor. The minimum required physical properties of the EPS material (measured in laboratory testing) are given in the following table (in accordance with ASTM D6817):

TABLE 1 Physical Property Requirements of EPS Geofoam^A

Type	EPS22	EPS29
Min. Density (kg/m ³)	21.6	28.8
Max. Density (kg/m ³)	50.0	50.0
Min. Compressive Resistance (kPa) at 1% strain	50	75
Min. Compressive Resistance (kPa) at 10% ^A strain	135	200
Min. Flexural Strength (kPa)	276	345
Min. Oxygen Index (volume %)	24	24

^AIf yield occurs prior to 10% deformation, report compressive resistance and deformation at yield in addition to the compressive resistance at 1%, 5% and 10% deformation

.2 Testing of EPS Material

.1 Testing Laboratory and Certified Test Reports

- .1 Testing shall be done by an independent testing laboratory approved by Parks Canada's representative.
- .2 The Contractor shall submit certified test results from the testing laboratory that the EPS material meets the required physical properties.

.2 Sampling and Seasoning of Test Specimens

- .1 The physical properties of the geofoam blocks shall be obtained by testing specimens prepared from samples taken from actual blocks produced for this project.
- .2 All test specimens shall be seasoned in accordance with the requirements given in ASTM C578 "Standard Specification for Rigid Cellular Polystyrene Thermal Insulation".
- .3 Sampling, including rates of sampling, shall be performed in accordance with ASTM D7557.

.3 Measurement of Physical Properties

- .1 Density, compressive strength, and flexural strength shall be measured in accordance with the requirements given in ASTM C578.
- .2 Density shall be determined in accordance with ASTM C303.
- .3 Compressive strength shall be determined in accordance with ASTM C165.
- .4 Flexural strength shall be determined in accordance with ASTM C203.

.3 Seasoning

- .1 EPS blocks shall be adequately seasoned prior to shipment to the project site. Seasoning shall be storage in a suitable area for a minimum of 72 hours after the blocks are released from the mold.
 - .1 A suitable storage area shall protect the blocks from moisture and UV radiation, allow for adequate space between blocks for ventilation, and provide positive air circulation and venting to foster the out gassing of blowing agent and trapped condensate from within the blocks.

.4 Flammability

- .1 EPS blocks shall have limited flammability in accordance with the product flammability limitations given in ASTM C578.

.5 Dimensional Tolerances

- .1 The thickness, width, and length of an EPS block shall be the minimum, intermediate, and maximum overall dimensions of the block respectively, as measured along a block face.
- .2 The dimensions of each block shall not deviate from the nominal dimensions by more than $\pm 0.5\%$.
- .3 The corner or edge formed by any two faces of a block shall be perpendicular. The deviation of any face of the block from a theoretical perpendicular plane shall not exceed 5 mm over a distance of 500 mm.
- .4 Any one face of a block shall not deviate from a flat plane by more than 5 mm when measured using a straightedge.

.6 Fasteners

- .1 Mechanical metal fasteners shall be used. The details of the fastener shall be submitted to the Parks Canada's representative for review and approval at least 4 weeks prior to use. Fasteners shall be designed and installed to positively connect each block to all adjacent blocks.

.7 Block Production

- .1 The EPS blocks shall be labelled with the Manufacturer's name, product type, material lot number, density, and date of manufacture.
- .2 Blocks shall be produced by a Manufacturer with a quality control program.
- .3 The Contractor shall furnish Parks Canada's representative with two copies of the test reports showing that the EPS blocks meet the required physical properties and production tolerances.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance:
 - .1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage, and installation instructions.

3.2 HANDLING AND STORAGE OF BLOCKS

- .1 At all stages of manufacturing, shipment, and construction, the EPS blocks shall be handled in a manner that will not damage the blocks. Refer to ASTM D7180 for basic considerations for the use of EPS blocks in geotechnical projects.
- .2 Secure storage areas shall be provided for stockpiling the blocks if blocks are stored on the project site.
 - .1 The storage area shall be away from sources of heat and construction activity that produces heat or flame. Blocks in temporary storage shall be secured with 8"x8" timbers, sandbags or similar ballast to prevent their being dislodged by wind.
 - .2 Blocks to be stored outside for longer than 1 week must be covered in a light coloured tarpaulin to protect them from UV exposure.
 - .3 Blocks shall be protected from exposure to excessive heat, debris, rodents, and hydrocarbons.

3.3 VERIFICATION OF BLOCK QUALITY

- .1 Parks Canada's representative will perform a visual inspection of each block delivered to the project site to check for damage. The representative will also check to ensure that each block is labelled with the required information. The size and shape of the blocks will also be checked.
- .2 Parks Canada's representative will inspect the EPS blocks when they are delivered to ensure that the blocks have the required minimum density.

- .1 The representative will perform on-site density tests by weighing one block randomly chosen from each truck load or from each approximately 100 cubic meters of EPS block delivered to the project site, with additional blocks checked if the initial measurements indicate a lack of compliance.
- .2 The contractor shall supply a scale on-site with sufficient capacity and precision for weighing the EPS blocks. This scale shall be calibrated at most 4 months prior to first delivery of EPS blocks to site, and a copy of the certificate of calibration shall be provided to Parks Canada's representative.
- .3 Blocks with damage or not meeting labelling and materials requirements may be rejected.

3.4 PREPARATION

- .1 Verify that subgrade surface is free from surface water, frozen material or projections and other foreign matter detrimental to performance. If surface water is a reoccurring problem then proper drainage shall be constructed to prevent subgrade damage and floatation of EPS blocks.
- .2 The subgrade shall be graded as specified on the project documents. Departures from planarity may not exceed ± 10 mm over 3 meters. Compacted granular 'A' is to be used as leveling material, with a minimum thickness as indicated on the project drawings and with consideration to ground conditions and machines to be employed.

3.5 INSTALLATION

- .1 The blocks shall be installed in a logical manner, in accordance with the requirements shown on the project drawings.
- .2 Installation of EPS blocks shall be done after subgrade materials have been prepared. Prepared subgrade must be inspected and approved by Parks Canada's representative before placement of blocks.
- .3 EPS blocks shall be placed with staggered joints, with each successive layer turned with the long axis of the blocks at 90° to the previous layer. Joints shall be tight, and blocks should be free from chips or broken edges.
- .4 Fasteners shall be installed in accordance with the manufacturer's recommendations to lock the blocks in place.
- .5 With the exception of sand bags or similar "soft" weights used to temporarily restrain the blocks against wind, construction material other than that shown on the contract drawings shall not be placed or stockpiled on the EPS blocks.
- .6 Once EPS blocks are in place they should be covered on sides and top by a hydrocarbon resistant geomembrane, 150 mm thick sand, and then a geotextile as soon as possible. Installation to be as shown on the project drawings or as directed by the Departmental Representative. Before backfilling over the blocks, they must be inspected and approved by Parks Canada's representative.
- .7 Compaction of the earth fill overlying the blocks shall be performed by lightweight equipment until a minimum of 500 mm of cover is placed over the blocks. Construction traffic shall not drive over the blocks until this cover is in place.

- .8 Where the EPS fill is stepped-down on the east end (closest to Dick's Brook), and additional EPS will be placed in future works, the EPS fill shall be covered by a geotextile and ballast to sufficiently weight the geotextile down from wind and other environmental loadings. This ballast shall be placed uniformly over each step and may consist of 8"x8" continuous timber blocking, sandbags, or similar material and must be installed in a careful manner so as not to damage the EPS and so it can be easily removed to expose undamaged EPS for future phases of work.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 05 16 – Aggregate Materials
- .2 Section 31 32 19.01 – Geotextile
- .3 Section 32 11 23 – Aggregate Base Courses

1.2 REFERENCES

- .1 ASTM C117, Test Method for Material Finer Than 75 m Sieve in Mineral Aggregate by Washing.
- .2 ASTM C131, Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .3 ASTM C136, Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D4318, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

Part 2 Products

2.1 MATERIALS

- .1 Crushed and screened gravel or rock approved by the Departmental Representative prior to placement.
- .2 Material shall be tested in accordance with ASTM C117 and ASTM C136 and shall conform to the following gradation:

<u>Sieve Size mm</u>	<u>Percent Passing</u>
112	100
40	60 – 85
5	25 – 50
0.315	5 – 15
0.080	2 – 7

- .3 Fill Against Structure shall conform to the physical properties requirements listed in the following:

<u>Property</u>	<u>Test Method</u>	<u>FAS</u>
LA Abrasion (Grading A)	ASTM C131	45
Plasticity Index (Sand Portion)	ASTM D4318	< 6

Part 3 Execution

3.1 PLACING

- .1 The embankment underlying the Fill Against Structure shall be compacted as indicated on the drawings or as directed by the Departmental Representative.
- .2 Prior to placing structural fill, inspect subgrade to assure stability. Do not proceed with filling operations until these areas are approved by the Departmental Representative.
- .3 Fill material shall be placed in layers not exceeding 300 mm in thickness and each layer compacted as specified herein by means of a vibratory compactor.
- .4 Compaction of Fill Against Structure shall be compacted as in accordance with Section 32 11 23 Aggregate Base Coarses.
- .5 Extents of Fill Against Structure shall be as indicated on the Drawings or as determined by the Departmental Representative.
- .6 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .7 Do not use Fill Against Structure material which is frozen or contains ice, snow or debris.

3.2 SITE TOLERANCES

- .1 The extent of Fill Against Structure shall be as indicated on the plans or as determined by the Departmental Representative.

3.3 PROTECTION

- .1 Upon completion of Work, remove waste materials and debris and correct defects as directed by Departmental Representative.
- .2 Maintain finished slopes and lines until subsequent material is placed covering the Fill Against Structure.
- .3 Clean and reinstate areas affected by Work as directed by Departmental Representative.
- .4 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedure
- .2 Section 31 24 13 – Roadway Embankments
- .3 Section 31 24 13.06 – EPS Geofoam Lightweight Fill Material
- .4 Section 31 37 00 – Armour Rip-Rap
- .5 Section 31 37 20 – Clear Stone

1.2 REFERENCES

- .1 All current standards at the time of initial advertisement of tender apply
- .2 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
 - .2 ASTM D4491, Standard Test Methods for Water Permeability of Geotextiles by Permeability.
 - .3 ASTM D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - .4 ASTM D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - .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.
 - .7 ASTM D6241, Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

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

Part 2 Products

2.1 MATERIAL

- .1 Geotextile: woven synthetic fibre fabric, supplied in rolls.
 - .1 Width: 3.8 m minimum.
 - .2 Composed of: UV protected material.
- .2 Physical properties:
 - .1 Mass per unit area: to ASTM D5261, minimum 200 g/m².
 - .2 Grab tensile strength and elongation: to ASTM D4632.
 - .1 Breaking force: minimum 1300 N.
 - .2 Elongation at failure: maximum 20 %.
 - .3 Tear Resistance to ASTM D4533, minimum 525 N
 - .4 Puncture CBR to ASTM D6241, minimum 4250 N
 - .5 U.V. Resistance to ASTM D4355, minimum 70 % at 500 hours
- .3 Hydraulic properties:
 - .1 Apparent opening size (AOS): to ASTM D4751, 50 µm (minimum) 500 µm (maximum).
 - .2 Permittivity, 0.05 sec⁻¹.

Part 3 Execution

3.1 INSTALLATION

- .1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with security pins.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases. Stop geotextile 100 mm below finished surface.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 The preferred method of joining strips of geotextile is by sewing. Alternatively, each successive strip of geotextile can be overlapped 900 mm over the previously laid strip.
- .5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .6 After installation, cover with overlying layer within 8 hours of placement.
- .7 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

3.2 CLEANING

- .1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner. Recycle material if at all possible.

3.3 PROTECTION

- .1 Vehicular traffic not permitted directly on geotextile.

3.4 QUALITY CONTROL

- .1 The Contractor shall supply documentation from the manufacturer that the supplied material meets all specified as follows:

<u>Test Type</u>	<u>Standard</u>
UV Stability	ASTM D4355
Permittivity and Flow Rate	ASTM D4491
Tear Resistance	ASTM D4533
Grab Tensile Strength and Elongation	ASTM D4632
Apparent Opening Size	ASTM D4751
Puncture CBR	ASTM D6241
Mass Per Unit Area	ASTM D5261

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Hydrocarbon Resistant Geomembrane

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 31 24 13.06 – EPS Geofoam Lightweight Fill Material

1.3 REFERENCES

- .1 ASTM D638 – Test Method for Tensile Properties of Plastics
- .2 ASTM D814 – Standard Test Method for Rubber Property- Vapor Transmission of Volatile Liquids
- .3 ASTM D1434 – Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting
- .4 ASTM D4218 – Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
- .5 ASTM D4329 – Standard Practice for Fluorescent Ultraviolet (UV) Lamp Apparatus Exposure of Plastics
- .6 ASTM D4437 – Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes
- .7 ASTM D4833 – Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
- .8 ASTM D5199 – Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
- .9 ASTM D5397 – Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembrane Using Notched Constant Tensile Load Test
- .10 ASTM D5596 – Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
- .11 ASTM D5641 – Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber
- .12 ASTM D5820 – Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes
- .13 ASTM D6370 – Standard Test Method for Rubber – Compositional Analysis by Thermogravimetry (TGA)

- .14 ASTM D6392 – Test Method for Determining the Integrity of Non-Reinforced Geomembrane Seams Produced Using Thermo-Fusion Methods
- .15 ASTM D6497 – Standard Guide for Mechanical Attachment of Geomembrane to Penetrations or Structures.
- .16 ASTM D6693 – Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit samples of the geomembrane and product data at least 4 weeks prior to the beginning of work.
- .3 Indicate installation layout, dimensions and details, including fabricated and field seams, anchor trenches, and protrusion details.
- .4 Product Data:
 - .1 Provide specification sheets for geomembrane.
 - .2 Provide mill test reports for geomembrane roll stock used to make liner.
 - .3 Provide shop test reports for each fabricated panel produced.
 - .4 Provide field test reports for all welds completed in the field.

1.5 QUALITY ASSURANCE

- .1 Submit copies of material index quality control tests at least four weeks prior to start of the work.
 - .1 Material index quality control tests shall be performed a minimum of every 18 000 kg, once per shift, or at the start of a new material run.
 - .2 Each roll of geomembrane shall be labeled with; roll identification, roll number, thickness, roll dimensions, resin type, and date of manufacture.
- .2 Submit certificates that the material meets manufacturer's specification at least two weeks prior to delivery of the materials to the job site.
- .3 Follow documented installation plan and work procedures.
- .4 The installation shall be supervised by an engineer licensed in the Province of Newfoundland and Labrador. This engineer shall be engaged and compensated by the winning bidder and shall furnish a certificate of compliance stating that the selected geomembrane has been tested, meets the requirements of Section 2.1 and is:
 - .1 Free from pinholes, tears, and other defects that would cause leakage of liquids through the geomembrane.
 - .2 Acceptable for spill containment of hydrocarbons including (but not limited to) automobile gasoline, aviation gas, diesel fuel, kerosene, hydraulic fluid, methanol, ethanol, mineral spirits, and naphtha.

Part 2 Products

2.1 MATERIALS

.1 Geomembrane:

- .1 The geomembrane shall be puncture free and produced specifically for the purpose of hydraulic containment with inhibitors added to resist ultra-violet and chemical degradation and shall be capable of being sealed to itself using heat-sealing techniques.
- .2 The geomembrane shall be manufactured from: polyolefin alloy; tripolymer consisting of polyvinyl chloride, ethylene interpolymer alloy, and polyurethane; or a comparable polymer formulation approved by the Department Representative.
- .3 The geomembrane shall be flexible and, by its own weight, shall cover and conform closely to 90-degree edges and corners of EPS Geofoam blocks at the temperature where it is to be installed, without additional heating of the geomembrane.
- .4 The geomembrane shall meet the following physical and chemical requirements:
 - .1 Surface: The surface shall be textured on both sides, without pinholes or bubbles.
 - .2 Thickness (ASTM D 5199): Average thickness must exceed 1.00 mm (40 mil) with no individual reading lower than 10% below the average.
 - .3 Minimum Tensile Properties (ASTM D638 or ASTM D6693): Machine direction and perpendicular to machine direction (average values).
 - .1 Stress at Yield: $\geq 20 \text{ kN/m}$
 - .2 Stress at Break: $\geq 30 \text{ kN/m}$
 - .3 Strain at Break (50-mm gauge): ≥ 500 percent
 - .4 Puncture Resistance (ASTM D4833): $\geq 295 \text{ N}$
 - .5 Stress Crack Resistance under Constant Load (ASTM D5397):
 - .1 ≥ 800 hours.
 - .6 UV Resistance (ASTM D4329):
 - .1 Minimum 90% strength retained after 30,000 hours testing
 - .7 Solvent Vapour Transmission (ASTM D814):
 - .1 ASTM Fuel C: $\leq 10 \text{ g}/(\text{m}^2 \cdot \text{hr})$
 - .2 Ethanol: $\leq 10 \text{ g}/(\text{m}^2 \cdot \text{hr})$
 - .3 Methanol: $\leq 10 \text{ g}/(\text{m}^2 \cdot \text{hr})$
 - .4 ASTM IRM 903: $\leq 10 \text{ g}/(\text{m}^2 \cdot \text{hr})$
 - .8 Shop Seam Properties (ASTM D6392):
 - .1 Shear Strength: $> 10.0 \text{ kN/m}$
 - .2 Peel Strength: $> 8.5 \text{ kN/m}$
 - .9 Field Seam Properties (ASTM D6392):
 - .1 Shear Strength: $> 7.5 \text{ kN/m}$ (at 23 °C)
 - .2 Peel Strength: $> 7.0 \text{ kN/m}$ (at 23 °C)

Part 3 Execution

3.1 DELIVERY STORAGE AND PROTECTION

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

3.2 ACCESSORIES

- .1 Welding rod shall be manufactured from the same formulation as the geomembrane.

3.3 INSTALLER

- .1 Geomembrane Installer shall be approved by the geomembrane manufacturer and follow manufacturer's installation specifications.

3.4 PREPARATION

- .1 Ensure subgrade is prepared and surface finished as to not damage geomembrane.
- .2 Ensure surfaces to be lined are smooth, free of foreign and organic material, sharp objects, or debris of any kind.
- .3 Prepare mechanical attachments according to ASTM D6497 Standard Guide for Mechanical Attachment of Geomembrane to Penetrations or Structures.
- .4 All concrete surfaces to which the liner will attach shall have "smooth trowel" finish. All the corners shall have a minimum radius of 25 mm.
- .5 The work area shall be kept free of water and snow accumulation.

3.5 INSTALLATION

- .1 Installation of the geomembrane shall be performed in a logical sequence and in accordance with the lining installer's documented instructions.
- .2 Geomembrane shall be placed in accordance with the project drawings.
- .3 Sufficient thermal slack shall be incorporated during placement to ensure that harmful stresses do not occur in service. Wrinkles due to slack in the liner should be minimized and distributed evenly.
- .4 Weather conditions at time of installation:
 - .1 Site welding may proceed at any temperature providing a suitable qualification weld can be prepared at site conditions using the operator, equipment, and materials intended for the project.
 - .2 Installation of membrane in winds above 20 km/h can proceed only if the installer can demonstrate that the liner will not be at risk of damage.
 - .3 The membrane shall not be installed during precipitation or in the presence of excessive moisture.
 - .4 Installation shall not occur in conditions that may be detrimental to the function of the membrane.
- .5 Personnel working on geomembrane shall not use damaging footwear.

- .6 Completed panels shall be protected from damage and handled carefully to avoid damaging the liner.
- .7 Ballast used to prevent uplift by wind must not damage the geomembrane. A continuous load is recommended along the edges of panels to eliminate the risk of wind uplift.
- .8 Field Seams
 - .1 Field seams shall be tightly bonded using heat welding techniques. Extrusion welding shall only be used for repairs, detail work, and in areas where the use of other equipment is not practical. All personnel performing seaming operations shall be trained in the operation of the specific seaming equipment being used.
 - .2 Field seams shall be sampled for testing in a way that does not compromise the installed liner.
 - .1 One sample shall be tested for every 100 m of field seam.
 - .2 Test samples shall be removed from the ends of seams, or other location that does not introduce a defect into the liner or otherwise affect its performance.
 - .3 Samples to be approximately 100 mm long to permit testing of one shear and two peel specimens (ASTM D6392).
 - .4 Samples shall be tested immediately after seaming.
 - .5 Samples shall be tested on a field tensiometer in accordance with ASTM D6392.
 - .3 A written record shall be maintained for all field seam tests.
 - .4 All completed field seams will be 100 percent non-destructively tested using an air lance test (ASTM D4437 method 7.2) or a dual-seam air pressure test (ASTM D5820) as applicable.
 - .5 Field seams shall meet the specified requirements in peel and shear for the material. All discontinuities detected by any test method shall be repaired. All testing, repairs, and re-tests are to be recorded.
- .9 Qualification Seams
 - .1 Qualification seams shall be prepared at the beginning of each seaming period, at least every four hours, when the operator is changed, and when the equipment is adjusted.
 - .2 A qualification seam will be run prior to any field seams.
 - .3 A qualification seam is made with separate pieces of geomembrane using the same material and equipment that will be used for production welding.
 - .4 Machine conditions, and operator used for welding must be the same as those used for the qualification weld.
 - .5 Qualification seams shall be tested in shear and peel, and meet the specified requirements for the material as stated in the materials section.

3.6 TOLERANCES

- .1 Seam destructive tests:
 - .1 Follow the procedure in ASTM D6392.
 - .2 Test three specimens per sampling point, one in shear and two in peel.

- .1 All specimens must meet seam strength requirements
- .3 Procedures for case of failure of destructive testing.
 - .1 Cut out seam and re-weld; or,
 - .2 Retrace welding path to 3 m (in each direction) from location of failed test and take an additional sample for testing. If passed - cap strip or extrusion weld between re-tested location and original failed location.

3.7 REPAIR

- .1 Inspect seams and non-seam areas for defects, holes, blisters, and undispersed raw materials.
- .2 Identify any sign of foreign matter contamination.
- .3 Repair all through-thickness defects.
- .4 Repairs shall utilize the same material as the geomembrane and shall extend a minimum of 100 mm beyond the defect. Patches shall be secured by extrusion welding, hot air welding, or other approved technique.
- .5 Verification of repairs: All repairs are to be non-destructively tested using
 - .1 Air Lance Test, ASTM D4437 Method 7.2, or,
 - .2 Vacuum Box Test ASTM D5641
- .6 Redo failed repairs and re-test.
- .7 Keep records of all repairs and the results of repair testing.

3.8 CLEANING

- .1 Cleaning solvents shall not be used unless product is approved by the membrane manufacturer.
- .2 Use water and rags for all cleaning. If soap is used for cleaning rinse with clean water and dry before welding.

3.9 PROTECTION OF FINISHED WORK

- .1 Protect finished work from damage.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 32 19.01 – Geotextiles

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C127-07, Test Method for Material Finer Than 75 µm Sieve in Mineral Aggregate by Washing.
 - .2 ASTM C131-06, Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

1.3 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 ARMOUR STONE

- .1 Armour stone shall be hard, durable, field or quarry stone, free from splits, seams or defects likely to impair its soundness 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 stone shall not exceed two times the least dimension. The minimum density of the stone shall be 2 650 kg/m³. Physical properties shall be as defined as:

Property	Test Method	Armour Rock
Absorption % maximum	ASTM C 127	1.5
Los Angeles Abrasion, % maximum	ASTM C 131	35

Sizes of Armour Rip Rap shall be defined as:

Approximate Maximum Dimension, mm	Percent Smaller Than
1 050	100
650	0 – 50
300	0 - 15

2.2 GEOTEXTILE FILTER

- .1 Geotextile: in accordance with Section 31 32 19.01 - Geotextile.

Part 3 Execution

3.1 PLACING

- .1 Where armour rip rap is to be placed on slopes, excavate trench at toe of slope to dimensions as indicated.
- .2 Fine grade area to be armoured 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 - Geotextile and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .4 Place armour 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 The Armour Rip Rap shall be placed to the lines and grades shown on the drawings or as directed by the Departmental Representative. Placement shall be by machine in order to avoid waste and to ensure that the stone is in a stable position.
- .7 Final grading of slopes surrounding new abutments shall be completed within the allowable time for in water work as described in the specifications.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 05 16 – Aggregate Materials

1.2 REFERENCES

- .1 All reference standards shall be current issue or latest revision at the first date of tender advertisement. This specification refers to the following standards, specifications or publications:
- .1 ASTM C117-04, Standard Test Methods for Material Finer Than 75µm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C127-15, Test Method for Specific Gravity and Absorption of Coarse Aggregate.
 - .3 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D 4318 Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils
 - .5 MTO LS-618, Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.

Part 2 Products

2.1 MATERIALS

- .1 Clear stone material: shall consist of hard, durable stone particles and free from elongated or objectionable pieces. Material shall be tested in accordance with ASTM C117 and ASTM C136 and shall conform to the following gradation table:

<u>Sieve Size, mm</u>	<u>Percent Passing</u>				
	C1	C2	C3	C4	C5
250	100				
200		100	100		
150	20-35	90-100	90-100		
112		0-10	20-35	100	
80			0-20	90-100	
56	0-10				
28				0-10	100
20			0-10		90-100
10					0-40
5					0-10

- .2 Material shall conform to the physical properties listed in the table below:

<u>Property</u>	<u>Test Method</u>	<u>Clear Stone</u>
Absorption % max.	ASTM C 127	1.75
Plasticity Index	ASTM D 4318	0
Micro-Deval % max.	DOT&PW TM-1	25

Part 3 Execution

3.1 CONSTRUCTION METHODS

- .1 Where clear stone is to be placed on slopes, abutment drainage pipe ends, culvert ends, gutter ends, ditches or elsewhere directed by the Departmental Representative, excavate or prepare surface as directed.
- .2 Place geotextile on prepared surface in accordance with Section 31 32 19.01 - Geotextile and as indicated. Avoid puncturing geotextile. Vehicular traffic over geotextile not permitted.
- .3 Place clear stone to thickness and details as indicated or directed by Departmental Representative.
- .4 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass.
- .5 The clear stone shall be placed to the lines and grades shown on the drawings or as directed by the Departmental Representative. Placement and compaction shall be by machine in order to avoid waste and to ensure that the stone is in a stable position.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 05 16 – Aggregate Materials

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C117-04, Standard Test Methods for Material Finer Than 75µm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C127-15, Test Method for Specific Gravity and Absorption of Coarse Aggregate
 - .3 ASTM C131/C131M-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .4 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .5 ASTM C535-01, Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .6 ASTM D422-63 (2007), Standard Test Method for Particle-Size Analysis of Soils.
 - .7 ASTM D5821-13, Standard Test for Determining the Percentage of Fractured Particles in Coarse Aggregate.
 - .8 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort 600kN-m/m³.
 - .9 ASTM D1883-07, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - .10 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
 - .11 ASTM D1557-07, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort 27,000 kN-m/m³.
- .2 Canadian Standards Association (CSA)
 - .1 CSA A23.2-23A, Method of Test for the Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
- .3 Canadian General Standard Board (CGSB)
 - .1 CGSB 8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CGSB 8.2-M88, Sieves, Testing, Woven Wire, Metric Series.
- .4 Ministry of Transportation Ontario (MTO)
 - .1 MTO LS-618, Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 31 05 16 – Aggregate Materials.
- .2 Stockpile minimum 50% of total aggregate required prior to beginning operation. Maintain minimum of 1000 tonne in stockpile until last 1000 tonne is placed.

Part 2 Products

2.1 MATERIALS

- .1 Granular sub-base material (Granular B): Crushed and screened quarried rock. Material to consist of hard and durable stone and sand particles. Material shall be tested in accordance with ASTM C117 and ASTM C136 and shall conform to the following gradation table:

<u>Sieve Size mm</u>	<u>Percent Pass</u>
50.8	100
25.4	50 - 100
4.76	20 – 55
1.2	10 - 35
0.3	5 – 20
0.075	2 - 8

- .2 Granular material shall conform to the physical properties requirements listed in the following table:

<u>Property</u>	<u>Test Method</u>	<u>Sub-base</u>
Absorption (% Maximum)	ASTM C127	1.75
Los Angeles Abrasion* (loss % Maximum)	ASTM C131	35
Fractures Particles, one face, (% Minimum)**	ASTM D5821	80
Plasticity Index	ASTM D4318	0
Petrographic Number (Maximum)	ASTM C295	150
Micro-Deval Test for Fine Aggregate (% Max.)	CSA A23.2-23A	30
Micro-Deval Test for Coarse Aggregate (% Max.)	MTO LS-618	25

*The rates of loss after 100 revolutions to the loss after 500 revolutions shall not exceed 0.280.

**The fractured particle shall have at least one well defined fresh face resulting from fracture, with the face comprising no less than 20% of the particle surface area. Particles with smooth faces and rounded edges, or with only small chips removed will not be

considered as fractured.

- .3 Materials shall be considered unsuitable even though particle sizes are within the specified gradation limits if particle shape or any other characteristic precludes satisfactory compaction.
- .4 Materials shall conform to the gradation requirements and to the physical requirements stated. The gradation shall not show marked fluctuations from opposite extremes of the limiting sizes, and the plotted curve shall flow in a manner free from acute changes in direction.

Part 3 Execution

3.1 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 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Begin spreading sub-base material on crown line or high side of one-way slope.
- .6 Place granular sub-base materials using methods which do not lead to segregation or degradation.
- .7 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
- .8 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .9 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .10 Place and compact shouldering to match cross slope.
- .11 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 100% maximum dry density attained using the method prescribed herein as "Control Strip".
- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.

- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 CONTROL STRIP METHOD

- .1 A Control Strip is a lift of granular sub-base course constructed on a 30 m section, minimum 3 m wide, of prepared surface selected by the Departmental Representative.
- .2 A maximum dry density "Control Density" shall be established on a lift of granular sub-base course using the equipment and method of compaction as prescribed herein for construction of a Control Strip.
- .3 A Control Strip shall be constructed at the beginning of work. One or more Control Strips shall be constructed whenever a change is made in the type or source of material or any change in the compaction equipment used. Each Control Strip shall remain in place and become a portion of the completed sub-base course.
- .4 No additional lift shall be placed until the control density is determined and the compacted lift is approved by the Departmental Representative.
- .5 The Control Strip moisture content shall be adjusted to produce necessary compaction as directed by the Departmental Representative. The surface of the granular sub-base course shall be kept moist until testing is complete.
- .6 To determine the Control Density, a minimum of six moisture and density tests shall be taken at random locations by the Departmental Representative, using nuclear equipment. Test results shall be averaged to determine the in-place maximum dry density.
- .7 The type and mass of the compaction equipment used shall be such that uniform density is obtained throughout the depth of the layer being compacted.
- .8 Minimum compaction equipment shall be a vibratory steel roller(s) weighing not less than 6 t, having a vibratory capacity of at least 1500 VPM with a minimum dynamic or centrifugal force of 8000 kg, operated in a vibratory mode, at a speed not exceeding 8 km/h.
- .9 Control Density Determination.
 - .1 A lift of granular sub-base course shall be spread over the entire Control Strip section. Once the Control Strip lift has been completely spread, the measurements of the Control Density shall commence and continue during repeated passes of the compaction equipment until a maximum dry density is achieved.
 - .2 A pass shall be one complete coverage of the Control Strip layer with the compaction equipment.
 - .3 Testing of the Control Strip shall be discontinued when the average dry density between each series of passes increases by less than 10 kg/m^3 , continually decreases, or remains constant.
 - .4 The maximum dry density shall be the Control Density used to determine the percent compaction in other areas of the project for the same lift and thickness in other areas of the project for the same lift and thickness and same class of gravel as that used in the Control Section.

3.4 SITE TOLERANCES

- .1 Finished sub-base surface to be within a tolerance of +/-20 mm of dimensions as indicated but not uniformly high or low.

3.5 PROTECTION

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 31 05 16 – Aggregate Materials

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C117-04, Standard Test Methods for Material Finer Than 75µm (No. 200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C127-15, Test Method for Specific Gravity and Absorption of Coarse Aggregate.
 - .3 ASTM C131/C131M-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .4 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .5 ASTM C535-01, Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .6 ASTM D422-63 (2007), Standard Test Method for Particle-Size Analysis of Soils.
 - .7 ASTM D5821-13, Standard Test for Determining the Percentage of Fractured Particles in Coarse Aggregate.
 - .8 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort 600kN-m/m³.
 - .9 ASTM D1883-07, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - .10 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
 - .11 ASTM D1557-07, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort 27,000 kN-m/m³.
- .2 Canadian Standards Association (CSA)
 - .1 CSA A23.2-23A, Method of Test for the Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
- .3 Canadian General Standard Board (CGSB)
 - .1 CGSB 8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CGSB 8.2-M88, Sieves, Testing, Woven Wire, Metric Series.
- .4 Ministry of Transportation Ontario (MTO)
 - .1 MTO LS-618, Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.
 - .2

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 31 05 16 – Aggregate Material.
- .2 Store minimum 50% of total aggregate required prior to beginning operation. Maintain minimum of 1000 tonne in stockpile until last 1000 tonne is placed.

Part 2 Products

2.1 MATERIALS

- .1 Aggregate base material (Granular A): Crushed and screened quarried rock. Material to consist of hard and durable stone and sand particles. Material shall be tested in accordance with ASTM C117 and ASTM C136 and shall conform to the following gradation table:

<u>Sieve Size mm</u>	<u>Percent Pass</u>
----------------------	---------------------

19	100
9.51	50 – 80
4.76	35 – 60
1.2	15 – 35
0.3	5 – 20
0.075	2 - 8

- .2 Granular material shall conform to the physical properties requirements listed in the following table:

<u>Property</u>	<u>Test Method</u>	<u>Sub-base</u>
Absorption (% Maximum)	ASTM C127	1.75
Los Angeles Abrasion* (loss % Maximum)	ASTM C131	35
Fractures Particles, one face, (% Minimum)**	ASTM D5821	80
Plasticity Index	ASTM D4318	0
Petrographic Number (Maximum)	ASTM C295	150
Micro-Deval Test for Fine Aggregate (% Max.)	CSA A23.2-23A	30
Micro-Deval Test for Coarse Aggregate (% Max.)	MTO LS-618	25

*The rates of loss after 100 revolutions to the loss after 500 revolutions shall not exceed 0.280.

**The fractured particle shall have at least one well defined fresh face resulting from fracture, with the face comprising no less than 20% of the particle surface area. Particles with smooth faces and rounded edges, or with only small chips removed will not be considered as fractured.

- .3 Materials shall be considered unsuitable even though particle sizes are within the specified gradation limits if particle shape or any other characteristic precludes satisfactory compaction.
- .4 Materials shall conform to the gradation requirements and to the physical requirements stated. The gradation shall not show marked fluctuations from opposite extremes of the limiting sizes, and the plotted curve shall flow in a manner free from acute changes in direction.

Part 3 Execution

3.1 PLACING

- .1 Place aggregate base after granular sub-base is inspected and approved by Departmental Representative.
- .2 Construct aggregate base to depth and grade in areas indicated.
- .3 Ensure no frozen material is placed.
- .4 Place material only on clean unfrozen surface, free from snow or ice.
- .5 Begin spreading aggregate base material on crown line or high side of one-way slope.
- .6 Place aggregate base materials using methods which do not lead to segregation or degradation.
- .7 For spreading and shaping material, use spreader boxes having adjustable templates or screeds which will place material in uniform layers of required thickness.
- .8 Place material to full width in uniform layers not exceeding 150 mm compacted thickness. Departmental Representative may authorize thicker lifts (layers) if specified compaction can be achieved.
- .9 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .10 Place and compact shouldering to match cross slope. Compacted shouldering to be flush with asphalt concrete surface.
- .11 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

- .1 Compaction equipment to be capable of obtaining required material densities.
- .2 Compact to density of not less than 100% maximum dry density attained using the method prescribed herein as "Control Strip".

- .3 Shape and roll alternately to obtain smooth, even and uniformly compacted sub-base.
- .4 Apply water as necessary during compaction to obtain specified density.
- .5 In areas not accessible to rolling equipment, compact to specified density with mechanical tampers approved by Departmental Representative.
- .6 Correct surface irregularities by loosening and adding or removing material until surface is within specified tolerance.

3.3 CONTROL STRIP METHOD

- .1 A Control Strip is a lift of aggregate base course constructed on a 30 m section, minimum 3 m wide, of prepared surface selected by the Departmental Representative.
- .2 A maximum dry density "Control Density" shall be established on a lift of aggregate base course using the equipment and method of compaction as prescribed herein for construction of a Control Strip.
- .3 A Control Strip shall be constructed at the beginning of work. One or more Control Strips shall be constructed whenever a change is made in the type or source of material or any change in the compaction equipment used. Each Control Strip shall remain in place and become a portion of the completed base course.
- .4 No additional lift shall be placed until the control density is determined and the compacted lift is approved by the Departmental Representative.
- .5 The Control Strip moisture content shall be adjusted to produce necessary compaction as directed by the Departmental Representative. The surface of the aggregate base course shall be kept moist until testing is complete.
- .6 To determine the Control Density, a minimum of six moisture and density tests shall be taken at random locations by the Departmental Representative, using nuclear equipment. Test results shall be averaged to determine the in-place maximum dry density.
- .7 The type and mass of the compaction equipment used shall be such that uniform density is obtained throughout the depth of the layer being compacted.
- .8 Minimum compaction equipment shall be a vibratory steel roller(s) weighing not less than 6 t, having a vibratory capacity of at least 1500 VPM with a minimum dynamic or centrifugal force of 8000 kg, operated in a vibratory mode, at a speed not exceeding 8 km/h.
- .9 Control Density Determination.
 - .1 A lift of aggregate base course shall be spread over the entire Control Strip section. Once the Control Strip lift has been completely spread, the measurements of the Control Density shall commence and continue during repeated passes of the compaction equipment until a maximum dry density is achieved.
 - .2 A pass shall be one complete coverage of the Control Strip layer with the compaction equipment.
 - .3 Testing of the Control Strip shall be discontinued when the average dry density between each series of passes increases by less than 10 kg/m^3 , continually decreases, or remains constant.

- .10 The maximum dry density shall be the Control Density used to determine the percent compaction in other areas of the project for the same lift and thickness in other areas of the project for the same lift and thickness and same class of gravel as that used in the Control Section.

3.4 SITE TOLERANCES

- .1 Finished aggregate base surface to be within a tolerance of +/-10 mm of dimensions as indicated but not uniformly high or low.

3.5 PROTECTION

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

END OF SECTION

Part 1 General

1.1 GENERAL

- .1 This section consists of the application of water to the surface of the work to suppress dust.

1.2 RELATED SECTIONS

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

Part 2 Products

2.1 MATERIALS

- .1 Water: in accordance with Departmental Representative's approval.

Part 3 Execution

3.1 APPLICATION

- .1 Apply water with equipment approved by Departmental Representative at rate of 1L/m² for liquid when directed by Departmental Representative.
- .2 Failure of the Contractor to provide adequate dust control measures resulting in suspension of Work will be the responsibility of the Contractor.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

- .1 To complete finish grading to contours and elevations as shown on Drawings, as specified, or as required, and summarized but not restricted to:
 - .1 Preparation of Subgrade for areas to be hydroseeded.
 - .2 Preparation of Subgrade, provision and placement of planting soil mixture in planting pits.

1.2 RELATED WORK

- .1 Section 01 35 43 Environmental Procedures
- .2 Section 31 24 13 Roadway Embankments
- .3 Section 32 92 19.16 Hydraulic Seeding
- .4 Section 32 93 10 Planting of Trees, Shrubs, and Groundcovers

1.3 REFERENCES

- .1 ASTM D698-12e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³))

1.4 SOURCE QUALITY CONTROL

- .1 Protect site, soils and imported material from contamination by invasive plant species. Remove all invasive plant species introduced to the work site. Invasive plant species is defined as vegetative material not native to nor currently found within the project site and which aggressively spreads, is fast growing and/or is difficult to eradicate, such as Japanese knotweed, purple loosestrife, goutweed, glossy buckthorne, scotch pine, garlic mustard, etc.
- .2 The Contractor shall submit representative samples of planting soil that is to be used on the project to a Soil Plant Testing Laboratory acceptable to the Departmental Representative. Prior to using these materials on site they must meet the requirements as indicated in the project specifications. Information to be obtained from testing includes the following:
 - .1 Soil type classification.
 - .2 Percent organic matter.
 - .3 Chemical soil test.
 - .4 Recommendation for soil amendments and fertilizers.
- .3 Contractor to pay for costs of testing.
- .4 Perform pH test to determine required treatment to bring pH value of soil to 6.0 to 7.5 level

- .5 Submit two copies of soil analysis and recommendations for corrections to Departmental Representative.

1.5 SCHEDULING

- .1 No planting soil is to be placed before soil testing results have been provided by Contractor and approved by the Departmental Representative.

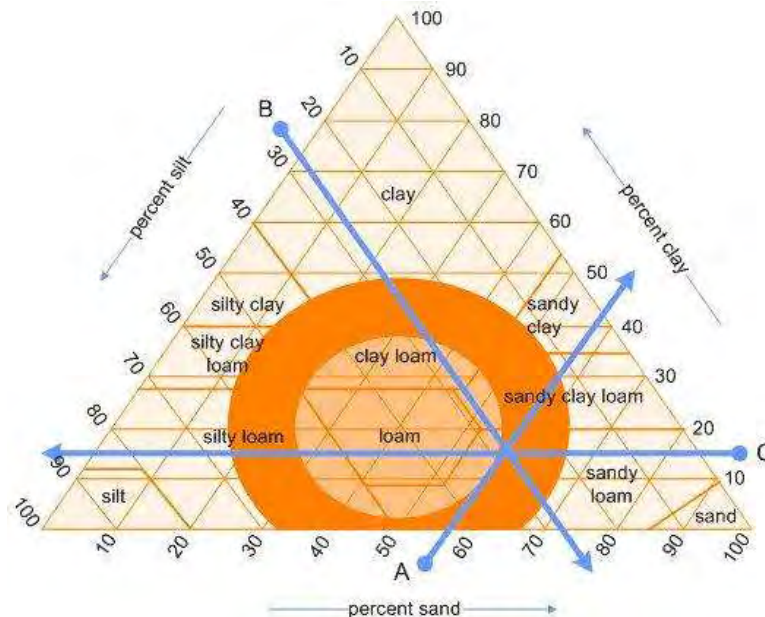
1.6 PROTECTION

- .1 Prevent damage to trees, landscaping, natural features, bench marks, existing pavement, culverts, and utility lines which are to remain. Make good any damage.
- .2 Protect newly graded and filled areas from washouts and settlements caused by rain and water drainage. Fill and grade settled or washed out areas to required levels and slopes under Work of this Section.

Part 2 Products

2.1 MATERIALS

- .1 Topsoil shall conform to the following characteristics unless otherwise specified. Be natural, fertile, friable and classified as either a loam or sandy loam texture as per Standard Topsoil Triangle.



- .2 Planting soil shall contain not less than 20%, or more than 40%, by weight of decayed organic matter (humus). All materials shall be taken from a well drained, arable site, free from subsoil, debris, vegetation, toxic materials, and stones and roots over 25mm max. dimension. Planting soil shall be free of grassy weeds such as quack grass and noxious weeds. Material shall have a pH of between 6.0 and 7.5. If material does not meet

minimum specifications it must be amended with an approved material and tested at the expense of the Contractor.

- .3 Manure: Well rotted, unleached cattle manure, not less than eight months or more than two years old, free of harmful chemicals and substances, containing no more than 25% straw, leaves or other materials unsuitable for planting use.
- .4 Peat moss:
 - .1 Derived from partially decomposed fibrous or cellular stems and leaves of sphagnum mosses.
 - .2 Elastic and homogeneous, brown in colour.
 - .3 Free of wood and deleterious material which could inhibit growth.
 - .4 Shredded particle minimum size 6mm.
- .5 Bonemeal: Raw bonemeal, finely ground with a minimum analysis of 2% nitrogen and 20% phosphoric acid.
- .6 Planting Soil Mixture for trees and shrubs. Planting soil can be manufactured by mechanically mixing: 6 parts topsoil, with 1 part well-rotted manure, and 3 parts peat moss.
 - .1 Incorporate bonemeal at rate of 2.75 kg per cu. meter
 - .2 Incorporate fertilizer at rate determined by soil sample test.
 - .3 Landscape Treatment 1 – Planting Soil Medium to consist of 100% planting soil.
 - .4 Landscape Treatment 2 & 3 – Planting Soil Medium to consist of 50% planting soil and 50% existing organic/graded material.

Part 3 Execution

3.1 GENERAL

- .1 Establish Subgrade for new planting areas by excavating/filling to indicated grades with existing organic/granular material.
- .2 Consolidate each layer to minimum 95% Standard Proctor Density.
- .3 Establish areas of proposed tree reinstatement and shrub reinstatement with Departmental Representative.
- .4 Imported planting soil shall be free of invasive plant species. Source of topsoil is to be inspected prior to arrival on site so as to permit inspector to see species growing in soil.

3.2 PREPARATION OF SUBGRADE & FINISH GRADING

- .1 Grade Subgrade, eliminating uneven areas and low spots, ensuring positive drainage. Remove soil contaminated with toxic materials. Dispose of removed materials from site as required by the Newfoundland Department of Environment.

- .2 Cultivate entire area that is to receive hydroseeding to depth of 100mm. Repeat cultivation in those areas where equipment used for hauling and spreading has compacted soil.
- .3 Remove surface debris, roots, vegetation, branches and stones in excess of 75mm dimension.
- .4 Placing planting soil medium to indicated depths:
 - .1 600mm of Treatment 1 planting medium.
 - .2 600mm of Treatment 2 planting medium.
 - .3 150mm of Treatment 3 planting medium.

3.3 PREPARATION OF PLANTING PITS

- .1 Excavate planting pits for new planting to dimensions and spacing indicated on Drawings.
- .2 Plant new material and backfill with planting soil mixture. Refer to Section 32 93 10.

3.4 SURPLUS MATERIALS

- .1 Dispose of surplus topsoil not required for fine grading and landscaping off-site.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures

1.2 SUBMITTALS

- .1 Product Data.
 - .1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Submit statement which certifies that each bag of seed and each bag of fertilizer for use on this project is fully labeled in accordance with the Canada Seed Act and Fertilizer Act.
 - .3 Submit manufacturer's instructions, printed product literature and data sheets for seed, mulch, tackifier, fertilizer, liquid soil amendments and micronutrients.
 - .4 Submit in writing to Departmental Representative 10 days prior to commencing work:
 - .1 Volume capacity of hydraulic seeder in litres.
 - .2 Amount of material to be used per tank based on volume.
 - .3 Number of tank loads required per hectare to apply specified slurry mixture per hectare.

1.3 QUALITY ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.4 SCHEDULING

- .1 Schedule hydraulic seeding to coincide with preparation of soil surface.
- .2 Hydraulic seeding shall be carried out as soon as possible after completion of the surface preparation in order to prevent erosion by wind and water. Hydraulic seeding shall take place no more than two (2) weeks after excavation and embankment construction is complete.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:

- .1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.
- .2 Inoculant containers to be tagged with expiry date.
- .3 Storage and Handling Requirements:
 - .1 Store fertilizer in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.
- .2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.
- .3 Do not dispose of unused fertilizer into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

Part 2 Products

2.1 MATERIAL

- .1 Seed: “Canada pedigreed grade” in accordance with Government of Canada Seeds Act and Seeds Regulations.
 - .1 Grass mixture: “Certified”, “Canada No. 1 Lawn Grass Mixture” in accordance with Government of Canada “Seeds Act” and “Seeds Regulations”.
 - .2 Mixture composition: 60% Annual Rye and 40% Creeping Red Fescue.
- .2 Mulch: Specially manufactured for use in hydraulic seeding equipment, non-toxic, water activated, green colouring, with an environmentally acceptable dye, free of germination and growth inhibiting factors with following properties:
 - .1 Type I mulch.
 - .1 Made from wood cellulose fibre.
 - .2 Organic matter content: 95% plus or minus 0.5%.
 - .3 Value of PH: 6.0.
 - .4 Potential water absorption: 900%.
 - .2 Tackifier: Water dilutable, liquid dispersion water soluble vegetable carbohydrate powder.
- .3 Water: Free of impurities that would inhibit germination and growth.
- .4 Fertilizer:
 - .1 To Canada “Fertilizers Act” and “Fertilizers Regulations”.
 - .2 The fertilizer is to have a plant food ratio of 10 nitrogen, 10 phosphorus and 20 potash plus 2% Fritted Tract Elements.
 - .3 The fertilizer to be spread the following spring during the maintenance period shall have a plant food ratio of 5 nitrogen, 10 phosphorus and 30 potash.

- .5 Inoculants: Inoculant containers to be tagged with expiry date.

2.2 EQUIPMENT

- .1 Truck (hydraulic):
 - .1 Slurry tank: approved commercial hydraulic equipment.
 - .1 Capable of continually agitating the mixture during hydraulic seeding operation to ensure homogeneous slurry is produced.
 - .2 Pumps capable of maintaining continuous non-fluctuating flow of solution.

Part 3 Execution

3.1 WORKMANSHIP

- .1 Do not spray onto structures, signs, guide rails, fences, plant material, utilities and other than surfaces intended.
- .2 Clean-up immediately, any material sprayed where not intended, to satisfaction of Departmental Representative.
- .3 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.
- .4 Protect seeded areas from trespass until plants are established.

3.2 PREPARATION OF SURFACES

- .1 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.
- .2 Fine grade areas to be seeded free of humps and hollows.
- .3 Remove deleterious materials such as sticks, roots, or large rocks and loosen top 50 mm of soil to remove hardened or crusted soil.
- .4 Surface to be scarified parallel to the contour of the slope with a minimum indentation of 25 mm and at a maximum spacing of 150 mm.
- .5 Cultivated areas identified as requiring cultivation to depth of 25 mm.
- .6 Ensure areas to be seeded are moist to depth of 150 mm before seeding.
- .7 Obtain Departmental Representative's approval of grade before starting to seed.

3.3 PREPARATION OF SLURRY

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

3.4 HYDRAULIC SEEDING

- .1 Seed during local growing season when natural moisture is available and temperature is suitable to ensure germination and growth.
- .2 Measure all quantities of material by weight or by weight-calibrated volume measurement.
- .3 Charge seeder with water, and while agitating, slowly add mulch, seed, fertilizer and lime until all components are thoroughly mixed.
- .4 When required, add erosion control agent to seed and mix thoroughly to complete seeding slurry.
- .5 Slurry application per hectare:
 - .1 Seed: Grass mixture 125 kg.
 - .2 Fertilizer: 375 kg.
 - .3 Mulch: Type I 1350 kg.
 - .4 Tackifier: 300 kg.
 - .5 Water: Minimum 30,000 litres.
- .6 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.
 - .1 Use correct nozzle for application.
 - .2 Using hoses for surfaces difficult to reach and to control application.
 - .3 Blend application 300 mm into adjacent grass areas or sided areas and previous applications to form uniform surfaces.
 - .4 Slurry shall be thick enough to prevent grass seed from drying and blowing but not to impact germination and growth.
 - .5 Reshoot areas where application is not uniform.
 - .6 Remove slurry from items and areas not designated to be sprayed.
 - .7 Protect seeded areas from trespass satisfactory to Departmental Representative.
 - .8 Remove protection devices as directed by Departmental Representative.

3.5 MAINTENANCE DURING ESTABLISHED PERIOD

- .1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
- .2 The contractor shall be responsible for maintaining hydraulic seeded areas to ensure proper and adequate growth of the vegetation during the warranty period. The contractor shall also be responsible for an additional application of fertilizer the following spring after initial application. This application shall be by a method approved by the Departmental Representative. The fertilizer shall be 5-10-30 and shall be at a rate of 300 kg/ha. No additional payment will be made for maintenance on the extra application of fertilizer.

3.6 ACCEPTANCE OF HYDROSEED APPLICATION FOR PARTIAL PAYMENT

- .1 Hydroseeded areas will be accepted for payment provided:

1. Seeded areas are uniformly established and turf is free of rutted, eroded, bare or dead spots.
2. Seeded areas have established to 50% coverage, i.e. 50% of soil surface soil is visible when grass has been cut to 75 mm height.
3. Areas seeded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

3.7 WARRENTY PERIOD

- .1 All areas hydraulic seeded under this contract shall have a warranty period of one (1) year starting from the date of initial acceptance. This warranty shall cover any defects in materials and workmanship, and damages caused by the elements of weather. During this period, any defect brought to the attention of the Contractor by the Departmental Representative shall be fixed, repaired or made good to the satisfaction of the Departmental Representative and at no additional cost.

3.8 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures

1.2 SUBMITTALS

- .1 Product Data.
 - .1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.
 - .2 Submit manufacturer's instructions, printed product literature and data sheets, processed products, and tackifier.

1.3 QUALITY ASSURANCE

- .1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.4 SCHEDULING

- .1 Schedule dry mulching to coincide with preparation of soil surface.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
 - .1 Labelled bags of processed material identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.
 - .2 Inoculant containers to be tagged with expiry date.
- .3 Storage and Handling Requirements:
 - .1 Material should not be so wet, decayed or compacted as to inhibit even and uniform spreading.
 - .2 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .3 Replace defective or damaged materials with new.

1.6 WASTE MANAGEMENT AND DISPOSAL

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

- .2 Do not dispose of unused materials where it will pose health or environmental hazard.

Part 2 Products

2.1 MULCH

- .1 Straw in an unprocessed form such as in bales or rolls, free of noxious weeds, as defined by the Weed Control Act and other undesirable species such as those having ecological or maintenance concerns, e.g. Purple Loosestrife and Sweet Clover.
- .2 Material in processed form shall be shredded straw or wood fibre packaged in plastic bags.

2.2 WATER

- .1 Free of impurities that would inhibit plant growth.

2.3 MULCH TACKIFIER

- .1 Water diluted liquid dispersion containing polyvinyl acetate polymer emulsion.

Part 3 Execution

3.1 WORKMANSHIP

- .1 Do not spray onto structures, signs, guide rails, fences, plant material, utilities and other than surfaces intended.
- .2 Clean-up immediately, any material sprayed where not intended, to satisfaction of Departmental Representative.

3.2 PREPARATION OF SURFACES

- .1 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.
- .2 Grade areas to be mulched.
- .3 Remove deleterious materials such as sticks, roots, or stones and loosen top 50 mm of soil to remove hardened or crusted soil.
- .4 Water soil to moisten.
- .5 Obtain Departmental Representative's approval of grade before starting to mulch.

3.3 DRY MULCHING

- .1 Mulch shall be spread by hand or mulch blower evenly and uniformly over the designated areas at a rate of 4500 kg/ha +/- 10%. Rough grade and steep slopes require more mulch and tackifier than finished or flatter ground. Adjust application rate to ensure the soil is covered with an appropriate thickness of mulch.
- .2 Tackifier shall be applied immediately after the mulch application as an aqueous slurry. The spray shall be broadcast upwards over the previously placed mulch at low pressures

to assure large droplet sizing. The tackifier shall not be applied during or immediately before a rain event.

- .3 Where tackifier is not used, mulch shall be mechanically incorporated into the soil surface of all mulched areas, using a mulch crimper, "sheep's foot" roller, punch roller or by scarification with a track walking vehicle. Scarifications shall be parallel to the contour of the slope.

3.4 MAINTENANCE DURING ESTABLISHED PERIOD

- .1 Perform the following maintenance operations from time of application to acceptance:
 - .1 Bare spots to be re-mulched to maintain adequate cover.

END OF SECTION

Part 1 General

1.1 WORK INCLUDED

- .1 To complete planting of trees and shrubs as shown, specified, or required, and summarized, but not restricted to:
 - .1 Supply and placement of planting soil mix.
 - .2 Supply and planting of trees and shrubs, and ground cover, complete with all related components and accessories.
 - .3 Maintenance and warranty.

1.2 RELATED WORK

- .1 Section 01 35 43 Environmental Procedures
- .2 Section 32 91 21 Topsoil and Finish Grading

1.3 REFERENCE STANDARDS

- .1 Perform planting of trees, shrubs and ground covers work in accordance with the Canadian Nursery Trades Association Canadian Standards (CNTA) for Nursery Stock – latest edition except where specified otherwise.

1.4 DELIVERY, STORAGE & PROTECTION

- .1 Protect plant material from damage during transportation.

1.5 WARRANTY

- .1 The Contractor hereby warrants that transplanted tree will be maintained to remain healthy and free of defects for **1 year** from date of Substantial Performance.

Part 2 Products

2.1 PLANT MATERIAL

- .1 Type of root preparation, sizing, grading and quality: comply with Canadian Nursery Trades Association Canadian Standards for Nursery Stock – latest edition.
- .2 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.
- .3 Plant material: root pruned regularly.
- .4 Trees: to CNTA Standards, with straight trunks, well and characteristically branched for species except where specified otherwise.
- .5 Bare root stock: not acceptable.
- .6 Collected (native) stock: not acceptable.

- .7 Substitutions to plant material indicated on planting plan is not permitted unless written permission has been obtained as to size, type, variety, and quantity. Substitutions must be of similar species as originally specified.

2.2 WATER

- .1 Free of impurities that would inhibit plant growth.

2.3 FERTILIZER

- .1 Commercial type, as determined by soil sample test. Organic product acceptable substitute, provided it will supply the nutrient requirements determined by soil sample test.

2.4 ANTI-DESICCANT

- .1 Wax-like emulsion to approval of Departmental Representative.

Part 3 Execution

3.1 PRE-PLANTING OPERATIONS

- .1 Ensure plant material acceptable to Departmental Representative.
- .2 Remove damaged roots and branches from plant material.
- .3 Ensure nursery applies anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.

3.2 EXCAVATION AND PREPARATION OF PLANTING BEDS

- .1 Ensure Subgrade for planting areas meets requirements as outlined in this specification, and is approved by Departmental Representative.
- .2 Preparation of planting areas is specified in Section 32 91 21 – Topsoil and Finish Grading.
- .3 For individual planting holes:
 - .1 Stake out location of planting areas and obtain approval from Departmental Representative prior to excavating.
 - .2 Excavate to depth and width indicated.
 - .3 Scarify sides of planting hole.
 - .4 Remove water which enters excavations prior to planting.

3.3 PLANTING

- .1 For container stock or root balls in non-degradable wrapping, water plants before removing container. Remove container or wrapping without damaging root ball.
- .2 Plant vertically in locations as indicated.
- .3 For trees and shrubs:

- .1 Excavate plant pit in reinstated organic stripping material. Place plant in pit and backfill with planting soil. Water to eliminate air pockets. After water has penetrated into soil, backfill to finish grade.
- .4 Water plant material thoroughly after planting operations are complete. After soil settlement has occurred, fill with soil to finish grade.
- .5 Dispose of burlap, wire, and container material off site.

3.4 TREE SUPPORTS

- .1 No tree supports are required.

3.5 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Establishment Period: Time between planting of material and acceptance by Departmental Representative that planting has been completed and plant material is alive and healthy.
- .2 Perform following maintenance operations from time of planting to preliminary acceptance at substantial completion review by Departmental Representative.
 - .1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.
 - .2 For evergreen plant material: water thoroughly in late fall prior to freeze-up to saturate soil around root system.
 - .3 Remove dead or broken branches from plant material.
 - .4 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

3.6 PRELIMINARY ACCEPTANCE

- .1 Plant material to be inspected by Departmental Representative at completion of planting activities. Plant material shall be accepted provided that plant material exhibits healthy growing condition and is free from disease, insects and fungal organisms.
- .2 Plant material installed in Fall will be accepted in following spring, one month after start of growing season, provided acceptance conditions outlined in 1 above, are fulfilled.
- .3 Warranty period will commence from date of Substantial Completion of full contract.

3.7 MAINTENANCE DURING WARRANTY PERIOD

- .1 Commence maintenance immediately following installation of Work and continue it until 1 year (the guarantee period) following Substantial Completion of Contract.
- .2 This maintenance will be the sole source of maintenance of the work during this period and is wholly the Contractor's responsibility.
- .3 From time of acceptance by Consultant to end of warranty period, perform following maintenance operations.
 - .1 Water to maintain soil moisture conditions for optimum growth and health of plant material without causing erosion.

- .2 For evergreen plant material: water thoroughly in late fall prior to freeze-up to saturate soil around root system.
- .3 Remove broken or hazardous branches from plant material.
- .4 Notify Departmental Representative when maintenance period is completed to arrange final inspection and transfer of maintenance responsibility to Owner.
- .5 Replace plants deemed to be unacceptable by Departmental Representative. Extend warranty period for one year from date of replacement.
- .6 Include the cost of maintenance in the Total Tender Price in the Form of Tender.

3.8 CLEAN-UP

- .1 Remove materials which have spilled onto adjacent surfaces during Work of this Contract.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 74 21 – Construction/Demolition Waste Management and Disposal
- .3 Section 31 05 16 – Aggregate Materials
- .4 Section 31 23 33.01 – Excavating, Trenching and Backfilling

1.2 REFERENCES

- .1 CSA International
 - .1 CSA B182.6-11, Profile Polyethylene (PE) Sewer Pipe and Fittings for Leak-Proof Sewer Applications
 - .2 CSA B182.8-11, Profile Polyethylene (PE) Storm Sewer Pipe and Drainage Pipe and Fittings
 - .3 CSA –G401, Corrugated Steel Pipe Products
 - .4 CSA-GA257.2, Standards for Concrete Pipe

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit list of all pipe, indicating location, type, diameter, length and invert elevations for Departmental Representative review, at least 4 weeks prior to ordering of pipe.
- .3 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for pipes and backfill and include product characteristics, performance criteria, physical size, finish and limitations.
- .4 Samples:
 - .1 Inform Departmental Representative at least 4 weeks before beginning Work, of proposed source of bedding materials and provide access for sampling.
- .5 Certification: to be marked on pipe.
- .6 Test and Evaluation Reports:
 - .1 Submit manufacturer's test data and certification at least 4 weeks prior to beginning Work.

1.4 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.
- .2 Store and protect pipes from damage.
- .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

- .1 High Density Polyethylene Pipe: double walled, with a smooth interior surface, conforming to CSA-B182.8. HPDE shall have a minimum stiffness of 320 Kpa.
- .2 Joints: Bell and spigot with integrated gasket.

2.2 CORRUGATED STEEL PIPE

- .1 Corrugated steel pipe: to CSA-G401, aluminized or double zinc corrugated steel pipe, couplers, nuts and bolts. Diameter as noted with 68 x 13 corrugations, or to match pipe to be extended.
- .2 Couplers to be annular corrugated with minimum width of 600 mm and extend 360 degrees around the pipe and fastened with bolts.

2.3 CONCRETE PIPE

- .1 Reinforced concrete pipe: to CSA A257.2 diameter as indicated, strength classification 65-D.
- .2 Rubber gaskets for joints: to CSA A257.
- .3 Cement mortar joint filler:
 - .1 Portland cement: to CSA A3000 type 10.
 - .2 Sand: to ASTM C144.
 - .3 Mortar: one part by volume of cement to two parts of clean, sharp sand mixed dry. Add sufficient water after mixing to give optimum consistency for hand application.

2.4 GRANULAR BEDDING AND BACKFILL

- .1 Granular bedding and backfill material to Section 32 11 23 - Aggregate Base Courses.

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 and walkways, according to sediment and erosion control plan, specific to site, that complies with requirements of authorities having jurisdiction.
 - .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 corrected maximum dry density.
- .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 HDPE PIPE CULVERTS

- .1 Begin placing pipe at downstream end of culvert with flanged end of first pipe section facing upstream.
- .2 Ensure bottom of each pipe is in contact with shaped bed throughout its length.
- .3 Do not allow water to flow through pipes or excavation during construction except as permitted by Departmental Representative.
 - .1 Water control proposed by the Contractor is subject to review and approval by the Departmental Representative.

3.6 JOINTS: HDPE PIPE CULVERTS

- .1 Joints to be Type 2 silt-tight gasket joints which shall not leak when tested in accordance with ASTM D3212.

3.7 LAYING CORRUGATED STEEL PIPE CULVERTS

- .1 Begin placing pipe at downstream end.
- .2 Ensure bottom of each pipe is in contact with shaped bed 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 or excavation during construction except as permitted by Departmental Representative.
 - .1 Water control proposed by the Contractor is subject to review and approval by the Departmental Representative.

3.8 JOINTS: CORRUGATED STEEL CULVERTS

- .1 Corrugated steel pipe: joints / couplings shall be non-corroding, steel culverts aluminized Type II to manufacturer's standards.
- .2 Match corrugations or indentations of coupler with pipe sections before tightening.
 - .1 Tap couplers firmly as they are being tightened, to take up slack and ensure snug fit.
 - .2 Insert and tighten bolts.

3.9 LAYING CONCRETE PIPE CULVERTS

- .1 Begin at downstream end of culvert with flanged end of first pipe section facing upstream.
- .2 Ensure barrel of each pipe is in contact with shaped bed throughout its length.
- .3 Do not allow water to flow through pipes or excavation during construction except as permitted by Departmental Representative.
 - .1 Water control proposed by the Contractor is subject to review and approval by the Departmental Representative.

3.10 JOINTS: CONCRETE PIPE CULVERTS

- .1 Joints may be made with rubber gaskets, bituminous jointing compound or Portland cement mortar.
 - .1 Rubber gasket joints:
 - .1 Install in accordance with manufacturer's written recommendations.
 - .2 Ensure that tapered ends are fully entered into flanged ends.
 - .2 Bituminous filled joint:
 - .1 Make joint with excess of filler to form continuous bead around outside of pipe and finish smooth on inside.
 - .3 Mortar joints:
 - .1 Prepare mortar as specified herein.
 - .2 Clean pipe ends and wet with water before joint is made.
 - .3 Place mortar in lower half of flanged end of pipe section in place.
 - .4 Apply mortar to upper half of tapered end of pipe section being installed.

- .5 Join pipe ends and force joint up tight, taking care to ensure inner surfaces of abutting pipe sections are flush and even.
- .6 Clean inside of pipe and annular space between ends of pipes after each joint is made.
- .7 Fill joint with mortar and finish smooth and even.
- .8 For pipes 800 mm or less diameter, fill joints before mortar in joints has set.
- .9 For pipes over 800 mm diameter, postpone filling joint until backfilling has been completed. Re-clean joints before applying mortar.

3.11 BACKFILLING

- .1 Place and compact granular material for bedding and backfilling in accordance with Section 31 23 33.01 – Excavating Trenching and Backfilling.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 74 21 – Construction / Demolition Waste Management and Disposal
- .2 Section 32 11 16.01 – Granular Sub-base.

1.2 REFERENCES

- .1 American Association of State Highway and Transportation Officials (AASHTO)
 - .1 AASHTO M180-2011, Corrugated Sheet Steel Beams for Highway Guardrails.
- .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM A307-12, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating
- .4 Canadian Standards Association (CSA)
 - .1 CAN/CSA-080 Series-08 (R2012), Wood Preservation
 - .2 CAN/CSA-S136, Cold Formed Steel Structure Members
 - .3 CAN/CSA-G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles
- .5 Newfoundland and Labrador Department of Transportation and Works (NLDTW)
 - .1 NLDTW Specification Book

1.3 DEFINITIONS

- .1 Steel W-Beam Guide Rail shall consist of single W-beam guide rail with posts spaced at 3.81 m intervals and off-set blocks at each post.
- .2 Steel W-Beam Guide Rail – Bridge Approach shall consist of single W-beam guide rail between posts spaced at 1.905 m intervals except for the first length of rail extending from the end of the bridge which shall have posts spaced at 0.953 m intervals. All posts to have off-set blocks at each post.

1.4 SAMPLES

- .1 At least 4 weeks prior to commencing work, inform Departmental Representative of proposed sources of guide rail and components, and provide access for sampling.

Part 2 Products

2.1 MATERIALS

- .1 Steel W-beam guide rail:

- .1 Steel rail and terminal sections: to AASHTO M180, Class B (3.5 mm thick), Type 2 zinc coated.
- .2 Bolts, nuts and washers: to ASTM A307, hot dip galvanized to CSA G164.
- .2 Timber post and offset block:
 - .1 Well seasoned, straight and sound, free from loose knots or other defects, dressed four sides.
 - .2 Sizes: posts to be 200 mm x 200 mm x 2.1 m in length; blocks to be 200 mm x 200 mm x 440 mm in length.
 - .3 Acceptable species of wood: Jack Pine or Eastern Hemlock.
 - .4 Treat posts and blocks to CSA 080 commodity standard 080.14-M, pressure preserved wood for highway construction Table 1 and its references. Standard minimum retention of CCA preservative 6.4 kg/m³.
 - .5 Reflector strips shall be 70 mm x 75 mm on metal backing.
- .3 Fasteners:
 - .1 Spikes: to CSA B111 with spiral shank. Spikes to be hot dip galvanized after manufacture with 40 g minimum weight of zinc coating, to CSA G164.

Part 3 Execution

3.1 ERECTION

- .1 Install posts and rails in accordance to contract drawings or directed by the Departmental Representative.
 - .1 Bury end treatment in accordance to contract drawings.
- .2 Install posts plumb at locations and with minimum embedment of 1320 mm in road embankment or directed by Departmental Representative.
- .3 Excavation of post holes shall be by auger with diameter of hole to be approximately 360 mm. Trench excavation is not permitted.
- .4 Bottom of each post hole to be compacted to provide firm foundation. Set post plumb and square in hole, backfill in 150 mm layers and compact each layer before placing succeeding layer.
- .5 Cutting of posts is not permitted without approval of the Departmental Representative.
- .6 Treat cut with two coats of same type of wood preservative used to pressure treat posts.
- .7 Connect off-set blocks to posts with 2-100 mm spikes.
- .8 Erect steel W-beam components to details indicated. Lap joints in direction of traffic. Tighten nuts to 100 N.m. torque. Maximum protrusion of bolt 6 mm beyond nut.
- .9 Once the W-beam rail is properly installed, new reflective strips shall be placed immediately on every second post and on each end post.
 - .1 White reflector shall be placed facing the approaching traffic in the immediately adjacent driving lane and yellow reflector on the opposite side of the same post facing traffic in the other direction.

3.2 TOUCH-UP

- .1 Clean damaged surfaces with brush removing loose and cracked coatings. Apply two coats of organic zinc-rich paint to damaged areas in accordance with manufacturer's instructions.

3.3 REMOVAL

- .1 Wooden posts and steel guide rail systems shall be removed where and as directed by the Departmental Representative.
- .2 Components which are considered salvageable by the Departmental Representative shall be removed with care, delivered and stacked in neat piles at a location to be designated by the Departmental Representative;
 - .1 Every effort shall be made to avoid damage to reusable guide rail system components during the removal operation.
 - .2 The use of heat to remove bolts and the cutting of rail sections and bolts shall be not permitted unless approved by the Departmental Representative.
 - .3 For Parks Canada depot locations, Contractor must provide 48 hour notice to Parks Canada staff to arrange drop off.
- .3 Remaining non-salvageable components shall be removed and disposed of in accordance with Section 01 74 21 – Construction / Demolition Waste Management and Disposal.
- .4 Post holes to be backfilled and compacted with Sub-Base Granular material.
- .5 Area to be graded to match surrounding shoulder elevation.

END OF SECTION