

**Pier 401 Removal -
Machon's Point Wharf
Murray Harbour, Kings Co, PEI
Project No. R077232.001**

List of Contents

This document is the document referred to as "Plans and Specifications" and marked "A" in the Articles of Agreement and includes the following:

"A"

Public Works and Government Services Canada
**Pier 401 Removal - Machon's Point Wharf
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Project No. R077232.001**

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Appendix A – Geotechnical Investigation – Proposed Marginal Wharf Replacement (March 30, 2015)

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List of Drawings

The enclosed drawings (plans) listed hereunder form part of the documents referred to as "Plans and Specifications" and marked in the Articles of Agreement and consists of the following:

"A"

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Drawing No. Title

1 of 1 Existing Conditions, Removals and Site Plan

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General Instructions

PART 1 – GENERAL

1. Documents Required
 - .1 Maintain at job site, one copy each of the following:
 - .1 Contract drawings;
 - .2 Specifications;
 - .3 Addenda;
 - .4 Reviewed shop drawings/submissions;
 - .5 Change Orders;
 - .6 Other modifications to Contract;
 - .7 Field test reports;
 - .8 Copy of approved work schedule;
 - .9 Manufacturer's installation and application instructions.

 2. Site Conditions
 - .1 Geotechnical report prepared by Stantec Job No. 121618169 dated March 30, 2015, is included in Appendix A. This material is not necessarily up-to-date and is for information purposes only. It should be complemented with site visits and consultation with appropriate expertise.

 3. Work Schedule and Completion Dates
 - .1 Prepare and submit to the Departmental Representative within 5 days of notification of Contract award, 1 copy of the construction schedule, in the form of a bar chart, showing the dates for commencement and completion of each major activity of the work, including the work of subcontractors; dates of submissions, review and return of all drawings and submittals.; the dates of Substantial Completion; and intended man hours of labour and equipment for each major items of work. If the schedule as submitted is unacceptable in any way, submit without delay a revised schedule satisfactory to the Departmental Representative.

 - .2 The Departmental Representative is to notify the Contractor in writing of acceptance of the Construction Schedule. Comply with the Dates of the Construction Schedule at all times. If, for any reason the Construction Schedule is not followed, immediately notify the Departmental Representative of the changes and submit a revised schedule for acceptance. Upon written acceptance by the Departmental Representative, this schedule will become the Construction Schedule.
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- .3 Whenever required, give further written particulars concerning this schedule. The submission to and acceptance by the Departmental Representative of the Contractor's Construction Schedule or the furnishing of details and particulars thereto will not relieve the Contractor of any duties and responsibilities under the Contract.
4. Measurement Responsibilities
- .1 Notify *Departmental Representative* sufficiently in advance of operations to permit required measurements for payment purposes.
5. Contractor's Use of Site
- .1 Co-operate with users of existing facilities.
- .2 Should interference's occur, take directions from the *Departmental Representative*.
- .3 Do not unreasonably encumber site with materials or equipment.
- .4 Move stored products or equipment which interfere with operations of *Departmental Representative*, other Contractors or harbour operations.
- .5 Obtain and pay for use of additional storage or work areas needed for operations.
- .6 Comply with all regulations and authorities having jurisdiction over the work, whether on land or on water.
- .7 Ensure no damage occurs to existing structures as a result of operations. Any damage will be repaired at Contractor's expense.
- .8 Provide temporary barriers and warning signs in location where work is adjacent to areas used by public.
- .9 Provide temporary navigational lights and signs as required or requested by the *Departmental Representative*.
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6. Codes and Standards
- .1 Perform work in accordance with National Building Code of Canada (NBC), latest edition, and any other code of provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements will apply.
 - .2 Meet or exceed requirements of specified standards, codes and referenced documents. When a standard or code is outdated, the latest edition will supersede the referenced date.
 - .3 Observe and enforce construction safety measures under the Canadian Occupational Health & Safety Regulations and safety regulations of the Province of Prince Edward Island. In the event of conflict between any provisions of above authorities the most stringent provision will apply.
7. Project Meetings
- .1 Departmental Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.
8. Setting Out of Work
- .1 Do all detail surveys necessary for the work, including locating and maintaining working points, and establishing lines and elevations. Perform all layout work, and carefully preserve benchmarks, reference points and stakes.
 - .2 Provide such masts, scaffolds, batter boards, lines, straight edges, templates and other devices as may be necessary to facilitate layout, construction and inspection of the work. Whenever necessary, suspend work for such reasonable time as may be necessary to permit the Departmental Representative to check or inspect any portion of the Work. The Contractor will not be allowed any extra compensation or time for completion because of this suspension of work.
 - .3 Elevations for the various grades and features of the specified works to be referenced and properly related to a benchmark, which will be approved by the Departmental Representative.
 - .4 Verify all grades, lines, levels, and dimensions shown on the drawings and report any errors or inconsistencies to the Departmental Representative before commencing work. Provide and maintain well built batterboards at all points to
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facilitate the progress of the work. Establish all other grades, lines, levels required to facilitate the work.

- .5 Note that all existing soundings and grades shown on the Drawings were relevant only on the date indicated (that they were obtained).

9. Existing Services

- .1 Where work involves breaking into, connecting to or extending existing services, carry out work at times directed by governing authorities, with minimum of disturbance to pedestrian and vehicular traffic.

- .2 Before commencing work, establish and confirm location, elevation, alignment, size, type and extent of service lines in area of work and notify Departmental Representative of findings.

- .3. Any services interrupted, relocated or extended as a result of work are to be reinstated in a manner as directed by the governing authority.

- .4 Submit schedule to and obtain acceptance from Departmental Representative for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.

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

10. Contract Documents

- .1 Contract Drawings:

- .1 The drawings for the Work consist of all drawings listed in these "List of Drawings, Section 00 00 01" and any additional drawings issued at a later date by the Departmental Representative.

- .2 Departmental Representative may furnish additional drawings to assist in proper execution of work. These drawings will be issued for clarification only. Such drawings will have same meaning and intent as if they were included with plans referred to in Contract Documents.

- .3 The drawings indicate the extent and general dimensions of the work. Make all necessary measurements to

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ensure that the result of the work is in accordance with the intent.

- .4 Verify all existing conditions in field prior to proceeding with work.

.2 Contract Specifications:

- .1 The general requirements and technical specifications are written solely for the General Contractor. They are organized into the NMS format of separate divisions and sections.

- .2 Specification language is of the 'Short Form type' for example, where the word "provide" occurs, interpret it to mean "the Contractor shall furnish all labour, material and equipment necessary to complete the work".

- .3 This Specification and accompanying drawings are intended to describe and provide for a finished project. They are intended to be complementary, and what is called for by either will be as binding as if called for by both. The Contractor shall understand that the work herein described will be complete in every detail, notwithstanding that every item necessarily involved is not particularly mentioned, and Contractor will be held to provide all labour, materials and equipment necessary for the entire completion of the work and will not avail themselves of any errors or omissions.

11. Permits and Regulations

- .1 Apply for, obtain and pay for all necessary permits, approvals and other authorizations required for the work.
- .2 Comply with all by-laws, ordinances and regulations of all authorities having jurisdiction.

12. Cutting, Fitting and Patching

- .1 Execute cutting (including excavation), fitting and patching required to make work fit properly.
- .2 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .3 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.

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- .4 Obtain Departmental Representative's approval before cutting, boring or sleeving, or excavating adjacent to load-bearing members.
13. Record of Construction
- .1 As work progresses, maintain accurate records to show all deviations from the contract drawings, with particular reference to work which will be concealed. Prior to the inspection of the work for the issuance of the Substantial Certificate of Completion, provide the Departmental Representative with one set of white prints of the drawings with all deviations shown neatly thereon in red.
- .2 Also provide "as built" cross sections of any excavation, dredging or fill work.
14. Payment
- .1 Payment for all work under this contract to be according to the Contract Documents and the “Project Particulars and Measurement” Section 01 29 00.
- .2 No separate payment will be made for work specified under General Conditions, Supplementary Conditions or any sections of Specification under Division 01. The cost of this work is to be considered as overhead and to be included in the unit prices of the Contract.
- .3 Dimensional changes as directed by the Departmental Representative to suit existing conditions, but not resulting in additional work or materials, will not be considered as extra to the Contract.
15. Site Examination
- .1 All parties tendering could visit the site of the work prior to submission of tenders and to become acquainted with site conditions, conditions of existing objects to be removed, tides, degree of exposure and all information necessary for the proper carrying out of the work covered by the drawings and this Specification.
- .2 The Departmental Representative will give no consideration whatsoever to any claim by the Contractor resulting from failure to have made all the necessary investigations prior to tendering.
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- .3 If interested in visiting the site, the Contractor is to request permission to access the site from the Departmental Representative prior to going.
- .4 In advance of a site visit, the Contractor is to review hazards as identified in Section 01 35 29 Part 1.11 Project/Site Conditions and submit a site specific safety plan for the purpose of viewing the site.
16. Cooperation & Assistance to Departmental Representative
- .1 Co-operate with Departmental Representative on inspection of work.
- .2 Provide assistance when requested.
- .3 Provide small motor boat with operator and sounding chain for Departmental Representative's use when requested.
17. Datum
- .1 Datum referred to in this Specification is Chart Datum. Chart Datum is, by International Agreement a plane below which the tide will seldom fall. The Canadian Hydrographic Service has adopted the plane of the lowest normal tide (L.N.T.) as Chart Datum. As the rise, fall, and range of tides varies daily, the Canadian Tide and Current Tables, as issued by the Canadian Hydrographic Service, should be consulted for tidal predictions and other tidal information relating to the work.
18. Contractor's Representative
- .1 Continuously maintain on the site an authorized representative to whom communication may be addressed and who will be competent to speak for the Contractor in discussing work methods.
19. Workers Compensation
- .1 Contractor and all sub-contractors must be registered under the Workers Compensation Act and provide evidence of good standing.
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- .2 With each claim for payment, the Contractor will present to the Departmental Representative a Letter of Certification from the Workers Compensation Board, showing that all required assessments are paid in connection with all trades.
20. Laws, Standards
Taxes and Fees
- .1 Comply with all laws and standards governing all or any part of the work, pay all applicable taxes and pay for all permits and certificates required in respect of the execution of the work. Where variances exist between the requirements of agencies governing all or any part of the work, the most restrictive will govern, but in no instance will the standards established by the drawings and this Specification, which exceed such requirements, be reduced.
21. Protection and
Repair
- .1 Repair any damage resulting from work under this contract to conditions that existed prior to commencement of work. Match condition or adjacent, undisturbed areas.
22. Location of
Equipment and
Fixtures
- .1 Location of equipment, fixtures or any appurtenances indicated are to be considered approximate.
23. Inspection
And Testing
- .1 The Departmental Representative may employ an Inspector and/or Testing Company to ensure work conforms with contract.
24. Disposal of
Debris
- .1 Debris, including construction materials not incorporated in the work, oil products and containers, and other materials of this nature will be disposed of in suitable locations off the site in keeping with Section 01 35 29 and 01 35 44. Disposal is the responsibility of the Contractor.
- .2 Removal, hauling and disposal of contaminated materials such as creosote timber and excavated material needs to be paid for and undertaken in a provincially approved manner.
- .3 Material from the work will not be permitted to go adrift or otherwise become a menace to navigation.

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25. Existing Soils
Conditions .1 Any information pertaining to soils and all boreholes logs are furnished by the Departmental Representative as a matter of general information only and borehole descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those described by the boreholes themselves.
26. Environmental
Protection .1 Provide environmental protection in accordance with the requirements of Environment Canada, Department of Fisheries and Oceans, Province of PEI and Section 01 35 44.
27. Relics And
Antiquities .1 Protect relics, antiquities, items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found during course of work.
- .2 Give immediate notice to Departmental Representative and await written instructions before proceeding with work in this area.
- .3 Relics, antiquities and items of historical or scientific interest remain her Majesty's property.
28. Temporary
Navigational Buoys .1 The Contractor is to maintain temporary buoy’s to mark the position of the outer end of the structures as construction and removals proceed. All buoys are to meet the requirements of Canadian Coast Guard Standard TP968 and be equipped with radar reflectors. Refer to the following website for information.
- <http://www.ccg-gcc.gc.ca/aids/home>
- .2 The Contractor shall coordinate the buoy installation with the local Harbour Authority.
- .3 The Contractor is responsible for all costs associated with the supply, installation and removal of all temporary navigational buoys.
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Project Particulars And Measurement

PROJECT PARTICULARS

1.1 Description
of Work

- .1 The project involves complete demolition and removal of Pier 401 at Machons Point Wharf in Murray Harbour, including dredging (underwater excavation) under the pier after removal as well as harbour dredging for a floating dock.
- .2 The work includes but is not limited to:
 - .1 Demolition, removals and Provincial disposal of construction materials
 - .2 Excavation and Provincial disposal of marine materials and underwater debris

PROJECT MEASUREMENT

1. General

- .1 No items will be measured for payment. The lump sum bid price will be full compensation for all work, materials, equipment, labour and incidentals required to complete the work.

2. Measurement
For Payment

Division 01

Mobilization/Demobilization: Mobilization and demobilization, temporary navigational lighting and all other contract requirements not specifically measured, will be paid as part of the lump sum bid price.

Division 31

Sitework, Demolition, Removals and Reinstatement: Sitework, demolition, removals and reinstatement will be paid as part of the lump sum bid price. This includes all removals and disposal noted on the drawings including required excavation for removal of these items. Also included are environmental protection measures and any required reinstatement of site.

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Project Particulars And Measurement

Division 35

Underwater Excavation (Dredging): Will be paid as part of the lump sum bid price. This item will include removal of material, disposal in the on-site existing dredged material containment cell, leveling of material, reinstatement, surveying as required and all other work necessary to complete the project.

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Shop Drawings/Submissions

PART 1 – GENERAL

1. General
 - .1 Submit to Departmental Representative, for review, shop drawings, product data, samples and other information specified.
 - .2 Until submission is reviewed, work involving relevant product may not proceed.
 2. Shop Drawings
 - .1 Drawings to be originals prepared by contractor, subcontractor, supplier or distributor, which illustrate appropriate portion of work, showing fabrication, layout, setting or erection details as specified in appropriate sections.
 - .2 Identify details by reference to sheet and detail numbers shown on Contract Drawings.
 - .3 Maximum sheet size 860mm x 1120 mm.
 3. Product Data
 - .1 Certain specification sections specify that manufacturer's standard schematic drawings, catalogue sheets, diagrams schedules, performance chart, illustrations and other standard descriptive data will be accepted in lieu of shop drawings.
 4. Samples
 - .1 Submit samples in sizes and quantities specified.
 - .2 Construct field samples and mock-ups at locations acceptable to Departmental Representative.
 - .3 Accepted samples will become standards of workmanship and material against which, installed work will be checked on project.
 5. Miscellaneous Data
 - .1 Provide certificates, methodologies, design and test results as required.
 6. Coordination of Submissions
 - .1 Review shop drawings, product data, samples and miscellaneous data prior to submissions.
 - .2 Verify:
 - .1 Field Measurements.
 - .2 Field Construction Criteria.
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Shop Drawings/Submissions

- .3 Catalogue numbers and similar data.
 - .3 Coordinate each submission with requirements of work and contract documents. Individual submissions will not be reviewed until all related information is available.
 - .4 Contractor's responsibility for errors and omissions in submission is not relieved by the Departmental Representative's review of submissions.
 - .5 Contractor's responsibility for deviations in submission from requirements in Contract documents is not relieved by Departmental Representative's review of submission, unless Departmental Representative gives written acceptance of specified deviations.
 - .6 Notify the Departmental Representative, in writing at time of submission, of deviations from requirements of contract documents stating reasons for deviations.
 - .7 After Departmental Representative's review, distribute copies.
7. Submission Requirements
- .1 Schedule submissions at least 14 days before dates reviewed submissions will be needed.
 - .2 Submit electronic copies in PDF format or number of opaque diazo copies of shop drawings, product data which Contractor requires for distribution, plus two (2) copies which will be retained by Departmental Representative.
 - .3 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 submitted.
 - .5 Other pertinent data.
 - .4 Submissions shall include:
 - .1 Date and revision dates.
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- .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Separate details when pertinent.
 - .4 Identification of product or material.
 - .5 Relation to adjacent structure or materials.
 - .6 Field dimensions, clearly identified as such.
 - .7 Specification Section Number.
 - .8 Applicable standards such as CSA or CGSB numbers.
 - .9 Contractor's stamp, initialed or signed, certifying review of submission, verification of field measurements and compliance with contract documents.
8. Shop Drawings Review .1 The review of shop drawings by Public Works and Government Services Canada or its authorized Departmental Representative, is for the sole purpose of ascertaining conformance with the general concept. This review shall not mean that Public Works and Government Services Canada approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same, and such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and contract documents. Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of the work of all sub-trades.
9. Other Reviews .1 As for shop drawings above, other reviews are for the sole purpose of ascertaining the general concept.

Machon's Point Marginal**Wharf Construction****Murray Harbour, Kings Co, PEI****Project No. R077232.001****Special Procedures On Fire Safety Requirements**PART 1 – GENERAL

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|-----|---|----|---|
| 1.1 | <u>Section Includes</u> | .1 | Fire Safety Requirements |
| | | .2 | Hot Work Permit |
| | | .3 | Existing Fire Protection and Alarm Systems |
| 1.2 | <u>Related Work</u> | .1 | Section 01 35 29: Health and Safety |
| 1.3 | <u>References</u> | .1 | National Fire Code of Canada, latest edition. |
| 1.4 | <u>Definitions</u> | .1 | Hot Work defined as: |
| | | .1 | Welding work |
| | | .2 | Cutting of materials by use of torch or other open flame devices |
| | | .3 | Grinding with equipment which produces sparks. |
| 1.5 | <u>Submittals</u> | .1 | Submit copy of Hot Work Procedures, to Departmental Representative for review, within 14 calendar days after contract award. |
| | | .2 | Include sample of Hot Work Permit. |
| | | .3 | Submit above documents in accordance with the submittal general requirements specified in Section 01 33 00. |
| 1.6 | <u>Fire Safety & Hot Work Requirement</u> | .1 | Implement and follow fire safety measures during Work. Comply with following: |
| | | .1 | National Fire Code of Canada, latest edition. |
| | | .2 | Federal and Provincial Occupational Health and Safety Acts and Regulations as specified in Section 01 35 29. |
| | | .2 | In event of conflict between any provisions of above authorities the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, Departmental Representative will advise on the course of action to be followed. |

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Special Procedures On Fire Safety Requirements

.3 NFC standards are available from National Research Council (NRC).

.4 Hot Work Requirements:

.1 Obtain Departmental Representative's written Authorization to Proceed for the performance of Hot Work on site as may be required in the course of Work.

.2 To obtain authorization, submit to Departmental Representative for review:

.1 Contractor's Hot Work Procedures to be followed on site in accordance with clause 1.8 below.

.2 Type of work and frequency of situations which will require Hot Work.

.3 Upon confirmation that effective fire safety measures will be implemented for hot work, Departmental Representative will grant Authorization to Proceed.

.4 In most cases, Departmental Representative will issue only one written authorization covering the entire construction project and duration of work. However in some cases, depending on the nature or phasing of work, the quantity of various trades needing to perform welding and cutting on site, or other deemed situation, Departmental Representative might designate certain portions of the work as separate entities, each entity requiring individual written authorization to proceed. Follow Departmental Representative's directives in this regard.

.5 Do not perform any Hot Work until receipt of Departmental Representative's written Authorization to Proceed.

1.7 Conformance

.1 Ensure that Hot Work Procedures, as established for project and agreed upon with Departmental Representative, are stringently followed. Enforce use and compliance by all workers.

.2 Brief all workers and subcontractors on Hot Work Procedures and Permit system

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Special Procedures On Fire Safety Requirements

- .3 Failure to comply with the established hot work procedures may result in the issuance of a Non-Compliance Notification at Departmental Representative's discretion with possible disciplinary measures imposed as specified in Section 01 35 29.

1.8 Hot Work
Procedures

- .1 Develop Hot Work Procedures, to be followed when Hot Work is required as part of the work.
 - .2 Describe safe work practices and sequence of activities to be followed on site by Contractor and workers to minimize the potential occurrence of a fire resulting from Hot Work.
 - .3 Hot Work Procedures to include:
 - .1 Requirement to perform hazard assessment of the site or immediate work area, based on type and extent of Hot Work required, in accordance with Hazard Assessment and Safety Plan requirements of Section 01 35 29. Carry out hazard assessment for each hot work event.
 - .2 Use of a Hot Work Permit system, issued by an authorized person in Contractor's employ, for each event when Hot Work is required, granting permission to carry out hot work.
 - .3 Provision of a designated person (s) to carry out a Fire Safety Watch for a minimum of 30 minutes immediately upon completion of the hot work.
 - .4 Procedures to comply with fire safety codes and standards specified herein and specified in Section 01 35 29.
 - .5 Generic procedures, if used, must be edited, supplemented with pertinent information and tailored to reflect specific project conditions. Clearly label as being the Hot Work Procedures applicable to this contract.
 - .6 Include within procedures the step by step process on how to prepare and issue the Hot Work Permit.
 - .7 Hot Work Procedures to be in typewritten format, listing step by step procedures and worker instructions, clearly establishing and allocating responsibilities of:
 - .1 Worker (s)
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- .2 Designated person authorized to issue the Hot Work Permit,
 - .3 Fire Safety Watcher,
 - .4 Subcontractors and Contractor.
- 1.9 Hot Work Permit
- .1 Develop "Hot Work Permit" form in typewritten format.
 - .2 Hot Work Permit form to include, as a minimum, the following data:
 - .1 Project name and project number;
 - .2 Building name, address and specific floor, room or area where hot work will be performed;
 - .3 Date when permit issued
 - .4 Description on type of hot work to be carried out;
 - .5 Special precautions required, including type of fire extinguisher needed;
 - .6 Name and signature of authorized person, designated by Contractor, to issue the permit.
 - .7 Name of worker(s) (clearly printed) to which the permit is being issued.
 - .8 Time duration of permit (not to exceed 8 hours) indicating "Start" time & date and "Completion" time & date when Hot Work permit will be in effect.
 - .9 Worker signature with date and time when hot work terminated.
 - .10 Specified period of time requiring Safety Watch.
 - .11 Name and signature of person designated as Fire Safety Watcher, complete with time & date when safety watch terminated, certifying that the surrounding area was under their continual watch and inspection for the minimum time period specified in Permit and commenced immediately upon the completion of Hot Work.
 - .3 Industry Standard forms shall only be used if all data specified above is included on form.
 - .4 Each Hot Work Permit to be completed in full and signed as follows:
 - .1 Authorized person issuing Permit before hot work commences;
 - .2 Worker(s) upon completion of Hot Work;
 - .3 Fire Safety Watcher upon termination of safety watch and;
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Special Procedures On Fire Safety Requirements

- .4 Returned to Contractor's Site Superintendent for safe keeping.

1.10 Fire Protection
And Alarm Systems

- .1 Fire protection and alarm systems shall not be:
 - .1 Obstructed.
 - .2 Shut-off, unless approved by Departmental Representative.
 - .3 Left inactive at the end of a working day or shift.
- .2 Do not use fire hydrants, standpipes and hose systems for purposes other than fire fighting.
- .3 Costs incurred, from the fire department, Harbour Authority and tenants, resulting from negligently setting off false alarms will be charged to the Contractor in the form of financial progress payment reductions and holdback assessments against the Contract.

1.11 Documents on Site

- .1 Keep Hot Work Permits and Hazard assessment documentation on site for duration of Work.
 - .2 Upon request, make available to Departmental Representative or to authorized safety representative for inspection.
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Health And Safety

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- 1.1 Related Work .1 Section 01 35 24: Special Procedures on Fire Safety Requirements.
- 1.2 Definitions .1 COSH: Canada Occupational Health and Safety Regulations made under Part II of the Canada Labour Code.
- .2 Competent Person: means a person who is:
- .1 Qualified by virtue of personal knowledge, training and experience to perform assigned work in a manner that will ensure the health and safety of persons in the workplace, and;
- .2 Knowledgeable about the provisions of occupational health and safety statutes and regulations that apply to the Work and;
- .3 Knowledgeable about potential or actual danger to health or safety associated with the Work.
- .3 Medical Aid Injury: any minor injury for which medical treatment was provided and the cost of which is covered by Workers' Compensation Board of the province in which the injury was incurred.
- .4 PPE: personal protective equipment
- .5 Work Site: where used in this section shall mean areas, located at the premises where Work is undertaken, used by Contractor to perform all of the activities associated with the performance of the Work.
- 1.3 Submittals .1 Make submittals in accordance with Section 01 33 00.
- .2 Submit site-specific Health and Safety Plan prior to commencement of Work.
- .1 Submit within 10 work days of notification of Bid Acceptance. Provide 3 copies.
- .2 Departmental 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
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reduce Contractor's overall responsibility for Occupational Health and Safety of the Work.

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

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

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

.5 Submit copy of Letter in Good Standing from Provincial Workers Compensation or other department of labour organization.

.1 Submit update of Letter of Good Standing whenever expiration date occurs during the period of Work.

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

.7 Submit copies of incident reports.

.8 Submit WHMIS MSDS - Material Safety Data Sheets.

1.4 Compliance Requirements

.1 Comply with Occupational Health and Safety Act for Province of Prince Edward Island, and Occupational Health and Safety Regulations made pursuant to the Act.

.2 Comply with Canada Labour Code - Part II (entitled Occupational Health and Safety) and the Canada Occupational Health and Safety Regulations (COSH) as well as any other regulations made pursuant to the Act.

.1 The Canada Labour Code can be viewed at:
[www.http://lois.justice.gc.ca/eng/acts/L-21](http://lois.justice.gc.ca/eng/acts/L-21).

.2 COSH can be viewed at:
[www.http://laws.lois.justice.gc.ca/eng/rgulations/SOR-86-304/](http://laws.lois.justice.gc.ca/eng/rgulations/SOR-86-304/)

.3 Copies may be obtained at:
Publishing and Depository Services
Public Works & Government Services Canada
Ottawa, Ontario, K1A 0S5
Tel: 1-800-635-7943

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- .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 Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter in Good Standing.
- .6 Medical Surveillance: Where prescribed by legislation or regulation, obtain and maintain worker medical surveillance documentation.

1.5 Responsibility

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons and environment adjacent to the site to 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.

1.6 Site Control
And Access

- .1 Control the Work and entry points to Work Site. Approve and grant access only to workers and authorized persons. Immediately stop and remove non-authorized persons.
 - .1 Departmental Representative will provide names of those persons authorized by Departmental Representative to enter onto Work Site and will ensure that such authorized persons have the required knowledge and training on Health and Safety pertinent to their reason for being at the site, however, Contractor remains responsible for the health and safety of authorized persons while at the Work Site.
- .2 Isolate Work Site from other areas of the premises by use of appropriate means.
 - .1 Erect fences, hoarding, barricades and temporary lighting

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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 51 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.

1.7 Protection

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

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

1.8 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.

1.9 Permits

.1 Post permits, licenses and compliance certificates, specified in Section 01 10 10, at Work Site.

.2 Where a particular permit or compliance certificate cannot be

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obtained, notify Departmental Representative in writing and obtain approval to proceed before carrying out applicable portion of work.

1.10 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.

1.11 Project/Site Conditions

- .1 Following are potential health, environmental and safety hazards at the site for which Work may involve contact with:
 - .1 Existing hazardous and controlled products stored on site:
 - .1 None known.
 - .2 Existing hazardous substances or contaminated materials:
 - .1 None Known.
 - .3 Known latent site and environmental conditions:
 - .1 Pier 401 is currently barricaded to prevent access as it is not suitable to withstand any loads.
 - .2 Adjacent marine structures have unknown load carrying capacity.
 - .3 Work will be occurring in a marine environment and will be occurring over water.
 - .4 There are overhead power lines and operational water service lines on site.
 - .4 Facility on-going operations:
 - .1 This site is part of an active fishing port with regular loading and unloading activities occurring.
 - .2 Public vehicles and pedestrians will be at the site.
- .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.

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- .4 MSDS Data sheets of pertinent hazardous and controlled products stored on site can be obtained from Departmental Representative.
 - .5 Physical Hazards:
 - .1 Slip and trip hazards due to uneven surfaces.
- 1.12 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.
- 1.13 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 their competence and reporting relationship in Contractor's company.
 - .6 Names, competence and reporting relationship of other supervisory personnel used in the Work for occupational health and safety purposes.
 - .3 On-site Contingency and Emergency Response Plan shall include:
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- .1 Operational procedures, evacuation measures and communication process to be implemented in the event of an emergency.
 - .2 Evacuation Plan: site and floor plan layouts showing escape routes, marshalling areas. Details on alarm notification methods, fire drills, location of fire fighting equipment and other related data.
 - .3 Name, duties and responsibilities of persons designated as Emergency Warden(s) and deputies.
 - .4 Emergency Contacts: name and telephone number of officials from:
 - .1 General Contractor and subcontractors.
 - .2 Pertinent Federal and Provincial Departments and Authorities having jurisdiction.
 - .3 Local emergency resource organizations.
 - .5 Harmonize Plan with Facility's Emergency Response and Evacuation Plan. Departmental Representative will provide pertinent data including name of PWGSC and Facility Management contacts.
 - .4 On-site Communication Plan:
 - .1 Procedures for sharing of work related safety information to workers and subcontractors, including emergency and evacuation measures.
 - .2 List of critical work activities to be communicated with Facility Manager which have a risk of endangering health and safety of Facility users.
 - .5 Address all activities of the Work including those of subcontractors.
 - .6 Review Health and Safety Plan regularly during the Work. Update as conditions warrant to address emerging risks and hazards, such as whenever new trade or subcontractor arrive at Work Site.
 - .7 Departmental Representative will respond in writing, where deficiencies or concerns are noted and may request re-submission of the Plan with correction of deficiencies or concerns.
 - .8 Post copy of the Plan, and updates, prominently on Work Site.
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- 1.14 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 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.
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- 1.15 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.
- 1.16 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 rules on site.
- 1.17 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.
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- 1.18 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 \$5,000.00.
- .2 Submit report in writing.
- 1.19 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.
- 1.20 Blasting .1 Blasting or other use of explosives is not permitted on site.
- 1.21 Powder Actuated Devices .1 Use powder actuated fastening devices only after receipt of written permission from Departmental Representative.
- 1.22 Confined Spaces .1 Abide by occupational health and safety regulations regarding work in confined spaces.
- 1.23 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.
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- 1.24 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

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Environmental Protection Procedures for Marine Work

PART 1 – GENERAL

1.1 References

- .1 WHMIS: Workplace Hazardous Materials Information System, Health Canada.
- .2 Transportation of Dangerous Goods Act, Transport Canada, 192, updated 2015-02-26
- .3 MBCA: Migratory Birds Convention Act, Environment Canada, 1994, updated 2010-12-10.
- .4 Canadian Coast Guard Regulations, Department of Fisheries and Oceans Canada.
- .5 Canadian Shipping Act, Transport Canada, 2001, updated 2015-02-26.
- .6 AWWA: American Wood Protection Association.
- .7 PEI Department of Transportation, Infrastructure and Energy Environmental Protection Plan.

1.2 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
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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.

1.3 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 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.

.6 Construction activities must comply with all/any conditions of the Navigation Waters Protection Act (NPA) permit issued by Transport Canada.

1.4 Disposal Of
Excavated Material

.1 Material will be disposed of by the Contractor on site at the existing dredge material disposal cell where indicated on the drawings.

.2 Water that decants from the disposed excavated material shall not enter any waterways.

.3 Eliminate free board spillage when excavating, loading and hauling dredged material.

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- .4 Do not overload trucks when hauling dredged material. Secure contents against spillage. Clean ground spills to extent as directed by authority having jurisdiction.
- .5 Obtain approval from Departmental Representative of the proposed route to be used to haul dredged material to the disposal site.
- .6 Wash down stations will be employed prior to leaving site (harbour).
- .7 Place and spread excavated marine materials at the disposal field in a uniform and well graded manner. Minimize height and slopes of the disposed material. Match slopes and contours of the existing surrounding terrain as much as possible.
- .8 Items such as rubber tires, bottles, cans and other debris or litter must be removed from the disposal site following regrading. Failure to remove such debris may constitute a littering offence under the Solid Waste Resource Management Regulations.
- .9 Control runoff of water containing suspended materials or other harmful substances in accordance with requirements of all federal, provincial and municipal authorities having jurisdiction.
- 1.5 Rock Material .1 All rock material that will be used for the project should be free of excessive fines.
- 1.6 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.
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- .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) overpack 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.

1.7 Disposal of Wastes

- .1 Do not bury rubbish, demolition debris and waste materials on site.
- .2 Dispose and recycle demolition debris and waste materials in accordance with provincial regulations.
- .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.

1.8 Water Quality

- .1 Conduct any excavation work of a watercourse in such a manner to limit turbidity and reduce sediment suspension in the water to an absolute minimum at all times.
 - .1 Maintain appropriate production speed and momentum of the excavation equipment. Make adjustments as required and as approved by Departmental Representative.
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- .2 Strategically position excavator equipment and haul vehicles to avoid over the water swings of excavated material whenever possible.
 - .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 area on a daily basis during the in-water work periods.
 - .1 Should excessive change occur in the turbidity of the water outside the work area, such as a distinct color difference; the work must stop and the Departmental Representative will be contacted to determine if additional mitigation measures are required.
 - .4 Site isolation measures are required where in water works are occurring. Install Type II silt fence or silt boom as required in accordance with Section 7.1 Erosion Control in PEI DOTIE Environmental Protection Plan.
 - .5 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 AWWPA approved.
 - .5 Do not use timber and lumber treated with creosote, petroleum and pentachlorophenol for any part of the Work.
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Environmental Protection Procedures for Marine Work

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

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

1.10 Bird And
Bird Habitat

- .1 Become knowledgeable with and 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 Do not perform night-time work.
 - .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 neighbouring vegetation until nesting is completed.
 - .2 Minimize work immediately adjacent to such areas until nesting is completed.
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- .3 Protect these areas by following recommendations of Canadian Wildlife Service.

1.11 Fish and Fish Habitat

- .1 There is a silverside fishery at the Harbour. If work is to occur between October 1st and December 31st, the Departmental Representative will coordinate with the Harbour users (including the silverside fishers) and will utilize adoptive management where necessary, to mitigate potential disruption for duration of the works.
 - .2 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.
 - .3 To minimize the possibility of fish habitat contamination, all construction equipment which will be immersed into the water of a watercourse, or has the possibility of coming into contact with such water 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, pumps, pipe lines 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 Scrape 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.
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- .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 washdown 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 washdowns 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 Environment Canada and the Department of Fisheries and Oceans – Oceans and Habitat Branch in cleaning and wash down of equipment.

1.12 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.

1.13 Fires

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

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1.14 Archaeological

- .1 All construction personnel are responsible for reporting any unusual materials unearthed during construction to the construction supervisor. If the find is believed to be an archaeological resource, the construction supervisor will immediately stop work in the vicinity of the find and notify their immediate supervisor.

- .2 If an archaeological and/or historically significant item is discovered during excavation, work in the area will be stopped and Departmental Representative will be contacted.

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Testing Laboratory Services

PART 1 – GENERAL

- 1.1 Related Requirements
- .1 Particular requirements for inspection and testing of concrete to be carried out by testing laboratory designated by Departmental Representative are specified under various sections.
- 1.2 Appointment And Payment
- .1 Departmental Representative will appoint and pay for services of testing laboratory except for the following:
- .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
- .2 Inspection and testing performed exclusively for Contractor's convenience.
- .3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
- .4 Mill tests and certificates of compliance.
- .5 Tests specified to be carried out by the Contractor under the supervision of Departmental Representative.
- .2 Where tests or inspections by designated testing laboratory reveal work not in accordance with contract requirements, Contractor shall pay costs for additional tests or inspections as Departmental Representative may require to verify acceptability of corrected work.
- 1.3 Contractor's Responsibilities
- .1 Furnish labour and facilities to:
- .1 Provide access to work to be inspected and tested.
- .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 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.

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Testing Laboratory Services

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

Machon's Point Marginal**Wharf Construction****Murray Harbour, Kings Co, PEI****Project No. R077232.001**

Temporary Facilities

PART 1 – GENERAL

1. Access
 - .1 Provide and maintain adequate access to project site.
 - .2 If authorized to use existing roads or structures for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractor's use of roads.
 - .3 The Contractor is to maintain full access to the work site. Should a court injunction be required ordering a person or group to refrain from impeding access to the site, such as a demonstration, picketing or union action, then obtaining the injunction and any associated costs will be considered incidental to this Contract. Any delays associated with such activity will be considered incidental to this Contract.
 2. Contractor's Site Office
 - .1 Establish on the site of the work and keep open at all times during the execution of the work an office where all letters, orders, notices and other communications may be received or acknowledged either by the Contractor or their authorized agent or representative. Provide a telephone in the office.
 - .2 Keep one up-to-date copy of contract documents, bulletins and other materials as specified under Section 01 10 10.
 3. Departmental Representative's Site Office
 - .1 Provision of a temporary office for sole use of Departmental Representative is not required.
 - .2 Washroom facilities not required. Provide outside sanitary facilities to approval.
 4. Storage Sheds
 - .1 Provide adequate weather tight sheds with raised floors, for storage of materials, tools and equipment which are subject to damage by weather.
 - .2 Contractor to make their own arrangements for on-site storage areas.
-

Machon's Point Marginal**Wharf Construction****Murray Harbour, Kings Co, PEI****Project No. R077232.001**

Temporary Facilities

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|-----|-------------------------------|----|--|
| 5. | <u>Sanitary Facilities</u> | .1 | Provide sanitary facilities for work force in accordance with governing regulations and ordinances. |
| | | .2 | Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition. |
| 6. | <u>Parking</u> | .1 | Contractor to make own arrangements to provide parking space for work force. |
| 7. | <u>Power</u> | .1 | Arrange, pay for and maintain temporary electrical power supply in accordance with governing regulations and ordinances. |
| 8. | <u>Water Supply</u> | .1 | Arrange, pay for and maintain temporary water supply in accordance with governing regulations and ordinances. |
| 9. | <u>Barricades</u> | .1 | Provide and maintain sufficient barricades, fencing, notices, warning signs, light signals, etc. for the protection of adjoining property and to warn others and workers engaged on the job of the dangers caused by the work. |
| | | .2 | Types and location of barricades, etc. to be in accordance with local regulations and to the satisfaction of Departmental Representative. |
| | | .3 | The presence of such barricades, lights, etc. shall not relieve the Contractor of the responsibility for any damages. |
| 10. | <u>Security</u> | .1 | Contractor to make their own arrangements for security of their equipment, materials, damages resulting from fire and theft. |
| 11. | <u>Site Signs and Notices</u> | .1 | Only Project Identification and Consultant/ Contractor signboards and notices for safety or instruction are permitted on site. |
| | | .2 | Format, location and quantity of site signs and notices to be accepted by Departmental Representative. |
| | | .3 | Signs and notices for safety or instruction to be in English and French languages, or commonly understood graphic symbols. |
-

Machon's Point Marginal

Wharf Construction

Murray Harbour, Kings Co, PEI

Project No. R077232.001

Temporary Facilities

12. Removal of
Temporary
Facilities

- .1 Remove temporary facilities from site when directed by Departmental Representative.
- .2 When project is closed down for a period of time, keep temporary facilities operational until no longer required by Departmental Representative.

Machon's Point Marginal**Wharf Construction****Murray Harbour, Kings Co, PEI****Project No. R077232.001****Materials And Equipment**PART 1 – GENERAL

1. General
 - .1 Use new material and equipment unless otherwise specified.
 - .2 Submit following information for any or all materials and products proposed for supply within seven (7) days of request by Departmental Representative:
 - .1 name and address of manufacturer
 - .2 trade name, model and catalogue number
 - .3 performance, descriptive and test data
 - .4 manufacturer's installation or application instructions
 - .5 evidence of arrangements to procure.
 - .3 Provide material and equipment of specified design and quality, performing to published ratings and for which replacement parts are readily available.
 - .4 Use products of one manufacturer for equipment or material of same type or classification unless otherwise specified.
2. Manufacturer's Instructions
 - .1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
 - .2 Notify Departmental Representative in writing of any conflict between these specifications and manufacturers' instructions. Departmental Representative will designate which document is to be followed.
3. Delivery and Storage
 - .1 Deliver, store and maintain packaged material and equipment with manufacturer's seal and labels intact.
 - .2 Prevent damage, adulteration and soiling of material and equipment during delivery, handling and storage. Immediately remove rejected material and equipment from site.
 - .3 Store material and equipment in accordance with supplier's instructions.
4. Conformance
 - .1 When material or equipment is specified by standard or performance specifications, upon request of Departmental

Machon's Point Marginal**Wharf Construction****Murray Harbour, Kings Co, PEI****Project No. R077232.001**

Materials And Equipment

Representative, obtain from manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements.

5. Substitution

- .1 Proposals for substitution may be submitted only after award of Contract. Such requests must include statements of respective costs of items originally specified and proposed substitutions.
- .2 Proposals will be considered by Departmental Representative if:
 - .1 Products selected by tenderer from those specified, are not available, or
 - .2 Delivery date of products from those specified would unduly delay completion of Contract, or
 - .3 Alternative products to those specified, which are brought to attention of, and considered by Departmental Representative as equivalent to those specified and will result in a credit to Contract amount.
- .3 Should proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on project. Pay for design or drawing changes required as result of substitution.
- .4 Amounts of all credits arising from approval of substitutions will be determined by Departmental Representative and Contract price will be reduced accordingly. No substitutions will be permitted without prior written approval of Departmental Representative.
- .5 Departmental Representative reserves the right for acceptance or rejection of substitution of materials.

1.7 Construction
Equipment and Plant

- .1 On request, prove to the satisfaction of Departmental Representative that the construction equipment and plant are adequate to manufacture, transport, place and finish work to quality and production rates specified. If inadequate, replace or provide additional equipment or plant as directed.
- .2 Maintain construction equipment and plant in good operating order.

Machon's Point Marginal

Wharf Construction

Murray Harbour, Kings Co, PEI

Project No. R077232.001

Materials And Equipment

- 1.8 Damaged and
Rejected Materials
- .1 Immediately replace, repair or otherwise make good any material damaged, broken or defaced during construction to the satisfaction of Departmental Representative.
 - .2 Remove rejected materials from site.
-

Machon's Point Marginal

Wharf Construction

Murray Harbour, Kings Co, PEI

Project No. R077232.001

Project Record Documents

PART 1 – GENERAL

1. Record
Drawings
 - .1 Departmental Representative will provide two sets of white prints for record drawing purposes.
 - .2 Maintain project record drawings and accurately record deviations from contract documents caused by site conditions and changes ordered by Departmental Representative.
 - .3 Mark changes in red coloured ink.
 - .4 Record following information:
 - .1 Elevations of various elements in relation to Chart Datum.
 - .2 Field changes in dimensions and details.
 - .3 Changes made by Change Order.
 - .5 At completion of project and prior to final inspection, neatly transfer notations to second set and submit both sets to Departmental Representative.
-

Machon's Point Marginal

Wharf Construction

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Cleaning

PART 1 – GENERAL

1. General
 - .1 Conduct cleaning and disposal operations to comply with local ordinances and antipollution laws.
 - .2 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
 - .3 Prevent accumulation of waste which creates hazardous conditions.

 2. Cleaning During Construction
 - .1 Maintain the work, at least on a daily basis free from accumulations of waste material and debris.
 - .2 Provide on-site containers for collection of waste materials, and debris.
 - .3 Remove waste materials, and debris from site.
 - .4 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces.

 3. Final Cleaning
 - .1 In preparation for acceptance of the project on an interim or final certificate of completion perform final cleaning.
 - .2 Remove grease, dust, dirt, stains, and other foreign materials, from exterior finished surfaces.
-

**Pier 401 Removal –
Machon’s Point Wharf
Murray Harbour, Kings Co, PEI
Project No. R077232.001**

PART 1 - GENERAL

- 1.1 Description of 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 as per Section 01 10 10, Part 15.
 - .2 Removal and disposal of Pier 401.
 - .3 All other site work and reinstatement not specified elsewhere.
- 1.2 Related Work .1 Refer to Section 01 33 00 for Shop Drawing/Submission requirements.
- 1.3 Submissions .1 Methodology:
- .1 When requested provide methodology for carrying out the work
 - .2 Provide submission in accordance with Section 01 33 00.
- 1.4 Protection .1 Pier 401 has been barricaded to prevent any loading on the structure. It cannot bear any loading to carry out demolition and/or construction.
- .2 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.
 - .3 Prevent debris from going adrift and becoming a menace to navigation.
 - .4 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.
- 1.5 Measurement For Payment .1 Sitework, demolition and removals will be measured in accordance with Section 01 29 00.

**Pier 401 Removal –
Machon's Point Wharf
Murray Harbour, Kings Co, PEI
Project No. R077232.001**

Site, Demolition, Removals & Reinstatement

Page 2

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 drawings or as required by the Departmental Representative.
 - .4 Existing boat slip, existing building and adjacent infrastructure to be protected from any damages. All repairs to damages as a result of Contractor's operations to be at their cost and to the satisfaction of the Departmental Representative.
- 3.2 Removal
- .1 Remove items indicated.
 - .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 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 The material to be disposed is to be transported and disposed of 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 Restoration
- .1 Upon completion of work, remove debris, trim surfaces and leave work site clean.
 - .2 Reinstatement areas and existing works outside areas of demolition to conditions that existed prior to commencement of work. Match condition of adjacent, undisturbed areas.

**Pier 401 Removal –
Machon’s Point Wharf
Murray Harbour, Kings Co, PEI
Project No. R077232.001**

Underwater Excavation and Site Preparation

PART 1 – GENERAL

- 1.1 Definitions
- .1 Underwater Excavation: excavating, transporting and disposing of underwater materials below Chart Datum (CD):
 - .2 Excavated Material: loose or shale rock, silt, sand, quick sand, mud, shingle, gravel, clay and sand, boulders, hardpan, debris, and solid rock or boulders of any size.
 - .3 Debris: all construction material, including pieces of wood, wire rope, scrap steel, concrete, etc.
 - .4 Grade: plane above which all material is to be excavated to.
 - .5 Estimated quantity: volume of material calculated to be above grade and within specified side slopes.
 - .6 Sideslope: inclined surface or plane from grade at side limit of excavation area to intersect original ground line outside of side limit and to be expressed as a ratio of horizontal to vertical.
 - .7 Chart Datum: by international agreement, a plane below which the tide will seldom fall. The Canadian Hydrographic Services has adopted the plane of Lowest Norman Tide (LNT) as Chart Datum. As the rise, fall and ranges of tides varies daily, The Canadian Hydrographic Services should be consulted for tidal prediction and other tidal information relating to the work.
 - .8 CPM: cubic metres place measurement prior to removal.
 - .9 CMTM: cubic metres truck measurement.
- 1.2 Description of Work
- .1 Work under this section covers the following:
 - .1 Excavation of underwater material to lines and grades as shown on the drawings.
- 1.3 Related Work
- .1 Refer to 01 29 00 Project Particulars and Measurement.
 - .2 Refer to Section 01 33 00 for Shop Drawing/Submission

**Pier 401 Removal –
Machon’s Point Wharf
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Project No. R077232.001**

Underwater Excavation and Site Preparation

requirements.

.3 Refer to Section 01 35 44 Environmental Protection Procedures for Marine Work.

.4 Refer to Section 31 23 10 Excavating, Trenching and Backfilling.

1.4 Submissions

.1 Certificates:

.1 Provide copies of all permits and licenses required to carry out the work.

.2 Methodology:

.1 Provide methodology for carrying out the work.

.3 Provide submissions in accordance with Section 01 33 00.

1.5 Schedule of Work

.1 Submit to Departmental Representative within 2 weeks after award of contract, a schedule of work including time periods during which each operation involved in work will be undertaken.

1.6 Interference to Navigation

.1 Be familiar with vessel movements and fishery activities in area affected by underwater excavating operations. Plan and execute work in a manner that will not unnecessarily impede navigation and fishing operations including movement of vessels at adjacent structures.

.2 Keep District Manager informed of operations in order that necessary Notices will be issued.

1.7 Requirements of Regulatory Agencies

.1 Comply with municipal, provincial and national codes and regulations relating to project.

.2 Mark floating equipment with lights in accordance with Regulations for the Prevention of Collisions and Notice to Mariners.

.3 Blasting operations are not permitted.

**Pier 401 Removal –
Machon’s Point Wharf
Murray Harbour, Kings Co, PEI
Project No. R077232.001**

Underwater Excavation and Site Preparation

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|--|----|--|
| <u>1.8 Datum, Water Gauges and Targets</u> | .1 | Elevations used in this specification and contract drawings are in metres referred to chart datum. |
| <u>1.9 Qualifications</u> | .1 | Retain a qualified experienced staff member to supervise and program the work, and to determine precautions, preparation and operation techniques. |
| <u>1.10 Protection</u> | .1 | Prevent damage to surroundings and injury to persons. Post guards, sound warnings and display signs when undertaking the work. |
| <u>1.11 Equipment</u> | .1 | Determine the equipment required to excavate the area and material specified. |
| <u>1.12 Site Information</u> | .1 | Results of prior soundings, soil borings and soil investigations may be available for inspection at offices of Public Works and Government Services Canada, 3 Queen Street, Charlottetown, PE C1A 4A2. |
| | .2 | Results of most recent soundings are included with the drawings. This data is made available for tendering purposes only. It should be noted that this information may differ from present site conditions. |
| | .3 | The Contractor will be responsible for making their own interpretation of soil conditions at any location, other than borehole locations. Borehole descriptions shown on the logs are only descriptive of conditions at locations described by boreholes themselves. |
| <u>1.13 Measurement For Payment</u> | .1 | Only material excavated above grade plane and within side slopes indicated or specified will be measured. |
| | .2 | Underwater excavation and site preparation will be measured in accordance with Section 01 29 00. |
-

**Pier 401 Removal –
Machon’s Point Wharf
Murray Harbour, Kings Co, PEI
Project No. R077232.001**

Underwater Excavation and Site Preparation

- .3 Material removed and dumped in the absence of the Department's Inspector will not be considered for payment.
- .4 Material disposed of without written approval of dumpsite will not be measured for payment.
- .5 There will be no additional payment for delays incurred as a result of weather conditions.
- .6 There will be no additional payment for delays caused by vessel traffic in and out of the harbour.
- .7 There will be no additional payment for down time.
- .8 The Contractor will adhere to the schedule and take immediate action to correct any shortfall, by effectively altering existing excavating operations or mobilizing other equipment. The Departmental Representative is to be notified of the corrective action to be taken.

PART 3 - EXECUTION

3.1 General

- .1 Mark floating equipment with lights in accordance with International Rules of Road and maintain a radio watch on board.
 - .2 Lay out work from bench marks and base lines established by Departmental Representative. Be responsible for accuracy of work relative to established bench marks. Provide and maintain electronic position fixing and distance measuring equipment, laser transits and such other equipment as normally required for accurate underwater excavation control.
 - .3 Establish and maintain water level gauges in order that proper depth of excavating can be determined. Locate gauges so as to be clearly visible.
 - .4 Establish and maintain on-land targets for location and definition of designated excavation area limits. Targets to be suitable for control of underwater excavating operations and locating soundings. Remove targets on completion of work.
-

**Pier 401 Removal –
Machon's Point Wharf
Murray Harbour, Kings Co, PEI
Project No. R077232.001**

Underwater Excavation and Site Preparation

- .5 Excavate area to the grade depths indicated on the plan.
- .6 Excavation is to take place during the time periods indicated in these specifications.
- .7 Excavate side slope to allow material to freely fall inwards to form natural side slope.
- .8 Use extreme caution when excavating adjacent to existing structures. Damages are to be repaired at contractor's expense.
- .9 Remove materials above specified grade depths, within limits indicated. Material removed from below grade depth or outside specified area or side slope is not part of work.
- .10 Remove shoaling which occurs as a result of work. Once excavated, maintain area at grade.
- .11 Remove material cast-over on surrounding area and dispose of it as excavated material. Do not cast-over material unless authorized by Departmental Representative.
- .12 Immediately notify Departmental Representative upon encountering an object which might be classified as an obstruction. By-pass the object after clearly marking its location and continue work.
- .13 It will be the Contractor's responsibility to gain access to the excavation area. The construction of access will be at the Contractor's expense and will be removed if not acceptably incorporated into the work at the completion of the project. Any derricks, power lines, etc., which will require removal will be done so at the Contractor's expense and will be replaced to satisfaction of the Departmental Representative. Contractor to advise Departmental Representative of his proposed method to carry out excavation and disposal of the material.

3.2 Disposal of Material

- .1 Underwater excavated material shall be disposed of in the existing onsite dredge material disposal cell.

**Pier 401 Removal –
Machon’s Point Wharf
Murray Harbour, Kings Co, PEI
Project No. R077232.001**

Underwater Excavation and Site Preparation

3.3 Final Excavation Grade

- .1 The Contractor is to verify the final grade in the excavation area by an acceptable method.
- .2 Survey/sound the dredge areas as required to verify grades prior to and after dredging. Record the elevations.
- .3 If, as a result of incomplete work, additional verification of depths by sounding or sweeping becomes necessary, additional costs involved shall be paid by Contractor.
- .4 Excavate underwater to lines and grades specified as shown on the drawings. Material removed from outside specified limits is not considered part of work and will not be measured for payment.

3.4 Co-operation and work Assistance to Departmental Representative

- 1 Co-operate with Departmental Representative for inspection of assistance requested.
- .2 On request of Departmental Representative, furnish use of such boats, equipment, labour and materials forming ordinary and usual part of the required equipment as may be reasonably necessary to inspect and supervise work.

3.5 Rock Removal

- .1 If rock or boulders are to be removed, submit to Departmental Representative for review, two weeks before removal, details of proposed method of removal.

Public Works and Government Services Canada

Pier 401 Removal -

Machon's Point Wharf

Murray Harbour, Kings Co, PEI

Project No. R077232.001

Appendix A

Geotechnical Investigation

**Geotechnical Investigation –
Proposed Marginal Wharf
Replacement, Machons Point,
Kings County, PEI**

Job No. 121618169 – File No. 3675



Prepared for:

Public Works and Government
Services Canada
3 Queen Street
(Cambridge Building)
PO Box 1268
Charlottetown PE C1A 8R4

Prepared by:

Stantec Consulting Ltd.
165 Maple Hills Avenue
Charlottetown PE C1C 1N9

March 30, 2015



Stantec Consulting Ltd.
165 Maple Hills Avenue
Charlottetown PE C1C 1N9
Tel: (902) 566-2866
Fax: (902) 566-2004

March 30, 2015
Job No. 121618169 – File No. 3675

Attention: Mr. Gordon MacPhee, P.Eng.
Public Works and Government Services Canada
3 Queen Street (Cambridge Building)
PO Box 1268
Charlottetown PE C1A 8R4

Dear Mr. MacPhee,

**Reference: Geotechnical Investigation – Proposed Marginal Wharf Replacement,
Machons Point, Kings County, PE**

This report presents the results of the geotechnical investigation carried out for the above-noted project, in accordance with your request. The purpose of the investigation was to establish the subsurface conditions within the area of the proposed wharf and, based on the conditions encountered, to provide geotechnical engineering recommendations pertaining to wharf design and construction.

PROCEDURE

The field work for the present investigation was carried out on March 14, 2015, and consisted of drilling two (2) boreholes at the site, designated BH 201 and BH 202, with an auger drill rig equipped with a cantilevered platform to permit drilling over the edge of the existing wharf. An attempt to drill through the existing ice was unsuccessful as the drill rig was not able to safely access the ice sheet by way of the existing slipway. The boreholes were advanced to an average depth of 7.2 m below harbour bottom at the locations shown on the appended Drawing No. 1.

Samples of the overburden soils encountered were taken at regular intervals by means of a conventional split spoon sampler during the performance of Standard Penetration Tests. Bedrock was proven at each borehole location by rotary core drilling in NQ-size (45 mm core diameter).

All soil samples recovered were placed in moisture-proof containers and were delivered, with the rock core, to our Charlottetown laboratory for classification and testing. All soil and rock core samples remaining after testing will be stored for a period of three months from the date of issue of this report, after which they will be discarded unless directions to the contrary are received.

Detailed logs of the strata encountered at the site and of the sampling and testing carried out are shown on the appended Borehole Records.

The locations and elevations of the boreholes were established in the field by our personnel. The borehole locations were established relative to the existing wharf and site structures. The harbour



**Reference: Geotechnical Investigation – Proposed Marginal Wharf Replacement,
Machons Point, Kings County, PE**

bottom elevations at the boreholes were determined with respect to Low Normal Tide (LNT) Datum based on the temporary benchmark provided (refer to Drawing No. 1, appended).

The subsurface information obtained at previous BH-01 (Stantec Report No. 2989, issued January 18, 2010) has been incorporated into this report.

SUBSURFACE CONDITIONS

The subsurface conditions encountered at the present boreholes and at previous BH-01, are shown in detail on the appended Borehole Records, are summarized on Table 1 (also appended) and are described below. The conditions encountered at the site are also depicted on the Stratigraphic Section (Drawing No. 2, appended).

Marine Deposit

Marine deposited soils were encountered at the surface of each borehole and found to extend to depths ranging from 0.6 to 1.4 m below harbour bottom. The marine soil was found to vary in composition from a dark grey sand to a silt and sand and to contain varying amounts of gravel, clay, organics, and shell fragments, as noted the Borehole Records.

Standard Penetration Test N-values obtained within the marine soil generally range from 0 (i.e., weight of drill rods) to 7 indicating a very loose to loose relative density.

A grain size test (curve appended) performed on a split spoon sample of the marine soil recovered from BH 202 shows it to contain 20 percent gravel, 67 percent sand and 13 percent fines (i.e., silt and clay sizes). An Atterberg Limit determination showed this soil to be non-plastic. A grain size test (curve appended) performed on a split spoon sample of the marine soil recovered from previous BH-01 shows a similar gradation with 9 percent gravel, 72 percent sand and 19 percent fines. Three sample of the marine soil were each found to have a moisture content of 18 percent.

The following parameters may be assigned to the marine soil for design purposes:

Total Unit Weight	20 kN/m ³
Submerged Unit Weight	10 kN/m ³
Effective Friction Angle	30 degrees



**Reference: Geotechnical Investigation – Proposed Marginal Wharf Replacement,
Machons Point, Kings County, PE**

Glacial Till

A reddish brown glacial till stratum, ranging in thickness from 0.9 to 3.4 m, was encountered directly below the marine deposit at the boreholes. The till was found to vary in composition from a silty sand, to a clayey silt and sand, to a sand, some silt. The till was found to contain trace to some gravel and sandstone cobbles.

N-values obtained within the till range from 15 to in excess of 50 indicating a compact relative density. The N-values greater than 50 may be attributed to the presence of sandstone cobbles within the till.

Grain size analyses (curves appended) performed on representative split spoon samples of the till show it to contain 5 to 17 percent gravel, 42 to 78 percent sand, and 18 to 41 percent fines. An Atterberg Limit determination performed on a clayey till sample recovered from BH 201 shows it to contain fines of low to medium plasticity based on liquid and plastic limits of 33 percent and 13 percent, respectively. A sample of silty sand till recovered from BH 201 was found to contain non-plastic fines. The natural moisture content of selected till samples was found to range from 16 to 18 percent.

The following parameters may be assigned to the till stratum for design purposes:

Total Unit Weight	21 kN/m ³
Submerged Unit Weight	11 kN/m ³
Effective Friction Angle	32 degrees

Bedrock

Sedimentary bedrock was encountered directly below the fill stratum at the boreholes. The rock core recovered consists predominantly of reddish brown, fine to coarse grained sandstone with occasional stiff to hard reddish brown clayey/mudstone seams.

The bedrock surface was encountered 1.8 to 4.0 m below harbour bottom at the boreholes. The bedrock surface elevation was found to range from a low of el. -5.11 m at BH 201 to a high of el. -2.78 m at BH 202.

The bedrock is horizontally bedded with extremely close (<20 mm) to moderately close (200 to 600 mm) joints which typically occur along the bedding planes. An average RQD (Rock Quality Designation) value of 58 indicates poor quality, severely fractured bedrock.

The results of point load tests carried out on selected bedrock core samples are presented on Table 2, appended. The point load index (I_{s50}) was determined from both diametral and axial



**Reference: Geotechnical Investigation – Proposed Marginal Wharf Replacement,
Machons Point, Kings County, PE**

tests. The unconfined compressive strength (Q_u) was estimated from the point load data using the relationship $Q_u = 24 \times I_{s50}$ (axial). The point load test data indicate that the sandstone core samples tested generally fall within the weak (i.e., $Q_u = 5$ to 25 MPa) to strong (50 to 100 MPa) strength classifications. It should be noted that the weakest rock is often not recovered during coring operations and that intact core samples are required for testing. Consequently, a very weak to strong classification would be more representative of the overall rock mass at the site and is used on the Borehole Records.

The following parameters may be assigned to the bedrock stratum for design purposes:

Total Unit Weight	23 kN/m ³
Submerged Unit Weight	13 kN/m ³
Effective Friction Angle (for fractured, non-intact bedrock)	36 degrees

DISCUSSION AND RECOMMENDATIONS

It is understood that the proposed replacement for the existing marginal wharf is to be located immediately southeast of the existing wharf and could either consist of a pile-supported structure or a bulkhead type structure. A bulkhead structure could consist of a Berlin Wall system (utilizing steel H-piles and precast concrete panels or timber lagging) or a steel sheet pile wall. The effects of the subsurface conditions encountered on the design and construction of pile-supported and bulkhead wharves are considered in the following sections.

Pile-Supported Structure

It is understood that concrete filled steel pipe piles or H-piles with a protective jacket have been used for similar applications. It is expected that steel piles would be driven to bedrock to develop the required capacity. Steel piles should be driven to refusal using a hammer with a rated energy of at least 350 J/cm² of net steel cross sectional area. Previous experience has shown that an actual delivered energy in the order of 200 J/cm² is required to attain the allowable contact stress/bearing pressure given below. Refusal may be taken as 10 blows for the last 25 mm of pile penetration.

Re-tapping of some piles (e.g., 20 percent) within a 48-hour period is recommended to assess relaxation effects, and the requirement to re-tap additional piles.

Actual penetration depths of steel piles into the sandstone bedrock will depend on the driving energy delivered and the bedrock condition/strength at the pile locations. Previous experience has shown that penetration depths can vary significantly from site to site or within the same site,



March 30, 2015
Mr. Gordon MacPhee, P.Eng.
Page 5

**Reference: Geotechnical Investigation – Proposed Marginal Wharf Replacement,
Machons Point, Kings County, PE**

depending on the rock quality and strength, and can range from less than 1 m to 2 m or more. The stronger rock layers encountered at the boreholes will likely impede pile penetration.

The capacity of steel piles driven to refusal may be determined using an allowable contact stress of 50 MPa for steel H and open end pipe piles (based on net steel area). An allowable bearing pressure of 7 MPa may be used for design of closed end pipe piles (based on gross end area). The settlement of piles installed as outlined above and proportioned for foundation loads would be negligible.

For the analysis of lateral resistance, an effective pile width of 2.5 times the pile diameter (i.e., 2.5D) may be used.

For driven steel piles, some uplift resistance will be obtained through shaft friction (typically 50 percent of the shaft friction available in compression is assumed for uplift). The actual magnitude of the uplift resistance would depend on the type/size of the pile selected for use and the depth driven. Additional uplift resistance, if required, could be obtained through the use of socketed piles and/or rock anchors.

Bulkhead Structure

It is recommended that the very loose to loose marine soil, which represents the upper 600 mm (+/-) of the marine deposit, be removed from within the footprint of any type of bulkhead structure. If left in place, the compression of this soil under the weight of new fills will result in high lateral loads that must be accounted for. Other potential concerns associated with leaving this compressive soil in place would include settlement of the new infill/wharf deck and over-stressing of the tie-rods.

For a bulkhead design incorporating steel piles, the pile design/installation recommendations provided in the previous section would be applicable. The following parameters may be assigned to the various strata encountered for bulkhead design purposes:

Parameter/Soil Type	Marine Soil	Glacial Till	Bedrock (Sandstone)	Select Borrow (Compacted Infill)
Total Unit Weight, kN/m ³	20	21	23	21
Submerged Unit Weight, kN/m ³	10	11	13	11
Effective Friction Angle, degrees	30	32	36 ²	33
Active Earth Pressure Coefficient, Ka	0.33	0.31	0.26	0.29
Passive Earth Pressure Coefficient, Kp ¹	3.00	3.25	3.86	3.39

Notes:

1. neglecting the effects of wall friction
2. based on bedrock zone fragmented by pile penetration



March 30, 2015
Mr. Gordon MacPhee, P.Eng.
Page 6

**Reference: Geotechnical Investigation – Proposed Marginal Wharf Replacement,
Machons Point, Kings County, PE**

We would be pleased to provide further geotechnical input for this project on an as required, as requested basis.

CLOSING COMMENTS

Use of this report is subject to the Statement of General Conditions provided in the Appendix. It is the responsibility of Public Works and Government Services Canada, which is identified as "the Client" within the Statement of General Conditions, and its agents to review the conditions and to notify Stantec Consulting Ltd. should any of these not be satisfied. The Statement of General Conditions addresses the following:

- Use of the report
- Basis of the report
- Standard of care
- Interpretation of site conditions
- Varying or unexpected site conditions
- Planning, design or construction

We trust that this factual report it contains all of the information required at this time. Should you have any questions or if we can be of further service, please contact us at your convenience.

Regards,

STANTEC CONSULTING LTD.

A handwritten signature in blue ink, appearing to read "George Zafiris".

George Zafiris, P.Eng.
Principal, Geotechnical Engineering
George.Zafiris@stantec.com



March 30, 2015

Mr. Gordon MacPhee, P.Eng.

**Reference: Geotechnical Investigation – Proposed Marginal Wharf Replacement,
Machons Point, Kings County, PE**

APPENDIX

STATEMENT OF GENERAL CONDITIONS

USE OF THIS REPORT: This report has been prepared for the sole benefit of the Client or its agent and may not be used by any third party without the express written consent of Stantec Consulting Ltd. and the Client. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT: The information, opinions, and/or recommendations made in this report are in accordance with Stantec Consulting Ltd.'s present understanding of the site specific project as described by the Client. The applicability of these is restricted to the site conditions encountered at the time of the investigation or study. If the proposed site specific project differs or is modified from what is described in this report or if the site conditions are altered, this report is no longer valid unless Stantec Consulting Ltd. is requested by the Client to review and revise the report to reflect the differing or modified project specifics and/or the altered site conditions.

STANDARD OF CARE: Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in the state or province of execution for the specific professional service provided to the Client. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS: Soil, rock, or other material descriptions, and statements regarding their condition, made in this report are based on site conditions encountered by Stantec Consulting Ltd. at the time of the work and at the specific testing and/or sampling locations. Classifications and statements of condition have been made in accordance with normally accepted practices which are judgmental in nature; no specific description should be considered exact, but rather reflective of the anticipated material behavior. Extrapolation of in situ conditions can only be made to some limited extent beyond the sampling or test points. The extent depends on variability of the soil, rock and groundwater conditions as influenced by geological processes, construction activity, and site use.

VARYING OR UNEXPECTED CONDITIONS: Should any site or subsurface conditions be encountered that are different from those described in this report or encountered at the test locations, Stantec Consulting Ltd. must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. Stantec Consulting Ltd. will not be responsible to any party for damages incurred as a result of failing to notify Stantec Consulting Ltd. that differing site or sub-surface conditions are present upon becoming aware of such conditions.

PLANNING, DESIGN, OR CONSTRUCTION: Development or design plans and specifications should be reviewed by Stantec Consulting Ltd. , sufficiently ahead of initiating the next project stage (property acquisition, tender, construction, etc.), to confirm that this report completely addresses the elaborated project specifics and that the contents of this report have been properly interpreted. Specialty quality assurance services (field observations and testing) during construction are a necessary part of the evaluation of sub-subsurface conditions and site preparation works. Site work relating to the recommendations included in this report should only be carried out in the presence of a qualified geotechnical engineer; Stantec Consulting Ltd. cannot be responsible for site work carried out without being present.

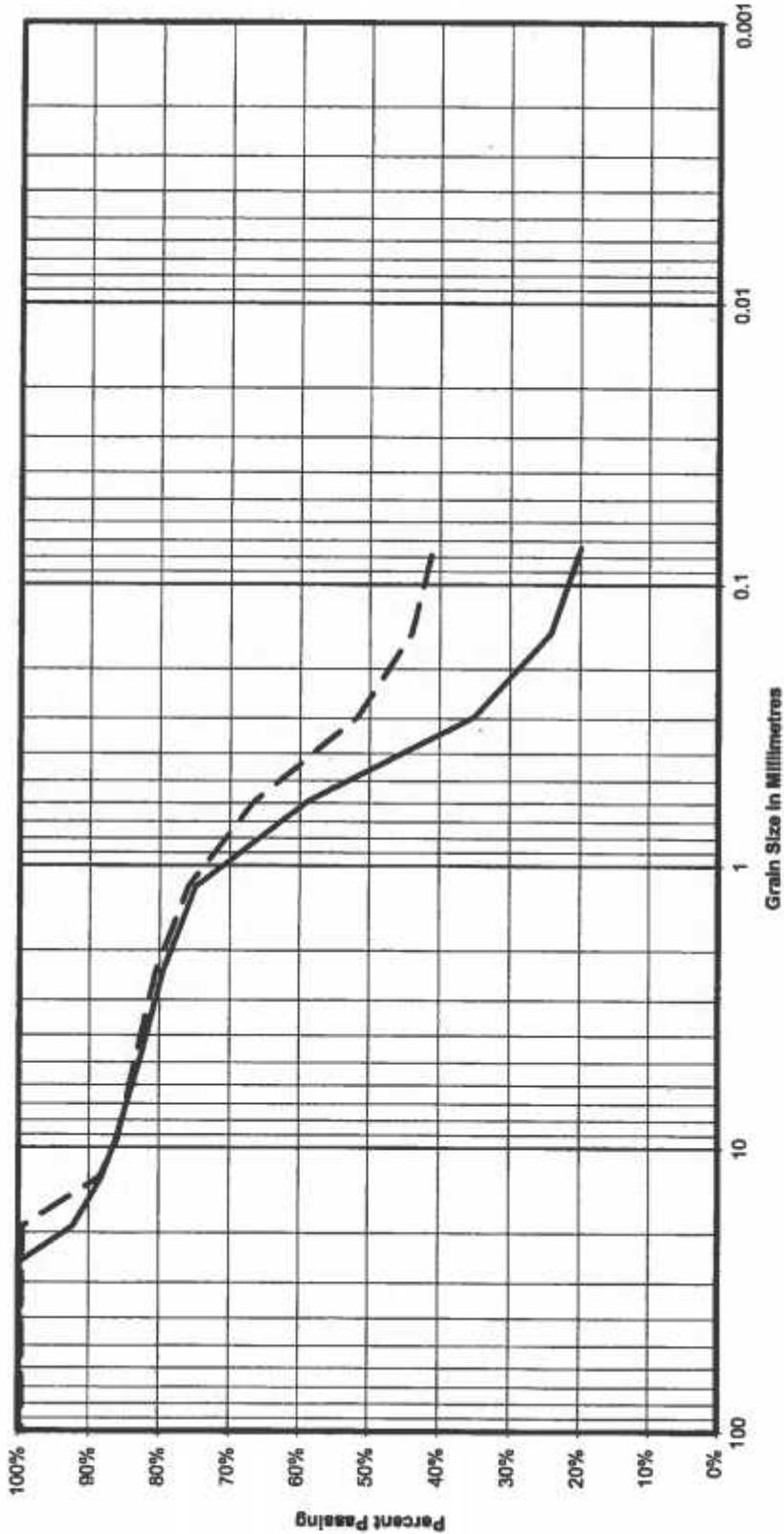
Table 1 - Borehole Summary - Machons Point

	Borehole Number	
	Present Investigation	Previous
	BH 201	BH-01
Harbour Bottom el., m	-1.07	-0.10
Marine Soil Thickness, m	0.61	1.37
Till Surface el., m	-1.68	-1.47
Till Thickness, m	3.43	2.14
Depth to Bedrock, m	4.04	3.51
Bedrock Surface el., m	-5.11	-3.61
Depth of Borehole, m	8.61	5.82

NOTES:

- BH 201 and BH 202 were drilled at the site on March 14, 2015; BH-01 was drilled December 14, 2009
- harbour bottom elevations are referenced to Low Normal Tide (LNT) datum based on the benchmark provided
- sandstone bedrock was proven at each borehole by rotary core drilling

Approved:



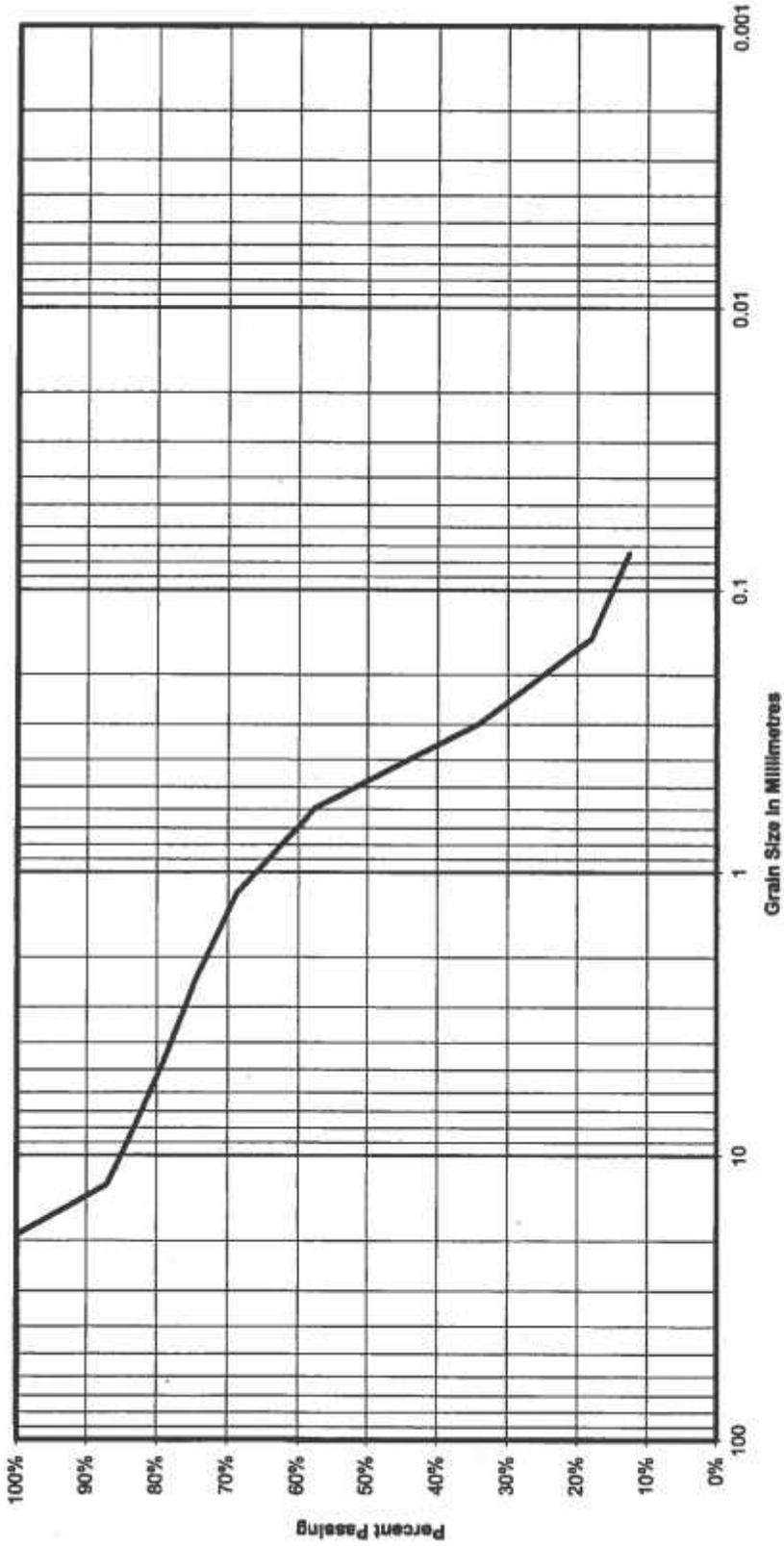
Gravel		Sand			Silt and Clay	
Coarse	Fine	Coarse	Medium	Fine		

Unified Soil Classification System ASTM D 2487/2488

Curve	BORHOLE/TESTPIT	SAMPLE	DEPTH (m)	Soil Fractions			Soil Description
				Gravel	Sand	Silt/Clay	
—	BH 201	2	0.9	17%	63%	20%	Silty sand, some gravel: TH
- - -	BH 201	3	1.5	17%	42%	41%	Clayey silt and sand, some gravel: TH



Approved:



Gravel		Sand		Silt and Clay	
Coarse	Fine	Coarse	Medium	Fine	

Unified Soil Classification System ASTM D 2487/2488

CURVE	BOREHOLE/TESTPT	SAMPLE	DEPTH (m)	Soil Fractions		Soil Description
				Gravel	Silt/Clay	
	BH 202	1	0.4	21%	13%	Sand, trace silt, gravel, Marine Deposit



Approved:

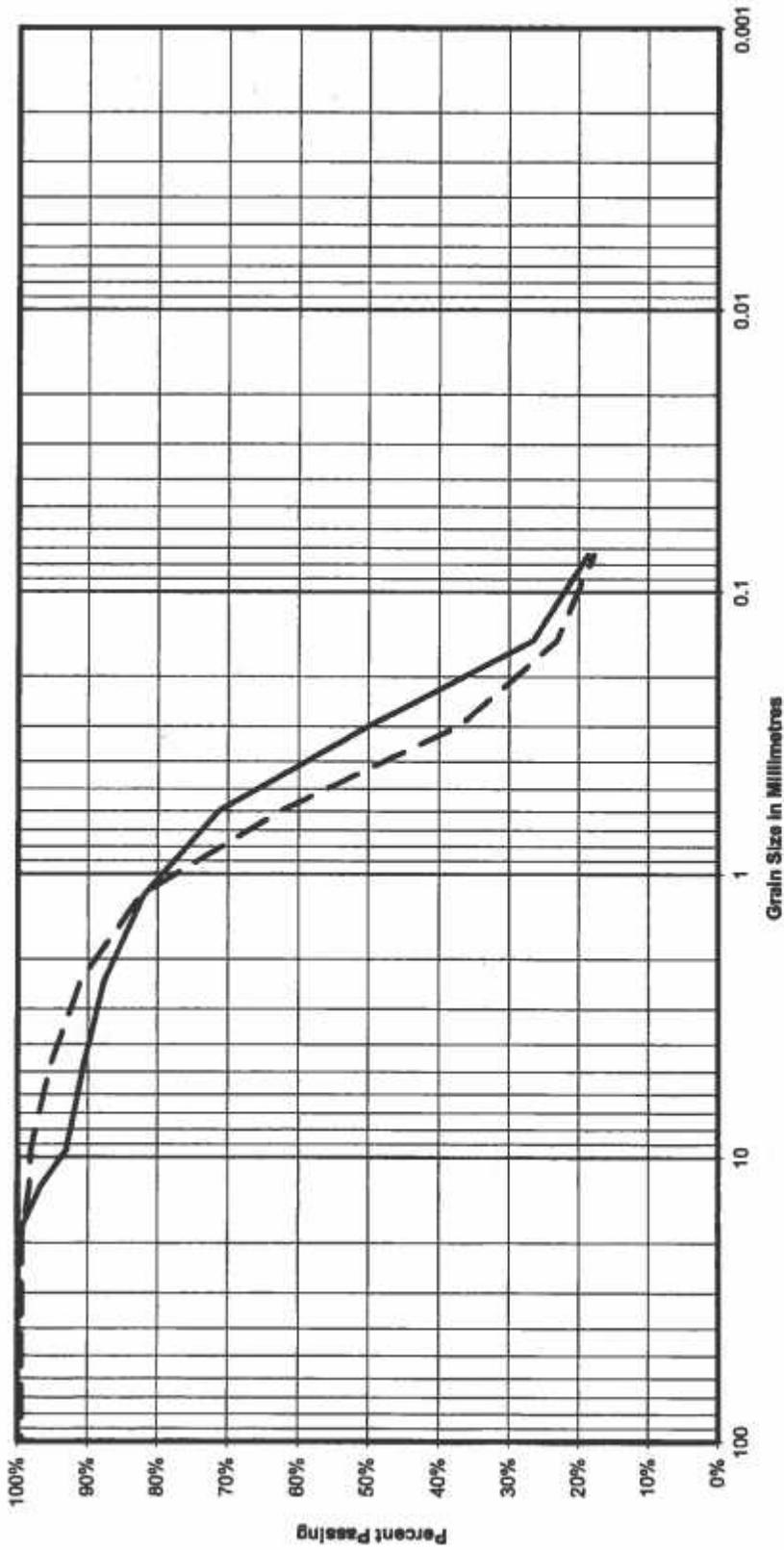


Table 2 - Point Load Test Summary - Machons Point

Borehole Number	Sample Depth, m	Test Type	Is(50), MPa	UCS (Qu), MPa	Rock Type
BH-01	4.0	D	0.1		MGSS
	4.0	A	0.0	1	MGSS
	4.6	D	0.1		MGSS
	4.6	A	0.6	15	MGSS
	5.2	D	1.0		MGSS
	5.2	A	1.0	25	MGSS
	5.6	D	1.7		MGSS
	5.6	A	2.2	53	MGSS
	5.9	D	2.1		MGSS
	5.9	A	1.9	46	MGSS
	7.0	D	1.3		MGSS
	7.0	A	1.9	45	MGSS
	7.3	D	1.7		MGSS
	7.3	A	2.8	67	MGSS
	7.9	D	1.0		MGSS
	7.9	A	2.6	63	MGSS
	8.4	D	0.8		MGSS
	8.4	A	1.2	29	MGSS
BH-02	2.3	D	3.0		MGSS
	2.3	A	2.8	67	MGSS
	2.5	D	1.0		MGSS
	2.5	A	1.5	35	MGSS
	2.9	D	0.1		CGSS
	2.9	A	0.1	4	CGSS
	3.6	D	0.3		CGSS
	3.6	A	1.0	24	CGSS
	4.3	D	0.2		MGSS
	4.3	A	1.2	28	MGSS
	5.1	D	0.8		MGSS
	5.1	A	1.0	24	MGSS
	5.4	D	0.8		MGSS
	5.4	A	1.0	24	MGSS

Legend: A- axial test
 D- diametral test
 UCS- unconfined compressive strength
 FGSS- fine grained sandstone
 MGSS- medium grained sandstone
 CGSS- coarse grained sandstone

Note: USC is estimated based on relationship $Qu = 24 \times Is50$ (axial)

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

<i>Rootmat</i>	- vegetation, roots and moss with organic matter and topsoil typically forming a mattress at the ground surface
<i>Topsoil</i>	- mixture of soil and humus capable of supporting vegetative growth
<i>Peat</i>	- mixture of visible and invisible fragments of decayed organic matter
<i>Till</i>	- unstratified glacial deposit which may range from clay to boulders
<i>Fill</i>	- material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

<i>Desiccated</i>	- having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
<i>Fissured</i>	- having cracks, and hence a blocky structure
<i>Varved</i>	- composed of regular alternating layers of silt and clay
<i>Stratified</i>	- composed of alternating successions of different soil types, e.g. silt and sand
<i>Layer</i>	- > 75 mm in thickness
<i>Seam</i>	- 2 mm to 75 mm in thickness
<i>Parting</i>	- < 2 mm in thickness

Terminology describing soil types:

The classification of soil types are made on the basis of grain size and plasticity in accordance with the Unified Soil Classification System (USCS) (ASTM D 2487 or D 2488) which excludes particles larger than 75 mm. For particles larger than 75 mm, and for defining percent clay fraction in hydrometer results, definitions proposed by Canadian Foundation Engineering Manual, 4th Edition are used. The USCS provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing cobbles, boulders, and non-matrix materials (organic matter or debris):

Terminology describing materials outside the USCS, (e.g. particles larger than 75 mm, visible organic matter, and construction debris) is based upon the proportion of these materials present:

<i>Trace, or occasional</i>	Less than 10%
<i>Some</i>	10-20%
<i>Frequent</i>	> 20%

Terminology describing compactness of cohesionless soils:

The standard terminology to describe cohesionless soils includes compactness (formerly "relative density"), as determined by the Standard Penetration Test (SPT) N-Value - also known as N-Index. The SPT N-Value is described further on page 3. A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
<i>Very Loose</i>	<4
<i>Loose</i>	4-10
<i>Compact</i>	10-30
<i>Dense</i>	30-50
<i>Very Dense</i>	>50

Terminology describing consistency of cohesive soils:

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by *in situ* vane tests, penetrometer tests, or unconfined compression tests. Consistency may be crudely estimated from SPT N-Value based on the correlation shown in the following table (Terzaghi and Peck, 1967). The correlation to SPT N-Value is used with caution as it is only very approximate.

Consistency	Undrained Shear Strength		Approximate SPT N-Value
	kips/sq.ft.	kPa	
<i>Very Soft</i>	<0.25	<12.5	<2
<i>Soft</i>	0.25 - 0.5	12.5 - 25	2-4
<i>Firm</i>	0.5 - 1.0	25 - 50	4-8
<i>Stiff</i>	1.0 - 2.0	50 - 100	8-15
<i>Very Stiff</i>	2.0 - 4.0	100 - 200	15-30
<i>Hard</i>	>4.0	>200	>30

ROCK DESCRIPTION

Except where specified below, terminology for describing rock is as defined by the International Society for Rock Mechanics (ISRM) 2007 publication "The Complete ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 1974-2006"

Terminology describing rock quality:

RQD	Rock Mass Quality
0-25	Very Poor Quality
25-50	Poor Quality
50-75	Fair Quality
75-90	Good Quality
90-100	Excellent Quality

Alternate (Colloquial) Rock Mass Quality	
Very Severely Fractured	Crushed
Severely Fractured	Shattered or Very Blocky
Fractured	Blocky
Moderately Jointed	Sound
Intact	Very Sound

RQD (Rock Quality Designation) denotes the percentage of intact and sound rock retrieved from a borehole of any orientation. All pieces of intact and sound rock core equal to or greater than 100 mm (4 in.) long are summed and divided by the total length of the core run. RQD is determined in accordance with ASTM D6032.

SCR (Solid Core Recovery) denotes the percentage of solid core (cylindrical) retrieved from a borehole of any orientation. All pieces of solid (cylindrical) core are summed and divided by the total length of the core run (It excludes all portions of core pieces that are not fully cylindrical as well as crushed or rubble zones).

Fracture Index (FI) is defined as the number of naturally occurring fractures within a given length of core. The Fracture Index is reported as a simple count of natural occurring fractures.

Terminology describing rock with respect to discontinuity and bedding spacing:

Spacing (mm)	Discontinuities	Bedding
>6000	Extremely Wide	-
2000-6000	Very Wide	Very Thick
600-2000	Wide	Thick
200-600	Moderate	Medium
60-200	Close	Thin
20-60	Very Close	Very Thin
<20	Extremely Close	Laminated
<6	-	Thinly Laminated

Terminology describing rock strength:

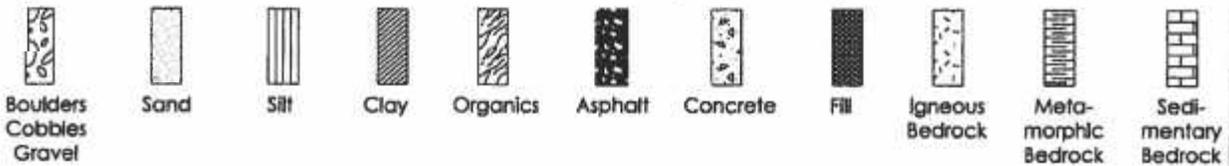
Strength Classification	Grade	Unconfined Compressive Strength (MPa)
Extremely Weak	R0	<1
Very Weak	R1	1 - 5
Weak	R2	5 - 25
Medium Strong	R3	25 - 50
Strong	R4	50 - 100
Very Strong	R5	100 - 250
Extremely Strong	R6	>250

Terminology describing rock weathering:

Term	Symbol	Description
Fresh	W1	No visible signs of rock weathering. Slight discoloration along major discontinuities
Slightly	W2	Discoloration indicates weathering of rock on discontinuity surfaces. All the rock material may be discolored.
Moderately	W3	Less than half the rock is decomposed and/or disintegrated into soil.
Highly	W4	More than half the rock is decomposed and/or disintegrated into soil.
Completely	W5	All the rock material is decomposed and/or disintegrated into soil. The original mass structure is still largely intact.
Residual Soil	W6	All the rock converted to soil. Structure and fabric destroyed.

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.



SAMPLE TYPE

SS	Split spoon sample (obtained by performing the Standard Penetration Test)
ST	Shelby tube or thin wall tube
DP	Direct-Push sample (small diameter tube sampler hydraulically advanced)
PS	Piston sample
BS	Bulk sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond coring bits.

WATER LEVEL MEASUREMENT

 measured in standpipe, piezometer, or well

 inferred

RECOVERY

For soil samples, the recovery is recorded as the length of the soil sample recovered. For rock core, recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

N-VALUE

Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 140 pound (63.5 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (300 mm) into the soil. In accordance with ASTM D1586, the N-Value equals the sum of the number of blows (N) required to drive the sampler over the interval of 6 to 18 in. (150 to 450 mm). However, when a 24 in. (610 mm) sampler is used, the number of blows (N) required to drive the sampler over the interval of 12 to 24 in. (300 to 610 mm) may be reported if this value is lower. For split spoon samples where insufficient penetration was achieved and N-Values cannot be presented, the number of blows are reported over sampler penetration in millimetres (e.g. 50/75). Some design methods make use of N-values corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-values presented on the log.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to 'A' size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone one foot (300 mm) into the soil. The DCPT is used as a probe to assess soil variability.

OTHER TESTS

S	Sieve analysis
H	Hydrometer analysis
k	Laboratory permeability
γ	Unit weight
G_s	Specific gravity of soil particles
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct Shear
C	Consolidation
Q_u	Unconfined compression
I_p	Point Load Index (I_p on Borehole Record equals $I_p(50)$ in which the index is corrected to a reference diameter of 50 mm)

	Single packer permeability test; test interval from depth shown to bottom of borehole
	Double packer permeability test; test interval as indicated
	Falling head permeability test using casing
	Falling head permeability test using well point or piezometer



BOREHOLE RECORD

BH 201

CLIENT PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

PROJECT No. 3675

LOCATION Proposed Harbour Modifications, Machons Point, Kings County, PEI

BH SIZE 100 mm

DATES: BORING 2015/03/14 WATER LEVEL Tidal

DATUM LNT

DEPTH(m)	ELEVATION(m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES				OTHER TESTS	UNDRAINED SHEAR STRENGTH - kPa									
					TYPE	NUMBER	RECOVERY	N-VALUE OR-RQD %		WATER CONTENT & ATTERBERG LIMITS		DYNAMIC PENETRATION TEST, BLOWS/0.3m		STANDARD PENETRATION TEST, BLOWS/0.3m					
					mm				20 40 60 80 W _p W W _L * ●										
									10 20 30 40 50 60 70 80 90										
0	-1.07	Very loose dark grey silty sand, trace clay, organics, shell fragments: MARINE DEPOSIT			SS	1	50	3											
	-1.68				SS	2	375	17		S/A									
1		Compact reddish brown silty sand to clayey silt and sand, some gravel and sandstone cobbles: TILL			SS	3	400	15	S/A										
					SS	4	75	90											
2					NQ	5	375	-											
					NQ	6	425	-											
4	-5.11	Very weak to weak, reddish brown, fine to medium grained sandstone: BEDROCK; occasional clayey partings/seams; extremely close to moderately close joint spacing			NQ	7	100%	RQD 50											
5					NQ	8	97%	RQD 68											
	-6.63				NQ	9	100%	RQD 78											
6		Very weak to strong, reddish brown to whitish red, medium to coarse grained sandstone: BEDROCK; extremely close to moderately close joint spacing																	
8	-9.68				End of Borehole														

© NBBH 3/0/15



Stantec

BOREHOLE RECORD

BOREHOLE No.: BH-01

PROJECT No.: 2989

CLIENT: Public Works and Government Services Canada

LOCATION: Machons Point Harbour, Kings County, PEI

DATES: BORING: December 14, 2009

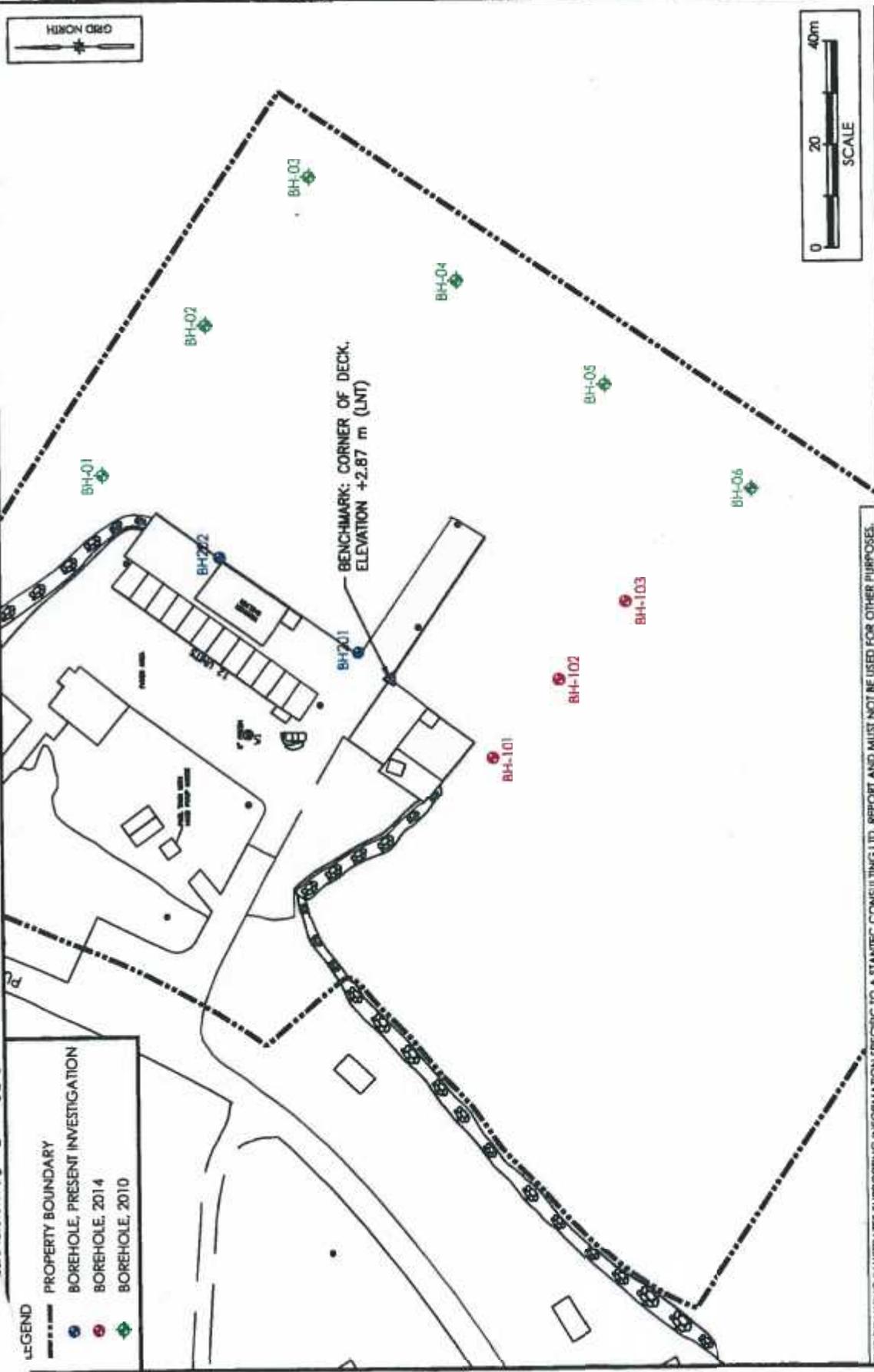
WATER LEVEL: Tidal

DATUM: Low Normal Tide

Depth (m)	Elevation (m)	Soil Description	Strata Plot	Water Level	Sample Type	Sample Number	Recovery (mm)	SPT N-Value	RQD (%)	Moisture (%)	Other Tests	SPT N-Value						
												10	30	50	70	90		
0	-0.10	Harbour Bottom																
1	0.00	Very loose dark grey to reddish brown silt and sand, trace organics, shells: Marine Deposit			SS	1	500	0										
2	-0.71																	
3	0.81	Loose reddish brown sand, some silt, trace gravel: Marine Deposit			SS	2	375	7		18	S							
4	-1.47																	
5	1.37	Compact reddish brown sand, some silt to silt and sand, trace to some gravel, occasional sandstone cobbles and clayey layers: Till			SS	3	600	24		16	S							
6																		
7																		
8																		
9		Very weak to medium strong, medium to coarse grained, reddish brown to whitish red sandstone, occasional mudstone seams: Bedrock; extremely close to close joint spacing			NQ	4	425	63		47								
10																		
11	-3.61				NQ	5	44%		7									
12	3.51																	
13					NQ	6	84%		57									
14																		
15		End of Borehole																
16																		
17																		
18																		
19	-5.92																	
20	5.82																	
21																		
22																		
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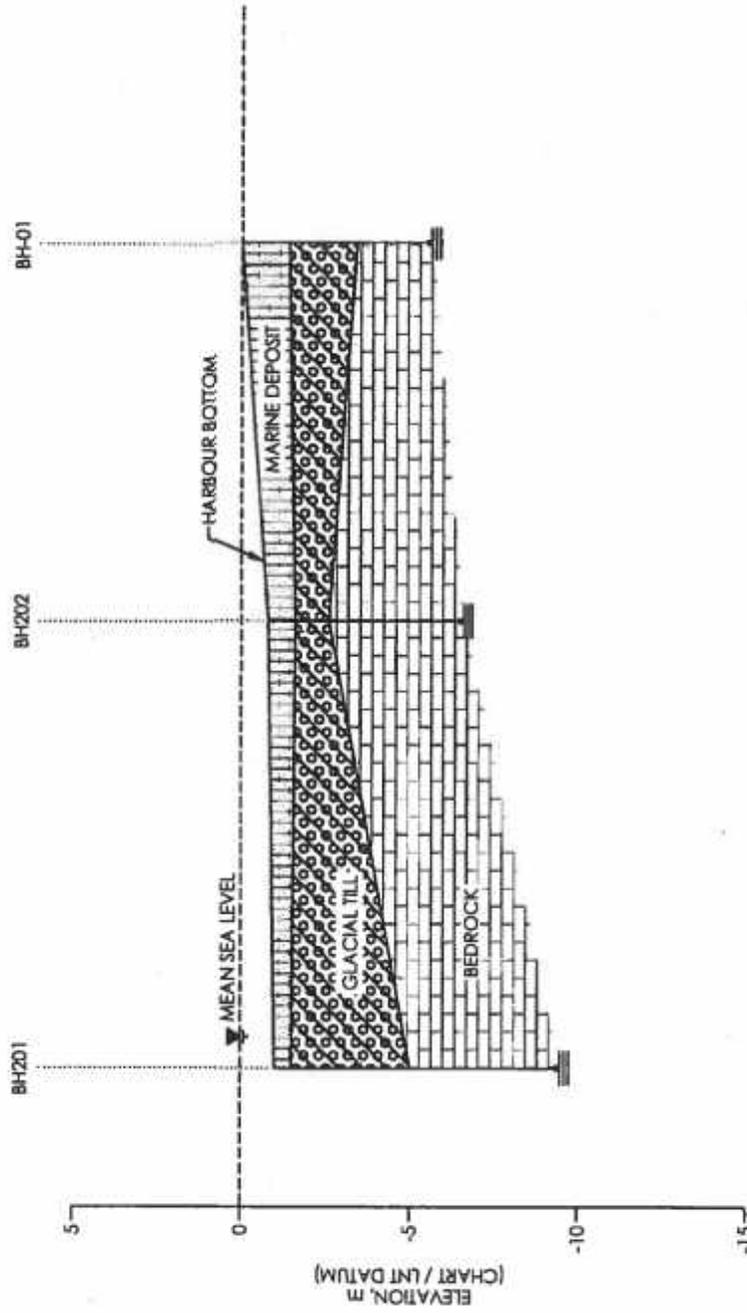
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LEGEND

---	PROPERTY BOUNDARY
●	BOREHOLE, PRESENT INVESTIGATION
●	BOREHOLE, 2014
●	BOREHOLE, 2010

THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.	
Job No.:	121618169
Scale:	1 : 1000
Date:	03-MAR-2015
Des. By:	MO
App'd By:	GZ
BOREHOLE LOCATION PLAN PROPOSED HARBOUR MODIFICATIONS MACHONS POINT, KINGS COUNTY, PE	
PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	
Client:	
Job No.: 121618169 Scale: 1 : 1000 Date: 03-MAR-2015 Des. By: MO App'd By: GZ	Dwg. No.: 1



SCALE 1:500 (HORIZONTAL)
1:200 (VERTICAL)

- NOTES:
- SUBSURFACE CONDITIONS SHOWN BETWEEN BOREHOLES ARE EXTRAPOLATED FROM A AVAILABLE INFORMATION; ACTUAL CONDITIONS BETWEEN BOREHOLE LOCATIONS MAY DIFFER FROM THOSE SHOWN.

■ DENOTES END OF BOREHOLE

THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

Job No.: 1216118169		Dwg. No.: 2	
Scale: AS SHOWN			
Date: 03-MAR-2015			
Dwn. By: MO			
App'd By: GZ			
<p>BOREHOLE STRATIGRAPHY PROPOSED HARBOUR MODIFICATIONS MACHONS POINT, KINGS COUNTY, PE</p>			
Client:		PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	

