ISSUED FOR TENDER

For

Shoreline Protection Works
Highway 114 and Beach Area
Fundy National Park

Parks Canada Agency

PCA Project No.: 1346
Date: October, 2017

Specifications
Issued for Tender

Parks Canada Agency

Shoreline Protection Works Highway 114 and Beach Area
Fundy National Park

Project No. 1346
GEMTEC Limited
CBCL Limited

Corey G. Keats.
GEMTEC Limited

END

Appendix

DRAWING LIST

END

PART 1 GENERAL

1.1 Work Covered By Contract Documents

.1 Scope Narrative

.1 The works described herein are to be completed in Fundy National Park along New Brunswick Highway 114 between the Park Visitors Centre and the Salmon River crossing into the Town of Alma. The site is characterized by a sand and gravel beach, a highway embankment with partial armourstone protection, a tidal lagoon contained within a sand and gravel berm, and a steep bluff with mature trees and partial armourstone protection. Ongoing erosion along the site's shoreline requires remediation through the partial retrofit and addition of new shoreline protection features. Sections along the highway embankment and bluffs feature existing armourstone of various sizes, to be generally left in place where possible and integrated into the proposed shore protection works as indicated on the drawings. The proposed shoreline protection features consist of rock revetments, rubblemound breakwaters and natural beach.

The work involves but is not necessarily limited to:

.1 Establishment of a staging area in the adjacent parking lot at the Fundy National Park Visitors Centre prior to commencement of works. Use the staging area for storage of equipment and the stockpiling of materials including recovered and screened beach material (cobble, sand and gravel). Clear the staging area of obstructions and clean for use no later than May 1st 2018.

.2 Earthwork operations including the excavation, screening, segregation and stockpiling of beach sand, gravel, cobble

and other excavated material as indicated on the drawings. Excavate the toe feature of the rock revetment and rubblemound breakwater during the placement of armourstone at a distance no greater than 10m from the face of construction.

.3 Place the new rock revetments and rubblemound breakwaters on the prepared sub-surface. Place the material in sequential order with component layers of corestone, filterstone and armourstone. Place the excavated and sorted beach material within the following areas, in order of priority: (1) sand, gravel and cobble in beach fill area, and (2) remaining material over the structure toe.

.4 Within beach fill area, place excavated beach sand at the surface, above sorted gravel material, in areas indicated on the drawings. Remove marram grass plugs and replant marram grass in the spring of 2018.

.5 Extend existing culverts along highway through filter stone layer as shown on the Project Drawings. Extensions to be 100D concrete pipe that will be fitted over the existing PVC or corrugated steel pipes.

.6 Construct new timber boardwalk and stairways extending from the existing visitor access point to the beach after removing existing end platform, as shown on drawings. There will be absolutely no equipment permitted on the areas shown as vegetated on the project drawings, including but not limited to the area of the new boardwalk. Construction of boardwalk will be completed by staging off the completed sections. The Contractor shall provide equipment of suitable size and capacity to allow staging off completed section of boardwalk for all elements of the boardwalk construction. Installation equipment weight to be limited to 2000 kg.

Boardwalk surface decking to be protected from damage during construction.

1.2 Contract Method

.1 Construct Work under a combined unit price/lump sum contract.

1.3 Work by Others

.1 Other contractors may be working in the same construction area. This contractor to cooperate and coordinate with other contractors.

1.4 Work Sequence

.1 Work can be completed in one phase, all work to be completed by May 1st, 2018.

1.5 Contractor Use of Premises

Limit use of premises for Work, to allow:

.1
- .1 Work by Parks Canada employees.
- .2 Parks Canada will accommodate the Contractor with a location for their construction trailer and the inspectors site trailer.

.2 Storage areas for Contractor's equipment and materials shall be in the parking lot at the Fundy National Park Visitor Centre.

.3 Disposal of waste materials shall be outside the Park Boundaries at an approved facility/site. Locations and costs associated with waste disposal shall be the responsibility of the Contractor.

.4 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

1.6 Summary of Work

.1 The tasks associated with the upgrade to the site are summarized as follows. Details of the requirements are provided in the project technical specifications and drawings.

.1 Provide and implement designated controls for environmental aspects of the work.
.2 Construction of rubble mound revetments.
.3 Removal and replanting of marram grass and planting of trees and shrubs.
.4 Excavation and placement of beach material.
.5 Construction of a new boardwalk.
.6 Complete al1 restoration.

1.7 Existing Services

.1 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.

.2 Protect, relocate or maintain existing active services.

1.8 Documents Required

.1 Maintain at job site, one copy each document as follows:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to the Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.
.12 Construction Schedule
.13 Environmental Control Plan (ECP)

2 PRODUCTS

2.1 NOT USED

.1 Not used.

3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 Access and Egress

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

.2 Submit access plan and traffic control plan for approval in accordance with Section 01 55 26. Plans should include all known restrictions.

1.2 Use of Site and Facilities

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

.2 Provide for personnel and vehicle access.

1.3 Alterations, Additions or Repairs

.1 Execute work with least possible interference or disturbance to premises. Arrange with Departmental Representative to facilitate execution of work.

1.4 Existing Services

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

.2 Provide for Parks Canada personnel, pedestrian and vehicular traffic.

.3 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.5 Special Requirements

.1 Submit schedule in accordance with Section 01 32 16 - Construction Progress Schedule - Bar (GANTT) Chart.

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

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

.4 No work, encroachment or construction vehicles are permitted outside of the work areas shown on the drawings.

1.6 National Parks Act

.1 The requirements and regulations made under the National Parks Act shall apply to this project.

.2 A copy of this Act may be obtained by contacting the Departmental Representative.

PART 2 PRODUCTS

2.1
NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1
NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 Measurement .1 All measurement shall be along a horizontal plane unless otherwise indicated.

1.2 Pay Items .1 All items in this contract will be paid for by costs included in the unit prices and Lump Sum Payment for costs not included in these items.

Lump Sum Items

.1 Bid Item 1 – Mobilization and Demobilization for the project – Section 01 29 00
.1 Terms of Payment: Lump Sum
50% to be paid after mobilization
50% to be paid after de-mobilization

.2 Bid Item 2 – Sections 01 35 29, 01 52 00, 10 22 00
.1 Terms of Payment: Lump Sum
.2 This Item includes:
.1 Construction Facilities including:
.1 Departmental Representative's Site Trailer.
.2 Weigh Scales
.3 Traffic Control
.4 Temporary Road/access
.2 Contract Requirements:
.1 Insurance & Bonding
.2 Municipal Fees, Permits, etc.
.3 Inspection & Testing
.4 Commissioning
.5 Protection of all cultural and archaeological resources
.6 Any other item required to complete work but not covered in another pay item.

.3 Bid Item 3 – Section 01 35 43 – Environmental Protection Procedures for Marine Work
.1 Terms of Payment: Lump Sum
.2 This Item includes:
.1 Environmental Procedures.
.1 Submission of Environmental Protection Plan for review and approval; installation and general maintenance of all environmental control measures

or as directed by the Departmental Representative.

.4 Bid Item 4 – Section 31 11 00 – Sitework Demolitions, Removals and Salvaging, 31 23 10 – Excavation and Beach Fill.

.1 Sitework demolition, salvage and removals will be measured by the lump sum. This item includes the salvage, screening, sorting, stockpiling, protection of stockpiles, the excavation of beach sediment for the placement and toe-in of new rock structures, and the re-use of sand, gravel and cobble as defined in Section 31 23 10 where shown on the Project Drawings and as specified herein, and any other removals required to complete this work.

.5 Bid Item 5 – Section 05 50 00, 06 10 00, 31 66 15 – Boardwalk

.1 Terms of Payment: Lump Sum.

.2 This item includes all materials and equipment related to the construction of the boardwalk including, helical piles, metals and lumber.

.3 Probe testing and associated work to determine helical pile requirements.

.4 Includes all materials and equipment to allow removal of a portion of the existing viewing platform and boardwalk removal off site and connection to new boardwalk.

.5 There will be absolutely no equipment permitted on the areas shown as vegetated on the project drawings. Including, but not limited to entire area of new boardwalk area. Construction of boardwalk will be completed by staging off the completed sections. Contractor shall provide equipment of suitable size and capacity to allow staging off completed section of boardwalk for all elements of the boardwalk construction.

.6 Bid Item 6 - Section 31 11 00 – Removal and replanting of Marram Grass and Planting of Trees and Shrubs

.1 Removal and replanting of Marram Grass will be measured by lump sum within the limits indicated or as directed by the Departmental Representative. This item includes the removal and immediate re-planting of Marram grass where

shown on the Project Drawings. This work will take place at the conclusion of the Work.

.2 Planting of trees and shrubs including supply of all materials, and all work required as shown on drawings.

Bid Items Unit Price

.7 Bid Item 7 – Section 35 31 24 – Corestone

.1 Corestone will be measured by the tonne as confirmed by weigh scale tickets provided to the Departmental Representative. This item includes the supply, transport and placement of corestone to the lines and elevations shown on the Project Drawings.

.8 Bid Item 8 – Section 35 31 24 – Filterstone (200-600 kg)

.1 Filterstone (200-600 kg) will be measured by the tonne as confirmed by weigh scale tickets provided to the Departmental Representative. This item includes the supply and placement of filterstone to the lines and elevations shown on the Project Drawings.

.9 Bid Item 9 – Section 35 31 24 – Armourstone (1.5 – 3 T)

.1 Armourstone (1.5 – 3 T) will be measured by the tonne as confirmed by weigh scale tickets provided to the Departmental Representative. This item includes the supply, transport and placement of armourstone to the lines and elevations shown on the Project Drawings.

.10 Bid Item 10 – Section 35 31 24 – Armourstone (3 – 5 T)

.1 Armourstone (3 – 5 T) will be measured by the tonne as confirmed by weigh scale tickets provided to the Departmental Representative. This item includes the supply, transport and placement of armourstone to the lines and elevations shown on the Project Drawings.

.11 Bid Item 11 – Section 31 32 19 – Geogrid Composite

.1 Geogrid Composite will be measured in square metres by plan area within the limits indicated or as directed by the Departmental

Representative. This item includes the supply, transport, placement and maintenance of Geogrid where shown on the Project Drawings.

.12 Bid Item 12 – Section 31 32 21 – Geotextile

.1 Geotextile will be measured in square metres by plan area within the limits indicated or as directed by the Departmental Representative. This item includes the supply, transport, placement and maintenance of Geotextile where shown on the Project Drawings.

.13 Bid Item 13 – Section 33 40 00 – Culvert Extension

.1 Culvert extension will be paid for by each preparation of existing culvert as required, modular seal and extension. This item includes excavation, supply, transport and placement of all work required to place concrete pipe complete with modular seal.

.14 Bid Item 14 – Section 31 23 10 – Imported Beach Sand (Provisional)

.1 Imported beach sand will be paid by the cubic metre as verified by topographical survey measurement. This item includes the supply and placement of off Site beach sand meeting the requirements stated in Section 31 23 10. Written approval of the Departmental Representative will be required in order to charge against this item.

.15 All and any items not specifically included in the Measurement for Payment and Pay Item List are considered incidental to the work and are to be included in the tendered price for related work.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

END OF SECTION

1 General

1.1 Related Requirements

. 1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative.

1.2 Appointment and Payment

.1 Departmental Representative will appoint and pay for services of testing laboratory except follows:

.1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.

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

1.3 Contractor's Responsibilities

.1 Provide labour, equipment and facilities to:

.1 Provide access to Work for inspection and testing.

.2 Facilitate inspections and tests .

.3 Make good Work disturbed by inspection and test.

.4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify Departmental Representative 48 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

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

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

2.0 PRODUCTS

2.01 NOT USED

.1 Not Used.

3.0 EXECUTION

3.1 NOT USED

. 1 Not Used .

END OF SECTION

PART 1 GENERAL

1.1 Administrative

.1 Schedule and administer project meetings throughout the progress of the work or at the call of Departmental Representative.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and, affected parties not in attendance, Departmental Representative.

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

1.2 Preconstruction Meeting

.1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

. 5 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work: - Construction Progress Schedule - Critical Path Method (CPM)or - Construction Progress Schedules - Bar (GANTT) Chart.

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

.4 Requirements for temporary facilities, site sign, offices, 'storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

.5 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

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

.7 Owner provided products.

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

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

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

.11 Appointment of inspection and testing agencies or firms.

.12 Insurances, transcript of policies.

1.3 Progress Meetings

.1 During course of Work and two weeks prior to project completion, schedule progress meetings.

.2 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.

.3 Notify parties minimum seven days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within three days after meeting.

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

2.0 PRODUCTS

2.1 NOT USED

.1 Not Used.

3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 Definitions

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

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.

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

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

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

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

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

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and

controlling activities and is used as basis for decision making throughout project life cycle.

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

1.2 Requirements

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

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

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 Action and Informational Submittals

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

.2 Submit to Departmental Representative within 10 working days of Award of Contract, Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

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

1.4 Master Plan

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

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

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

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

1.5 Project Schedule

.1 Develop detailed Project Schedule derived from Master Plan.

1.6 Project Schedule Reporting

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.

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

1.7 Project Meetings

.1 Contractor to provide hard and electronic copies of updated schedule a minimum of two (2) days prior to meeting.

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

.3 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 Execution

3.1 NOT USED

END OF SECTION

PART 1 GENERAL

1.1 Administrative

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

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

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

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

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

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

.7 Verify field measurements and affected adjacent Work are co-ordinated.

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

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

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

1.4 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.

.3 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of New Brunswick, Canada.

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

. 5 Allow ten days for Departmental Representative's review of each submission.

.6 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.

.7 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.

.8 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.

.9 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.

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

. 11 Submit 3 prints and one electronic copy of shop drawinqs for each requirement requested in

specification Sections and as Departmental Representative may reasonably request.

.12 Submit one electronic copy 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.

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

.14 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, two 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.

.15 The review of shop drawings by Parks Canada Agency (PCA) is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that PCA 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.

1.8 Certificates and Transcripts

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

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

2 PRODUCTS

2.1 NOT USED

. 1 Not Used.

3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

END

1 General

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 provisions of occupational health and safety statutes and regulations that apply to the work, and;
- .3 Knowledgeable about potential or actual danger to health and safety associated with the work.

.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 working days of notification of Bid Acceptance. Provide 3 copies.
- .2 Departmental Representative will review Health and Safety Plan and provide comments.
- .3 Revise the plan as appropriate and resubmit within 5 work days after receipt of comments.
- .4 Departmental Representative's review and comments made of the plan shall not be construed as an

endorsement, approval or implied warranty of any kind by Canada and does not reduce Contractor's overall responsibility for Occupational Health and Safety of the work.

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

.3 Submit name of designated Health and 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 in 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 New Brunswick, and Regulations made pursuant to the Act.

.2 Comply with Canada Labour Code – Part II (entitled Occupational Health and Safety) and the Canada Occupational Health and Safety regulations (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/ne.html

.3 A copy may be obtained at:
Canadian Government Publishing Public Works & Government Services Canada Ottawa, Ontario, K1A 0S9 Tel: (816) 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 Municipal by-laws and ordinances.

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

.5 Maintain Worker's 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 or 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 50 00 for minimum acceptable requirements.

.2 Post signage at entry points and other strategic locations indicating restricted access and conditions for access.

.3 Use professionally made signs with bilingual message in the 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, 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 Working in Traffic (marine and vehicular) .
    .2 Working adverse Weather Conditions .
    .3 Working near wildlife .
    .4 Working on uneven surfaces
    .5 Working with tides

.2 Facility on-going operations:
- .1 The Contractor will co-operate with users of existing facilities. Consult with the Departmental Representative for site access limitations.
- .2 Should interference occur, take directions from Departmental Representative.
- .3 Do not unreasonably encumber site with materials.
- .4 Move stored products or equipment which interfere with operations.
- .5 Comply with all regulations and authorities having jurisdiction over the work.

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

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

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

1.11 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 .
- .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 firefighting equipment and other related data .
- .3 Name, duties and responsibilities of persons designated as Emergency Warden(s) and deputies .
- .4 Emergency Contacts: name and telephone number of officials from:
  - .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 PCA 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 and hearing protection .

. 2 Immediately report unsafe condition at site, near-miss accident, injury and damage .

. 3 Maintain *site* and storage, areas in a tidy condition free of hazards causing injury .

. 4 Obey warning signs and safety tags .

. 2 Brief persons of disciplinary protocols to be taken for non compliance. Post ruleson 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 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.

1.20 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.

1.21 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.

1.22 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 Fire and Safety Requirements
.4 Special Procedures on Lockout Requirements.

END OF SECTION

1.0 GENERAL

1.1 Related Requirements

.1 05 50 00 Metal Fabrication
.2 06 10 00 Rough Carpentry
.3 31 11 00 Sitework Demolition, Removals and Salvage
.4 31 15 53 Erosion and Sediment Control
.5 31 23 10 Excavation and Beach Fill
.6 31 32 19 Geogrid Composites
.7 31 32 21 Geotextiles
.8 31 66 15 Helical Foundation Piles
.9 35 31 24 Rock Revetment and breakwaters

1.2 References

.1 Reference Standards:
  .1 U.S. Environmental Protection Agency (EPA)/Office of Water
    .1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.
  .2 EPA General Construction Permit (GCP) 2012.

.2 New Brunswick Department of Transportation and Infrastructure Standard Specifications (most recent version):
  .1 NBDTI Standard Specification Division 600-Environmental.
  .2 The New Brunswick Environment Act and Regulations pursuant to the Act.
  .3 The Erosion and Sedimentation Control Handbook for Construction Sites.
  .4 CWRS Erosion and Sediment Control Course and binder.

.3 Canadian Environmental Assessment Act (most recent version).

.4 WHMS: Workplace Hazardous Materials Information System, Health Canada.

.5 Transportation of Dangerous Goods Act. Transport Canada, updated 2008-02-21.

.6 Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters, Department of Fisheries and Oceans Canada, 1998.

.7 MBCA: Migratory Birds Convention Act, Environment Canada, 1994.

.8 Canadian Coast Guard Regulations, Department of Fisheries and Oceans Canada.

.9 Canadian Shipping Act, Transport Canada, 2001.

.10 AWPA: American Wood Preserver Association.

.11 Basic Impact Assessment (BIA).

.12 National Parks Act.

1.3 Definitions

.1 Hazardous Material: Product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to the environment or adversely affect health of persons, animals, or plant life when released into the environment.

.2 Wetlands: land where the water table is at, near or above the surface or which is saturated for a long enough period to promote such features as wet-altered soils and water tolerant vegetation. Wetlands include organic wetlands or "peatlands," and mineral wetlands or mineral soil areas that are influenced by excess water but produce little or no peat.

.3 Watercourse: refers to the bed and shore of a river, stream, lake, creek, pond, marsh, estuary or salt-water body that contains water for at least part of each year.

.4 Alien species: refers to a species or subspecies introduced outside its normal distribution whose establishment and spread threaten ecosystems, habitats or species with economic or environmental harm.

.5 Buffer zone: a vegetated land that protects watercourses from adjacent land uses. It refers to the land adjacent to watercourses, such as streams, rivers, lakes, ponds, oceans, and wetlands, including the floodplain and the transitional lands between the watercourse and the drier upland areas.

.6 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.7 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.4 Transportation

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

.2 Do not overload trucks when hauling material. Secure contents against spillage.

.3 Maintain trucks clean and free of mud, dirt and other foreign matter.

.4 Avoid potential release of contents and of any foreign matter onto highways, roads and access routes used for the Work. Take extra care when hauling dredged material and other hazardous materials. Immediately clean any spillage and soils.

.5 Before commencement of work, advise the Departmental Representative of the existing roads and temporary routes proposed to be used to access work areas and to haul material to and from the site, including roads to the dredged disposal field.

1.5 Work Adjacent To Waterways

.1 The Contractor is required to install, inspect and maintain in good working order temporary erosion, siltation and pollution control features, as directed by Departmental Representative. These devices are to be removed in proper manner upon completion of project.

.2 Do not use waterway beds for borrow material.

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

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

.5 Do not operate construction equipment in waterways.

.6 Works performed in and around waterways will be carried out in accordance with regulations of authorities having jurisdiction.

.7 Cuts and fills adjacent to waterways are to be stabilized, and ditch run-outs constructed to prevent entry of silt into waterways. In vicinity of stream banks, maintain as much of the existing vegetation as possible.

1.6 Hazardous Material Handling

.1 Handle and store hazardous materials on site in accordance with WHMIS procedures and requirements.

.2 Store all hazardous liquids in location and manner to prevent their spillage into the environment.

.3 Maintain written inventory of all hazardous material kept on site. List product name, quantity and storage date.

.4 Keep MSDS data sheets on site for all items.

1.7 Petroleum, Oil and Lubricants

.1 Comply with Federal and Provincial laws, regulations, codes and guidelines for the storage of fuel and petroleum products on site.

.2 Do not place fuel storage tanks and store fuel or other petroleum products within a 30 metre buffer zone of watercourses and wetlands. Do not fuel or lubricate equipment within this 30 metre buffer zone. Obtain approval from Departmental Representative of acceptable location on site for fuel storage and equipment service.

.3 Do not dump petroleum products or any other deleterious substances on ground or in the water.

.4 Be diligent and take all necessary precautions to avoid spills and contaminate the soil and water (both surface and subsurface) when handling petroleum products on site and during fueling and servicing of vehicles and equipment.

.5 Maintain on site appropriate emergency spill response equipment consisting of at least one 250-litre (55 gallon) over pack spill kit for containment and cleanup of spills.

.6 Maintain vehicles and equipment in good working order to prevent leaks on site.

.7 In the event of a petroleum spill, immediately notify the Departmental Representative and the Canadian Coast Guard (CCG) at 1-800-565-1633 (24 hour report line). Perform clean-up in accordance with all regulations and procedures stipulated by authority having jurisdiction.

1.8 Disposal of Waste

.1 Do not bury rubbish demolition debris and waste materials on site.

.2 Dispose and recycle demolition debris and waste materials in accordance with project waste management requirements specified in section 01 74 21.

.3 Do not dispose of hazardous waste, volatile materials (such as mineral spirits, paints, thinners etc) and

petroleum products into waterways, storm or sanitary sewers or in waste landfill sites.

.4 Dispose of hazardous waste in accordance with applicable federal and provincial laws, regulations, codes and guidelines.

.5 Concrete waste:

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

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

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

.4 Perform dumping of residual material and truck cleaning operations only at the concrete plant. Follow environmental regulations and good practices as approved by the Provincial Department of the Environment and other authorities having jurisdiction.

1.9 Water Quality

.1 Conduct excavation on beach in such a manner to limit turbidity and reduce sediment suspension in the water to an absolute minimum at all times.

.2 Where work may affect the water quality adjacent to water intake lines used by Lobster Holding Facilities, Fish Processing Facilities and other harbour users, schedule work in cooperation with the Harbour Authority as directed by Departmental Representative to minimize interference and impact to harbour users.

.3 Visually monitor the water turbidity of the surrounding areas adjacent to the work and up to the established dredge limit of 200 metre.

.1 Should excessive change occur in the turbidity beyond the dredge limit which differs from existing conditions of the surrounding water bodies, such as a distinct color difference; notify the Departmental Representative to obtain appropriate mitigation measures to be followed.

.4 Water contamination by preservative treated wood:

.1 Preservative treated lumber and timber, whether plant or site treated, shall be cured for a

minimum of 30 days from date of the treatment application before their installation in areas which will be in contact with the water.

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

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

.4 Wood treated with Chromate Copper Arsenate (CCA) or Ammoniac Copper Zinc Arsenate (ACZA) must be CSA or AWPA approved.

.5 Do not use timber and lumber treated with cresote, petroleum and pentachlorophenol for any part of the Work.

.5 Do not wash down equipment within a 30 metre buffer zone of wetland, watercourse or other identified environmentally sensitive area.

1.10 Socioeconomic Restrictions

.1 Abide by municipal and provincial regulations for any restrictions on work performed during the night time and on flood lighting of the site. Obtain applicable permits.

.2 Place flood lights in opposite direction of adjacent residential and business areas.

.3 Equip equipment and machinery with purposely designed mufflers to reduce noise on site to lowest possible level. Maintain mufflers in good operating condition at all times.

1.11 Bird and Bird Habitat

.1 Become knowledgeable with abide by the Migratory Birds Convention Act (MBCA) in regards to the protection of migratory birds, their eggs, nests and their young encountered on site and in the vicinity.

.2 Minimize disturbance to all birds on site and adjacent areas during the entire course of the Work.

.3 Do not approach concentrations of seabirds, waterfowl and shorebirds when anchoring equipment, accessing wharves or ferrying supplies.

.4 During night time work, position flood lights in opposite direction of nearby bird nesting habitat.

.5 Do not use beaches, dunes and other natural previously undisturbed areas of the site to conduct work unless specifically approved by the Departmental Representative .

.6 Should nests of migratory birds in wetlands be encountered during work, immediately notify Departmental Representative for directives to be followed.
.1 Do not disturb nest site and neighboring vegetation until nesting is completed.
.2 Minimize work immediately adjacent to such areas until nesting is completed.
.3 Protect these areas by following recommendations of Canadian Wildlife Service.

1.12 Fish and Fish Habitat

.1 Be aware of the risk for contamination of the fish habitat at the site as a result of alien species being introduced in the water.

.2 To minimize the possibility of fish habitat contamination, all construction equipment which will be coming into contact with water or watercourse during the course of the work, must be cleaned and washed to ensure that they are free of marine growth and alien species.
.1 Equipment shall include boats, barges, cranes, excavators, haul trucks and other all miscellaneous tools and equipment previously used in a marine environment.

.3 Cleaning and washing of equipment shall be performed immediately upon their arrival at the site and before use in or over the body of water.

.4 Conduct cleaning and washing operations as follows:
.1 Scrap and remove heavy accumulation of mud and dispose appropriately.
.2 Wash all surfaces of equipment by use of a pressurized fresh water supply.
.3 Immediately follow with application of a heavy sprayed coating of undiluted vinegar or other environmentally approved cleaning agent to

thoroughly remove all plant matter, animals and sediments.

.4 Check and remove all plant, animal and sediment matter from the all bilges and filters .

.5 Drain standing water from equipment and let fully dry before use.

.6 Upon removal from the water, drain standing water from equipment and let fully dry before removal off the site.

.5 Do not perform cleaning and wash down within a 30 metre buffer zone of a wetland, watercourse or other identified environmentally sensitive area.

.6 Record of Assurance Logbook:

.1 Maintain an on-going log of past and present usage and wash downs of all equipment to illustrate mitigation measures undertaken against fish habitat contamination by alien species.

.2 Write data in a hard cover bound logbook,

.3 Include the following:

.1 Date and location where equipment was previously used in a watercourse or wetland;

.2 Type of work performed.

.3 Dates of wash down for each piece of equipment;

.4 Cleaning method and cleaning agent(s) used.

.7 Keep Record of Assurance Logbook updated from project to project. Upon request, submit logbook to Departmental Representative for review.

. 8 Abide by requirements and recommendations of the Federal Department of Environment and the Department of Fisheries and Oceans - Habitat Protection and Sustainable Development Branch in cleaning and wash down of equipment.

1.13 Air Quality

.1 Keep airborne dust and dirt resulting from the work on site to an absolute minimum.

.2 Apply dust control measures to roads, parking lots and work areas.

.3 Spray surfaces with water or other environmentally approved product. Use purposely suited equipment or machinery and apply in sufficient quantity and

frequency to provide effective result and continued dust control during the entire course of the work.

.4 Do not use oil or any other petroleum products for dust control.

1.14 Fires

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

1.15 Environmental Protection Plan

.1 Submit to the Departmental Representative before the commencement of work on site an Environmental Protection Plan for review and approval that includes but is not necessarily limited to: floating silt booms as required, silt fences and temporary ground cover. Provide measures in accordance with Basic Impact Analysis (BIA) and Parks Canada Best Management Practices – Road, Highway, Parkway and Related Infrastructure.

.2 Environmental Protection Plan: include as applicable:
- .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
- .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
- .3 Names and qualifications of persons responsible for training site personnel.
- .4 Descriptions of Environmental Protection Personnel Training Program.
- .5 Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .6 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.
  - .1 Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
  - .2 Plan showing contractors proposed access road/method of entering and existing site

including plan to protect existing vegetation.

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

.8 Non-Hazardous Solid Waste Disposal Plan identifying methods and locations for solid waste disposal including clearing debris and disposing unsuitable materials.

.9 Air Pollution Control Plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.

.10 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.11 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

END OF SECTION

PART 1 GENERAL

1.1 References and Codes

.1 Perform work in accordance with National Building Code of Canada (NBC) including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:
.1 contract documents
.2 specified standards, codes and references documents.

1.2 Building Smoking Environment

.1 Comply with smoking restrictions and municipal by-laws.

1.3 Archaeological Status

.1 Departmental Representative assigned to this project shall have authority to suspend work on this project in the event that directions and specifications are not followed or when there is a threat to resources.

1.3 National Parks Act

.1 Perform work in accordance with National Parks Act when projects are located within boundaries of National Park.

2.0 Products

2.1 Not Used
.1 Not used.

3.0 Execution

3.1 Not Used
.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 References

.1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 2-94, Stipulated Price Contract

1.2 Inspection

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

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

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

.4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. Is such work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.04 Independent Inspection Agencies

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

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

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

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

1.05 Access to Work

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

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

1.06 Procedures

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

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and material on site. Provide sufficient space to store and cure test samples.

1.07 Rejected Work

.1 Remove defective work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which

has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

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

.4 If in opinion of Departmental Representative it is not expedient to correct defective work or work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.08 Reports

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

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

1.09 Tests and Mix Designs

.1 Furnish test results and mix designs as requested.

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

2.0 Products

2.1 NOT USED

.1 Not used.

3.0 Execution

3.01 NOT USED

.1 Not used.

END OF SECTION

1 General

1.1 References

.1 U.S. Environmental Agency (EPA) / Office of Water
.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.2 Action and Informational Submittals

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

1.3 Installation and Removal

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

.2 Remove from site all such work after use.

1.4 Dewatering

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

1.5 Water Supply

.1 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.

1.6 Temporary Power and Light

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

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

.3 Provide and maintain temporary lighting throughout project.

1.07 Temporary Communication Facilities

.1 Provide and pay for temporary telephone, fax, data hook up, lines, equipment necessary for own use and use.

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

2.0 Products

2.1 NOT USED

.1 Not used.

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, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

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

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

END OF SECTION

PART 1 GENERAL

1 General

1.2 References

.1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 2-1994, Stipulated Price Contract.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
.2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.

.4 Canadian Standards Association (CSA International)
.1 CSA-A23.1/A232.04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CSA-0121-M1978 (R2003), Douglas Fir Plywood
.3 CAN/CSA-S269.2-M1987 (R2003), Access Scaffolding for Construction Purposes
.4 CAN/CSA-Z321-96 (R2001), Signs and Symbols for the Occupation Environment.

.5 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 Action and Information Submittals

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

1.4 Installation and Removal

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

.2 Identify areas which have to be graveled to prevent tracking of mud.

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

.4 Remove from site all such work after use.

1.5 Site Storage/Loading

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premise with products.

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

1.6 Construction Parking

.1 Parking locations have to be discussed and approved by Departmental Representative.

.2 Provide and maintain adequate access to project site.

1.7 Security

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

1.8 Offices

.1 Provide office heated to 22 degrees C, lights 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

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

.3 Subcontractors to provide their own offices as necessary. Direct locations of these offices.

.4 Department Representative’s Site office.
- .1 Provide temporary office for Departmental Representative.
- .2 Inside dimensions minimum 3.6 m long X 3 m wide X 2.4 m high, with floor 0.3 m above grade, complete with 4 50% opening windows and one lockable door.

.3 Insulate building and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.

.4 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.

.5 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10% upward light component.

.6 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.

.7 Equip office with 1 X 2 m table, 4 chairs, 6 m of shelving, 300 m wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.

.8 Provide power, phone, fax and Wi-Fi service.

.9 Maintain in clean condition.

5

1.9 Equipment, Tool and Materials Storage

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

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

1.10 Sanitary Facilities

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

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

1.11 Construction Signage

.1 Provide and erect project sign, within 3 weeks of signing Contract, in a location designated by Departmental Representative.

.2 Construction sign to the New Brunswick Work Area Traffic Control Manual.

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

.4 Direct requests for approval to erect Consultant/Contractor signboard to Departmental

Representative. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages.

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

.6 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.

1.12 Protection and Maintenance of Traffic

.1 Provide access and maintain traffic as described in Section 01 55 26.

.2 Maintain and protect traffic on affected roads during construction period.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.

.4 Protect travelling public from damage to person and property.

.5 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.6 Construct access and haul roads as necessary.

.7 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.8 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.9 Dust control; adequate to ensure safe operation at all time.

.10 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

.11 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.12 Provide snow removal during period of Work.

.13 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.13 Clean-Up

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

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

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

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

2 Products

2.1 NOT USED

.1 Not used.

3 Execution

3.1 Temporary Erosion and Sedimentation Control

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge or soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.

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

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

END OF SECTION

1.1 Description

.1 This section is to provide traffic control pursuant to the New Brunswick Work Area Traffic Control Manual (WATCM).

.2 Given the nature of the highway, its critical transportation link, effect on motorists, etc., it is imperative that Park personnel be kept notified as to the number of construction areas, their locations, duration of work, etc. This information must be provided by the contractor to the Park Communications staff on an ongoing basis.

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

.4 The departmental Representative reserves the right to direct the contractor to reduce either the number of length of traffic control work areas during peak traffic volumes or when cumulative delays exceed the specified maximum.

.5 Two lanes of unrestricted access must be maintained throughout construction except for limited single lane closures, which must be approved by the Departmental Representative.

1.2 Related Work

.1 Section 01 11 10 – Summary of Work

.2 Section 01 35 29 – Health and Safety Requirements

1.3 Reference Standard

.1 Regulate traffic in accordance with the requirements of the WATCM, distributed by the New Brunswick Department of Transportation & Infrastructure and Parks Canada regulations.

.2 The Departmental Representative reserves the right to direct the contractor to reduce either the number or length of traffic control work areas during peak traffic volumes or when cumulative delays exceed the specified maximum.

1.4 Definitions

.1 Traffic delay: period of time for which vehicle(s) is stopped or delayed in travelling through the contract limits due to the performance of Work on this project. Traffic delay applies to both single lane operation and road closure.

.2 Road closure: period of time for which the road within the contract limits is not open the public.

1.5 Measurement for Payment

.1 See Section 01 29 00 - Project Particulars and Measurement.

1.6 Operational Requirements

.1 Maintain existing conditions for marine and road traffic throughout period of contract except that, when required for construction under contract and when measures have been taken as specified and approved by Departmental Representative to protect and control marine and public traffic.

.2 Maintain existing conditions for traffic crossing right-of-way.

.1 Delays to public traffic: Maximum 10 minutes.

1.7 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 traveled way:

.1 Place equipment in position to present minimum of interference and hazard to traveling public.

.2 Keep equipment units as close together as working conditions will permit and preferably on same side of traveled way.

.3 Do not leave equipment on traveled way overnight.

.3 Do not close any lanes of roadway without approval of Department Representative. Before re routing traffic, erect suitable signs and devices in accordance with instructions contained in the TWTCM. Provide sufficient crushed gravel to ensure

a smooth riding surface during work.

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

.5 Limit construction to maintain at least one lane of traffic at all times and two lanes after work hours.

.6 When directed by Department 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 Department Representative.

1.8 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 NB WATCM.

.4 Place signs and other devices in locations recommended in the NB WATCM.

.5 The contractor shall provide an Accredited Sign Supervisor, who has successfully completed the Temporary Workplace Traffic Control Training Course, to be on site at all times when active construction is taking place. The Accredited Traffic Control Sign Supervisor will be responsible to supervise the placement and dismantling of all temporary condition signs and devices that indicate to the road user that highway construction activity exist and also to ensure that proper traffic

control procedures are carried out in accordance with the WATCM. The Accredited Sign Supervisor is considered part of the contractor's supervision and administration staff and compensation the provision this individual is considered incidental to the work.

.6 A traffic control plan must be approved by the engineer prior to commencing any work.

.7 Continually maintain traffic control devices in use by:

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

.2 Removing or covering signs which do not apply to conditions existing from day to day.

1.9 Control of Public Traffic

.1 Provide traffic control personnel who have a valid provincial license and trained in accordance with and properly equipped as specified in the WATCM, in following situations:

.1 When public traffic is required to pass working vehicles or equipment which may block all or part of traveled 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 traveled way over brow of hills, around sharp curves or at other locations where oncoming traffic would not otherwise have adequate warning.

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

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

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

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

.2 Provide pilot vehicles which will be in continual operation and where public traffic must use particularly hazardous routes or where traffic is required to remain in one lane or change periodically from one lane to another or negotiate sections of construction at restricted speed.

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

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

1.10 Pilot Vehicles

.1 No separate Payment for pilot vehicle.

.2 Where required to maintain traffic flow and as directed by the Department Representative, provide sufficient pilot vehicles to keep a steady and controlled flow of traffic moving around or through construction area with the maximum delay to traffic limited to 10 minutes.

.3 Pilot vehicles to be operated continuously in conjunction with traffic control personnel stationed at each end of restricted work area.

.4 Equip pilot vehicles with:

.1 A large sign(s) with minimum 200 mm high letters designating vehicle as a pilot vehicle, showing in both directions.

.2 An arrow board.

.3 Flashing orange lights mounted on roof at either side so as to be clearly visible in both directions.

.4 Signs and flashing lights to be used both day and night.

.5 Vehicle to be capable of transporting up to five cyclists and their bicycles thru the work

zone.

1.11 Traffic Management Plan Requirement

.1 Contractor to provide a detailed traffic management plan, prior to construction.

.2 Traffic control measures are summarized as follows:

.1 The roadway will remain open to the public at all times and will be a contract obligation.

.2 Complete road closures (both roads) will not be permitted.

.3 Escort vehicles will be used through construction during the summer season. Radio communications and one-way traffic controls will be used during the shoulder seasons.

.3 The required traffic measures will be included in the construction contract. A detailed construction sequencing and Traffic Management Plan will be required prior to construction. On-going information and communications will be maintained throughout the construction period.

END OF SECTION

PART 1 GENERAL

1 General

1.1 References

.1 Canadian General Standards Board (CGSB)
.1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel
.2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.

.2 Canadian Standards Association (CSA International)
.1 CSA-01210M1978 (R2003), Douglas Fir Plywood.

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

1.2 Installation and Removal

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

.2 Remove from site all such works after use.

1.3 Guard Rails and Barricades

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

.2 Provide as required by governing authorities.

1.4 Access to Site

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

1.5 Public Traffic Flow

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and

flares, lights, or lanterns as required to perform Work and protect public.

1.6 Fire Routes

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

1.7 Protection for Off-Site and Public Property

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

.2 Be responsible for damage incurred.

1.8 Water Management and Disposal

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

2 Products

2.1 NOT USED
.1 Not used.

3 Execution

3.1 NOT USED
.1 Not used.

END OF SECTION

1 General

1.1 References

.1 Canadian Construction Documents Committee (CCDC)
.1 CCDC 2-94, Stipulated Price Contract.

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

.3 Conform to these reference standards, in whole or in part as specifically requested in specification.

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

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

1.2 Quality

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

.2 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 disputes arise as to quality or fitness of products, decision rests strictly with

Departmental Representative based upon requirements of Contract Documents.

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

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

1.3 Availability

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitution 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 commencement of Work and should it subsequently appear that work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 Storage, Handling and Protection

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

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

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

.4 Store Cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or motor materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, timber products 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.

1.5 Transportation

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

1.6 Manufacturer’s Instructions

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

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

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

1.7 Quality of Work

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

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

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

1.8 Co-Ordination

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

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

1.9 Remedial Work

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

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to

neither damage not put at risk any portion of work.

1.10 Location of Fixtures

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Departmental Representative of conflicting installation. Install as directed.

1.11 Fastenings

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.16 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 wharf and park 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.

2 Products

2.1 NOT USED
.1 Not used.

3 Execution

3.1 NOT USED
.1 Not used.

END OF SECTION

Part 1 General

.1 Contractor to identify existing survey control points and property limits as identified on the drawings.

1.1 Qualifications of Surveyor

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

1.2 Survey Reference Points

.1 Existing base horizontal and vertical control points are designated on drawings.

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

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

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

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

1.3 Survey Requirements

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

.2 Before commencing work, establish lines and levels, locate and lay out, by instrumentation.

.3 Stake for grading, fill and topsoil placement and landscaping features.

.4 Stake slopes and berms.

.5 Establish pipe invert elevations.

.6 Establish and maintain labelled survey stakes every 10 metres.

1.4 Existing Services

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

.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.5 Location of Equipment and Fixtures

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.6 Records

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

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

1.7 Action and Informational Submittals

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

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

.3 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform to Contract Documents.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 General

1.1 References

.1 Canadian General Standards Board (CGSB)
.1 CGSB 2-94, Stipulated Price Contract.

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

1.2 Project Cleanliness

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

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

.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 marked separate bins for recycling. Refer to Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

.6 Dispose of waste materials and debris at designated dumping areas on Crown property, off site.

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

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

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

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

1.3 Final Cleaning

.1 When work is substantially performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining work.

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

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

.4 Remove waste products and debris.

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

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

.7 Remove dirt and other disfiguration from exterior surfaces.

.8 Seep and wash clean paved areas.

1.4 Waste Management and Disposal

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

2 Products

2.1 Not Used

.1 Not used.

3 Execution

3.1 Not Used.

.1 Not Used

END OF SECTION

1 General

1.1 Waste Management Goals

.1 Accomplish maximum control of solid construction waste.

.2 Preserve environment and prevent pollution and environment damage.

1.2 Definitions

.1 Class III: non-hazardous waste – construction renovation and demolition waste.

.2 Inert fill: inert waste – exclusively asphalt and concrete.

.3 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.

.4 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.

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

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

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

.8 Separate Condition: refers to waste sorted into individual types.

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

1.3 Materials Source Separation Program (MSSP)

.1 Prepare MSSP and have ready for use prior to project start-up.

.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 or reusable and recyclable materials.

.4 Provide containers to deposit reusable and recycle 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.

1.4 Storage, Handling and Protection

.1 Store, materials to be reused, recycled, and salvaged in locations as directed by Departmental Representative.

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

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

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

.5 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.

1.5 Disposal of Wastes

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste, volatile materials, mineral spirits, oil, 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.

1.6 Use of Site and Facilities

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

1.7 Scheduling

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

2 Products

2.1 Not Used

.1 Not used.

3 Execution

3.01 Application

.1 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.

3.03 Diversion of Materials

.1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative, and consistent with applicable fire regulations.

.1 mark containers or stockpile areas.

.2 Provide instruction on disposal practices.

.2 On-site sale of salvaged, recovered, reusable, recyclable materials is not permitted.

END OF SECTION

1 General

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

.2 Departmental Representative Inspection:
  .1 Departmental Representative and Contractor to inspect work and identify defects and deficiencies.
  .2 Contractor to correct work as directed.

.3 Completion Tasks: submit written certificates in English or French that tasks have been performed as follows:
  .1 Work: completed and inspected for compliance with Contract Documents.
  .2 Defects: corrected and deficiencies completed.
  .3 Work: complete and ready for final inspection.

4. Final Inspection:
  .1 When completion tasks are done, request final inspection of work by Departmental Representative, and Contractor.
  .2 When work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

5. Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

. 6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted Declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period

unless required otherwise by lien statute of Place of Work.

.7 Final Payment:
.1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

.8 Payment for Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.4 Final Cleaning

.1 Clean in accordance with Section 01 74 00 – Cleaning.
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

2 Products

2.1 Not Used.
.1 Not used.

3 Execution
3.1 Not Used.
.1 Not used.

END OF SECTION

1 General

1.1 Administrative requirements

.1 Pre-warranty meeting:

.1 Convene meeting one week prior to contract completion with contractor's representative and Departmental Representative, in accordance with Section 01 31 19 – Project Meetings to:

.1 Verify project requirements.

.2 Departmental Representative to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for types of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 Action and Informational Submittals

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

1.3 As-Built Documents and Samples

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

.1 Contract Drawings

.2 Specifications.

.3 Addenda.

.4 Change orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's Certificates.

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

.3 Label record documents and file in accordance with Section number listing in List of Contents of this project manual.
.1 Label each document "PROJECT RECORD" in neat, large printed letters.

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

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

1.4 Recording Information on Project Record Documents

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

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

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

.4 Contract Drawings and Show Drawings: mark each item to record actual construction, including:
.1 Measured horizontal and vertical locations of underground utilities and

appurtenances, referenced to permanent surface improvements.

.2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.3 Field changes of dimension and detail.

.4 Changes made by change orders.

.5 Details not on original Contract Drawings.

.6 References to related shop drawings and modifications.

5. Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

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

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

1.5 Final Survey

.1 Submit final site survey certificate in accordance with Section 01 33 00 – Submittal Procedures, certifying that elevations and locations of completed work are in conformance, or non-conformance with Contract Documents.

2 Products

2.1 Not Used.

.1 Not used.

3 Execution

3.1 Not Used.

.1 Not used.

END OF SECTION

Part **1** GENERAL

1.1 Reference Standards

.1 Do welding in accordance with CSA W59-1984 unless specified otherwise.

1.2 Shop Drawings

1. Submit shop drawings.

2. Indicate materials, core thickness, finishes, connections, joints, methods of anchorage, number of anchors, supports, reinforcements, details and accessories.

Part 2 PRODUCTS

2.1 Materials

1. Steel section and plates: to CAN 3-G40.21-M81, Grade 300W.

2. Steel pipe: to ASTM A53-84A standard weight.

3. Welding materials: to CSA W59-1984.

4. Bolts and anchor bolts: to ASTM A307-84A.

5. Galvanizing: hot-dipped galvanizing with minimum zinc coating of 700 g/m^2 to CSA G164- M1981.

6. Shop coat primer: CGSB 1-GP-40M.

7. Zinc primer: zinc rich, ready mix to CGSM 10GP-181M + Amdt. – Mar. 78.

8. Grout: non-shrink, non-metallic, flowable, 24h, Mpa 15, pull-out strength 7.9 Mpa.

9. Railing wire mesh to be stainless steel type 316 with 3mm wire diameter of 0,44.16/sq ft.

2.2 Fabrication

.1 Fabricate work square, true, straight, and accurate to required size, with joints closely fitted and properly secured.

.2 Where possible, fit and shop assemble, ready for erection.

.3 Use self-tapping shake-proof counter-sunk flat headed screws on items requiring assembly by screws or as indicated. Use screws for interior metal work. Use welded connections for exterior metal work unless otherwise approved by Architect.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush. Seal exterior steel fabrications to provide corrosion protection in accordance with CAN3-S16.1-M84.

Part 3 EXECUTION

3.1 Erection

1. Erect metal work square, plumb, straight and true, accurately fitted, with tight joints and intersections.

2. Provide suitable means of anchorage acceptable to the Departmental Representative, such as dowels, anchor clips, bar anchors, expansion bolts and shields, toggles.

3. Make field connection with high tensile bolts to CAN 3-S16.1-M84 or weld.

4. Hand items over for casting into concrete or building into masonry, to appropriate trades together with setting templates.

5. Touch up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
6. Touch up galvanized surfaces with zinc rich primer where burned by field welding.

END OF SECTION

Part 1 General

1.1 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM 153M-09, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

.2 ASTM F1997 Standard Specification for Driven Nails, Spikes, and Staples.

.3 ASTM A449 Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use

.4 ASTM F2329-13 Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners

.2 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber.

.3 Canadian Standards Association (CSA International)

.1 CSA O80.02 Series-08, Wood Preservation.

1.2 Quality Assurance

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

1.3 Submittals

.1 Submit proof of compatibility between Alkaline Copper Quaternary (ACQ) pressure treated lumber and fasteners to be utilized.

Part 2 Products

2.1 Lumber Material

.1 Lumber: unless specified otherwise, softwood, No. 1 or No. 2 grade, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
.1 CAN/CSA-O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Pressure treated material to be Alkaline Copper Quaternary (ACQ).

2.2 Float Devices

.1 Virgin polyethylene with ultra violet inhibitors, one piece shell construction conforming to ASTM D1998-06 (Falling Dart Impact Test).

.2 Expanded polystyrene (EPS) foam filled.

.3 Wall thickness minimum 3mm.

.4 Exterior dimensions: 1800mm x 1200mm x 400mm

.5 Buoyancy: 826 kg

.6 Warranty: 15 year float drum warranty

.7 All mounting hardware and dock connections as recommended by float supplier.

2.3 Accessories

.1 Nails, spikes and staples: to ASTM F1997.

.2 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers galvanized.

.3 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

2.4 Finishes

.1 Galvanizing: to ASTM F2329-13, use hot dip galvanized fasteners for exterior work and pressure- preservative treated lumber.

2.5 Wood Preservative

.1 Preservative: to CSA-O80.20 Series, water-borne, for clear finish.

Part **3** Execution

3.1 Application of Preservative

.1 Treat lumber to CAN/CSA- O80 Series.

.2 Following water-borne preservative treatment, dry material to maximum moisture content of 19%.

.3 Treat all field cuts with two (2) coats of clear copper napthenate or 5% pentachlorophenol solution, water repellent preservative.

3.2 INSTALLATION

.1 Install members true to line, levels, and elevations. Space uniformly.

.2 Construct continuous members from pieces of longest practical length.

.3 install spanning members with "crown edge" up.

.4 Treat field cuts in accordance with Article 3.1.3.

3.3 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

END OF SECTION

PART 1 GENERAL

1.1 References

.1 Measurement Canada

.2 Weights and Measurement

1.2 Action and Information Submittals

.1 Submit proof of certification of scales.

PART 2 PRODUCTS

2.1 Materials

.1 Weigh scale to be of the size to safely weigh loads pertinent to the project.

PART 3 EXECUTION

3.1 Installation

.1 Weigh scale to be located at a location suitable for project use. Weigh scales not to be located on Fundy National Park property.

.2 The foundation and ramp for the scale shall be adequate to support the largest load to be scaled without movement or deflection in the foundation or weighbridge. The scale shall be installed so as to prevent the ramp from binding against the scale platform. Each ramp shall be constructed straight and to the same elevation as the scale platform for a distance equal to at least the length of the platform.

.3 The scale shall be kept level and must be able to withstand loads up to the device capacity without movement or deflections. If ground or weather conditions cause movement or deflection, operations shall be suspended. Shims and other means of height adjustment shall be made of any suitable material that resists compression at least as well as the main support structure, and shall fill the entire void area under the level stands or load cell bases to ensure that the scale remains stable and level under normal conditions of use of the scale.

3.2 Operation

.1 An operator will direct the operation of the scale and issue weigh tickets showing gross, tare and net weight for each load of material. The tare weight shall be established when hauling begins on a project, and thereafter as frequently as directed by the Departmental Representative.

.2 The scale platform and mechanism shall be kept clean and maintained free of gravel, mud, snow, ice or other deleterious materials.

3.3 Scale House

.1 The Contractor shall provide a scale house meeting the following minimum requirements:
- .1 A minimum work area of 2.5 m by 1.8 m with a minimum height clearance of 2.1 m, containing a functional desk and chair.
- .2 A minimum room temperature of 20°C, and adequate ventilation.
- .3 Sufficient lighting to the level of intensity and of the quality defined by the standards for the type of Structure defined and the Work being performed.
- .4 An approved and maintained first-aid kit mounted on the wall at an accessible location on the interior house.

.2 The Contractor shall provide a safe means of access to and egrass from the scale house.

.3 All roads leading to the scale house shall be maintained so as to provide a safe passage for vehicles, and dust control shall be maintained within 30 metres of the scale house.

.4 The Contractor shall provide toilet facilities in close proximity to the scale house for the weigher.

END OF SECTION

PART 1 - GENERAL

1.1 Description of the Work

.1 This Section includes but is not limited to the following:

.1 All normal removals as required to complete the work. All items to be verified by a site visit prior to submission of a tender.

.2 Removal of any/all materials within the limits shown on the plans including toe-in armourstone.

.3 Removal and replanting of marram grass.

.4 Salvage, screening, sorting and stockpiling and re-use of beach sand, gravel and cobble as defined in Section 31 23 10.

.5 Removal and off-site disposal of uncovered fabric, as well as unsecured SSP and rods.

.6 Partial removal of existing viewing platform and all modifications required to tie-in new and existing platform.

.7 Removal and/or shaping of material around existing sewers and culvert pipe outlets. Removal and disposal of broken sections of existing pipes to permit connections and extensions.

.8 Removal and replanting of marram grass.

1.2 Submissions

.1 Methodology:

.1 When requested provide methodology for carrying out the work

.2 Provide submission in accordance with Section 01 33 00.

1.3 Protection

.1 Prevent movement, settlement or damage of adjacent structures. Provided bracing and shoring as required. In event of damage, immediately replace such items or make repairs to approval of Departmental Representative and at no

additional cost to Departmental Representative.

.2 Prevent debris from going adrift and becoming a menace to navigation.

.3 All damage to existing structures, roadways, pipelines, electrical systems not specified for removal to be repaired at the Contractor's cost to the satisfaction of the Departmental Representative.

1.4 Measurement for Payment

.1 Sitework, demolition and removals will be measured in accordance with the lump sum item provided in Section 01 29 00.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

3.1 Preparation

.1 Inspect site and verify with Departmental Representative items designated for removal and items to be preserved.

.2 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.

.3 Provide temporary power and lighting as shown on the plan or as required by the Departmental Representative.

.4 Should existing conditions such as beach topography vary significantly from those shown on the Project Drawings, inform the Departmental Representative who will provide direction.

3.2 Removal

.1 Remove items indicated on drawings.

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

.3 At end of each day's work, leave work in safe condition so no part is in danger of toppling or falling.

3.3 Disposal of Salvage Material

.1 Disposal of materials not designated for salvage or re-use in work, will be the contractor's responsibility, and must be disposed of off-site.

.2 Transport and disposal of material in an environmentally acceptable manner to the satisfaction of the Departmental Representative, and in accordance with any local, Municipal, Provincial and Federal restrictions and regulations.

3.4 Salvaging

.1 Stockpile salvageable material on-site.

.2 Protect salvaged material from the environment by placing a polyethylene liner or tarp over the stockpile.

3.5 Harvesting and Replanting of Marram Grass

.1 Harvest marram grass plugs and immediately replant and flag. Have approved by the Departmental Representative.

.2 Harvest marram grass plugs under direction of the Departmental Representative from the vegetated area indicated on the drawings to the East of the existing boardwalk.

.3 Give two (2) weeks written notice prior to removal of marram grass plugs to arrange for Department Representative on-site.

.4 Complete spring harvesting and replanting operations at the end of construction prior to mid-May.

.5 Keep plants and roots moist before and during planting. Use wet burlap or approved equivalent to retain moisture.

.6 Harvest marram grass plugs by manual methods in small clumps ranging from one

single stem to 5 to 10 stems. Plant each clump in a separate hole excavated deep enough to hold the harvested root ball, approximately 18 to 30 centimetres deep. Take every precaution to excavate the entire root ball in one clump.

.7 Replant harvested marram grass plugs in new beach fill area as indicated on drawing immediately after harvesting. The replanting operation must follow a staggered grid pattern to reflect natural distribution within the project limits. Clumps must be spaced at a maximum distance of 45 centimetres from each other. Compact the sand firmly around plants.

.8 Protect new plantings from foot traffic by placing protective fencing around planted area until the site becomes stabilized.

3.6 Restoration

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

.2 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work. Match condition of adjacent, undisturbed areas.

END OF SECTION

PART 1 - GENERAL

1.1 General

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

.2 Do erosion control in accordance with approved Environmental Protection Plan.

PART 2 - PRODUCTS

2.1 Sediment Control Fence

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

PART 3 - EXECUTION

3.1 Temporary Soil Covers

.1 If blown straw is used as temporary soil cover for sediment and erosion control of exposed soils, a 100% cover should be required to ensure soil erosion is minimized.

.2 Where blown straw is used as a mulch to protect new seeding, the thickness of the application needs to be controlled to avoid smothering of the seed. If used in lieu of environmental blanket, apply straw and hay blown onto the seeded areas uniformly in distribution and thickness. Thickness would depend on site conditions, seed mix, slope and soil type.

3.2 Sediment Control Fence

.1 Attach fence with roofing nails and roofing tins. Provide wood strapping along top of fence.

.2 Excavate 150mm x 150mm trench along length of fence. Lay fabric bottom in trench and backfill with selected excavated material.

3.3 Maintenance Of Sediment Control Features

.1 Maintain siltation control features throughout the construction period. Repair damage to original condition.

.2 Remove accumulated sediment from behind silt fence.

.3 Maintain vertical alignment of silt fence and boom such that it is always plumb and straight.

3.4 Removal Of And Sediment Control Features

.1 Remove sediment control features at upon Completion of the Work.

END OF SECTION

PART 1 - GENERAL

1.1 Work Included

.1 This section specifies requirements for the excavation, segregation and stockpiling for all earthwork operations including beach sand, cobble and other excavated material. Work includes supply of products, excavating, transportation, segregating, stockpiling and protection of excavated beach material in areas indicated on the drawings, backfilling, compacting, shoring, dewatering and disposal of unsuitable and surplus material.

.2 It is anticipated that the beach excavation, as shown in the Contract Drawings, will provide sufficient and suitable material to meet the beach fill requirements of this project. In the event that the excavated materials are insufficient or unacceptable to meet the beach fill requirements of this project, additional beach fill material will be acquired from an offsite source.

1.2 Related Sections

.1 Environmental Procedures for Marine Work: Section 01 35 44

.2 Sitework, Demolitions, Removals and Salvaging: Section 31 11 00

1.3 Reference Standards

.1 ASTM D698-2012E2, Test Method for LaboratoryCompaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

.2 ASTM D4253-16, Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

.3 ASTM D4254-16, Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

.4 CAN/CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard for Concrete.

.5 Standard Specifications for Highway Construction, New Brunswick Department of Transportation and Infrastructure.

1.4 Definitions

.1 Rock: material which requires drilling, ripping or breaking up with power-operated tools for its removal, and boulders and pieces of concrete exceeding volume limits below. Frozen material will not be classified as rock.
.1 Volume limits:
.1 Trench excavation: 0.5 m^3
.2 Mass excavation: 1.0 m^3

.2 Topsoil: soil capable of supporting good vegetative growth and suitable for use in top dressing and landscaping.

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

.4 Unsuitable material: all material which is not suitable for use in work and must be disposed of.

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

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

.7 Beach fill, defined as sediment suitable for beach fill as indicated on drawings: hard, granular, founded or sharp material, well graded, free of silt impurities and chemicals or organic matter with median grain size D50 ranging from:
.1 0.2mm to 5mm for sand.
.2 4mm to 80mm for gravel.

1.5 Submittals

.1 Submit samples, sieve analysis, mix design, and the like as directed by the Departmental Representative.

1.6 Existing Conditions

.1 Should existing conditions such as beach topography vary significantly from those shown on the Project Drawings, inform the Departmental Representative who will provide direction.

.2 It is important to note that the beach is a dynamic system, and changes in topography will occur in response to waves and currents.

1.7 Beach Fill Material QA/QC Program

.1 Excavated Materials:
- .1 Only excavate beach materials from designated excavation areas only, as noted in the Contract Drawings.
- .2 Excavated materials are expected to consist of sand, gravel and cobble. Stop excavation and advise the Departmental Representative immediately if other materials are encountered.

.2 Materials Imported from Offsite Sources:
- .1 Establish and maintain, Quality Control for all beach fill production, hauling and placement under this contract to assure compliance with specifications.
- .2 Offsite Quality Assurance activities may be performed by the Departmental Representative. These activities are intended to provide independent observations of conformance to the requirements of this section prior to shipment of material to the site, and in no way relieves the Contractor of their responsibilities for Quality Control and in-place requirements.
- .3 The Departmental Representative may also perform Quality Assurance activities at the project site.

PART 2 - PRODUCTS

2.1 Materials

.1 Beach sand material must meet the following specifications:
- .1 Screened from local excavation, or imported from a local source.
- .2 Clean, light brown, poorly graded (well sorted), medium to coarse sand.
- .3 Median grain size (D50) of 1 to 3 mm.
- .4 Fines less than 5% (material less than 0.16mm).
- .5 Gravel less than 5% (material larger than 5mm).
- .6 Free of debris, sharp rocks, concrete rubble, clay and organic material.

.2 Gravel: site excavated and screened gravel, free of silt impurities and chemicals or organic matter and well graded from 5mm to 80mm.

.3 Cobble: site excavated and screened cobble, free of silt impurities and chemicals or organic matter and well graded from 80mm to 260mm.

.4 Fine material: site excavated and screened material finer than beach sand as defined in 2.1.1.

PART 3 - EXECUTION

3.1 Excavation

.1 Excavation and placement of beach fill materials may be a non-continuous operation that will progress in combination with the construction of the rubblemound structures. The timing of excavation, filling and grading operations may be influenced by the Contractor's other activities, and/or by weather conditions at the site. No separate or additional payment will be made for stoppages and resumption of beach excavation and placement operations.

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

.3 Excavate to base levels for quarried stone structure as shown in the Contract Drawings.

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

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

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

.7 Take care to protect excavated material from the elements.

.8 Do not stockpile materials alongside of excavations in such manner that stockpiling will cause side failure or bottom uplift.

.9 Replace over excavation of trench bottom with selected site material, granular material, or beach sand fill as directed.

.10 Notify the Departmental Representative whenever unsuitable materials are encountered and remove to depth and extent directed.

.1 If such work is due to nature of soil, the Departmental Representative and Contractor will jointly measure work for payment.

.2 If such work is due to any act or fault of Contractor remedial work is responsibility of Contractor.

.11 Segregate and stockpile beach fill in the areas indicated on the drawings. These materials will be used for separate functions as beach fill. Protect stockpiled beach fill by the use of tarps above and below the stockpile. Have the protection system approved by the Departmental Representative before the onset of winter. Replace any beach fill lost during the Work. No extra payment will be made for lost beach fill due to faulty protection.

.12 Dispose of unsuitable or surplus materials that cannot be used as beach fill off site.

3.2 Use of Suitable Excavated Material as Beach Fill

.1 Sort beach material excavated for toe placement by size to separate fine material, beach sand, gravel and cobble as defined in Article 2.1. Place cobble and gravels at the bottom of beach fill and sand on the top of beach fill. Sand layer under marram grass plantings area at elevation 13.0 chart datum must be a minimum of 1.0m thick. Import sand from off Site source matching the sieve requirements in Part 2 herein if there isn't enough site suitable excavated material.

.2 Place excess excavated cobble over the oceanside toe of the rock revetment and breakwater.

.3 Place excess excavated fine material, if any, in the following order of priority and

under the supervision of the Departmental Representative:

.1 On lagoon side of lagoon breakwaters provided it does not cover any existing vegetation;

.2 Over the oceanside toe of the rock revetment and breakwater.

3.3 Beach Fill and Placement

.1 The general intent of the work is to fill and grade the beach areas to the neat lines as shown on the Contract Drawings. It is noted that the shape and slope of the beach fill may vary due to natural processes. In particular, storm waves may cause changes to the shape and slope of the beach fill.

.2 Place fill material on the beach to the lines, grades and cross-sections as shown on the Contract Documents, unless otherwise provided for herein or directed by the Departmental Representative.

.3 The Departmental Representative reserves the right to vary the lines and grades of the beach fill from the cross sections shown on the Contract Drawings. The cross sections shown on the Contract Drawings are for the purposes of estimating the volume of fill required for the project, and will be used by the Departmental Representative in making any changes to the lines and grades.

.4 Provide the dressing specified below:

.1 Dressing for Verification – Immediately following placement of the beach fill, grade, level and dress the fill to meet the required elevations and dimensions shown on the Contract Drawings. Dressing for verification to include the removal of humps, depressions, undrained pockets, vehicle access ramps and other temporary works, and must be completed prior to the verification surveys being undertaken.

.2 Dressing for Final Acceptance – This final dressing is a requirement of the post construction cleanup. Grade the seaward slope of the beach fill down to a slope not steeper than ten (10)

horizontal to one (1) vertical. Remove grade stakes intact, and backfill any excavation required to remove the stakes.

.5 The top surface and seaside slope of the beach fill material to meet the tolerances specified herein.

.6 Compaction of beach fill is not required.

3.4 Unsuitable Excavation

.1 When unsuitable material is encountered notifythe Departmental Representative for measurement and assist in investigation to determine depth and type of material. Isolate area to minimize entry of water into excavation.

.2 Excavate unsuitable material to extent directed.

.3 Dispose of unsuitable material off site.

3.5 Rock Salvage

.1 Salvage rock in accordance with Section 31 11 00.

3.6 Temporary Roadway

.1 Complete backfilling by placing and compacting material indicated in 300 mm layers. Bring backfill up evenly around structures.

.2 Compact all materials to 95% Standard Proctor Density with the following exceptions:

.1 Top 300 mm below subgrade to 98% Standard Proctor Density.

.2 Gravel under paved surface to 100% Standard Proctor Density.

.3 Clear Stone to 70% Relative Density.

.3 Density Tests: Standard Proctor in accordance with Method B, ASTM D 698. Relative Density in accordance with ASTM D 4253 and D4254.

.4 Maintain crowns and cross slopes to provide surface drainage.

3.7 Bedding and Backfilling

.1 Remove all timber, snow, ice, frozen material, and debris from excavation before backfilling. Do not backfill until work has been inspected by the Departmental Representative.

.2 Backfill with materials indicated.

3.8 Mass Excavation and Embankment

.1 Establish with the Departmental Representative lead time required to take measurements. Notify the Departmental Representative in accordance with agreed lead time.

.2 Excavate and place fill to lines and grades indicated.

.3 When rock, or unsuitable material is encountered notify the Departmental Representative for measurement.

3.9 Tolerances

.1 Final grade for beach and dune fill shall be within 0.15m (plus or minus) of the lines shown on the Contract Drawings. This tolerance shall extend across the full width of the beach fill to the intersection of the fill with the pre-construction surveyed condition. Elevations may not be uniformly high or low.

.2 Contractor may stockpile beach fill above the 0.15m upper tolerance up-slope to compensate for material expected to be removed by wave action, but smooth slopes shall be maintained.

.3 If any material is deposited in areas that are not designated or approved for fill, remove such material and redeposit it as directed by the Departmental Representative at no additional expense to the Contract.

.4 The intention of the above tolerances is that the work will be built generally to the required elevations, slopes and grades and that the outer surfaces shall present a neat and aesthetic appearance. Remove or re-work placed material not meeting this intent as directed by the Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 Summary

.1 Section Includes: supply and installation requirements for a stress resistant polypropylene geogrid, bonded or sewn to a woven monofilament polypropylene geotextile.

1.2 References

.1 American Association of State Highway and Transportation Officials (AASHTO):
- .1 AASHTO HB-17-2002, Standard Specification for Highway Bridges (2002).

.2 American Society for Testing and Materials (ASTM):
- .1 D6637-15, Determining Tensile Properties of Geogrids by Single or Multi-Rib Tensile Method.
- .2 D1388-14E1, Standard Test Method for Rigidity of Fabrics.
- .3 D4759-11, Standard Practice for Determining the Specification Conformance of Geosynthetics.
- .4 D7737-15, Individual Geogrid Junction Strength
- .5 D5818-11, Practice for Exposure and Retrieval of Samples to Evaluate Installation Damage to Geosynthetics.

.3 U.S. Army Corps of Engineers:
- .1 U.S. Army Corps of Engineers of Torsional Rigidity.

1.3 Definitions

.1 Grid Composite: An integral formed geogrid structure manufactured of a stress resistant polypropylene (PP) material, bonded or sewn to a monofilament polypropylene woven geotextile.

.2 Minimum Average Roll Value: Value based on testing and determined in accordance with ASTM D 4759.

.3 True Tensile Modulus in Use: The ratio of tensile strength to corresponding strain (e.g. 1%). The tensile strength is measured via ASTM D 6637 without deforming test materials under load before measuring such resistance or employing “secant” or

"offset" tangent methods of measurement so as to overstate tensile properties. Values shown are minimum average roll values.

.4 Junction Strength: Breaking tensile strength of junctions when tested in accordance with ASTM D7737 tested at a strain rate of 10 percent per minute based on this gauge length. Values shown are minimum average roll values.

.5 Flexural Stiffness (also known as Flexural Rigidity) - Resistance to bending force measured via ASTM D 1388 (Option A) using specimens of width two ribs wide, with transverse ribs cut flush with exterior edges of longitudinal ribs (as a "ladder"), and of length sufficiently long to enable measurement of the overhang dimension. The overall Flexural Rigidity is calculated as the square root of the product of machine- and cross-machine-direction Flexural Rigidity values. Values shown are minimum average roll values.

.6 Torsional Stiffness: Resistance to in-plane rotational movement measured by applying a 20kg-cm movement to the central junction of a 9-inch x 9-inch specimen restrained at its perimeter in accordance to US Army Corps of Engineers Methodology.

.7 Resistance to Installation Damage: Resistance to loss of load capacity or structural integrity when subjected to mechanical stress in installation measured via ASTM D 5818 in a crushed stone classified as a poorly graded gravel with a maximum 2 inch particle size (GP). Values shown are typical values.

1.4 Submittals

.1 Submit product samples of:
.1 Grid Composite.
.2 Braid.
.3 Mechanical connection elements.

.2 Shop Drawings – Submit details of the typical sections and connections.

.3 Submit grid composite product data sheet and certification from the manufacturer

that the product supplied meets the requirements herein.

.4 Submit manufacturer's general recommendations and instructions for fabrication, storing, cutting, installation and repair.

1.5 Quality Assurance .1 Prior to the installation of the grid composite, arrange a meeting at the site with the system supplier. Notify Departmental Representative at least three (3) days in advance of the time of the meeting.

1.6 Delivery, Storage, and Handling .1 Storage and Protection:
- .1 Prevent excessive mud, wet concrete, epoxy, or other deleterious materials from coming in contact with and affixing to geogrid composite materials.
- .2 Store at temperatures above –20 degrees F (-29 degrees C).
- .3 Rolled materials may be laid flat or stood on end.

1.7 Design Requirements .1 Grid Composite System to possess:
- .1 Positive mechanical interlock with bedding stone or similar; contiguous sections of itself when overlapped and embedded in bedding stone or similar; and mechanical connectors such as bodkins, pins, hooks or HDPE/PP braids.
- .2 Sufficient cross-sectional profile to present a substantial abutment interface to particulate construction fill materials such as bedding stone and to resist movement relative to such materials.
- .3 Sufficient flexural rigidity to help maintain intimate contact of the geotextile with the underlying material when bedding stone, riprap or armor stone is placed on top.
- .4 Sufficient true initial modulus to cause applied force to be transferred to the geogrid at low strain levels

without material deformation of the reinforced structure.

.5 Complete continuity of all properties throughout its structure and shall be suitable for use with bedding stone, riprap and armor stone materials in coastal and waterway environments to improve the long-term stability of the coastal structure such as rubble mound breakwaters, jetties and groins.

.2 Alternates:

.1 Woven, flexible geogrid will not be considered as an alternate to the integral formed stress resistant polypropylene geogrid component of the Polymeric Grid Composite system.

.2 Do not use alternate grid composite materials unless submitted to the Departmental Representative and approved in writing by the Departmental Representative at least seven (7) days prior to the tender closing. The Departmental Representative will have absolute authority to reject or accept alternate materials based on the requirements of this Section and the Engineer’s judgment. Certain material properties of the grid composite are critical to the fabrication and serviceability of this application. The grid composite must satisfy the requirements of this Section, regardless of any previous approval by the Departmental Representative for other types of applications. Coated grid composite will not be allowed for constructing Polymeric Grid Composite System. In order to be considered, submittal packages for alternate grid composite materials must include:

.1 A list of 10 comparable projects, in terms of size and applications, in Canada, where the results of using the specific alternate geogrid material can be verified after a minimum of three (3) years of service life.

.2 A sample of the alternate grid material and certified specification sheets.
.3 Recommended fabrication and installation instructions.
.4 Additional information as required at the discretion of the Engineer.

PART 2 PRODUCTS

2.1 Materials .1 Grid Composite:
.1 Deliver the grid composite to the project site in roll form with each roll individually identified and nominally measuring 12ft (3.7m) in width and 164ft (50.3m) in length. On special request, the grid composite may also be custom cut to specific length or widths to suit site specific engineering design.
.2 Unless otherwise called out on the Construction Drawings or Shop Drawings or directed by the Departmental Representative, the grid composite type must have the following characteristics:

PROPERTY (Geogrid)	UNITS	MD Values	XMD Values
True 1% Tensile Modulus in Use (MD)	kN/m (lb/ft)	410 (28,100)	420 (28,780)
Junction Strength (MD)	kN/m (lb/ft)	21.5 (1,474)	21.5 (1,474)
Flexural Stiffness	mg-cm	750,000	
Torsional Stiffness	kg-cm/deg	6.0	
Resistance to Installation Damage	%GP	71	
Resistance to Long Term Degradation	%	98	
Ultraviolet Stability (Retained Strength @ 500 hours)	%	98	
PROPERTY (Geotextile)	UNITS	MD Values	XMD Values
Puncture Strength	kN (lbs)	0.47 (105)	
Trapezoidal Tear	kN (lbs)	0.51 (115)	0.33 (75)
Percent Open Area	%	15	
Apparent Opening Size (AOS)	US Sieve	40	
Permittivity	Sec^{-1}	1.36	

Ultraviolet Stability (Retained Strength @ 500 hours)	%	90

2.2 Manufacturers

.1 An approved source of geogrid is Tensar International Corporation, Alpharetta, GA or their designated representative.

.2 Acceptable product is Geogrid Composite GC654050 or equivalent.

PART 3 EXECUTION

3.1 Examination

.1 Check the geogrid, braid and mechanical connection elements upon delivery to verify that the proper material has been received. Inspect these materials and confirm they are free of flaws or damage occurring during manufacturing, shipping, or handling.

3.2 Preparation

.1 Prepare subgrade soil as indicated in Section 31 23 10 and as directed by the Departmental Representative. Excavate subgrade to the lines and grades as shown on the drawings or as directed by the Departmental Representative. Fill any over-excavated areas with compacted select backfill material.

3.3 Installation

.1 Place the grid composite at the proper elevation, alignment and orientation as shown on the Project Drawings. Secure grid composite temporarily in place with staples, pins, sand bags, or backfill as required by fill properties, fill placement procedures, or weather conditions, or as directed by the Departmental Representative.

.2 Connect/splice grid composite when required to provide continuity of tensile resistance. Connect the grid composite with a mechanical polymer bar.

.3 Overlap connections may be used if the Contractor provides the Departmental Representative independent test

documentation which demonstrates that the load/deformation characteristics of the overlap of geogrid materials is equal to or exceeds those of the geogrid. Minimum overlap to be as indicated in the Project Drawings and as specified by the manufacturer.

.4 Cover lower end of geogrid with armourstone and fill. Do not wrap geogrid around armourstone toe. Geogrid lower end shall not be exposed after armourstone toe installation.

.5 As indicated on drawings, leave existing armourstone in place and start geogrid placement at toe of existing armourstone.

3.4 Fill Placement

.1 Place backfill material in lifts and compacted in accordance with Section 31 23 10. Place, spread and compact backfill in such a manner that minimizes the development of wrinkles in and/or movement of the grid composite.

.2 Do not operate tracked construction equipment directly on the grid composite. A minimum fill thickness of 150mm is required prior to operation of tracked vehicles over the grid composite. Keep turning of tracked vehicles to a minimum to prevent tracks from displacing the fill and damaging the grid composite. Rubber-tired equipment may pass over the grid composite at slow speeds, less than 10 mph. Avoid sudden braking and sharp turning. A minimum fill thickness of 150mm is required prior to operation of rubber-tired equipment over polyester geogrid reinforcement.

3.5 Repair

.1 Repair or replace any grid composite damaged during installation. Do such measures required at no additional cost to the Contract.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

.1 This section specifies the requirements for the supply and installation of geotextile to:
- .1 Separate and prevent mixing of granular materials of different grading.
- .2 Act as hydraulic filters permitting passage of water while retaining soil strength of granular structure.

1.2 RELATED SECTIONS

.1 Section 31 23 10 – Excavation and Beach Fill.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM D 4751-16, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-4.2 No. 11.2-M89, Textile Test Methods - Bursting Strength - Ball Burst Test (Extension of September 1989).
- .2 CAN/CGSB-148.1, Methods of Testing Geosynthetics - Geotextiles - Sampling and Preparation of Test Specimens (ISO 9862:1990).
  - .1 No.2-M85, Methods of Testing Geotextiles and Geomembranes - Mass per Unit Area.
  - .2 No.3-M85, Methods of Testing Geotextiles and Geomembranes - Thickness of Geotextiles.
  - .3 No.6.1-93, Methods of Testing Geotextiles and Geomembranes - Bursting Strength of Geotextiles Under No Compressive Load.
  - .4 No.7.3-92, Methods of Testing Geotextiles and Geomembranes - Grab Tensile Test for Geotextiles.
  - .5 No. 10-94, Methods of Testing Geosynthetics - Geotextiles - Filtration Opening Size.

1.4 DELIVERY, STORAGE AND HANDLING

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

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Manage all waste in accordance with Section 01 74 21.

PART 2 - PRODUCTS

2.1 MATERIAL

.1 Geotextile: woven synthetic fibre fabric, supplied in rolls.
  .1 Width: 3.81 m minimum.
  .2 Composed of: UV protected.

.2 Physical properties:
  .1 Grab tensile strength and elongation: to CAN/CGSB-148.1, No.7.3.
    .1 Breaking force: minimum 1400 N, wet condition.
    .2 Elongation at break: maximum 15%.
  .2 Mullen burst strength: to CAN/CGSB-4.2, No.11.2, minimum 4.10 MPa, wet condition.
  .3 Bursting strength: use values specified in CAN/CGSB-148.1, No.6.1, wet condition.

.3 Hydraulic properties:
  .1 Apparent opening size (AOS): to ASTM D 4751, 600 µm (maximum).
  .2 Permittivity: to CAN/CGSB-4.2 No. 11.1-9.

.4 Approved geotextile material: TerraFix 400W; MACTEX MXW13 by MaccaFerri; or accepted equivalent meeting all specified properties.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated and retain in position with security pins.

.2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases. Stop geotextile 100 mm below finished surface.

.3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

.4 Overlap each successive strip of geotextile 600 mm over previously laid strip.

.5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.6 After installation, cover with overlying layer within 4 h of placement.

.7 Replace damaged or deteriorated geotextile to approval of the Departmental Representative.

.8 Place and compact material layers in accordance with Section 31 23 10.

3.2 CLEANING

.1 Remove construction debris from Project site and dispose of debris in an environmentally responsible and legal manner.

3.3 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.

3.4 QUALITY CONTROL

.1 Implement the following quality control tests:

Test Type	Standard	QC Frequency
Opening	ASTM D4751	1 per 1000m^2
Bursting Strength	CAN/CGSB-4.2 No. 11.2	1 per 1000m^2
Mass/Unit Area	CAN/CGSB-148.1 No. 2	1 per 1000m^2
Thickness	CAN/CGSB-148.1 No. 3	1 per 1000m^2
Burst	CAN/CGSB-148.1 No. 6.1	1 per 1000m^2
Tensile	CAN/CGSB-148.1 No. 7.3	1 per 1000m^2
Filtration Opening	CAN/CGSB-148.1 No. 10	1 per 1000m^2

END OF SECTION

PART 1- GENERAL

1.1 WORK INCLUDED

.1 This Section specifies requirements for supplying, transporting and placing graded gravel fill collectively referred to as granular base material to lines, grades and typical cross-sections indicated on the Drawings or as directed by the Departmental Representative for temporary roadway and for use as base material for new installed culverts.

1.2 RELATED WORK

.1 Excavating and Beach Fill: Section 31 23 10.

1.3 REFERENCES

.1 ASTM D698-12E1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-26ft/ft³ (600kN-m/m³)).

.2 ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³(2,700 kN-m/m³)).

.3 ASTM D 4254-00e1, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

.4 New Brunswick Department of Transportation (NBDOT) Standard Specifications, January, 2011.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular base (aggregate base) and granular subbase (aggregate sub-base) materials: crushed and screened rock or gravel, consisting of approved hard and durable stone particles, free from flat, elongated or other objectionable pieces. Gradation to be:

.1 Granular base: non-frost susceptible, well graded granular fill composed of 31.5mm minus crushed rock aggregate with a maximum of 8% passing the 75µm sieve size satisfying the requirements of NBDOT Standard Specifications, Table 201-2.

.2 Granular subbase:

.1 Non-frost susceptible, well graded granular material conforming to 75mm minus crushed gravel aggregate subbase of NBDOT Table 201-3.

.2 Non-frost susceptible, pit run granular

material satisfying the requirements of NBDOT Standard Specifications, Table 201-4.

.2 Arrange and pay for all gradation and compaction tests on the proposed granular base and subbase materials to the approval and satisfaction of the geotechnical engineer prior to and during placement. Submit geotechnical test report(s) to the Departmental Representative for review.

PART 3 - EXECUTION

3.1 INSPECTION OF SUBGRADE

.1 Do not place granular base or subbase until finished subgrade is inspected and approved.

.2 Proof roll subgrade in presence of geotechnical inspector prior to beginning placement of granular base and granular materials. Over-excavate any soft spots and backfill with compacted approved granular fill.

3.2 PLACING

.1 Place material only on a clean unfrozen surface, properly shaped and compacted and free from snow or ice.

.2 Place granular materials using methods which do not lead to segregation or degradation.

.3 Place gravel in uniform layers, not to exceed 200 mm compacted thickness, to compacted depth shown on Drawings.

.4 Shape each layer to a smooth contour and compact to specified density before the succeeding layer is placed.

.5 Remove and replace that portion of a layer in which material becomes segregated during spreading.

3.3 COMPACTING

.1 Compact granular base and subbase gravels to a density of not less than 100% of standard Proctor density, corrected for oversized particles.

.2 Shape and roll alternately to obtain a smooth, even and uniformly compacted subbase.

.3 In areas not accessible to rolling equipment, compact to specified density with approved mechanical tampers.

3.4 FINISH TOLERANCES

.4 Finish compacted surface to within 12 mm of established grade, but not uniformly high or low.

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

3.5 MAINTENANCE

.6 Maintain finished granular base and sub-base in condition conforming to this section until succeeding material is applied.

3.6 REMOVAL

.7 Remove temporary road at the conclusion of the Work.

END OF SECTION

Part 1 GENERAL

1.1 References

.1 Canadian Standards Association:

.1 Standards referenced in the National Building Code.

.2 American Society for Testing and Materials:

.1 ASTM A29/A29M Standard Specification for Steel Bars, Carbon and Alloy, Hot- Wrought and Cold-finished, General Requirements for.

.2 ASTM A36/A36M Standard Specification for Carbon Structural Steel.

.3 ASTM A53 Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc- Coated, Welded and Seamless.

.4 ASTM A153 Standard Specification for Zinc Coating (Hot-Dip)on Iron and Steel Hardware.

.5 ASTM A193/A193M Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.

.6 ASTM A252 Standard Specification for Welded and Seamless Steel Pipe Piles.

.7 ASTM A320/A320M Standard Specification for Alloy/Steel Bolting Materials for Low-Temperature Service.

.8 ASTM A500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

.9 ASTM A572 Standard Specification for High- Strength Low Alloy Columbium-Vanadium Structural Steel.

.10 ASTM A618 Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing.

.11 ASTM A656 Standard Specification for Hot-Rolled Structural Steel, High- Strength Low-Alloy Plate with Improved Formability.

.12 ASTM A935 Standard Specifications for Steel, Sheet and Strip, Heavy Thickness Coils, High Strength, Low-Alloy, Columbium for Vanadium, or Both, Hot-Rolled.

.13 ASTM A936 Standard Specification for Steel, Sheet and Strip, Heavy Thickness Coils, High Strength, Low-Alloy, Hot-Rolled, with improved Formability.

.3 Society of Automotive Engineers (SAE):

.1 SAE J429 Mechanical and Material Requirements for Externally Threaded Fasteners.

1.2 Definitions

.1 Special definitions that apply to this section include:

.1 Power Installed Helical Screw Foundation: Consists of steel screw anchors with one or more helix-shaped steel plates attached to a central steel tube. Product shall be designed for above-grade wooden boardwalks and deck. Fabricated from high-strength pipe shafts to resist bending moments and installing torque ratings. Referred to hereinafter using the abbreviation “HSF".

1.3 System Description

.1 Design power installed HSF application by a Professional Structural Engineer experienced in design of this work and licensed in New Brunswick.

.2 Performance Requirements: Provide power installed HSFs that have been manufactured, fabricated and installed to the following criteria:

.1 Maximum Installing Torque (Foot Pounds): as recommended by probe test.

1.4 Submittals

.1 Product Data: Submit manufacturer's product data and installation instructions.

.2 Shop Drawings: Provide engineer stamped shop drawings indicating profiles and product components and accessories and indicate the following:

.1 HSF number, location and pattern by assigned identification number.

.2 HSF design load.

.3 Type and size of central steel shaft.

.4 Helix configuration (number and diameter of helix plates).

.5 Minimum effective installation torque.

.6 Minimum overall length.

.7 Lateral support of HSF.

.8 Cut-off elevation.

.9 HSF attachment to proposed deck and boardwalk structure.

.3 Quality Assurance/Control Submittals: Submit the following:

.1 Design Data: Engineer's design data and calculations. All the Engineer's design data and calculations must bear the stamp of a qualified professional, experienced in the design of this type of work and registered to practice in the Province of New Brunswick.

.1 In addition to the requirement called in this section, design shall include the lateral support calculation as well as provision to prevent up-lift due to the frost condition, and calculations for connections to proposed structure.

.2 Lateral load shall be a minimum of 2% of the HSF compressive capacity applied at the top of the HSF.

.2 The soil probe investigation must be done on site by HSF manufacturer, but the design data and calculation must be done by a Professional Structural Engineer registered to practice in the Province of New Brunswick as requested

above.
Test Reports: Certified test reports showing compliance with specified characteristics and physical properties.

.3 Certificates: Submit the following:

.1 Manufacturer's certificate that products meet or exceed specified requirements.

.2 Mill test report as requested.

.4 Closeout Submittals: Submit the following:

.1 Installer's Field Reports: Accurately record the following: Type, size, depth, and actual locations of HSF torque installation record on all HSF and torque monitoring calibration data.

1.5 Approved Manufacturer

.1 The approved manufacturer must provide the following information within five (5) business days of award of contract:

.1 Documentation of at least five (5) years of production experience manufacturing helical piles.

.2 Documentation that the manufacturer's helical piles have been used successfully in at least 5 engineered construction projects within the last three (3) years.

.3 Documentation that the helical pile/anchor manufacturer has a current Evaluation Report completed by Canadian Construction Materials Center (CCMC).

.4 Documentation.

1.6 Quality Assurance

.1 Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity, and who is authorized and trained by the manufacturer to install its products.

.2 Certifications: Certified mill test reports for the central steel shaft, as the material is delivered, for record purposes.

Provide ultimate strength, yield strength, percent elongation and chemistry composition.

.3 Pre-installation meeting to be coordinated by the Contractor with the Departmental Representative.

1.7 Delivery, Storage And Handling

.1 Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

.2 Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

.3 Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

1.8 Warranty

.1 Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

.2 Manufacturer's Warranty: Submit for Departmental Representative's acceptance, manufacturer's standard warranty document excused by authorized company official. Manufacturer's warranty is in addition to and not a limitation of other rights that Departmental Representative may have under Contract Document.

Part 2 PRODUCTS

2.1 Helical Screw Foundations

.1 Manufacture components from materials conforming to the standards referenced in this Section and to described type and load capacity as below:

.1 Model No. P3 helical, 89mm outside diameter **r**efer also to drawings

.1 Protect components by Hot- Dip Galvanizing to CAN/CSA G184 or ASTM A153 with zinc coating 600m/m3.

Part 3 EXECUTION

3.1 Manufacturer's

.1 Comply with the instructions and recommendations of the power installed HSF manufacturer.

3.2 Examination

.1 Site Verification of Conditions:

.2 Verify that site conditions are acceptable for installation of power installed helical screw foundations.

.1 Verify that all work of other trades is completed to the point where HSFs may commence without restriction.

.2 Verify that all HSFs may be installed in accordance with all pertinent codes and regulations regarding such items as underground obstructions, right-of-way limitations, utilities, etc.

.1 Do not proceed with installation of power installed helical screw foundations until unacceptable conditions are corrected.

3.3 Installation

.1 Equipment or vehicles not permitted on vegetated areas. Boardwalk to be used as working platform as work progresses.

.2 Provide torque monitoring device as part of the installing unit of as a separate in-line device. Make available calibration torque monitoring data for Departmental Representative.

.3 Position HSF anchor in conformance with the design drawings.

.4 Establish proper angular alignment at the start of installation.

.5 Connect the installation unit to the anchor with manufacturer's approved adapters. Provide safe and secure connection to screw anchors and extensions. Apply sufficient downward pressure to advance anchor.

.6 Install in a smooth and continuous manner, rate of anchor rotation 3 10rpm.

.7 Monitor torque applied by the installing unit during the entire installation and record values achieved on each HSF anchor. Remove encountered obstructions, or relocate HSF anchor and adjacent anchors as required.

.8 Provide extension material to obtain indicated depth, couple with bolts provided as part of extension torque.

.9 Connect HSF anchor together. Use manufacturer approved steel angles or approved reinforced method of lateral support.

.10 Depth and Torque Tolerances HSF anchors that reach maximum torque rating before reaching minimum indicated depth shall be subject to the following:

.1 Terminate at depth obtained with written approval of the system design Engineer.

.2 Replace screw anchor with smaller and/or fewer, installed 0.9m minimum beyond termination of original HSF anchor.

3.4 Field Quality Requirements

.1 Site tests: Monitor torque applied by the installing units Requirements during the entire installation.

.1 Inspection: Field inspection when required will be performed by Departmental Representative.

3.5 Protection

.1 Protection: Protect installed product from damage during construction. Contractor to ensure all existing construction and site conditions to be during construction.

END OF SECTION

Part 1 General

1.1 Summary

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

1.2 Related Sections

.1 Section 01 11 10 Summary of Work.

.2 Section 01 35 43 Environmental Protection Procedures for Marine Works.

.3 Section 31 23 10 Excavation and Beach Fill.

1.3 Reference Standards

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

1.4 Waste Management and disposal

.1 Separate and recycle waste materials in accordance with Section 01 74 21.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Seal emptied containers and store safely for disposal.

.4 Use sealers, form release and stripping agents that are non-toxic, biodegradable and have zero or low VOC’s.

1.5 Delivery, Storage & Protection

.1 Protect plant material from damage during transportation.

1.6 Warranty

.1 The Contractor hereby warrants that transplanted tree will be maintained to remain healthy and free of defects for 2 years from date of Substantial Performance.

Part 2 Products

2.1 Plant Material

.1 Type of root preparation, sizing, grading and quality: comply with Canadian Nursery Trades Association Canadian Standards for Nursery Stock – latest edition.

.2 Plant material: free of disease, insects, defects or injuries and structurally sound with strong fibrous root system.

.3 Plant material: root pruned regularly.

.4 Trees: to CNTA Standards, with straight trunks, well and characteristically branched for species except where specified otherwise.

.5 Bare root stock: not acceptable.

.6 Collected (native) stock: not acceptable.

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

2.2 Water

.1 Free of impurities that would inhibit plant growth.

2.3 Tree Stakes

.1 Round, wooden stakes, 75mm to 100mm dia., pointed one end, 3 m long.

2.4 Guying Wire

.1 Galvanized steel, 3mm wire or 3mm diameter multi-wire steel cable.

2.5 Guying Collar

.1 Tube: plastic, 12mm diameter, nylon reinforced.

2.6 Turnbuckle

.1 Galvanized steel, 10 mm diameter with 250 mm open length. Painted fluorescent orange.

2.7 Anchors

.1 Wood: 38 mm x 38 mm x 610 mm long.

.2 Steel: T-bar, 500 mm long.

2.8 Fertilizer

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

2.9 Anti-Desiccant

.1 Wax-like emulsion to approval of Consultant.

2.10 Mulch

.1 Double grinded bark mulch: varying in size from 25mm to 75mm in length, from coniferous trees.

Part 3 EXECUTION

3.1 Pre-Planting Operations

.1 Ensure plant material acceptable to Departmental Representative.

.2 Remove damaged roots and branches from plant material.

.3 Request nursery to apply anti-desiccant to conifers and deciduous trees in leaf in accordance with manufacturer's instructions.

3.2 Excavation and Preparation of Planting Beds

.1 Ensure Subgrade for planting beds meets requirements as outlined in this specification, and is approved by Departmental Representative.

.2 Preparation of planting beds in according with CNTA Standards and drawings.

.3 For individual planting holes:
- .1 Stake out location and obtain approval from Departmental Representative prior to excavating.
- .2 Excavate to depth and width indicated.
- .3 Remove subsoil, rocks, roots, debris and toxic materials from excavated material that will not be used as planting soil. Dispose of excess material.
- .4 Scarify sides of planting hole.
- .5 Remove water which enters excavations prior to planting. Notify Departmental Representative if water source is ground water.

3.3 Planting

.1 For container stock or root balls in non-degradable wrapping, water plants before removing container. Remove container or wrapping without damaging root ball.

.2 Plant vertically in locations as indicated. Orient plant material to give best appearance in relation to structure, roads and walks.

.3 For trees and shrubs:
- .1 Backfill soil in 150mm lifts. Lightly tamp each lift and water to eliminate air pockets. When two thirds of depth of planting pit has been backfilled, fill remaining space with water. After water has penetrated into soil, backfill to finish grade.

.4 Water plant material thoroughly after planting operations are complete. After soil settlement has occurred, fill with soil to finish grade.

.5 Dispose of burlap, wire, and container material off site.

3.4 Tree Supports

.1 Install tree supports as indicated on drawings.

.2 Use double stake tree support for deciduous trees.

.1 Place one stake on prevailing wind side of tree and second opposite or as directed by Project Manager. Both stakes should be 300mm minimum from trunk and should be placed on either side of root ball. Where trees are planted next to driveways or walkways, place one stake between tree trunk and driveway or walkway.

.2 Drive stakes minimum 300mm into undisturbed soil beneath rootball. Ensure stakes are secure, vertical and unsplit.

.3 Install 2 guying collars above lowest branch crotch a minimum 1.5m above grade.

.4 Thread guying wire through collar tube. Twist wire to form collar and secure firmly to stake. Cut off excess wire. Ensure collar is minimum 25mm diameter larger than tree.

.3 After tree supports have been installed, remove broken branches with clean, sharp tools.

.4 Use three (3) guy wires and anchors for evergreen trees greater than 1000mm in height.

.1 Install guying collars above branch to prevent slipping at approximately 2/3 height for evergreens. Collar mounting height not to exceed 915 mm above grade.

.2 Guying collars to be of sufficient length to encircle tree plus 50mm space for trunk clearance. Thread

guy wire through collar encircling tree trunk and secure to lead wire by clamp or multi- wraps; cut wire ends close to wrap. Spread lead wires equally proportioned about trunk at 120 degrees.

.3 Install anchors at equal intervals about tree and away from trunk so that guy wire will form 45 degree angle with ground. Install anchor at angle to achieve maximum resistance for guy wire.

.4 Attach guy wire to anchors. Tension wire and secure by multi-wraps.

.5 Install wire tightener ensuring that guys are secure and leave room for slight movements of tree.

.6 Saw tops off anchors which extend in excess of100 mm above grade or as directed.

3.6 Maintenance during Establishment Period

.1 Perform following maintenance operations from time of planting to preliminary acceptance at substantial completion review by Departmental Representative.

.1 Water to maintain soil moisture conditions for optimum establishment, growth and health of plant material without causing erosion.

.2 For evergreen plant material: water thoroughly in late fall prior to freeze-up to saturate soil around root system.

.3 Remove weeds monthly.

.4 Replace or re-spread damaged, missing or disturbed mulch.

.5 Apply pesticides only in accordance with all Federal, Provincial, and Municipal regulations as and when required to control insects, fungus, and disease. Obtain product approval from Departmental Representative prior to application.

.6 Remove dead or broken branches from plant material.

.7 Keep stakes and guy wires in proper repair and adjustment.

.8 Apply fertilizer in early spring at manufacturer's suggested rate and as required by plant material.

.9 Remove and replace dead plants and plants not in healthy growing condition. Make replacements in same manner as specified for original plantings.

.10 Remove trunk protection, tree supports and level watering saucers at end of first growing season.

3.7 Preliminary Acceptance

.1 Plant material to be inspected by Departmental Representative at Substantial Completion review. Plant material shall be accepted provided that plant material exhibits healthy growing condition and is free from disease, insects and fungal organisms.

.2 Plant material installed in Fall will be accepted in following spring, one month after start of growing season, provided acceptance conditions outlined in 1 above, are fulfilled.

.3 Warranty period will commence from date of Substantial Completion.

3.8 Maintenance during Warranty Period

.1 Commence maintenance immediately following installation of Work and continue it until 1 year (the guarantee period) following Substantial Completion of Contract. Except for trees which shall be guaranteed for 2 years following Substantial Completion of Contract.

.2 This maintenance will be the sole source of maintenance of the work during this period and is wholly the Contractor's responsibility.

.3 From time of acceptance by Departmental Representative to end of warranty period, perform following maintenance operations.

.1 Water to maintain soil moisture conditions for optimum growth and

health of plant material without causing erosion.

.2 For evergreen plant material: water thoroughly in late fall prior to freeze-up to saturate soil around root system.

.3 Reform damaged watering saucers.

.4 Remove weeds monthly.

.5 Replace or re-spread damaged, missing or disturbed mulch.

.6 Apply pesticides only in accordance with all Federal, Provincial, and Municipal regulations as and when required to control insects, fungus, and disease. Obtain product approval from Departmental Representative prior to application.

.7 Apply fertilizer in early spring at manufacturer's suggested rate and as required by plant material.

.8 Remove broken or hazardous branches from plant material.

.9 Keep stakes in proper repair and adjustment.

.4 Notify Departmental Representative when maintenance period is completed to arrange final inspection and transfer of maintenanceresponsibility to Owner.

.5 Replace plants deemed to be unacceptable by Departmental Representative. Extend warranty period for one year from date of replacement.

.6 Include the cost of maintenance in the Total Tender Price in the Form of Tender.

3.9 Clean-Up

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

END OF SECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 This section specifies requirements for placing new concrete culverts complete with modular seal over existing corrugated steel pipe where shown on the Project Drawings.

1.2 RELATED SECTIONS

.1 Excavating and Backfill: Section 31 23 10

1.3 REFERENCE STANDARDS

.1 ASTM C14M-15A, Concrete Sewer, Storm Drain, and Culvert Pipe (Metric).

.2 ASTM C76M-16, Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric).

.3 ASTM D1056-14, Flexible Cellular Materials - Sponge or Expanded Rubber.

1.4 CERTIFICATES

.1 Upon request, submit manufacturers' test data and certification that products and materials meet requirements of this Section in accordance with Section 01 33 00.

1.5 HANDLING AND STORAGE

.1 Handle and store pipe and fittings in such a manner as to avoid shock and damage. Do not use chains or cables passed through pipe bore.

.2 Store gaskets in accordance with the manufacturer’s written instructions.

PART 2 - PRODUCTS

2.1 GENERAL

.1 Diameter, material, strength class and dimensional ratio of pipe and fittings: 100D concrete pipe, size as indicated.

2.2 CONCRETE PIPE AND FITTINGS

.1 Pipe and Fittings:

.1 Non-reinforced: to ASTM C 14M or CAN/CSA A257.1.

.2 Reinforced: to ASTM C 76M or CAN/CSA A257.2.

.2 Joints: bell and spigot with flexible rubber gaskets to CAN/CSA A257.3-M.

.3 Modular seal: EPDM – rubber (black), sized to suit application.
.1 Acceptable product: Link-Seal or approved equivalent.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Inspect products for defects and remove defective products from site.

.2 Confirm pipe and fittings are clean before installation.

.3 Cut existing pipe back to undamaged pipe.

3.2 EXCAVATING BEDDING AND BACKFILLING

.1 Perform excavation, bedding and backfilling in accordance with Section 31 23 10.

3.3 PIPE INSTALLATION

.1 Lay and join pipe and fittings as specified herein and according to manufacturer's published instructions.

.2 Lay pipe and fittings on prepared bed, true to line and grade indicated within following tolerances:
.1 Horizontal Alignment: 50mm.
.2 Vertical Alignment: the lesser of 13mm or one half the rise per pipe length.

.3 Commence laying at outlet and proceed in upstream direction with bell ends facing upgrade.

.4 Prevent entry of bedding material, water or other foreign matter into pipe. Use temporary watertight bulkheads when pipelaying is not in progress.

.5 Install gaskets and modular seals in accordance with manufacturers published instructions.

.6 Align pipe before joining.

.7 Support pipes as required to achieve concentricity until joint is properly completed.

.8 Keep pipe joints free from mud, silt, gravel or other foreign material.

.9 Avoid displacing gasket or contaminating with dirt, petroleum products, or other foreign material. Remove, clean, reinstall and lubricate gaskets so disturbed.

.10 Complete each joint before laying next length of pipe.

.11 Cut pipe as required for fittings or closure pieces, square to centreline, and as recommended by manufacturer.

END OF SECTION

PART 1 - GENERAL

1.1 Description

.1 This section specifies requirements for construction of rubble mound breakwaters consisting of component layers, including armour and filter stone, to the dimensions indicated.

1.2 Reference Standards

.1 ASTM C127-15, Standard Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate

.2 AASHTO T85-14, Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate

1.3 Source Sampling

.1 Inform the Departmental Representative of proposed source of materials and provide access for sampling at least two (2) weeks prior to commencing work. Forward, prepaid, a sample rock to be used to a testing consultant determined by the Departmental Representative for approval. Sample to be between 5 and 10 kg, representative of quarry and submitted minimum two (2) weeks prior to starting work.

1.4 Existing Conditions and Haul Road

.1 Determine what preparatory work will be required for the following:

.1 Condition of existing structures over which material must be hauled.

.2 Preparation, maintenance and removal of temporary roadways to and on the breakwater for the use of trucks, cranes, excavators, draglines, etc.

.3 Preparation, maintenance and removal of all temporary causeways and/or fills as required for trucks, loaders, excavators, cranes, draglines, etc.

.4 Identify sections of the existing guardrail that will need to be removed to allow access for the construction of the revetment.

.5 The land surrounding the site is the property of Her Majesty the Queen in the Right of Canada and the

Contractor will exercise extreme care to prevent damage to the land.

.6 Contractor will be solely responsible for construction and maintenance of haul roads which will be considered incidental to the work. Remove all temporary roads at the completion of the project and restore the land to its original condition.

1.5 Stone Gradation Test Requirements

.1 Armour Stone:

.1 Two (2) Quality Assurance gradation tests will be conducted for the armour stone throughout the scheduled work, unless gradation test results or observations of stone materials indicate additional gradation tests are required.

.2 The Departmental Representative will randomly select a representative sample of stone equal to at least 30 times the median stone weight for the stone classification being sampled. The total sample must accurately weighed to within 1%. Each individual stone in the sample will then be measured along three mutually perpendicular axes (dimensions a, b and c) and the measurements recorded. Individual stone weights will then be initially estimated based on the measured volume (i.e., measured volume = a x b x c) multiplied by the saturated surface dry (SSD) stone density for that stone type. The individual initial estimated weights will then be "adjusted" by an adjustment factor equal to the ratio of the actual total sample weight divided by the sum of the individual initial estimated weights. The resulting "adjusted" stone weights will be used to assemble a gradation curve for the sample. Alternatively, the Contractor may elect to weigh every stone in the sample, in which case the gradation curves will be assembled using the actual measured stoneweights.

.2 Filter Stone:

.1 One (1) Quality Assurance gradation test will be conducted for the filter stone throughout the scheduled work,

unless gradation test results or observations of stone materials indicate additional gradation tests are required.

.2 Undertake Quality Assurance gradation tests for filter stone in accordance with Article 1.5.1.2 above, with a minimum sample size of 3,000 kg. Alternative methods may be considered, subject to approval by the Departmental Representative.

.3 Provide Departmental Representative with loaders, certified scales, other equipment, and operators of such equipment as required to gather samples and measure/weigh each individual stone. Methods used to weigh each individual stone must be accurate to ±5 kg for stones larger than 50 kg, and to ±0.5 kg for stones smaller than 50 kg.

PART 2 - PRODUCTS

2.1 Materials .1 Rock Material:

.1 Test all rock materials and have approved by the Departmental Representative prior to installation in the work.

.2 All rock materials to be free from cracks, seams and other defects which may impair durability.

.3 Armourstone and Filterstone to meet the following requirements: Specific Gravity minimum 2.65 and absorption maximum 2.0%. Slate, sandstone, shale and stone containing mica not acceptable for filterstone or armourstone.

.4 Corestone to meet the following requirements: Specific Gravity minimum 2.50.

.5 Actual Specific Gravity and absorption will be determined by testing selected samples of material being incorporated into the works. Materials with a specific gravity less than required minimum specified above or an absorption rate in excess of 2% will be rejected.

.2 Corestone:
.1 Pit run or quarried material rough and angular in shape requiring approval by the Departmental Representative prior to being used in the work.
.2 Material not to contain organic matter, frozen lumps, sod, roots, logs, stumps or any other objectionable matter.
.3 Corestone gradation must be within the following limits:

IMPERIAL SIZE	METRIC SIZE	% PASSING BY MASS
18"	450 mm	100
8"	200 mm	44 - 75
4"	100 mm	25 - 50
2"	50 mm	7 - 14

.4 Material to be screened, if required, to allow for no fines or stones less than 0.2 kilograms are placed in the work.
.5 Material to be blended so that a homogeneous mix of smaller and larger sizes within the approved range is attained.

.3 Armour Stone:
.1 Armour stone to be angular in shape, with the ratio of maximum to minimum dimensions (aspect ratio) not exceeding 2.0.
.2 Armour stone class designation '1.5 to 3.0 tonne' to conform to 2.25 tonne median weight and:
.1 No more than 5% must be less than 800 kg.
.2 No more than 10% must be less than 1500 kg.
.3 No less than 70% must be less than 3000 kg.
.4 No less than 97% must be less than 5000 kg.
.3 Armour stone class designation '3.0 to 5.0 tonne' to conform to 4.00 tonne median weight and:

.1 No more than 5% must be less than 2000 kg.
.2 No more than 10% must be less than 3000 kg.
.3 No less than 70% must be less than 5000 kg.
.4 No less than 97% must be less than 8000 kg.

.4 Armour stones outside of the specified ranges may be acceptable for use at the discretion of the Departmental Representative.

.4 Filter Stone:
.1 Filter stone to be angular in shape, with the ratio of maximum to minimum dimensions (aspect ratio) not exceeding 2.0.
.2 Filter stone to conform to 200 to 600kg Class designation, 400 kg Median weight and:
.1 No more than 5% must be less than 125 kg.
.2 No more than 10% must be less than 200 kg.
.3 No less than 70% must be less than 600 kg.
.4 No less than 97% must be less than 900 kg.

.5 Field Stone: all field stone must be accepted before it is used in the work.

PART 3 – EXECUTION

3.1 Toe Protection

.1 Provide toe protection by keying in armourstone up to 1.1 metre into beach as indicated on drawings.

.2 Do not extend excavation for toe-in more than 10m before placing armourstone.

3.2 Corestone

.1 Do not place corestone until bottom area has been accepted by the Departmental Representative.

.2 Do not place material under poor weather conditions. Place immediately prior to planned placement of filter stone.

.3 Tolerance: surface of bearing layer to be within 50mm of elevation indicated and

variation in elevation over whole area of bearing layer not to exceed 75mm.
.1 Other layers to be within 100mm of lines shown.

.4 Place core material to lines, grades and dimensions indicated on the plan.

.5 Place material on clean harbour bottom to specified grades, and after the removal of kelp, debris, snow, ice, etc.

.6 Execute work in such a manner to protect core material from storm wave action or tidal erosion damage. Replace material lost due to storm or erosion damage at no additional cost to the Contract.

.7 Do not extend corestone material for breakwater more than 10 metres beyond filterstone protection.

.8 Corestone material may be placed by end dumping. However, note that due to the side slopes of the breakwater that mechanical placing of the core will be necessary to produce the slopes and shapes required.

.9 Grades, lines, dimensions, slope and quantity of core, to be reviewed and approved by the Departmental Representative before proceeding with overlaying filter layer.

3.3 Filterstone

.1 Place filter layer material to lines, grades and dimensions indicated on the plans.

.2 Place filter layer material in two (2) layers as shown on plans.

.3 Do not extend filter material for breakwater more than 10 metres beyond armourstone protection.

.4 Place filterstone using mechanical means to the lines, grades and dimensions shown on the plans. Do not dump filter units into place. Commence placement at toe of slope and proceed up the slope towards the crest. Place filterstone so that it is stable,

secure on slope and supported by units below. Control placement of filterstone so as to produce a uniform and continuous cover over the underlying layer.

.5 Replace filterstone units broken or damaged during placement. Remove damaged units from the work. Provide replacements and removals at no additional cost to the Contract.

.6 Have grades, lines, dimensions, slopes and quantity of filterstone reviewed and approved by the Departmental Representative before proceeding with the overlying armour layer.

3.4 Armourstone

.1 Where existing armourstone hinders the placement of new armourstone to the lines and elevations shown on the Project Drawings, re-work armourstone to conform with the lines and elevations indicated. Generally, existing armourstone will remain in place.

.2 Re-use single detached armourstone where indicated on the Project Drawings provided they meet the specification herein.

.3 Place armourstone in layers as shown on the plan to the lines, grades and dimensions shown on the plan.

.4 Place each armourstone individually using mechanical means to the lines, grades and dimensions shown on the plans. Do not dump armour units into place. Commence placement at toe of slope and proceed up the slope towards the crest elevation. Place each unit so that it is stable and secure on slope and supported by units below. Control placement of armour units so as to produce a uniform and continuous cover.

.5 Completed armourstone in place to consist of:

.1 Two (2) layers along all slopes of the new revetments and breakwaters, including seaward slope, 180 degree end cones and back slopes, as shown on plans.

.2 Two (2) layers along the whole crest of the breakwater, as shown on plans.

.3 Two (2) layers along the crest of the revetment at the highway embankment, with total thicknesses and crest elevations as shown on plans.
.4 Place armourstone in an approved manner to produce regular surface and a stable mass.

.6 Replace armourstone units broken or damaged during placement. Damaged units to be removed from the work and will not be paid for.

3.5 Tolerances

.1 Completed component layers to be within following tolerances of line and grades indicated:
.1 Corestone: ±50 mm
.2 Filterstone: ±100 mm
.3 Armourstone: ±200 mm
.4 Armourcrest: Minimum design elevation not to be uniformly high or low.

3.6 Cross Sections

.1 During construction submit cross-section sheets to the Departmental Representative showing the following:
.1 Cross-sections at stations every 10 metres along the breakwater slope.
.2 The design cross-section showing proposed core, filter, and armourstone in solid lines.
.3 Superimposed in dashed lines elevations taken at 2 metre intervals perpendicular to the centreline and at top and toe of slopes showing core, filter, and armourstone as constructed surfaces.
.4 Reference cross-sections to the plan view of the breakwater with stations shown for reference.
.5 Submit cross-sections as work at each station is completed for each class of stone. Do not place next layer until the Departmental Representative or his representative has reviewed and approved the as-built elevations for underlying layer.
.6 After construction is complete and before the Final Certificate of Completion will be paid, submit detailed as-built survey plan to Departmental Representative to show that contract grades and elevations

have been achieved. Provide an electronic file and two (2) sets of prints. The following minimum requirements must be met:

.1 Elevations every 10 meters along the centerline of the breakwater and every 6 meters perpendicular to the centerline, on the end cone, and top and toe of slopes.

3.7 Protection

.1 Take into account anticipated weather conditions and degree of exposure of site and tidal conditions in setting requirements for protection.

.2 The work site is subject to water level variations due to tidal action.

.3 Replace any stone lost due to storms, tidal erosion or by own activities.

.4 Schedule and carry out construction so that each phase of work is not left exposed longer than necessary.

.5 Progress of placement of core and stone to be recorded daily by the Departmental Representative's inspector with Contractor's concurrence. Replacement of material lost due to storm wave action or tidal erosion damage will be based on daily journal of work progress and is considered incidental to the work.

END OF SECTION

Appendix A

BIA (Basic Impact Analysis)

Appendix B

Parks Canada Best Management Practices
Roadway, Highway, Parkway and Related Infrastructure

Parks Canada Parcs Canada

Parks Canada National Best Management Practices

Roadway, Highway, Parkway and Related Infrastructure

(for JNP 4-6 Roads Project – May 11. 2017)

Canada

May 2015

Parks Canada National Best Management Practices for Roadway, Highway, Parkway and Related Infrastructure

Approved by

Original signed by Mike Wong

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Mike Wong, Executive Director Natural Resource Conservation Branch

Original signed by Kalvin Mercer

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Kalvin Mercer, Associate Vice-President Asset Management and Project Delivery

July 23, 2015

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Date

Contents

Introduction

The Parks Canada National Best Management Practices for Roadway, Highway, Parkway and Related Infrastructure will allow an identified suite of project activities to be undertaken in such a manner that there will not be resulting significant adverse environmental effects.

The Best Management Practice (BMP) pathway is applied when there is a suite of routine, repetitive projects (e.g. paving) or activities (e.g.de-watering), with well understood and predictable effects. This fulfils Park's Canada's obligations under the *Canadian Environmental Assessment Act 2012* as a manager of federal land, see the Guide to the Parks Canada EIA Process. The BMP maximizes efficiency through creation of a pre-approved impact assessment for the defined suite of projects, to which standard mitigation and environmental management measures can be applied.

The impact assessment officer (IAO) will review a proposed project and advise the functional manager of the project if and how this BMP should be applied. The IAO's advice will be based on whether the project falls within the scope of the BMP, and whether application of the mitigation measures in the BMP will adequately address potential adverse effects of the project.

Project Managers are responsible to ensure all mitigation measures applicable to the project are added to the terms and conditions of any permits or contracts issued for the project.

The Impact Assessment Officers must ensure the project, EIA pathway applied and determination are recorded in the Parks Canada National Impact Environmental Assessment Tracking System.

Scope of Application

This BMP outlines the impact assessment of repetitive and routine projects on roadways, highways and parkways. If a project involves some or all of below activities, and the initial assessment of site and project indicate "the project is unlikely to result in significant adverse environmental effects" the BMP can be applied. Projects that this BMP would likely be applied to include:

- The proposed maintenance or repair of an **existing** sidewalk, or parking lot.
- The proposed maintenance or repair of an **existing** road, including pull-off areas, that would be carried out on the existing right of way[1].

Activities included in the scope of this BMP are:

1. Project Design
2. General Activities
    - Worksite Conditions/Staging/Laydown
    - Equipment operations
    - Fuel storage and refueling

[1] Highway Footprint or Right of Way (ROW): The permanent physical intrusion of a highway or freeway, including the road surface, shoulders, side slopes, drainage ditches and/or storm drainage ponds (Transport Canada, 2008).

- Site Clean Up/Waste Disposal

3. Asphalt Production and Handling
    - Asphalt Plant Operation
    - Gravel Crushing and Washing
    - Oiling of Truck Boxes
    - Clean Up and Disposal of Waste Products
4. Concrete Handling
    - Operation, maintenance and inspection of Onsite Temporary Concrete Washout Facility
    - Removal of Temporary Concrete Washout Facilities
    - Onsite concrete management
5. Paving, Resurfacing and Grading
    - Grading
    - Paving and Resurfacing
    - Pavement Marking and Barrier and Guardrail Reinstatement
6. Barriers and Guardrails
    - Repair, replacement and upgrades of barriers and guardrails
7. Vegetation Removal
    - Vegetation Removal
    - Grubbing
    - Brushing
    - Disposal of Vegetation Debris
    - Integrated Pest Management
8. Excavation, Soil Stripping and Overburden Removal
    - Excavation
    - Soil Stripping
    - Topsoil Salvage
    - Excavated Material Storage
    - Excess Material and Waste (overburden removal)
9. Soil and Vegetation Restoration
    - Topsoil Replacement
    - Soil Amendments
    - Seedbed Preparation
    - Species Selection
    - Seed Lot Selection
    - Seed Mixture Composition
    - Seeding
    - Alternatives to Seeding
    - Reclamation Standards
    - Reclamation Plot Evaluation
    - Time Limits
10. Drainage Structures
    - Drainage structures
    - Culverts

Exceptions

This BMP is not suitable for the following project activities as they would require supplemental assessment and/or mitigations:

- Work that may impact aquatic or terrestrial wildlife habitat connectivity, such as fences or culverts;
- Elongation of culverts; realigning water courses; dredging; or work below the high water mark of a fish bearing water body;
- Bridge projects needing work to occur below the High-Water Mark[1], with permanent; alteration to the water course, such as replacement of piers/abutments or permanent installation of structures on the bed of a water body;
- Greater than 10% increase in land use footprint (e.g. gravel pit expansion); and,
- Work which might adversely impact any potential or established Aboriginal and Treaty rights or traditional use[2].

If the project has the potential to have an adverse effect on the critical habitat of a species at risk (with endangered, threatened, or extirpated status) this BMP does NOT apply. The project will require a separate environmental impact analysis.

If the project has the potential for **residual** adverse effects on a listed species at risk (including effects to individuals and residence of the individuals) this BMP does NOT apply, the project will require a separate environmental impact analysis.

Note: If there is any uncertainty regarding potential adverse effects to species at risk, consult a member of the National Office Species Conservation team.

Approved geographic area of application

This BMP is intended for use in all Parks Canada administered protected heritage places with roadways, highways and parkways.

Components of the environment that may be affected

Potential effects from projects of this type are well understood and predictable. They include:

Water Resources:

- Adverse modifications to surface drainage patterns

[1] High-water Mark is the usual or average level to which a body of water rises at its highest point and remains for a sufficient time so as to leave a mark on the land. (Fisheries and Oceans, 2015). Upper Controlled Water Elevation (UCWE) is used as definition of High-water Mark in managed waterways.

[2] Parks Canada must engage in additional and separate consultations with Aboriginal groups if there is a possibility of a project adversely affecting established or potential Aboriginal or Treaty rights. This is required to fulfill federal government responsibilities in upholding the honour of the crown. If there is uncertainty regarding the need for Aboriginal consultation with respect to a project, refer the matter to Parks Canada Legal Services for advice. Guidance on consultation may be sought from the Aboriginal Affairs Secretariat and from the guidance document "A Handbook for Parks Canada Employees on Consultation with Aboriginal Peoples".

- Reduced water quality due to increased erosion, sedimentation, transportation of debris and contamination (i.e. from leaks and accidental spills, etc.)

Soil/Land Resources:

- Change in slopes, landforms, and landscape
- Soil compaction and rutting
- Slope instability, due to increased soil exposure and improper excavation and storage
- Soil contamination

Air quality:

- Decreased ambient air quality (i.e. from dust, equipment emissions, etc.)
- Increased ambient noise levels
- Temporary increased levels of CO_2 and other pollutants
- Temporary increased localized temperatures from paving and equipment operation.

Flora and Fauna:

- Damage to and/or removal of vegetation in immediate or adjacent areas
- Introduction of non-native species populations, or expansion of existing populations
- Wildlife sensory disturbance causing displacement/preferred habitat avoidance
- Wildlife habituation/attraction to artificial food sources
- Impeded/altered wildlife movement
- Damage to nests/disruption of nesting animals
- Mortality from project activities

Cultural Resources:

- Adverse effects on the heritage value or character-defining elements of a cultural resource
- Impacts to archaeological resources (known or potential)

Mitigation Measures

To use the document efficiently, keep the activity mitigation lists that apply to the project expanded and collapse the other activities by clicking on the section titles, print this as a pdf or paper document and include with the EIA determination record. This will reduce the overall size and scope of the mitigations to present to contractors and project managers.

Choose all that apply to project. Each title is hyperlinked to the related section.

Module	
1.	Project Design
2.	General Activities
3.	Asphalt Production and Handling
4.	Concrete Handling
5.	Paving, Resurfacing, Grading
6.	Barriers and Guardrails

7. Vegetation Removal
8. Excavations, Soil Stripping and Overburden Removal
9. Slope Stabilization, Drilling and Blasting
10. Soil and Vegetation Restoration
11. Drainage Structures

1. Project Design

When upgrades to infrastructure are planned opportunities to decrease the environmental impacts of long term operation should be considered in the engineering design. Some examples are: directing runoff into vegetated areas rather than directly into surface waters to decrease pollution in surface waters, increasing the span length of bridges during replacements to allow for terrestrial wildlife passage underneath and converting smaller culverts to larger culverts or clear span bridges to allow for better fish passage and less restricted flows.

2. General Activities Mitigations Module

Construction activities involve the use of laydown/staging areas, equipment operations, storage and handling of hazardous materials. Potential adverse effects include: destruction of vegetation, erosion and sedimentation, constriction for wildlife movements and introduction/spread of non-native vegetation.

Work Site Conditions/Staging/Laydown

2.1. All employees must attend a briefing with an Impact Assessment Officer (IAO) or Surveillance Officer (SO) before beginning work at the site review and explain the mitigations that are conditions of the project approvals.

2.2. Minimize vegetation-clearing activities and ground disturbance by staging on existing hardened areas wherever possible.

2.3. Avoid or terminate activities on site that attract or disturb wildlife. Vacate the area and stay away from the immediate location if wildlife display aggressive behaviour or persistent intrusion.

2.4. Control materials that might attract wildlife (e.g. petroleum products, human food and garbage).

2.5. Notify the SO immediately about dens, litters, nests, carcasses (road kills), wildlife activity or encounters on or around the site or crew accommodation. Other wildlife-related encounters are to be reported to SO within 24 hours.

2.6. Delineate the work zone; clearly mark the limits to active construction and the access and egress locations.

2.7. When work involves the disturbance of soils or the use of erodible materials (e.g. sands, topsoil), prevent the transport of sediment by the installing of appropriate erosion and sediment control.

2.8. An Erosion and Sedimentation Management Plan shall be prepared for the components of the work undertaken in proximity to watercourses, wetlands or riparian environments. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger. The ponds shall also be designed to handle 1:5 year storm events, with overflow spill capacity for 1:10 year storm events and emergency spillway capacity for 1:100 year storm events. All components require regular maintenance to ensure effectiveness.

Equipment Operations

2.9. Equipment movements and workers' private vehicles shall be restricted to the 'footprint' of the construction area.

2.10. Ensure machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species, noxious weeds and soils from off-site.
2.11. Operate machinery on land above the high water mark, on ice, or in another manner that minimizes disturbance to the banks and bed of any water body.
2.12. Limit machinery crossing (fording) a stream or watercourse to a one-time event (i.e., over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure in compliance with the *Fisheries Act*.
2.13. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (e.g., swamp mats, pads) if minor rutting is likely to occur during fording.
2.14. Use temporary crossing structures or other practices to cross streams or water bodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds.

Fuel Storage and Refueling/Emergency Plans

2.15. A Spill Response Plan will be prepared and detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products in accordance with all applicable federal and provincial legislation. The Plan shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment. Such products include, but are not limited to, waterproofing agents, grout, cement, concrete finishing agents, hot poured rubber membrane materials, asphalt cement and sand blasting agents.
2.16. Spill kits shall be provided at re-fuelling, lubrication, and repair locations that are capable of dealing with 110% of the largest potential spill and shall be maintained in good working order. Site staff shall be informed of the location of the spill response kit(s) and be trained in its use.
2.17. If potentially hazardous materials (e.g. cement-based products, sealants or paints) are used on site ensure raw material, mixed compounds and wash water are not released to any watercourse or soils. Measures such as collection/drip trays and berms lined with occlusive material such as plastic and a layer of sand, and double-lined fuel tanks can prevent spills into the environment.
2.18. Hazardous or toxic products shall be stored no closer than 100 metres from streams, wetlands, water bodies or waterways.
2.19. Timely and effective action shall be taken to stop, contain and clean-up all spills as long as the site is safe to enter. The SO shall be notified immediately of any spill. In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and clean-up.
2.20. The costs involved in a spill incident (the control, clean up, disposal of contaminants and site remediation to pre-spill conditions), shall be the responsibility of the proponent. The site will be inspected to ensure completion to the expected standard and to the satisfaction of Parks Canada.

Site Clean Up/Waste Disposal

2.21. Clean tools and equipment off-site to prevent the release of wash water that may contain deleterious substances.

2.22. Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site.
2.23. Construction, trade, hazardous waste and domestic waste materials shall not be burned, buried or discarded at the construction site or elsewhere in Parks Canada protected heritage places. These wastes shall be contained and removed in a timely and approved manner and disposed at an appropriate waste landfill site located outside the Parks Canada protected heritage place. Construction waste storage containers, shall be emptied when 90% full. Waste containers will have lids, be wildlife proof if there attractants and waste loads shall be covered while being transported.
2.24. Sanitary facilities, such as a portable container toilet, shall be provided and maintained in a clean condition.

3. Asphalt Production and Handling Mitigations Module

Asphalt is a common building material for transportation infrastructure. Its production requires the use of gravel, water, and petroleum products, and associated project activities include transportation, storage and handling of these materials. Installation of asphalt plants is common within the larger parks where gravel extraction is undertaken.

Timing of Works

3.1. Asphalt works are preferably undertaken during periods of dry weather as this allows easier control of contaminated runoff and sediment.
3.2. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.

Operation of Asphalt Plants

3.3. Asphalt plant operation must comply with all environmental pollution control regulations, including provincial regulations, and the plant operational plan.
3.4. Spoil piles and stock piles will be at least 30 meters from the edge of any water body.
3.5. There must be enough room between the stockpiles and the asphalt plant for a loader in the event of a spill at the asphalt plant.
3.6. A containment berm with an associated liner made of occlusive material (e.g. plastic of a thickness approved by the SO) and covered with absorbent sand or clay shall be installed under the asphalt storage tank to ensure containment of 110% of the tank's capacity.
3.7. The proponent shall be responsible for the purchase and safe delivery/storage/handling of asphalt cement and emulsions to the asphalt plant site.
3.8. Excess hot mix or reject new asphalt shall be temporarily in stored in the containment area sufficient to prevent runoff of petroleum into soils or surface waters as directed by

the SO, and removed from the Parks Canada protected heritage place, prior to project completion.

3.9. Every effort will be made to recycle waste asphalt, either as a base course, or by recycling waste asphalt through the asphalt plant according to engineering specifications.Old cured ground asphalt material shall be removed, recycled, or stored for future recycling at an approved operational gravel pit or asphalt plant site. Stockpiles must be further than 30 metres from any surface waters.

3.10. Remaining stockpiles will be removed or incorporated into reclamation plans for the gravel pits or asphalt plant sites.

3.11. Asphalt to be removed must be sampled and analyzed to determine possible lead contamination. Contaminated asphalt will be transported to an approved waste disposal facility. A receipt of delivery is to be provided to the SO.

3.12. Proponent should protect containment/catchment areas and drip trays at the asphalt plant from rainfall since, if contaminated, all of the collected water will require disposal of at an approved disposal facility at the expense of the Proponent.

3.13. Dyking and ponding will be required to control the rate and quality of runoff from the plant site.

3.14. Ensure that the water in the settling ponds remains clean of petroleum products. Any contaminated water will require disposal at an approved disposal facility at the expense of the Proponent.

Gravel Crushing and Washing

3.15. Where possible within engineering constraints, asphalt materials should be recycled to reduce the need for new gravel.

3.16. Gravel will be obtained from an approved operational borrow pit only. For gravel obtained from a borrow pit within a protected heritage place or borrow pit, gravel extraction within the footprint of the disturbed area of the approved operational borrow pit is permitted.

3.17. Gravel will not be crushed within 30 meters of any water body.

3.18. If water for cleaning is extracted from a watercourse, refer to water withdrawal section of this BMP.

3.19. If gravel requires washing, the water used will not be returned directly to any watercourse.

3.20. Water free from chemical contaminants will be discharged into ground where further erosion and runoff into surface water is prevented. Discharging into well vegetated ground surface, at a rate which prevents erosion can often provide increased absorption and reduction of sediment load.

3.21. Contaminated water must be treated to meet CCME guidelines or transported outside of the Parks Canada protected heritage place for disposal at an approved facility.

3.22. For waste removed from the park a detailed receipt of delivery to an approved facility will be provided to the SO.

Oiling of Truck Boxes

Trucks for hauling asphalt mixture shall have tight, clean, smooth metal beds that have been sprayed with a minimum amount of thin fuel oil to prevent the mixture from adhering and causing waste asphalt.

3.23. Truck boxes may be oiled only when absolutely necessary.
3.24. Oiling will take place in a bermed area, consisting of a plastic underlay with 15 centimetres overlay of clean gravel. Oil contaminated gravel will be hand collected (so as to prevent tearing of the plastic) from the bermed area daily, and put through the asphalt plant.
3.25. Vehicle covers shall be securely fastened.

Air Quality Mitigations

3.26. Asphalt plants should be 500 meters from buildings with human habitation.
3.27. Emissions from the asphalt plant and paving project equipment will comply with End Product Specifications (EPS) emission control standards and other provincial emissions regulations. Stack test results provided to the ESO by the operator or surveillance contractor may be required when the asphalt plant is at full capacity to ensure the plant is operating within the required standards. If the plant is not operating within the appropriate levels, production will cease until the requirements are met.
3.28. Sludge removed from the clarifier that is free of chemical contamination will be contained to prevent fine dust particles from becoming airborne during windy periods.
3.29. Unannounced stack tests will be conducted throughout the project. If the plant does not meet requirements, operation will cease until the requirements can be met.

Disposal and Clean Up of Other Waste Products

3.30. To ensure regular clean-up of waste asphalt and petroleum spills, a defined clean up schedule will be established during the preconstruction meeting.
3.31. Leaks will be collected in drip-trays, the collected material will either be removed from the park, or recycled back through the Asphalt Plant. For any material removed outside the park to an approved facility, a detailed receipt will be provided to the ESO.
3.32. Used oil, filters, grease cartridges, oil cans and other waste products of plant servicing will be collected and disposed of at the nearest industrial waste facility.

4. Concrete Handling Mitigations Module

Concrete is a common construction material used in transportation infrastructure. Its use ensures longevity of the infrastructure and safety for public use. One litre of concrete wash water or leachate in 1000L of water will kill fish. Cement-based products including grouts and concrete are lethal to fish and many other aquatic organisms. Raw product or leachate entering a watercourse will alter water chemistry, making it more basic or alkaline.

Onsite Temporary Concrete Washout Facility

4.1. Temporary concrete washout facilities shall be located a minimum of 30m from storm drain inlets, open drainage facilities, and watercourses.
4.2. Temporary concrete washout facilities shall be temporary pit or bermed areas constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.
4.3. Straw bales, wood stakes, and sandbag materials can be used to construct temporary containment walls or “barriers”.

4.4. Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material.
4.5. The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.
4.6. Perform washout of concrete mixer trucks in designated areas only.
4.7. Wash concrete from mixer truck chutes into approved concrete washout facility or collect in an impermeable bag for disposal.
4.8. Pump excess concrete in concrete pump bin back into concrete mixer truck.
4.9. Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed offsite.
4.10. Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of per federal and provincial regulations.

Maintenance and Inspection of Temporary Concrete Washout Facilities

4.11. Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 100 mm (4 inches) for above grade facilities and 300 mm (12 inches) for below grade facilities.
4.12. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition.
4.13. Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
4.14. Temporary concrete washout facilities shall be inspected for damage (i.e. tears in PVC liner, missing sand bags, etc.).
4.15. Onsite concrete waste storage and disposal procedures should be monitored at least weekly or as directed by the ESO.

Removal of Temporary Concrete Washout Facilities

4.16. Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and restored.

Onsite Concrete Management

4.17. Rolling concrete mixers with surplus concrete in amounts less than one cubic metre of wet concrete may waste this concrete in the grade right-of-way as directed by the Parks Canada Representative in areas that drain well away from watercourses. Surplus amounts in excess of one cubic metre are to be returned to the batching yard.
4.18. Water contaminated in the placing of cement and curing of concrete shall be contained and removed from the site to an approved disposal facility.
4.19. The concrete batching plant must be operated pursuant to applicable dust, air emission, and water quality control regulations.

4.20. Waste, solidified concrete from rolling concrete mixers in amounts less than 1 cubic meter and waste solidified concrete from construction pour shall be buried in the grade within 48 hours of the pour, subject to approval and direction from the Departmental Representative

5. Paving, Resurfacing, Grading Mitigations Module

Highway surface management activities are undertaken to ensure public safety on Parks Canada Agency highways by maintaining clean, level, and unbroken road surface conditions through activities such as pavement cleaning, patching, application of surface treatments, and pavement crack sealing. Grading is used to address drainage issues, vegetation encroachment, potholes and rough surfaces.

Timing of Works

5.1. Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of contaminated runoff and sediment.

5.2. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.

Grading

5.3. During grade construction conducted close to any watercourse, water body or wetland ensure materials are not pushed, fall or are eroded into the water or wetlands.

5.4. No grade building shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest. Any material inadvertently falling outside the work limits will be removed promptly in a manner that does not damage trees or vegetation.

5.5. Materials shall be placed at storage sites or on the grade without spillage outside the work limits. Any material inadvertently falling outside the work limits will be removed promptly in a manner that does not damage trees or vegetation.

5.6. Retain a 30 metre vegetated buffer around water bodies or install runoff management structures.

5.7. If possible grade roads early in the spring before vegetation develops seed heads or late in season after vegetation has set seed and is dormant to minimize non-native vegetation propagation.

5.8. Ensure gravel or road bed material is free of weeds and comes from an approved operational gravel source free of other contaminates.

Paving and Resurfacing

5.9. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface waters.

5.10. Minimize application of seal coats in wet conditions. Attempt to apply only to dry surfaces and not prior to (within 24 hrs.) or during rainfall. If unforeseen rain arrives ensure runoff from recently seal coated surfaces are prevented from entering surface waters.

5.11. For asphalt handling and management see the Asphalt Mitigation Module of the BMP.

Pavement Marking and Barrier and Guardrail Reinstatement

5.12. Minimize changes to the surface that could affect infiltration and runoff characteristics and maintain effective surface drainage to limit direct runoff into surface water Pavement marking shall be undertaken pursuant to standard methods applied in National Parks for control of paint products, both in transport and handling. The Contractor shall present a description of methods to be employed for transporting and controlling paint and hazardous products, application of paint, cleaning of equipment, containment and disposal of waste paint and cleaning products, etc. the satisfaction of the Parks Canada Representative.

5.13. Where concrete barriers or guard rails are temporarily removed, for highway improvements, temporary glow posts shall be installed, at 20.0 m intervals on straight sections and at 10.0 m intervals on curves and shall remain in place until permanent barrier system has been installed.

6. Barriers and Guardrails Mitigations Module

Repair, installation and upgrade of barriers and guardrails involves laydown/staging areas, equipment operations, minor excavation (e.g., for barrier post holes) and use of concrete. Potential adverse effects include destruction of vegetation and erosion and sedimentation.

Timing of Works

6.1. Where excavation is required, schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.

6.2. If the work schedule requires working in the rain, appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

Repairs, Replacement and Upgrades

6.3. An Erosion and Sedimentation Management Plan shall be prepared for the components of the work undertaken within 100m of watercourses, wetlands or riparian environments. If sediment ponds are required, they shall be designed to settle all sediment particles 0.02 mm or larger.

6.4. Where use of concrete is required for guardrail post holes, Concrete Handling Mitigations apply.

6.5. If vegetation removal is required for barrier or guardrail works, Vegetation Removal Mitigations apply.

6.6. Where concrete barriers or guardrails are temporarily removed, temporary glow posts shall be installed, at 20.0 m intervals on straight sections and at 10.0 m intervals on curves and shall remain in place until permanent barrier system has been installed.

7. Vegetation Removal Mitigations Module

Roadside vegetation management activities include mowing, brushing, and landscape maintenance activities undertaken to maintain clear sight lines for highway users, control noxious weeds, facilitate effective drainage, and reduce possible fire hazards. Mature timber

may need to be removed for improving road alignments, improving sight linesor replacing or repairing associated infrastructure. Grubbing (stump and root removal) may be required to prepare the ground surface for other activities.

Timing Windows

7.1. Vegetation clearing can negatively impact nesting birds and/or bats in spring and summer. Avoid all vegetation removal during this time. If vegetation removal is scheduled to occur within these times a qualified professional biologist/ecologist should further clarify the species presence and timing particular to the work site and any occupied bird nests, eggs, or nests of species protected under the Migratory Bird Convention Act (MBCA). See appendix on regulatory guidance for further detail on the MBCA and SARA.

7.2. If a nest is found during the pre-work surveys, the vegetated area will be left intact with a suitable sized buffer of shrubs/trees around it until the young have fledged and left the nest. Size of buffer species dependent, to be determined in consultation with professional biologist or park ecologist.

7.3. Grass mowing and trimming should not occur during peak spring or fall reptile/amphibian migrations and hatching. Consult a local biologist/ecologist for site and species specific timing windows.

Vegetation Removal Mitigations

7.4. Vegetation removal should be limited to the minimum Clear Zone Distance[1] dependent on type and size of road and maximum height needed to meet the road safety objectives.

7.5. Minimize full removal and retain vegetation when possible to reduce erosion.

7.6. Clearing activities shall be avoided during nesting seasons for birds, reptiles and amphibian species in the project area.

7.7. If wildlife is observed during work, if possible, give animals the opportunity to escape the work area to the surrounding forest or elsewhere to seek new shelter.

7.8. Avoid ground vegetation removal during dry, windy periods to prevent erosion of topsoil and reduction of air quality with dirt/dust.

7.9. Retain 30 metre vegetated buffer around water bodies, where disturbance is necessary and unavoidable restoration is required.

7.10. Debris will not be deposited in water bodies.

7.11. Ensure tree limbs/stumps are flush cut as close to the ground or stem as possible.

7.12. Logs and other salvage materials are to be conveyed to and placed at a storage site without spread of debris or damage to other standing trees or landscape resources outside the marked clearing or storage limits. They shall not be skidded through wetlands, waterways or water bodies.

[1] A clear zone is an unobstructed, traversable roadside area designed to enable a driver to stop safely or regain control of a vehicle that has accidentally left the roadway. The selection and design of appropriate clear zone dimensions is project-specific and should be the responsibility of professionals trained in roadside design.

7.13. During the grubbing component, stumps, roots, imbedded logs and other non-soil debris shall be pulled and shaken free of loose soil and rocks before transport to a designated pit.

7.14. Where possible preserve identified wildlife trees by limbing or topping if they are not assessed as hazard trees.

Disposal of Vegetation Debris

7.15. All vegetation debris must be removed as soon as possible from the right-of-way, by transporting off-site for disposal.
7.16. All vegetation containing non-native species will be piled and bagged and removed off site to disposal facility.
7.17. Where fire fuel loading is not a concern vegetation debris of limited amounts will be dragged in the forest to mimic natural tree fall.
7.18. In some cases, logs from newly cut trees may be set aside for use elsewhere as directed by local park site managers and the ESO.
7.19. Store removed vegetation on already disturbed areas to minimize disturbance area.
7.20. In appropriate areas re-establish native vegetation where it has been completely removed/damaged.

Integrated Pest Management

7.21. A Field Unit Integrated Pest Management Plan (IPMP) must be completed and approved prior to the use of herbicides to ensure the most effective and least harmful substances are properly used.

8. Excavations, Soil Stripping and Overburden Removal Mitigations Module

Construction projects often involve excavations. To successfully complete reclamation of disturbed areas, and protect areas from erosion proper soil handling and backfilling procedures must be followed. Post excavation and stripping soil and vegetation restoration mitigations should be applied. See section of this BMP for Soil and Vegetation Restoration.

Timing of Works

8.1. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
8.2. If the work schedule requires working in the rain, appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

Excavation

8.3. Materials shall be placed at storage sites or on the grade without spillage outside the working limits. Any material inadvertently falling outside the work limits is to be removed promptly in a manner that does not damage trees or vegetation.

8.4. All sediment control measures must be in place before starting work in the vicinity of rivers, water bodies, watercourses, and wetlands.
8.5. Special precautions may have to be taken during excavation in the vicinity of intermittent or active drainage channels.
8.6. Excavation plans must be compared to local archaeological resource inventories, if available. If no archaeological information is available for the work area, an Archaeological Overview Assessment (AOA) may be required to determine the archaeological potential of the work area. Based on the results from the AOA, an Archaeological Impact Assessment might be required. It would be time and cost efficient to refer the plan to Parks Canada's Terrestrial Archaeology section before conducting any excavation to determine the appropriate course of action.
8.7. If cultural resources (eg. archaeological resources) are discovered, immediately cease work, and alert SO.
8.8. Minimize changes to the ground surface that affects its infiltration and runoff characteristics and maintain/re-establish effective surface drainage on completion of the project
8.9. Backfill and compact excavations as soon as possible. Optimize degree of compaction to minimize erosion and allow for re-vegetation.
8.10. All trenches or ditches left unattended overnight must be fenced or covered to prevent wildlife entrapment.

Soil Stripping

8.11. Strip topsoil under dry conditions, whenever possible.
8.12. No stripping shall occur outside of the delineated work area or within 1 metre of the drip line of existing forest.
8.13. In the event of a work program shutdown during inclement weather (e.g. winter conditions unfavourable for construction, heavy rain events, construction delays, etc.) erosion control of bared soils or excavated material stockpiles is required.
8.14. Stripping close to any watercourse, water body or wetland shall employ methods to ensure materials are not pushed, do not fall or erode into the water or wetlands.
8.15. Work within a 100 metre buffer from the high water mark of waterways or wetlands will require a site specific sediment and erosion control plan.
8.16. An erosion control plan is also needed to control dust generated from the construction site.

Topsoil Salvage

8.17. Salvage topsoil at all excavation sites for reclamation purposes.
8.18. Usually the upper 15 cm of soil, below the sod layer if present, is considered topsoil, where depths exceed 15cm salvage the entire depth of topsoil.
8.19. Remove stumps and woody debris from topsoil, wherever possible.

Excavated Material Storage

8.20. Allow space for separate storage of topsoil and spoil; where space is available separate stored topsoil from spoil by at least 1 m. Use appropriate material (e.g., geo-textile) to separate soil components where space is limited.

8.21. Topsoil may be stored on hardened surfaces, geo-textile material or directly on undisturbed vegetation. If storage occurs on vegetation, material recovery by hand may be required.
8.22. Cover all stockpiled material with heavy-duty plastic or filter cloth to prevent erosion during precipitation events.
8.23. Topsoil should be stockpiled on the uphill side of the disturbance on sloped terrain.
8.24. Construct barricades to prevent losses on steep terrain (>18°, 3:1) and within 100m of watercourses.

Excess Materials and Waste (Overburden Removal)

8.25. Remove excess excavated material from site where it cannot be used for the final grading of the area. Site specific arrangements must be made for disposal locations and procedures of overburden.
8.26. Surplus excavated material may be used to fill depressions around the project site providing topsoil is stripped before filling, with approval from SO.

9. Soil and Vegetation Restoration Mitigations Module

Almost all projects activities included in this BMP will require some ecological restoration- *the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed*. The restoration plan can be a simple application of the following mitigations and can be at the site or both at the site and in concert with another site designated to offset the permanent impact of a project. For disturbance areas greater than a hectare a restoration plan is required. The restoration works can be often be considered projects in and of themselves. Soil and vegetation restoration must apply the principles of effective, efficient and engaging solutions.

Timing Windows

9.1. Develop restoration plan as part of the project scoping and specifications prior to project approvals.
9.2. Vegetation restoration is most effective if seeded in the fall, this allows for full scarification of the seed over the winter and adequate moisture available. Spring and early summer will also work, consider using seed that requires shorter scarification times for these applications. Transplants will do best in the spring and summer and will require adequate watering.

Topsoil Replacement

9.3. Implement restoration plan for the disturbed area immediately following completion of construction.
9.4. Replace topsoil to all areas immediately following fine grading.
9.5. Do not compact topsoil.
9.6. Where insufficient topsoil is available imported soil may be used as a last resort. Imported topsoil must be certified completely free of non-native seeds and compost

developed from sewage treatment plants. Methods of improving vegetation succession using locally sourced, weed and contaminant free materials are preferred.

9.7. Slopes to be seeded should be no steeper than 2 horizontal to 1 vertical (2:1) and covered with a minimum of 5 cm (2 inch) of topsoil. Finish grading should always follow top soil placement.

9.8. Where remaining soils are unstable due to steepness or soil characteristics, immediate installation of sod or erosion control blanket is required.

9.9. Methods of bioengineering such as terracing, willow staking, live pole drain systems should be assessed as solutions where soils are steeper or remain unstable.

Soil Amendments

Fertilizer Application

9.10. Avoid use of fertilizer to limit non-native vegetation growth and allow for local species to use available nutrients.

9.11. If needed use locally sourced mycorrhizae compost teas to improve vegetative success.

Topsoil substitute

9.12. Apply an organic cellulose only amendment as a soil substitute if reclamation standards are not being met within the defined time frame.

9.13. Determine the type of organic amendment based on the site-specific requirements (e.g., peat moss, compost).

Seedbed Preparation

9.14. The seedbed will be scarified by hand or, with the approval of the SO, by machine on large areas (i.e., roadbeds) where it is accessible and appropriate.

9.15. The seedbed will be scarified if seeding takes place more than 7 days after final grading or if there has been a rainfall between final grading and the seeding date.

9.16. The cleats of a tracked vehicle or a harrow device will be used, where possible, to prepare an adequate seedbed with seedling safe-sites (microsites) substantially free of soil crusts.

9.17. Align cleat marks at right angles on slopes to trap seed and sediment and reduce erosion.

Species Selection

9.18. When selecting species and varieties:

- Use species of local native plant communities.
- Species viability in proposed environment and climatic conditions.
- Capability to effectively control erosion, where required.
- Adaptation to the variable site conditions of undulating topography.
- Consider palatability of some species to herbivores and avoid growing attractants in areas of increased risk to wildlife and visitors.

- Variable life expectancy to produce variable, delayed die-out of seeded species and replacement with indigenous native plants.

Seed Lot Selection

9.19. Select seed lots based on indigenous species variety and quality (guaranteed weed seed free content and highest purity and germination), consult with vegetation restoration specialist or fire/vegetation ecologist.

9.20. Reject any seed lots containing any seed of undesirable crop or weed species.

Seed Mixture Composition

9.21. The proportion of each species should be calculated to provide an adequate quantity of pure live seed (PLS) per unit area of each key component.

9.22. Aim for density of about 140 seedlings/m^2 at the end of the first growing season to provide adequate ground cover and allow native species to re-colonize the site over time.

9.23. Consider that parameters such as seed lot purity, seed germination, seedling establishment, seed size and seeding method affect the final stand composition.

Seeding

9.24. Use approved native seed mixes developed for site-specific conditions for various elevations.

9.25. Seed and stabilize (e.g. mulch/tackifier) bare areas as soon as possible after disturbance, preferably as soon as a significant area is graded and finished and before the next rain event. If there is a risk of seedling mortality as a result of fall frost stabilize until appropriate growing conditions exist.

9.26. Use sod in high traffic areas or places that need extra erosion control. Source sod grown from native species (often called fescue sod) and ensure adequate anchoring and watering is in place.

9.27. Use temporary seeding when outside the seeding dates for permanent vegetation

9.28. Apply a seed mixture which is appropriate for the climate, soil, and drainage conditions of the site.

9.29. Apply seed at a rate appropriate to the seed mixture, seeding method and existing vegetation conditions.

9.30. Conduct broadcast seeding under calm wind conditions. Hydro-seeding is acceptable where access is available.

9.31. Do not exceed 30 kg/ha for the broadcast method, ensure seed is integrated with the soil by light rake or harrow. Broadcast method seeding rate is 25 kg/ha (2.5g/m^2) (e.g., 1x25 kg bag will cover 10,000m^2 or 1 hectare).

9.32. For hydro-seeding do not exceed 75 kg/ha with light mulch rates (500 kg/ha- of mulch with hydro-seeding) and 150 kg/ha with heavy mulch rates (1500 kg/ha of mulch with hydro-seeding).

9.33. Do not increase the seeding rate to compensate for poor seedbed conditions.

9.34. Monitor temporary erosion control measures to prevent seed loss.

9.35. Some seeding procedures may have to be completed or repeated in subsequent years.

Reclamation Standards

9.36. Minimum standard for plant density is 25 plants/m^2, with 90% frequency.
9.37. Minimum standard for plant cover is 80% ground cover, with 90% frequency.
9.38. Minimum standard for plant community composition standard is 50% cover and 90% frequency of native species.
9.39. Exclude species designated as weeds in the work sites from the plant density standard consult local vegetation ecologist for current site specific non-native vegetation management program.
9.40. Rock, plant litter and non-vascular species are included in the cover standard.
9.41. Remaining plant cover of seeded native species is acceptable.

Reclamation Plot Evaluation

9.42. Select any site within reclamation area measuring 10 x 10 m, providing 100 plots of 1 square meter.
9.43. Measure the plant density, cover and composition in each of the 100 square meter plots.
9.44. The reclamation standard will have been met if 90 of the 100 plots match or exceed the criteria.
9.45. No fertilizer will be applied one year before the reclamation standard is evaluated.

Time Limits

9.46. Inspect site annually during the growing season.
9.47. Minimum reclamation standard, as above, to be met within one season post planting.
9.48. Apply amendments annually, depending on reclamation progress.
9.49. Re-seed site if the plant density standard is not expected to be achievable within 5 years.

- A new restoration plan will be prepared and implemented when reclamation standards have not been met after 5 years.

10. Drainage Structures Mitigations Module

Drainage structures on roadway, highway and parkways are structures such as culverts, ditches and drains. Drainage structure management activities are undertaken to ensure that surfaces are safe and efficiently drained, water is efficiently channeled to ditches and watercourses, and erosion of highways and adjacent properties is prevented. These mitigations include the cleaning and maintenance of drainage structures and related hardware, as well as the repair or replacement of existing and installation of new drainage structures.

Timing of Works

10.1. Time work in water to respect **timing windows** to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. Contact your local aquatics specialists and DFO offices for further information on **timing windows** in your region.

10.2. Conduct in-stream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.
10.3. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.
10.4. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls installed to prevent the release of sediment-laden water or any other deleterious substances into surface waters.

Drainage Structures

10.5. Isolate your work area from any flowing water that may be present. Ensure any flows are temporarily diverted around the portion of the ditch or watercourse where you are working.
10.6. Select appropriate equipment and work access routes to reduce damage to riparian vegetation and watercourse banks when using earth-moving equipment.
10.7. For smaller scale debris and sediment removal activities, remove materials by hand.
10.8. To assist with bank stability and invasive plant prevention, leave topsoil and root systems intact on channel banks surrounding your work area.
10.9. Ensure any works to repair damaged structures retain the pre-repair channel conditions (e.g., streambed profile, substrate, channel cross section) and do not constrict the stream width.
10.10. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

Culverts

If a proposed culvert crosses a stream where fish are present, the crossing should be designed or upgraded to provide fish passage and avoid interference with fish habitat. To mitigate the impact of culverts on fish movement technical assessment of the water flows and fish species is required to establish a culvert design that will allow for passage of fish. Often there are regional or provincial best practices available online and qualified professionals can assist with designs. Some best management practices for installation or replacement of culverts follows.

Culvert Design and Alternatives

Utilize alternative crossing structures (e.g. clear span bridges, lock blocks and concrete decks) as a replacement for culverts, where possible.

10.11. Ideally, crossings should have natural streambed material through them to allow continuous substrate that matches the streambed below and above the crossing. Open bottom crossings are ideal for maintaining natural substrate.
10.12. Utilize a single large culvert design over a multiple culverts design (i.e. several smaller culverts) to reduce debris blockage and increased fish and wildlife passage, where hydrologically feasible
10.13. Design culvert bottoms to be placed at least 30cm below the stream bed elevation to ensure culverts remain passable by fish and wildlife by preventing culverts from becoming perched.
10.14. A minimum water depth of 200 mm should be provided throughout the culvert length. To maintain this water depth at low flow periods an entrance/downstream pool can be constructed. In some cases, an upstream pool may also be necessary.
10.15. The culvert slope should follow the existing streambed slope where possible.

10.16. The culvert, inlet(s) and outlet(s) should be adequately protected with rip-rap to prevent erosion and scour around the culvert during high runoff events. The following measures should be incorporated when using replacement rock to stabilize the culvert:
- Place appropriately-sized, clean rocks into the eroding bank area by hand or machinery operating outside the water course.
- Do not obtain rocks from below the ordinary high water mark of any water body.
- Where possible, install rock at a slope similar to the stream bank to maintain a uniform stream profile and natural stream alignment. Otherwise, install the rock at the closest slope required to ensure it is stable.
- Ensure rock does not interfere with fish passage or constrict the channel width.

10.17. Trash racks should not be used near the culvert inlet. Accumulated debris may lead to severely restricted fish passage and potential injuries to fish. Where trash racks cannot be avoided in culvert installations, they must only be installed above the water surface indicated by bank full flow. A minimum of 9 inches clear spacing should be provided between trash rack vertical members. If trash racks are used, a long term maintenance plan must be provided along with the design, to allow for timely clearing of debris.

10.18. Natural or artificial supplemental lighting should be considered in new or replacement culverts that are over 150 feet in length.

10.19. Ensure designs locate culvert structures in areas that minimize impacts to riparian vegetation and associated wildlife.

Culvert Installation

10.20. It may be necessary to exclude fish from the immediate construction site while a culvert is being installed. If this practice is necessary, fish shall be salvaged by a qualified aquatics professional from within the exclusion area.

10.21. If dewatering is required refer to the dewatering mitigation module of this BMP for appropriate mitigations.

10.22. Maintain effective sediment and erosion control measures until complete re-vegetation of disturbed areas is achieved.

10.23. Remove any old structures to a suitable upland disposal facility away from the riparian area and floodplain to avoid waste material from re-entering the watercourse

Wildlife Considerations for Culverts

At times, culverts are placed along portions of highways that bisect wetlands or specific habitats that support an abundance of wildlife. Consider building natural rock ledges through culverts to allow for small and medium-sized animals to walk on during periods of high flow.

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Appendix 1 Regulatory Guidance

Jurisdictions

While all projects on lands managed by Parks Canada must adhere to Federal law and regulation, it is considered best practice to refer to local community, regional, provincial regulation and best practices where federal guidance is silent and/or attempt to meet those targets if it can reduce the overall impact of the project.

Some of the project activities reviewed have potential environmental impacts that are addressed by various provincial, federal and territorial acts and regulations. All activities must meet current environmental law and regulations in their design and construction. The following is a brief description of some of the key federal acts and regulations. Further review, understanding and application of other federal, provincial and territorial environmental laws are part of a rigorous approach to project planning and execution.

Canada National Parks Act and Regulations-Parks Canada

All work inside National Parks and Protected Areas must be performed in accordance with the laws and regulations set out in the *Canada National Parks Act* and Regulations. This includes the requirement for most activities described to only be done under a permit such as: business licence for contractor, disturbance of natural objects, travel in restricted areas, special events or use of disposal sites.

Fisheries Act - Fisheries and Oceans Canada

If a project is to be conducted near water, it is the proponent's responsibility to ensure they avoid causing serious harm to fish in compliance with the *Fisheries Act*. The advice in on the Fisheries and Oceans website will help a proponent avoid causing harm and comply with the Act.

If the water body in the project area has fish or is connected to waters at any time that have fish the project must meet the self assessment criteria on the Fisheries and Oceans website, if not a project review can be made by Fisheries and Oceans Canada to assess whether the project requires authorization or authorization can be requested directly. Given the level of detail required for a review and/or authorization request the EIA officer may need to consider a more involved EIA pathway in those circumstances.

Migratory Bird Convention Act – Environment Canada

The purpose of this Act is to implement the Convention by protecting and conserving migratory birds - as populations and individual birds - and their nests. Section 6 - prohibits the disturbance, destruction, or taking of a nest, egg, or nest shelter of a migratory bird.

In Canada, the general nesting period may start as early as mid-March and may extend until end of August. This is a general nesting period that covers most federally protected migratory bird species. This period varies regionally across Canada mainly due to differences in species assemblages, climate, elevation and habitat type. Generally, the nesting period is delayed in more northerly latitudes, corresponding to vegetation development and food availability. (Environment Canada, 2014). To help with determining regionally relevant periods where

nesting is likely to occur, Environment Canada is publishing estimated regional nesting periods within large geographical areas across Canada referred as "nesting zones". These periods are estimated for each zone and consider the time of first egg-laying until the young have naturally left the vicinity of the nest. Field Units may wish to refine this section and add their known local nesting periods.

Species at Risk Act

If a species listed under the *Species at Risk Act* (SARA) is found within the project area, any potential adverse effects from the proposed project to the individuals of the species, their residences and/or their critical habitat must be understood. Species at risk considerations require specific expertise, due to additional legal requirements under the SARA and CEAA 2012. If the projects or activities to be addressed by the BMP could affect a listed species or its critical habitat, the EIA officer may need to consider a more involved EIA pathway in those circumstances.

Appendix C

Geotechnical Investigation

GEMTEC

Factual Geotechnical Report
Shoreline Protection Works Highway 114 and Beach Area

Fundy National Park, New Brunswick
September 28, 2017

Prepared for Parks Canada Agency
Project No. 4088.31 – R01

GEMTEC
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September 28, 2017

File: 4088.31 – R01

Parks Canada Agency
1869 Upper Water Street, Suite 201
Halifax, NS
B3J 1S9

Attention: Debra Hickey, P.Eng.

Re: Factual Geotechnical Report, Shoreline Protection Works Highway 114 and Beach Area
Fundy National Park, New Brunswick

Please find enclosed our factual report for the geotechnical investigation for the proposed Shoreline Protection Works near NB Highway 114 and the Beach Area located in Fundy National Park, New Brunswick.

Please contact the undersigned if you have any questions or require additional information.

Marco Sivitilli, P.Eng.

David J. Purdue, P.Eng.

BJS/mls

Enclosures

\\223.254.250.1\Files and Drawings\Files\4000\4088.31\Report\2017bjs0829-R01 Rev.2-4088.31 (Geotechnical Investigation Factual Report NB Highway 114 Coastal Erosion Protection, Fundy National Park, NB).docx

Factual Geotechnical Report
Shoreline Protection Works Highway 114 and Beach Area
Fundy National Park, New Brunswick

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Factual Geotechnical Report
Shoreline Protection Works Highway 114 and Beach Area
Fundy National Park, New Brunswick

1.0 Introduction

Parks Canada Agency retained GEMTEC Limited to conduct a geotechnical investigation as a part of the design for a coastal erosion protection plan for the area along the beach on NB Highway 114 in Fundy National Park, near Alma, New Brunswick.

The purpose of this investigation was to characterize the soil conditions at the site. The scope of work included putting down ten (10) boreholes at locations shown on the attached plan. See Appendix A for a borehole location plan and Appendix B for descriptive terms and detailed borehole logs.

Between May 10 and May 17, 2017 ten (10) boreholes were advanced at the site using a rubber track-mounted geotechnical drill rig. Boreholes BH17-01 through BH17-03 were put down above the existing armour stone breakwater on the south side of the outlet of Upper Salmon River and to the east of NB Highway 114. The remaining boreholes were put down along the shoreline to the east of NB Highway 114. The soil stratum was penetrated and samples were collected at all borehole locations except for CPT-01. See Appendix A for a borehole location plan. GEMTEC personnel were on site to supervise drilling operations and to log the soil conditions encountered at the borehole locations during the investigation.

CPT-01 was advanced using the cone penetration test (CPT) method and therefore no samples were collected at this borehole location. CPT-01 was put down adjacent BH17-07 to collect further data on the fine grained material encountered in this area in the boreholes. A CPT output log for this borehole is appended (Appendix B).

During borehole advancement, SPT N[1]-values were recorded throughout overburden soil sampling until a dense stratum was encountered. Boreholes were terminated in various materials at depths ranging from 3.66 metres (BH17-01, chart elevation +8.05 metres) to 14.86 metres (BH17-09, chart elevation -5.28 metres) below existing surface.

Bedrock was not encountered or cored in this investigation.

The coordinate values referenced in this report and on the attached logs are NAD83 (CSRS) Zone 19. The elevations referenced are in chart datum, based on PWGSC bench mark “BM Top Concrete Deck” having a chart elevation of +12.585 metres.

[1] The number of blows of a 475 Joule free fall hammer required to advance a 50 mm ø split spoon sampler a distance of 300 mm

2.0 Site Description

The investigated site is located within the limits of Fundy National Park, near the village of Alma, New Brunswick. The site can be accessed via NB Highway 114 (Fundy National Park property, near the existing boardwalk structure) on the south side of the outlet of the Upper Salmon River.

See Appendix A for a borehole location plan with a plan view of the site.

3.0 Subsurface Soil Description

The subsurface conditions encountered at the borehole locations generally consist of sand with varying amounts of gravel and silt. At several borehole locations this soil layer is underlain by a layer of primarily silt with varying amounts of sand and clay, with trace amounts of gravel.

See Appendix A for borehole location plan, Appendix B for detailed borehole logs, and Appendix C for detailed laboratory testing results.

Table 1 below summarizes the borehole location information in NAD83 (CSRS) Zone 19 coordinate system and chart datum. Table 2 summarizes the subsurface soil conditions.

Table 1 Summary of Borehole Location Information

Borehole	Northing (m)	Easting (m)	Borehole Elevation (Chart Datum) (m)
BH17-01	7401110.984	2621264.61	+11.71
BH17-02	7401109.574	2621200.057	+12.46
BH17-03	7401070.499	2621168.1	+11.80
BH17-04	7401012.421	2621187.709	+7.41
BH17-05	7400941.318	2621101.245	+9.62
BH17-06	7400861.008	2621047.686	+10.10
BH17-07	7400781.075	2621017.638	+11.20
BH17-08	7400672.023	2621001.649	+11.07
BH17-09	7400619.759	2621002.078	+9.59
BH17-10	7400590.345	2620981.121	+10.94

Table 2 Summary of Subsurface Soil Conditions

Borehole	Total Depth (m)	Depth Below Grade				
		Topsoil and Organics (m)	Gravelly Sand, trace Silt to Sand and Gravel, trace Silt (m)	Sandy Silt, some Clay, trace Gravel (m)	Sand, trace Silt (m)	Bedrock (m)
BH17-01	3.66	0 to 0.15	0.15 to 3.66+	N.E.	N.E.	N.E.
BH17-02	13.21	0 to 0.15	0.15 to 13.21+	N.E.	N.E.	N.E.
BH17-03	12.93	0 to 0.15	0.15 to 12.93+	N.E.	N.E.	N.E.
BH17-04	8.15	N.E.	0 to 8.15+	N.E.	N.E.	N.E.
BH17-05	7.29	N.E.	0 to 4.78	4.78 to 7.29+	N.E.	N.E.
BH17-06	9.40	N.E.	0 to 2.13	2.13 to 9.40+	N.E.	N.E.
BH17-07	13.84	N.E.	0 to 1.83	1.83 to 3.05 4.88 to 13.84+	3.05 to 4.88	N.E.
BH17-08	10.16	N.E.	0 to 1.52	1.52 to 10.16+	N.E.	N.E.
BH17-09	14.86	N.E.	0 to 2.30	2.30 to 14.86	N.E.	N.E.
BH17-10	12.75	N.E.	0 to 1.52 4.57 to 12.75+	1.52 to 3.66	3.66 to 4.57	N.E.

*N.E. = Not Encountered

3.1 Topsoil and Organics

A layer of topsoil and organics was encountered at three (3) borehole locations (BH17-01, 17-02, 17-03). The thickness of this layer was approximately 0.15 metres at each borehole location. There were no representative SPT N-values for this layer of material.

No samples of this material were selected for laboratory testing.

3.2 Gravelly Sand, Trace Silt to Sand and Gravel, trace Silt

A layer of gravelly sand, trace silt to sand and gravel, trace silt was encountered at all ten (10) borehole locations. The thickness of this layer ranges from 1.52 metres (BH17-08 and BH17-10) to 13.06 metres (BH17-02). The observed representative SPT N-values ranged from 3 to 50+ with an average of 24. Based on these values the compactness of this layer can be described as loose to medium.

Two samples of this material were selected for laboratory testing. The average moisture content was 8%.

Grain size analyses conducted on the samples of this material showed an average grain size distribution consisting of approximately 33% gravel, 59% sand, and 8% silt/clay.

At the CPT-01 location the auger was advanced to a depth of 1.5 metres to ensure that this layer was fully penetrated prior to beginning advancement of the CPT cone.

3.3 Sandy Silt, Some Clay, Trace Gravel

A layer of primarily silt, with varying proportions of sand and clay, and trace gravel was encountered at six (6) borehole locations (BH17-05, BH17-06, BH17-07, BH17-08, BH17-09, BH17-10). The thickness of this layer ranges from 1.22 metres (BH17-07) to 12.53 metres (BH17-09). The observed representative SPT N-values ranged from 0 to 50+ with an average of 12. Based on these values the compactness of this layer can be described as loose to medium.

The CPT cone (CPT-01, located adjacent to BH17-07, see Appendix A) was advanced through approximately 8 m of sand, silt and clay (primarily silty clay) from depth 1.8 m to approximately 9.8 m. Based on the CPT results, the compactness of this material is described as loose.

Seven (7) samples of this material were selected for laboratory testing. The average moisture content of the samples was 38%.

Grain size analysis conducted on the samples of this material showed an average grain size distribution of approximately 5% gravel, 26% sand, 51% silt, and 19% silt/clay.

3.4 Sand, Trace Silt and Clay

A layer of sand, trace silt and clay was encountered at two (2) borehole locations (BH17-07 and BH17-10). The thickness of this layer ranged from 0.91 metres (BH17-10) to 1.83 metres (BH17-07). The observed representative SPT N-values ranged from 2 to 6 with an average of 4. Based on these values the compactness of this layer can be described as very loose to loose.

No samples of this material were selected for laboratory testing.

3.5 Bedrock

Bedrock was not encountered at any of the ten (10) borehole locations.

4.0 Groundwater

All boreholes are within or very close proximity to the tidal zone; therefore, water levels at each location are subject to tidal conditions. The depth to groundwater at the time of the investigation ranged from approximately 1.52 metres (BH17-04, BH17-06, and BH17-09) to 6.1 metres (BH17-03).

In addition to tidal effects, groundwater levels will vary seasonally and in response to weather events.

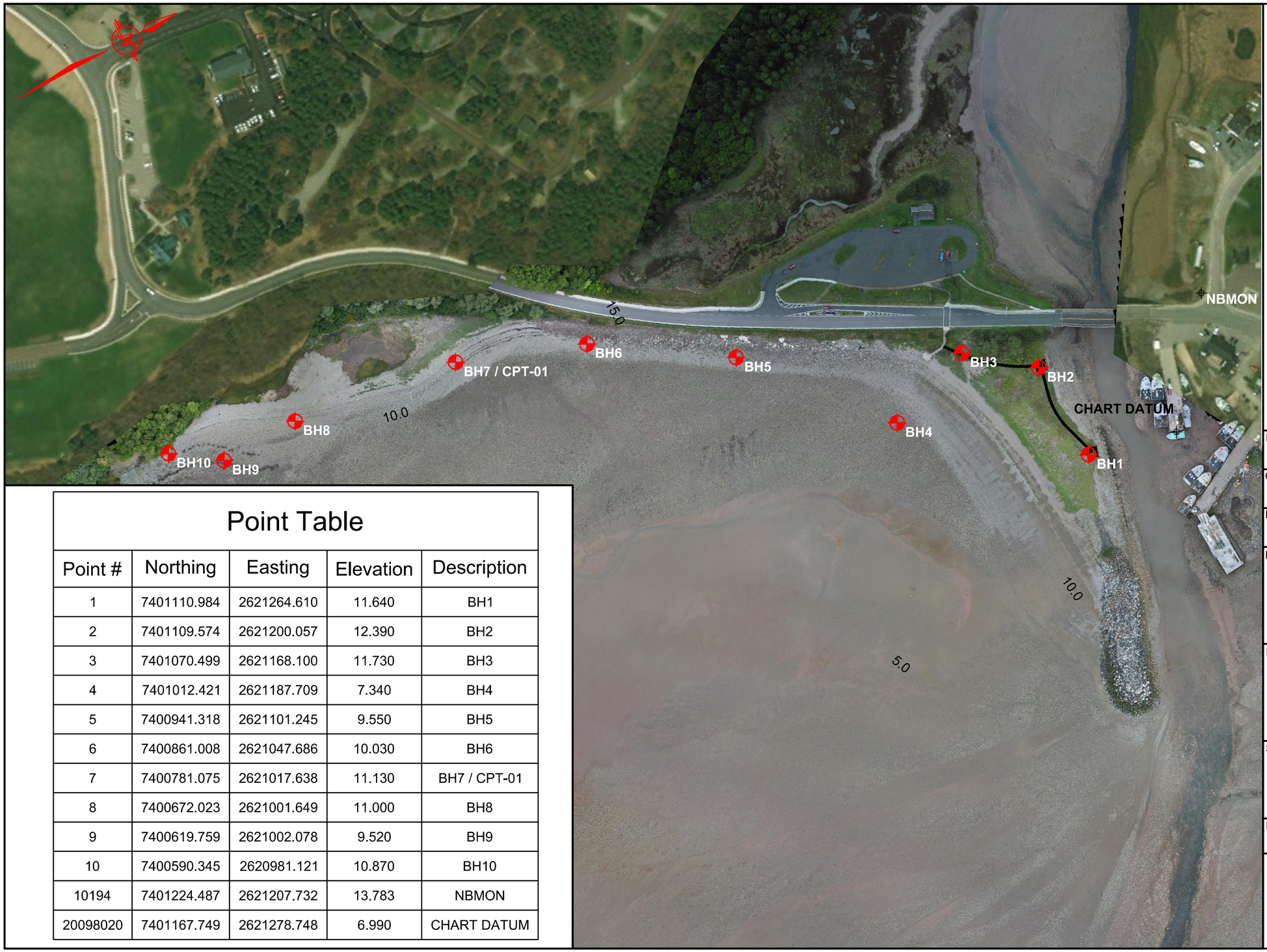
5.0 Closure

The boreholes put down at this site are somewhat scattered and soil conditions may vary from those determined at the borehole locations. Although representative samples were taken, GEMTEC Limited personnel should be contacted immediately if the soils encountered during excavations are different than those encountered in our geotechnical investigation.

The investigation outlined in this report is strictly geotechnical in nature and should not be viewed as an environmental assessment of the site.

Appendix A

Borehole Location Plan



LEGEND

BOREHOLE LOCATION

NOTE:
ELEVATIONS SHOWN ARE IN CHART DATUM BASED ON BENCHMARK 2009B8020.

NOTE:
Contours shown in metres (Chart Datum).

Point Table

Point #	Northing	Easting	Elevation	Description
1	7401110.984	2621264.610	11.640	BH1
2	7401109.574	2621200.057	12.390	BH2
3	7401070.499	2621168.100	11.730	BH3
4	7401012.421	2621187.709	7.340	BH4
5	7400941.318	2621101.245	9.550	BH5
6	7400861.008	2621047.686	10.030	BH6
7	7400781.075	2621017.638	11.130	BH7 / CPT-01
8	7400672.023	2621001.649	11.000	BH8
9	7400619.759	2621002.078	9.520	BH9
10	7400590.345	2620981.121	10.870	BH10
10194	7401224.487	2621207.732	13.783	NBMON
20098020	7401167.749	2621278.748	6.990	CHART DATUM

Drawn By: MGN	Checked By: MS
Calculations By:	Checked By:

Date: AUGUST, 2017

Project:
SHORELINE PROTECTION WORKS
HIGHWAY 114 AND BEACH AREA

Drawing:
BOREHOLE LOCATIONS

Scale: 1:2500

0 50 100 150m

File No.	Drawing	Revision No.
40883102	FIGURE 1	0

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

Appendix B

Descriptive Terms and Detailed Borehole Logs

GEMTEC
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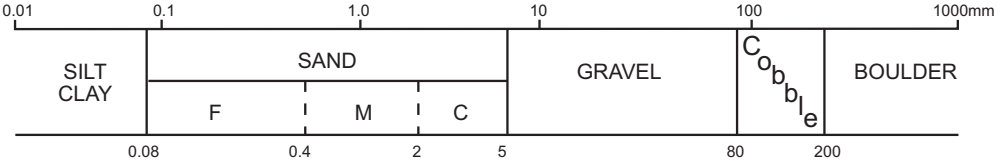
FREDERICTON, MONCTON, BATHURST, GRAND FALLS, SAINT JOHN, NB

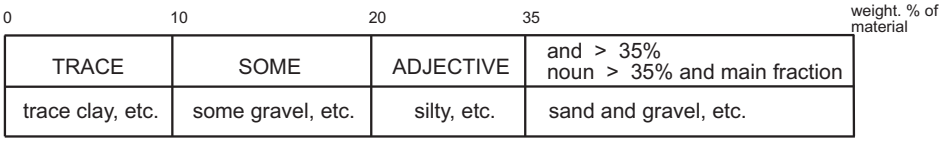
DESCRIPTIVE TERMS- BOREHOLE/TEST PIT LOG

SOILS

GRAIN SIZE



DESCRIPTIVE TERMINOLOGY



TRACE	SOME	ADJECTIVE	and > 35% noun > 35% and main fraction
trace clay, etc.	some gravel, etc.	silty, etc.	sand and gravel, etc.

COMPACTNESS gravels, sands, tills

N, RANGE	0 - 4	4 - 10	10 - 30	30 - 50	> 50
DENSITY	V. LOOSE	LOOSE	MEDIUM	DENSE	V. DENSE

CONSISTENCY silt, clay

S, KPa	< 12.5	12.5 - 25	25 - 50	50 - 100	100 - 200
CONSISTENCY	V. SOFT	SOFT	MEDIUM	STIFF	V. STIFF

ROCK

RQD	OVERALL QUALITY	FRACTURE SPACING
0 - 25	VERY POOR	VERY CLOSE 20 - 60 mm
25 - 50	POOR	CLOSE 60 - 200 mm
50 - 75	FAIR	MODERATE 200 - 600 mm
75 - 90	GOOD	WIDE 600 - 2000 mm
90 - 100	EXCELLENT	VERY WIDE 2 - 6 m

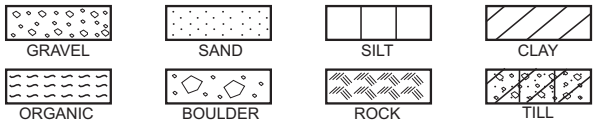
COMP. STR. MPa	1 - 5	5 - 25	25 - 50	50 - 100	100 - 250
DESCRIPTION	V. WEAK	WEAK	MODERATE	STRONG	V. STRONG

SAMPLE TYPES (location to scale on log)

S	SPLIT TUBE	G	SHOVEL
T	SHELBY TUBE	H	CARVED BLOCK
P	PISTON	K	SLOTTED
F	AUGER	V	IN SITU VANE
W	WASH	NR	NO RECOVERY

ROCK CORES A(30mm); B(41mm); N(54mm)

LOG SYMBOLS



WELL SYMBOLS

N - standard penetration test; blows by 475 J drop hammer to advance Std. 50mm O.D. split tube sampler 0.3m

RQD - percent of core consisting of hard, sound pieces in excess of 100mm long (excluding machine breaks)

RECOVERY - sample recovery expressed as percent or length

S - shear strength , kPa; vane ⊕ ; penetrometer ■; unconfined ○; Uc unconfined compressive strength

Sr - shear strength, remoulded; vane ⊗ ; penetrometer □

Dd - dry density; t/m^3

W - natural moisture content, percent ✳

PL - plastic limit, percent ⊢

LL - liquid limit, percent ⊣

ND - non detect, total petroleum hydrocarbons (TPH) not detected in soil

Groundwater Level ▼ ; Seepage ▽

Revised Oct, 2009

BHDESCRM-2009.CDR

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 4088.31	BOREHOLE BH17-01
Project	Boardwalk and Coastal Erosion Protection	Date Drilled 2017/05/17	Page 1 of 1
Location	Fundy National Park		
Ground Level, m 11.64	Datum: Chart	Logged By BJS	

Undrained Shear Strength - kPa: 0, 25, 50, 75, 100

○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded

Water Content & Atterburg Limits: w_P w w_L
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m

DEPTH m	SAMPLE No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION	
0	1	S	11	390		0.15 TOPSOIL and ORGANICS	11.49
						0.61 Gravelly SAND, trace Silt and Organics	11.03
1	2	S	12	280		SAND and GRAVEL, trace Silt	
	3	S	13	310			
2	4	S	10	200			
	5	S	28	450			
3	6	S	27	330		3.66	7.98

-Groundwater not encountered
-EOH at 3.66 metres on probable BEDROCK or BOULDER (auger refusal)

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 4088.31	BOREHOLE BH17-02
Project	Boardwalk and Coastal Erosion Protection	Date Drilled 2017/05/10	Page 1 of 1
Location	Fundy National Park		
Ground Level, m 12.39	Datum: Chart	Logged By BJS	

Undrained Shear Strength - kPa: 0, 25, 50, 75, 100

○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg 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 90 100

DEPTH m	SAMPLE No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION
0	1	S	1	250		0.15 TOPSOIL and ORGANICS 12.24
						Gravelly SAND, trace Silt and Organics
1	2	S	8	370		1.52 10.87
	3	S	15	510		SAND and GRAVEL, trace Silt and Rock Fragments
2	4	S	16	450		-thin layer of blackish brown material encountered at 2.23 metres
3						
	5	S	31	600		
4	6	S	48	600		
	7	S	35	600		
5	8	S	50+	600		
6						
	9	S	37	600		
7	10	S	21	600		7.31 5.08
			28			-Pen-cone advanced from 7.31 to 13.21 metres, no samples were collected
8			27			
			36			
9			27			
			25			
10			30			
			50+			
11			36			
			28			
12			50+			13.21 -0.82
13						-Groundwater encountered at 4.57 metres -EOH at 13.21 metres on probable BEDROCK or BOULDER (pen-cone refusal)

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 4088.31	BOREHOLE BH17-03
Project	Boardwalk and Coastal Erosion Protection	Date Drilled 2017/05/10	Page 1 of 1
Location	Fundy National Park		
Ground Level, m 11.73	Datum: Chart	Logged By BJS	

Undrained Shear Strength - kPa (0, 25, 50, 75, 100)
○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg Limits (w_P, w, w_L)
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m

DEPTH m	SAMPLE No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION	
0	1	S	4	300		0.15 TOPSOIL and ORGANICS	11.58
1	2	S	12	400		Gravelly SAND, trace Silt and Organics	
						1.52	10.21
2	3	S	13	380		SAND and GRAVEL, trace Silt and Rock Fragments	
	4	S	22	410			
3							
	5	S	30	500			
4	6	S	50+	500			
						-Cobble encountered from 4.27 to 4.57 metres	
5	7	S	12	600			
	8	S	43	600			
6	9	S	23	470			
7	10	S	23	600			
						7.62	4.11
8			14			-Pen-cone advanced from 7.62 to 12.93 metres, no samples were collected	
			12				
9			29				
			26				
10			50				
			50+				
11			50+				
			48				
12			50+				
						12.93	-1.20
						-Groundwater encountered at 6.1 metres -EOH at 12.93 metres on probable BEDROCK or BOULDER (pen-cone refusal)	

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 4088.31	BOREHOLE BH17-04
Project	Boardwalk and Coastal Erosion Protection	Date Drilled 2017/05/10	Page 1 of 1
Location	Fundy National Park		
Ground Level, m 7.34	Datum: Chart	Logged By BJS	

Undrained Shear Strength - kPa (0, 25, 50, 75, 100)
○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg Limits (w_P, w, w_L)
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m

DEPTH m	SAMPLE No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION
0	1	S	18	300		SAND and GRAVEL, some Rock Fragments, trace Silt
1	2	S	22	250		
2	3	S	27	320		
	4	S	32	600		
3	5	S	18	500		
4	6	S	13	100		
5	7	S	16	600		5.18 / 2.16
			19			-Pen-cone advanced from 5.18 to 8.15 metres, no samples were collected
6			13			
			32			
7			37			
8			50+			8.15 / -0.81
						-Groundwater encountered at 1.52 metres -EOH at 8.15 metres on probable BEDROCK or BOULDER (pen-cone refusal)

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 4088.31	BOREHOLE BH17-05
Project	Boardwalk and Coastal Erosion Protection	Date Drilled 2017/05/11	Page 1 of 1
Location	Fundy National Park		
Ground Level, m 9.55	Datum: Chart	Logged By BJS	

Undrained Shear Strength - kPa (0, 25, 50, 75, 100)
○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg Limits (w_P, w, w_L)
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m

DEPTH m	No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION
0	1	S	14	360		SAND and GRAVEL, trace Silt
1	2	S	41	270		
	3	S	35	450		
2	4	S	29	340		
3	5	S	22	330		
4	6	S	28	600		
	7	S	7	600		
4.78						4.77
5	8	S	4	600		Sandy Clayey SILT, trace Gravel
6	9	S	5	600		
	10	S	9	420		
7	11	S	42	400		
7.29						-greyish/black SILT/CLAY from 6.71 to 7.29 metres -Groundwater encountered at 2.74 metres -EOH at 7.29 metres on probable BEDROCK or BOULDER (SPT refusal)

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 4088.31	BOREHOLE BH17-06
Project	Boardwalk and Coastal Erosion Protection	Date Drilled 2017/05/12	Page 1 of 1
Location	Fundy National Park		
Ground Level, m 10.03	Datum: Chart	Logged By BJS	

Undrained Shear Strength - kPa: 0, 25, 50, 75, 100

○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg 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 90 100

DEPTH m	SAMPLE No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION
0	1	S	19	310		Gravelly SAND, trace Silt, Clay, and Rock Fragments
1	2	S	27	400		
	3	S	3	50		
2	4	S	4	360		2.13 7.90 Sandy SILT, some Gravel and Clay
3	5	S	2	470		
4	6	S	2	580		
	7	S	2	450		
5	8	S	3	260		
6	9	S	4	300		
	10	S	2	500		
7	11	S	7	370		
8	12	S	11	280		
	13	S	11	310		
9	14	S	47	290		9.40 0.63

-Groundwater encountered at 1.52 metres
-EOH at 9.4 metres on probable BEDROCK or BOULDER (SPT refusal)

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 4088.31	BOREHOLE BH17-07
Project	Boardwalk and Coastal Erosion Protection	Date Drilled 2017/05/11	Page 1 of 1
Location	Fundy National Park		
Ground Level, m 11.13	Datum: Chart	Logged By BJS	

Undrained Shear Strength - kPa (0, 25, 50, 75, 100)
○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg 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, 90, 100)

DEPTH m	No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION
0	1	S	22	360		SAND and GRAVEL, trace Silt and Rock Fragments
1	2	S	14	250		
	3	S	5	100		
					1.83	9.30
2	4	S	6	600		SILT, some Sand and Clay, trace Organics (shells)
3	5	S	2	410		
					3.05	8.08
	6	S	2	100		SAND, trace Silt and Clay
4	7	S	3	50		
					4.88	6.25
5	8	S	6	600		Sandy Clayey SILT, trace Gravel and Organics
	9	S	5	290		
6	10	S	7	600		
	11	S	6	420		-Sand seam encountered from 6.40 to 6.71 metres
7						
	12	S	0	600		
8	13	S	11	570		
	14	S	4	280		
9	15	S	20	600		
	16	S	7	600		-Sand seam encountered from 10.06 to 10.36 metres
10	17	S	21	450		
11	18	S	7	280		
					12.19	-1.06
12			3			-Pen-cone advanced from 12.19 to 13.84 metres, no samples were collected
			10			
13			50+			
					13.84	-2.71
						-Groundwater encountered at 1.83 metres -EOH at 13.84 metres on probable BEDROCK or BOULDER (pen-cone refusal)

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 4088.31	BOREHOLE BH17-08
Project	Boardwalk and Coastal Erosion Protection	Date Drilled 2017/05/12	Page 1 of 1
Location	Fundy National Park		
Ground Level, m 11.00	Datum: Chart	Logged By BJS	

Undrained Shear Strength - kPa: 0, 25, 50, 75, 100
⊙ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg 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 90 100

DEPTH m	No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION
0	1	S	4	250		Gravelly SAND, trace Silt and Rock Fragments
1	2	S	3	170		
						1.52 9.48
2	3	S	17	600		brownish grey Sandy Clayey SILT, trace Gravel
	4	S	5	400		-Black Sandy/Silty material from 2.1 to 2.38 metres
3	5	S	4	600		
4	6	S	4	310		
5	7	S	2	550		
	8	S	8	550		
6	9	S	2	260		
7	10	S	4	480		
	11	S	4	400		
8	12	S	8	400		-SILT/CLAY turning from grey to brownish black
	13	S	11	350		
9	14	S	13	250		
10	15	S	50+	400		10.16 0.84
						-Groundwater encountered at 1.83 metres -EOH at 10.16 metres on probable BEDROCK or BOULDER (SPT refusal)

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 4088.31	BOREHOLE BH17-09
Project	Boardwalk and Coastal Erosion Protection	Date Drilled 2017/05/11	Page 1 of 1
Location	Fundy National Park		
Ground Level, m 9.52	Datum: Chart	Logged By BJS	

Undrained Shear Strength - kPa (0, 25, 50, 75, 100)
○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg Limits (w_P, w, w_L)
Dynamic Penetration Test, blows/0.3m ★
Standard Penetration Test, blows/0.3m ●

DEPTH m	SAMPLE No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION
0	1	S	6	380		SAND, GRAVEL, and ROCK FRAGMENTS, trace Silt
1	2	S	13	430		
2	3	S	10	260		
	4	S	2	410		2.30 7.22
3						Sandy SILT, some Clay, trace Gravel
	5	S	3	200		
4	6	S	3	500		
5	7	S	2	600		
	8	S	3	600		
6						6.10 3.42
			1			-Pen-cone advanced from 6.1 to 14.86 metres, no samples were collected
7			3			
			10			
8			11			
			10			
9			17			
10			16			
			24			
11			24			
			30			
12			27			
			28			
13			35			
			40			
14			50+			14.86 -5.34
						-Groundwater encountered at 1.52 metres -EOH at 14.86 metres on probable BEDROCK or BOULDER (pen-cone refusal)

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

BOREHOLE LOGS

Client	Parks Canada Agency	Proj No. 4088.31	BOREHOLE BH17-10
Project	Boardwalk and Coastal Erosion Protection	Date Drilled 2017/05/12	Page 1 of 1
Location	Fundy National Park		
Ground Level, m 10.87	Datum: Chart	Logged By BJS	

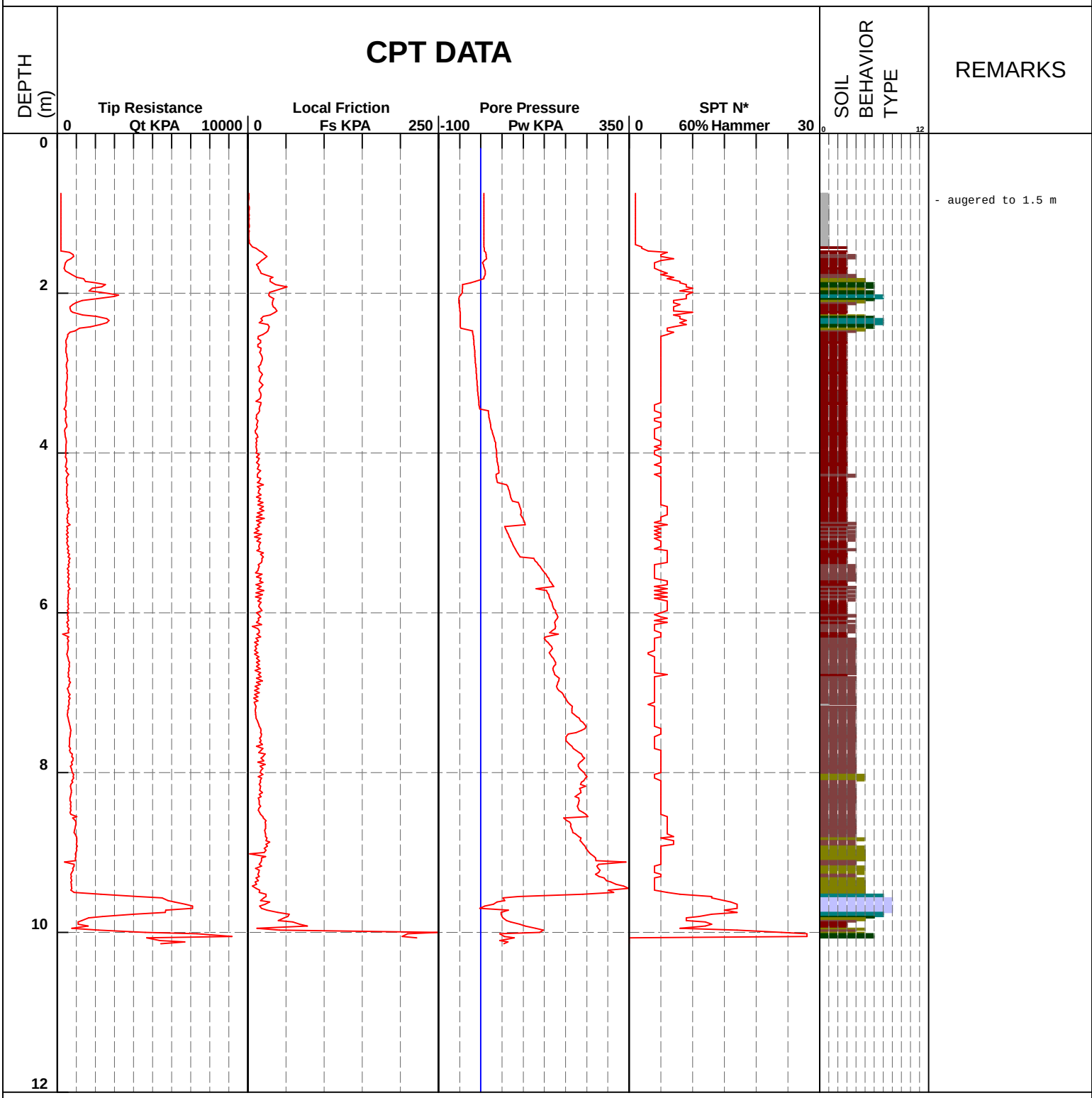
Undrained Shear Strength - kPa (0, 25, 50, 75, 100)
○ Unconfined Compression ■ Pocket Penetrometer
⊕ Field Vane Test ⊗ Remoulded
Water Content & Atterburg Limits (w_P, w, w_L)
Dynamic Penetration Test, blows/0.3m ★
Standard Penetration Test, blows/0.3m ●

DEPTH m	SAMPLE No	TYPE	N (RQD)	REC (mm)	LOG	DESCRIPTION
0	1	S	4	200		Gravelly SAND, trace Silt and Rock Fragments
1						
						1.52 9.35
2	2	S	6	400		Sandy Clayey SILT, trace Gravel and Organics
	3	S	5	370		-Wood debris from 2.08 to 2.13 metres, and from 2.67 to 2.74 metres
3						
	4	S	6	350		
						3.66 7.21
4	5	S	6	0		SAND
						4.57 6.30
5	6	S	16	250		SAND and GRAVEL, some Silt and Rock Fragments, trace Clay
	7	S	10	330		
6	8	S	10	220		
	9	S	11	380		
7			7			7.01 3.86
						-Pen-cone advanced from 7.01 to 12.45 metres, no samples were collected
8			6			
			6			
9			15			
			26			
10			28			
			26			
11			25			
			35			
12			50+			12.75 -1.89
						-Groundwater encountered at 3.66 metres
						-EOH at 12.75 metres on probable BEDROCK or BOULDER (pen-cone refusal)

GEMTEC Limited

Operator	Ashlee	Cone Number	DSG1016	Location	Alma
Job No.	4088.31	Date and Time	5/17/2017 11:12:01 AM	CPT No.	CPT 1
Groundwater Depth	0 m	Ground Elev.			

CPT DATA



1 - sensitive fine grained	4 - silty clay to clay	7 - silty sand to sandy silt	10 - gravelly sand to sand
2 - organic material	5 - clayey silt to silty clay	8 - sand to silty sand	11 - very stiff fine grained (*)
3 - clay	6 - sandy silt to clayey silt	9 - sand	12 - sand to clayey sand (*)

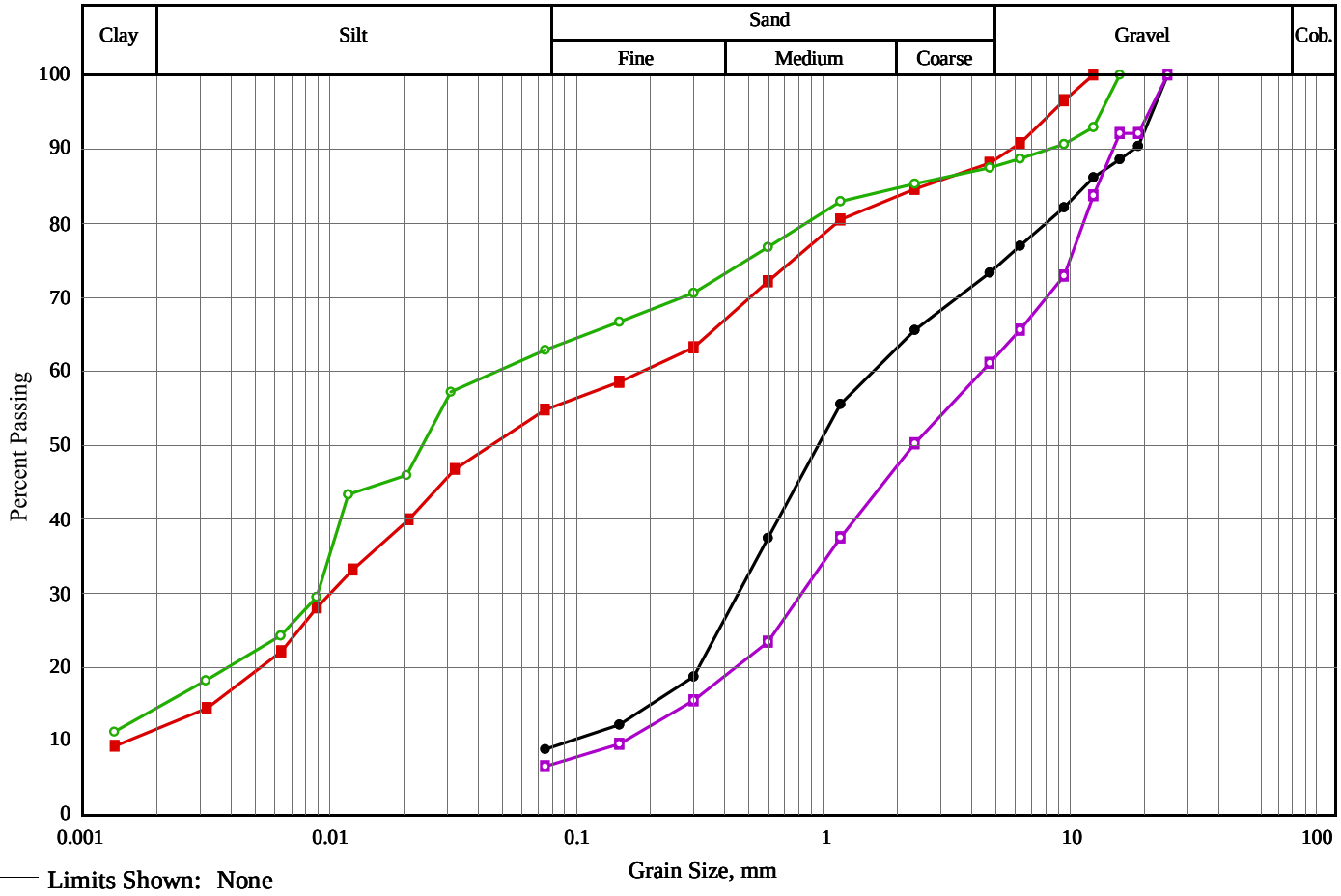
Appendix C

Laboratory Test Results

GEMTEC
Consulting Engineers and Scientists

Client:	Parks Canada Agency
Project:	Highway 114 (Fundy National Park) Coastal Erosion Pro
Project #:	0408831

Soils Grading Chart



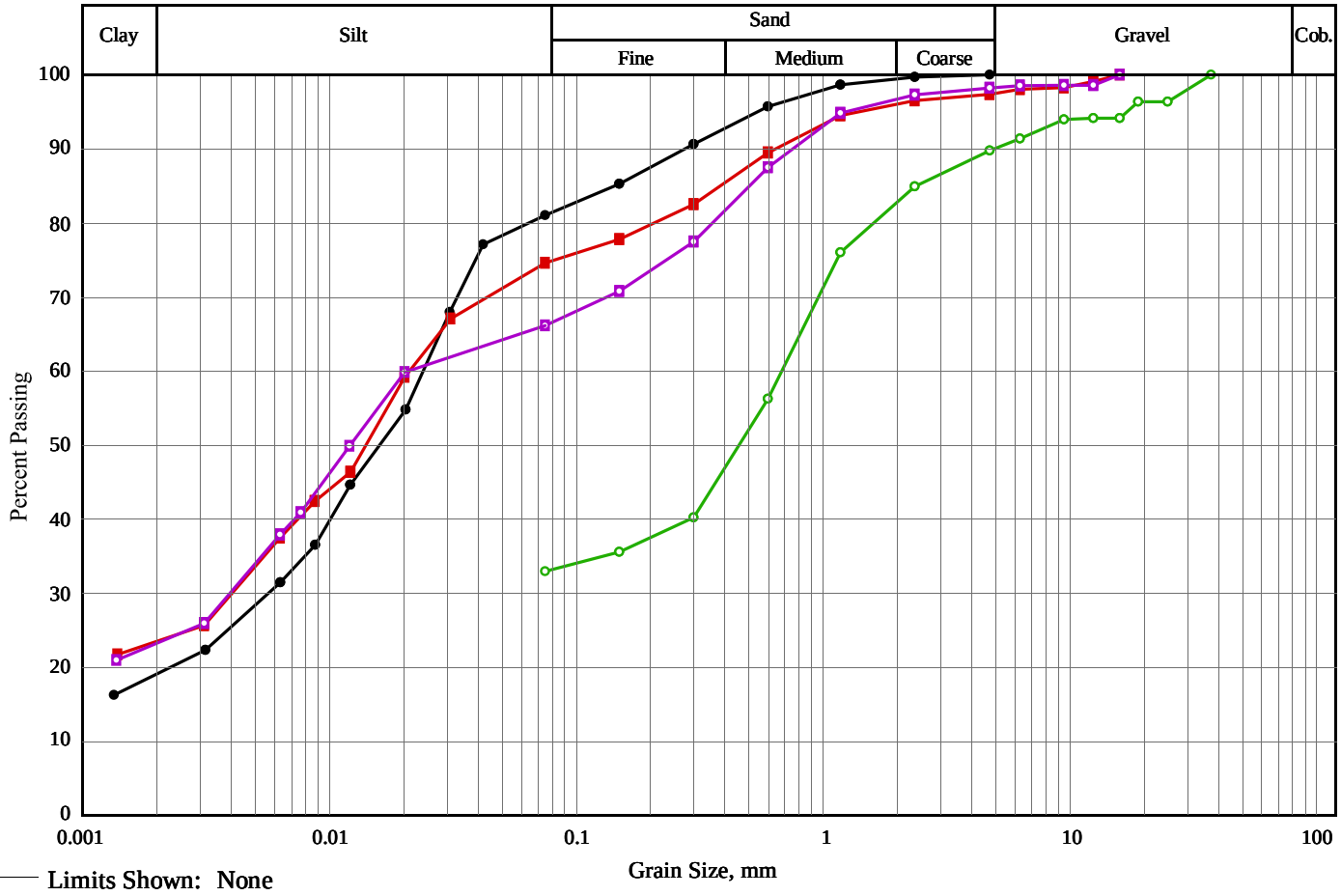
Line Symbol	Description	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay	Date Sampled
	BH 17-06 S2 (0.6m-1.2m)	17-06	170519-01	0.6m-1.2m	26.7	64.4	8.9		17/05/19
	BH17-06 S6 (3.6m-4.2m)	17-06	170519-02	3.6m-4.2m	11.9	33.3	43.1	11.7	17/05/19
	BH 17-06 S10 (6.3m-6.9m)	17-06	170519-03	6.3m-6.9m	12.6	24.6	48.4	14.5	17/05/19
	BH 17-07 S2 (0.6m-1.2m)	17-07	170519-04	0.6m-1.2m	39.0	54.4	6.6		17/05/19

Line Symbol	Sample Description	AASHTO	D_{10}	D_{15}	D_{50}	D_{85}	% 5-75µm
	Gravelly sand , trace silt	A-1-b	0.09	0.20	0.96	11.58	---
	Sandy silt , some gravel, some clay	A-7-6(7)	0.00	0.00	0.04	2.58	35.4
	Sandy silt , some gravel, some clay	A-6(7)	---	0.00	0.02	2.17	40.7
	Sand and gravel , trace silt	A-1-a	0.16	0.28	2.33	12.99	---

GEMTEC
Consulting Engineers and Scientists

Client:	Parks Canada Agency
Project:	Highway 114 (Fundy National Park) Coastal Erosion Pro
Project #:	0408831

Soils Grading Chart



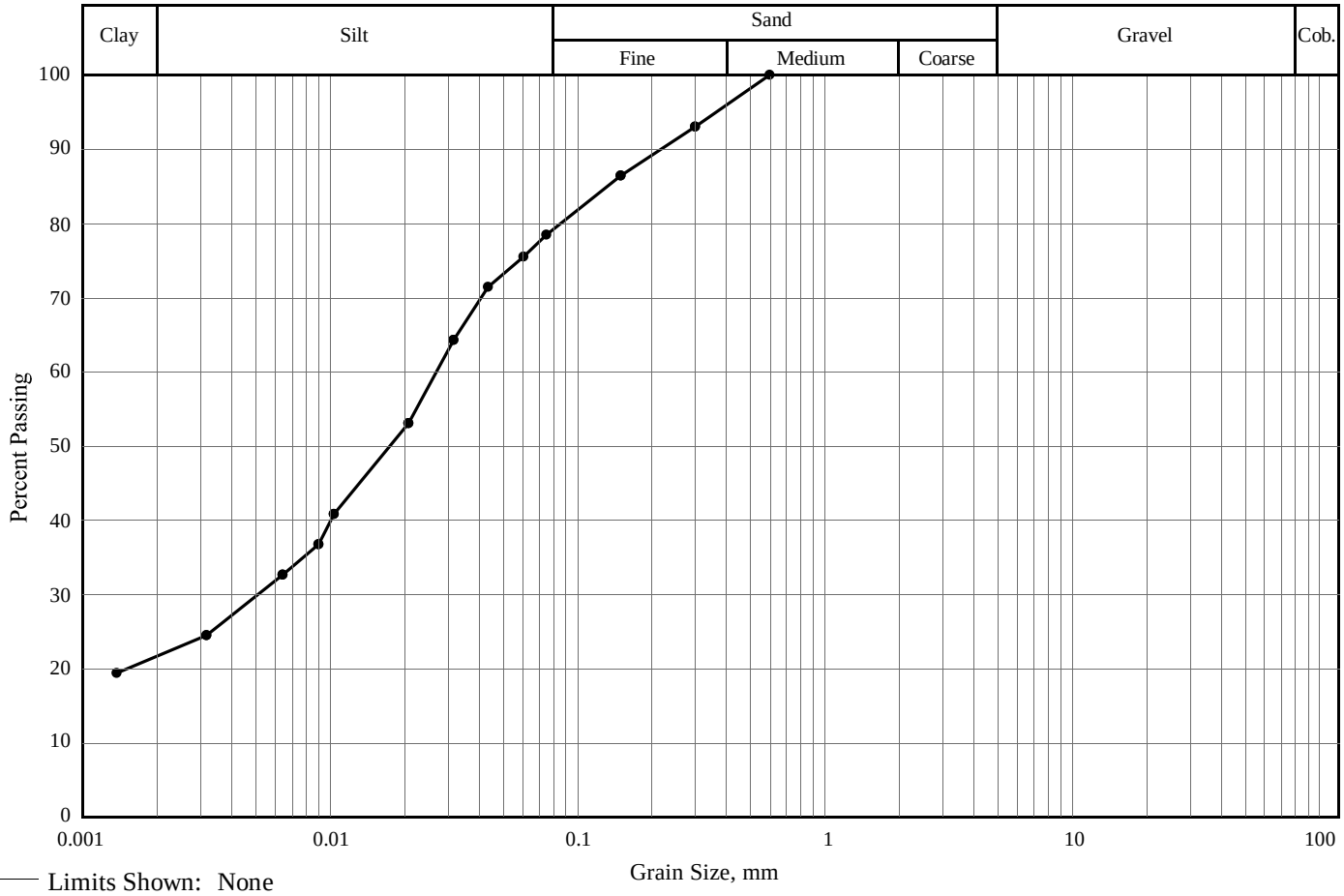
Line Symbol	Description	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay	Date Sampled
	BH 17-07 S5 (2.4m-3.0m)	17-07	170519-05	2.4m-3.0m	0.0	19.0	62.0	19.1	17/05/19
	BH 17-7 S12 (6.6m-7.2m)	17-07	170519-06	6.6m-7.2m	2.6	22.8	51.1	23.5	17/05/19
	BH 17-08 S3 (1.5m-2.1m)	17-08	170519-07	1.5m-2.1m	10.2	56.8	32.9		17/05/19
	BH 17-08 S7 (4.5m -5.1m)	17-08	170519-08	4.5m-5.1m	1.8	32.1	42.9	23.2	17/05/19

Line Symbol	Sample Description	AASHTO	D_{10}	D_{15}	D_{50}	D_{85}	% 5-75µm
	Silt , some sand, some clay	A-6(10)	---	---	0.02	0.14	52.7
	Sandy clayey silt , trace gravel	A-7-6(14)	---	---	0.01	0.38	41.0
	Silty sand , some gravel	A-2-4	---	---	0.46	2.39	---
	Sandy clayey silt , trace gravel	A-7-6(10)	---	---	0.01	0.51	32.2

GEMTEC
Consulting Engineers and Scientists

Client:	Parks Canada Agency
Project:	Highway 114 (Fundy National Park) Coastal Erosion Pro
Project #:	0408831

Soils Grading Chart



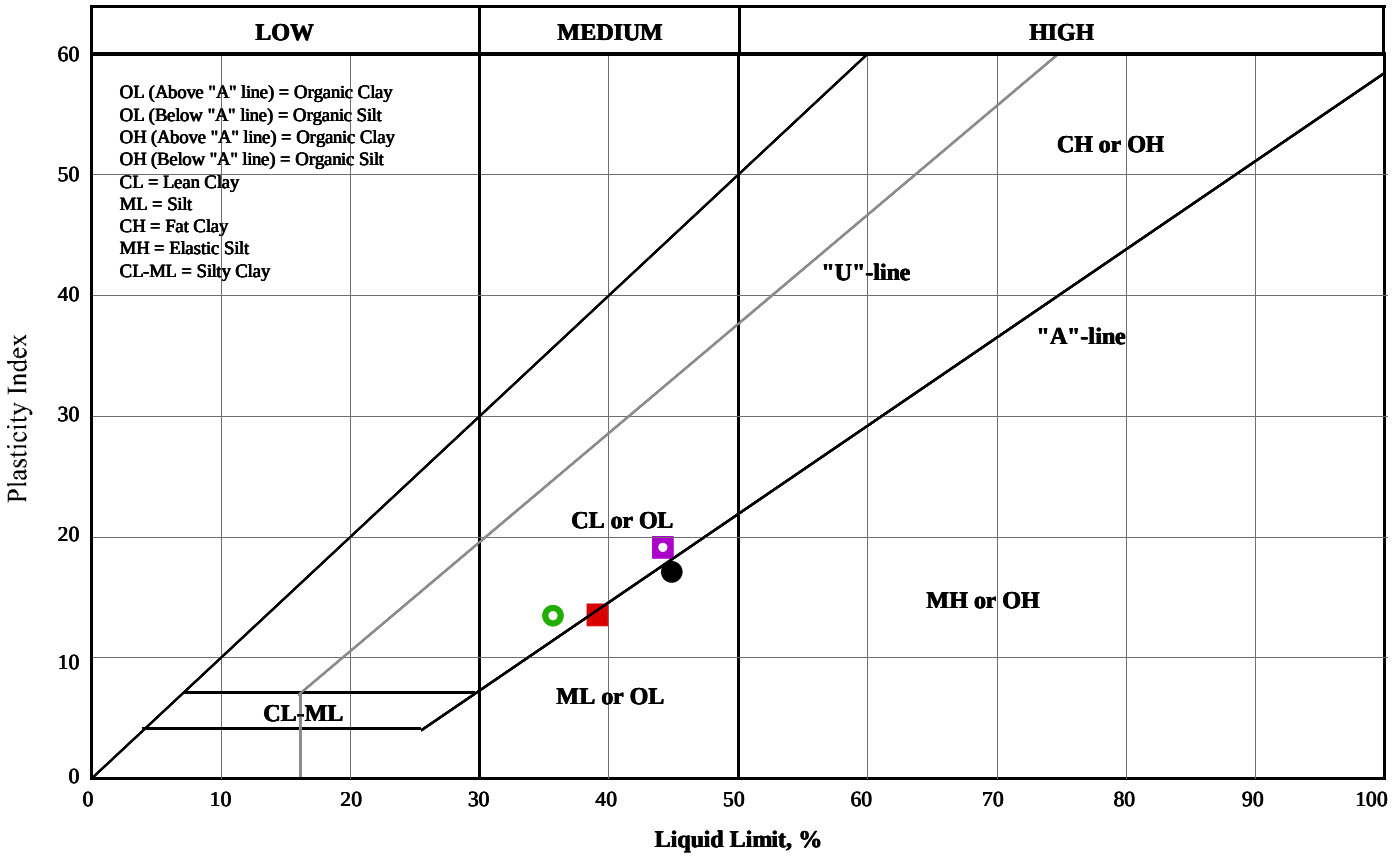
Line Symbol	Description	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay	Date Sampled
—●—	BH 17-08 S12 (7.8m-8.4m)	17-08	170519-09	7.8m-8.4m	0.0	21.6	56.8	21.7	17/05/19

Line Symbol	Sample Description	AASHTO	D_{10}	D_{15}	D_{50}	D_{85}	% 5-75µm
—●—	Sandy clayey silt	A-7-6(14)	---	---	0.02	0.13	48.7

GEMTEC
Consulting Engineers and Scientists

Client:	Parks Canada Agency
Project:	Highway 114 (Fundy National Park) Coastal Erosion Pro
Project #:	0408831

Plasticity Chart

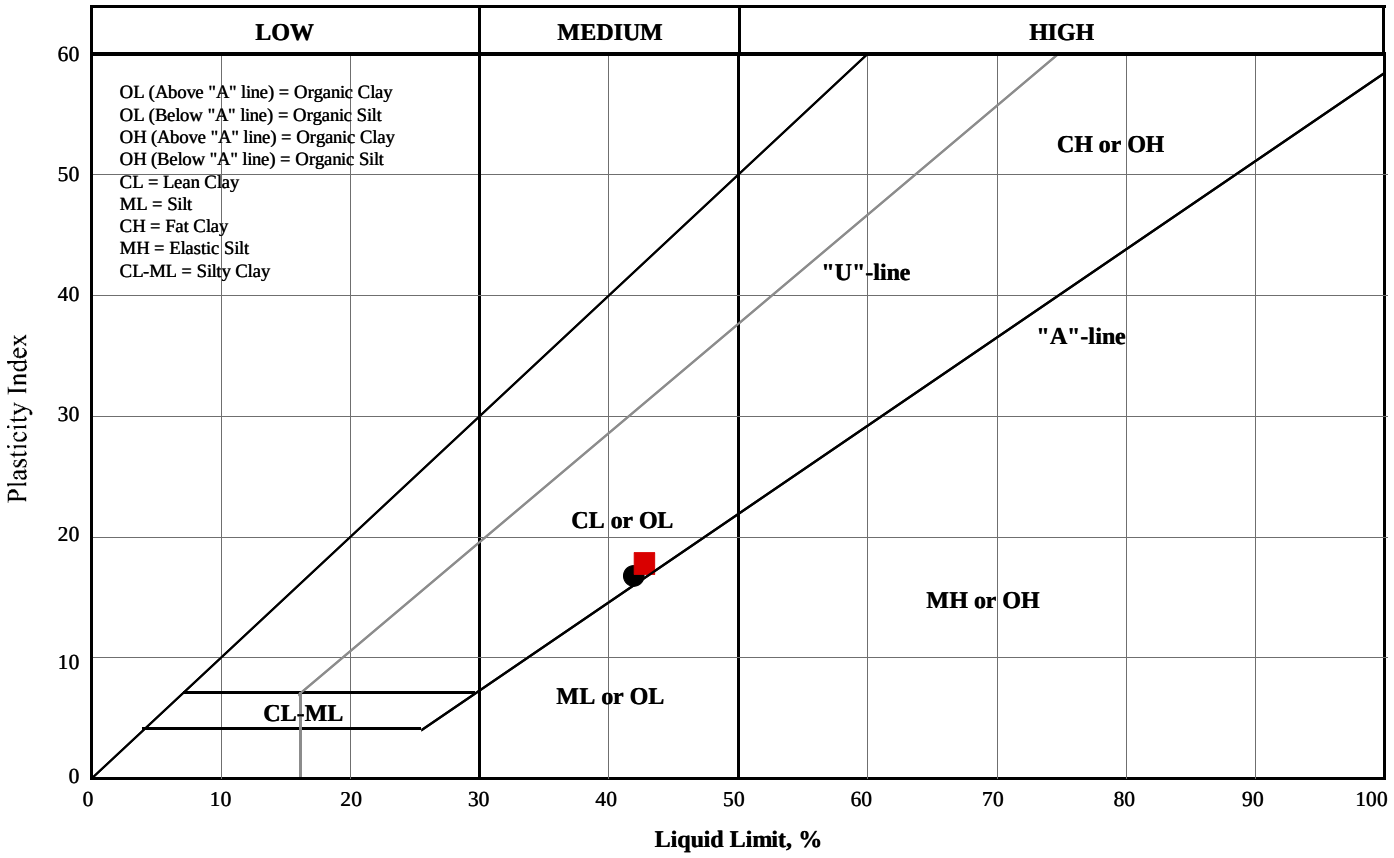


Symbol	Borehole /Test Pit	Sample Number	Depth	Date Sampled	Liquid Limit	Plastic Limit	Plasticity Index	Non-Plastic	Moisture Content, %
●	17-06	170519-02	3.6m-4.2m	May 19, 2017	44.9	27.8	17.1	☐	45.69
■	17-06	170519-03	6.3m-6.9m	May 19, 2017	39.1	25.6	13.5	☐	38.38
○	17-07	170519-05	2.4m-3.0m	May 19, 2017	35.7	22.2	13.5	☐	35.83
◘	17-07	170519-06	6.6m-7.2m	May 19, 2017	44.2	25.0	19.1	☐	43.48

GEMTEC
Consulting Engineers and Scientists

Client:	Parks Canada Agency
Project:	Highway 114 (Fundy National Park) Coastal Erosion Pro
Project #:	0408831

Plasticity Chart



Symbol	Borehole /Test Pit	Sample Number	Depth	Date Sampled	Liquid Limit	Plastic Limit	Plasticity Index	Non-Plastic	Moisture Content, %
●	17-08	170519-08	4.5m-5.1m	May 19, 2017	41.9	25.2	16.8	☐	33.58
■	17-08	170519-09	7.8m-8.4m	May 19, 2017	42.8	25.0	17.8	☐	42.89

GEMTEC
Consulting Engineers and Scientists

Client	Parks Canada Agency
Project:	Highway 114 (Fundy National Park) Coastal Erosion Pro
Project #:	0408831

Moisture Content and Density

Borehole:	17-06	Date/Time Sampled:	17/05/19 12:13:00 PM	Mass of Cont. + Wet Soil, g:	117.73
Depth:	0.6m-1.2m	Date/Time Tested:	17/05/24 12:14:07 PM	Mass of Cont. + Dry Soil, g:	108.81
Sample:	170519-01			Mass of Container, g:	33.94
Description:	BH 17-06 S2 (0.6m-1.2m)			Moisture Content, %:	11.91
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm³	
				Wet Density, kg/m³	
				Dry Density, kg/m³	

Borehole:	17-06	Date/Time Sampled:	17/05/19 11:58:00 AM	Mass of Cont. + Wet Soil, g:	99.77
Depth:	3.6m-4.2m	Date/Time Tested:	17/05/24 12:19:21 PM	Mass of Cont. + Dry Soil, g:	79.02
Sample:	170519-02			Mass of Container, g:	33.61
Description:	BH17-06 S6 (3.6m-4.2m)			Moisture Content, %:	45.69
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm³	
				Wet Density, kg/m³	
				Dry Density, kg/m³	

Borehole:	17-06	Date/Time Sampled:	17/05/19 11:54:00 AM	Mass of Cont. + Wet Soil, g:	119.53
Depth:	6.3m-6.9m	Date/Time Tested:	17/05/24 12:20:05 PM	Mass of Cont. + Dry Soil, g:	95.60
Sample:	170519-03			Mass of Container, g:	33.25
Description:	BH 17-06 S10 (6.3m-6.9m)			Moisture Content, %:	38.38
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm³	
				Wet Density, kg/m³	
				Dry Density, kg/m³	

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Moisture Content and Density

Borehole:	17-07	Date/Time Sampled:	17/05/19 12:15:00 PM	Mass of Cont. + Wet Soil, g:	1365.30
Depth:	0.6m-1.2m	Date/Time Tested:	17/05/24 12:15:43 PM	Mass of Cont. + Dry Soil, g:	1347.20
Sample:	170519-04			Mass of Container, g:	949.00
Description:	BH 17-07 S2 (0.6m-1.2m)			Moisture Content, %:	4.55
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm^3	
				Wet Density, kg/m^3	
				Dry Density, kg/m^3	

Borehole:	17-07	Date/Time Sampled:	17/05/19 11:51:00 AM	Mass of Cont. + Wet Soil, g:	87.50
Depth:	2.4m-3.0m	Date/Time Tested:	17/05/24 12:20:47 PM	Mass of Cont. + Dry Soil, g:	73.20
Sample:	170519-05			Mass of Container, g:	33.29
Description:	BH 17-07 S5 (2.4m-3.0m)			Moisture Content, %:	35.83
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm^3	
				Wet Density, kg/m^3	
				Dry Density, kg/m^3	

Borehole:	17-07	Date/Time Sampled:	17/05/19 11:41:00 AM	Mass of Cont. + Wet Soil, g:	102.00
Depth:	6.6m-7.2m	Date/Time Tested:	17/05/24 12:16:55 PM	Mass of Cont. + Dry Soil, g:	81.38
Sample:	170519-06			Mass of Container, g:	33.96
Description:	BH 17-7 S12 (6.6m-7.2m)			Moisture Content, %:	43.48
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm^3	
				Wet Density, kg/m^3	
				Dry Density, kg/m^3	

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Moisture Content and Density

Borehole:	17-08	Date/Time Sampled:	17/05/19 12:10:00 PM	Mass of Cont. + Wet Soil, g:	109.05
Depth:	1.5m-2.1m	Date/Time Tested:	17/05/24 12:11:45 PM	Mass of Cont. + Dry Soil, g:	93.05
Sample:	170519-07			Mass of Container, g:	33.73
Description:	BH 17-08 S3 (1.5m-2.1m)			Moisture Content, %:	26.97
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm³	
				Wet Density, kg/m³	
				Dry Density, kg/m³	
Borehole:	17-08	Date/Time Sampled:	17/05/19 11:48:00 AM	Mass of Cont. + Wet Soil, g:	119.14
Depth:	4.5m-5.1m	Date/Time Tested:	17/05/24 12:22:26 PM	Mass of Cont. + Dry Soil, g:	97.67
Sample:	170519-08			Mass of Container, g:	33.73
Description:	BH 17-08 S7 (4.5m -5.1m)			Moisture Content, %:	33.58
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm³	
				Wet Density, kg/m³	
				Dry Density, kg/m³	
Borehole:	17-08	Date/Time Sampled:	17/05/19 11:46:00 AM	Mass of Cont. + Wet Soil, g:	88.42
Depth:	7.8m-8.4m	Date/Time Tested:	17/05/24 12:21:36 PM	Mass of Cont. + Dry Soil, g:	71.01
Sample:	170519-09			Mass of Container, g:	30.42
Description:	BH 17-08 S12 (7.8m-8.4m)			Moisture Content, %:	42.89
				Sample Length, mm:	
				Sample Diameter, mm:	
				Sample Mass, g:	
				Sample Volume, mm³	
				Wet Density, kg/m³	
				Dry Density, kg/m³	

Appendix D

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