SPECIFICATIONS

FOR

BROAD COVE BIN WALL REMEDIATION
CAPE BRETON HIGHLANDS NATIONAL PARK, NS

ISSUED FOR TENDER

PCA Project No.: 2039
Date: March 26, 2021

PART 1 – GENERAL

1.1 Description of Work

.1 The work will be carried out on park facilities at Cape Breton Highlands National Park, NS.

.2 The work of this contract includes the provision of all materials, labour, equipment, and ancillaries, all as necessary for the completion of the work as indicated on the drawings and as described in the specifications and notes. Work on this project consists generally of, but is not limited to, the following:

.1 Supply and install all environmental protection measures required such as site erosion and sediment control measures, check dams, silt fencing, hay/straw bales, vegetative stabilization and other measures, to be maintained for the duration of the project and removed following completion.

.2 Supply and operation of traffic control and signage for the duration of the project.

.3 Excavation as indicated on the drawings or a directed by the Departmental Representative.

.5 Re-construction of embankments to tie into existing.

.6 Restoration of reconstructed embankments

.7 Construction of new septic field

.8 Realignment of walking trail

.9 Maintain roadways and control dust throughout the duration of the project using Calcium Chloride.

.10 All other labour, materials and work necessary to complete the project to the Departmental Representative's full satisfaction.

.3 All work to be carried out in accordance with applicable federal and 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, Canada Labour Code and the NS Occupational Health and Safety Act and Regulations.

.4 The Contractor is advised that other construction work may be being performed by others at different locations during the time frame of this contract.

1.2 Work Restrictions

.1 Work must be completed by June 17, 2022.

.2 All concrete work to be done outside frost susceptible time or be frost protected.

.3 Work shall not start before 8:00 a.m.

.4 Night shift is not permitted unless approved in advanced by the Departmental Representative.

1.3 Familiarization With Site

.1 Before submitting a bid, it is recommended that bidders visit the site to review and verify the form, nature and extent of the work, materials needed, the means of access and the temporary facilities required to perform the Work.

.2 The site is located along Broad Cove Campground in Cape Breton Highlands National Park, NS

.3 Obtain prior permission from the Parks Canada Asset Manager before carrying out such site inspection.

.4 Contractors, bidders or those they invite to site are to review specification Section 01 35 29 – Health and Safety Requirements before visiting site. Take all appropriate safety measures for any visit to site, both before and after acceptance of bid.

1.4 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 Specification Manual.

1.5 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.

1.6 Setting Out Work

.1 Contractor to carry out all layout.

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

elevations indicated.

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

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

1.7 Measurement For Payment

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

1.8 Maintenance of Work During Construction

.1 Maintain work during construction. Undertake continuous and effective maintenance workday by day, with adequate equipment and forces so that the site and facilities are continuously kept in a condition satisfactory to Departmental Representative.

1.9 Codes and Standards

.1 Perform work in accordance with National Parks Act, Code of Practice of the Department of Labour, and any other code of federal, provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Materials and workmanship must conform to or exceed applicable standards of Canadian General Standards Board (CGSB), Canadian Standards Association (CSA), American Society for Testing and Materials (ASTM) and other standards organizations.

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

1.10 Work Within Park Boundaries

.1 The project is within a national park and it is essential that lands remain as undisturbed as possible. The Contractor will be expected to use

standards and methods beyond those for normal construction in order to protect the environment and ensure the aesthetics of the work. Contract limits shall be strictly adhered to and every precaution shall be taken to minimize environmental damage and disruption to vegetation, wildlife habitat, and structures or existing services, both on construction and storage sites.

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

.2 If Contractor fails to repair damage to the satisfaction of the Departmental Representative, the Departmental Representative may 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 underground cables.

.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.

1.11 Documents Required

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

1.12 Site Conditions

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

1.13 Departmental Representative

.1 Departmental Representative will be assigned after contract award.

1.14 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.

1.15 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.

1.16 Contractor's Use of Site

.1 Use of site: for execution of work within project limits and those areas specified by the Departmental Representative.

.2 The Departmental Representative will specify the areas for work and storage.

1.17 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, 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, and environment protection methods.

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

.4 No work will begin until the pre-construction meeting is held, and all submittals have been approved.

.5 Following the pre-construction meeting and approval of submittals, the work will be carried out to meet the time restraints and have the project completed on time.

1.18 Cutting & 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.

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

.7 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.

.8 Verify locations of any underground utilities.

1.20 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.

1.21 Relics, Antiquities 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 the property of Canada.

1.22 National Park Act

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

1.23 Measurement of Quantities

.1 Linear: Items which are measured by metre 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 scales approved by and at locations designated by Departmental Representative. Units used to haul material being paid for by mass shall bear legible identification numbers plainly visible to scale person as it approaches and leaves scale-house.

.4 Time:
.1 Unless otherwise provided for elsewhere or by written authority of Departmental Representative, hourly rental of equipment will be measured in actual working time and necessary travelling time of equipment within limits of project at an all-inclusive rate. Equip each unit of mobile equipment with an approved device to register hours of operation. Devices which only measure hours of running of motor will not be accepted.

1.24 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 charges in connection therewith.

1.25 Equipment Rental Rates

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

1.26 Existing Survey

.1 Topographic survey used in the preparation of these Contract Documents was provided by Englobe Corp.

1.27 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 Canada.

.3 Contractor will take adequate precautions to protect existing structures when operating tracked equipment.

.4 Exercise care so as not to obstruct or damage public or private property in the area.

.5 At completion of work, restore area to its original condition. Damage to ground and property will be repaired by Contractor. Remove all construction materials, residue, excess, etc., and leave site in a condition acceptable to Departmental Representative.

1.28 Archaeology

.1 Specific Conditions:

.1 All excavation of soil that may contain archaeological remains must be monitored by an archaeologist appointed by the federal government. The specific areas requiring monitoring will be identified in the Archaeological Impact Assessment which will be provided to the Contractor prior to the start of Construction. Because of the potential to find archaeological remains during the necessary excavation this work is the subject of this section.

.2 Access and Collaboration:

.1 The contractor shall cooperate and comply with all the project manager’s guidelines during excavation in order to avoid any loss of archaeological information on the site, if any.

.2 The contractor shall facilitate access to the work and collaborate with the archaeologist.

The archaeologist or his/her representative will be based on site according to the needs related to the protection and registration of the remains. Their role will be to guide the contractor to avoid any loss of archaeological information and gather information on the remains.

.3 If necessary, the contractor shall allow the archaeological team to conduct examinations and archaeological surveys.

.3 Archaeological Discoveries:

.1 The contractor shall notify the Parks Canada representative or, in his/her absence, the archaeologist or his/her representative of any archaeological discoveries (remains of buildings or installations, objects and object fragments) made at the scene and await his/her guidelines before continuing the work on site.

.2 The remains, antiques and other items with some historical, archaeological or scientific interest (remains, object or object fragment) found on site or in areas to excavate or demolish are the property of the Crown. The contractor shall protect them and obtain the project manager's directions in this regard.

.4 Work Suspension:

.1 In case of accidental discoveries of cultural resources made in the absence of an archaeologist, the project manager and/or the prime contractor for the project must stop the work in the immediate area of the discovery and notify the Parks Canada project manager.

.5 Manual Excavations for Archaeological Purposes:

.1 Given the possibility of archaeological discoveries, the contractor is advised that during work, manual excavation and all work necessary to ensure the protection of the discoveries may be required. The contractor will be compensated under the agreements.

.6 Protection of Remains and Works:

.1 The contractor shall take all reasonable precautions during excavations and work to

protect the discovered remains and allow them to be examined by the archaeologists. Parks Canada will not tolerate non-compliance in this regard. If the contractor deteriorates by negligence any remains whatsoever, it will be held responsible and the Department will consider the implications.

.2 Should the Parks Canada representative authorize the demolition of archaeological features on the site, the contractor shall take the necessary precautions to protect the adjacent archaeological works that will not be demolished. The demolition of the features shall be carried out gradually and in a controlled manner after the archaeological surveys have been completed. If works are damaged during the work, notify the Parks Canada representative immediately.

END OF SECTION

PART 1 – GENERAL

1.1 Submittals

.1 Upon acceptance of bid and prior to commencement of work, submit to Departmental Representative the following work management documents:
.1 Work Schedule as specified herein.
.2 Health and Safety Plan as specified in Section 01 35 29 – Health and Safety Requirements.
.3 Environmental Protection Plan as specified in Section 01 35 43 – Environmental Procedures.
.4 Traffic Control Plan as specified in Section 01 55 26 – Traffic Regulation.

1.2 Work Schedule

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

.2 Schedule to indicate all calendar dates from commencement to completion of all work within the time stated in the accepted bid.

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

.4 Work schedule content to include as a minimum the following:
.1 Bar (GANTT) Charts, indicating all work activities, tasks and other project elements, their anticipated durations, planned dates for achieving key activities and major project milestones supported with;
.1 Written narrative on key elements of work illustrated in bar chart, providing sufficient details to demonstrate a reasonable implementation plan for completion of project within designated time.
.2 Generally Bar Charts derived from commercially available computerized project management system are preferred but not mandatory.

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

.6 Schedule work in cooperation with the Departmental Representative.

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

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

.9 Schedule Updates:
.1 Submit when requested by Departmental Representative.
.2 Provide information and pertinent details explaining reasons for necessary changes to implementation plan.
.3 Identify problem areas, anticipated delays, impact on schedule and proposed corrective measures to be taken.

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

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

1.3 Project Meetings

.1 Schedule and administer project meetings for entire duration of work as deemed necessary for progress of work or particular situation.

.2 Prepare agenda for meetings.

.3 Notify participants by e-mail 4 days in advance of an unscheduled meeting date.
.1 Ensure attendance of all subcontractors.
.2 Departmental Representative will provide list of other attendees to be notified.

.4 Hold meetings at project site or where approved by Departmental Representative.

.5 Preside at meetings and record minutes.
.1 Indicate significant proceedings and decisions. Identify action items by parties.
.2 Distribute to participants by e-mail or by facsimile within 3 calendar days after each meeting.
.3 Make revisions as directed by Departmental Representative.

END

PART 1 - GENERAL

1.1 General Requirements

.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 centerline 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 Overhaul will not be paid on this Contract.

1.2 Lump Sum Items

1. 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 This item includes all other work considered incidental to the work and which are not

specifically noted or accounted for in other items in the Lump Sum Table, but are necessary to complete the work in accordance with the Contract, the Drawings, and Specifications. This item shall include but is not limited to the following: project layout and surveying, traffic control, dust control, permits, relocation of existing infrastructure encountered in the work area not covered in other items, temporary structures and restoration of facilities damaged during the undertaking of this work.

2. 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.

3. 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.

.4 Demolition (Deconstruction of Structures)

.1 Unit of Measurement is Lump Sum

.2 This item includes the demolition and removal of the entire bin structure as shown on drawings and as directed by the Departmental Representative. This includes but is not limited to steel bin, concrete, manholes and all other components of the structure. Demolition materials must be removed from site and properly disposed of unless otherwise directed by the Departmental Representative. Work to maintain environmental requirements are incidental to the work.

.5 Clearing & Grubbing

.1 Unit of Measurement is Lump Sum

.2 This item includes the clearing, grubbing and disposal of vegetation accept plant material noted for relocation as per Section 13, Trees, Shrubs and Ground Cover, below, within the clearing limits shown on the drawings, including trees (standing and felled), shrub vegetation, underbrush, boulders and rock fragments as directed by Departmental Representative

.6 Unclassified Excavation

.1 Unit of Measurement is Lump Sum

.2 This item includes excavation of unclassified material, as indicated on the drawings and as directed by the Departmental Representative. Excavated material to be stockpiled at Black Brook Site as directed by the Departmental Representative. Metal and concrete to be disposed of separately. Fencing that exists within area to be excavated under this item shall be removed and disposed of by the Contractor. Work required to remove manholes and pipes is incidental to work.

.7 Gravel Driveway Restoration

.1 Unit of Measurement is Lump Sum

.2 This item includes the supply and transportation of all equipment, labour and materials for the gravel driveway restoration. Including but not limited to, spreading, grading, compaction of materials and final clean-up. Refer to section 31 24 13 – Roadway Embankment.

.8 Trail Construction (Beach Access)

.1 Unit of Measurement is Lump Sum

.2 This item is for the construction of a new pedestrian access path to the beach and includes all select tree removal or trimming, excavation, granular surface, removal of existing lumber stairs, surface restoration, and all incidentals. Refer to section 31 24 13 – Roadway Embankment.

.9 Repositioning Armour Stone

.1 Unit of Measurement is Lump Sum

.2 This item is for the repositioning of existing armour stone to locations noted

on drawings. Work includes handling and repositioning existing armour stone within the site, as directed by the Departmental Representative.

.10 Chain Link Fences

.1 Unit of Measurement is Lump Sum

.2 This item includes the supply, materials and labour for the install of chain link fence as shown on the drawings. All materials to complete the install of the chain link fence is incidental to the work.

.11 Topsoil Placement and Grading

.1 Unit of Measurement is Lump Sum

.2 This item includes the topsoil placement for the seeded areas; complete soil mix as stated in section 32 91 19.13; erosion and sedimentation control; stripping and stockpiling of topsoil as per drawings or as directed by the Departmental Representative for salvage; preparation of existing grade as per section 31 22 13 – Rough Grading; placing and spreading of topsoil; finish grading; disposal of excess material; and site cleanup.

.12 Hydraulic Seeding

.1 Unit of Measurement is Lump Sum

.2 This item includes supply of all materials, preparation of surface, application to areas exposed during the work or as directed by the Departmental Representative.

.13 Trees, Shrubs & Ground Covers

.1 Unit of Measurement is Lump Sum

.2 This item includes the confirmation and flagging of plant material to be relocated with Departmental Representative; layout & digging of trenches and planting holes;

removal and relocation of vegetation including plants, seedlings, trees and mats; stockpile and installation of topsoil, heeling-in, root pruning; supply, stockpile and spread of mulch; supply and application of potable water, supply and application of anti-desiccant; maintenance of relocated plants during heeling-in period, and maintenance during the first year of growth. It is the contractor's responsibility to properly store and care for plants to ensure successful planting if continued into Spring 2022.

.14 Public Sanitary Sewerage Piping (Including Work in Existing Sewage Tank)

.1 Unit of Measurement is Lump Sum

.2 This item is for the conversion of the existing concrete septic tank to an overflow chamber including cleaning out the existing tank, leak testing, and installation of float switch & alarm. Refer to sections 33 31 13 – Public Sanitary Utility Sewerage Piping and 33 34 00 – Sanitary Pressure Pipe Systems for piping details.

.15 Subsurface Wastewater Effluent Dispersion System

.1 Unit of Measurement is Lump Sum

.2 This item is for the installation of the new Subsurface Dispersion System for the treated effluent from the existing wastewater treatment plant, including clearing and grubbing, removal and disposal of the existing septic field, existing effluent outfall piping and manholes down to the coastline from the existing septic tank, FRP tanks, access risers, dosing pumps, Control panel, float switches, Valves, Dosing tank, drip irrigation lines, chambers, and all incidental connections, electrical wiring, piping, couplings, fittings, excavation, select or imported

backfills, restoration of gravel driveway as required and installation of 1200-mm chain link fence, and any other work considered incidental to the complete treated wastewater dispersion system.

1.3 Unit Price Items .1 Armour Stone Supply and Install

.1 Unit of Measurement is tonnes

.2 This item is for the supply and install of imported armour stone to locations noted on the drawings. Work includes excavation, filter fabric, supply and install armour stone to the site, as directed by the Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

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

.2 Section 01 35 43 - Environmental Procedures.

.3 Section 01 45 00 – Testing and Quality Control.

.4 Section 01 55 26 – Traffic Regulations.

.5 Section 01 74 21 – Construction/Demolition & Waste Management Disposal.

.6 Section 01 78 00 – Closeout Submittals

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 coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

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

reasons for deviations.

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

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

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

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

1.3 Shop Drawings And Product Data

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

.2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Nova Scotia, Canada.

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

.4 Allow 5 days for Departmental Representative to review 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 one (1) transparency on plastic film, six (6) prints and one (1) electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental

Representative may reasonably request.

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

.12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accordance with specified requirements.
.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copies of manufacturer’s instructions for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with

manufacturer's standards or instructions.

.16 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.17 Delete information not applicable to project.

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

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

.20 The review of shop drawings by the 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 in triplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative business address.

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

.4 Where colour, pattern or texture is criterion, submit full range of samples.

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

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

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

1.5 Certificates And Transcripts

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

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

END OF SECTION

1.1 Definitions

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

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

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

.4 PPE: personal protective equipment

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

1.2 Submittals

.1 Make submittals in accordance with Section 01 33 00.

.2 Submit site-specific Health and Safety Plan prior to commencement of Work.
.1 Submit within 10 work days of notification of Bid Acceptance. Provide 3 copies.
.2 Departmental Representatives will review Health and Safety Plan and provide comments.
.3 Revise the Plan as appropriate and resubmit within 10 work days after receipt of comments.
.4 Departmental Representative's review and comments made of the Plan shall not be construed as an endorsement, approval or implied warranty of any kind by Canada and does not reduce Contractor's overall responsibility for Occupational Health and Safety of the Work.
.5 Submit revisions and updates made to the Plan during the course of Work.

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

.4 Submit building permit, compliance certificates and other permits obtained.

.5 Submit copy of Letter in Good Standing from Provincial Workers Compensation or other department of labour organization.
.1 Submit update of Letter of Good Standing whenever expiration date occurs during the period of Work.

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

.7 Submit copies of incident reports.

.8 Submit WHMIS MSDS - Material Safety Data Sheets.

1.3 Compliance Requirements

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

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

.3 Observe construction safety measures of:
.1 Part 8 of National Building Code
.2 Provincial Worker’s Compensation Board.
.3 Municipal by-laws and ordinances.

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

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

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

1.4 Responsibility

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

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

1.5 Site Control and Access

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

.2 Isolate Work Site from other areas of the premises by use of appropriate means.
.1 Erect fences, hoarding, barricades and temporary lighting as required to effectively delineate the Work Site, stop non-authorized entry, and to protect pedestrians and vehicular traffic around and adjacent to the Work and create a safe environment. See Section 01 56 00 – Temporary Barriers and Enclosures for minimum

acceptable requirements.
.2 Post signage at entry points and other strategic locations indicating restricted access and conditions for access.
.3 Use professionally made signs with bilingual message in the 2 official languages or international known graphic symbols.

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

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

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

1.6 Protection

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

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

1.7 Filing of Notice

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

1.8 Permits

.1 Post permits, licenses and compliance certificates, specified in section 01 11 00 – General Instructions, at Work Site.

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

1.9 Hazard Assessments

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

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

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

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

1.10 Project/Site Conditions

.1 Following are potential health, environmental and safety hazards at the site for which Work may involve contact with:
  .1 Known latent site and environmental conditions:
    .1 Steep slopes and rock faces.
    .2 Streams, brooks and other water bodies.
    .3 Wildlife.

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

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

1.11 Meetings

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

1.12 Health and Safety Plan

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

.2 Health and Safety Plan shall include the following components:
.1 List of health risks and safety hazards identified by hazard assessment.
.2 Control measures used to mitigate risks and hazards identified. Contractor to include organization’s control measures as required for COVID-19.
.3 On-site Contingency and Emergency Response Plan as specified below.
.4 On-site Communication Plan as specified below.
.5 Name of Contractor's designated Health & Safety Site Representative and information showing proof of his/her 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.

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

.2 Pertinent Federal and Provincial Departments and Authorities having jurisdiction.
.3 Local emergency resource organizations.

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

.4 On-site Communication Plan:
.1 Procedures for sharing of work-related safety information to workers and subcontractors, including emergency and evacuation measures.
.2 List of critical work activities to be communicated with Facility Manager which have a risk of endangering health and safety of Facility users.

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

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

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

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

1.13 Safety Supervision

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

.2 Health & Safety Site Representative may be the Superintendent of the Work or other person designated by Contractor and shall be assigned the responsibility and authority to:
.1 Implement, monitor and enforce daily compliance with health and safety requirements of the Work.

.2 Monitor and enforce Contractor's site-specific Health and Safety Plan.
.3 Conduct site safety orientation session to persons granted access to Work Site.
.4 Ensure that persons allowed site access are knowledgeable and trained in health and safety pertinent to their activities at the site or are escorted by a competent person while on the Work Site.
.5 Stop the Work as deemed necessary for reasons of health and safety.

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

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

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

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

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

1.14 Training

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

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

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

1.15 Minimum Site Safety Rules

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

.2 Brief persons of disciplinary protocols to be taken for non-compliance. Post rules on site.

1.16 Correction of Non-Compliance

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

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

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

1.17 Incident Reporting

.1 Investigate and report the following incidents to Departmental Representative:
.1 Incidents requiring notification to Provincial Department of Occupational Safety and Health, Workers Compensation Board or to other regulatory Agency.
.2 Medical aid injuries.

.3 Property damage in excess of $10,000.00,
.4 Interruptions to Facility operations resulting in an operational lost to a Federal department in excess of $5000.00.

.2 Submit report in writing.

1.18 Hazardous Products

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

.2 Keep MSDS data sheets for all products delivered to site.
.1 Post on site.
.2 Submit copy to Departmental Representative.
.3 For interior work in an occupied Facility, post additional copy in one or more publicly accessible locations.

1.19 Blasting

.1 Blasting or other use of explosives is not permitted on site without prior receipt of written permission and instructions from Departmental Representative.

1.20 Powder Actuated Devices

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

1.21 Confined Spaces

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

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

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

1.22 Site Records

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

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

1.23 Posting of Documents

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

.2 Post other documents as specified herein, including:
- .1 Site specific Health and Safety Plan
- .2 WHMIS data sheets
- .3 Incident reports
- .4 Tool box and safety meeting minutes

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 35 45 – Environmental Protection Refueling Vehicles.

.2 Section 01 74 21 – Constructional Demolition Management and Disposal.

.3 Basic Impact Analysis (BIA) – by Parks Canada

1.3 Fires

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

1.4 Disposal of Wastes

.1 Do not bury rubbish and waste materials on site unless approved by Departmental Representative.

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

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

1.5 Drainage

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

.2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.

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

1.6 Site Clearing and Plant Protection

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

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

.3 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.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict vegetation removal to areas indicated or designated by Departmental Representative. Shrubs, trees and other vegetation will be harvested and re-planted as shown on drawings or as directed by the Departmental Representative.

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

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

1.7 Work Adjacent to Waterways

.1 Do not operate construction equipment in waterways.

.2 Do not use waterway beds for borrow material without Departmental Representative's approval.

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

.4 Design and construct temporary crossings to minimize erosion to waterways.

.5 Do not skid logs or construction materials across waterways.

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

.7 Do not blast under water or within 100 m of indicated spawning beds.

.8 Temporary diversion ditches, approved by the Departmental Representative, are to be plastic lined.

.9 Temporary storage sites for debris generated from clearing operations should be deposited away from watercourses and should be surrounded by a natural vegetative buffer.

.10 Do not pump or drain water containing suspended materials into waterways. Water containing suspended materials shall be pumped into vegetation a minimum of 30 m away from watercourses.

1.8 Pollution Control

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

.2 Control emissions from equipment and plant to local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air beyond application area, by providing temporary enclosures.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for roadways. Chemicals used in dust control must have prior approval of the Departmental Representative.

1.9 General Requirements

.1 Work under this contract is to be carried out in a National Park, and environmental protection must be given a high priority by all staff involved with the work.

.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 The Contractor shall meet all requirements as detailed in Appendix B – Basic Impact Analysis (BIA)Broad Cove Campground, Coastal Retainment Wall Upgrades, CBHNP. This document is not all-inclusive, and site adjustment of the mitigation methods for the work may be required. The Departmental Representative will advise the Contractor of any additional requirements as they arise.

1.10 Site Set-up and Use

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

.2 Work sites will be equipped with appropriate and properly maintained sanitary facilities.

.3 Garbage must be collected and removed daily from the work site. All material must be removed, transported and disposed of in accordance with existing provincial – municipal and Park solid waste disposal guidelines and/or regulations.

.4 Littering is prohibited.

.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.

1.11 Environmental Protection Plan

.1 The Contractor is required to submit a plan showing all pollution control measures that will be used to fulfill the requirements of the Environmental Protection Section. This plan will be reviewed by the Departmental Representative and the Environmental Protection Officer prior to commencement of any work. Any deviation from this plan will require further approval by the Departmental Representative. The protection plan shall be submitted prior to the pre-construction

meeting.

.2 The Environmental Plan will outline how the Contractor will address the environmental protection requirements, including removal and installation of culverts, and ensure pollution created by the construction is controlled. It will show sufficient detail on products to be used and physical placement on site to determine effectiveness of these items.

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

.4 A floating boom curtain will be required for excavation in the water for silt and turbidity containment. Contractor to submit plan for approval to the Department Representative.

1.12 Environmental Performance

.1 The Contractor is required to follow the Canadian Environmental Protection Act.

.2 The Contractor is held responsible to ensure that all necessary permits related to Environmental Protection have been obtained and that necessary documentation is available on-site.

1.13 Vehicular Movements

.1 Restrict movement of vehicles and equipment to existing disturbed areas (access roads, borrow pits, disposal areas and right-of-ways).

1.14 Storage and Handling of Fuels and Dangerous Fluids

.1 Locate fuel storage facility outside Park and a minimum of 100 m from any water body in an area approved by Departmental Representative and construct impermeable dykes so that any spillage is contained. Fueling of vehicles or equipment will not be permitted within 100 m of any water body. Maintenance of vehicles and equipment will be permitted only in designated areas as directed by the Departmental Representative.

.2 Exercise care in handling of fuels or dangerous materials to minimize potential for spills.

Report immediately any spills to Departmental Representative. Contractor is responsible for responding immediately to any spill to minimize environmental damage and for clean-up, repair or rehabilitation resulting from any spills to the satisfaction of the Departmental Representative.

.3 Supply and maintain on site emergency response material to contain spills and minimize environmental damage, i.e. absorbent material, to the approval of Departmental Representative. Disposal of all contaminated material shall be off-site at an approved facility.

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

.5 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.

.6 The management of fuels, lubricants and chemicals must meet with the requirements of the Nova Scotia Department of Environment and all other appropriate provincial and federal regulations.

.7 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.

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

.9 The Departmental Representative and the Park’s Environmental Protection Officer (EPO) must be immediately contacted after a spill of fuel or lubricant, and after any amount of other chemical products has escaped.

.10 Storage of any fuel must occur only in previously approved locations, and with Parks Canada's consent. The Contractor must submit plans for fuel management and a Spill Contingency Plan seven days prior to the start of the Work. The Contractor is expected to be prepared to effect the containment and cleanup of all spills related to the Work.

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

.12 Emulsion storage tanker and transfer of emulsion from tanker to spray vehicle are not permitted.

1.15 Erosion and Sediment Control

.1 Appropriate preventative controls should be in place at all times during construction to prevent undue erosion and sedimentation. The Contractor is required to provide to the Departmental Representative for approval ten (10) working days before start-up an erosion and sedimentation control plan, as part of the Environmental Protection Plan. The plan shall incorporate all necessary silt fences, silt traps, plastic lined trenches and ditches as approved by the Departmental Representative.

.2 The Contractor shall install and maintain all sedimentation and erosion control features for the duration of the project, in accordance with the approved plan. The Contractor shall remove all sedimentation and erosion control upon completion of the work and when requested by the Departmental Representative.

.3 Sediment fences and erosion control structures shall be constructed prior to any excavation as directed by Departmental Representative.

.4 To minimize run-off, work on slopes which may affect water body will be curtained during periods of heavy rainfall, as directed by the Departmental Representative.

.5 Prior to carrying out work, check long range

weather forecast to ensure there is adequate time before forecast of heavy rainstorms to stabilize the work. Provide details of stabilization plan to Departmental Representative for review.

.6 Maintain a stockpile of appropriate erosion and environmental protection materials (e.g. silt fences, clean rock fill and aggregate base course) on site at all times.

.7 Install additional erosion control measures as required by site conditions to prevent sediment from entering drainage courses.

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

1.16 Fisheries Regulations

.1 Obtain proper permits or authorization from Federal Department of Fisheries and Oceans and maintain a copy of said permit on site. Regulations stipulated in the Permit will be strictly enforced.

1.17 Relics and Antiquities

.1 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 to be demolished, shall remain property of Canada. Protect such articles and request direction from Departmental Representative.

.2 Give immediate notice to Departmental Representative if evidence of archaeological finds are encountered during construction and await his written instructions before proceeding with work in this area.

1.18 Treated Wood

.1 Workers shall 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.

.2 Disposal of treated wood wastes including saw-dust must be outside of the site, and in accordance with all applicable Provincial and Municipal regulations. Similar attention must be given to

disposal of any replaced guiderail posts which have been treated with creosote, which must also be removed from the park for disposal.

1.19 Environmental Incident or Emergency

.1 In the event of an environmental incident or emergency such as:
- .1 Chemical spill or petroleum spill;
- .2 Poisonous or caustic gas emission;
- .3 Hazardous material spill;
- .4 Sewage spill;
- .5 Contaminated water into waterways.
- .6 The Contractor or his employees shall immediately:
  - .1 Notify the Contractor's job superintendent.
  - .2 Call the local emergency services and give type of emergency.
  - .3 Notify the Departmental Representative and the Park's Environmental Protection Officer (EPO).

.2 The Contractor is to submit to Departmental Representative a copy of its Environmental/Spill Response Plan for approval.

1.20 Site Decommissioning

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

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

1.21 Site Clearing

.1 Timber and vegetation shall not be cleared unless approved by Departmental Representative.

.2 Vegetation and topsoil shall not be removed to obtain fill for road construction purposes.

.3 All cleared trees and timber shall become the property of the Contractor, and are to be disposed of outside the park boundaries.

.4 All cut shrub vegetation and underbrush shall be chipped and evenly dispersed on-site or dragged

from sight into the adjacent forest edge. No burning of any vegetation or debris will be permitted in the park boundaries.

.5 No vegetation clearing will be permitted during the annual songbird nesting period of May 15 to June 30.

END OF SECTION

PART 1 - GENERAL

1.1 Refueling

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

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

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

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

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

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

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

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

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

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

1.2 Spill Control Kit

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

1.3 Spills

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

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

.3 Contractor to protect all wells, catch basins,

drywells, drains and watercourses from contamination in event of a spill.

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

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

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

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

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

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures

1.2 Inspection

.1 Give timely notice requesting inspection of Work designated for special tests, inspections or approvals by Departmental Representative or by inspection authorities having jurisdiction.

.2 In accordance with the General Conditions, Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents.

.3 If Contractor covers or permits to be covered Work designated for special tests, inspections or approvals before such is made, uncover Work until particular inspections or tests have been fully and satisfactorily completed and until such time as Departmental Representative gives permission to proceed.

.4 Pay costs to uncover and make good work disturbed by inspections and tests.

1.3 Testing

.1 Tests on materials, as specified in various sections of the Specifications are the responsibility of the Department except where stipulated otherwise.

.2 Departmental Representative will engage and pay for service of Independent Inspection and Testing Agencies for purpose of inspecting and testing portions of Work except for the following which remain part of Contractor’s responsibilities:
.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
.2 Inspection and testing performed exclusively for Contractor’s convenience.
.3 Mill tests and certificates of compliance.
.4 Tests as specified within various sections designated to be carried out by Contractor under the supervision of Departmental Representative.
.5 Additional tests specified in Clause 1.3.2.

1.5 Access to Work

.1 Facilitate Departmental Representative's access to Work. If part of Work is being fabricated at locations other than construction site, make preparations to allow access to such Work whenever it is in progress.

.2 Furnish labour and facility to provide access to the work being inspected and tested.

.3 Co-operate to facilitate such inspections and tests.

1.6 Rejected Work

.1 Remove and replace defective Work, whether result of poor workmanship, use of defective or damaged products and whether incorporated in Work or not, which has been identified by Departmental Representative as failing to conform to Contract Documents.

.2 Make good damages to new construction and finishes resulting from removal or replacement of defective work.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 01 52 00 - Construction Facilities.

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

1.2 Installation and Removal

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

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

1.3 Dewatering

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

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

1.4 Temporary Heating and Pumping

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

.2 Maintain strict supervision of operation of temporary heating and pumping equipment:

.1 Conform with applicable codes and standards.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Prevent damage to finishes.

1.5 Temporary Power and Light

.1 Departmental Representative will not provide and pay for temporary power during construction for temporary lighting and operating of power tools.

.2 Arrange for connection with appropriate utility company. Pay all costs for installation, maintenance and removal.

.3 Provide and maintain temporary lighting throughout project.

.4 Coordinate with all Parks Canada Staff and Departmental Representative.

.5 Install temporary facilities for power to approval of local power supply authorities.

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

1.6 Temporary Communication Facilities

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

1.7 Fire Protection

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

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

1.8 Sanitary Facilities

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

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

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

1.9 Storage Sheds

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

1.10 Access

.1 Provide and maintain adequate access to project site.

.2 Build and maintain temporary roads where approved and provide snow removal during period of work.

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

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

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

PART 2 – PRODUCTS

2.1 Not Used .1 Not Used

PART 3 – EXECUTION

3.1 Not Used .1 Not Used

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Construction aids.

.2 Office and sheds.

.3 Parking.

.4 Project identification.

1.2 Precedence

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

1.3 Related Sections

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

1.4 References

.1 Canadian General Standards Board (CGSB)
.1 CGSB 1-GP-189M-84, Primer, Alkyd, Wood, Exterior.
.2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
.1 CAN3-A23.1-/A23.2-94, Concrete Materials and Methods for Concrete Construction/Method of Test for Concrete.
.2 CSA-0121-M1978, Douglas Fir Plywood.
.3 CAN/CSA-Z321-96, Signs and Symbols for the Occupational Environment.

1.5 Installation and Removal

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

.2 Remove from site all such work after use.

1.6 Scaffolding

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

1.7 Hoisting

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

.2 Hoists cranes shall be operated by qualified operator.

1.8 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 a weight or force that will endanger the Work.

1.9 Construction Parking

.1 Parking will be limited to Contractor vehicles and equipment required to carry out work only, provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

.3 Build and maintain temporary roads where indicated or directed by Departmental Representative and provide snow removal during period of Work.

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

1.10 Security

.1 Contractor shall provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays (24 hours per day, 7 days per week).

1.11 Departmental Representative's Site Offices

.1 Contractor to provide Departmental Representative's office trailer/space. Minimum office trailer/space size is 40 m^2.

.2 Contractor to arrange and pay for phone, fax machine, internet connection and photocopier in Departmental Representative's office for its exclusive use. Long distance calls placed on this phone and fax to be paid for by Departmental Representative. Replacement cartridges for printer and photocopier to be supplied by contractor.

.3 Contractor to equip office with washroom, kitchen and one separate office, two 1 m x 2 m tables, one 1 m x 2 m drafting table, 4 chairs, 6 m of shelving 300 mm wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.

.4 Upon completion of the Contract; all equipment and furniture provided by the Contractor shall be returned to contractor.

.5 Supply of the Departmental Representative's office, supplies and services will be incidental to the work. Payment to be included in the lump sum portion of the work.

.6 Contractor to ensure site office is supplied and operational within 14 days after contract award.

.7 Provide garbage and cleaning services bi-weekly.

.8 Maintain inside air temperature at 20 degrees.

1.12 Equipment, Tool and Materials Storage

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

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

1.13 Sanitary Facilities

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

.2 Park facilities will be closed, winterized and

made non-operational from November to May.

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

1.14 Construction Signage

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

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

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

1.15 Weigh Scale and Scale House

.1 The scales shall be of such capacity to accurately weigh any single loaded truck arriving on the site. The contractor is advised that split weighing will not be permitted under any circumstances. The vehicle being weighed must be fully supported by the scale platform. Split or axle weighing is a method to be used only for highway weight restriction control.

.2 The scale shall be equipped with a portable scale house complete with furniture and adequate provision for heat, air conditioning and light.

.3 The Contractor shall periodically clean the scale house and maintain all lights, air conditioning, and heating in good working condition at all times when the scales are in use.

.4 The scale platform and mechanism shall at all times be maintained clean and free from encumbrances such as gravel, asphalt, snow, and ice.

.5 Scale houses must be equipped with suitable washroom facilities that meet the Regulations. These facilities must be located within 100m of the scale house.

.6 These facilities must be cleaned twice weekly and in the case of a portable toilet, emptied of sewage as well. Contractor must also supply toiletries for the facility.

.7 Ensure scale house is sufficient distance away from scales to prevent roll-over accidents.

END OF SECTION

PART 1 - GENERAL

1.1 Description

.1 This section is to provide traffic control as stipulated in the Temporary Workplace Traffic Control Manual.

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

1.2 Related Sections

.1 Section 01 11 10 - General Instructions.

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

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

.4 Section 01 33 00 – Submittal Procedures

1.3 Reference Standard

.1 Government of Nova Scotia, Temporary Workplace Traffic Control Manual, 2018

1.4 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 roadway without approval of Departmental Representative. The Contractor must formally request a road closure with the Departmental Representative if they feel it is

necessary. Before re-routing traffic, erect suitable signs and devices in accordance with instructions contained in the TCM. Provide sufficient crushed gravel to ensure a smooth riding surface during work.

.4 Roads that cannot be closed include:
.1 Emergency Exit
.2 Access Road to Treatment Plant.

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

.6 When directed by Departmental Representative, provide well graded, detours or temporary roads to facilitate passage of traffic around restricted construction area. Provide and maintain signs and lights and maintain roadway.

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

.8 All flag persons and traffic control personnel shall have successfully completed a traffic control training course approved by the Provincial Traffic Authority of Nova Scotia. Proof of training for all persons shall be available on site at all times.

1.5 Informational and Warning Devices

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

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

.3 Supply and erect signs, declinators, barricades and miscellaneous warning

devices as specified in TCM.

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

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

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

1.6 Control of Public Traffic

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

provided by other traffic control devices.

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

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

.4 In addition to traffic control during the normal hours of work, 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).

.5 Flag persons are to be equipped with portable radios only, not cellular devices. Any flag person using cellular devices, except for emergency use only, shall be deemed incompetent and shall be removed from site immediately. PCA shall not be held responsible for lost time incurred due to the removal of such an individual.

1.8 Operational Requirements

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

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 52 00 - Construction Facilities.

.2 Section 01 55 26 – Traffic Regulation.

1.3 References

.1 Canadian General Standards Board (CGSB)
.1 CGSB 1.189M-84, Primer, Alkyd, Wood, Exterior.
.2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
.1 CSA-O121-M1978, Douglas Fir Plywood.

.3 Government of Nova Scotia, Department of Transportation and Infrastructure Renewal, Highway Design Division.
.1 Traffic Control Manual (TCM), latest edition.

1.4 Installation and Removal

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

.2 Remove from site all such work after use.

1.5 Guard Rails and Barricades

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.

.2 Provide as required by governing authorities.

.3 Provide Traffic Control guard rails, barricades and delineators in accordance with Section 01 55 26 – Traffic Regulation.

1.6 Access to Site	.1	Provide and maintain access roads, as may be required for access to Work.
1.7 Public Traffic Flow	.1	Provide Traffic Control in accordance with Section 01 55 26 – Traffic Regulation.
1.8 Fire Routes	.1	Maintain access to properties for use by emergency response vehicles.
1.9 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.

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 Reference Standards

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

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

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

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

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

1.3 Quality

.1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

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

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

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

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.4 Availability

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

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

1.5 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, fencing 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.

1.6 Transportation

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

1.7 Manufacturer’s Instructions

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

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

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental

Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.8 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.

1.9 Co-Ordination

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

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.10 Remedial Work

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

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 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, and/or building occupants and pedestrian and vehicular traffic.

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

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 78 00 - Closeout Submittals.

1.2 Precedence

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

1.3 References

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

1.4 Qualification of Surveyor

.1 Qualified registered land surveyor, licensed to practice in Place of Work, acceptable to Departmental Representative.

1.5 Survey Reference Points

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

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

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

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

1.6 Survey Requirements

.1 Establish permanent benchmarks on site, as required, referenced to established benchmarks 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.

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

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

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

1.7 Existing Services

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

1.8 Records

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

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

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

1.9 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.

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 Section

.1 Section 01 77 00 - Closeout Procedures.

1.3 Project Cleanliness

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

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

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

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

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

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

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

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

1.4 Final Cleaning

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

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

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

.4 Remove waste 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 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.7 Remove dirt and other disfiguration from exterior surfaces.

.8 Sweep and wash clean paved areas.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 33 00 - Submittal Procedures.

1.2 Precedence

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

1.3 Definitions

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

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

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

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

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

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

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

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

1.4 Documents

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

1.5 Submittals

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

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

1.6 Waste Reduction Workplan (WRW)

.1 Prepare, Waste Reduction Workplan.

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

.3 Describe management of waste.

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

1.7 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 weight bills and/or receipt must be submitted on a monthly basis with the Contractor's monthly Progress claim.

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

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

.4 Provide containers to deposit reusable and recyclable materials.

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

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

.7 Collect, handle, store on-site, and transport off-site, salvaged materials in separated condition.

.1 Transport to approved and authorized recycling facility.

1.8 Storage, Handling and Protection

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

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

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

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

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

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

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

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

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

.1 On-site source separation is recommended.

.2 Remove co-mingled materials to off-site processing facility for separation.
.3 Provide waybills for separated materials.

1.9 Disposal of Wastes

.1 Do not bury rubbish or waste materials.

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

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

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

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

1.10 Use of Site and Facilities

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

.2 Maintain security measures established by PCA.

1.11 Scheduling

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

PART 2 - PRODUCTS

.1 Not Applicable

PART 3 - EXECUTION

3.1 Application

.1 Do Work in compliance with WRW.

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

regulations and codes.

3.2 Cleaning

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

.2 Clean-up work area as work progresses.

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

END OF SECTION

PART 1 - GENERAL

1.1 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 78 00 - Closeout Submittals.

.2 Section 01 74 11 - Cleaning.

1.3 Inspection and Declaration

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
.2 Request Departmental Representative's Inspection.

.2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

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

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

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 33 00 - Submittal Procedures.

.2 Section 01 71 00 - Examination and Preparation.

.3 Section 01 77 00 - Closeout Procedures.

1.3 Submission

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

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

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

.4 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged, free of defects, and of same quality and manufacture as products provided in Work.

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

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

.8 Pay costs of transportation.

1.4 Format

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

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

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

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

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

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

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

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

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

1.5 Contents - Each Volume

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

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

.3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable

information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 – Testing and Quality Control.

1.6 As-Builts and Samples

.1 Maintain at the site for Departmental Representative one record copy of:
.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to the Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

1.7 Recording Actual Site Conditions

.1 Record information on set of opaque drawings, provided by Departmental Representative.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
.1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.2 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.

.5 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.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.8 Final Survey

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

1.9 Warranties and Bonds

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and

manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

1.10 Materials and Finishes

.1 Building Products, Applied Materials, and Finishes: include produce data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 01 35 00 – Traffic Regulation.

.2 Section 01 35 43 – Environmental Procedures.

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

1.2 Description

.1 This section specifies requirements for deconstruction, demolishing and removing, wholly or in part, various items designated to be removed or partially removed.

.2 Demolition and removal will consist of, but not necessarily be limited to, the following:

.1 Deconstruction/demolition, removal and disposal of the bin structure in its entirety. This includes, but is not limited steel bin, concrete, manhole, and all other components of the structure.

1.3 References

.1 Definitions:

.1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or materials that endanger human health or environment if handled improperly.

.2 Reference Standards:

.1 CSA International

.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.2 Federal Legislation

.1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.

.2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.4 Motor Vehicle Safety Act 1993, c.16.

1.4 Protection

.1 Protect existing objects designated to remain. In event of damage, immediately replace or make repairs to approval of, and at no additional cost to, Departmental Representative.

.2 Contractor to submit plan to protect and maintain the existing outfall pipe during deconstruction/demolition of structure in accordance with 01 33 00 – Submittal Procedures. If existing piping is exposed, the contractor must have a plan in place to re-cover.

1.5 Administrative Requirements

.1 Pre-Demolition Meetings:
.1 Convene pre-demolition meeting 1 week prior to beginning work on-site, with Contractor's Representative and Departmental Representative to:
.1 Verify project requirements.
.2 Verify existing site conditions adjacent to demolition work.
.3 Co-ordination with other construction subtrades.

1.6 Quality Assurance

.1 Qualifications: provide adequate workforce training through meetings and demonstrations. Have someone on site with deconstruction experience throughout project for consultation and supervision purposes.

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

1.7 Environmental Requirements

.1 Do Work in accordance with Section 01 35 43 – Environmental Procedures.

.2 Ensure deconstruction work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air noise pollution.

.3 Fires and burning of waste or materials is not permitted on site.

.4 Do not bury waste or materials on site unless

approved in writing by Departmental Representative.

.5 Do not dispose of waste or volatile materials into watercourses, storm or sanitary sewers.
.1 Ensure proper disposal procedures in accordance with applicable Provincial/ Territorial regulations.

.6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties in accordance with authorities having jurisdiction.

.7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction as directed by Departmental Representative.

.8 Protect trees, plants and foliage on site and adjacent properties where indicated.

.9 Prevent extraneous materials from contaminating air beyond deconstruction area, by providing temporary enclosures during Work.

.10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on temporary roads.

1.8 Site Conditions

.1 Structures to be demolished to be based on their condition at time of examination prior to tendering.

.2 Support affected structures and, if safety of structure being deconstructed or adjacent services appears to be endangered, take preventative measures. Cease operations and immediately notify Departmental Representative.

.3 Prevent debris from blocking surface drainage system.

PART 2 – PRODUCTS

2.1 Equipment

.1 Leave equipment and machinery running only while in use. Except where extreme temperatures prohibit shutting down.

.2 Where possible, use water efficient wetting equipment/trucks/attachments when minimizing dust.

PART 3 - EXECUTION

3.1 Execution

.1 Inspect site and verify with Departmental Representative objects designated for removal.

3.2 Preparation

.1 Obtain necessary permits and approvals.

.2 Locate and protect utility lines. Do not disrupt active or energized utilities traversing premises designated to remain undisturbed.

3.3 Removal

.1 Remove in their entirety all materials and objects specified for removal.

.2 Do not disturb adjacent work designated to remain in place.

3.4 Safety Code

.1 Do demolition work in safe manner and according to provincial regulations.

.2 Blasting is not permitted.

3.5 Disposal of Materials

.1 The Owner will have the first right of refusal (at no cost) to all deconstructed materials except those designated for reuse. If the Owner does not want any of the materials, such materials will become the property of the Contractor to be removed from the site and disposed of to the satisfaction of Departmental Representative and in accordance with all applicable permits.

3.6 Restoration

.1 Upon completion of work, remove debris, trim surfaces and leave work site in clean condition.

.2 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 01 35 43 - Environmental Procedures.

1.2 Definitions

.1 Clearing consists of cutting off trees and brush vegetative growth to not more than a specified height above ground and disposing of felled trees, previously uprooted trees and stumps, and surface debris. Flag shrubs and trees to be harvested and re-planted as directed by the Departmental Representative.

.2 Grubbing consists of removing all stumps, grass, sod, and organic growth to a depth of 300 mm below the existing grade and stockpiling the material at location directed by Departmental Representative. Grubbing includes removal and stockpiling of clearing slash remaining from previous Clearing Contract, including cut trees, brush, and logs.

1.3 Storage & Protection

.1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, utility lines, site appurtenances, water courses, root systems of trees which are to remain.

.2 Repair any damaged items to approval of Departmental Representative. Replace any trees designated to remain, if damaged, as directed by Departmental Representative.

PART 2 – PRODUCTS

.1 Not Applicable

PART 3 - EXECUTION

3.1 Preparation

.1 Inspect site and verify with Departmental Representative, items designated to remain. Departmental Representative to flag all plant material to be salvaged within areas identified for clearing and grubbing.

.2 Locate and protect above ground and underground utility lines. Preserve in

operating condition active utilities traversing site.

.3 Notify utility authorities before starting clearing.

3.2 Clearing

.1 Clear all trees and underbrush, other than that flagged for salvage, by saw cutting from areas indicated to within 100 mm of original ground surface. Mechanical brushers are not permitted. Trees and underbrush as well as all other materials disturbed during this clearing operation are to be removed from the site and disposed of outside the park boundaries in a manner and location approved by the Departmental Representative.

.2 Cut off branches and cut down trees overhanging area cleared as directed by Departmental Representative.

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

.4 All cleared trees and timber shall become the property of the Contractor and are to be disposed of outside the park boundaries.

.5 Clearing is not permitted during nesting season which is anticipated to be between May 15 and June 30. Contractor must receive written approval from Departmental Representative prior proceeding with any clearing or cutting during the nesting period.

3.3 Grubbing

.1 Remove all stumps, grass, sod, and organic growth to a depth of 300 mm below the existing grade, or as directed by the Departmental Representative, and stockpile at a location selected by PCA for reuse to re-establish vegetation on the the finished slope.

.2 Remove all clearing slash, including cut trees, brush, and logs, and dispose at a location outside of the Park boundary.

.3 Where grubbing operations are required near a watercourse or water body, the Contractor shall ensure that a minimum 15 m "no grub" zone is left between the watercourse or water body and adjacent work area. This "no grub" buffer shall be clearly marked in the field by the Departmental Representative prior to any grubbing so that the area is visible to heavy equipment operators.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 31 23 33.01 - Excavation, Trenching and Backfilling.

.2 Section 32 92 19.16 – Hydraulic Seeding

1.2 EXISTING CONDITIONS

.1 Establish precise field location of plant material to be relocated before commencing work.

.2 Verify that no underground and surface utility lines and buried objects are in the grading area.

.3 Refer to dewatering in Section 31 23 33.01 Excavating Trenching and Backfilling.

.4 Refer to drainage requirements.

1.3 PROTECTION

.1 Maintain access roads to prevent accumulation of construction related debris on roads.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Excavated or graded material existing on site is suitable to use as fill for grading work if approved by Departmental Representative.

PART 3 - EXECUTION

3.1 GRADING

.1 Rough grade to levels allowing for relocation of plant material as indicated.

.2 Rough grade to follow depths indicated on details.

.3 Place fill in voids in relocated planting. existing ground,

.4 Maintain fill and existing surface at approximately same moisture content to facilitate bonding.

.5 Compact fill within planted areas as follows:

.1 Manually compact with foot traffic to remove voids within planted areas.

3.2 SURPLUS MATERIAL

.1 Stockpile surplus material for fill, grading or landscaping as directed by Departmental Representative.

END

PART 1 – GENERAL

1.1 Related Sections

.1 Section 31 22 13 – Rough Grading

.3 Section 33 31 13 – Public Sanitary Utility Sewerage Piping

.8 Section 33 36 33 – Subsurface Dispersion

1.2 References

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

- .1 ASTM C-33-90, Standard Specification for Concrete Aggregates.
- .2 ASTM C117-04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
- .3 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .4 ASTM D422-63, Standard Test Method for Particle-Size Analysis of Soils.
- .5 ASTM D698-00ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ;) (600 kN-m/m ;).
- .6 ASTM D1557-02e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ;) (2,700 kN-m/m ;).
- .7 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
- .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA International)

- .1 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .2 CSA-A3001-03, Cementitious Materials for Use in Concrete.
- .3 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods

of Test and Standard Practices for Concrete.

.4 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices

1.3 Definitions

.1 Excavation classes: all excavation will be considered unclassified.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.3 Topsoil:

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

.1 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

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

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

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

.7 Unsuitable materials:

.1 Weak, chemically unstable, and compressible materials.

.2 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

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

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

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

1.4 Temporary Shoring And Bracing

.1 Install and be responsible for shoring and bracing as required.

.2 When support of excavation is required, engage services of qualified Professional Engineer who is registered or licensed in Province of New Brunswick, to design shoring and bracing and inspect its installation.

.3 Provide record copy of drawings signed and sealed by Professional Engineer responsible for their preparation.

.4 Submit design and supporting data at least two weeks prior to commencing Work.

.5 Keep design and supporting data on site.

1.5 Submittals

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

.2 Preconstruction Submittals:

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

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

.3 Provide the Engineer with the following information before the commencement of the work and at any time during the construction at the request of the Engineer (at no cost to the Owner):

.1 Approved testing geotechnical firm to complete the following analyses and collect samples at the proposed site:

.1 Source of supply of aggregate

.2 Sieve analysis

.3 Micro-Deval Analysis

.4 Freeze-thaw

.5 Flat and Elongated Particles

.6 Plasticity Index

.7 Standard Proctor and Optimal Moisture values

.4 When submitting results to the Engineer, the geotechnical testing firm must confirm that the materials meets the Specifications and that it is or is not suitable for the intended use. This is to be in letter report format submitted directly to the Engineer.

.5 The Owner reserves the right to reject any source of supply of aggregates on the basis of past field performance, document by the records and experience of the Owner and/or the Engineer with a specific material, regardless of compliance with physical requirements of grading limits.

.6 Samples:

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

.2 Inform Consultant at least 4 weeks prior to beginning Work, of proposed source of fill, unshrinkable fill materials and provide access for sampling.

.3 Submit 70 kg samples of type of fill, unshrinkable fill specified including representative samples of excavated material.

.4 Ship samples prepaid to Consultant, in tightly closed containers to prevent contamination and exposure to elements.

.5 At least 4 weeks prior to beginning Work, inform Consultant source of fly ash and submit samples to Consultant.

.1 Do not change source of Fly Ash without written approval of Consultant.

1.7 Quality Assurance

.1 Qualification Statement: submit proof of insurance coverage for professional liability.

.2 Where Consultant is employee of Contractor, submit proof that Work by Consultant is included in Contractor's insurance coverage.

.3 Submit design and supporting data at least 2 weeks prior to beginning Work.

.4 Design and supporting data submitted to bear stamp and signature of qualified professional Engineer registered or licensed in Nova Scotia, Canada.

.5 Keep design and supporting data on site.

.6 Engage services of qualified professional Engineer who is registered or licensed in Nova Scotia, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.

.7 Do not use soil material until written report of soil test results are reviewed and approved by Consultant.

.8 Health and Safety Requirements:

.1 Do construction occupational health and safety in accordance with Section 01 35 30 - Health and Safety Requirements.

1.7 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling as required.

.2 Divert excess aggregate materials from landfill to local recycling facility for reuse as directed by Consultant.

.3 Stockpile material as indicated on site servicing plan.

1.8 Existing Conditions

.1 Buried services:

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

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

.3 Remove obsolete buried services within 2m of foundations: cap cut-offs.

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

.5 Prior to beginning excavation Work, notify applicable Consultant authorities having jurisdiction, establish location and state of use of buried utilities and structures. Authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.

.6 Confirm locations of buried utilities by careful test excavations or soil hydrovac methods.

.7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered as indicated.

.8 Where utility lines or structures exist in area of excavation, obtain direction of Consultant before removing or re-routing. Costs for such Work to be paid by Owner.

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

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

.2 Existing buildings and surface features:

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

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

PART 2 - PRODUCTS

2.1 Materials

.1 Class A Fill:

.1 To meet Government of Nova Scotia Standards.

.2 Crushed, pit run or screened stone, gravel or sand consisting of hard durable particles free from clay lumps, cementation, organic

material, frozen material and other deleterious materials.

.3 Gradations to be within limits specified when tested to ASTM C136-84a and ASTM C117-87. Sieve sizes to CAN/CGSB-8.1-88, rather than ASTM E11-87.

Sieve Designation		% Passing
200	mm	-
75	mm	-
50	mm	-
31.5	mm	100
25	mm	95-100
19	mm	75-100
12.5	mm	60-82
9.5	mm	52-75
4.75	mm	36-61
2.36	mm	25-48
1.18	mm	16-36
0.300	mm	5-16
.075	mm	0-6

.2 Class B Fill:

.1 Crushed, pit run or screened stone, gravel or sand consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials to meet Nova Scotia Transportation and Infrastructure Renewal (NSTIR) standard specifications for Gravel Borrow as per Division 3, Section 1.

.2 Gradations to be within limits specified when tested to ASTM C136-84a and ASTM C117-87. Sieve sizes to CAN/CGSB-8.1-88, rather than ASTM E11-87.

Sieve Designation		% Passing
112	mm	100
14	mm	15-65
0.08	mm	3-10

.3 Type 3 Fill – Crusher Dust:

.1 Crusher dust, clean granular topping of crushed rock, screenings of stone dust to meet the following gradations:

Sieve Designation		% Passing
19	mm	100
4.15	mm	50-100
1.18	mm	50-55
0.3	mm	20-30
0.075	mm	0

.4 Type 4 Fill - Drainage stone:

.1 Clean. Unfrozen and free from clay lumps, cementation, organic material, and other deleterious materials.

Sieve Designation		% Passing
60	mm	100
50	mm	90-100
25	mm	35-100
19	mm	15-85
12.5	mm	0-53
9.5	mm	0-30
4.75	mm	0-4
1.18	mm	0-2

.5 Type 5 Fill – Rip Rap R5

.1 Shot Rock, Hard, dense with relative density not less than 2.65, durable quarry stone, free from seams, cracks or other structural defects, to meet following size distribution for use intended:

Mass	Size (mm) nominal	% finer by mass
15 kg	220	100
10 kg	190	70-90
5 kg	150	40-55
.5 kg	70	0-15

.6 Type 6 Fill – Bedding Sand:

.1 Bedding Sand, free from clay, shale, organic matter and stones larger than 12.5mm diameter.

.7 Type 7 Fill - Common or Borrow Fill;

.1 Material excavated from the site, free from stumps, trees, roots, sod, organics, rocks, boulders and any deleterious material. Material to be well graded and having a maximum particle size of 50mm in diameter.

.2 Material shall be free from frost and shall not be placed on frozen ground or in water. It must have a moisture content that will allow compaction to the specified density.

.3 Any common excavated fill proposed for inclusion into the work shall be reviewed and approved by the Consultant.

.8 Type 8 Fill - Bedding material for all pipes (sanitary sewer, water, culverts, and laterals outside of building footprint):

.1 Class A Fill.

.9 Type 9 Fill - Bedding material in wet trench conditions:

.1 Gradation as follows:

ASTM Sieve size	% passing
20.0 mm	100 -
14.0 mm	40 - 80
10.0 mm	20 - 62
5.0 mm	0 - 20
2.5 mm	0 - 10
0.08 mm	0 - 3

.2 Must have Engineer's approval prior to use.

.3 Completely wrap in non-woven geotextile filter fabric in order to limit migration of fine materials into the rock.

.4 At least 50% of the particles retained on the 5 mm sieve shall have one or more surfaces formed by the fracture of a larger particle.

.5 The plasticity index of that fraction of the aggregate base material passing the No. 40 sieve shall not exceed 3 (three).

.6 Provide the Engineer with the following information before the commencement of the work and at any time during the construction at the request of the Engineer (at no cost to the Owner):

.1 Source of supply of aggregate;

.2 Sieve analysis.

.7 The analyses are to be completed by an approved testing geotechnical firm and samples must be collected at the proposed site by the same firm:

.8 The Owner reserves the right to reject any source of supply of aggregate on the basis of past field performance, document by the records and experience of the Owner and/or the Engineer with a specific material, regardless of compliance with physical requirements of grading limits.

.9 In certain locations where it is important to prevent the flow of water through the granular bedding material typically used for the pipelines, clay bedding material may be specified.

.1 The source of clay material for this use shall be approved by the Engineer.

.2 Provide the results of testing conducted by a certified testing laboratory to confirm that the following material specifications are met:

.1 Particle size range is to be determined by ASTM D2487 and 422-63. Acceptable size ranges by weight are:

.1 Percent fines (passing 75 um sieve): greater than or equal to 50%

.2 Clay content: greater than or equal to 20%

.3 Sand content: less than or equal to 45%

.2 Atterberg Limits are to be determined by ASTM D4318. Acceptable Limits are:

.1 Plasticity Index (PI): greater than or equal to 20%

.2 Liquid Limit (LL): greater than or equal to 30%

.3 Laboratory hydraulic conductivity shall be determined by ASTM 5084 on at least three (3) samples that have been compacted to 95% standard Proctor maximum dry density (as per ASTM D698). The hydraulic conductivity shall not exceed 5 x 10-10 m/s for the material to be suitable.

.10 Type 10 Fill - Unshrinkable fill:

.1 Proportioned and mixed to provide:

.1 Portland cement: CSA Standard CAN3-A5-M, Type 10 or Type 30 (High Early Strength for winter construction).

.2 Supplementary cementing materials, when permitted, shall conform to the requirements of CSA Standard CAN3-A23.5-M.

.3 Fine and coarse aggregate: CSA Standard CAN3-A23.1-M. The gradation shall conform to Table 1 of the CSA Standard for 10 mm minus.

.4 Mixing water: CAN3-A23.1-M

.5 Air-entraining admixtures: CSA Standard CAN3-A266.1-M.

.6 Mix Design for Non-compressible Fill

.1 Maximum cement content: 25 kg/m3

.2 Maximum strength at 28 days (measured in accordance with CAN3-A23.2-9C): 0.40 MPa

.3 Slump (measured in accordance with CAN3-A23.2-5C):150-200 mm

.4 Air content (measured in accordance with CAN3-A23.2) : 4% - 6%

.7 Prior to the production of unshrinkable fill for use, provide to the Owner a certificate from the Owner's testing company stating that the fill to be supplied conforms to the above requirements.

.11 Boulders: Salvaged from site. Owner to select and verify size. See detail on drawings for installation.

.12 Drain Tile: Rigid PVC perforated pipe Soleno perforated ridged HDPE dual wall pipe to meet CGSB41GP29MA. 100mm diameters c/w rodent traps at the outfalls.

.13 Insulation: Owens Corning Fomular C-300 extruded polystyrene rigid insulation or approved equal.

PART 3 - EXECUTION

3.1 Temporary Erosion & Sedimentation Control

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or

airborne dust to adjacent properties and walkways, according to sediment and erosion control drawings.

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

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

3.2 Site Preparation

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

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 Preparation/Protection

.1 Protect existing features in accordance with Section 01 00 01 – General Requirements and applicable local regulations.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Consultant approval.

.4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.5 Protect buried services that are required to remain undisturbed

3.4 Stripping of Topsoil

.1 Begin topsoil stripping of areas as directed by Consultant after area has been cleared of trees, brush, weeds and grasses have been removed from site.

.2 Strip topsoil to depths as directed by Consultant.

.1 Do not mix topsoil with subsoil.

.3 Stockpile in locations as directed by Consultant

.1 Stockpile heights not to exceed 2.0 metres and should be protected from erosion.

.4 Dispose of unused topsoil as directed by Consultant.

3.5 Stockpiling

.1 Stockpile fill materials in areas designated by Consultant.

.1 Stockpile granular materials in manner to prevent segregation.

.2 If locations are not provided by Consultant, please provide proposed location to Consultant prior to start of construction.

.2 Protect fill materials from contamination.

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

3.6 Cofferdams, Shoring and Underpinning

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 30 - Health and Safety Requirements.

.1 Where conditions are unstable, Consultant to verify and advise methods to correct.

.2 Construct temporary Works to depths, heights and locations as directed by Consultant.

.3 During backfill operation:

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

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

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

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

.5 Upon completion of substructure construction:

.1 Remove cofferdams, shoring and bracing.

3.7 Dewatering & Heave Prevention

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

.2 Provide for Consultant's approval of details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile

cut-offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.

.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

.4 Protect open excavations against flooding and damage due to surface run-off.

.5 Dispose of water in accordance with Section 00500 – General Conditions to approved collection, runoff areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.6 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

.7 Construct any temporary ditches, berms, sumps, etc. required and provide pumps, hoses, power supplies, etc., as required to keep the site and all excavations acceptably dewatered to enable the work to be done properly and without delay.

.1 This includes dewatering from all sources, including precipitation, runoff, snowmelt, groundwater, pipe flows, etc.

.2 Maintain site work and site ditching to continuous drainage.

.3 Disposed of water pumped from the trench by directing flows to sedimentation ponds prior to discharge into adjacent ditches and watercourses.

.4 Dewatering shall not be measured for separate payment but is considered incidental to the work.

3.8 Excavation

.1 Advise Consultant at least 7 days in advance of excavation operations.

.2 Repair removed or damaged pavement or surfaces beyond the limits specified above, at no expense to the Owner.

.3 At the end of each working day, restore all disturbed drainage ditches and re-install the culvert pipes that were removed or disturbed

during the work in progress, incidental to the work.

.4 Excavate to lines, grades, elevations and dimensions as indicated. Excavate minimum 600 mm under concrete slabs and out a minimum of 1500mm from the perimeter edge of slab.

.5 Remove concrete, masonry, paving, walks, demolished foundations and rubble and other obstructions encountered during excavation in accordance with Section 02 41 13 – Selective Site Demolition.

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

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

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

.8 Install barricades on both sides of any area where the depth of the trench is greater than 3000 mm from the adjacent original ground surface. These barricades will not be measured for separate payment but shall be considered incidental to the work.

.9 For trench excavation, unless otherwise authorized by Consultant in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.1 Excavate all trenches according to the requirements of the Occupational Health and Safety Act of the Province of Nova Scotia, latest revision.

.2 A certified trench box or cage may be required in all pipeline installations in order to keep the amount of surface restoration to a minimum.

.3 Multiple trench boxes or cages may be required in all pipeline installation exceeding the single trench box height.

.4 The requirement for trench box will be as shown on the drawings or as identified separately herein.

.5 Backfill all trenches at the end of the day unless special permission is given by the Engineer to leave them open and that all traffic control and safety requirements are

met.

.6 Protect trenches not backfilled at night with Jersey barriers on the traffic side and an acceptable continuous barricade on the side away from the roadway. These barricades will not be measured for separate payment but shall be considered incidental to the work.

.7 If work is stopped on the whole or any part of the trench and the trench is left open for an unreasonable length of time in advance of the placing of the pipe, when directed by the Engineer, refill such trench or part thereof at his own expense, and will not again open such trench or part thereof until he is ready to proceed with construction.

.8 If the Contractor should refuse, neglect, or fail to refill completely such trench within two hours after receipt of notice in writing to do so, the Engineer may order the refilling of the trench with the cost and expense thereof to be charged to the Contractor and the Owner will recover the amount of such cost and expense out of any monies due or to become due to the Contractor. The Engineer may stop the excavation and any other portion of the work and require the Contractor to complete the system and backfilling up to such a point as he may direct. The Contractor will not become entitled to demand or receive any allowance or compensation other than an extension of time of completion for as many days as the Engineer may determine.

.9 Protect all excavations during the course of the day’s work.

.10 Width of trench at pipe depth in common excavation: 600 mm to no more than 900 mm greater than the outside diameter of the pipe.

.1 Trench width for multiple pipes in a common trench: one pipe plus a minimum of 300 mm clearance between service lateral pipes, and a minimum of 600 mm for main pipes, plus the width of the additional pipes.

.11 Remove and replace unstable or unsuitable

soil within the limits of the specified trench excavation that cannot be re-used for backfill and replace with suitable material from the pipe trench excavation in 300 mm layers compacted to 95% of maximum dry density as determined by ASTM D698.

.1 Replace unsuitable soil removed with suitable material from the pipe trench, as determined by the Engineer, included in the pipe price.

.2 Extra payment will only be made where it is necessary to import replacement fill material to the site.

.12 Excavate trench to the depth required for placing of the pipe bedding material.

.13 Excavate and remove unsuitable material where the bottom of the trench at sub-grade is found to be unstable or unsatisfactory, to the width and depth as directed by Engineer.

.14 Dewater trench for the proper placing of the bedding material and pipe.

.15 Restore sub-grade by backfilling with suitable material from the trench excavation, as determined by the Engineer or with pipe bedding material in 150 mm layers compacted to 95% of maximum dry density as determined by ASTM D698.

.16 Widen trenches where required and as appropriate to allow adequate clearances for the installation of manholes and other appurtenances.

.17 In locations where the trench must be excavated across or along paved surfaces, remove pavement and road surfaces as a part of the trench excavation. The amount removed will depend upon the width of trench specified for the installation of the pipe. The width of pavement removed along the normal trench will not exceed the required width of the trench specified by more than 150 mm on each side as laid out on site.

.18 Comply with the trenching safety requirements of Nova Scotia under the Occupational Health and Safety Act, regardless of marked width of proposed pavement removal.

.10 Where excavation depths and/or soil conditions require a trench width greater than 4 m at the surface, limit asphalt removal to 4 m and use a trench box (cage).

.1 Ensure the height of the trench box is sufficient to keep the top width of the trench less than 4 m wide while meeting trench safety requirements.

.11 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Consultant.

.12 Restrict vehicle operations directly adjacent to open trenches.

.13 Dispose of surplus and unsuitable excavated material in approved location on site.

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

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

.16 Notify Consultant when bottom of excavation is reached.

.17 Obtain Consultant approval of completed excavation.

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

.19 Correct unauthorized over-excavation as follows:

.1 Fill under support bearing surfaces and footings with concrete specified for footings

.2 Fill under other areas with Type 2 fill compacted to not less than 98 % of corrected Standard Proctor maximum dry density.

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

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

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

.21 If rock as defined is encountered during any phase of construction, immediately notify the Engineer. Any excavation done in rock prior to notification

will not be considered for payment.

.22 In the event when there is no tendered price for rock excavation, the owner will establish a fair price based on average prices currently in effect in the region, for excavation where drilling and blasting was carried out to facilitate excavation in rock.

.23 There are two alternate methods which may be applied, with the Engineer's authorization:

.1 Bringing a larger excavator to the site to excavate the rock; or,

.2 Breaking the rock.

.24 For trench excavation in rock, rock is defined as solid rock, boulders, concrete or masonry exceeding one-half cubic meter in volume for which drilling and blasting are required for removal.

.25 Dimensions of trenches in rock: Excavate rock to a depth of at least 300 mm below the bottom of the pipe or structure to be installed.

.1 Width of trench excavation in rock: at least 600 mm greater than the outside diameter of the pipe (300 mm each side) for a single main in a trench.

.2 Width of trench excavation for two or more mains in a common trench: as specified for a single main plus 600 mm clearance between pipes.

.3 Width of trench excavation for service laterals: minimum of 1 m.

.26 Blasting will not be permitted.

.27 Disposal of excavated rock: Use only rock fragments smaller than 200 mm in greatest dimension for trench backfill. Dispose of rock fragments larger than 200 mm in greatest dimension off site.

.1 No separate payment will be provided for disposal of rock larger than 200 mm, but to be considered incidental to the work.

.28 Surplus material: all surplus or unsuitable excavated material remains the property of the Contractor.

.1 Remove this material off site on a daily basis.

.2 The cost of this work will not be measured separately for payment but will be

considered incidental to the works.

.29 Common material: soft, layered broken rock or mudstone which can be excavated by a hydraulic excavator equipped with a 1.5 cubic meter general duty bucket (based on Crown Construction Contract Act's Schedule B) and operating normally.

.1 Production slowdown due to excavation in this material shall not be compensated for in any way.

.30 The Contractor may choose to bring on site a larger excavating machine than that stated above or larger than is presently on site in order to excavate the rock thus eliminating the need for drilling and blasting. No additional compensation will be made for this option.

.31 Cut and remove all asphalt or concrete as marked or specified, within the limits of the proposed work.

.32 Cutting of asphalt must be done by using a saw to give a square, undamaged edge for bonding. UNDER NO CIRCUMSTANCES WILL RIPPING OR CUTTING OF ASPHALT BY EXCAVATION MACHINERY BE ALLOWED. Cut asphalt parallel to the centerline of the trench unless otherwise directed by the Engineer.

.1 This work must be done in a manner which leaves the sub-base undisturbed insofar as possible.

.33 Provide traffic control and signage during the cutting and removal process to protect the public and ensure the work is carried out in a safe manner.

.34 Barricades and warning signs shall be placed around the work area.

.35 Unless otherwise specified or directed by the Engineer, all asphalt and concrete materials removed under this Section will become the property of the Contractor and shall be properly loaded, transported and disposed of incidental to the work.

.36 Use proper and acceptable methods for excavation which will at all times be subject to the Engineer's approval and will employ such safe slope angles, shores, piling, bracing, etc., as may be necessary for the protection of workmen. Earth slides or slips and over excavation together with any subsequently required fill attributable to the negligence or carelessness of the

Contractor will not be considered as part of the work.

3.9 Bedding & Surround of Underground Services

.1 Place and compact granular material for bedding and surround of underground services as indicated.

.2 Bedding methods and materials must conform to the pipe manufacturer's requirements for all materials that are being bedded.

.3 The use of excavated material for bedding is strictly forbidden unless otherwise directed and approved in writing.

.4 Place bedding and surround material in unfrozen condition.

.5 Place bedding in layers to a depth of 150 mm or 300 mm in rock and compacted to a density of 95% of maximum as determined by ASTM D698.

.6 Place bedding in 150 mm lifts to a minimum height of 300 mm over the top of the pipe. The bedding shall be tamped or rodded by hand under the haunches of the pipe upon placing of the first lift. Place and compact succeeding layers to a density 95% of maximum as determined by ASTM D698.

.7 Pipe-bedding material shall not be placed in water or trenches having soft and unstable bottom conditions.

.1 Where water from any source is found in the trench, provide pumps, hoses, power supplies, etc., as required to keep the trenches acceptably dewatered during the work. Dispose of water pumped from the trenches in an environmentally acceptable method. Dewatering will not be measured for separate payment but is considered incidental to the work.

.8 Compacting equipment for pipe bedding material shall be suitably sized so as not to cause damage to the pipe or movement of the pipe due to impact and vibration and of ample size to provide the degree of compaction specified.

3.10 Backfilling

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

.1 Consultant has inspected and approved installations.

.2 Consultant has inspected and approved of construction below finish grade.

.3 Inspection, testing, approval, and recording location of underground utilities.

.4 Removal of concrete formwork.

.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 300 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer. At a minimum compact with 8 passes of a 10 ton (minimum) vibratory steel drum roller.

.5 Backfilling around installations:

.1 Place bedding and surround material as specified elsewhere.

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

.3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 1 m.

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

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

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

.6 Place unshrinkable or recycled fill in areas as indicated.

.7 Consolidate and level unshrinkable fill with internal vibrators.

.8 Install drainage and filter system in backfill as directed by Consultant.

3.11 Restoration

.1 Conduct and confine all construction operations within the limits of the work as shown on the Drawings or as laid out by the Engineer.

.2 The entire site and all properties, facilities, structures, fences, shrubs, lawns, trees, signs, driveways, sidewalks, ditches, culverts, appurtenances, etc. affected by the work must be fully restored to original or better condition before issuance of the "Certificate of Final Acceptance".

.3 Upon completion of Work, remove waste materials and debris in accordance with standard best practise. Trim slopes, and correct defects as directed by Consultant.

.4 Replace topsoil as directed by Consultant.

.5 Reinstate lawns to elevation which existed before excavation.

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

.7 Clean and reinstate areas affected by Work as directed by Consultant.

.8 Clean-up and re-establish ditches disturbed during the installation of pipelines at no extra cost to the Owner.

.9 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

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

.11 Trench maintenance: Maintain all trenches until issuance of the “Certificate of Final Acceptance”.

.1 Maintain trenches in travelled roads with granular base course only until such time as asphalt can be placed to allow a smooth travel surface.

.2 Inspect trench backfill conditions and a weekly program of trench maintenance or daily when weather or traffic conditions dictate, until issuance of the “Certificate of Final Acceptance”.

.12 Dust Prevention:

.1 Assume responsibility for dust prevention

on any street or site where works have been or are being carried out, until such works are restored to original condition or upon issuance of the "Certificate of Final Acceptance".

.2 Dust prevention includes sweeping of paved roadways and/or sidewalks and flushing of same, when deemed necessary by the Engineer and at the end of each working day. All methods of dust prevention must be approved by the Engineer.

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 31 11 00 – Clearing and Grubbing.

.2 Appendix C – Geotechnical Investigation

1.2 Definitions

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

.2 Unclassified Excavation: excavation of materials regardless of type.

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

.4 Borrow material: Rock Borrow material obtained from areas off site required for construction of embankments or for other portions of work.

.5 Embankment: Material derived from usable excavation and placed above original ground or stripped surface up to subgrade.

.6 Pavement structure: combination of layers of unbound or stabilized granular sub-base, base, and asphalt or concrete surfacing.

.7 Subgrade elevation: elevation immediately below pavement structure.

1.3 Traffic Provisions

.1 Provide and maintain roadways, walkways and detours, for vehicular and pedestrian traffic and access to fire hydrants, alarms and emergency telephones.

PART 2 - PRODUCTS

2.1 Materials

.1 Embankment materials to approval of Departmental Representative.

.2 Material used for embankment not to contain organic matter, frozen lumps, weeds, sod, roots,

logs, stumps, boulders larger than 150 mm or any other unsuitable material.

PART 3 - EXECUTION

3.1 Compaction Equipment

.1 Compaction equipment must be capable of obtaining required densities in materials on project.
- .1 Demonstrate compaction equipment effectiveness on specified material and lift thickness by documented performance of test-strip before start of Work.
- .2 Replace or supplement equipment that does not achieve specified densities.

.2 Operate compaction equipment continuously in each embankment when placing material.

.3 Minimum roller size: 9t

3.2 Water Distributors

.1 Apply water with equipment capable of uniform distribution.

3.3 Embankments

.1 Remove topsoil and rootmat.

.2 Do not place material which is frozen nor place material on frozen surfaces.

.3 Maintain a crowned surface during construction to ensure ready runoff of surface water. Do not place material in free standing water.

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

.5 Compaction:
- .1 Place and compact to full width in uniform layers not exceeding 200 mm loose thickness. Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
- .2 Compact to a density of not less than 95% corrected maximum dry density in accordance with ASTM D698.
- .3 Bring moisture content of soil to level required to achieve specified compaction.

Add water or aerate as required.

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

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

3.4 Excavations

.1 Excavate material to lines and grades indicated on drawings or as directed by the Departmental Representative. Refer to Appendix C – Geotechnical Investigation for existing subsurface conditions.

3.5 Subgrade Compaction

.1 After grading has been completed, scarify and mix subgrade surface to required depth of subgrade compaction.

.2 Remove unsuitable materials found during work. Replace with material approved by Departmental Representative

.3 Bring moisture content of soil to level required to achieve specified compaction. Add water or aerate as required.

3.6 Finishing and Tolerances

.1 Shape and compact surfaces to within 30 mm of design elevations but not uniformly high or low.

.2 Do scarifying, grading, compacting or other methods of work as necessary to provide thoroughly compacted roadbed shaped to grades and cross sections as indicated or as directed by Departmental Representative.

.3 Finish edges and slopes of common material to neat condition, true to line and grade.

.1 Remove isolated boulders exposed in cut slopes and fill resulting cavities.

.2 Hand finish slopes that cannot be finished satisfactorily by machine.

3.7 Maintenance

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

END OF SECTION

PART 1 – GENERAL

1.1 Related Sections

.1 Section 02 41 16 - Deconstruction of Structures

.2 Section 31 24 13 – Roadway Embankments

PART 2 – PRODUCTS

2.1 Stone

.1 Hard, durable, field or quarry stone, free from splits, seams or defects likely to impair its soundness during handling or by the action of water and ice. Shale slate or rocks with thin foliations shall not be acceptable. The great dimension of each stone shall not exceed two times the least dimension. The minimum density of the stone shall be 2650 kg/m^3. Armour stone to be supplied from the same source for colour consistency and is subject to approval by the Departmental Representative. Physical properties shall be as defined as:

.1 Property / Test Method
Absorption % maximum, 1.5% (ASTM C 127)
Los Angeles Abrasion, 35% maximum (ASTM C 131)

.2 Sizes of Armour Stone shall vary in size from 4500kg to 6250kg.

PART 3 – EXECUTION

3.1 Placing

.1 Fine grade area to be rip rapped to uniform, even surface. Fill depressions with suitable material and compact to provide firm bed.

.2 Place Armour Stone to thickness and details as indicated.

.3 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes and intersperse imported stones with Armour Stone presently on site to be repositioned.

.4 Machine placing:
- .1 Place to minimize voids in stable mass.
- .2 Finish surface evenly, free of large openings and neat in appearance.

END OF SECTION

PART 1 - GENERAL

1.1 Section Includes

.1 Materials and installation for chain link fences and bollards.

1.2 Related Sections

.1 Section 01 00 02 – Standard General Requirements

1.3 References

.1 Canadian General Standards Board (CGSB).
- .1 CAN/CGSB-138.1, Fabric for Chain Link Fence.
- .1 CAN/CGSB-138.2, Steel Framework for Chain Link Fence.
- .2 CAN/CGSB-138.3, Installation of Chain Link Fence.

.2 Canadian Standards Association (CSA International).
- .1 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- .2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 Submittals

.1 Submittals in accordance with Section 01 00 02 – Standard General Requirements

.2 Submit LEED documentation using the MISF (Material Information Submittal Form) and provide the following manufacturer documentation:
- .1 Recycled content: provide material cost (excluding on-site labour and equipment and including transportation to site and off-site pre-installation fabrication labour) and manufacturers documents verifying recycled content.

1.5 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling.
- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.3 Separate for reuse and recycling and place in designated containers waste in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility as approved by Departmental Representative.

.5 Divert unused concrete materials from landfill to local facility as approved by Departmental Representative.

.6 Fold up metal banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 Materials

.1 Chain-link fence fabric: to CAN/CGSB-138.1.

.1 50mm diamond mesh, 9 gauge wire.

.2 Height of fabric: 1,200 mm and 2,400 mm.

.2 Posts, braces and rails: to CAN/CGSB-138.2, galvanized steel pipe. Dimensions as indicated on the drawings.

.3 Top and bottom tension wire: to CAN/CGSB-138.2, single strand, galvanized steel wire.

.4 Tension bar: to ASTM A653/A653M, 5 x 20 mm minimum galvanized steel.

.5 Gates to CAN/CGSB-138.4.

.6 Gate frames/posts and braces: to ASTM A53/A53M, galvanized steel pipe, to sizes indicated on the drawings.

.1 Fabricate gates as indicated with electrically welded joints, and hot-dip galvanized after welding.

.2 Fasten fence fabric to gate with twisted

selvage at top.

.3 Furnish gates with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.

.7 Fittings and hardware: to CAN/CGSB-138.2, galvanized steel.

.1 Tension bar bands: 3 x 20 mm minimum galvanized steel.

.2 Post caps to provide waterproof fit, to fasten securely over posts and to carry top rail.

.3 Overhang tops to provide waterproof fit, to hold top rails.

.4 Turnbuckles to be drop forged.

2.2 Finishes

.1 Galvanizing:

.1 For chain link fabric: to AN/CGSB-138.1 Grade 2.

.2 For pipe: to ASTM A90.

.3 For other fittings: to CAN/CSA-G164.

.2 Supply full body yellow plastic caps for bollards, as indicated on the drawings.

Part 3 Executing

3.1 Grading

.1 Remove debris and correct ground undulations along fence line to obtain smooth uniform gradient between posts.

.1 Provide clearance between bottom of fence and ground surface to match existing 40-74 mm clearance or as directed by Engineer.

3.2 Erection of Fence

.1 Erect fence along lines as indicated or as directed by Engineer and to CAN/CGSB-138.3.

.2 Space straining posts at equal intervals not to exceed 150 m.

.3 Fence and gate posts to be installed as per the

drawing details.

.4 Install corner post where change in alignment exceeds 10 degrees.

.5 Install end posts at end of fence and at buildings.

.1 Install gate posts on both sides of gate openings.

.6 Place concrete in post holes (where required) then embed posts into concrete to depth indicated on drawings.

.1 Brace to hold posts in plumb position and true to alignment and elevation until concrete has set.

.2 All concrete to be 25MPa minimum, unless noted otherwise.

.7 Do not install fence fabric until concrete has cured minimum of 5 days.

.8 Install brace between end and gate posts and nearest line post as directed by the Engineer.

.9 Install overhang tops and caps.

.10 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.

.11 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.

.12 Lay out fence fabric. Stretch tightly to tension recommended by manufacturer and fasten to end, corner, gate and straining posts with tension bar secured to post with tension bar bands spaced at 300 mm intervals.

.1 Knuckled selvedge at bottom.

.2 Twisted selvedge at top.

.13 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 400 mm intervals.

.1 Give tie wires minimum two twists.

3.3 Installation of Gates

.1 Exact locations will be as indicated on the drawings, or as approved by the Engineer.

.2 Level ground between gate posts and set gate bottom approximately 40 mm above ground surface.

.3 Install gate stops where indicated.

END OF SECTION

PART 1 - GENERAL

1.1 MATERIAL SUPPLIED CONTRACTOR

.1 Contractor will supply topsoil delivered to job site.

1.2 RELATED SECTIONS

.1 Section 32 92 19.16 – Hydro Seeding

.2 Section 32 93 10 - Trees, Shrubs and Ground Cover Planting

1.3 REFERENCES

.1 Agriculture and Agri-Food Canada

.1 The Canadian System of Soil Classification, Third Edition, 1998.

.2 Canadian Council of Ministers of the Environment

.1 PN1340-2005, Guidelines for Compost Quality.

1.4 DEFINITIONS

.1 Compost:

.1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.

.2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss on Ignition (LOI) test.

.3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below 25 and contain no toxic or growth inhibiting contaminates.

.4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category A or B.

1.5 SUBMITTALS

.1 Quality control submittals:

.1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.

1.6 QUALIFICATIONS

.1 All landscape works (planting, seeding, topsoil, sod) shall be undertaken by a Contractor registered with Landscape Nova Scotia for the last 3 years and a supervisor who has completed the Landscape Industry Certification Program.

PART 2 – PRODUCTS

2.1 TOPSOIL

.1 Topsoil for seeded areas: mixture of particulates, micro organisms and organic matter which provides suitable medium for supporting intended plant growth.

.1 Soil texture based on The Canadian System of Soil Classification, to consist of 30 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.

.2 Contain no toxic elements or growth inhibiting materials.

.3 Finished surface free from:

.1 Debris and stones over 20 mm diameter.

.2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.

.4 Consistence: friable when moist.

.5 Salvaged topsoil may be used as is without amendments. Salvaged topsoil can be blended with imported topsoil.

2.2 SOIL AMENDMENTS

.1 Peatmoss:

.1 Derived from partially decomposed species of Sphagnum Mosses.

.2 Elastic and homogeneous, brown in colour.

.3 Free of wood and deleterious material which could prohibit growth.

.4 Shredded particle minimum size: 5 mm.

.2 Sand: washed coarse silica sand, medium to course textured.

.3 Organic matter: compost Category A, B in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.

.4 Use composts meeting Category A or B requirements for land fill reclamation and large scale industrial applications.

.5 Limestone:

.1 Ground agricultural limestone.

.2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.

2.3 SOURCE QUALITY CONTROL

.1 Advise Departmental Representative of sources of topsoil and manufactured topsoil to be utilized with sufficient lead time for testing.

.2 Contractor is responsible for amendments to supply topsoil as specified.

.3 Soil testing by recognized testing facility for PH, P and K, and organic matter.

.4 Testing of topsoil will be carried out by testing laboratory designated by Contractor.

.1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction sediment and erosion control drawings sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

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

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

3.2 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as directed by Departmental Representative after area has been cleared of vegetation identified for salvage. Retain all organic matter during stripping.

.2 Strip topsoil to depths as directed by Architect-Engineer.

.1 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.

.3 Stockpile in locations as directed by Departmental Representative.

.1 Stockpile height not to exceed 2 m.

.4 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by Departmental Representative.

.5 Protect stockpiles from contamination and compaction.

.6 Existing topsoil may be used as is with existing organics/stone not to exceed 25mm in diameter.

3.3 PREPARATION OF EXISTING GRADE

.1 Verify that grades are correct.

.1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.

.2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

.3 Remove debris, roots, branches, stones in excess of 25 mm diameter and other deleterious materials.

.1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.

.2 Remove debris which protrudes more than 75 mm above surface.

.3 Dispose of removed material off site.

.4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.

.1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

.1 Place topsoil after Departmental Representative has accepted subgrade.

.2 Spread topsoil in uniform layers not exceeding 150 mm.

.3 Spread topsoil as indicated to following minimum depths after settlement.

.1 Minimum 150 mm for seeded areas.

.4 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

.5 Compact topsoil to 85% Standard Proctor Maximum Dry Density to ASTM D698.

3.5 FINISH GRADING

.1 Grade to eliminate rough spots and low areas and ensure positive drainage.

.1 Prepare loose friable bed by means of cultivation and subsequent raking.

.2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.

.1 Leave surfaces smooth, uniform and firm against deep foot printing.

3.6 ACCEPTANCE

.1 Departmental Representative will inspect topsoil in place and determine acceptance of material, depth of topsoil and finish grading. Provide soil test results prior to acceptance review.

3.7 SURPLUS MATERIAL

.1 Dispose of materials except topsoil not required.

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 00 01 - Submittal Procedures.

.2 Section 31 22 13 - Rough Grading.

1.2 MEASURMENT PROCEDURES

.1 Measure hydraulic seeding square metres of actual surface area for:

.1 Grass mixture.

.2 Areas of blending into existing turf grass will not be measured for payment.

.2 Measure maintenance during establishment period and warranty period of areas seeded in hectares square metres.

1.3 SUBMITTALS

.1 Product Data

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

.2 Provide product data for:

.1 Seed.

.2 Mulch.

.3 Tackifier.

.3 Submit in writing to 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.

1.4 QUALITY ASSURANCE

.1 Perform Work in accordance with the projects Erosion and Sedimentation Control Plan as specified at Section 01 57 13

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

.3 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.4 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements.

1.5 SCHEDULING

Schedule hydraulic seeding to coincide with preparation of soil surface.

.2 Schedule hydraulic seeding using grass mixtures.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 1.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Seed: "Canada pedigreed grade" in accordance with Government of Canada Seeds Act and Regulations.

.2 Type 1: Seed Mix

.1 35% Creeping Red Fescue

.2 15% Timothy

.3 15% Tall Fescue

.4 15% Alsike Clover

.5 15% Annual Ryegrass

.6 5% Kentucky Bluegrass

.3 Seed at rate of 2.5 kg per 100 m2.

.4 Mulch: specially manufactured for use in hydraulic seeding equipment, non toxic, water activated, green colouring, free of germination and growth inhibiting factors with following properties:

.1 Type I mulch:

.1 Made from wood cellulose fibre.

.2 Organic matter content: 95% plus or minus 0.5%.

.3 Value of pH: 6.0.

.4 Potential water absorption: 900%.

.2 Type II mulch:

.1 Made from newsprint, raw cotton fibre and straw, processed to produce fibre lengths of 15 mm minimum and 25 mm maximum. Greater proportions of ingredients to be straw.

.5 Tackifier: water dilutable, liquid dispersion.

.6 Water: free of impurities that would inhibit germination and growth.

.7 Inoculants: inoculant containers to be tagged with expiry date.

PART 3 - EXECUTION

3.1 WORKMANSHIP

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

.2 Clean-up immediately, any material sprayed where not intended, to satisfaction of the Departmental Representative.

.3 Do not perform work under adverse field conditions such as wind speeds over 10 km/h, frozen ground or ground covered with snow, ice or standing water.

.4 Protect seeded areas from trespass until plants are established.

3.2 PREPARATION OF SURFACES

.1 Fine grade areas to be seeded free of humps and hollows. Ensure areas are free of deleterious and refuse materials.

.2 Ensure areas to be seeded are moist to depth of 150 mm before seeding.

.3 Obtain Departmental Representative’s approval of grade and topsoil depth before starting to seed.

.4 Measure quantities of materials by weight or weight calibrated volume measurement satisfactory to the Departmental Representative. Supply equipment required for this work.

.5 Charge required water into seeder. Add material into hydraulic seeder under agitation. Pulverize mulch and charge slowly into seeder.

.6 After all materials are in the seeder and well mixed, charge tackifier into seeder and mix thoroughly to complete slurry

3.3 SLURRY APPLICATION

.1 Hydraulic seeding equipment:

.1 Slurry tank.

.2 Agitation system for slurry to be capable of operating during charging of tank and during seeding, consisting of recirculation of slurry and/or mechanical agitation method.

.3 Capable of seeding by 50 m hand operated hoses and appropriate nozzles.

.4 Tank volume to be certified by certifying authority and identified by authorities "Volume Certification Plate".

.2 Slurry mixture applied per hectare.

.1 Seed: Seed Mix 250kg.

.2 Mulch: Type I II 1350 kg.

.3 Tackifier: 300 kg.

.4 Water: Minimum 30,000 L.

.3 Apply slurry uniformly, at optimum angle of application for adherence to surfaces and germination of seed.

.1 Using correct nozzle for application.

.2 Using hoses for surfaces difficult to reach and to control application.

.4 Blend application 300 mm into adjacent grass areas or sodded areas, previous applications to form uniform surfaces.

.5 Re apply where application is not uniform.

.6 Remove slurry from items and areas not designated to be sprayed.

.7 Protect seeded areas from trespass satisfactory to the Departmental Representative.

.8 Remove protection devices as directed by the Departmental Representative.

3.4 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Perform following operations from time of seed application until acceptance by the Departmental Representative.

.2 Seed Mixture:

.1 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.

.2 Water seeded area to maintain optimum soil moisture level for germination and continued growth of mix. Control watering to prevent washouts.

3.5 ACCEPTANCE

.1 Seeded areas will be accepted by the Departmental Representative provided that:

.1 Plants are uniformly established. Seeded areas are free of rutted, eroded, bare or dead spots.

.2 Areas seeded in fall will achieve final acceptance in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.6 MAINTENANCE DURING WARRANTY PERIOD

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

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

3.7 CLEANING

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

END

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:

.1 Materials and installation for relocated plant material; mulch, heeling in and maintenance.

.2 Related Sections:

.1 Section 01 00 01 - Project Specific General Requirements.

1.2 REFERENCES

.1 Agriculture and Agri-Food Canada (AAFC).

.1 Plant Hardiness Zones in Canada-2000.

.2 Canadian Nursery Landscape Association (CNLA).

.1 Canadian Standards for Nursery Stock-2001.

.2 Canadian Landscape Standard – 2016.

.3 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

.2 Transportation of Dangerous Goods Act (TDGA), 1992, c.34.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

1.3 DEFINITIONS

.1 N/A

1.4 SUBMITTALS

.1 Submit product data for:

.1 Mulch.

.2 Submit samples for:

.1 Mulch.

1.5 SCHEDULING

.1 Co-ordinate with contractor best time to relocate material. Optimal weather would be cloudy with little chance of rain during

the relocation. As soon as access to site and ground unfrozen. Schedule relocation prior to an expected rain event if possible.

.2 Schedule to include:

.1 Confirm plant material/mat zone to be relocated is identified and flagged with coloured tape.

.2 Pre-dig trenches or planting holes, as appropriate for relocated plants, seedlings, trees and mats.

.3 Stockpile salvaged topsoil for backfilling and heeling in seedlings and trees.

.4 Root prune all trees by spading around canopy to minimize root tearing on removal of the plant.

.5 Mulch stockpiled on site.

.6 Spruce boughs prepared.

.7 Potable water on site.

1.6 WARRANTY

.1 Given the existing location, soil and plant conditions, no warranty will be applied to relocated material.

.2 For plant material as itemized on plant list the 12 months warranty period prescribed in is extended to one full growing season after final acceptance.

.1 The Contractor hereby warrants that plant material as itemized on plant list will remain free of defects in accordance with General Conditions

for 1 full growing season, providing adequate maintenance has been provided.

.2 End-of-warranty inspection will be conducted by Architect-Engineer.

.3 Architect-Engineer reserves the right to extend Contractor's warranty responsibilities for an additional one year if, at end of initial warranty period, leaf development and growth is not sufficient to ensure future survival.

PART 2 – PRODUCTS

.1 Type of root preparation, sizing, grading and quality: comply to Canadian Standards for Nursery Stock.

.1 Source of plant material: grown in Zone 5 in accordance with Plant Hardiness Zones in Canada.

.2 Plant material must be planted in zone indicated as appropriate for its species.

.3 Plant material in location appropriate for its species.

.4 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

.5 Trees: with straight trunks, well and characteristically branched for species except where specified otherwise.

.6 Bare root stock: not acceptable.

2.1 WATER

.1 Free of impurities that would inhibit plant growth.

2.2 MULCH

.1 Shredded bark: aged and processed, varying in size from 25 to 125 mm in length, from coniferous trees.

.2 Wood chips: From onsite chipping activities, if available.

.3 Colour: Black or dark brown or natural.

2.2 FERTILIZER

.1 None

PART 3 – EXECUTION

.1 PRE-PLANTING PREPARATION

.1 Ensure plant material acceptable to Architect-Engineer. All plant material to be inspected by Architect-Engineer prior to any planting.

.2 Remove damaged roots and branches from plant material.

.2 PRE-PLANTING PREPARATION

.1 Ensure plant material acceptable to Architect-Engineer. All plant material to be inspected by Architect-Engineer prior to any planting.

.2 Remove damaged roots and branches from plant material.

3.1 PRE-PLANTING/REPLANTING PREPARATION

.1 Prepare trenches and/or planting holes for relocated plant material. Material will be either mats of vegetation or individual tree and seedlings. Trenches should be prepared by mechanical means for the mats; small bucket of skid steer or tractor. Trenches should be laid out in similar orientation to the removed plant material mat, e.g. east to west. Trench for seedling can be manually dug for small seedlings or by mechanical means for larger shrubs or trees. See details. Planting pits for large trees should dug larger than expected plant root ball and backfilled with salvaged topsoil.

.2 Ensure plant material to be relocated has been identified and flagged for removal. Maintain the same orientation when relocated. Material can be moved with either a small bucket on a skid steer, tractor or equipment acceptable to Departmental Representative.

.3 Ensure seedling material to be heeled in has been flagged. Heel in seedlings identified using

salvaged topsoil from trench excavations as needed.

.4 Plant species may include, but not limited to, the following; Picea glauca, Picea mariana, Myrica gale, Rosa sp., Alnus sp., Vaccinum sp.,Betula papyrifera, Betula alleghaniensis, Kalmia angustifolia and Abies balsamea

3.2 EXCAVATION AND PREPARATION OF PLANTING BEDS

.1 For heeling trenches:

.1 Excavate to depth and width as indicated. Use same equipment for digging heeling trenches and extraction of vegetation mat. Depth will be dependent upon the equipment used. Care should be taken to try to maintain a standard depth of removed plant material and that depth should match the heeling trench. Trench for seedlings can be manually dug as per detail. Excavated material can be used to backfill trench.

.2 Remove rocks, stumps, debris from heeling trench that will disrupt relocation of plant mat.

.3 Remove water which enters excavations prior to planting. Notify Departmental Representative if water source is ground water.

.4 Stockpile excavated material for future reuse during replanting.

3.3 HEELING-IN

.1 Install relocated material in trench locations identified. Install matt plant material to same orientation and depth as original, install mats as close to each other as possible. Infill voids with salvaged topsoil. Plant seedlings into heeling trench as detailed. Use stockpiled soil to backfill and fill voids in replanted material.

.2 Plant Mats collected with a machine bucket should be installed immediately into pre-dug trench. Mat length will be determined by the length of the bucket. Width of mat should be limited to what is easily contained within the bucket.

.3 Seedlings dug from existing location should have as much loose soil removed from roots as possible. Long roots should only have minimal pruning, 25-50mm maximum, as a severe root pruning will likely set plants back. Keep seedlings in bucket of water till relocated in heeling trench. Lay seedlings into trench with roots running in one direction along bottom of trench. Backfill with salvaged topsoil

.4 Trees and shrubs dug from existing location should retain as much rootball as possible. Root prune outside tree/shrub canopy with spade. Ensure clean cuts on all roots. Backfill with salvaged topsoil on replanting in new plant pits. Maintain same orientation when transplanting.

.4 Water plant material thoroughly.

.5 Mulch.

.6 Apply anti desiccant to relocated plant material in accordance with manufacturer's instructions.

3.4 ADDITIONAL PLANT MATERIAL

.1 The following additional plant material will be installed as per the planting plan. Location is a guide. Adjust final location based on space and surrounding plantings.

Botanical Name	Common Name	Size	Remarks
	Trees & Shrubs		
Abie balsamea	Balsam Fir	60 cm	pot
Acer rubrum	Red Maple	200 cm	pot
Amelanchier canadensis	Serviceberry	100 cm	pot
Betula alleghanensis	Yellow Birch	225 cm	pot
Cornus sericea	Red Osier Dogwood	60 cm	pot
Picea glauca	White Spruce	60 cm	pot
Rosa carolina	Carolina Rose	30 cm	pot
Sorbus americana	American Mountain Ash	175 cm	pot
Tsuga canadensis	Canada Hemlock	80 cm	pot
Viburnum trilobum	Highbush Cranberry	60 cm	pot

3.5 MULCHING

.1 Spread mulch as indicated to 75 mm depth.

.2 Apply a very loose covering of spruce boughs over relocated seedling material to reduce exposure to wind and sun. Too much wind and sun will put more stress on the relocated root systems resulting in greater plant losses.

3.6 MAINTENANCE DURING HEELING-IN PERIOD

.1 Perform following maintenance operations from time of planting to acceptance by Departmental Representative.

.1 Water to maintain soil moisture conditions for optimum growth and health of root zone without causing erosion.

.2 Replace or re-spread damaged, missing or disturbed mulch.

.3 Replace or adjust spruce boughs.

3.7 PLANTING IN FALL

.1 Prepare planting area to receive mats, seedlings and trees/shrubs. Pre-dig trench for plant mat. Individual seedlings can be planted in individual holes made by shovels or trowels, depending upon the size of the plant. Excavate planting pits for larger trees and shrubs. Plant vegetation at a roughly one plant per square metre density. Seed all bare spaces with hi-way mix.

.2 Remove spruce boughs and retain for re-use.

.3 Move mats carefully to minimize damage during relocation in the same manner as in which they were installed. Maintain the same surface elevation upon replanting.

.4 Backfill all joints and voids to reduce pooling water and protect roots.

.5 Seedlings will require one or two spadeful size holes depending upon the root system of the seedling. Minimize damage of the roots during planting. Firm soil back around roots zone and ensure the seedling is close to original grade as possible.

.6 Overseed planting area with a Highway Mix suitable as specified.

3.8 RE-VEGETATION OF HEEL-IN TRENCH

.1 Refill and regrade the trench with salvaged topsoil to meet existing grades. Compact to 85% density.

.2 Re-plant selected seedlings if desired. Quantity based on number available and desired effect.

.3 Seed exposed areas with Highway Mix grass/forb blend.

3.9 MAINTENANCE DURING FIRST YEAR OF GROWTH

.1 Perform following maintenance operations from time of planting to acceptance by Departmental Representative.

.1 Water as necessary to maintain soil moisture for optimum growth

and health of root zone without causing erosion.

.2 Replace or re-spread damaged, missing or disturbed mulch.

.3 Replace or adjust spruce boughs.

END

PART 1 – GENERAL

1.1 Work Included

.1 This section includes the supply of all labour, materials and equipment and incidentals necessary for the complete installation of all sanitary sewer mains, sanitary sewer laterals and insulation and testing of all sanitary sewer mains as shown on the drawings and herein specified.

1.2 Related Requirements

.1 Section 31 23 33 Excavating, Trenching and Backfilling.

1.3 Measurement and Payment

.1 This is a stipulated sum project and therefore measurement for payment will not apply to this item.

1.4 References

.1 American National Standards Institute/American Water Works Association (ANSI/AWWA)

.1 ANSI/AWWA C111/A21.11-07, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.2 ASTM International

.2 ASTM C12-09, Standard Practice for Installing Vitrified Clay Pipe Lines.

.3 ASTM C14M-07, Standard Specification for Nonreinforced Concrete Sewer, Storm Drain and Culvert Pipe (Metric).

.4 ASTM C76M-10a, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).

.5 ASTM C117-04, Standard Test Method for Material Finer Than 75 MU m (No. 200) Sieve in Mineral Aggregates by Washing.

.6 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.7 ASTM C425-09, Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings.

.8 ASTM C428-05(2006), Standard Specification for Asbestos-Cement Nonpressure Sewer Pipe.

.9 ASTM C443M-07, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).

.10 ASTM C663-98(2008), Standard Specification for Asbestos Cement Storm Drain Pipe.

.11 ASTM C700-09, Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated.

.12 ASTM C828-06, Standard Test Method for Low-pressure Air Test of Vitrified Clay Pipe Lines.

.13 ASTM D698-07e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft4-lbf/ft3 (600 kN-m/m3)).

.14 ASTM D1869-95(2005)e1, Standard Specification for Rubber Rings for Asbestos Cement Pipe.

.15 ASTM D2680-01(2009), Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Composite Sewer Piping.

.16 ASTM D3034-08, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.17 ASTM D3350-10, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

.3 CSA International

.1 CSA A3000-08, Cementitious Materials Compendium.

.2 CSA A257 Series-09, Standards for Concrete Pipe and Manhole Sections.

.3 CAN/CSA-B70-06, Cast Iron Soil Pipe, Fittings, and Means of Joining.

.4 CSA B1800-11, Thermoplastic

Non-pressure Pipe Compendium.

.1 CSA B182.1-11, Plastic Drain and Sewer Pipe and Pipe Fittings.

.2 CSA B182.2-11, PSM Type Polyvinylchloride PVC Sewer Pipe and Fittings.

.3 CSA B182.6-11, Profile Polyethylene (PE) Sewer Pipe and Fittings for Leak-Proof Sewer Applications.

.4 CSA B182.11-11, Standard Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.

1.5 Administration Requirements

.1 Scheduling:

.1 Schedule Work to minimize interruptions to existing services and maintain existing sewage flows during construction.

.2 Submit schedule of expected interruptions for approval and adhere to approved schedule.

.3 Notify Engineer 24 hours minimum in advance of any interruption in service.

1.6 Action and Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for pipes and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates:

.1 Certification to be marked on pipe.

.4 Test and Evaluation Reports:

.1 Submit manufacturer's test data and

certification 2 weeks minimum before beginning Work.

1.7 Delivery, Storage and Handling

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

.2 Load and unload pipe and accessories by lifting with hoists and slings, on pallets, or careful skidding so as to prevent shock and damage.

.3 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.4 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

.2 Store and protect pipes and coatings from damage.

.3 Replace defective or damaged materials with new.

.4 Do not drop or drag pipe.

.5 Avoid severe impact blows, abrasion damage, and gouging or cutting of PVC pipe by metal surfaces or rocks.

.6 For pipe handled on skidways, do not skid or roll pipe against pipe already on the ground.

.7 Avoid stressing bell joints and damage of bevel ends.

Part 2 Products

.1 Minimum size of sanitary sewer mains is 200 mm.

.2 Sanitary sewer pipe and gaskets will be supplied by the Contractor. Sewer pipe gaskets to be supplied to the Contractor by the pipe manufacturer.

2.1 General

.3 Sanitary service lateral pipes, bored pipes, tees, wyes, bends, couplings, rings, fittings, elbows, caps and saddles will be provided by the Contractor.

.4 Sanitary sewer mains and fittings 375 mm and smaller in diameter to be polyvinyl chloride pipe.

.5 Joints to be push-on type and must be watertight.

2.2 Plastic Pipe

.1 Type PSM Polyvinyl Chloride (PVC): to CSA B182.2.

.1 Standard Dimensional Ratio (SDR): 35.

.2 Gasket to ASTM D3212 and integral bell system with no reduction in the wall thickness.

.3 Nominal lengths: 6 m.

.4 Color coded “green”.

.2 High Density Polyethylene (HDPE) for bored sewer mains: shall be PE 4710 high density polyethylene (HDPE) DR11 of the diameter indicated on the Drawings. Pipe shall be tested to ASTM F714 and AWWA Standard C906 for DR11 and ASTM D-3050 standard specification for high density polyethylene (HDPE) pipe, cell classification PE445574C, and CSA B137-1.

.1 Acceptable pipe: Performance Pipe DriscoPlex Series 4000 or approved equal.

.2 Pipe shall be green in colour, or black with green longitudinal striping.

.3 Joints to be made by fusion butt-welding in accordance with manufacturer’s recommendations to make a watertight joint of strength equal to or greater than that of the pipe. Fusion butt-welding shall only be done by persons experienced in this technique.

.4 Fittings shall be molded or fabricated in accordance with ASTM D3261 for butt fittings and ASTM F1055 for electrofusion fittings. All fittings and custom fabrications shall be pressure rated for the same internal pressure as the pipe they are being installed on.

.5 Either butt fusion or electrofusion fittings are acceptable. Butt fusion fittings shall be as supplied by Performance Pipe or approved equal. Electrofusion fittings shall be Central Plastics or approved equal. All PE 4710 fittings shall be tested to the requirements of AWWA C906. Electrofusion fittings shall be

installed in accordance with the manufacturer's recommendations.

.6 When an OD compression mechanical fitting is used at any location on HDPE piping, a stiffener insert shall be installed in the bore of the PE pipe under the compression area of the coupling. The stiffener insert shall be Type 304 SS or approved alternate material and shall be as recommended and supplied by the HDPE pipe supplier. Inserts shall be used at all locations where compression fittings are used, including Pipe Penetration Seal joints and clamp-type check valves.

.7 MJ flange adaptors shall be provided where required, to be electrofusion flanges where other components are to be attached.

.8 Connection of HDPE to gravity PVC sewer main: to be made using a Fernco rubber coupling or approved equivalent of appropriate size and style to make a waterproof connection and to provide smooth flow within the pipe with no obstruction.

2.3 Market Tape

.1 Metal marker tape:

.1 50 mm wide.

.2 To carry the message "CAUTION – SEWER MAIN BURIED"

2.4 Service Connections

.1 Type PSM Poly (Vinyl) Chloride: to CSA B182.2.

.2 Plastic pipe and fittings: to ASTM 3034 and CSA B182.1, with push-on joints.

.1 PVC DR35, colour coded green.

.2 Minimum 100 mm diameter.

.3 Joints: bell and spigot type with locked in rubber gasket.

.3 Bends: long radius type only.

.4 Caps for ends of laterals: PVC.

.5 Saddles: PVC gasket and strap on type of the size as indicated on the drawings, meeting the same requirements as the sanitary service pipe. Rubber "Insert-a-tee" or "Kor-n-tee" type connections with stainless steel bands are also accepted.

.6 Bends: long radius type only.

.7 Only PVC tees will be accepted when main sewer pipe has a depth of 3 metres or greater.

.8 Settlement joint: as manufactured by Royal Pipe Systems or approved equivalent.

.1 Required when main sewer pipe has a depth of 3 metres or greater.

2.5 Cement Mortar

.1 Portland cement: to CSA A3000, normal type 10.

.2 Mix mortar 1 part by volume of cement to two parts of clean, sharp sand mixed dry.

.1 Add only sufficient water after mixing to give optimum consistency for placement.

.2 Do not use additives.

2.6 Pipe Bedding and Surround Materials

.1 Granular material to Section 31 23 33 - Excavating, Trenching and Backfilling.

2.7 Backfill Material

.1 In accordance with Section 31 23 33 - Excavating, Trenching and Backfilling.

2.8 Insulation

.1 Insulation: extruded, expanded closed-cell polystyrene insulation with the following minimum characteristics:

.1 Compressive strength – 210 kPa;

.2 Water absorption (% by volume) - Max. 0.7%;

.3 Capillarity (none);

.4 Shear strength - 275kPa.

.2 Acceptable Products:

.1 Styrofoam HI-40, Celfort 300 as manufactured by Owens Corning, or approved equivalent.

2.9 Layout Equipment

.1 In laying out the sewer lines, the Engineer will establish only the locations and elevations of manholes.

.2 Use approved laser beam instrumentation and techniques to determine intermediate line and grade for all pipes except where and when the Engineer may allow other methods to be used.

.1 Install laser beam in the pipe, just above the pipe, or in the bottom of the manhole, unless otherwise approved by the Engineer.

.3 Use an approved laser sighting triangle or template to set each pipe.

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 sewer pipe installation in accordance with manufacturer's written instructions.

.2 Visually inspect substrate in presence of Engineer.

.1 Inform Engineer of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied.

3.2 Preparation

.1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Engineer.

.2 Clean and dry pipes and fittings before

installation.

.3 Obtain Engineer's approval of pipes and fittings prior to installation.

3.3 Trenching

.1 Do trenching Work in accordance with Section 31 23 33 - Excavating, Trenching and Backfilling.

.2 Protect trench from contents of sewer or sewer connection.

.3 Trench alignment and depth require approval of Engineer prior to placing bedding material and pipe.

3.4 Concrete Bedding and Encasement

.1 All concrete to be 25MPa minimum, unless noted otherwise.

.1 Place concrete to details as indicated.

.2 Position pipe on concrete blocks to facilitate placing of concrete.

.1 When necessary, rigidly anchor or weight pipe to prevent flotation when concrete is placed.

.3 Do not backfill over concrete within 24 hours after placing.

3.5 Granular Bedding

.1 Place bedding in unfrozen condition.

.2 Place granular bedding materials in uniform layers not exceeding 300 mm compacted thickness to depth as indicated.

.3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.

.2 Do not use blocks when bedding pipe.

.4 Shape transverse depressions as required to suit joints.

.5 Compact each layer full width of bed to at least 95% maximum density to ASTM D698.

.6 Fill excavation below bottom of specified bedding adjacent to manholes or structures with compacted bedding material or lean mix concrete mud slab, as indicated on drawings.

3.6 Installation

.1 Install sanitary sewer mains according to the sizes and locations indicated on the drawings.

.2 Provide and use proper implements, tools and facilities for safe and efficient execution of the work.

.3 Lay and join pipes to: ASTM C12.

.4 Lay and join pipes in accordance with manufacturer's recommendations, in accordance with recognized good practice and to approval of Engineer.

.5 Handle pipe using methods approved by Engineer.

.1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

.2 Carefully lower pipe and fittings into trench in such a manner as to prevent damage to them. Do not drop pipe or fittings into trench.

.3

.6 Lay pipes on prepared bed, true to line and grade, with pipe invert smooth and free of sags or high points.

.1 Minimum grade, unless otherwise indicated:

.1 Pipe diameter 200 mm to 300 mm: 0.4%

.2 Permanent dead-end sewers: 0.6%

.2 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

.3 Remove and re-lay any pipe which is not in true alignment or shows undue settlement after laying.

.7 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

.8 Do not lay pipe on a foundation into which frost has penetrated, or at any time when the Engineer may deem that there is a danger of the formation of ice or the penetration of frost at the bottom of the excavation.

.9 Inspect pipe thoroughly before and after laying. Remove defective or damaged pipe from the site and replace with new sound material.

.10 Trenches where pipe laying is in progress are to be kept dry. Pipes are not to be laid in water or upon wet bedding. Dewater excavations as required.

.11 Thoroughly clean pipes as they are laid and protect pipes from dirt and water.

.12 No length of pipe shall be laid until the preceding length has been thoroughly bedded and secured in place so as to prevent movement or disturbance of the pipe.

.13 Do not walk on or work over pipes until there is a minimum of 300 mm of cover over them, except as necessary in refilling trench and compacting the bedding material.

.14 Joint deflection permitted within limits recommended by pipe manufacturer.

.15 Water to flow through pipe during construction, only as permitted by Engineer.

.16 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.

.17 Install plastic pipe and fittings in accordance with CSA B182.11.

.18 Pipe jointing:

.1 Install gaskets in accordance with manufacturer's written

recommendations.

.2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

.3 Align pipes before joining.

.4 Maintain pipe joints free from mud, silt, gravel and foreign material. Wipe clean ends of pipe, rubber gaskets, fittings, etc. immediately before jointing.

.5 Avoid displacing gasket or contaminating with dirt or foreign material. Gaskets so disturbed to be removed, cleaned and lubricated and replaced before joining is attempted.

.6 Apply lubricant as approved by the pipe manufacturer to the spigot up to the reference mark and to the face of the gasket (mechanical joint gaskets included).

.7 Complete each joint before laying next length of pipe.

.8 Minimize joint deflection after joint has been made to avoid joint damage.

.1 Joint deflection permitted within limits recommended by pipe manufacturer.

.9 At rigid structures, install pipe joints not more than 1.2 m from side of structure.

.10 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.

.11 Pipes may be pushed together by means of a crow-bar solidly wedged into the ground, by using a suitable pipe puller at the joint, or in some instances by very carefully pushing with the backhoe, or by any other method approved by the engineer.

.1 Use a block of wood when pushing

against the pipe to prevent damage,

.12 Ensure pipe gaskets are not rolled, pinched, dislodged, or torn during jointing.

.19 When stoppage of Work occurs, block pipes as directed by Engineer to prevent creep during down time.

.20 Plug lifting holes with pre-fabricated plugs approved by Engineer, set in shrinkage compensating grout.

.21 Cut pipes as required for special inserts, fittings or closure pieces as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

.22 Make watertight connections to manholes.

.1 Use shrinkage compensating grout when suitable gaskets are not available.

.23 Connections to existing piping:

.1 Install new pipes to within 2 m of existing pipe, but do not make connection until all downstream system work is complete and ready to receive wastewater flows.

.2 Install watertight plug at the end of new pipe to prevent groundwater, dirt or debris from entering the pipe. Obtain survey coordinated of end of the pipe to facilitate the location of the pipe later.

.3 When the remainder of the system is ready to receive wastewater flows, excavate the end of the new pipe and complete the connection. The Contractor shall as part of the work supply plugs and pumps to by-pass existing flows while the connection is being made. The sewer section and manhole to be leakage tested prior to opening this pipe section to use.

.4 The Contractor shall be aware that at

these connection points it may not be possible for all work can be done at one time and shall allow for this in pricing the work.

.5 Use prefabricated saddles or field connections approved by Engineer, for connecting pipes to existing sewer pipes.

.6 Joints to be structurally sound and watertight.

.24 Connection of Bored Sewer Mains:

.1 Connection of bored sewer main to sanitary sewer main and manhole: to be done after final contraction/expansion of the pipe has occurred from thermal stabilization in its installed location (a period of 48 hours after the installation is recommended, to be confirmed by the pipe manufacturer).

.2 Connection to sanitary manholes to be done as follows:

.1 Where bored/HDD sanitary sewer main is installed prior to the manhole, and the other connection to the MH is a PVC pipe:

.1 Cut and trim the PVC pipe at the point where it matches the required pipe location with the MH in place;

.2 Carefully move the MH onto the prepared end of the PVC pipe, matching the alignment and invert elevations, until the pipe has been inserted the proper distance through the MH pipe gasket;

.3 Insert a 1.0m long section of HDPE pipe the proper distance into the other MH pipe gasket;

.4 Cut the HDD installed HDPE pipe to permit a proper connection to be made to the HDPE stub inserted into the MH;

.5 Join HDPE sewer pipe and HDPE manhole pipe section with an electrofusion coupling, ensuring proper horizontal and vertical alignment.

.2 Where bored/HDD sanitary sewer main is installed prior to the manhole, and an HDPE connection is to be made at the inlet and outlet:

.1 Cut and trim the HDPE pipe at the point where it matches the required pipe location with the MH in place;

.2 Carefully move the MH onto the prepared end of the HDPE pipe, matching the alignment and invert elevations, until the pipe has been inserted the proper distance through the MH pipe gasket;

.3 Insert a 1.0m long section of HDPE pipe the proper distance into the other MH pipe gasket;

.4 Cut the HDD installed HDPE pipe to permit a proper connection to be made to the HDPE stub inserted into the MH;

.5 Join HDPE sewer pipe and HDPE manhole pipe section with an electrofusion coupling, ensuring proper horizontal and vertical alignment.

.3 Where manhole is installed prior to the bored sanitary sewer the

following steps are to be followed:

.1 Insert a 600 mm long HDPE pipe section into manhole;

.2 Fuse a flexible HDPE restraint on top of the 600 mm HDPE pipe at the center;

.3 Join HDPE sewer pipe and HDPE manhole pipe section with an electrofusion coupling.

.3 Connection of HDPE to gravity PVC sewer main: to be made using a Fernco rubber coupling or approved equivalent of appropriate size and style to make a waterproof connection and to provide smooth flow within the pipe with no obstruction.

3.7 Pipe Surround

.1 Place surround material in unfrozen condition.

.2 Upon completion of pipe laying, and after Engineer has inspected pipe joints, surround and cover pipes as indicated.

.1 Leave joints and fittings exposed until field testing is completed.

.3 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated.

.1 Do not dump material within 1 m of pipe.

.4 Place layers uniformly and simultaneously on each side of pipe.

.5 Compact each layer from pipe invert to mid height of pipe to at least 95% maximum density to ASTM D698.

.6 Compact each layer from mid height of pipe to underside of backfill to at least 90% maximum density to ASTM D698.

.7 When field test results are acceptable to

Engineer, place surround material at pipe joints.

3.8 Insulation

.1 Install insulation in the locations shown on the drawings and as directed by the Engineer.

.2 Install insulation 50 mm thick at 300 mm above the pipe for a width of 1200 mm.

.3 Level and prepare the surface on which the insulation is to be placed so the insulation is not cracked or broken when backfilled.

.4 Secure joints between sheets of insulation with an appropriate sheeting tape. Acceptable product: duct tape, or approved equivalent.

.5 Cover insulation with a minimum of 150 mm of bedding before backfilling.

3.9 Backfill

.1 Place backfill material in unfrozen condition.

.2 Install marker tape 600 mm above the top of the pipe.

.3 Place backfill material, above pipe surround in uniform layers not exceeding 300 mm compacted thickness up to grades as indicated.

.4 Under paving and walks, compact backfill to at least 95% maximum density to ASTM D698.

.1 In other areas, compact to at least 90% maximum density to ASTM D698.

.5 Place unshrinkable fill in accordance with Section 31 23 33 - Excavating, Trenching and Backfilling.

3.10 Service Connections

.1 Install pipe to manufacturer's instructions and specifications.

.2 Maintain grade for 100 and 125 mm diameter sewers at 1 vertical to 50 horizontal unless indicated

otherwise.

.3 Install pipe in the locations as staked and according to the sizes as indicated on the Drawings.

.4 Greater depths may be required where existing structures require services and the sewer main permits the greater depth.

.5 Where reconnection of an existing lateral pipe is being completed as part of the work, the existing lateral pipe will be reconnected to the new or existing main section by inserting a new lateral section between the existing lateral and the new or existing main section. This new lateral section will be connected to the existing lateral pipe with an approved coupling (Fernco or equivalent) and to the new or existing main as set out in this Section.

.6 All connections shall be made watertight. Contractor to supply all labour, material including the section of new laterals and equipment necessary for connection of the existing lateral to the existing main.

.7 Marker Tape

.2 Install marker tape 600 mm above the top of the pipe.

.8 Service connections to main sewer: standard Tee fittings or approved saddles, properly fitted to the sewer main.

.1 Do not use break-in and mortar patch-type joints.

.2 Orientation of the connection to be as detailed on the drawings.

.3 When connecting a saddle, neatly cut the appropriate circular hole with an appropriately sized hole saw, without seriously damaging the pipe. Remove and properly dispose of all material generated by this cutting.

.9 Service connection pipe: not to extend into interior of main sewer.

.10 Make up required horizontal and vertical bends from 45 degrees bends or less, separated by straight section of pipe with minimum length of 4 pipe diameters.

.1 Use long sweep bends where applicable.

.11 Plug service laterals with water tight caps or plugs as approved by Engineer.

.12 Place location marker at ends of plugged or capped unconnected sewer lines.

.1 Each marker: 100 x 100 mm stake extending from pipe end at pipe level to 1.0 m above grade.

.2 Paint exposed portion of stake green with designation SAN SWR LINE in black.

3.11 Field Testing

.1 Repair or replace pipe, pipe joint or bedding found defective.

.2 When directed by Engineer, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.

.3 Remove foreign material from sewers and related appurtenances by flushing with water.

.4 Provide all labour, equipment and materials required to provide leakage tests on sanitary sewer mains and manholes.

.5 Perform infiltration and exfiltration testing as soon as practicable after jointing and bedding are complete, and service connections have been installed.

.1 Where the groundwater table may normally be below the level of the pipeline, test the pipeline using an air exfiltration method. Where the groundwater table may normally be

above the level of the pipeline, test the pipeline using an air infiltration method.

.6 Do infiltration and exfiltration test to ASTM C828.

.7 Do infiltration and exfiltration testing as specified herein and as directed by Engineer.

.1 Perform tests in presence of Engineer.

.2 Notify Engineer 48 hours minimum in advance of proposed tests.

.3

.8 Carry out tests on each section of sewer between successive manholes including service connections.

.9 Install watertight bulkheads in suitable manner to isolate test section from rest of pipeline.

.10 Exfiltration test:

.1 Do exfiltration test to ASTM C969.

.2 Plug pipe outlets that discharge into the upstream manhole and plug the outlet of the test section at the downstream manhole; the plug in the test section at the upstream manhole shall have a fitting to permit connection of an air hose;

.3 Using a low-pressure air pump, apply a pressure of 27.6 kPa to the test section;

.4 Close the valve between the air pump and the test section and allow the pressure to drop to 24.1 kPa and begin recording the test time at this point;

.5 The Engineer will calculate the allowable exfiltration. If the actual leakage time is greater than the allowable, the section tested has passed the test.

.6 Fill test section with water to displace air in line. Maintain under nominal head for 24 hours to ensure absorption in pipe wall is complete

before test measurements are begun.

.7 Immediately prior to test period add water to pipeline until there is head of 1 m over interior crown of pipe measured at highest point of test section or water in manhole is 1 m above static ground water level, whichever is greater.

.8 Duration of exfiltration test: 2 hours.

.9 Water loss at end of test period: not to exceed maximum allowable exfiltration over any section of pipe between manholes.

.11 Infiltration test:

.1 Do infiltration tests to ASTM C1618 for concrete pipe and F1417 for PVC pipe testing using low pressure air.

.2 Plug pipe outlets that discharge into the upstream manhole and plug the outlet of the test section at the downstream manhole; the plug in the test section at the upstream manhole shall have a fitting to permit connection of a vacuum hose;

.3 Use a vacuum pump to increase the negative pressure to 27.6 kPa Close the vacuum source and allow the negative pressure to decrease to 24.1 kPa; begin recording of the test time;

.4 The Engineer will calculate the allowable infiltration; if the actual leakage time is greater than the allowable then the test section is acceptable.

.5 Test all pipe less than 1200 mm in diameter from manhole to manhole. Test all pipe 1200 mm in diameter or greater one joint at a time.

.6 The maximum allowable leakage per joint tested individually shall be that calculated for a 1 metre length of pipe of that diameter at the rate of 0.001 cubic metres per minute square metre of internal pipe surface

area.

.7 Conduct infiltration test in lieu of exfiltration test where static ground water level is 750 mm or more above top of pipe measured at highest point in line to be used.

.8 Do not interpolate a head greater than 750 mm to obtain an increase in allowable infiltration rate.

.9 Install watertight plug at upstream end of pipeline test section.

.10 Discontinue pumping operations for at least 3 days before test measurements are to begin and during this time, keep thoroughly wet at least one third of pipe invert perimeter.

.11 Prevent damage to pipe and bedding material due to flotation and erosion.

.12 Place 90 degrees V-notch weir, or other measuring device approved by Engineer in invert of sewer at each manhole.

.13 Measure rate of flow over minimum of 1 hour, with recorded flows for each 5 min interval.

.12 Infiltration and exfiltration: not to exceed following limits in L per hour per 100 m of pipe, including service connections.

Nominal Pipe diameter	Asbestos-Cement or Plastic pipe	Concrete or Vitrified Clay pipe
(mm)	(L/h/100 m of pipe)	(L/h/100 m pf pipe)
100	3.88	25.5
125	4.62	30.0
150	5.51	34.0
200	7.45	41.5
250	9.39	49.5
300	11.33	56.5
350	13.27	63.5
400	14.91	70.0
450	16.84	76.0
500	18.78	81.5
550	20.72	87.0
600	22.80	92.5

700	26.53	102.0
800	30.11	110.5
900	33.69	118.0
1000	37.56	124.5
1100	41.29	130.0
1200	45.01	135.0

13 Leakage: not to exceed following limits in litres per hour per 100 m of sewer for diameter tested including service connections:

.1 Exfiltration, based on 600 mm head: 0.175 L.

.2 Infiltration: 0.150 L.

.14 Repair and retest sewer line as required, until test results are within limits specified.

.15 Repair visible leaks regardless of test results.

.16 Television and photographic inspections:

.1 Clean sewers, manholes, and all related appurtenances of all foreign material either by flushing or by hand.

.1 Intercept any debris by installing a basket or other suitable device at the downstream end of the section(s) being flushed

.2 Video inspection is not permitted before or during the flushing operation.

.3 After flushing but before the video inspection begins, add enough water to the upstream manhole so it can be seen flowing at the downstream manhole.

.4 Carry out inspection of installed sewers by passing the video camera through the sewer pipe in the direction of the flow.

.1 One hundred percent (100%) of the sewers will be video inspected.

.5 Provide means of access to permit Engineer to do inspections.

.6 The sewer will be inspected for

alignment and obstructions. Water ponding in gravity sewers that cannot be eliminated by flushing and cleaning will be considered as evidence of pipe settlement.

.7 Any and all defects such as water ponding, leaking joints, sags, improper grade or alignment, excessive deflection, obstructions, etc. may be cause for rejection and such defects must be repaired by the Contractor at no expense to the Owner. The Engineer shall make the decision if such defects warrant correction.

.8 The Project Inspector shall be present when new sewer is being video inspected.

3.12 Cleaning

Progress Cleaning:

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

PART 1 – GENERAL

1.1 Work Included

.1 This Section governs the supply of all labour, materials and equipment and incidentals necessary for the complete installation and testing of all sanitary sewer pressure pipes, gate valves, valve boxes, valves and chambers as shown on the drawings and herein specified that are a part of the sanitary pressure pipe system.

1.2 Related Work

.1 Excavating, Trenching and Backfilling: Section 31 23 10

.2 Public Sanitary Utility Sewerage Piping: Section 33 31 13

.3 Subsurface Dispersion System: Section 33 36 33

1.3 References

.1 American National Standards Institute/American Water Works Association (ANSI/AWWA)

.1 ANSI/AWWA C207-07, Standard for Steel Pipe Flanges for Waterworks Service, Sizes 4 Inch Through 144 Inch (100 mm Through 3,600 mm).

.2 ANSI/AWWA C900-07, Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inch Through-12 Inch (100 mm-300 mm), for Water Transmission and Distribution.

.2 ASTM International

.1 ASTM D698-07e1, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort ((12,400 ft-lbf/ft3) (600kN-m/m3)).

.2 ASTM D2241-09, Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

.3 ASTM D3034-08, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 41-GP-25M-77, Pipe, Polyethylene, for the Transport of Liquids.

.4 CSA International

.1 CSA B137 Series-09, Thermoplastic Pressure Piping Compendium.

1.4 Submittals

.1 Submit in accordance with Section 01 33 00.

.2 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.

.3 Certification to be marked on pipe.

.4 Test and Evaluation Reports: submit manufacturer’s test data and certification at least 2 weeks prior to beginning Work.

.5 Manufacturer’s Instruction: submit to Departmental Representative 1 copy of manufacturer’s installation instructions.

1.6 Delivery

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Common Product Requirements and manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address. Unload, store and protect on-site.

.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 Materials

.1 Polyvinyl chloride (PVC) pipe: to CSA B137 and ANSI/AWWA C900.

.1 Series 160 SDR: 26, white.

.2 Pressure Class: 160

.3 Gasket bell end.

.4 Pipe joints: bell and spigot with rubber gaskets solvent welded joints or mechanical joints to ANSI/AWWA C111/A21.11, with transition gaskets to pipe manufacturer's specifications. This is a push-on joint and must be watertight. The bell will be an integral and homogeneous part of the pipe barrel with no reduction in the wall thickness.

.5 Rubber gaskets: to CSA B137.3 and ASTM D2241 ANSI/AWWA C111/A21.11. Gaskets for mechanical joints to be duck-tipped transition gaskets for PVC.

.2 Polyethylene pressure pipes: to CSA B137:

.1 Type: DR26.

.2 Joints:

.1 Thermal butt fusion

.2 Flanged with steel backing flanges.

.3 Flanged with stainless steel backing flanges in marine/submerged areas

.3 Polyethylene fittings: to CSA B137, for pipe sizes 4" and less.

.4 Pressure class 350 with cast iron outside diameter and integral bell gasketed joints, to ASTM D2992. Material: to ASTM D2310

.3 Fittings:

.1 PVC pressure fittings to AWWA C907 and CSA B137.3.

.1 Class 160 (DR26).

.2 Push-on bell and spigot type.

.4 Joints:

.1 PVC pressure fittings: push-on bell and spigot type, unless otherwise indicated.

.5 Joint Restraints:

.1 Iron fittings, joint restraint system components and couplings: ductile-iron with high strength low alloy steel tee bolts and nuts tightened using a torque wrench to the manufacturer's specifications, completely wrapped with 8-mil poly to AWWA C105.

.2 Mechanical joint restraint for ductile iron fitting to be approved by shop drawing.

.3 Mechanical joint restraint for PVC pressure fittings to be approved by shop drawing.

.4 No extra payment will be made for the supply and installation of joints and fittings restrainers, this shall be considered incidental to the work.

.6 Marker Tape:

.1 50 mm wide metal marker tape, carrying the message "CAUTION – FORCE MAIN BURIED"

.7 Gate Valves and Valve Boxes:

.1 Epoxy coated, standard iron body brass mounted gate valves with non rising stem and 50 mm square nut operators with extensions, to the latest AWWA Standard C-509-01 for resilient seated gate valves for water and sewerage systems. When fully open, the gate valve disc shall be raised completely above the pipe section so as to leave the full pipe diameter unobstructed.

.2 Valves will open in a counter clockwise direction and will have

mechanical joints with high strength low alloy steel tee bolts and nuts tightened using a torque wrench to the manufacturer's specifications, completely wrapped with 8-mil poly according AWWA C105.

.3 Valves will to be approved by shop drawing.

.8 Pipe Penetration Seal

.1 As shown on the Contract Drawings, where cast in rubber gaskets cannot be installed and core drilling is required, suitable pipe penetrations seal is to be installed to ensure that the hole is watertight. All core drilling pipe perforations shall be sealed for a watertight seal, shop drawing to be submitted. Size of the core drilling holes shall be in accordance with the manufacturer's recommendations.

2.2 Equipment

.1 In laying out the sewer pressure pipes, the Engineer will establish only the locations and elevations of discharge locations. The Contractor shall be responsible for all other field layout in accordance with Section 01 00 01 General Requirements.

.2 Utilize laser beam instrumentation and techniques to determine intermediate line and grade for all pipes except where and when the Engineer may allow other methods to be used.

.3 Approved laser alignment equipment must be used to control line and grade during all laying of pipe. An approved laser sighting triangle or template must be used by the Contractor in setting each pipe.

2.3 Pipe Bedding and Surround Materials

.1 All bedding and surround materials to be in accordance with NSTIR standard specifications.

2.4 Backfill Material

.1 In accordance with Section 31 23 33.01 -Excavating, Trenching and Backfilling.

PART 3 - EXECUTION

3.1 Examination

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for pipe 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.

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

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

.2 Pipes and fittings to be clean and dry.

.3 Prior to installation, obtain Departmental Representative’s approval

of pipes and fittings.

3.3 Trenching

.1 Do trenching Work, in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Trench alignment and depth require approval from Departmental Representative prior to placing bedding material or pipe.

3.4 Granular Bedding

.1 Place granular bedding in unfrozen condition.

.2 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.

.3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.

.4 Shape transverse depressions as required to suit joints.

.5 Compact each layer full width of bed to at least 95% maximum density to ASTM D698.

.6 Fill excavation below design elevation of bottom of specified bedding with common backfill.

3.5 Installation

.1 Load and unload pipe and accessories by lifting with hoists or skidding so as to prevent shock and damage.

.2 Pipe handled on skid-ways will not be skidded or rolled against pipe already on the ground. Pipe will not be dragged along the ground at any time. All material will be handled and stored in accordance with the manufacturer's requirements.

.3 Pipe will be so handled so that any

coating will not be damaged. When handling PVC pipe, avoid severe impact blows, abrasion damage and gouging or cutting by metal surfaces or rocks. Avoid stressing bell joints and damage of bevel ends. If, however, any part of the pipe is damaged, the repair will be made by the Contractor in a manner satisfactory to the Departmental Representative.

.4 Thoroughly inspect pipe in the field before and after placement. Immediately remove any defective or damaged pipe from the site and replace with new sound material at the Contractor's expense.

.5 Lay pipes according to the sizes, types and in the locations as indicated on the drawings in accordance with manufacturer's recommendations and recognized good practice.

.6 Lay pipe to promote gravity drainage as indicated on the drawings. The Contractor is responsible for locating this line at the connection points.

.7 Lay pipe in prepared trenches commencing at lowest point with bell of pipe pointing upgrade.

.8 Use proper implements, tools and facilities for safe and efficient execution of the work.

.9 Join pipes in accordance with manufacturer's recommendations. Pipes may be pushed together by means of a crow-bar solidly wedged into the ground, or by using a suitable pipe puller at the joint, or in some instances by very carefully pushing with a backhoe, or by any other method that may be approved by the Departmental Representative. When pushing against the pipe, a block of wood must be used to prevent any damage to the pipe.

.10 Avoid damage to machined ends of pipes in handling and moving pipe. Do not drop pipe or fittings into trench.

.11 Maintain grade and alignment of pipes.

.12 Align pipes carefully before jointing.

.13 Joint deflection permitted within limits in accordance with pipe manufacturer's written recommendations.

.14 Support pipe firmly over entire length, except for clearance necessary at couplings.

.1 Suitable excavation shall be made to receive the bell, which shall not bear upon the sub-grade or bedding.

.2 Do not use blocks to support pipe.

.15 Lay pipe on dry bedding and keep trench dry during pipe laying.

.16 Keep pipe and pipe joints free from foreign material.

.17 Avoid bumping gasket and knocking it out of position, or contaminating with dirt or other foreign material. Remove disturbed gaskets clean, lubricate and replace before jointing is attempted.

.18 Support pipes using hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.

.19 The ends of the pipe, rubber gaskets, fittings, etc., will be wiped clean immediately before joining the pipes to remove foreign matter from the joints. Apply lubricant to the spigot up to the reference mark and to the face of the gasket.

.20 Apply sufficient pressure in making joint to ensure that joint is complete

to manufacturer's recommendations.

.21 Apply restraint to pipe to ensure that joints when completed are held in place, by tamping fill material under and alongside pipe, or otherwise as approved by Departmental Representative.

.22 Remove and re-lay any pipe which is not in alignment or shows undue settlement after laying.

.23 No length of pipe shall be laid until the preceding length has been thoroughly embedded and secured in place so as to prevent any movement or disturbance of the pipe.

.24 When stoppage of Work occurs, block pipe using a watertight plug as directed by Departmental Representative to prevent creep during downtime.

.25 No pipe will be laid on a foundation into which frost has penetrated, or at any time when the Departmental Representative may deem that there is a danger of the formation of ice or the penetration of frost at the bottom of the excavation.

.26 No walking on or working over the pipes after they have been laid will be allowed until they are completely backfilled, except as may be necessary in refilling the trench and compacting the bedding material.

.27 Mechanical joint connections and tightening and torquing of bolts shall be in accordance with the manufacturer's instructions and recognized good practice.

.28 Install 50 mm wide metal marker tape, carrying the message “CAUTION – FORCE MAIN BURIED”.

3.6 Thrust Block

.1 Restrain bends, tees valves, and fittings using concrete thrust blocks as indicated.

.2 Keep pipe couplings free of concrete.

.3 Bearing area of thrust blocks to be as indicated.

3.7 Pipe Surround

.1 Place surround material in unfrozen condition.

.2 Upon completion of pipe laying, and after the Departmental Representative has inspected pipe joints, surround and cover pipes as indicated. Leave joints and fittings exposed until field testing is completed.

.3 Hand place surround material in uniform layers simultaneously on each side of pipe not exceeding 150 mm compacted thickness as indicated.

.1 Do not dump material within 1 m of pipe.

.4 Compact each layer from pipe invert to mid height of pipe to at least 95% maximum density to ASTM D698.

.5 Compact each layer from mid height of pipe to underside of backfill to at least 90% maximum density to ASTM D698.

.6 When field test results are acceptable to Departmental Engineer, place surround material at pipe joints.

3.8 Backfill

.1 Place backfill material in unfrozen condition.

.2 Place backfill material, above pipe surround in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

.3 Under paving and walks, compact backfill to at least 95% maximum density to ASTM D698. In other areas, compact to at least 90% maximum density to ASTM D698.

.4 Place unshrinkable fill in accordance with Section 31 23 33 - Excavating, Trenching and Backfilling.

3.9 Pipe Penetration Seal

.1 As shown on the Contract Drawings, where cast in rubber gaskets cannot be installed and core drilling is required, suitable pipe penetrations seal is to be installed to ensure that the hole is watertight. All core drilling pipe perforations shall be sealed for a watertight seal, shop drawing to be submitted. Size of the core drilling holes shall be in accordance with the manufacturer's recommendations.

3.10 Gate Valves and Valve Boxes

.1 Install gate valves of the indicated size at locations shown on the drawings.

.2 Properly join gate valves to the mains with mechanical joint connections to manufacturer's requirements and recognized good practice.

.3 Restrain all gate valves.

.4 The valves shall be set so that the valve stems are vertical and plumb.

.5 Gate valves will be installed level. The base of the valve box shall be set so as not to transmit stress to the valve and shall be accurately centered over the wrench nut of the valve, with the valve box set plumb.

.6 Provide drainage from the enclosures indicated on drawings by carefully placing crushed rock around.

.7 Set covers of enclosures flush with the finish grade.

3.11 Field Testing Of Force Main

.1 Testing of force main to be carried out by Contractor in presence of Departmental Representative.

.2 Test after backfilling sections of pipelines as directed by the Departmental Representative and prior to the placement of roadway base material or surface restoration wherever possible.

.3 Pipeline to be thoroughly flushed before applying the pressure test.

.4 Provide all necessary labour, materials and equipment for the test, including a suitable pump and measuring tank, pressure hoses and connections, plugs, caps, gauges, valves including pressure control valve and all other apparatus necessary for filling the pipe, pumping at the required test pressure, and recording the pressure and leakage losses.

.5 Supply a sufficient amount of water for testing and flushing.

.6 Strut and brace caps, bends, tees, valves, and other parts to prevent movement when test pressure is applied.

.7 Expel air from force main, by slowly filling main with water.

.1 If air valves or other means of venting air are not provided, drill and tap high points and install suitable cocks to vent air and to be shut when pressure is applied. Provide a suitable saddle, main stop, valve, corporation stop or approved equal to vent air and which can be shut when pressure is applied.

.2 Remove cocks after satisfactory

completion of test and seal holes with tight fitting plugs.

.3 This shall be considered incidental to the work.

.8 After completion of the preliminaries described above, apply pressure to the distribution pipeline only (not the dispersion pipe), using a suitable force pump equipped with a measuring tank.

.9 The test section will normally be subjected to a hydrostatic pressure of 1000 kPa for 2 hours for sanitary pressure pipes but in any case, the test pressure will be limited to 50% above the operating pressure for the pipes in use.

.10 Apply pressure for 1 hour for pressure test and 2 hours for leakage test. Maintain pressure by pumping additional water into the pipe from the measuring tank.

.11 Examine exposed pipe, joints and fittings while system is under pressure.

.12 Remove defective joints, pipe and fittings and replace with new sound material.

.13 Define leakage as amount of water supplied from water storage tank meter in order to maintain test pressure for 2 hours.

.14 Leakages not permitted.

.15 Locate and repair defects if leakage is greater than amount specified.

.16 Repeat test until leakage is within specified allowance for full length of force main.

3.12 Flushing of Pipe

.1 Thoroughly flush all sanitary pressure pipes using adequate volume and pressure to remove all loose material within the pipe.

.2 The Contractor must supply all labour, water, and facilities required to carry out the flushing.

.3 The Contractor must provide a screen or other acceptable apparatus at the lower end of the section being flushed to retain and dispose of all debris flushed from the pipe. The Contractor is responsible for removing any debris not so retained from adjacent sections. Under no circumstances shall dirt be flushed into existing pipes.

3.13 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

- End of Section -

PART 1 – GENERAL

1.1 Work Included

.1 This Section specifies requirements for supplying and installing the Packaged Subsurface Dispersion System as shown on the drawings and as specified.

1.2 Related Work

.1 Excavating, Trenching and Backfilling: Section 31 23 10

.2 Sanitary Sewer: Section 33 31 00

.3 Sanitary Pressure Pipe Systems 33 34 00

1.3 References

.1 ASTM D698-2012, Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m3).

.2 ASTM D1785-2012, Standard Specification for PolyVinyl Chloride Plastic Pipe.

.3 ASTM D3034-2008, Standard Specification for Type PSM PolyVinyl Chloride Sewer Pipe and Fittings.

.4 ASTM D2321-2011, Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.

.5 ANSI/AWWA D120-09, Thermosetting Fibreglass Reinforced Plastic Tanks.

.6 CSA B66-10, Design, Material and Manufacturing Requirements for Prefabricated Septic Tanks.

1.4 Design Parameters

.1 Peak treated effluent flow = 42,000 Lpd (11,100 USgpd).

1.5 Submittals

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for fiberglass dosing tanks, pumps, effluent filters drip tubing and associated filters

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

.3 Shop Drawings:
.1 Shop Drawings: to CSA A23.4.
.1 Indicate on drawings:
.1 Finishing schedules.

.4 Methods of handling and erection.

.5 Storage facilities.

.6 Openings, sleeves, inserts and related reinforcement.

1.6 Delivery

.1 Deliver, store and handle materials in accordance STORAGE AND with manufacturer's written instructions. Coordinated HANDLING delivery with Departmental Representative.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address, unload, store and protect on-site.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect tanks, pumps and accessories from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 FRP Tanks

.1 Provide single wall FRP underground tanks complete ACCESS RISERS AND with tie down anti floatation system, internal piping ACCESS LIDS and openings complete with risers to surface per drawing. Alternatively, the PVC risers as specified can be attached to the tank.

.2 Tanks: designed to CSA B66.

2.2 Access Risers

.1 Risers: ribbed PVC or HDPE to CSA B182.4. Length and WITH ACCESS LIDS diameter as shown on drawings complete with locking access lids.

.2 Access lids: constructed of fibreglass, or reinforced polyester, or PVC. Provide a gasketed watertight fit on the top of the riser and at connection to tank.

.3 Where piping penetrates the access risers, seal the penetration using grommets of a diameter equivalent to that of the pipe.

.4 Acceptable Products: Orenco Systems Inc., Zabel, Soleno, or approved equivalent.

.5 Alternative tankage: Concrete, watertight and must conform to Standard CAN/CSA-B66-00.

2.3 Dosing

.1 Pump System:

.1 A duplex submersible PUMP SYSTEM dosing pumps: 1/2 Hp, 115 volt, single phase, capable of a total dynamic head of 22.3m (73.3 feet) at a flow of 1.05L/s (16.7 USgpm) and rated for minimum 300 on/off cycles per day. Pumps to be Class 1, Zone 2 rated.

.2 Pump discharge assemblies must be suitable for intended operation. Provide valved drains on each assembly. Drilled holes in the components are not acceptable. Provide each discharge assembly complete with a PVC ball valve and check valve. Drill drain back hole in pump discharge line rather than discharge assembly, and provide barbed fitting and tubing to direct drain back flow into tank. Make connections to the pump discharge and the pressure sewer with PVC Schedule 40 unions. Configuration will be such that the pumps may easily be removed.

.3 Subsurface dispersion drip lines to be 16mm OD diameter with emitter spacing of 600 mm. The tubing joints are to be minimized and centralized at the manifolds. The tubing must have a antimicrobial lining and root-growth

inhibitor at the emitters. The depth of bury must be between 150 mm and 250 mm, consistently graded with no high or low grades in the tubing.

.4 Pump Power Cables: factory fitted with PUMP SYSTEM sufficient length of power cable to extend to junction box where shown on the drawings. Cable suitable for Class 1 Zone 1 environment.

.5 Pumps to have thermal overload protection.

.6 Pumps to be located in preassembled pump vaults which hangs from support base in dosing tank.

2.4 Control Panel

.1 General - Supply and install a pre-packaged control panel with control over dispersion system equipment and ancillary components, including alarm and control floats, dosing pump system. Panel to include NEMA 4X painted steel enclosure, elapsed time meter, event counter, intrinsically safe control relays and pump run lights.

.2 System to have a HOA selector, signal alarm status, pump status, float status, pump run times, pump cycle counts and anti-condensation heater.

.3 Provide panel general arrangement layouts, schematic drawings, wiring termination schedules and a bill of materials with shop drawings submission. Provide manual for timer operation.

.4 Panel Float Monitoring and Control: Include the following monitoring and control functionality at a minimum:

.1 Pump Dosing Tank

.1 High Level Alarm float.

.2 Dosing Tank (Timed Dosing) (Duplex).

.1 High level alarm/lag pump enable float.

.2 Override timer float.

.3 Timer will be active as long as the RO float is raised.

.4 Alarms:

.1 Alarm test switch.

2.5 Float Switches

.1 Mechanical type suitable for intrinsic safe installation. Cable to be type SJOOW or equivalent and be supplied in sufficient length of cable to extend to junction box where shown on the Project Drawings. Float to have adjustable weight to allow adjustment of pump volume.

.2 Floats may be mounted as single assembly on float stem with float collars, or top mounted.

.3 One (1) SPDT contact, rated for at least 5 amps at 120 VAC (continuous use).

2.6 Dosing

.1 Provide Schedule 40 PVC unions and couplings to match underdrain piping.

.2 Materials of construction: Schedule 40 PVC.

2.7 Dispersion

.1 Provide as a complete assembly including valves, pump filters, air/vacuum breakers, drip irrigation lines, VALVE ASSEMBLY valve, two zone valve each with an outlet port, Schedule 80 unions for removal and cleaning, and clear PVC ports for inspection. Valve manufactured of corrosion resistant ABS polymer, stainless steel, and die-cast metal. Distributing valve to include the following:

.1 Distributing valve assembly shall be enclosed in a 600mm diameter access riser with cover. The riser and lid combination must be watertight and support a 2500 lb. wheel load.

.2 Headworks to be contained in a precast concrete or High-Density polyethylene tank, insulated using two layers of 50 mm rigid highway-grade insulation, complete with one vortex filter model AP4E-200-3, pressure regulator, pressure gauge, filter flush valve and two field flush valves.

.3 Filter systems use a self-cleaning Vortex Filter with a stainless screen 150 mesh / or 100-micron filter element. The clean-out port must be opened and closed automatically managed by the controller.

.4 Filter to be a 3⁄4” Filter. The Y filter body shall be molded from glass

reinforced engineering grade black plastic with a 19mm male pipe thread (MIPT) inlet and outlet. The two-piece body shall be capable of being serviced by untwisting and shall include an O-ring seal. An additional 19mm MIPT outlet shall be capable of periodic flushing. The filter shall be model number AP4E-200-3.

.5 Supply Manifold carries the water from the dosing tank to the dispersal area. Rigid PVC is used and must be designed to slope back to the pump tank in freezing conditions. The velocity in the manifold is between 0.6 metres per second and 1.5 meters per second (m/s).

.6 Return Manifolds are rigid PVC. These systems must also be sloped back through the valve assemblies to the dosing tank to prevent from freezing.

.7 Pressure Regulator must be adjusted to a system pressure of 172 kPa (25 psi).

.8 Rigid closed-cell foam insulation of 50mm thickness shall be mechanically attached to the underside of the lid. Use fasteners made of corrosion resistant stainless steel. Insulation to have an R-value of no less than 10 per 50mm increment.

.9 Air release valves as shown, as per Manufacturer's instruction, placed at high points of dispersion field. Air valve chamber to be insulated using two layers of 50mm rigid polyethylene road-grade insulation, to be placed to ensure valve function as designed, tested for operation.

2.8 Valves

.1 Ball Valves: PVC body with EPDM seals and PTFE seats. True union design rated at 150 psi.

.2 Ball Check Valves: PVC body with EPDM seals. True union design rated at 150 psi, but operable at low head (3-30 ft).

.3 Gate valves: high impact PVC type II body with polypropylene paddle and non-rising stem.

2.9 Dosing Tank

.1 System to be accessible at finished grade and EFFLUENT FILTER removable with a lift out filter system, including all accessories and apparatus.

.2 Filter to be capable of removing all solids greater than 1/8" and designed to have a cleaning frequency of one per year based on sated flows. Filters to be sized to allow removal by one (1) person.

.3 Locate inlet holes at 50% of liquid depth.

.4 Provide float system to detect high tank liquid level indicating dirty filter.

PART 3 - EXECUTION

3.1 Installation

.1 Handle and install equipment in strict accordance with manufacturer's instructions. Issue instructions at time of shop drawing issue and make available on site when required.

.2 Provide concrete equipment attachments as required by the equipment and as shown on the Drawings.

.3 Provide small connecting pipework, fittings and valves whether shown on the Drawings or not but required for proper functioning and servicing of the equipment. Do work in accordance with the manufacturer's instructions at no additional cost to the Contract. Where pipe is connected to equipment, fit pipe in a manner such that neither pipe equipment is strained during the joining procedure.

3.2 FRP Tank INSTALLATION

.1 Refer to 31 23 10 for backfilling.

.2 Hydrostatically test tank for 24 hours according to manufacturer's requirements. Repair any leaks and retest. Repeat until all leaks are repaired at no extra cost.

.3 Once backfilled and all pipes connected fill 150mm up riser and repeat as above to test

interconnecting pipes.

.4 Tank installation and testing to follow manufacturer's requirements in effect at time of installation.

3.3 Lubrication

.1 Provide complete initial lubrication of all equipment in accordance with the equipment manufacturer's recommendations.

3.4 Responsibility

.1 Obtain written permission from the Departmental OF TEMPORARY TRIAL Representative to use and test permanent equipment USAGE and systems prior to acceptance by the Departmental Representative.

.2 The guarantee period must not be affected by temporary trial use of the equipment.

.3 Clean and renew equipment and systems used before acceptance. Restore to original or new working condition.

.4 Protect equipment and systems openings from dirt, dust and other foreign materials during temporary usage.

3.5 Commissioning, Start Up and Training

.1 Provide the services of competent servicemen, TESTING AND mechanics or other trained personnel of the equipment START-UP supplier's or manufacturer's to check the complete installation and be present for start-up of the equipment. Submit a written report signed by the equipment manufacturer's representative to the Departmental Representative stating the following:

.1 That a satisfactory installation of equipment has been performed and outlining any modifications that have been made as a result of the commissioning or testing of the equipment at no additional cost to the Contract.

.2 That the equipment is now ready for permanent operation;

.3 Test installed equipment with actual plant operation to verify hydraulic balancing, head loss and effluent quality. Make adjustments required to

place equipment into operation and to optimize the treated water quality.

.2 The equipment manufacturer's representative will fully instruct the permanent operator of the equipment in the proper operation and maintenance of all equipment at no additional cost to the Contract.

.3 Advise in writing at least one (1) week in advance of the proposed date for testing and start-up. Conduct all tests in the presence of the Departmental Representative.

.4 Replace defective material or equipment with new TESTING AND material or equipment. Bear costs including START-UP re-testing and repairing.

.5 A minimum period of four (4) days on site for skilled supervision and instruction and a minimum of two (1) trips to the site should be assumed by the equipment manufacturer. Provide as many trips and days on site to complete the installation and put the equipment into satisfactory operation, including time at site required to inspect the progress of the construction works as it pertains to said equipment.

.6 Provide training and demonstration of the equipment to the Park maintenance staff in accordance with Section 01 79 00.

3.6 Identification

.1 Locate manufacturer's nameplates so that they are easily read. Do not paint over plates.

3.7 System Maintenance

.1 Regular maintenance routine to be reviewed with the Department Representatives. The routine maintenance period is to be reviewed with the Operators.

.2 The review will include the following:

.1 Removal of the filter and cartridge cleaning to be reviewed.

.2 Operation and purpose of field and filter flush valves.

.3 Cleaning the used filter cartridge.

.4 Opening the field flush valve.

.5 Manually turning on the pump.

.6 Flushing the system for approximately five minutes.

.7 Checking for proper pressures on the gauge.

.8 Checking operation of the vacuum breaker and air valves.

.9 Visually inspection of the field for any irregularities.

.10 Turning the pump and controller to auto mode.

END OF SECTION

APPENDIX A:

Basic Impact Analysis

BASIC IMPACT ANALYSIS

Broad Cove Campground
Coastal Retainment Wall Upgrades
Cape Breton Highlands National Park of Canada

By: A. Doucette

Resource Conservation

January 8, 2018

PROJECT TITLE & LOCATION	Broad Cove Campground Retainment Wall Upgrade Cape Breton Highlands National Park of Canada
PROPONENT INFORMATION	Audrey Buchanan – Asset Manager – Cape Breton Field Unit audrey.buchanan@pc.gc.ca 902-733-3520
PROPOSED PROJECT DATES	Planned commencement: 2018-05-15 Planned completion: To be determined
INTERNAL PROJECT FILE #	CBFU2018-001

PROJECT LOCATION & DESCRIPTION

In 2016, upgrades were conducted on the wastewater treatment facility at Broad Cove Campground, Cape Breton Highlands National Park. The work involved the installation of a new Recirculation Textile Filter System as well as septic field upgrades.

Broad Cove Campground.

A coastal retainment wall, bordering the lower reaches of the septic field, has deteriorated and is now in need of repair.

This is a Basic Impact Analysis (BIA) on the retainment wall repair upgrades.

Project activities include:

Site preparation: access road creation, material transport, stockpiling and vegetation removal

Construction & Installation: excavation, trenching, armour stone installation, Binwall repairs, backfilling

Site Remediation: waste removal, equipment demobilizing, landscaping to PCA satisfaction.

VALUED COMPONENTS LIKELY TO BE AFFECTED

Valued Components were considered using the Effects Matrix (Appendix 1.) and are related to Natural Resources, Cultural Resources and Visitor Experience Impacts.

Natural Resources

Soil and Landforms

Work will occur mostly within the former developed footprint area. Some equipment however will be used on/ near the beach area (e.g., lower retainment wall).

Potential impacts to local soils and landforms may be likely during all phases, and could result from: transport of equipment on/off of site, excavating and trenching, soil and material stockpiling, backfilling, site landscaping and remediation. Potential impacts could also come from heavy equipment use, spills of petroleum, lubricants and hydraulic fluids.

Water (Surface Water, Ground Water)

The project will occur adjacent to the Atlantic Ocean with no sensitive aquatic habitats identified where work is being completed. A nearby estuary is beyond the scope of the undertaking and is not expected to be affected by activities.

There is potential for water contamination from some construction activities involving site excavating and trenching, soil and material stockpiling, backfilling, site landscaping and remediation. Potential impacts could arise from routine heavy equipment use (spills during the refueling/routine maintenance stage, mechanical failure, etc.).

Flora & Fauna

No Species at Risk have been identified as being present at the proposed work location. Most of the proposed location is already landscaped land and access to the site is already developed.

Only minor impacts to flora and fauna are anticipated, since only a minimal amount of vegetation is to be cut and the subject area comprises already impacted terrestrial areas.

Cultural Resources

No known cultural resources have been identified as being possibly affected but damage to unknown cultural resources could possibly occur.

Visitor Experience

Visitor Access & Services

During construction, visitor access and services to certain parts of the campground/beach may be impacted from construction activities. Impacts will be minimal if the work is completed in the off season.

Viewscapes & Soundscapes

Viewscapes may be impacted during the project by the presence of construction equipment and the stockpiling of required materials. Increase noise in the campground from the use of heavy equipment and presence of increased vehicular traffic will have an impact on the visitor experience.

Visitor Safety

As with any construction project, visitor safety is of upmost importance. There will be increased vehicular/construction traffic in the campground, heavy equipment operating, open excavations, etc.

EFFECTS ANALYSIS

- This infrastructure upgrade project will take place in a well-developed front-country campground, so impacts to the natural environment will be minimal.
- No sensitive ecosystems/flora or fauna species have been identified as existing within the site location and there are no sensitive aquatic ecosystems in the area.
- There is a potential for erosion and sedimentation to occur with excavations. This could impact local ground water reservoirs and the nearby coastline through the local drainage systems.
- Visitor Experience impacts will be present during the operating season of the campground from construction traffic/noise.
- There are no known cultural resources that will be impacted but there is a possibility that there may be some unknown resources damaged from the construction process.
- Overall, environmental impacts from the proposal will be minimal and short-lived if all mitigation measures and the developed Environmental Protection Plan are followed.

MITIGATION MEASURES

The following mitigation measures will help reduce the environmental impact of the proposed project:

1. Please contact the author prior to commencement of project to discuss worksite specifics, including site delineation and other logistics. Phone: 902.224.4233 or archie.doucette@pc.gc.ca
2. Work will be carried out in a manner that reduces impacts to the surrounding natural environment. The least amount of local vegetation and trees is to be removed with removal in the least destructive way possible.

3. The proponent shall not disturb the natural environment outside the defined work boundaries.
4. Construction equipment and material storage should be restricted to already landscaped areas, or areas where impacts from above mentioned activities would result in less environmental damage.
5. Restrict equipment fuelling/maintenance to paved (or gravelled) areas away from any drainage or areas where spills cannot be easily contained in the event they occur.
6. Have spill containment equipment on site and report any spills to appropriate authority.
7. Ensure proper containment measures are in place for sediment and erosion control measures.
8. If project occurs during the visitation period, ensure visitor safety by developing a clear and safe separation of visitor accessibility and the area where the work is being completed at all times.
9. Reduce visitor experience impacts by restricting the movement/speed of vehicular traffic through the campground to avoid early morning or late evening impacts (this would also include noise impacts from operating equipment on site).
10. Site reinstatement must be completed to standard after completion of installation.
11. (See Appendix 2 – *Coastal Infrastructure Projects* - for further Mitigation)

PUBLIC/STAKEHOLDER ENGAGEMENT & ABORIGINAL CONSULTATION

Was public/stakeholder engagement undertaken in relation to potential adverse effects of the proposed project?

☒ No ☐ Yes

Was Aboriginal consultation undertaken in relation to potential adverse effects of the proposed project?

☒ No ☐ Yes

This project is mostly repair and maintenance of an existing structure and thus, did not warrant formal consultation. The Indigenous community if occasionally notified of such projects and to date no feedback from the community has been received.

SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

This is a maintenance proposal for an already existing structure and thus, with the proposed mitigation measures, the lasting environmental impacts will be minimal with no significant residual environmental effects.

SURVEILLANCE

Surveillance for this project is not required but the proponent will provide regular updates to the document author at the beginning and regularly throughout the process.

FOLLOW-UP MONITORING

Due to the small scale and scope of the project, formal follow-up monitoring is not required.

DECISION

Taking into account implementation of mitigation measures outlined, the project is :

✓ Unlikely to cause significant adverse environmental effects.

_____ Likely to cause significant adverse environmental effects .

SIGNATURES AND APPROVAL

BIA Author

Name: Archie Doucette *Environmental Assessment Coordinator,* CBFU

Signature: Archie Doucette Date :

BIA Recommender

Name: Maura McKeough, *A/ Cultural Resource Manager,* CBFU

Signature: Maura L M'Keough Date :

Project Functional Manager

Name:

Signature: _____ Date :

BIA Recommender

Name: Robert Howey, *Resource Conservation Manager,* CBHNPC

Signature: _____ Date : 2018/01/29

Approved by:

Name: Éric Le Bel, *Superintendent* CBHNPC

Signature: _____ Date: 2018/04/10

Comment:

_____

_____

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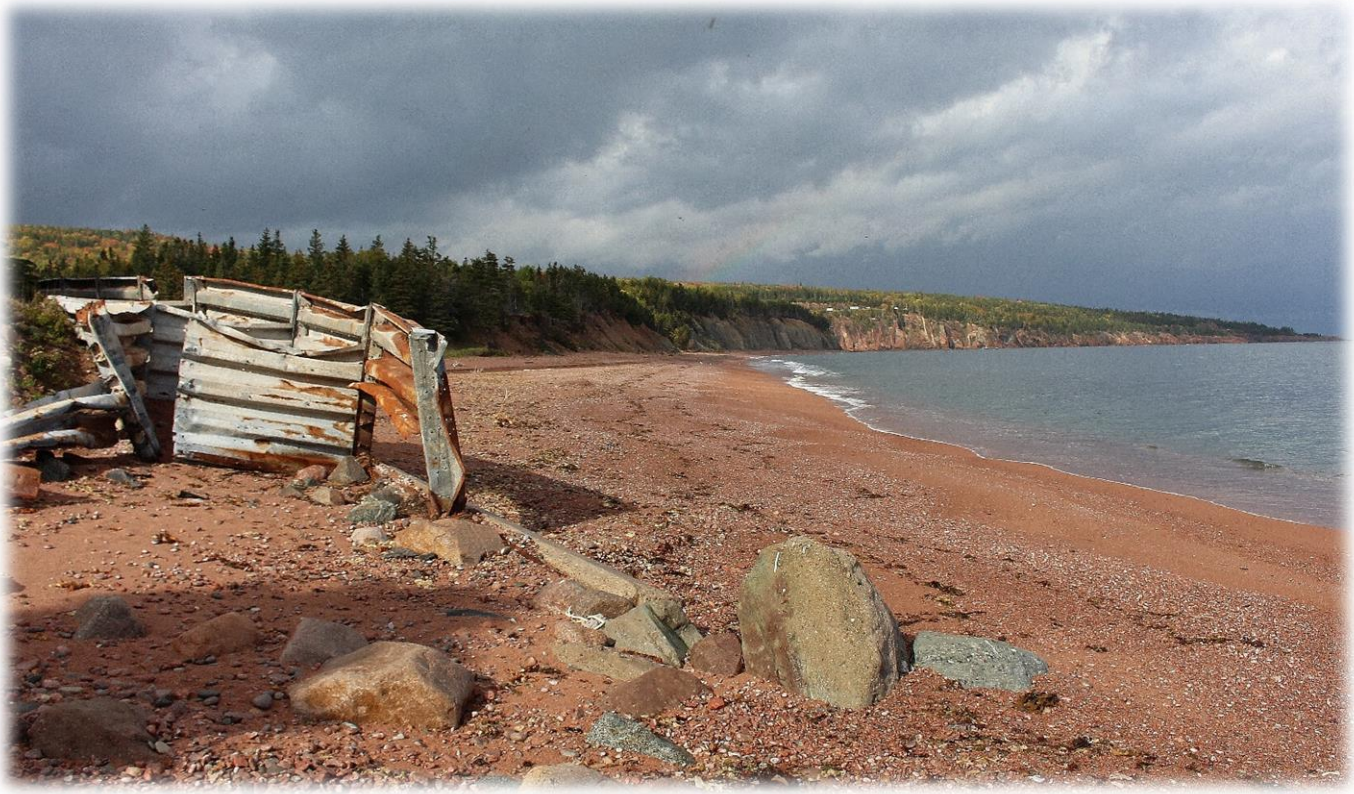
Appendix 1 - Effects Identification Matrix

This Effects Identification Matrix focuses specifically on direct effects related to the proposed project. There are not thought to be any adverse residual environmental effects if the proposed mitigation measures and Environmental Protection Plan are followed.

A. Direct Effects (during site preparation/construction phases)

			Components potentially directly affected by the proposed project												
			Natural Resources					Cultural Resources		Visitor Experience					
			Air	Soil & landforms	Water (surface, ground, crossings, etc.)	Local Flora	Local Terrestrial Fauna	Unknown in situ resources	Insert heritage values	Visitor access & services	Recreational/Accomm. opportunities	Viewscapes and soundscapes	Visitor Safety	Essence of place
	Phase	Examples of Associated Activities													
Project Components	Preparation / Construction	Supply and storage of materials	☐	☒	☒	☒	☐	☐	☐	☐	☐	☒	☒	☐
		Burning	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		Clearing	☐	☒	☒	☒	☐	☐	☐	☒	☐	☒	☒	☐
		Disposal of waste	☐	☒	☒	☒	☒	☐	☐	☐	☐	☐	☐	☐
		Drainage	☐	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐
		Excavation	☐	☒	☒	☒	☐	☒	☐	☒	☐	☒	☒	☐
		Grading	☐	☒	☒	☒	☐	☐	☐	☒	☐	☒	☐	☐
		Backfilling	☐	☒	☒	☒	☐	☐	☐	☒	☐	☒	☐	☐
		Use of machinery	☒	☒	☒	☒	☒	☒	☐	☒	☒	☒	☒	☐
		Transport of materials/ equipment	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒	☐
		Use of Chemicals	☒	☒	☒	☒	☒	☐	☐	☐	☐	☐	☒	☐
		Set up of temporary facilities	☐	☒	☒	☒	☒	☐	☐	☒	☐	☒	☒	☐

A. **Direct effects continued** (during operation/implementation/decommissioning phases)															
			Components potentially affected by the proposed project												
			Natural Resources					Cultural Resources		Visitor Experience					
			Air	Soil & landforms	Water (surface, ground, crossings, etc.)	Local Flora	Local Terrestrial Fauna	Unknown in situ resources	Insert heritage values for your site	Visitor access & services	Recreational & Accomm. opportunities	Viewscapes and soundscapes	Visitor Safety	Essence of place
	Phase	**Examples of Associated Activities**													
Project Components	Operation/Implementation/Decommissioning	Waste disposal	☐	☒	☒	☒	☒	☐	☐	☐	☐	☐	☒	☐
		Wastewater disposal	☐	☒	☒	☒	☐	☐	☐	☐	☐	☐	☒	☐
		Use	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
		Use/Removal of temporary facilities	☐	☐	☒	☒	☐	☒	☐	☒	☐	☐	☐	☐
		Use of Chemicals	☒	☒	☒	☒	☒	☐	☐	☐	☐	☐	☒	☐
		Vehicle Traffic	☒	☒	☐	☐	☒	☐	☐	☒	☐	☐	☒	☐
		Other…	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐



APPENDIX 2

Small Scale Coastal Infrastructure

Projects and Activities

(Mitigation)

Environment Canada | Environnement Canada

Environment Canada Guidance Related to the

Small Scale Coastal Infrastructure Projects and Activities in the Atlantic Provinces

October 2012

Introduction

The general guidance offered below is applicable to small scale coastal infrastructure projects and activities such as the construction, modification or decommissioning of **wharves**, **docks**, **breakwaters**, **sea walls**, **boardwalks**, **trails**, **bridges**, **culverts**, and **dredging and on-land disposal activities**. It should be emphasized that this guidance is offered only as a starting point in assessing impacts associated with project-specific activities and site-specific environmental sensitivities. In the context of such an assessment, Environment Canada (EC) is prepared to work with proponents and responsible agencies in identifying suitable project-specific mitigation and monitoring measures, and any permitting requirements for Disposal at Sea.

Disposal at Sea Activities

If project activities include the placement or disposal of dredged, excavated, or other waste materials into seawater, brackish waters (waters with salinity levels above 0.5 ppt measured under conditions of high tide, low flow) or intertidal areas, the proponent is advised to contact EC to verify applicability of the *Canadian Environmental Protection Act 1999* (CEPA) - Part 7 Division 3. Identification of such activities will assist EC in determining if a **Disposal at Sea Permit** is required under CEPA. In addition, if requested, EC can also provide expert advice (i.e. best management practices) with respect to dredging techniques and contaminated sediments.

Further information regarding Disposal at Sea can be obtained by contacting Jayne Roma at 902-426-3649 or Jayne.Roma@ec.gc.ca (for the Maritime Provinces) or Natasha Boyd at 709-772-2161 or Natasha.Boyd@ec.gc.ca (for Newfoundland and Labrador). Information is also available at: http://www.ec.gc.ca/iem-das/default.asp

Wildlife and Habitat

Every effort should be taken to ensure that coastal infrastructure projects and activities will not impact habitats harbouring wildlife[1] at risk (including identified critical habitat under existing or

proposed recovery strategies of species at risk) or other sensitive habitats (e.g. bird concentration areas), migratory birds, and wetlands.

Wildlife at Risk

The *Species at Risk Act* (SARA) is one of three elements of Canada's Strategy for the Protection of Species at Risk. The other two are the federal-provincial/territorial *Accord for the Protection of Species at Risk* and the Habitat Stewardship Program for Species at Risk. The 1996 *Accord for the Protection of Species at Risk* commits the federal government, provinces and territories to establish complementary legislation and programs to protect Canada's species at risk. SARA complements the work being done by provincial and territorial governments while ensuring federal responsibilities and standards are met.

The goal of SARA is to prevent endangered or threatened wildlife from becoming extinct or lost from the wild, and to provide for the recovery of these species. SARA is also intended to manage species of special concern and to prevent them from becoming endangered or threatened. The Minister of the Environment's responsibilities under SARA includes the protection and recovery of migratory birds and species at risk on **federal lands, other than those under the responsibility of the Minister of Fisheries and Oceans or Parks Canada Agency**. The Minister of Fisheries and Oceans is responsible for aquatic species at risk. Under the *Accord for the Protection of Species at Risk*, it is understood that the provinces and territories will undertake actions and enforce prohibitions for the conservation of species at risk that come under their management authority. SARA allows the federal government to enact protective prohibitions in cases where a province or territory fails to provide effective protection for a species or its critical habitat.

SARA recognizes that the protection of wildlife species is a joint responsibility and that all Canadians have a role to play in the protection of wildlife. It is the responsibility of the proponent to ensure that activities are managed so as to comply with the SARA. The complete text of SARA, including prohibitions, is available at: www.sararegistry.gc.ca.

Regulatory Requirements

SARA section 79 indicates that "Every person who is required by or under an Act of Parliament to ensure that an assessment of the environmental effects of a project is conducted must, without delay, notify the competent minister or ministers in writing of the project if it is likely to affect a listed wildlife species or its critical habitat". The person must identify adverse effects of the project on listed species and their critical habitat. If the project is implemented, the person must ensure that measures are taken to avoid or lessen adverse effects and that effects are monitored. Mitigation measures must be consistent with recovery strategies and action plans for the species. Notification is required for all effects, including adverse and beneficial effects, and the requirement to notify is independent of the significance of the likely effect. It should also be noted that while SARA prohibitions do not apply to species listed as Special Concern, section 79 of SARA does apply to these species.

In addition to SARA requirements, application of the Precautionary Principle, and the consideration of potential impacts on all rare or imperiled species in Canada (e.g., species of conservation concern), is considered by EC to be a best practice approach.

Best Management Practices

In assessing the potential for project interactions with species at risk, it should be noted that while it is important to consider data from desktop searches (e.g. the Atlantic Canada Conservation Data Centre, the Maritime Breeding Bird Atlas, Nature Counts, etc.) in an assessment, it should not be used as the sole source of information to establish whether wildlife at risk potentially occur in the project area. Data is only available for areas where surveys have been conducted, and the fact that a species has not been confirmed in an area does not necessarily mean that it does not occur there, *especially if habitat appropriate for that species is available.* It is generally recommended that data obtained from desktop searches, and other sources such as provincial wildlife agencies and local naturalists, be supplemented by field surveys by professional biologists (with expertise at conducting the types of surveys required) ***at the appropriate time of year in habitats potentially harbouring wildlife at risk.***

Migratory Birds

The conservation of migratory birds is the joint responsibility of the countries these birds visit during the breeding, migration, and non-breeding seasons. EC is responsible for fulfilling Canada's obligations for the conservation of migratory birds through administration of the *Migratory Birds Convention Act* (MBCA). Migratory birds, their eggs, nests, and young are protected under the MBCA. Should migratory birds, their nests, eggs, or chicks be harmed, charges can and have been laid. Migratory birds protected by the MBCA generally include seabirds (except cormorants and pelicans), waterfowl, shorebirds, and most landbirds (birds with principally terrestrial life cycles). Most of these birds are specifically named in the EC publication, *Birds Protected in Canada under the Migratory Birds Convention Act*, Canadian Wildlife Service Occasional Paper No. 1.

Regulatory Requirements

Under Section 6 of the *Migratory Birds Regulations* (MBR), it is forbidden to disturb, destroy or take a nest or egg of a migratory bird; or to be in possession of a live migratory bird, or its carcass, skin, nest or egg, except under authority of a permit. It is important to note that under the current MBR, no permits can be issued for the incidental take of migratory birds caused by development projects or other economic activities. Furthermore, subsection 5.1 of the MBCA describes prohibitions related to deposit of substances harmful to migratory birds:

> (1) No person or vessel shall deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area.
>
> (2) No person or vessel shall deposit a substance or permit a substance to be deposited in any place if the substance, in combination with one or more substances, results in a substance — in waters or an area frequented by migratory birds or in a place from which it may enter such waters or such an area — that is harmful to migratory birds.

It is the responsibility of the proponent to ensure that activities are managed so as to comply with the MBCA and associated regulations. In developing mitigation measures for avoidance of incidental take of migratory birds during construction activities, further advice can be found at: http://www.ec.gc.ca/nature/default.asp?lang=En&n=2D16D723-1

Specific Consideration When Planning

When planning coastal infrastructure project and activities, including site preparation, the proponent should consider the following points in fulfilling its responsibilities for MBCA compliance:

- The breeding season for most migratory birds in Newfoundland and Labrador extends from May 1st to July 31st while the breeding season for most migratory birds in the Maritime Provinces extends from May 1st to August 31st; however, some nest outside this timeframe.
- While most migratory bird species construct nests in trees and shrubs, several nest at ground level (e.g. Common Nighthawk, Killdeer, sandpipers) and some (e.g. Bank Swallows) may nest in burrows in stockpiles of overburden or the banks of pits. For a species such as Bank Swallows, the period when the nest would be considered active would include not only the time when birds are incubating eggs or taking care of flightless chicks, but also a period of time after chicks have learned to fly since swallows return to their colony to roost.
- Some migratory birds (e.g. Barn Swallows, Cliff Swallows, Eastern Phoebes) may nest on human-built structures (e.g. bridges, ledges, gutters).
- In some coastal areas, human-built structures have also been used as nesting structures by terns. Since terns "swoop down" to deter potential predators of their eggs and/or chicks, and view humans as potential predators, birds found nesting on these structures have in some cases been viewed as a menace. If a structure is being used as a nesting platform by migratory birds, EC's Canadian Wildlife Service would not issue a permit to destroy nests should these birds take aggressive measures to protect their eggs/chicks.
- Open areas of water under bridges are often used by a variety of waterbirds (e.g. mergansers, goldeneye) in winter.
- Some migratory birds (e.g. certain waterfowl species) may nest in head ponds created by beaver dams.
- Lights can result in adverse impacts on birds. Nocturnal migrants and night-flying seabirds (e.g. storm-petrels) are most at risk of attraction to lights especially during periods of fog, drizzle, and haze. This may result in collision with lit structures or their support structures, or with other birds. Disoriented birds are prone to circling a light source and may deplete their energy reserves and either die of exhaustion or drop to the ground where they are at risk of depredation. In assessing the impacts of lights, a focus should be placed on the most vulnerable species and the occurrence of infrequent, but potential risk for large-scale collision events (e.g. events associated with weather conditions, migratory seasons).

Best Management Practices

It is incumbent on the proponent to identify the best approach, based on the circumstances, to complying with the MBCA. The following are recommended best management practices:

- One method frequently used to minimize the risk of destroying bird nests, including nesting waterfowl, consists of avoiding certain activities which would disturb birds during the nesting period. For active nests, or birds caring for chicks discovered outside the breeding season, risks may be minimized by measures such as the establishment of buffer zones around nests, and minimization, or rescheduling, of high disturbance activities in the immediate area until nesting is complete and chicks have naturally migrated from the area.
- Activities such as cleaning, application and removal of protective coatings (e.g. paints), and demolition should not take place during the breeding season on structures where migratory birds are known to nest, since there is a risk of disturbing or destroying eggs or nestlings.
- The Piping Plover, a species at risk, breeds in Atlantic Canada. Plovers normally arrive on beaches in April, but could arrive as early as March. Dredging and on-land disposal activities should be scheduled to avoid the Piping Plover breeding season in habitats identified as Critical Habitat in the Piping Plover Recovery Strategy available on the SARA Registry.
- Concentrations of birds (e.g. waterfowl, seabirds and shorebirds) should not be approached when accessing a project site from water or from land. Engines should be properly maintained, and well muffled to reduce disturbance due to noise. Other measures may include reducing travel speeds around potentially sensitive habitats or colonies and using alternative travel routes.
- Food scraps and other wastes can attract predators of eggs and chicks. Proponents are encouraged to take steps that would help ensure waste is minimized and is not left behind as "litter".
- Task lights and decorative lights (e.g. spot and flood lights), as well as safety lights used during construction, should be shielded to shine down and only used where needed. It would be best if these lights were turned off, especially during the migratory season, when the risk to birds is greatest.

Coastal Habitats

When assessing impacts of a project or activity, this should include an evaluation of potential impacts on sensitive coastal habitats such as beaches, dunes, and wetlands (including salt marshes and eelgrass beds).

Salt marshes are very productive habitats. Plant material produced in these wetlands is eaten by invertebrates, birds and other salt marsh inhabitants; is decomposed in the marsh, thus adding nutrients to the food chain; or is exported to other coastal and marine systems. Salt marshes are also important nesting habitat for Willets and Sharp-tailed Sparrows, and migration habitat for shorebirds. Eelgrass also contributes large amounts of nutrients to coastal and marine habitats and is a very important food for migrating geese. Coastal wetlands also provide other important functions such as natural shoreline protection from wave action and erosion, as well as natural flood reduction and control.

The Federal Government has adopted the *Federal Policy on Wetland Conservation* (FPWC) with its objective to "promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future." In support of this objective, the Federal Government strives for the goal of No Net Loss of wetland function on federal lands or when federal funding is provided. The goals of the policy are to be considered in these circumstances, and the hierarchical sequence of mitigation alternatives (avoidance, minimization, and as a last resort, compensation) recommended in the FPWC should be followed. The FPWC is available at EC's Publication Catalogue: http://www.ec.gc.ca/Publications/.

Best Management Practices

The following best management practices should be taken into account in identifying appropriate mitigation measures applicable to coastal habitats:

- Beaches and dunes should not be accessed by heavy equipment and should not be used as staging or storage areas for the project. Vehicle and pedestrian traffic on beaches loosens the sand and damages the plant cover of dunes. Measures should be taken to ensure that project staff and vehicles do not trample sensitive beach habitats.
- Fueling and servicing of equipment should not take place within 30 m of sensitive coastal habitats.

An Invasive Alien Species Strategy for Canada

The introduction and spread of Invasive Alien Species is affecting Canada's environment, economy, and society, including human health. The current threats posed by existing and potential invasive alien species are significant and are growing at an alarming rate. The need for Canada to take measures to address invasive alien species and protect and conserve Canada's natural resources and associated industries, as well as the health of wildlife and humans, is essential. The impact of invasive alien species on native ecosystems, habitats and species is severe and often irreversible. According to the World Conservation Union, invasive alien species are the second most significant threat to biodiversity, after habitat loss.

This Strategy proposes to respond to the invasive alien species challenge through a hierarchical approach that focuses on prevention, early detection, rapid response, and management. For more information, the Strategy is available online at: http://www.ec.gc.ca/Publications/

Best Management Practices

To diminish the risk of introducing invasive species, the following best management practices should be taken into account in identifying appropriate mitigation and monitoring measures:

- A variety of species of plants native to the general area should be used in revegetation efforts. Should seed mixes for herbaceous native species for the area not be available, it should be ensured that plants used in revegetation efforts are known to be non-invasive.
- Construction equipment should be cleaned and inspected prior to transport from elsewhere to ensure that no matter is attached to the machinery that could introduce an

invasive species into the area (e.g., use of pressure water hose to clean vehicles prior to transport).

- Equipment should be regularly inspected prior to, during and immediately following construction in wetland areas and in areas found to support Purple Loosestrife to ensure that vegetative matter is not transported from one construction area to another.
- For marine activities, all equipment mobilized by land must be pressured washed prior to entering the marine environment.

Water Quality

When assessing a project or activity, this should include an evaluation of potential impacts on water quality.

Regulatory Requirements

The Fisheries Act

In addition to Section 5.1 of the MBCA, EC administers and enforces the pollution prevention provisions of the *Fisheries Act* and the *Canadian Environmental Protection Act*.

Subsection 36(3) of the *Fisheries Act* prohibits anyone from depositing or permitting the deposit of a deleterious substance of any type in water frequented by fish, or in any place under any conditions where the deleterious substance, or any other deleterious substance that results from the deposit of the deleterious substance, may enter such water. It is the responsibility of the proponent to ensure that all reasonable measures are conducted to prevent the release of substances deleterious to fish from their proposed activities. In general, compliance is determined at the last point of control of the substance before it enters waters frequented by fish, or, in any place under any conditions where a substance may enter such waters.

The *Canadian Environmental Protection Act*

Under the *Canadian Environmental Protection Act* a substance is considered toxic if it is entering or may enter the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity, constitute or may constitute a danger to the environment on which life depends; constitute or may constitute a danger in Canada to human life or health.

Other Considerations

Proponents should ensure that other more general impacts associated with construction and operation of a facility sited around water meet requirements under federal and provincial legislation. This includes proper treatment and disposal of sewage. Proponents are responsible for ensuring that no discharge of raw or untreated sewage to the marine environment occurs from land or from a vessel or platform. Sewage disposal from ships must comply with the *Canada Shipping Act* and the *Fisheries Act*. For larger facilities, the **Wastewater Systems Effluent Regulations** under the *Fisheries Act* may apply.

Proponents should also consider how the project may impact shellfish growing areas. EC's Marine **Water Quality Monitoring Program** routinely monitors bacterial water quality in shellfish growing areas and assesses impacts of pollution sources with the objective of identifying safe shellfish (bivalve mollusc) harvesting areas in Canada. This work fulfils part of EC's responsibilities under the Canadian Shellfish Sanitation Program Memorandum of Understanding and the Canada-United States Bilateral Agreement on shellfish.

Proponents are encouraged to consider how the project could affect classifications of shellfish growing areas and take steps to minimize adverse interactions, particularly with attention to adjacent shellfish aquaculture leases, commercial harvesting beds and First Nation harvesting interests. Section 2.3.6 of the Canadian Shellfish Sanitation Program Manual of Operations requires a prohibited shellfish harvesting area surrounding major pollution point source discharges and other structures which may pose a contamination risk. For example, shellfish harvesting is prohibited in the area within a minimum 125 metre radius around marinas and wharves (http://www.inspection.gc.ca/english/fssa/fispoi/man/cssppccsm/chap2e.shtml).

Best Management Practices

Construction Materials

At the project planning stage, all available construction materials should be considered (e.g., untreated wood, treated wood, pre-cast concrete, corrosive-resistant steel, plastic lumber), and those materials best suited to the conditions and intended use of the structure should be selected. Analysis of the preferred construction material should include a consideration of the full life-cycle of the material (i.e. ease of use, design factors associated with the construction material, maintenance requirements, and final disposal). Environmental implications associated with each life-cycle phase should also be considered (e.g. storm and ice damage). For example, it may not be cost effective to use pressure treated wood for a coastal structure that may be destroyed or damaged by storm surge during the life expectancy of the structure.

Pressure Treated Wood

The long-term impacts of pressure treated wood in aquatic environments remain uncertain; therefore EC urges that a precautionary approach be taken. If pressure treated wood (e.g. Chromated Copper Arsenate [CCA]) is determined to be the most suitable material for the project, the proponent is encouraged to incorporate the following standards into the planning and management of construction activities:

- Products should be approved for use by Health Canada's Pest Management Regulatory Agency, which sets out use limitations for all treated wood products under the *Pest Control Products Act*;
- Only wood treated according to the 2012 industry publication entitled "*Best Management Practices for the Use of Treated Wood in Aquatic and Wetland Environments*" should be used (this report is available at http://www.WWPinstitute.org/);

- Only proper construction techniques should be used (e.g. keep as much of the product above the high water mark as possible, and capture sawdust to avoid entry into water bodies);
- The use of pressure treated wood in *freshwater* environments is discouraged;
- According to "*Guidelines to Protect Fish and Fish Habitat from Treated Wood Used in Aquatic Environments in the Pacific Region*" by Hutton and Samis (2000), the use limitation restriction for Ammoniacal Copper Quaternary (ACQ) treated wood does not allow its use in aquatic environments when submerged (this report is available online at http://www.dfo-mpo.gc.ca/Library/245973.pdf); however, it can be used for above-water applications such as decking.
- When decommissioning in-water structures, treated wood should be completely removed from the water environment, including bottom sediment (for piles). According to Hutton and Samis (2000), piles should be removed by a slow, steady pull to minimize disturbance of surface habitats and to avoid bringing potentially contaminated sediments to the surface. If the pile breaks off below the biologically-active zone in the sediment, it may not be advisable to dredge the remainder out, depending on the sensitivity of the habitat at the site.
- Only wood treated according to the 2012 industry publication "*Best Management Practices for the Use of Treated Wood in Aquatic and Wetland Environments*" should be recycled/reused. Treated wood from structures *not* treated in accordance with the Best Management Practices (i.e. generally structures built prior to 1997, such as those constructed with creosoted wood) should be disposed of at a provincial landfill with approval of the owner, or through incineration at an approved hazardous waste incinerator.

Concrete Production

Discharges from project activities involving the use of concrete, cement, mortars and other Portland cement or lime-containing construction materials may have a high pH. Work should be planned and conducted to ensure that sediments, debris, concrete, and concrete fines are not deposited, either directly or indirectly into the aquatic environment. Measures must be taken to prevent any potentially contaminated water (e.g. exposed aggregate wash-off, wet curing, equipment and truck washing) from entering the aquatic environment unless it can be confirmed that this water will not be deleterious to fish or harmful to migratory birds. Containment facilities should be provided at the site.

Effects of Weather and Climate on the Project

Over its lifetime, coastal infrastructure will be sensitive to the impacts of wind, waves, storm surge, sea ice and sea level rise. Global average sea level rise projections range from 18 to 59 cm over the next century (Intergovernmental Panel on Climate Change). Some recent trends in research indicate that due to ice sheet melt, this range can be much higher than the projected 59cm by the year 2100. Coastal erosion will add to the effects of sea level rise. Sea level rise and crustal subsidence will exacerbate the effects of winds, waves and storm surges. In addition, climate warming will also lead to an increase in the water-holding capacity of the atmosphere, and more intense precipitation events are likely over the coming decades. This may affect local

flooding and infrastructure drainage. In considering the full life-cycle of the project, any sensitivity to climate change should be identified and adjustments made if necessary. It may be more cost-effective to adjust design criteria at this stage than to retrofit in future.

Historical data and local area knowledge should be utilized to determine adequacy of design. Based on an analysis of the potential effects of climate and weather elements, mitigation should be focused on minimizing risk of environmental damage and other accidents. Climatological data can be found at http://www.climate.weatheroffice.ec.gc.ca/, and value-added data can be obtained from EC's Climate Services. Contact: 1-900-565-1111 or email: weather.info.meteo@ec.gc.ca. Hydrometric station data, both archived and real-time, are available at http://www.ec.gc.ca/rhc-wsc/. The proponent is also encouraged to regularly consult EC's local forecast at http://www.weatheroffice.ec.gc.ca/.

Accidents and Malfunctions

A Contingency Plan that reflects a consideration of accidents and malfunctions should be prepared. This plan should consider site-specific conditions and sensitivities in dealing with potential environmental emergencies. The Canadian Standards Association publication, *Emergency Preparedness and Response,* CAN/CSA-Z731-03, is a useful reference. The following best management practices are recommended:

- Petroleum based products (e.g. fuels, lubricants, hydraulic oil) and wastes (e.g. waste oil) should be managed so as to minimize the risk of chronic and/or accidental releases; even small spills of oil can have very serious effects on migratory birds.
- Refuelling and maintenance activities should be undertaken on level terrain, at a suitable distance from environmentally sensitive areas including watercourses and wetlands, and on a prepared impermeable surface with a collection system;
- Biodegradable alternatives to petroleum-based chainsaw bar oil and hydraulic fluid for heavy machinery are commonly available from major manufacturers. Biodegradable fluids should be considered for use in place of petroleum products whenever possible.
- Drums of petroleum products or chemicals should be tightly sealed against corrosion and rust and surrounded by an impermeable barrier in a dry, water-tight building or shed with an impermeable floor.
- Proponents should ensure that storage tanks and equipment are leak-free (i.e. conduct routine inspections).
- In addition to having spill containment and clean-up materials on hand (i.e. sorbents and booms), personnel trained in spill mitigation should be on-site to ensure all spills or leaks, such as those from machinery or storage tanks, are promptly contained and cleaned up.

As per section 38 (5) of the *Fisheries Act* and notification regulations under CEPA, **all spills must be reported to the 24-hour Environmental Emergencies Reporting System:** Maritime Provinces **1-800-565-1633** or Newfoundland and Labrador **1-800-563-9089**

Addendum to Basic Impact Analysis

Broad Cove Campground Coastal Retaining Wall Upgrade
Cape Breton Highlands National Park

PROJECT TITLE & LOCATION	Broad Cove Campground Coastal Retaining Wall Upgrade Cape Breton Highlands National Park
PROPONENT INFORMATION	Robie Gourd, Asset Manager (902) 402-2851, robie.gourd@canada.ca
PROPOSED PROJECT DATES	Planned commencement: May 2020 Planned completion: Fall 2020 Project work will be scheduled in two phases, around peak visitation periods to minimize impacts to visitor experience. The first phase of the project is expected to be completed by July 1, 2020, with the second phase of the project completed after approximately September 7, 2020.
PROJECT FILE NUMBER	Original BIA: CBFU2018-001 BIA Addendum: CBFU2020-005

UPDATED PROJECT DESCRIPTION

In 2018, a Basic Impact Analysis (BIA) was prepared to address potential environmental concerns associated with repairing the deteriorating coastal retaining wall bordering the septic field in Broad Cove Campground. Given the continued erosion and ongoing maintenance concerns around the existing retaining wall, the removal of the current wall and a natural shoreline shaping approach was selected as a long-term and sustainable repair solution. This approach will involve cutting back the slope towards the existing septic field. Reshaping the slope between the septic field and the beach will allow for increased future shoreline movement and improve the size, condition, and quality of the beach.

The project is to be divided into two phases in order to work around the peak visitation period. Phase I will be completed in the spring of 2020 and will consist of the removal of the existing retaining wall structure (i.e., demolition and removal of the existing steel wall remnants, including metal components, infill material, manhole, and concrete foundations), stockpiling of topsoil and armour stone, clearing of vegetation as needed, and temporary slope stabilization (excavation of material and hydroseeding). Phase II will be conducted in the fall/winter of 2020 and will consist of final grading and sloping activities, repairs to the septic system, placing armour stone around the toe of the slope, and reinstatement of topsoil and vegetation. A Type 1 beach access trail will also be incorporated into the final slope design.

Figure 1. Broad Cove Campground retaining wall site location, 2019 aerial photograph.

ADDITIONAL MITIGATION MEASURES

As the project is occurring in the same location and involves similar activities to those addressed in the 2018 BIA (i.e., access road creation, use of construction equipment, stockpiling, vegetation removal, excavation, waste removal, and landscaping), the mitigation measures outlined in the 2018 BIA are considered adequate to address potential environmental concerns associated with this project. In addition, the following mitigation measures are noted:

- The contractor must provide an Environmental Protection Plan (EPP), which is to be reviewed by Parks Canada prior to the commencement of the project.
- Site workers must review the mitigation measures and any site-specific considerations with designated Parks Canada staff before work begins.
- On-site armour stone that is stockpiled between project phases should be done in such a way to ensure stability and visitor safety.
- Topsoil/overburden material stripped from the site is to be stockpiled in an approved location for reinstatement after slope grading and shaping activities are complete.

- Following the completion of the slope grading activities, vegetation is to be reinstated using native species as approved by Parks Canada to promote slope stability and minimize erosion.
- Material excavated from the slope is to be stockpiled at an approved location for potential future use (i.e., Black Brook Campground or other location specified by the departmental representative).

SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

As concluded in the 2018 BIA, when implementing the proposed mitigation measures, the lasting environmental impacts resulting from this project are considered to be minimal with no significant residual environmental effects.

In addition, given that this project involves reinstating a more naturally sloped shoreline, the project intends to decrease the need for maintenance over time.

DECISION

Taking into account the implementation of mitigation measures outlined in the Basic Impact Analysis, the project is considered:

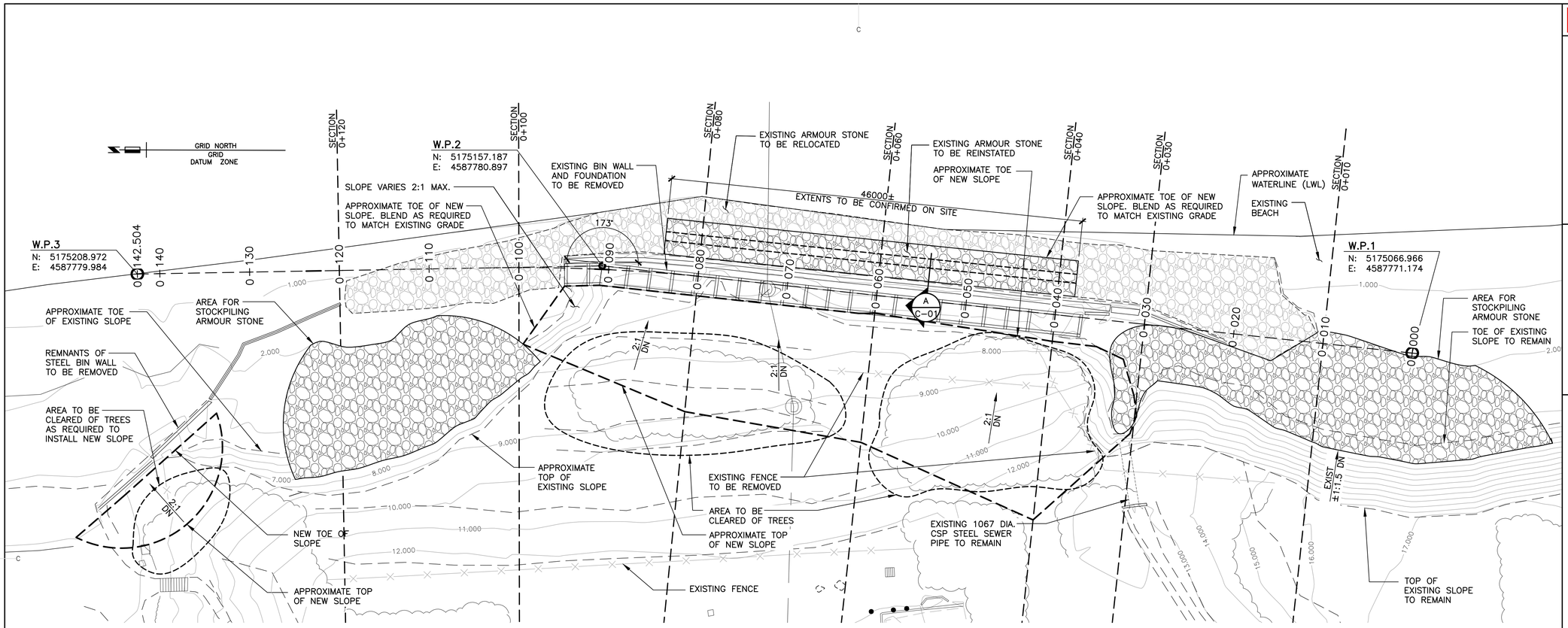
☒ not likely to cause significant adverse environmental effects.
☐ likely to cause significant adverse environmental effects.

APPROVAL

Prepared by: Angie Ricketts Resource Management Officer – Impact Assessment	Date: April 7, 2020
Reviewed by: Archie Doucette Impact Assessment Specialist	Date: April 8, 2019
Approval signature: Name & position (*Field Unit Superintendent)*: A. Blair Pardy	Date: April 28, 2020

ATTACHMENTS

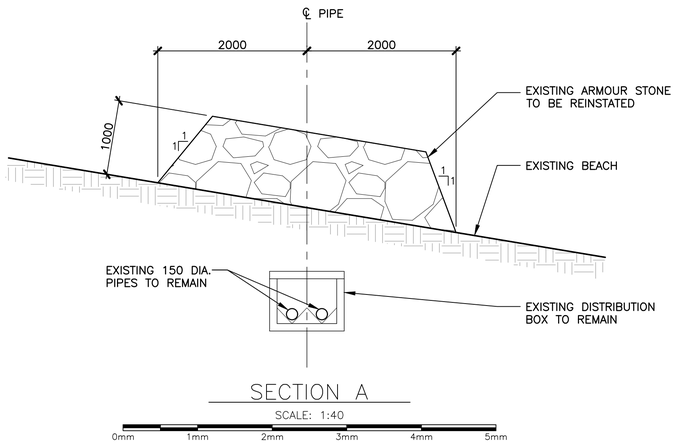
APPENDIX I – Site Plan



SITE PLAN

SCALE: 1:250

0m 5m 10m 15m 20m 25m



SECTION A

SCALE: 1:40

0mm 1mm 2mm 3mm 4mm 5mm

LEGEND

	EXISTING	NEW
FIBRE OPTIC MARKER POST	●	●
BOREHOLE	◆	◆
MANHOLE	Ⓓ	Ⓓ
TREELINE		
DITCH OR SWALE BOTTOM		
DRAINAGE CULVERT		
GUIDERAIL		
FENCE		
UNDERGROUND FIBRE OPTIC		
LIMIT OF WORK		L.O.W.
EDGE OF ASPHALT		
EDGE OF SHOULDER		
ROAD CENTERLINE		
CONTOUR LINE	289.0	289.0
TOP OF SLOPE		

NOTES:

1. ALL ELEVATIONS ARE VERTICAL DATUM GCVD23.
2. ALL HRIZONTAL COORDINATES ARE TO HORIZONTAL DATUM NAD 83.

Parcs Canada / Parks Canada

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HARBOURSIDE
Engineering Consultants

revisions		date
1	IFT FOR REVIEW	MAR.20 2020

project / projet

BROAD COVE BIN WALL REMEDIATION CAPE BRETON HIGHLANDS NATIONAL PARK

drawing / dessin

BIN WALL SITE PLAN

designed / conçu	M. PERTUS	
date	MARCH 20, 2020	
drawn / dessiné	D. LARADE	
date	MARCH 20, 2020	
approved / approuvé	M. REYNOLDS	
date	MARCH 20, 2020	

Tender / Soumission

PWGSC Project Manager / Administrateur de projets TPSGC

project number / no. du projet: 2039

drawing no. / no. du dessin: C-01

APPENDIX B:

Geotechnical Investigation

Geotechnical Investigation

Broad Cove Bin Wall Remediation
Cape Breton Highlands National Park,
Nova Scotia

File No: 193119

Prepared for:
Parks Canada Agency
1869 Upper Water Street, Suite AH201
Halifax, NS B3J 1S9

Prepared by:
Harbourside Geotechnical Consultants
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February 4, 2019

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1.0 INTRODUCTION

Acting on the request and authorization of Parks Canada Agency, Harbourside Geotechnical Consultants (Harbourside) have completed a geotechnical investigation to assess the subsurface conditions to aid with remediation of a bin wall at the Broad Cove Beach and Campground in Cape Breton Highlands National Park, Nova Scotia.

The campground was built in the 1960s and the original septic field was built on a bluff near the Atlantic Ocean. A bin wall and armour stone were added to protect the septic field in the 1970s. In the 1990s a new septic field was constructed leaving the previously constructed field obsolete, although it was never removed. The bin wall has since rusted and deteriorated and is no longer functioning as intended.

In 2015, in response to higher water usage rates, a larger filter treatment plant was added to treat the sewage and produce a high-quality effluent that can bypass the septic field and be discharged straight into the ocean. However, none of the surplus assets (including the original septic field, armour stone, and bin wall) have been removed or disposed of.

Harbourside and Crandall Engineering have been contracted to provide engineering related to the demolition and removal of the existing bin-wall structure, decommissioning and realignment of several pieces of wastewater treatment infrastructure, and realignment or diversion of the existing effluent outfall. Harbourside were engaged to provide geotechnical recommendations related to the reshaping of the shoreline and reinstating the beach.

The scope of work completed for this project includes the following:

- Completion of a geotechnical field investigation including four boreholes;
- A laboratory testing program; and
- Preparation of this report detailing the findings of the field investigation and laboratory analyses as week as providing geotechnical recommendations for design and construction of the bin-wall remediation.

2.0 SITE DESCRIPTION

The Broad Cove Campground is located north of the community of Ingonish and south of Neils Harbour. The campground is east of the Cabot Trail and south of Warren Brook which runs easterly into the Atlantic Ocean. The campground has 202 camping sites (both RV and tenting), several small- to medium-sized structures, and hiking trails.

There is an existing bin wall that bounds the site to the east which has a concrete foundation and has rusted and been emptied of most of its infill. Portions of the existing wall have been undermined and have been overturned. In areas where the wall has failed, there is a zone of accelerated erosion. Upland of the bin wall, there is a grassed area which slopes gently towards the ocean to a steep bluff/cliff. South of the site, there are cliffs of exposed bedrock that face the Atlantic Ocean.

Geological mapping indicates that the principal overburden strata consists of silty glacial till. Mapping of the bedrock geology indicates that the underlying bedrock at the site is comprised of sedimentary bedrock of the Windsor Group (undivided).

3.0 INVESTIGATIVE PROCEDURES

3.1 GENERAL

The field investigation, which included advancing four boreholes, was conducted between November 28th and December 2nd, 2019. Samples of soil were recovered from the boreholes, classified in the field and taken to our laboratory for final classification and testing. A detailed summary of the soil conditions encountered, as well as the sampling and testing carried out, is present in the Borehole Records in Appendix A. Appendix A also includes a document entitled "Symbols and Terms used on Borehole and Test Pit Records", which clarifies terms used through this report and symbols used on the borehole and test pit records.

3.2 BOREHOLES

To provide subsurface information and assist with remediation of the site, four boreholes were advanced. Boreholes BH01, BH02, and BH03 were put down behind a fence that separates the public from the eroding cliffs west of the bin wall area. Borehole BH04 was advanced near the beach on the northern portion of the site near where a walking trail provides beach access.

The boreholes were drilled to depths that ranged from 8.9 to 18.0 m below the ground surface. Standpipes were installed in three of the four boreholes and the water levels were measured on December 2nd, 2019. The measured groundwater levels are indicated on the borehole records in Appendix A.

Boreholes were advanced using 114-mm flight augers and HW-sized casing. Soil sampling was carried out at regular intervals using conventional 50-mm diameter split spoon samplers while performing standard penetration testing as described in *ASTM D1586 Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils*. The standard penetration test (SPT) "N-value" is the number of blows required to advance a 50-mm outer-diameter split-spoon sampler a distance of 300 mm into the soil using a standardized drop height and weight. N-values generally provide an indication of soil consistency or compactness and may also be used to aid in estimation of other soil parameters. A record of the sampling is included on the borehole records in Appendix A.

3.3 LABORATORY TESTING

Samples of soil and bedrock recovered from the test locations were taken to our geotechnical laboratory for final classification and testing. Laboratory testing on select samples included:

- Water content determinations (*ASTM D2216 Standard Test Methods for Laboratory Determination of Water Content of Soil and Rock by Mass*),
- Particle-size analyses (*ASTM D6913 Standard Test Method for Particle-Size Distribution of Soils Using Sieve Analysis*),
- Atterberg Limits (*ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils)*, and
- Unconfined compressive strength tests (*ASTM D7012 Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens Under Varying States of Stress and Temperatures*).

A summary of the testing performed is presented on the borehole records in Appendix A and in separate figures in Appendix B. Soil descriptions used throughout this report are in general

accordance with the Unified Soil Classification System (*ASTM D2487 Standard Practice for Classification of Soils for Engineering purposes / ASTM D2488 Standard Practice for Description and Identification of Soils*).

3.4 SURVEYING

The location and ground surface elevation of all boreholes were surveyed by Harbourside personnel using construction-grade GPS equipment with real-time kinetic (RTK) correction. Borehole coordinates are provided in MTM Zone 4 ATS77. Elevations are referenced to the Canadian Geodetic Vertical Datum of 2013 (CGVD2013).

4.0 SUBSURFACE CONDITIONS

The subsurface conditions encountered generally consisted of the following sequence:

- A surficial layer comprised of rootmat and topsoil or fill
- Silty sand or sand with gravel
- Sand with gravel
- Glacial till
- Bedrock

However, not all strata were encountered at all locations. The subsurface conditions observed in the boreholes are summarized in Table 1 and the following paragraphs, and are described in additional detail on the borehole records in Appendix A.

Table 1 Summary of Subsurface Conditions

Location	Layer Thickness					Bedrock	Groundwater	Total Depth (m)
	Rootmat and Topsoil (m)	Fill (m)	Silty Sand (m)	Sand with Gravel (m)	Glacial Till (m)	Depth [elev.] [(a)] (m)	Depth [elev.][(a)] (m)	
BH01	0.10	-	0.13	-	11.91	12.14 [0.07]	12.00 [0.21]	17.99
BH02	0.10	0.51	0.15	-	12.75	13.51 [-1.93]	8.61 [2.97]	16.18
BH03	0.08	0.10	-	-	>15.24	>15.42 [< -3.63]	No Standpipe	15.42
BH04	-	1.24	-	3.33	>4.37	>8.94 [<-5.05]	3.81 [0.08]	8.94

(a) Elevations referenced to CGVD2013.

4.1.1 Rootmat/Topsoil

A surficial layer of rootmat and topsoil was encountered in boreholes BH01, BH02, and BH03. At the borehole locations, the thickness of this layer ranged from 0.08 to 0.10 m.

4.1.2 Fill

Fill was encountered below the surficial layer in boreholes BH02, BH03, and at the surface of BH04. Where encountered, this layer ranged in thickness from 0.1 to 1.2 m. Trace organic matter and occasional rootlets were found throughout the fill.

The results of two particle size analyses are presented in Table 2. The water content of three samples were 5 and 15 percent.

Table 2 Particle Size Analyses – Fill

Location	Sample No.	Sample Depth (m)	ASTM Soil Classification[(a)]	Material Composition by Weight (%)		
				Gravel	Sand	Fines[(b)]
BH02	SS1	0.00 to 0.61	Silty Sand	13	69	18
BH04	SS1	0.00 to 0.61	Poorly Graded Gravel with Silt and Sand	49	46	5

(a) See ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
(b) For particle size analyses performed by sieve, the percent of silt- and clay-sized particles are reported collectively as the percent fines.

Based on the sampling and testing carried out (including visual-manual classification) the fill can be described as brown to grey silty sand to gravel with silt and sand.

4.1.3 Silty Sand

A layer comprised of orangish-brown silt and sand was encountered below the rootmat/topsoil in borehole BH01 and below the fill in BH02. Trace organic matter and occasional rootlets were encountered throughout this layer.

The results of one particle-size analysis on this material indicated 14 percent gravel, 73 percent sand, and 13 percent silt- and clay-sized particles. The natural water content of one sample was 19 percent.

SPT N-values indicate that this material may generally be classified as compact. Based on field testing and visual-manual classification this layer may be described as orangish-brown silty sand.

4.1.4 Sand with Gravel

A layer comprised of brown sand with gravel was encountered below the fill in BH04 (the borehole advanced the furthest north and at the lowest elevation, near the beach). At the test location this layer was 3.3 m thick.

The results of one particle size analysis on this layer indicated 66 percent gravel, 28 percent sand, and 6 percent silt- and clay-sized particles. The natural water contents of two samples were 17 and 20 percent. SPT N-values indicate the material may generally be described as loose.

Based on the sampling and testing completed, this layer may be described as brown sand with gravel.

4.1.5 Glacial Till

Glacial till comprised of silt, sand, and gravel was encountered in all four boreholes. In boreholes BH01 and BH02, where the boreholes extended through the till into bedrock, the till was 11.9 and 12.8 m thick, respectively. Boreholes BH03 and BH04 did not extend through the full thickness of this layer but were terminated after advancing 15.2 m and 4.4 m into the till, respectively. Occasional to frequent cobbles and boulders were encountered throughout this deposit.

The results of seven particle size analyses on the glacial till are presented in Table 3, below. The natural water contents of nine samples ranged from 7 to 25 percent, with an average of 13 percent. SPT N-values indicates the compactness condition may be generally described as compact to dense.

Table 3 Particle Size Analyses – Glacial Till

Location	Sample No.	Sample Depth (m)	ASTM Soil Classification[a]	Material Composition by Weight (%)		
				Gravel	Sand	Fines[b]
BH01	SS09	6.12 to 6.73	Well-Graded Gravel with Silt and Sand	66	28	6
BH02	SS07	4.52 to 5.12	Well-Graded Sand with Silt and Gravel	29	66	5
BH03	SS03	1.52 to 2.13	Silty Sand with Gravel	21	31	48
BH03	SS07	4.70 to 5.31	Well-Graded Sand with Silt and Gravel	42	49	9
BH03	SS13	11.28 to 11.89	Silty Sand with Gravel	16	65	19
BH03	SS15	13.66 to 14.27	Silty Sand with Gravel	20	57	23
BH04	SS10	6.35 to 6.96	Well-Graded Sand with Silt and Gravel	22	69	9

(a) See ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
(b) For Particle size analyses performed by sieve, the percent of silt- and clay-sized particles are reported collectively as the percent fines.

Based on the sampling and testing completed, this layer may be described as compact to very dense brown silty sand with gravel to gravel with silt and sand.

4.1.6 Bedrock

Bedrock was encountered in BH01 and BH02 at depths of 12.1 and 13.5 m below the ground surface. Bedrock was not encountered in boreholes BH03 and BH04 which were advanced to total depths of 15.4 and 8.9 m below the ground surface, respectively.

Bedrock consisted primarily of reddish-brown mudstone and reddish-brown and grey conglomerate. Based on rock quality designation (RQD) of the recovered core, the mudstone may generally be classified as very poor quality and completely weathered. The reddish brown and grey conglomerate may be classified as good to excellent quality and slightly to moderately weathered.

One unconfined compressive strength test (USC) was performed on a sample of the conglomerate which indicates a compressive strength of 10.8 MPa. Based on the laboratory and field testing the conglomerate bedrock may be classified as weak and the mudstone as extremely weak to weak.

4.1.7 Groundwater

Standpipe piezometers were installed in boreholes BH01, BH02, and BH04. The groundwater surface was measured on December 2nd, 2019 at depths of 12.0, 8.6, and 1.2 m below the ground surface for boreholes BH01, BH02 and BH04, respectively. These depths correspond to elevations of 0.2 to 3.0 m.

Groundwater levels are anticipated to fluctuate with the ocean's tides and to precipitation events as well as in response to climatic and seasonal weather trends.

5.0 DISCUSSION AND RECOMMENDATIONS

Based on a review of the existing information, the following is our understanding of the history of the site:

- The campground was built in the 1960s.
- The existing steel bin-type retaining wall was built in the early 1970s to protect the eroding slope in front of wastewater treatment infrastructure which had been constructed a few years previous.
- In 1986 the bin wall experienced scour which was resulting in a loss of ballast from in front of the concrete barrier wall. A repair was undertaken which involved building a concrete barrier wall directly in front of the bin wall, extending the wall with reinforced concrete walls, and the placement of armour stone in front of the refurbished wall.
- In the 1990s, a new septic field was constructed, leaving the previously constructed field obsolete, but it was not removed.
- In 2010, a preliminary shoreline protection design was developed which indicated armouring the slopes to elevation +7.0 m with armour stone and filter stone. The purpose of this design was to replace the deteriorating retaining structure, but the design was never implemented.

Generally, the bin wall has deteriorated over time and is well past its useful life. Currently, it is no longer considered an asset by Parks Canada and has become a safety concern. Sharp pieces of metal are visible along the beach and most of the ballast has been washed out of the bins, a portion of the wall has fallen, and much of the remaining structure in a potentially unstable condition.

During concept (RS2) design, two options were prepared and evaluated for the “remediation” of the shoreline near the bin wall. These options are discussed in detail in the Preliminary Design Report (prepared by Crandall and Harbourside and dated December 16, 2019). The two options are summarized briefly below:

- **Option 1 – Armouring of Slopes –** This option includes removal of the remaining bin wall, excavation of material to create a 6H:1V slope for a beach area along the shore (to match the existing shoreline to the north and south), flattening of the slopes behind the bin wall, and placement of armour protection. The armour protection would be designed to withstand coastal effects.
- **Option 2 – Natural Slopes –** This option does not include any slope armouring to protect the shoreline. Instead, the shoreline will be subject to environmental and coastal forces (waves, storm surge, rain, ice, etc.). With this option, the design would focus on maintaining worker safety throughout construction, but environmental and coastal forces may result in a “living” shoreline that changes over time. With time, over-steepened slopes like those occur along many portions of the shoreline in Nova Scotia and throughout Cape Breton Highlands National Park would likely develop with time.

After development of the concept designs, Option 2 (Natural Slopes) was selected as the preferred option by Parks Canada Agency.

Based on the geotechnical field investigation, the existing soils behind the bin wall are comprised primarily of glacial till with some areas of fill and silty sand. Bedrock was generally encountered

below the existing shoreline (however, it is exposed to form cliff faces south of the bin wall). Significant erosion of the overburden is possible from exposure to environmental and coastal forces.

During construction, the area behind the bin wall should be excavated to 1.5H:1V or flatter and this slope should be maintained throughout the duration of the construction project. However, sloping the overburden at this inclination will result in a relatively low factor of safety (even without consideration of the erosive forces) and the slopes are anticipated to strain and slough with time and may be unstable over the long-term. Therefore, the slopes should be monitored constantly throughout construction for the development of any unsafe conditions. When considering the environmental exposure of the site, erosion at the toe of the slope may result in over-steepening and eventually to relatively larger slope failures. Therefore, from a geotechnical perspective, although the 1.5H:1V slope is anticipated to be suitable for construction, it will not have an adequate factor of safety in the long-term.

We understand that Parks Canada intends to use natural vegetation and other “natural” methods to protect the slopes (as indicated in the Living Shoreline Report prepared by Helping Nature Heal Inc.). This approach will include encouraging plant growth in the upland area to reduce water movement and overland flow, adding biomass to the bank to absorb wind and wave energy, and establishing a plant cover on the shore. Although these approaches may aid to reduce the rate of erosion and help the site return to a natural-looking site, they should not be relied on to prevent erosion and should be considered relatively temporary in nature. We anticipate that it would be difficult or impractical to work on, and grow vegetation on, slopes of 1.5H:1V and thus slopes of 2H:1V would be more suitable for completion of this work.

The exposure to environmental and coastal forces may result in a constantly changing slope face that has not been engineered and as such does not have a factor of safety comparable to an engineered slope. As with a naturally-occurring steep shoreline there will be risks of slope movements (both relatively slow and relatively sudden) that could potentially result in damage or injury to persons or things near the crest or the toe of the slope. Essentially, the conditions should be considered as naturally-occurring rather than engineered once construction is complete or the conditions have been modified by the environment.

6.0 CLOSURE

This report has been prepared to assist with the remediation of the Broad Cove Bin Wall and related infrastructure in Broad Cove Campground, Cape Breton Highlands National Park. This report has been prepared for the sole benefit of Parks Canada Agency and their agents. Any use which a third party makes of this report is the responsibility of such third party.

This report is based on the site conditions encountered by Harbourside Geotechnical Consultants at the time of the work at the specific sampling locations and can only be extrapolated to a limited extent around these locations. Should any conditions differ from those detailed on the borehole records, the engineer should be notified to allow reassessment of any design assumptions.

If you have any questions or require any additional information, please do not hesitate to contact the undersigned at your convenience.

H a r b o u r s i d e
Geotechnical Consultants

Vince C. Goreham, Ph.D., P.Eng.
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APPENDIX A

Symbols and Terms Used on Borehole and Test Pit Records

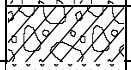
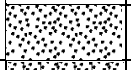
Borehole Records BH01 to BH04

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

STRATA PLOT

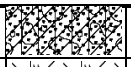
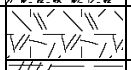
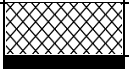
Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols:

USCS SOIL CLASSIFICATION SYMBOLS

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN 75 µm SIEVE SIZE	GRAVELS MORE THAN 50% OF COARSE FRACTION RETAINED ON 4.75 mm SIEVE	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES. LITTLE OR NO FINES
		GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL – SAND – SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL – SAND – CLAY MIXTURES
	SANDS MORE THAN 50% OF COARSE FRACTION PASSING THE 4.75 mm SIEVE	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES		SM	SILTY SANDS, SAND – SILT MIXTURES
				SC	CLAYEY SANDS, SAND – CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN 75 µm SIEZE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

OTHER COMMONLY USED SYMBOLS

GLACIAL TILL		UNSTRATIFIED GLACIAL DEPOSIT RANGING FROM CLAY TO BOULDERS
BEDROCK		IGNEOUS BEDROCK
		METAMORPHIC BEDROCK
		SEDIMENTARY BEDROCK
MATERIALS PLACED BY HUMANS		FILL: SUBSURFACE MATERIALS IDENTIFIED AS PLACED BY HUMANS
		ASPHALT
		CONCRETE

SAMPLE TYPE

SS	Split Spoon (obtained by performing SPT)
ST	Shelby Tube (Thin-Walled Tube)
GB	Grab Sample
PS	Piston Sample
WS	Wash Sample
HQ, NQ, AQ, BQ, etc.	Rock Core Samples Obtained Using Standard Size Diamond Bits

SPT N-VALUE (N-INDEX)

The standard penetration test (SPT) provides a qualitative evaluation of compactness and a qualitative comparison of subsoil stratification. The SPT is performed in in the bottom of a borehole where a split-barrel sampler having an outside diameter of 50.8 mm is impacted using a hammer weighing 623 N falling 0.76 m for each hammer blow. The SPT N-value is the blow count representation of the penetration resistance of the soil. In accordance with ASTM D1586, the N-value, reported in blows per 300 mm, equals the sum of the number of blows (N) required to drive the sampler over the depth interval of 150 to 450 mm. However, when a 600 mm sampler is used the number of blows (N) required to drive the sampler over the interval of 300 to 600 mm may be reported if this value is lower. For samples where insufficient penetration was achieved and N-Values cannot be presented, the number of blows are reported over sampler penetration in mm (e.g. 50/120). Although some methods make use of N-values corrected for various factors (for equipment used, overburden stress, length of drill rod, etc.) no corrections have been applied to the N-values presented on the logs.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests (DCPT) are performed using a standard 60-degree apex cone connected to 'A' size drill rods with the same standard fall height and weight as the SPT test. The DCPT value is the number of blows of the hammer required to drive the cone 300 mm. The DCPT provides a qualitative evaluation of compactness and allows for a qualitative comparison of subsurface stratification.

RECOVERY

For soil samples, recovery is recorded as the total length of the soil sample recovered. For rock core, recovery is expressed as a percentage of the total length drilled on a per run basis.

OTHER TESTS

S	Sieve Analysis	CD	Consolidated-Drained Triaxial	C	Consolidation
H	Hydrometer Analysis	CU	Consolidated-Undrained Triaxial	Q_u	Unconfined Compression
γ	Unit Weight	UU	Unconsolidated Undrained Triaxial	I_p	Point Load Index, Ip(50)
G_s	Specific Gravity of Soil Particles	DS	Direct Shear	k	Laboratory Permeability

SOIL DESCRIPTION

Terminology describing common soil genesis:

Rootmat	Vegetation, roots, and moss with organic matter and topsoil typically forming a mattress at the ground surface.
Topsoil	Mixture of soil and humus capable of supporting vegetative growth.
Peat	A soil composed of vegetable tissue in various stages of decomposition usually with an organic odor, a dark-brown to black color, a spongy consistency, and a texture ranging from fibrous to amorphous.
Till	Non-stratified glacial deposit which may range from clay to boulders
Fill	Artificial (man-made) deposits transported and placed on the natural surface of soil or rock.

Terminology describing soil structure:

Homogeneous	The lack of visible bedding and the same appearance and colour throughout
Desiccated	Having visible signs of weathering by oxidation of clay minerals, shrinking cracks, etc.
Fissured	Having cracks and hence a blocky structure
Stratified	Composed of regular alternating successions of different soil types
Varved	Comprised of regular alternating successions of silt and clay which were transported into freshwater lakes by melt water
Layer	> 75 mm
Seam	2 mm to 75 mm
Parting	< 2 mm
Pocket	Small erratic deposit, usually less than 300 mm
Lens	Lenticular deposit

Terminology describing soil types:
Soils are described in accordance with the Unified Soil Classification System (USCS) as described in ASTM D2487 and ASTM D2488. This system classifies soil into categories representing the results of laboratory tests to determine the particle-size characteristics, the liquid limit, and the plasticity index. Using this system, soils are assigned a group name (e.g. silty sand) and symbol (e.g. SM). The various groupings of this classification system have been devised to correlate in a general way with the engineering behavior of soils. Laboratory tests are performed on the portion of the sample passing the 75 mm sieve.

When laboratory test results indicate that that the soil is close to another classification group, the borderline condition can be indicated with two symbols separated by a slash (e.g. CL/CH).

Terminology describing cobbles, boulders, and non-matrix materials:
Materials outside of the USCS (e.g. particles larger than 75 mm, organic matter, construction debris) are described based on the proportion of these materials by weight using the following terminology:

Trace, or occasional	< 10%
Some	10% to 20%
Frequent	> 20%

Terminology describing the compactness condition of cohesionless soils:
A qualitative term describing the compactness condition of a cohesionless soil is interpreted from the SPT N-value (also known as the N-index). The relationship between the SPT N-value and the compactness condition is shown in the following table.

Compactness Condition	**SPT N-Value (blows per 0.3 m)**
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Over 50

Terminology describing the compactness condition of cohesive soils:
Cohesive soils can be classified in relation to undrained strength. Undrained strength can be determined by a number of tests including: unconfined compression tests, field and laboratory vane tests, laboratory fall-cone tests, shear-box tests, and triaxial tests. The consistency and undrained shear strength may also be approximately related the SPT N-Value. The relationship between the consistency and the undrained shear strength, as well as a rough correlation with SPT N-Value as shown in the following table.

Consistency	Undrained Shear Strength (kPa)	SPT N-Value (blows per 0.3 m)
Very Soft	< 12	< 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	> 200	> 30

ROCK DESCRIPTION

Rock is a natural aggregate of minerals that cannot be readily broken by hand and that will not disintegrate on a first wetting and drying cycle. A rockmass comprises blocks of intact rock that are separated by discontinuities such as cleavage, bedding planes, joints, shears and faults.

Terminology Describing Geological Classification of Rock:

Rock is classified with respect to its geological origin or lithology as follows:

Igneous Rocks	Rocks such as granite, diorite, and basalt, which are formed by the solidification of molten material.
Sedimentary Rocks	Rocks such as sandstone, limestone and shale, which are formed by the lithification of sedimentary soils.
Metamorphic Rocks	Rocks such as quartzite, schist, and gneiss, which have been altered by the application of intense heat and/or pressure.

Terminology Describing the Strength of Intact Rock:

Strength is the maximum stress level that can be carried by a specimen. Rocks may be classified based on their intact strength as shown in the following table.

Term	Unconfined Compressive Strength (MPa)
Extremely Weak	0.25 to 1
Very Weak	1 to 5
Weak	5 to 25
Medium Strong	25 to 50
Strong	50 to 100
Very Strong	100 to 250
Extremely Strong	> 250

Terminology Describing Discontinuity Spacing

The structural integrity of a rockmass will be affected by the presence of discontinuities. The spacing of discontinuities can vary from extremely wide to extremely close as indicated in the table below.

Term	Spacing Width (m)
Extremely Close	< 0.02
Very Close	0.02 to 0.06
Close	0.06 to 0.20
Moderately Close	0.20 to 0.6
Wide	0.6 to 2.0
Very Wide	2.0 to 6.0
Extremely Wide	> 6.0

Rock Quality Designation (RQD)

RQD is an indirect measure of the number of fractures within a rockmass. The method provides a quick and objective technique to estimate rockmass quality during diamond drill core logging. All pieces of intact and sound rock greater than 100 mm long are summed and divided by the total length of the core run in accordance with ASTM D6032.

RQD Classification	RQD (%)
Very Poor Quality	0 to 25
Poor Quality	25 to 50
Fair Quality	50 to 75
Good Quality	75 to 90
Excellent Quality	90 to 100

Terminology to Describe Rock Weathering

The state of weathering significantly alters the geotechnical behaviour of rocks and rockmasses. Weathering of the rockmass may be classified as shown in the following table.

Term	Description
Fresh	No visible sign of rock material weathering; perhaps slight discolouration on major discontinuity surfaces.
Slightly Weathered	Discolouration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discoloured by weathering and may be somewhat weaker than its fresh condition.
Moderately Weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discoloured rock is present either as a discontinuous framework or as corestones
Highly Weathered	More than a half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discoloured rock is present either as a discontinuous framework or as corestones.
Completely Weathered	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact.

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BOREHOLE RECORD

BH01

N: 5175109.5 E: 24587758.8

CLIENT PARKS CANADA AGENCY **PROJECT No.** 193119

LOCATION BROAD COVE, HIGHLANDS NATIONAL PARK, CAPE BRETON NOVA SCOTIA **DATUM** CGVD2013

DATES: BORING 2019-11-28 TO 2019-11-29 **WATER LEVEL** 2019-12-02 **BH SIZE** HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) RQD %	OTHER TESTS
	12.21								
	12.11	ROOTMAT/TOPSOIL							
	11.98	Compact orangish-brown silty SAND - with trace organic matter - with occasional rootlets			SS	1	300	2-2-7-25 (9)	S
		Compact to very dense brown silty sand with gravel to gravel with silt and sand TILL - with occassional cobbles and boulders			SS	2	325	19-40-48-41 (88)	
					SS	3	400	19-24-28-22 (50)	
					SS	4	400	31-7-22-35 (29)	
					SS	5	450	33-32-33-43 (65)	
					SS	6	400	26-22-25-39 (47)	
					SS	7	250	15-14-42-16 (56)	
					SS	8	325	20-15-18-15 (33)	
					SS	9	200	12-8-7-11 (15)	S
					SS	10	125	21-22-19-37 (41)	
		- pocket of silty clay at 9.55m depth			SS	11	250	26-22-27-50 / 75 mm	

UNDRAINED SHEAR STRENGTH - kPa

20 40 60 80

W_P W W_L

WATER CONTENT & ATTERBERG LIMITS

DYNAMIC PENETRATION TEST, BLOWS/0.3m

STANDARD PENETRATION TEST, BLOWS/0.3m

0 10 20 30 40 50 60 70 80

HARBOURSIDE GEOTECHNICAL CONSULTANTS, BOREHOLE RECORD 19-12-10

(Continued Next Page)

HARBOURSIDE
Geotechnical Consultants

BOREHOLE RECORD

BH01

N: 5175109.5 E: 24587758.8

CLIENT PARKS CANADA AGENCY **PROJECT No.** 193119

LOCATION BROAD COVE, HIGHLANDS NATIONAL PARK, CAPE BRETON NOVA SCOTIA **DATUM** CGVD2013

DATES: BORING 2019-11-28 TO 2019-11-29 **WATER LEVEL** 2019-12-02 **BH SIZE** HW

UNDRAINED SHEAR STRENGTH - kPa
20 40 60 80
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
DYNAMIC PENETRATION TEST, BLOWS/0.3m
STANDARD PENETRATION TEST, BLOWS/0.3m
0 10 20 30 40 50 60 70 80

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) RQD %	OTHER TESTS
11		Compact to very dense brown silty sand with gravel to gravel with silt and sand TILL - with occassional cobbles and boulders *(continued)*			SS	12	300	18-35-37-42 (72)	
12	0.07	Very poor quality grey to reddish-brown MUDSTONE - completely weathered - extremely weak to very weak			SS	13	350	16-29-50-50 / 25 mm	
13					HQ	13b	100%	0%	
14	-1.94				SS	14	350	30-52-50 / 75 mm	
		Good to excellent quality reddish-brown CONGLOMERATE - slightly to moderately weathered - weak			HQ	15	100%	95%	
15									
	-3.69				HQ	16	91%	86%	
16		Good to excellent quality grey CONGLOMERATE - slightly to moderately weathered - weak							
17	-5.17				HQ	17	100%	0%	Q_u
		Very poor quality grey to reddish-brown MUDSTONE - completely weathered - extremely weak to very weak							
18	-5.78	End of borehole - standpipe installed							
19									

HARBOURSIDE GEOTECHNICAL CONSULTANTS, BOREHOLE RECORD 19-12-10

HARBOURSIDE
Geotechnical Consultants

BOREHOLE RECORD

BH02

N: 5175148.5 E: 24587748.9

CLIENT PARKS CANADA AGENCY **PROJECT No.** 193119

LOCATION BROAD COVE, HIGHLANDS NATIONAL PARK, CAPE BRETON NOVA SCOTIA **DATUM** CGVD2013

DATES: BORING 2019-11-29 TO 2019-12-01 **WATER LEVEL** 2019-12-02 **BH SIZE** HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) RQD %	OTHER TESTS
	11.58								
	11.48	ROOTMAT/TOPSOIL							
		FILL: grey silty sand - with trace organic matter - with occasional rootlets			SS	1	275	1-3-3-3 (6)	S
	10.97 10.82	Compact orangish brown silty SAND - with trace organic matter - with occasional rootlets			SS	2	325	6-25-34-28 (59)	
1		Compact to dense brown silty sand with gravel to gravel with silt and sand TILL - with occasional cobbles and boulders			SS	3	300	16-27-36-41 (63)	
2					SS	4	150	39-53-51-32 (83)	
3					SS	5	400	14-11-15-16 (26)	
4					SS	6	250	10-10-11-12 (21)	
5					SS	7	275	9-9-8-9 (17)	S
6					SS	8	150	8-8-7-6 (13)	
7					SS	9	275	19-19-22-19 (41)	
8				▼					
9					SS	10	225	7-9-12-14 (21)	

UNDRAINED SHEAR STRENGTH - kPa
20 40 60 80
W_P W W_L
WATER CONTENT & ATTERBERG LIMITS
DYNAMIC PENETRATION TEST, BLOWS/0.3m
STANDARD PENETRATION TEST, BLOWS/0.3m
0 10 20 30 40 50 60 70 80

HARBOURSIDE GEOTECHNICAL CONSULTANTS, BOREHOLE RECORD 19-12-10

(Continued Next Page)

HARBOURSIDE
Geotechnical Consultants

BOREHOLE RECORD

BH02

N: 5175148.5 E: 24587748.9

CLIENT PARKS CANADA AGENCY **PROJECT No.** 193119

LOCATION BROAD COVE, HIGHLANDS NATIONAL PARK, CAPE BRETON NOVA SCOTIA **DATUM** CGVD2013

DATES: BORING 2019-11-29 TO 2019-12-01 **WATER LEVEL** 2019-12-02 **BH SIZE** HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) RQD %	OTHER TESTS
11		Compact to dense brown silty sand with gravel to gravel with silt and sand TILL - with occasional cobbles and boulders *(continued)*			SS	11	275	35-40-40-51 (80)	
12					SS	12	75	50 / 125 mm	
13	-1.93								
14		Very poor quality reddish-brown MUDSTONE - completely weathered - extremely weak to very weak			SS	13	0	23-33-55-14 / -50 mm	
	-2.74				HQ	14	100%	0%	
		Very poor quality grey MUDSTONE - completely weathered - extremely weak to very weak			SS	15	350	39-56-50 / 50 mm	
15					HQ	16	100%	0%	
16	-4.60								
		End of borehole - standpipe installed							
17									
18									
19									

UNDRAINED SHEAR STRENGTH - kPa
20 40 60 80
WATER CONTENT & ATTERBERG LIMITS W_P W W_L
DYNAMIC PENETRATION TEST, BLOWS/0.3m ★
STANDARD PENETRATION TEST, BLOWS/0.3m ●
0 10 20 30 40 50 60 70 80

HARBOURSIDE
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BOREHOLE RECORD

BH03

N: 5175187 E: 24587747.3

CLIENT PARKS CANADA AGENCY **PROJECT No.** 193119

LOCATION BROAD COVE, HIGHLANDS NATIONAL PARK, CAPE BRETON NOVA SCOTIA **DATUM** CGVD2013

DATES: BORING 2019-12-01 TO 2019-12-02 **WATER LEVEL** **BH SIZE** HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm)	BLOWS / 150 mm (N VALUE)	OTHER TESTS
	11.79								
	11.71	ROOTMAT/TOPSOIL							
	11.61	FILL: grey silty sand - with trace organic matter and occasional rootlets			SS	1	450	3-7-25-38 (32)	
1		Compact to dense brown silty sand with gravel to gravel with silt and sand TILL - with occasional to frequent cobbles and boulders			SS	2	400	35-33-36-30 (66)	
					SS	3	375	28-33-22-32 (54)	S
2					SS	4	400	28-32-25-24 (49)	
3					SS	5	75	50-50 / 75 mm	
4					SS	6	150	27-34-44-22 (66)	
5					SS	7	450	35-31-39-28 (67)	S
6					SS	8		31-27-22-21 (43)	
7					SS	9	225	10-11-16-14 (27)	
8					SS	10	325	18-13-25-22 (38)	
9					SS	11	200	9-11-11-10 (21)	

UNDRAINED SHEAR STRENGTH - kPa
20 40 60 80
W_P W W_L
WATER CONTENT & ATTERBERG LIMITS
DYNAMIC PENETRATION TEST, BLOWS/0.3m
STANDARD PENETRATION TEST, BLOWS/0.3m
0 10 20 30 40 50 60 70 80

HARBOURSIDE GEOTECHNICAL CONSULTANTS, BOREHOLE RECORD 19-12-10

(Continued Next Page)

HARBOURSIDE
Geotechnical Consultants

BOREHOLE RECORD

BH03

N: 5175187 E: 24587747.3

CLIENT PARKS CANADA AGENCY **PROJECT No.** 193119

LOCATION BROAD COVE, HIGHLANDS NATIONAL PARK, CAPE BRETON NOVA SCOTIA **DATUM** CGVD2013

DATES: BORING 2019-12-01 TO 2019-12-02 **WATER LEVEL** **BH SIZE** HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm)	BLOWS / 150 mm (N VALUE)	OTHER TESTS
		Compact to dense brown silty sand with gravel to gravel with silt and sand TILL - with occasional to frequent cobbles and boulders *(continued)*							
11					SS	12	75	18-17-11-14 (25)	
					SS	13	250	11-19-11-21 (30)	S
12									
					SS	14	200	9-8-13-15 (21)	
13									
					SS	15	250	6-6-16-50 (22)	S
14									
15	-3.63				SS	16	100	26-50 / ~~100 mm~~	
		End of borehole - standpipe installed							
16									
17									
18									
19									

UNDRAINED SHEAR STRENGTH - kPa
20 40 60 80
W_P W W_L
WATER CONTENT & ATTERBERG LIMITS
DYNAMIC PENETRATION TEST, BLOWS/0.3m
STANDARD PENETRATION TEST, BLOWS/0.3m
0 10 20 30 40 50 60 70 80

HARBOURSIDE
Geotechnical Consultants

BOREHOLE RECORD

BH04

N: 5175216.1 E: 24587752.9

CLIENT PARKS CANADA AGENCY **PROJECT No.** 193119

LOCATION BROAD COVE, HIGHLANDS NATIONAL PARK, CAPE BRETON NOVA SCOTIA **DATUM** CGVD2013

DATES: BORING 2019-11-28 **WATER LEVEL** 2019-12-02 **BH SIZE** HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm)	BLOWS / 150 mm (N VALUE)	OTHER TESTS
	3.89	FILL: brown gravel with silt and sand - with frequent organic matter - with frequent rootlets			SS	1	275	15-12-13-14 (25)	S
1					SS	2	50	9-8-11-16 (19)	
	2.65	Loose brown SAND with gravel - with occassional cobbles and boulders			SS	3	175	10-5-3-1 (4)	
2					SS	4	150	2-2-2-3 (4)	
					SS	5	250	4-3-1-3 (4)	S
3					SS	6	125	3-3-3-10 (6)	
		- black peat seam at 3.6 m depth		▼	SS	7	100	50 / 100 mm	
4		- boulder at 3.8 m depth							
	-0.68	Compact to dense brown silty sand with gravel to gravel with silt and sand TILL - with occasional cobbles and boulders			SS	8	175	34-30-16-9 (25)	
5					SS	9	375	10-7-12-16 (19)	
6					SS	10	300	10-11-12-14 (23)	S
7									
8					SS	11	300	11-15-14-15 (29)	
	-5.05				SS	12	275	18-19-20-20 (39)	
9		End of borehole - standpipe installed							

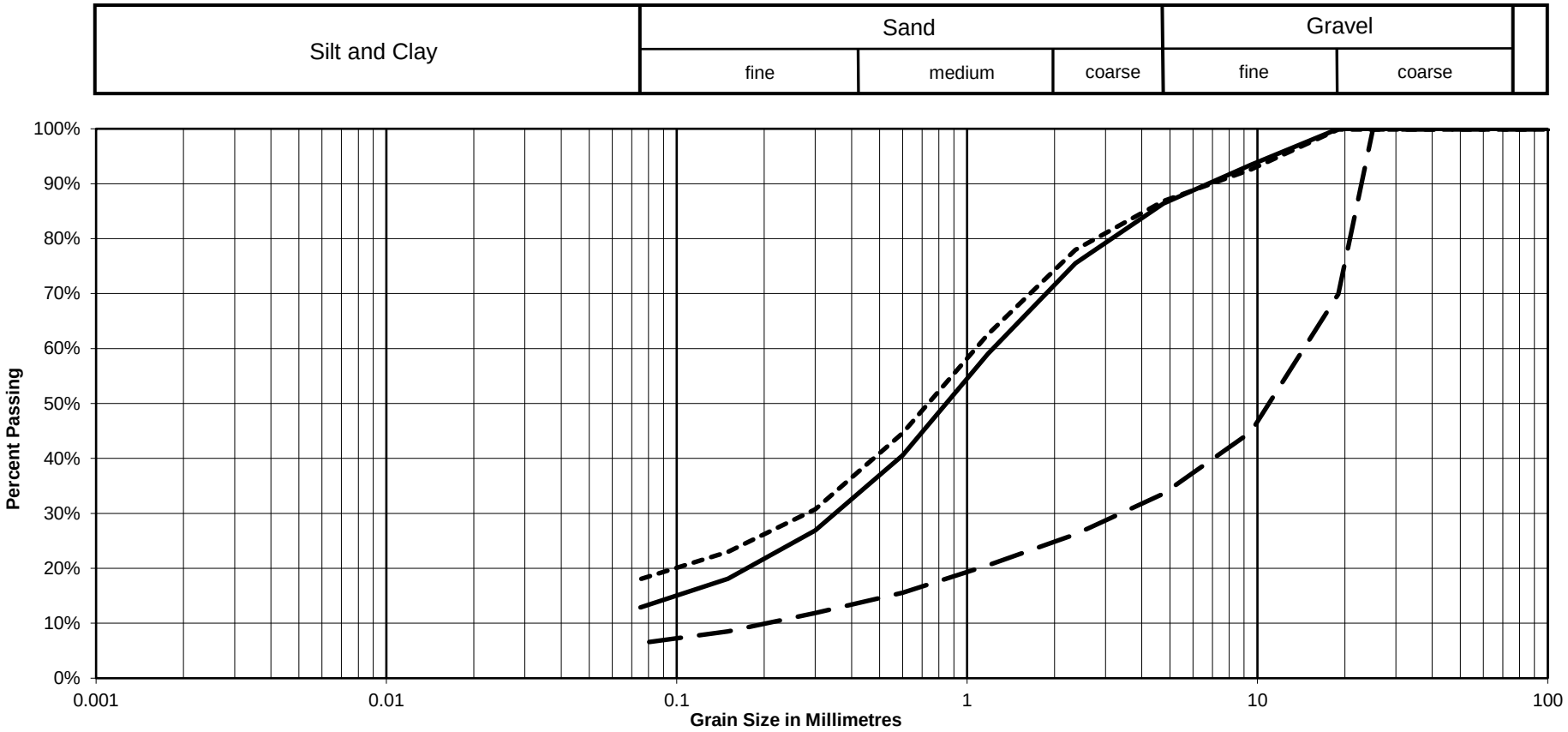
UNDRAINED SHEAR STRENGTH - kPa
20 40 60 80
W_P W W_L
WATER CONTENT & ATTERBERG LIMITS
DYNAMIC PENETRATION TEST, BLOWS/0.3m
STANDARD PENETRATION TEST, BLOWS/0.3m
0 10 20 30 40 50 60 70 80

APPENDIX B

Laboratory Testing Results

Checked: **VCG**

GRAIN SIZE DISTRIBUTION



CURVE	MATERIAL TYPE	SAMPLED FROM	MATERIAL SOURCE	SOIL FRACTION			SOIL DESCRIPITION
				GRAVEL	SAND	SILT/CLAY	
———	BH01	SS01	0 to 0.61	14%	73%	13%	Silty Sand
— — -	BH01	SS09	6.12 to 6.73	66%	28%	6%	Well-Graded Gravel with Silt and Sand
- - - -	BH02	SS01	0 to 0.61	13%	69%	18%	Silty Sand

HGC

t: 1.902.405.4696 | f: 1.902.405.4693
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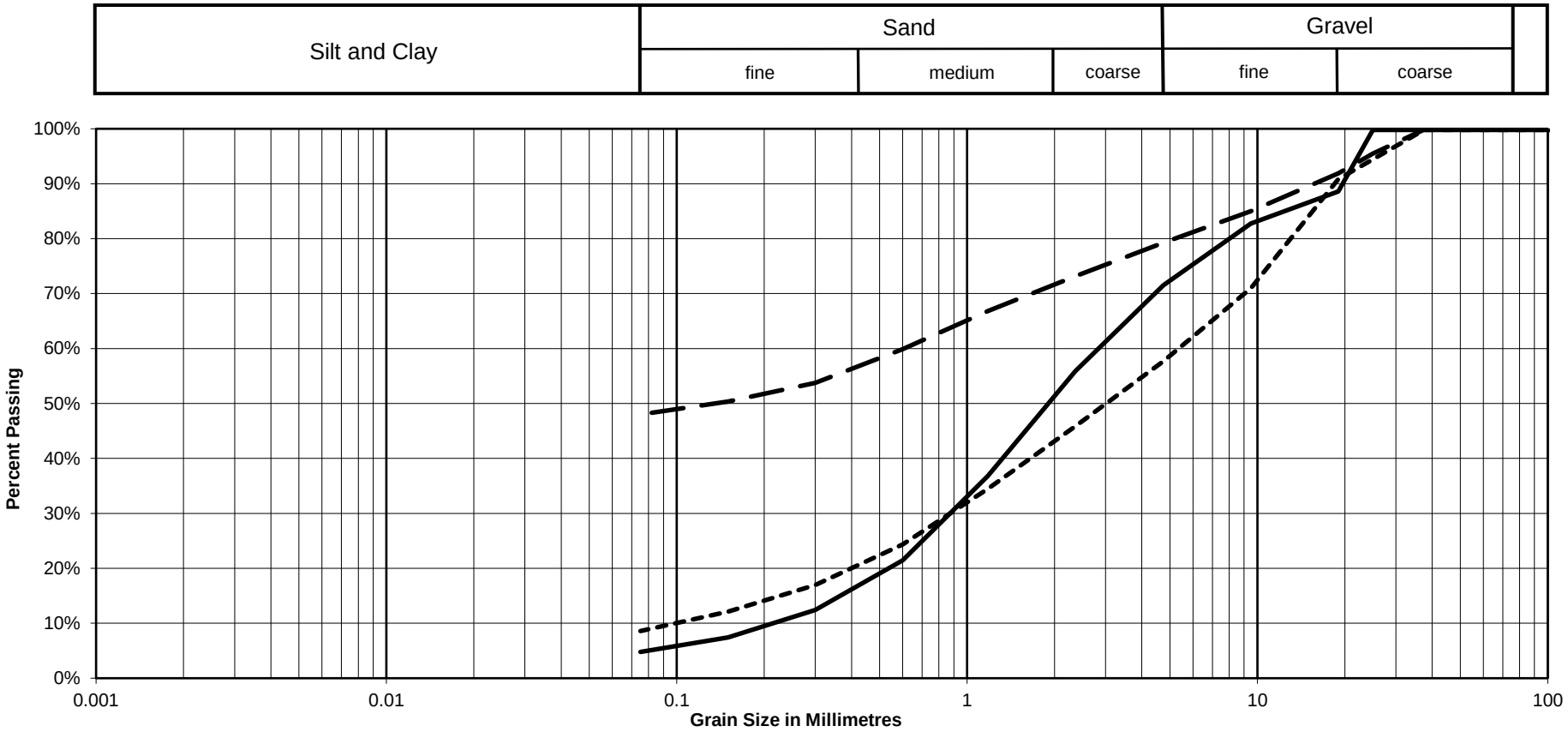
Dartmouth, NS B2X 2C3
http://harboursideengineering.ca

CLIENT Parks Canada Agency
PROJECT Broad Cove Bin Wall Remediation
LOCATION Highlands National Park, NS

PROJECT No.: 193119

Checked: **VCG**

GRAIN SIZE DISTRIBUTION



CURVE	BOREHOLE/TESTPIT	SAMPLE	DEPTH (m)	SOIL FRACTION			SOIL DESCRIPITION
				GRAVEL	SAND	SILT/CLAY	
———	BH02	SS07	4.52 to 5.12	29%	66%	5%	Well-Graded Sand with Silt and Gravel
— — -	BH03	SS03	1.52 to 2.13	21%	31%	48%	Silty Sand with Gravel
- - - -	BH03	SS07	4.70 to 5.31	42%	49%	9%	Well-Graded Sand with Silt and Gravel

PROJECT No.: 193119

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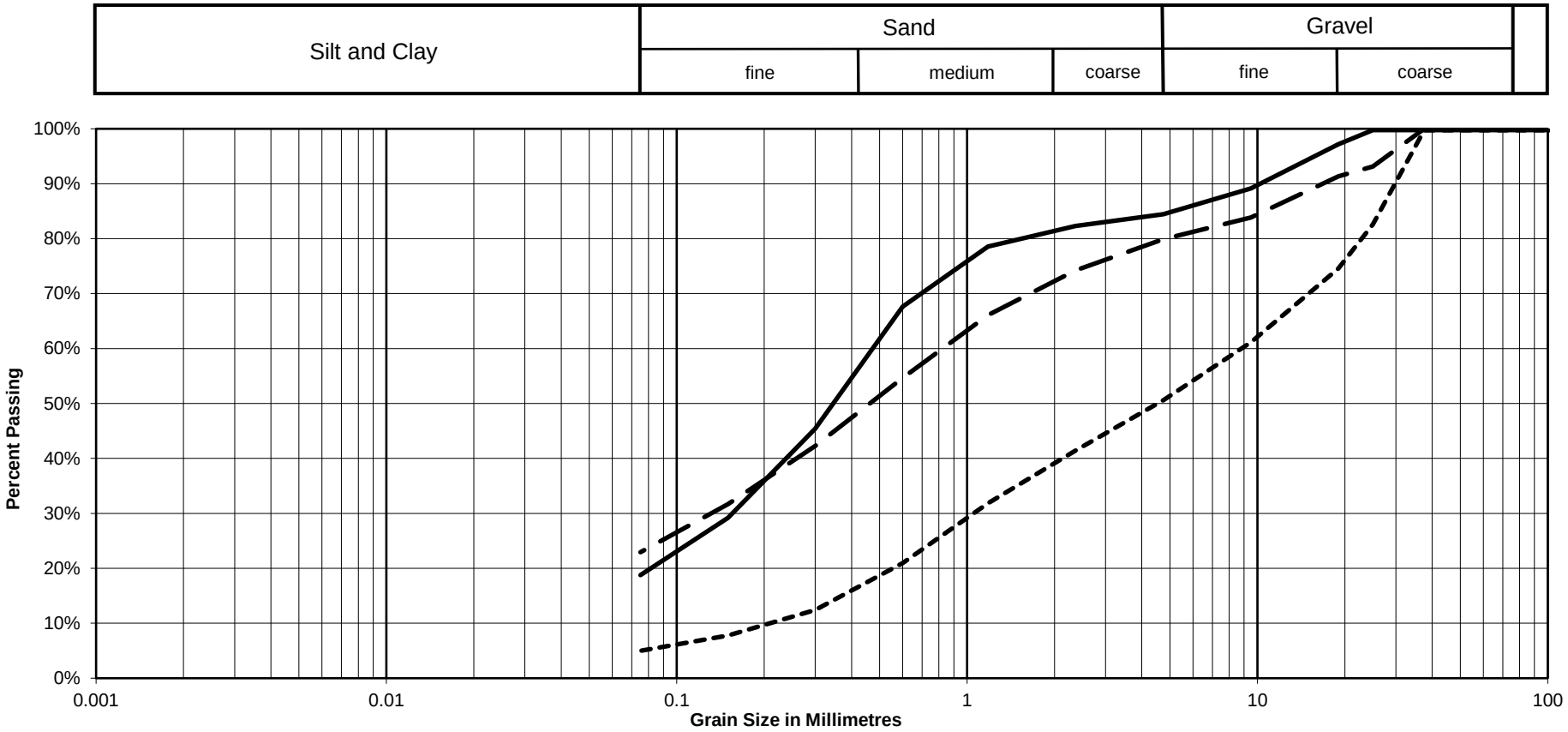
CLIENT Parks Canada Agency
PROJECT Broad Cove Bin Wall Remediation
LOCATION Highlands National Park, NS

Checked: **VCG**

GRAIN SIZE DISTRIBUTION



CURVE	MATERIAL TYPE	SAMPLED FROM	MATERIAL SOURCE	SOIL FRACTION			SOIL DESCRIPITION
				GRAVEL	SAND	SILT/CLAY	
———	BH03	SS13	11.28 to 11.89	16%	65%	19%	Silty Sand with Gravel
— — -	BH03	SS15	13.66 to 14.27	20%	57%	23%	Silty Sand with Gravel
- - - -	BH04	SS01	0 to 0.61	49%	46%	5%	Poorly Graded Gravel with Silt and Sand

PROJECT No.: 193119

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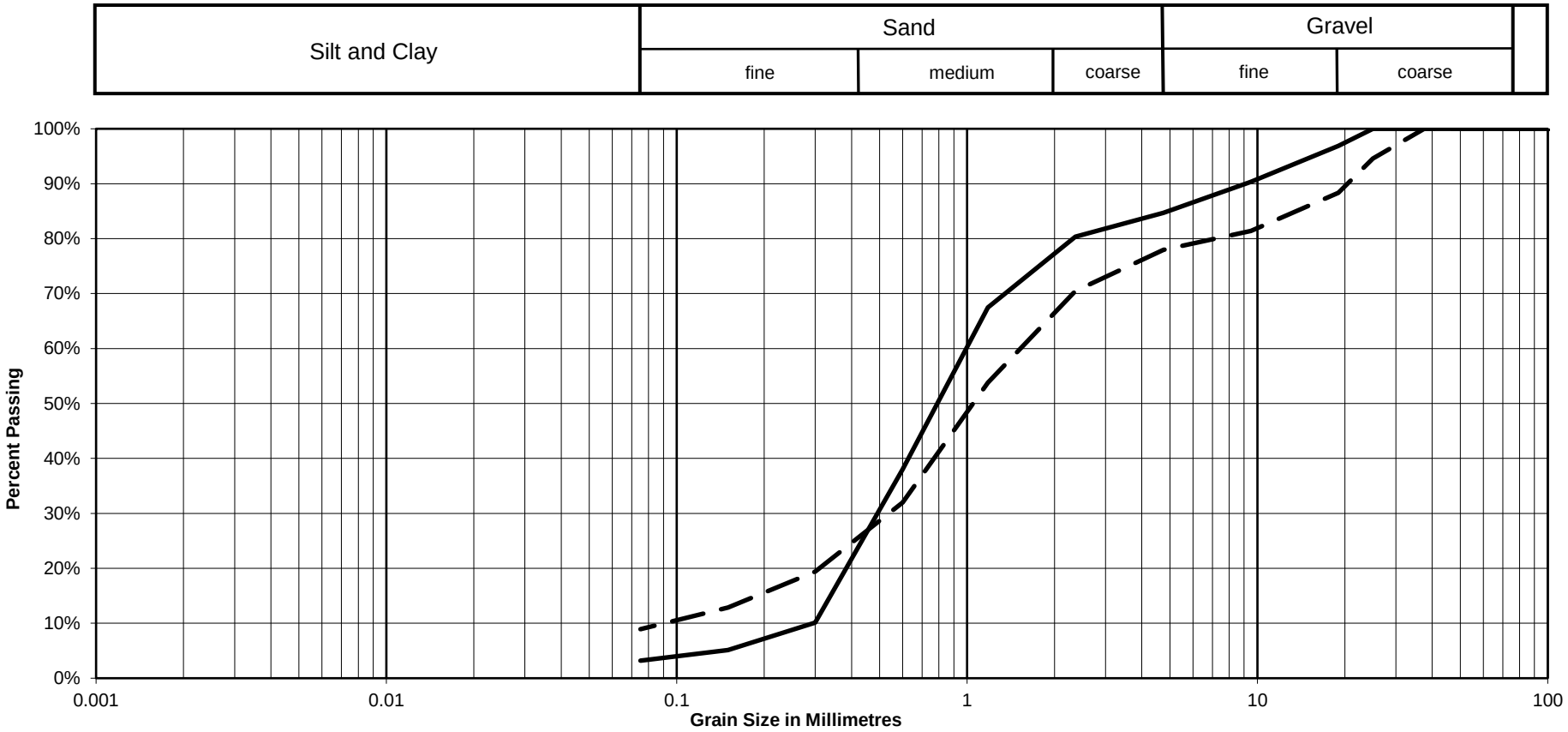
http://harboursideengineering.ca

CLIENT Parks Canada Agency
PROJECT Broad Cove Bin Wall Remediation
LOCATION Highlands National Park, NS

Checked: **VCG**

GRAIN SIZE DISTRIBUTION



CURVE	BOREHOLE / TESTPIT	SAMPLE	DEPTH (m)	SOIL FRACTION			SOIL DESCRIPITION
				GRAVEL	SAND	SILT/CLAY	
———	BH04	SS05	1.85 to 2.46	15%	82%	3%	Poorly Graded Sand with Gravel
— — -	BH04	SS10	6.35 to 6.96	22%	69%	9%	Well-Graded Sand with Silt and Gravel

PROJECT No.: 193119

HGC

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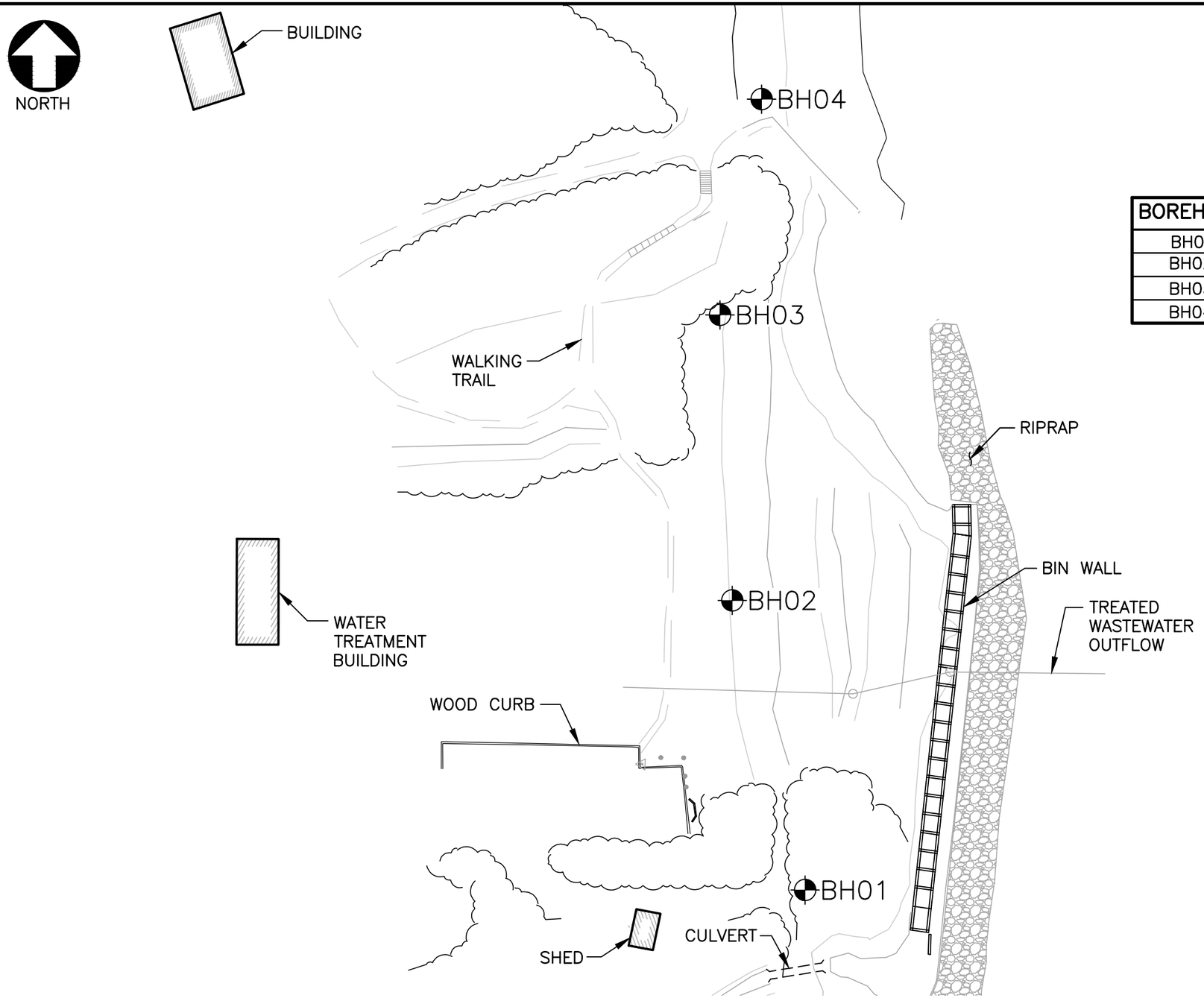
Dartmouth, NS B2X 2C3
http://harboursideengineering.ca

CLIENT Parks Canada Agency
PROJECT Broad Cove Bin Wall Remediation
LOCATION Highlands National Park, NS

APPENDIX C

Sketch G1 – Borehole Location Plan



BOREHOLE	NORTHING (m)	EASTING (m)	ELEVATION (m)
BH01	5175109.4	4587758.8	12.2
BH02	5175148.5	4587748.9	11.6
BH03	5175187.0	4587747.3	11.8
BH04	5175216.1	4587752.9	3.9

Scale	Date	Drawn	Designed	Checked	Approved	Contract
AS NOTED	DECEMBER 05, 2019	J. STEELE	V. GOREHAM	G. MACNEILL	V. GOREHAM	193119

HARBOURSIDE Geotechnical Consultants

BROAD COVE BIN WALL

PARKS CANADA AGENCY

SKETCH No.

G1

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