



RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:
Bid Receiving Public Works & Government
Services Canada/Réception des soumissions Travaux
publics et Services gouvernementaux Canada
1713 Bedford Row
Halifax, N.S./Halifax,(N.E.)
B3J 1T3
Halifax
Bid Fax: (902) 496-5016

SOLICITATION AMENDMENT

MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires

Vendor/Firm Name and Address
Raison sociale et adresse du
fournisseur/de l'entrepreneur

Issuing Office - Bureau de distribution
Atlantic Region Acquisitions/Région de l'Atlantique
Acquisitions
1713 Bedford Row
Halifax, N.S./Halifax, (N.E.)
B3J 3C9
Halifax
Nova Scot

Title - Sujet Wharf Construction - New Harbour NS	
Solicitation No. - N° de l'invitation EB144-180169/A	Amendment No. - N° modif. 004
Client Reference No. - N° de référence du client EB144-18-0169	Date 2017-06-09
GETS Reference No. - N° de référence de SEAG PW-\$PWA-310-5589	
File No. - N° de dossier PWA-7-78011 (310)	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2017-06-14	Time Zone Fuseau horaire Atlantic Daylight Saving Time ADT
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input checked="" type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Stevenson, Jacquelyn	Buyer Id - Id de l'acheteur pwa310
Telephone No. - N° de téléphone (902) 403-3520 ()	FAX No. - N° de FAX (902) 496-5016
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction:	

Instructions: See Herein

Instructions: Voir aux présentes

Delivery Required - Livraison exigée	Delivery Offered - Livraison proposée
Vendor/Firm Name and Address Raison sociale et adresse du fournisseur/de l'entrepreneur	
Telephone No. - N° de téléphone Facsimile No. - N° de télécopieur	
Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)	
Signature	Date

Solicitation No. - N° de l'invitation
EB144-180169/A
Client Ref. No. - N° de réf. du client
EB144-180169

Amd. No. - N° de la modif.
004
File No. - N° du dossier

Buyer ID - Id de l'acheteur
PWA 310
CCC No./N° CCC - FMS No/ N° VME

AMENDMENT 004

This amendment is raised for the following:

APPENDIX 1 - Combined Price Form

Delete: APPENDIX 1 Combined Price Form - Amendment
Insert: APPENDIX 1 Combined Price Form – Amendment 001 (see below)

Please see the below Combined Price Form – Amendment

All other terms and conditions remain the same.

Solicitation No. - N° de l'invitation
EB144-180169/A
 Client Ref. No. - N° de réf. du client
EB144-180169

Amd. No. - N° de la modif.
004
 File No. - N° du dossier

Buyer ID - Id de l'acheteur
PWA 310
 CCC No./N° CCC - FMS No/ N° VME

APPENDIX 1 - COMBINED PRICE FORM – AMENDMENT 001

- 1) The prices per unit shall govern in establishing the Total Extended Amount. Any arithmetical errors in this Appendix will be corrected by Canada.
 2) Canada may reject the bid if any of the prices submitted do not reasonably reflect the cost of performing the part of the work to which that price applies.

LUMP SUM

The Lump Sum Amount designates Work to which a Lump Sum Arrangement applies.
 (a) Work included in the Lump Sum Amount represents all work not included in the unit price table.

LUMP SUM AMOUNT (LSA) Excluding applicable tax	
--	--

UNIT PRICE TABLE

The Unit Price Table designates Work to which a Unit Price Arrangement applies.
 (a) Work included in each item is as described in the referenced specification section.
 (b) The Price per Unit shall not include any amounts for Work that is not included in that unit price Item.

# Item	Specification Reference	Class of Labour, Plant or Material	Unit of Measure	Estimated Quantity (EQ)	Price per Unit applicable tax extra (PU)	Extended amount applicable tax extra (EQ x PU)
1	03 30 00	reinforced concrete retaining walls	cmpm	17		
2	03 30 00	reinforced concrete pile caps	cmpm	160		
3	03 30 00	reinforced concrete deck at pilework	square metre	500		
4	03 30 00	reinforced concrete deck at cribwork	square metre	305		
5	03 30 00	concrete pile jackets	per each	48		
6	03 30 00	reinforced concrete pile infill	cmpm	26		
7	06 05 23	dimension timber	cmpm	34		
8	31 23 33	crushed rock mattress	cmpm	500		
9	31 53 13	timber cribwork	cmpm	1605		
10	31 61 13	pipe piles - supply	lineal metre	685		
11	31 61 13	bearing pipe piles - install	per each	32		
12	31 61 13	batter pipe piles - install	per each	16		
13	31 62 19	timber fender piles - supply	lineal metre	3424		
14	31 62 19	timber fender piles - install	per each	320		
15	31 63 19	rock sockets	per each	16		
16	35 20 23	dredging - Class 'A'	cmpm	415		
17	35 20 23	dredging - Class 'B'	cmpm	0		
18	35 31 19	filterstone	cmpm	26		
19	35 31 19	armourstone	cmpm	190		
20	35 31 19	scour protection	cmpm	130		
21	35 59 29	mooring cleats	per each	15		
22	35 59 29	mooring rings	per each	12		
23	35 70 00	ladders	per each	12		
TOTAL EXTENDED AMOUNT (TEA) Excluding applicable tax						
TOTAL BID AMOUNT (LSA +TEA) Excluding applicable tax						

AMENDMENT 004 – CONTINUED

QUESTIONS:

- Q: Part 2 Products**
2.2.1 For concrete caps, deck retaining wall and for concrete to be placed inside the steel piles (above bottom 2.0m) use concrete mix designed to produce air entrained concrete meeting the following requirements .4 Maximum aggregate size 10 mm sieve size (is this the correct size of Aggregate?)
- A:** Concrete caps, deck, retaining wall, pile infill above bottom 2.0m is to have 20mm aggregate.
- Q: 2.2.2 For fiber reinforced concrete pile jackets use concrete mix designed to produce air entrained concrete meeting the following requirements .4 Maximum aggregate size 20mm sieve size (is this the correct size of aggregate?)**
- A:** Concrete pile jackets to have 10mm aggregate.
- Q: Section 31 61 13 page 1 Section 1.4 Existing Sub-surface Conditions refers to “Record Sub-surface Investigation Reports” that are available upon request. Could we get a copy of these electronically? If not, can we arrange a time to please view them?**
- A:** Factual report is attached
- Q: Section 26 05 01, Section 3 Permits and Fees Item 3.2 “All bidders are to carry \$5000.00 (five thousand dollars) allowance for all costs levied by the power utility.” What does this include?**
- a. All hook-up costs?**
Yes, all costs from the Utility required for connection of the new system to the power grid. Actual costs will be reimbursed upon completion and submission of an invoice from the Utility.
- b. All power drops?**
No – Contractor’s power consumption should be covered in project overhead
- c. All consumption of power?**
No – Contractor’s power consumption should be covered in project overhead
- Q: Are we to provide an Office Trailer for the Owner?**
- A: Specification Section 01 50 00 **Insert** clauses:**
10. 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 his 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.
11. Departmental Representative's Site Office
- .1 Provide temporary office for sole use of Departmental Representative, complete with heat and lights. Insulated office required during October to May. Locate on or adjacent to site.

- .2 Inside dimensions minimum 5 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with 4-50% opening windows and one lockable door.
- .3 Arrange and pay for telephone and fax machine installation and service in Departmental Representative's office for the Departmental Representative's exclusive use. Long distance calls placed on this phone by the Departmental Representative will be paid for by Departmental Representative.
- .4 Washroom facilities not required in the office. Provide outside sanitary facilities to approval.
- .5 Equip office with six chairs, flat 1200 X 2400 X 25 table with writing surface and 4 drawer lockable filing cabinet.
- .6 Maintain in clean condition.

Q: There is some ambiguity within the tender drawings on sheets M05-M07. Some of the crib timber being denoted as 200mm x 200mm, while other sections are stating that there dimensions are 250mm x 250mm. Please clarify?

A: All crib timbers are to be 200 x 200

Drawings

Sheet M07 detail 2/M6/M7

Delete: 250 x 250 x 1200 TIMBER CHOCK

Insert: 200 x 200 x 1200 TIMBER CHOCK

Q: According to Section 01 41 00 it states that the Department Representative will appoint and pay for services testing of concrete. In Section 01 29 00, some of the concrete unit price items has concrete quality testing included in their measurement of payment. Please clarify?

A: Departmental Representative will arrange and pay for testing of concrete delivered to the site to be placed in the work. Contractor is responsible for all quality testing of all materials to be incorporated into the mix prior to delivery to the site. Refer to Section 01 41 00 clause 2 and 3 for Contractor's responsibilities.

Q: According to Item #12- Timber Fender Pile- Install there are to be 274 piles installed, upon reviewing the tender drawings there are 274 piles on the exterior sheathing side while there are an additional 40 timber fender piles on the interior sheathing side. Please confirm the total number of piles? Also, please clarify if Item #11 Timber Fender Pile- Supply of 4000m is based on 274 or 314 piles?

A: refer to revised unit price table attached

Q On the interior side of the wharf there is 200mm x 200mm timber sheathing. What unit price item covers payment for sheathing?

A: Timber sheathing shall be included in dimension timber unit price - refer to revised unit price table attached

Q With regards to form of tender item #7; our take-off suggests that the requested 13 cpm of dimensional timber is only enough to construct the face of the wharf fendering and not enough to account for the horizontal timber needed to support the fender panels.

A: refer to revised unit price table attached

Q: With regards to form of tender item #13; we understand that while the harbour floor may vary in depth below datum, the minimum required pile depth multiplied by the number of piles does not come close to the 4000 linear metres required by the form of tender. Please clarify if the required 4000 linear metres is a premise for the contractor to purchase and install much longer piles?

A: refer to revised unit price table attached

Q With regards to form of tender item #14; our takeoff suggests the required 274 timber piles to be in the range of 20% below what is actually required by the drawings.

A: refer to revised unit price table attached

Q With regards to form of tender item #16 and section 012900, division 35 .19, Page 6; Please clarify that any dredged material quantified as "class A material" and described as "class B material" will not require any means of excavation other than those typically used for "class B material" dredging. Additionally, will any material encountered not fitting the description of "class B material", i.e. rock, be dealt with as an addition to the tendered amount.

Q: Class A dredging - There is no definition in the specifications on this dredge material, from previous work we are assuming this is referring to solid rock. With that being said after looking at the boreholes we find greywacke material at an elevation below the -1.5m elevation of dredging. Therefore, we are wondering if this item is in the tender form incase boulders or rock are encountered.

A:
Specification
Section 01 29 00
Delete clauses 1.3.1.3, 1.3.2.19 and 1.3.2.20

Insert clauses:

1.3.1.3 Demolition of Existing Wharf: this item includes all Work required to demolish and dispose of the existing wharf and Class "B" dredging material. Dispose of timber, concrete, steel and any other non-granular material at an approved construction and demolition waste disposal site. Salvage all ballast material that meets the specifications for ballast material and stockpile for incorporation into the Work. Dispose of ballast stone not meeting specification, excavated granular material and all Class "B" dredge material at the designated on site disposal area indicated on the Project Drawings. Class "B" material includes any material not in wharf removal limits necessary for mattress preparation for new wharf, and all materials within the dredge limits in the berthing area.

1.3.2.19 Dredging Class 'A': This item will be measured for payment by the cubic metre place measurement (C.M.P.M.) of Class "A" material removed. Class "A" material is anticipated in the area of the approach retaining wall and cribs 1 and 2. The final quantity will be calculated by the Departmental Representative from a survey to be conducted by the Contractor including probes to identify hard bottom after all Class "B" material has been removed and disposed. This unit price will include the provision of a boat, motor and survey equipment as specified. The unit price will also include the cost of disposal at the designated onsite disposal area as shown on the Project Drawings as well as the supply, installation and removal of access roads or other means of accessing dredge areas.

Delete clause 1.3.2.7 and 1.3.2.9

Insert clauses

1.3.2.7 Dimension Timber: supply and installation of wales, sheathing and cribwork fenders will be measured for payment per cubic metre place measurement (CMPM). This will include all dimension timber, preservative treatment, bolts, hardware and all other supplementary materials considered incidental to work.

1.3.2.9 Timber Crib: supply and construction of the timber crib will be measured for payment by the cubic metre place measurement (CMPM) and includes all timber components (longitudinals, cross ties, binder posts, ballast floor, fillers, splice blocks, etc.), fasteners, hardware, ballast (salvaged to the greatest extent possible and supplemented with new), filter fabric, levelling course gravels and all associated appurtenances to underside of concrete deck. Volume of cribwork will be determined as follows:

- .1 Height: average of measurements taken at each vertical from the bottom of the lowest timber to the top of the uppermost timber.
- .2 Width: average of two measurements taken between the outside faces of exterior longitudinal timbers, each width measured on the top ties of each row of cross ties.
- .3 Length: measured horizontally along the centreline of crib between the outside faces of exterior cross ties.

Specification

Section 35 20 23

Delete clause 1.1.5

Insert clauses

- 1.1.5 Estimated Quantity: volume in cubic meters calculated from neat plan view dimensions as indicated.
- 1.1.10 Class "A" Material: boulders or concrete debris with each unit containing 3.0 cubic metres or more, and solid rock requiring hydraulic splitting to loosen.
- 1.1.11 Obstruction: material other than Class "A", having individual volumes of 3.0 cubic metres or more.
- 1.1.12 Class "B" Material: loose or shale rock, sand, quick sand, mud, shingle, clay and sand, gumbo, hardpan, clay, marine clay, clay sizes, marine silt, silt and gravel, gravel, cobbles, boulders, marine shells, or any other materials not defined under Class "A" material.

FORMS / REPORTS:

Insert: DREDGES AND OTHER FLOATING PLANT - BID AND ACCEPTANCE FORM FLOATING PLANT

Insert: Geotechnical Investigation Factual Report New Harbour Wharf, Guysborough County, Nova Scotia



BID AND ACCEPTANCE FORM FLOATING PLANT

DREDGES AND OTHER FLOATING PLANT

I/We declare that I/We have the following named plant for the performance of the Work and that the capacity as stated below applies to the materials and conditions specified for this project. I/We understand that the award of a contract by Public Works and Government Services Canada does not imply agreement with the claimed capacity but only confirms that the equipment meets the requirements of the floating plant clause as outlined below.

Name of Dredge		Official Registry No.	
*Type of Dredge	Capacity per Hour m3sm or m3pm	Length x Breadth m	
Draft m	Maximum Working Depth m	Minimum Working Depth m	
No. of Scows		Capacity of Each	
Tug	Official Registry No.	Length x Breadth x Draft m	
Name of Dredge		Official Registry No.	
*Type of Dredge	Capacity Per Hour m3sm or m3pm	Length x Breadth m	
Draft m	Maximum Working Depth m	Minimum Working Depth m	
No. of Scows		Capacity of Each	
Tug	Official Registry No.	Length x Breadth x Draft m	

* **Note:** The Bidder will state whether the dredges are of dipper, backhoe, clamshell, orange peel, cutter suction or trailing suction hopper type.

Dredges or other floating plant used to perform the Work on this dredging project shall be on Canadian registry and of Canadian make or manufacture. A bidder with dredges or other floating plant not of Canadian make or manufacture is required to obtain a certificate of qualification in that respect from Industry Canada prior to submitting a bid and a true copy of such certificate shall be included with the bid documents. A request for a certificate of qualification shall be directed to: Director

Space and Marine Directorate
Room: 709C, CD Howe Building
235 Queen Street
Ottawa, Ontario
K1A 0H5
Telephone: (343) 291-2107
Email: marine@ic.gc.ca

and must be received by that official not less than fourteen (14) days prior to the closing date for the submission of bids. Floating plant qualified by Industry Canada may be accepted to perform the Work on this dredging project. Requests for certificates of qualification may be submitted in the form annexed hereto.



BID AND ACCEPTANCE FORM FLOATING PLANT

Appendix
Page 2 of 2

REQUEST FOR CERTIFICATE OF QUALIFICATION OF FLOATING PLANT

The Bidder will use a separate sheet for each unit of floating plant.

1. Name and Address of Owner	
2. Name and Address of Operator	
3. Name of Unit	
4. Canadian Registry No.	5. Type of Unit (dredge, tug, scow, pontoon, etc.)
6. Date of Canadian Registry	7. Date Unit Originally Built
8. Shipyard Where Unit Originally Built	
9. Record of work done to unit in Canada. For each major job show:	
Date	Shipyard
Type of Work	Cost
Country of Origin of Equipment Installed	

10. If unit has changed ownership show name and current address of previous owner(s) for each modification referred to in item 9 on a separate page.

CORPORATE SEAL

Signature

Date

Geotechnical Investigation Factual Report

New Harbour Wharf,
Guysborough County, Nova Scotia
Project No.: 163537



Prepared for:
Small Craft Harbours, Maritimes and Gulf Region
Fisheries and Oceans Canada
2920 Highway 104
Antigonish, NS, B2G 2K6

Prepared by:
Harbourside Geotechnical Consultants
219 Waverley Rd., Suite 200
Dartmouth, NS B2X 2C3

September 14, 2016

TABLE OF CONTENTS

1.0	INTRODUCTION.....	1
2.0	SITE DESCRIPTION AND GEOLOGY.....	1
3.0	INVESTIGATIVE PROCEDURES	2
3.1	General.....	2
3.2	Boreholes	2
3.3	Laboratory Testing.....	2
3.4	Surveying.....	3
4.0	SUBSURFACE CONDITIONS	3
4.1	ORGANIC SILT	3
4.2	GRAVEL with Silt and Sand.....	4
4.3	Sandy ORGANIC SILT	4
4.4	Glacial Till	4
4.5	Bedrock	4
5.0	CLOSURE.....	5

LIST OF TABLES

Table 1 Summary of Subsurface Conditions	3
Table 2 Unconfined Compressive Strength	5

LIST OF APPENDICES

Appendix	A	Symbols and Terms Used on Borehole and Test Pit Records Borehole Records BH 01 to BH 10
Appendix	B	Grain Size Analyses Atterberg Limits
Appendix	C	Drawing 163537-1, Borehole Location Plan
Appendix	D	Terms of Reference

1.0 INTRODUCTION

Acting on the request and authorization of Small Craft Harbours (SCH) - Fisheries and Oceans Canada, Harbourside Geotechnical Consultants (HGC) has carried out a geotechnical investigation for the proposed construction of a new wharf at the New Harbour SCH facility in Guysborough County, Nova Scotia.

The existing wharf consists of a timber block and span stem and a full cribwork "T" which is currently barricaded due to its' deteriorated condition. We understand that the proposed replacement consists of the reconstruction of the wharf with a new structure such as cribwork or pile work structures (ex. a berlin wall type structure). The purpose of this geotechnical investigation is to determine the subsurface soil and rock conditions at the site and to provide geotechnical recommendations to aid with reconstruction of the New Harbour Wharf.

The scope of work completed for this project included the following:

- Completion of a geotechnical field investigation consisting of ten boreholes;
- A laboratory testing program consisting of 53 water content tests (minimum of 18), 18 grain size analyses, and 9 Atterberg Limits completed on recovered soil samples; and 9 unconfined compressive strength tests on recovered rock core; and
- Preparation of this report presenting the findings of the field investigation and laboratory analyses, as well as comments and recommendations to aid with site earthworks and foundation design.

This report has been prepared specifically and solely for the project described herein and contains all of the findings of this investigation.

2.0 SITE DESCRIPTION AND GEOLOGY

The site is located at the southern end of New Harbour Road, on the western side near the mouth of New Harbour Cove. New Harbour is located in Guysborough county on the eastern shore of Nova Scotia approximately 40 km west southwest of the town of Canso. The existing wharf structure is protected from the North Atlantic Ocean by an approximate 130 m long breakwater located southeast of the structure extending into the cove. The structure itself consists of an approximate 65 m main body and 37 m "T". The water depth in the immediate vicinity of the wharf varies from 0 to approximately 3.7 m with a gently sloping harbour bottom. The upland land area consists of gravelled parking and access road followed by a lightly vegetated 5 m high embankment.

Previous experience in the area and geological mapping indicates the native overburden material primarily consists of stony till plain which consists of a stony sandy matrix generated from local bedrock sources. The glacial till is overlain by marine deposits of organic silts, sands and gravels.

Bedrock geology mapping at the site indicates Cambrian Slate and Greywacke of the Goldenville Formation. The site is located adjacent to an inactive geologic fault, as typical of many of the harbours along the Eastern shore of Nova Scotia. The fault may indicate that surrounding bedrock is generally fractured, and may be altered from its' formational state.

3.0 INVESTIGATIVE PROCEDURES

3.1 GENERAL

The geotechnical field investigation was carried out between August 11 and 21, 2016. Ten boreholes were put down using an Acker diamond drill on a floating barge. The boreholes were put down adjacent to the existing structure. The locations of the boreholes are shown on Drawing 163537-1, Appendix C.

3.2 BOREHOLES

Conditions at each test location were observed and logged by a senior geotechnical technician. The boreholes were carried out in H size casing to depths of 1.83 to 10.57 m below harbour bottom. The soils were sampled at near continuous intervals using a 50 mm OD split spoon sampler while performing standard penetration testing as described in ASTM D1586 Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils; and 70 mm ID thin wall Shelby tubes.

The standard penetration test (SPT) "N-value" is the number of blows required to advance a 50-mm outer-diameter split-spoon sampler a distance of 300 mm into the soil using a standardized drop height and weight. N-values generally provide an indication of soil consistency or compactness and may also be used to aid in estimation of other soil parameters.

Bedrock was proven by core drilling in HQ size. Detailed logs of the soil and bedrock conditions encountered, and the sampling and testing carried out are given on the Borehole Records in Appendix A.

3.3 LABORATORY TESTING

All soil samples recovered were stored in moisture tight containers and delivered with the rock core to our geotechnical laboratory in Dartmouth, Nova Scotia for final classification and testing. Laboratory testing on selected soil samples included:

- water content determinations (*ASTM D2216 Standard Test Methods for Laboratory Determination of Water Content of Soil and Rock by Mass*);
- particle-size analyses (*ASTM D6913 Standard Test Method for Particle-Size Distribution of Soils Using Sieve Analysis*);
- Atterberg Limits (*ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*); and,
- Unconfined compressive strength rock core (*ASTM D7012 Standard Test Method for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures*).

A summary of the testing performed is presented on the borehole records in Appendix A or on separate figures in Appendix B. Soil descriptions used throughout this report are in general accordance with the Unified Soil Classification System (*ASTM D2487 Standard Practice for Classification of Soils for Engineering purposes / ASTM D2488 Standard Practice for Description and Identification of Soils*)

Samples remaining after testing will be stored until March 2017, six months hence, at which point you will be contacted to make arrangements for further storage or disposal.

3.4 SURVEYING

The locations and ground surface elevations for each borehole were surveyed by HGC personnel in UTM (NAD 83) Zone 20. Elevations are referenced to Canadian Hydrographic Service (CHS) Chart datum which were surveyed from temporary benchmarks (TBMs) #1 and #2 previously established on the site.

4.0 SUBSURFACE CONDITIONS

The subsurface conditions at the boreholes generally comprised marine deposits overlying native glacial till and bedrock. The marine deposits consisted of two to three layers which included organic silt overlying a layer of gravel with silt and sand, which was typically underlain by a layer of sandy organic silt. The entire marine deposit ranged in thickness from 0.43 at BH 01 to 5.69 m at BH 09. The till which was encountered in five of the boreholes put down for the investigation ranged in thickness from 0.59 m at BH 07 to 4.88 m at BH 05. Bedrock was encountered at depths ranging from 0.43 to 7.57 m below the harbour bottom.

The subsurface conditions observed in the boreholes are summarized in Table 1, below, and the following paragraphs and are described in detailed on the borehole records in Appendix A.

Table 1 Summary of Subsurface Conditions

Borehole Location	Elevation (m) ^a	Total Depth (m)	Layer Thickness (m)				Bedrock	
			Organic Silt	Gravel	Sandy Organic Silt	Glacial Till	Depth (m)	Elevation (m) ^a
BH 01	0.17	3.05	0.10	0.33	-	-	0.43	-0.26
BH 02	-1.51	3.05	0.13	0.35	-	-	0.48	-1.99
BH 03	-1.90	5.28	0.15	0.64	0.83 ^b	-	1.62	-3.52
BH 04	-3.01	7.37	0.76	1.68	1.17 ^c	-	3.61	-6.62
BH 05A	-3.05	1.83	0.61	>1.22	-	-	>1.83	< -4.88
BH 05	-2.95	9.63	0.30	1.22	1.17	4.88	7.57	-10.52
BH 06	-2.75	10.57	1.22	0.79	1.24	4.04	7.29	-10.04
BH 07	-1.96	9.42	2.13	1.30	1.85	0.59	5.87	-7.83
BH 08	-2.88	9.04	0.99	1.51	1.36	2.03	5.89	-8.77
BH 09	-2.16	8.53	2.64	1.76	1.29	-	5.69	-7.85
BH 10	-2.59	10.03	0.46	0.91	0.74	3.99	6.10	-8.69

(a) Elevations are referenced to CHS Chart Datum.

(b) Layer described as silty sand with gravel

(c) Layer described as sand with silt and gravel

4.1 ORGANIC SILT

A layer of very soft to soft black organic silt containing fibers and seashells was encountered in all of the boreholes put down for this investigation. This layer ranged in thickness from 0.10 m at BH 01 to 2.64 m at BH 09.

Four grain size analyses were performed on samples of the organic silt which resulted in 0 percent gravel, 13 to 23 percent sand, and 77 to 87 percent silt and clay sized particles. Atterberg limits completed on five samples showed liquid limits ranging from 55 to 89 and plasticity indices of 12 to 39. Water contents of twelve samples tested ranged from 45 to 96 percent with an average of 71 percent.

Based on the sampling and testing carried out this soil layer is classified as very soft to soft black organic silt to organic silt with sand.

4.2 GRAVEL WITH SILT AND SAND

A layer of grey and brown to black gravel with silt and sand was encountered below the organic silt in all of the boreholes put down for this investigation. The gravel layer varied in thickness from 0.33 m at BH 02 to 1.68 m at BH 04 and contained occasional to frequent cobbles and boulders.

Four grain size analyses were performed on samples of the gravel which resulted in 47 to 65 percent gravel, 25 to 43 percent sand and 7 to 11 percent silt and clay sized particles. Water contents of twelve samples ranged from 7 to 21 percent with an average of 12 percent.

N-values determined from twelve SPT samples ranged from 16 to 35 blows for 300 mm with an average of 26, and refusal occurring three times. Based on the sampling and testing carried out the soil is classified as compact to dense gravel with silt and sand.

4.3 SANDY ORGANIC SILT

A layer of soft to stiff brown to black sandy organic silt to organic silt with sand was encountered below the gravel deposit in six of the boreholes but down for this investigation. The layer varied in thickness from 0.74 at BH 10 to 1.85 m at BH 7.

Three grain size analyses were performed on samples of the gravel which resulted in 0 to 6 percent gravel, 16 to 49 percent sand and 51 to 78 percent silt and clay sized particles. Atterberg limits completed on five samples showed liquid limits ranging from 58 to 86 and plasticity indices of 13 to 27. Water contents of fourteen samples ranged from 33 to 82 percent with an average of 53 percent.

N-values determined from eight SPT samples ranged from 2 to 5 blows for 300 mm with an average of 4. Based on the sampling and testing carried out the soil is classified as very loose to loose sandy organic silt to organic silt with sand.

4.4 GLACIAL TILL

A layer of glacial till was encountered below the marine deposits in five of the ten boreholes put down for this investigation. The till ranged in thickness from 0.59 m at BH 07 to 4.88 m at BH 05.

Five grain size analyses were performed on samples of the gravel which resulted in 28 to 58 percent gravel, 27 to 46 percent sand and 11 to 32 percent silt and clay sized particles. Water contents of twelve samples ranged from 8 to 13 percent with an average of 10 percent.

N-values determined from eight SPT samples ranged from 22 to 69 blows for 300 mm with an average of 43, and refusal occurring six times. Based on the sampling and testing carried out the soil is classified as compact to very dense silty sand with gravel to gravel with silt and sand. Occasional to frequent cobbles and boulders were encountered throughout the glacial till deposit.

4.5 BEDROCK

Bedrock was proven in all boreholes drilled for this investigation, except BH 05A which was terminated in the gravel layer due to the drill casing veering sideways on inferred boulders. Bedrock was encountered at depths ranging from 0.43 to 7.57 m below the harbour bottom. The bedrock consisted of grey Slate and Greywacke of the Goldenville Formation.

Based on the rock quality designation (RQD) of the recovered core, the bedrock may be classified as very poor to good quality. Nine unconfined compressive strength tests were performed on

select samples of recovered rock core. Results of six tests on the slate ranged from 32 to 60 MPa with an average of 43 MPa; and three tests on the greywacke ranged from 43 to 79 MPa with an average of 63 MPa. Based on the sampling and testing carried out both rock types are classified as medium strong to strong. The results of the unconfined compressive strength tests are provided in Table 2, below.

Table 2 Unconfined Compressive Strength

Borehole	Depth (m)	Rock Type	Unconfined Compressive Strength (MPa)
BH 04	5.41	Greywacke	68
BH 04	7.09	Greywacke	79
BH 06	10.10	Slate	54
BH 07	8.53	Slate	32
BH 08	8.11	Slate	37
BH 08	8.32	Slate	60
BH 09	7.42	Greywacke	43
BH 10	9.69	Slate	46
BH 10	9.88	Slate	32

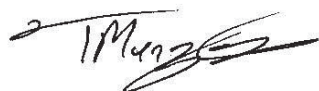
5.0 CLOSURE

This report has been prepared to assist in the design and construction of the proposed New Harbour Wharf Reconstruction. This report has been prepared for the sole benefit of Small Craft Harbours (SCH) - Fisheries and Oceans Canada and their agents. Any use which a third party makes of this report is the responsibility of such third party.

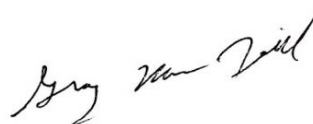
This report is based on the site conditions encountered by Harbourside Geotechnical Consultants at the time of the work at the specific sampling locations, and can only be extrapolated to a limited extent around these locations. Should any conditions differ from those detailed on the borehole records, the engineer should be notified to allow reassessment of any design assumptions.

Respectfully submitted,

H a r b o u r s i d e
 Geotechnical Consultants



W. Todd Menzies, M.A.Sc., P.Eng.
 Principal, Senior Geotechnical Engineer



S. Greg MacNeill, P.Eng.
 Principal, Senior Geotechnical Engineer

APPENDIX A

Symbols and Terms Used on Borehole and Test Pit Records

Borehole Records BH 01 to BH 10

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols:

USCS SOIL CLASSIFICATION SYMBOLS

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN 75 μm SIEVE SIZE	GRAVELS MORE THAN 50% OF COARSE FRACTION RETAINED ON 4.75 mm SIEVE	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES. LITTLE OR NO FINES
		GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL – SAND – SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL – SAND – CLAY MIXTURES
	SANDS MORE THAN 50% OF COARSE FRACTION PASSING THE 4.75 mm SIEVE	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES		SM	SILTY SANDS, SAND – SILT MIXTURES
				SC	CLAYEY SANDS, SAND – CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN 75 μm SIEZE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
			HIGHLY ORGANIC SOILS		

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

OTHER COMMONLY USED SYMBOLS

GLACIAL TILL		UNSTRATIFIED GLACIAL DEPOSIT RANGING FROM CLAY TO BOULDERS
BEDROCK		IGNEOUS BEDROCK
		METAMORPHIC BEDROCK
		SEDIMENTARY BEDROCK
MATERIALS PLACED BY HUMANS		FILL: SUBSURFACE MATERIALS IDENTIFIED AS PLACED BY HUMANS
		ASPHALT
		CONCRETE

SAMPLE TYPE

SS	Split Spoon (obtained by performing SPT)
ST	Shelby Tube (Thin-Walled Tube)
BS	Bulk Sample
PS	Piston Sample
WS	Wash Sample
HQ, NQ, AQ, BQ, etc.	Rock Core Samples Obtained Using Standard Size Diamond Bits

SPT N-VALUE (N-INDEX)

The standard penetration test (SPT) provides a qualitative evaluation of compactness and a qualitative comparison of subsoil stratification. The SPT is performed in the bottom of a borehole where a split-barrel sampler having an outside diameter of 50.8 mm is impacted using a hammer weighing 623 N falling 0.76 m for each hammer blow. The SPT N-value is the blow count representation of the penetration resistance of the soil. In accordance with ASTM D1586, the N-value, reported in blows per 300 mm, equals the sum of the number of blows (N) required to drive the sampler over the depth interval of 150 to 450 mm. However, when a 600 mm sampler is used the number of blows (N) required to drive the sampler over the interval of 300 to 600 mm may be reported if this value is lower. For samples where insufficient penetration was achieved and N-Values cannot be presented, the number of blows are reported over sampler penetration in mm (e.g. 50/120). Although some methods make use of N-values corrected for various factors (for equipment used, overburden stress, length of drill rod, etc.) no corrections have been applied to the N-values presented on the logs.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests (DCPT) are performed using a standard 60-degree apex cone connected to 'A' size drill rods with the same standard fall height and weight as the SPT test. The DCPT value is the number of blows of the hammer required to drive the cone 300 mm. The DCPT provides a qualitative evaluation of compactness and allows for a qualitative comparison of subsurface stratification.

RECOVERY

For soil samples, recovery is recorded as the total length of the soil sample recovered. For rock core, recovery is expressed as a percentage of the total length drilled on a per run basis.

OTHER TESTS

S	Sieve Analysis	CD	Consolidated-Drained Triaxial	C	Consolidation
H	Hydrometer Analysis	CU	Consolidated-Undrained Triaxial	Q _u	Unconfined Compression
γ	Unit Weight	UU	Unconsolidated Undrained Triaxial	I _p	Point Load Index, I _p (50)
G _s	Specific Gravity of Soil Particles	DS	Direct Shear	k	Laboratory Permeability

SOIL DESCRIPTION

Terminology describing common soil genesis:

Rootmat	Vegetation, roots, and moss with organic matter and topsoil typically forming a mattress at the ground surface.
Topsoil	Mixture of soil and humus capable of supporting vegetative growth.
Peat	A soil composed of vegetable tissue in various stages of decomposition usually with an organic odor, a dark-brown to black color, a spongy consistency, and a texture ranging from fibrous to amorphous.
Till	Non-stratified glacial deposit which may range from clay to boulders
Fill	Artificial (man-made) deposits transported and placed on the natural surface of soil or rock.

Terminology describing soil structure:

Homogeneous	The lack of visible bedding and the same appearance and colour throughout
Desiccated	Having visible signs of weathering by oxidation of clay minerals, shrinking cracks, etc.
Fissured	Having cracks and hence a blocky structure
Stratified	Composed of regular alternating successions of different soil types
Varved	Comprised of regular alternating successions of silt and clay which were transported into freshwater lakes by melt water
Layer	> 75 mm
Seam	2 mm to 75 mm
Parting	< 2 mm
Pocket	Small erratic deposit, usually less than 300 mm
Lens	Lenticular deposit

Terminology describing soil types:

Soils are described in accordance with the Unified Soil Classification System (USCS) as described in ASTM D2487 and ASTM D2488. This system classifies soil into categories representing the results of laboratory tests to determine the particle-size characteristics, the liquid limit, and the plasticity index. Using this system, soils are assigned a group name (e.g. silty sand) and symbol (e.g. SM). The various groupings of this classification system have been devised to correlate in a general way with the engineering behavior of soils. Laboratory tests are performed on the portion of the sample passing the 75 mm sieve.

When laboratory test results indicate that the soil is close to another classification group, the borderline condition can be indicated with two symbols separated by a slash (e.g. CL/CH).

Terminology describing cobbles, boulders, and non-matrix materials:

Materials outside of the USCS (e.g. particles larger than 75 mm, organic matter, construction debris) are described based on the proportion of these materials by weight using the following terminology:

Trace, or occasional	< 10%
Some	10% to 20%
Frequent	> 20%

Terminology describing the compactness condition of cohesionless soils:

A qualitative term describing the compactness condition of a cohesionless soil is interpreted from the SPT N-value (also known as the N-index). The relationship between the SPT N-value and the compactness condition is shown in the following table.

Compactness Condition	SPT N-Value (blows per 0.3 m)
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Over 50

Terminology describing the compactness condition of cohesive soils:

Cohesive soils can be classified in relation to undrained strength. Undrained strength can be determined by a number of tests including: unconfined compression tests, field and laboratory vane tests, laboratory fall-cone tests, shear-box tests, and triaxial tests. The consistency and undrained shear strength may also be approximately related the SPT N-Value. The relationship between the consistency and the undrained shear strength, as well as a rough correlation with SPT N-Value as shown in the following table.

Consistency	Undrained Shear Strength (kPa)	SPT N-Value (blows per 0.3 m)
Very Soft	< 12	< 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	> 200	> 30

ROCK DESCRIPTION

Rock is a natural aggregate of minerals that cannot be readily broken by hand and that will not disintegrate on a first wetting and drying cycle. A rockmass comprises blocks of intact rock that are separated by discontinuities such as cleavage, bedding planes, joints, shears and faults.

Terminology Describing Geological Classification of Rock:

Rock is classified with respect to its geological origin or lithology as follows:

Igneous Rocks	Rocks such as granite, diorite, and basalt, which are formed by the solidification of molten material.
Sedimentary Rocks	Rocks such as sandstone, limestone and shale, which are formed by the lithification of sedimentary soils.
Metamorphic Rocks	Rocks such as quartzite, schist, and gneiss, which have been altered by the application of intense heat and/or pressure.

Terminology Describing the Strength of Intact Rock:

Strength is the maximum stress level that can be carried by a specimen. Rocks may be classified based on their intact strength as shown in the following table.

Term	Unconfined Compressive Strength (MPa)
Extremely Weak	0.25 to 1
Very Weak	1 to 5
Weak	5 to 25
Medium Strong	25 to 50
Strong	50 to 100
Very Strong	100 to 250
Extremely Strong	> 250

Terminology Describing Discontinuity Spacing

The structural integrity of a rockmass will be affected by the presence of discontinuities. The spacing of discontinuities can vary from extremely wide to extremely close as indicated in the table below.

Term	Spacing Width (m)
Extremely Close	< 0.02
Very Close	0.02 to 0.06
Close	0.06 to 0.20
Moderately Close	0.20 to 0.6
Wide	0.6 to 2.0
Very Wide	2.0 to 6.0
Extremely Wide	> 6.0

Rock Quality Designation (RQD)

RQD is an indirect measure of the number of fractures within a rockmass. The method provides a quick and objective technique to estimate rockmass quality during diamond drill core logging. All pieces of intact and sound rock greater than 100 mm long are summed and divided by the total length of the core run in accordance with ASTM D6032.

RQD Classification	RQD (%)
Very Poor Quality	0 to 25
Poor Quality	25 to 50
Fair Quality	50 to 75
Good Quality	75 to 90
Excellent Quality	90 to 100

Terminology to Describe Rock Weathering

The state of weathering significantly alters the geotechnical behaviour of rocks and rockmasses. Weathering of the rockmass may be classified as shown in the following table.

Term	Description
Fresh	No visible sign of rock material weathering; perhaps slight discolouration on major discontinuity surfaces.
Slightly Weathered	Discolouration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discoloured by weathering and may be somewhat weaker than its fresh condition.
Moderately Weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discoloured rock is present either as a discontinuous framework or as corestones
Highly Weathered	More than a half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discoloured rock is present either as a discontinuous framework or as corestones.
Completely Weathered	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still largely intact.


HARBOURSIDE
 Geotechnical Consultants

BOREHOLE RECORD

BH 01

CLIENT SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA PROJECT No. 163537
 LOCATION NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA DATUM CHART
 DATES: BORING 19/08/2016 TO 19/08/2016 WATER LEVEL N/A BH SIZE HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) ROD %	OTHER TESTS	UNDRAINED SHEAR STRENGTH - kPa									
										<div><div>20406080</div><div>WATER CONTENT & ATTERBERG LIMITS</div><div>DYNAMIC PENETRATION TEST, BLOWS/0.3m</div><div>STANDARD PENETRATION TEST, BLOWS/0.3m</div></div>									
	0.17									<div><div>01020304050607080</div><div>W_pW_L</div><div>★</div><div>●</div></div>									
	0.07	Soft black ORGANIC SILT			SS	1	200	7-15-50 / 125 mm		<div><div>01020304050607080</div><div>●</div></div>									
	-0.26	Compact grey GRAVEL with silt and sand								<div><div>01020304050607080</div><div>●</div></div>									
1		Very poor quality, medium strong to strong grey GREYWACKE: BEDROCK - slightly to moderately weathered			HQ	2	100%	0%		<div><div>01020304050607080</div><div>●</div></div>									
					HQ	3	95%	0%		<div><div>01020304050607080</div><div>●</div></div>									
2					HQ	4	86%	29%		<div><div>01020304050607080</div><div>●</div></div>									
					HQ	5	100%	0%		<div><div>01020304050607080</div><div>●</div></div>									
3	-2.88			End of Borehole								<div><div>01020304050607080</div><div>●</div></div>							
4										<div><div>01020304050607080</div><div>●</div></div>									
5										<div><div>01020304050607080</div><div>●</div></div>									
6										<div><div>01020304050607080</div><div>●</div></div>									
7										<div><div>01020304050607080</div><div>●</div></div>									
8										<div><div>01020304050607080</div><div>●</div></div>									
9										<div><div>01020304050607080</div><div>●</div></div>									

CLIENT	SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA			PROJECT No.	163537
LOCATION	NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA			DATUM	CHART
DATES: BORING	11/08/2016 TO 12/08/2016	WATER LEVEL	N/A	BH SIZE	HW

[illegible]

CLIENT	SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA		PROJECT No.	163537
LOCATION	NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA		DATUM	CHART
DATES: BORING	18/08/2016 TO 19/08/2016	WATER LEVEL	N/A	BH SIZE
				HW

[illegible]


HARBOURSIDE
 Geotechnical Consultants

BOREHOLE RECORD

BH 04

CLIENT SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA PROJECT No. 163537
 LOCATION NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA DATUM CHART
 DATES: BORING 12/08/2016 TO 12/08/2016 WATER LEVEL N/A BH SIZE HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) ROD %	OTHER TESTS	UNDRAINED SHEAR STRENGTH - kPa 20 40 60 80 W _p W W _L WATER CONTENT & ATTERBERG LIMITS DYNAMIC PENETRATION TEST, BLOWS/0.3m STANDARD PENETRATION TEST, BLOWS/0.3m									
										0 10 20 30 40 50 60 70 80									
-3.01		Very soft black ORGANIC SILT			SS	1	150	Wt. of Rods											
-3.77		Compact grey to brown GRAVEL with silt and sand			SS	2	175	10-11-11-8 (19)	S										
					SS	3	125	13-7-9-12 (16)											
-5.45		Soft black to brown SAND with silt and gravel			SS	4	75	6-5-1-1 (2)											
					SS	5	75	1-2-2-2 (4)	S										
-6.62		Very poor to good quality, strong grey GREYWACKE: BEDROCK - slightly weathered			SS	6	0	50 / 125 mm											
					HQ	7	80%	0%											
					HQ	8	47%	0%											
					HQ	9	100%	78%	Q _u										
					HQ	10	97%	78%	Q _u										
-10.38		End of Borehole																	


HARBOURSIDE
 Geotechnical Consultants

BOREHOLE RECORD

BH 05

CLIENT SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA PROJECT No. 163537
 LOCATION NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA DATUM CHART
 DATES: BORING 21/08/2016 TO 21/08/2016 WATER LEVEL N/A BH SIZE HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) RQD %	OTHER TESTS	UNDRAINED SHEAR STRENGTH - kPa 20 40 60 80 WATER CONTENT & ATTERBERG LIMITS DYNAMIC PENETRATION TEST, BLOWS/0.3m STANDARD PENETRATION TEST, BLOWS/0.3m									
										0 10 20 30 40 50 60 70 80 W _p W W _L									
-2.95																			
-3.25		Very soft black ORGANIC SILT																	
		Compact grey GRAVEL with silt and sand (inferred from BH 5A)			SS	4	300	5-5-10-19 (15)											
-4.47		Soft dark brown ORGANIC SILT with sand			SS	5	450	1-2-2-2 (4)	S										
-5.64		Dense to very dense brownish grey silty sand with gravel: TILL - occasional to frequent cobbles and boulders			SS	6	350	0-2-3-12 (5)											
					SS	7	300	21-31-38-32 (69)	S										
					SS	8	150	14-17-22-27 (39)											
					SS	9	200	14-16-21-27 (37)	S										
					SS	10	100	50 / 100 mm											
					SS	11	100	16-50 / 75 mm											
-10.52		Very poor quality, medium strong grey SLATE: BEDROCK - moderately weathered			HQ	12	100%	0%											
					HQ	13	100%	0%											
-12.02		Very poor quality, medium strong to strong grey GREYWACKE: BEDROCK - moderately weathered			HQ	14	100%	60%											
-12.58		End of Borehole																	


HARBOURSIDE
 Geotechnical Consultants

BOREHOLE RECORD

BH 05A

CLIENT SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA PROJECT No. 163537
 LOCATION NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA DATUM CHART
 DATES: BORING 16/08/2016 TO 16/08/2016 WATER LEVEL N/A BH SIZE HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm)	BLOWS / 150 mm (N VALUE)	OTHER TESTS	UNDRAINED SHEAR STRENGTH - kPa 20 40 60 80 W _p W W _L WATER CONTENT & ATTERBERG LIMITS DYNAMIC PENETRATION TEST, BLOWS/0.3m STANDARD PENETRATION TEST, BLOWS/0.3m									
										0 10 20 30 40 50 60 70 80									
-3.05		Very soft black ORGANIC SILT			SS	1	50	0-0-0-2 (0)											
-3.66		Compact grey GRAVEL with silt and sand - occasional cobbles and boulders			SS	2	200	18-23-11-9 (20)											
-4.88		End of Borehole at a depth of 1.83 m - casing veered sideways on inferred boulders			SS	3	100	7-6-41-50 / 50 mm											
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			


HARBOURSIDE
 Geotechnical Consultants

BOREHOLE RECORD

BH 06

CLIENT SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA PROJECT No. 163537
 LOCATION NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA DATUM CHART
 DATES: BORING 15/08/2016 TO 16/08/2016 WATER LEVEL N/A BH SIZE HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) RQD %	OTHER TESTS	UNDRAINED SHEAR STRENGTH - kPa																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
										<div>20406080</div> <div>WATER CONTENT & ATTERBERG LIMITS</div> <div>DYNAMIC PENETRATION TEST, BLOWS/0.3m</div> <div>STANDARD PENETRATION TEST, BLOWS/0.3m</div>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	-2.75																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							</

HARBOURSIDE GEOTECHNICAL CONSULTANTS, BOREHOLE RECORD 14/9/16

(Continued Next Page)


HARBOURSIDE
 Geotechnical Consultants

BOREHOLE RECORD

BH 06

CLIENT SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA PROJECT No. 163537
 LOCATION NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA DATUM CHART
 DATES: BORING 15/08/2016 TO 16/08/2016 WATER LEVEL N/A BH SIZE HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) RQD %	OTHER TESTS	UNDRAINED SHEAR STRENGTH - kPa			
										20	40	60	80
		Cont'd, SLATE: BEDROCK							Q _u	WATER CONTENT & ATTERBERG LIMITS DYNAMIC PENETRATION TEST, BLOWS/0.3m STANDARD PENETRATION TEST, BLOWS/0.3m			
-13.32		End of Borehole								0 10 20 30 40 50 60 70 80			
11													
12													
13													
14													
15													
16													
17													
18													
19													


HARBOURSIDE
 Geotechnical Consultants

BOREHOLE RECORD

BH 07

CLIENT SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA PROJECT No. 163537
 LOCATION NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA DATUM CHART
 DATES: BORING 13/08/2016 TO 13/08/2016 WATER LEVEL N/A BH SIZE HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) ROD %	OTHER TESTS	UNDRAINED SHEAR STRENGTH - kPa 20 40 60 80 WATER CONTENT & ATTERBERG LIMITS DYNAMIC PENETRATION TEST, BLOWS/0.3m STANDARD PENETRATION TEST, BLOWS/0.3m									
										0 10 20 30 40 50 60 70 80 W _p W W _L									
-1.96		Soft black ORGANIC SILT - fibers and shells throughout			SS	1	50	Wt. of Rods	S										
					SS	2	250	Wt. of Rods											
					ST	3	600	Push											
-4.09		Dense grey and brown GRAVEL with silt and sand			SS	4	500	0-3-7-16 (10)	S										
					SS	5	300	21-18-17-16 (33)											
-5.39		Soft black sandy ORGANIC SILT - rootlets/fibers throughout			SS	6	350	2-1-1-2 (2)	S										
					SS	7	375	2-2-2-3 (4)											
					ST	8	300	PUSH											
-7.24		Compact to dense grey gravel with silt and sand: TILL			SS	9	150	2-10-12-27 (22)	S										
-7.83		- occasional to frequent cobbles and boulders			SS	10	50	25-50 / 25 mm											
					HQ	11	78%	56%											
		Very poor to fair quality, medium strong grey GREYWACKE: BEDROCK - moderately weathered			HQ	12	48%	0%	Q _u										
					HQ	13	100%	0%											
					HQ	14	100%	0%											
-10.04		Very poor to fair quality, medium strong grey SLATE: BEDROCK - moderately weathered			HQ	15	100%	88%	Q _u										
-11.38		End of Borehole																	


HARBOURSIDE
 Geotechnical Consultants

BOREHOLE RECORD

BH 08

CLIENT SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA PROJECT No. 163537
 LOCATION NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA DATUM CHART
 DATES: BORING 14/08/2016 TO 15/08/2016 WATER LEVEL N/A BH SIZE HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) ROD %	OTHER TESTS	UNDRAINED SHEAR STRENGTH - kPa 20 40 60 80 W _p W W _L WATER CONTENT & ATTERBERG LIMITS DYNAMIC PENETRATION TEST, BLOWS/0.3m STANDARD PENETRATION TEST, BLOWS/0.3m									
										0 10 20 30 40 50 60 70 80									
-2.88		Soft black ORGANIC SILT			SS	1	0	Wt. of Rods											
-3.87					ST	2	0	PUSH											
		Dense grey and brown GRAVEL with silt and sand - frequent cobbles and boulders to a depth of 2.5 m			SS	3	0	50 / 25 mm											
					HQ	4	430 mm	-											
					HQ	5	125 mm	-											
-5.38		Soft black sandy ORGANIC SILT																	
					SS	6	25	3-2-3-2 (5)											
-6.74		Compact to dense grey gravel with silt and sand: TILL - frequent cobbles and boulders			SS	7	300	3-10-50 / 25 mm											
					HQ	8	230 mm	-											
					HQ	9	200 mm	-											
-8.77		Fair to good quality, strong grey SLATE: BEDROCK - slightly weathered			SS	10	100	10-50 / - 50 mm											
					HQ	11	122%	0%											
					HQ	12	100%	51%											
					HQ	13	100%	82%											
-11.92		End of Borehole																	


HARBOURSIDE
 Geotechnical Consultants

BOREHOLE RECORD

BH 09

CLIENT SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA PROJECT No. 163537
 LOCATION NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA DATUM CHART
 DATES: BORING 13/08/2016 TO 13/08/2016 WATER LEVEL N/A BH SIZE HW

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) ROD %	OTHER TESTS	UNDRAINED SHEAR STRENGTH - kPa 20 40 60 80 WATER CONTENT & ATTERBERG LIMITS DYNAMIC PENETRATION TEST, BLOWS/0.3m STANDARD PENETRATION TEST, BLOWS/0.3m									
										0 10 20 30 40 50 60 70 80 W _p W W _L									
-2.16		Soft black ORGANIC SILT with sand			SS	1	50	Wt. of Rods											
1					ST	2	575	Push	S										
2					SS	3	300	Wt. of Rods											
-4.80		Compact to dense black to grey brown GRAVEL with silt and sand			ST	4	500	Push	S										
3					SS	5	275	15-20-18-17 (35)	S										
4					SS	6	250	8-11-18-8 (26)											
-6.56		Soft dark grey ORGANIC SILT with sand - trace gravel - fibers throughout			SS	7	125	1-1-2-1 (3)											
5					ST	8	600	Push	S										
-7.85		Fair to good quality, medium strong grey GREYWACKE: BEDROCK - slightly weathered			SS	9	50	50 / 50 mm											
6					HQ	10	100%	66%											
7																			
8					HQ	11	100%	84%	Q _u										
-10.69		End of Borehole																	
9																			


HARBOURSIDE
 Geotechnical Consultants

BOREHOLE RECORD

BH 10

 CLIENT **SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA**

 PROJECT No. **163537**

 LOCATION **NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA**

 DATUM **CHART**

 DATES: BORING **20/08/2016 TO 20/08/2016**

 WATER LEVEL **N/A**

 BH SIZE **HW**

DEPTH (m)	ELEVATION (m)	SOIL/BEDROCK DESCRIPTION	GRAPHIC LOG	WATER LEVEL	TYPE	NUMBER	REC. SOIL (mm) REC. ROCK (%)	BLOWS / 150 mm (N VALUE) ROD %	OTHER TESTS	UNDRAINED SHEAR STRENGTH - kPa 20 40 60 80 WATER CONTENT & ATTERBERG LIMITS DYNAMIC PENETRATION TEST, BLOWS/0.3m STANDARD PENETRATION TEST, BLOWS/0.3m									
										0 10 20 30 40 50 60 70 80 W _p W W _L									
-2.59																			
-3.05		Very soft black ORGANIC SILT			SS	1	50	0-0-2-12 (2)	S										
		Compact black GRAVEL with sand - trace silt			SS	2	300	12-20-11- 14 (25)											
-3.96		Soft black ORGANIC SILT with sand			SS ST	3 4	150 200	8-2-2-2 (4) Push											
-4.70		Dense greyish brown silty sand with gravel to silty gravel with sand: TILL - frequent cobbles			SS	5	375	15-20-25- 33 (45)	S										
					SS	6	150	12-11-27- 50 / 125 mm											
					SS	7	325	28-20-21- 22 (41)	S										
					SS	8	75	32-50 / 75 mm											
-8.69		Very poor to poor quality, medium strong grey GREYWACKE: BEDROCK - slightly to moderately weathered			HQ	9	100%	0%	Q _u										
-9.45		Very poor to poor quality, medium strong grey SLATE: BEDROCK			HQ	10	67%	0%											
					HQ	11	91%	0%											
					HQ	12	100%	40%											

HARBOURSIDE GEOTECHNICAL CONSULTANTS, BOREHOLE RECORD 14/9/16

(Continued Next Page)

CLIENT	SMALL CRAFT HARBOURS, FISHERIES AND OCEANS CANADA			PROJECT No.	163537
LOCATION	NEW HARBOUR WHARF, GUYSBOROUGH CO. NOVA SCOTIA			DATUM	CHART
DATES: BORING	20/08/2016 TO 20/08/2016	WATER LEVEL	N/A	BH SIZE	HW

[illegible]

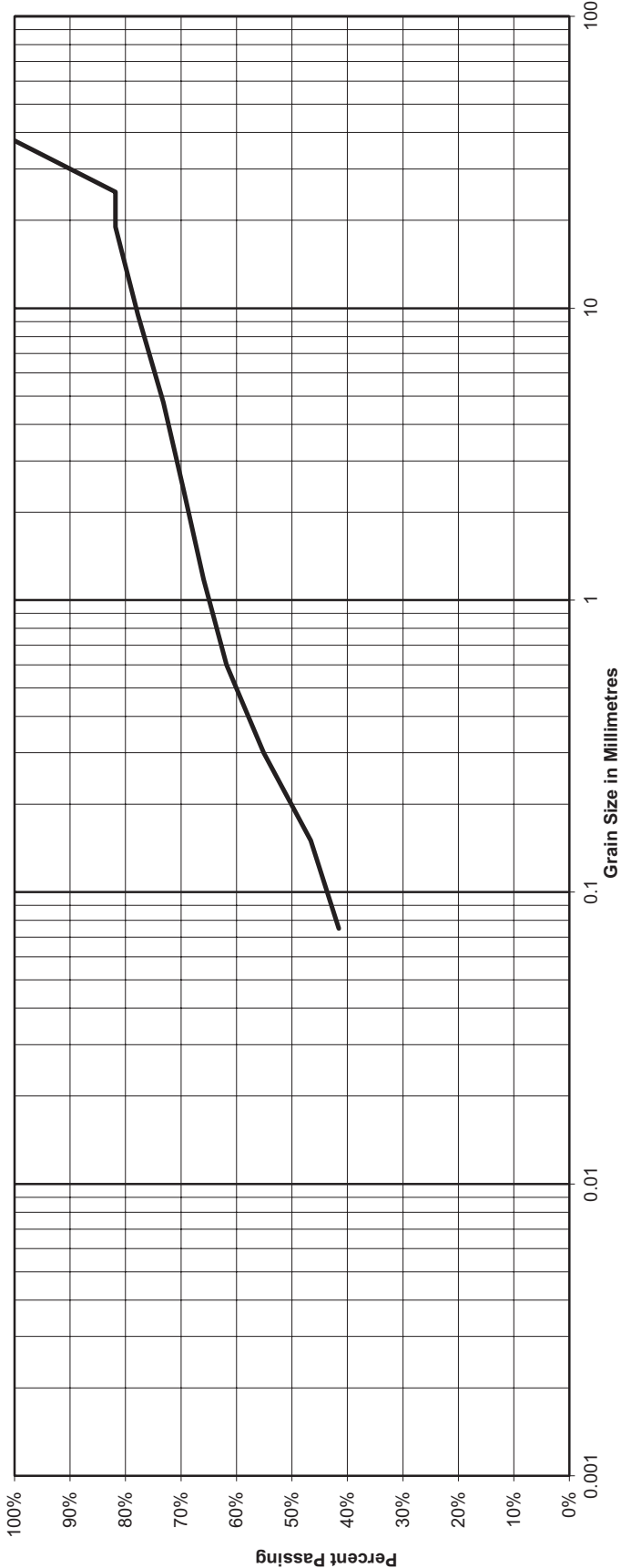
APPENDIX B

Grain Size Analyses

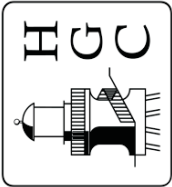
Atterberg Limits

GRAIN SIZE DISTRIBUTION

Silt and Clay			Sand			Gravel	
			fine	medium	coarse	fine	coarse



CURVE	BOREHOLE / TESTPIT	SAMPLE	DEPTH (m)	SOIL FRACTION			SOIL DESCRIPTION
				GRAVEL	SAND	SILT/CLAY	
—	BH 3	SS 2	0.79 - 1.40	27%	32%	42%	silty SAND with gravel



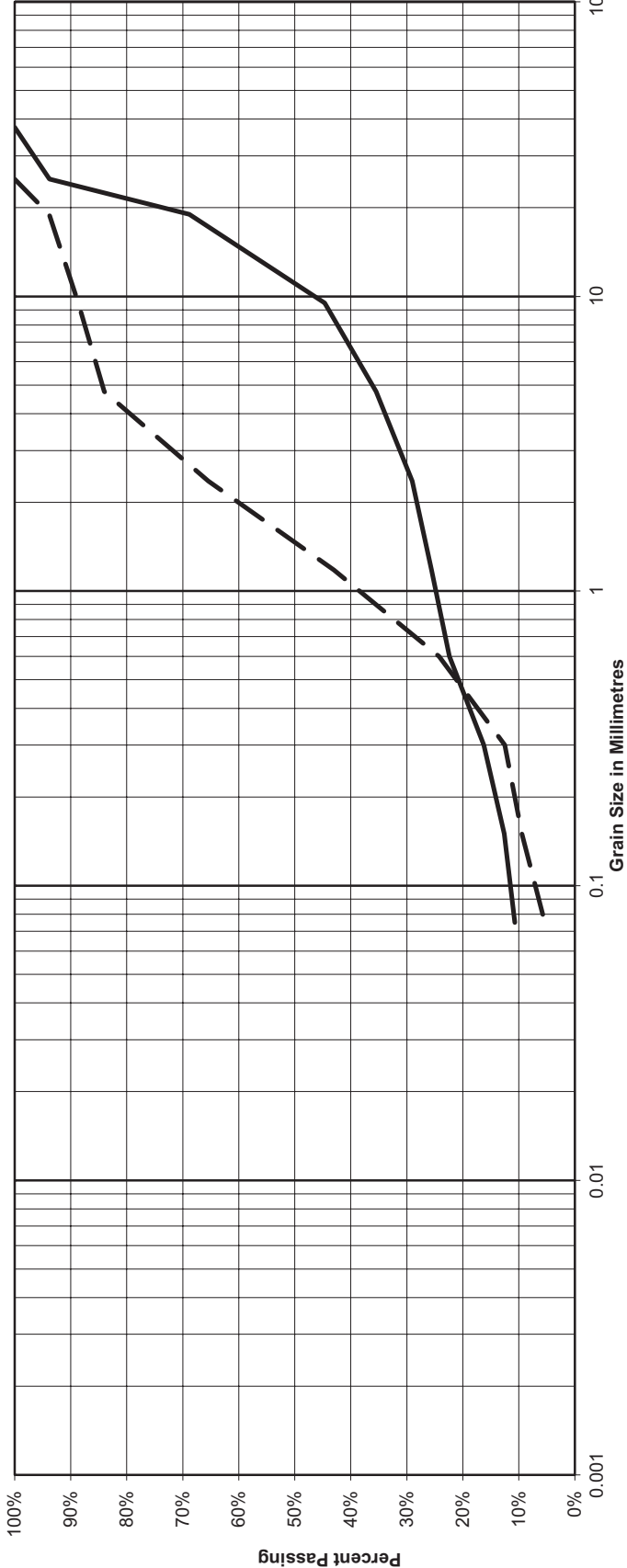
t: 1.902.405.4696 | f: 1.902.405.4693
219 Waverley Road, Suite 200
Dartmouth, NS B2X 2C3
<http://harcoursideengineering.ca>

CLIENT
LOCATION
PROJECT No.

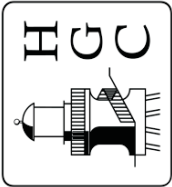
Small Craft Harbours
New Harbour Wharf
163537

GRAIN SIZE DISTRIBUTION

Silt and Clay			Sand			Gravel		
			fine	medium	coarse	fine	coarse	



CURVE	BOREHOLE / TESTPIT	SAMPLE	DEPTH (m)	SOIL FRACTION			SOIL DESCRIPTION
				GRAVEL	SAND	SILT/CLAY	
—	BH 4	SS 2	0.76 - 1.37	65%	25%	11%	GRAVEL with silt and sand
- - -	BH 4	SS 5	2.74 - 3.35	16%	79%	5%	SAND with silt and gravel

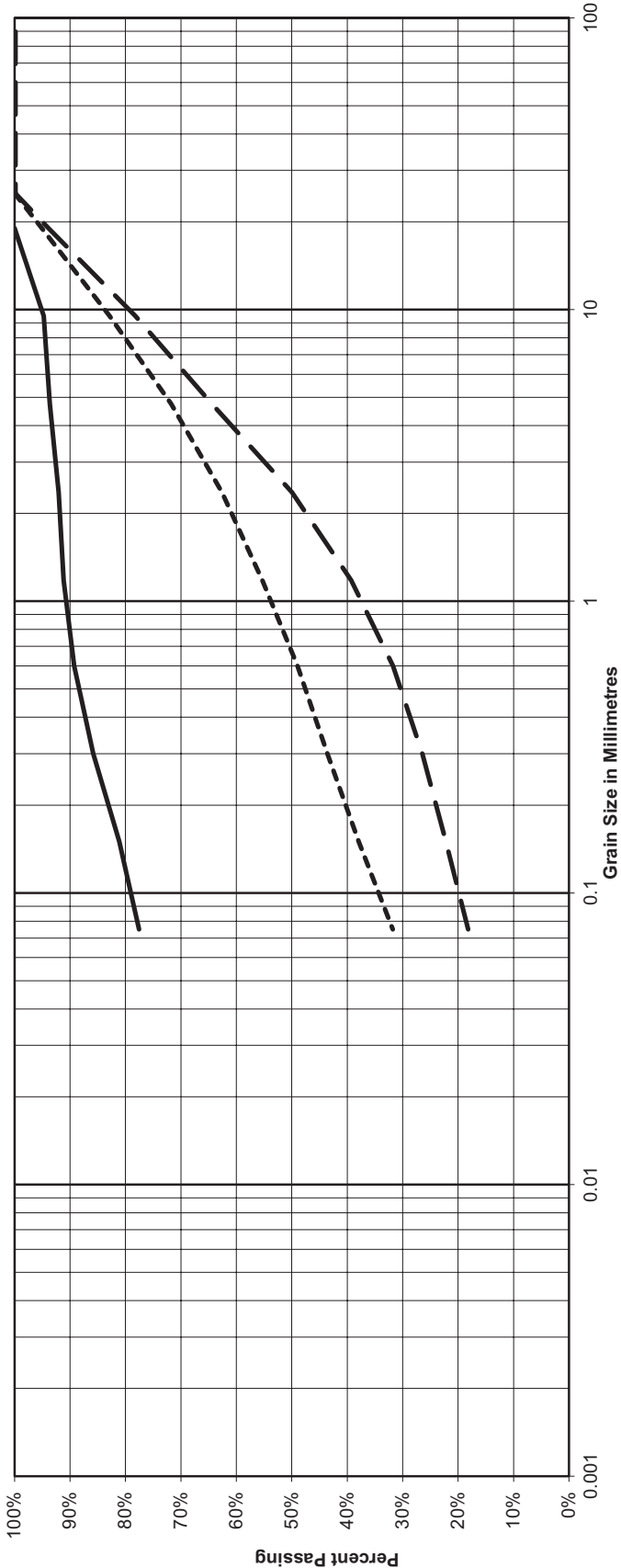


t: 1.902.405.4696 | f: 1.902.405.4693
219 Waverley Road, Suite 200
Dartmouth, NS B2X 2C3
<http://harcoursideengineering.ca>

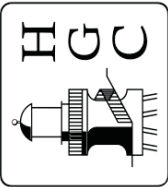
CLIENT Small Craft Harbours
LOCATION New Harbour Wharf
PROJECT No. 163537

GRAIN SIZE DISTRIBUTION

Silt and Clay		Sand			Gravel	
		fine	medium	coarse	fine	coarse



CURVE	BOREHOLE / TESTPIT	SAMPLE	DEPTH (m)	SOIL FRACTION			SOIL DESCRIPTION
				GRAVEL	SAND	SILT/CLAY	
—	BH 5	SS 5	1.62 - 2.23	6%	16%	78%	ORGANIC SILT with sand
- - -	BH 5	SS 7	3.02 - 3.63	36%	46%	18%	silty SAND with gravel
- . - . -	BH 5	SS 9	4.82 - 5.43	28%	40%	32%	silty SAND with gravel



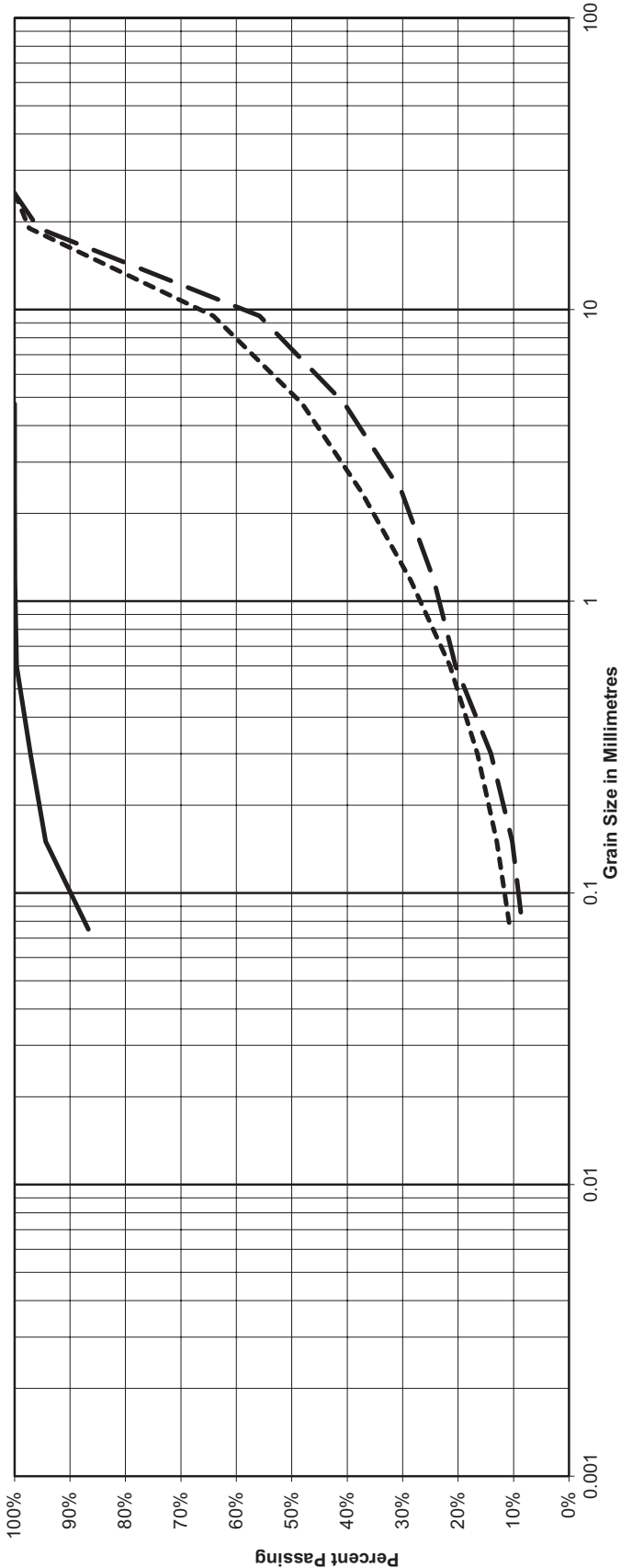
t: 1.902.405.4696 | f: 1.902.405.4693
219 Waverley Road, Suite 200
Dartmouth, NS B2X 2C3
<http://harboursideengineering.ca>

CLIENT
LOCATION
PROJECT No.

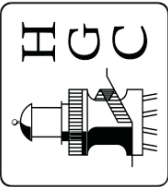
Small Craft Harbours
New Harbour Wharf
163537

GRAIN SIZE DISTRIBUTION

Silt and Clay		Sand			Gravel	
		fine	medium	coarse	fine	coarse



CURVE	BOREHOLE / TESTPIT	SAMPLE	DEPTH (m)	SOIL FRACTION			SOIL DESCRIPTION
				GRAVEL	SAND	SILT/CLAY	
—	BH 6	ST 2	0.63 - 1.24	0%	13%	87%	ORGANIC SILT
- - -	BH 6	SS 3	1.24 - 1.85	60%	32%	8%	GRAVEL with silt and sand
- . - . -	BH 6	SS 7	3.71 - 4.27	52%	37%	11%	GRAVEL with silt and sand



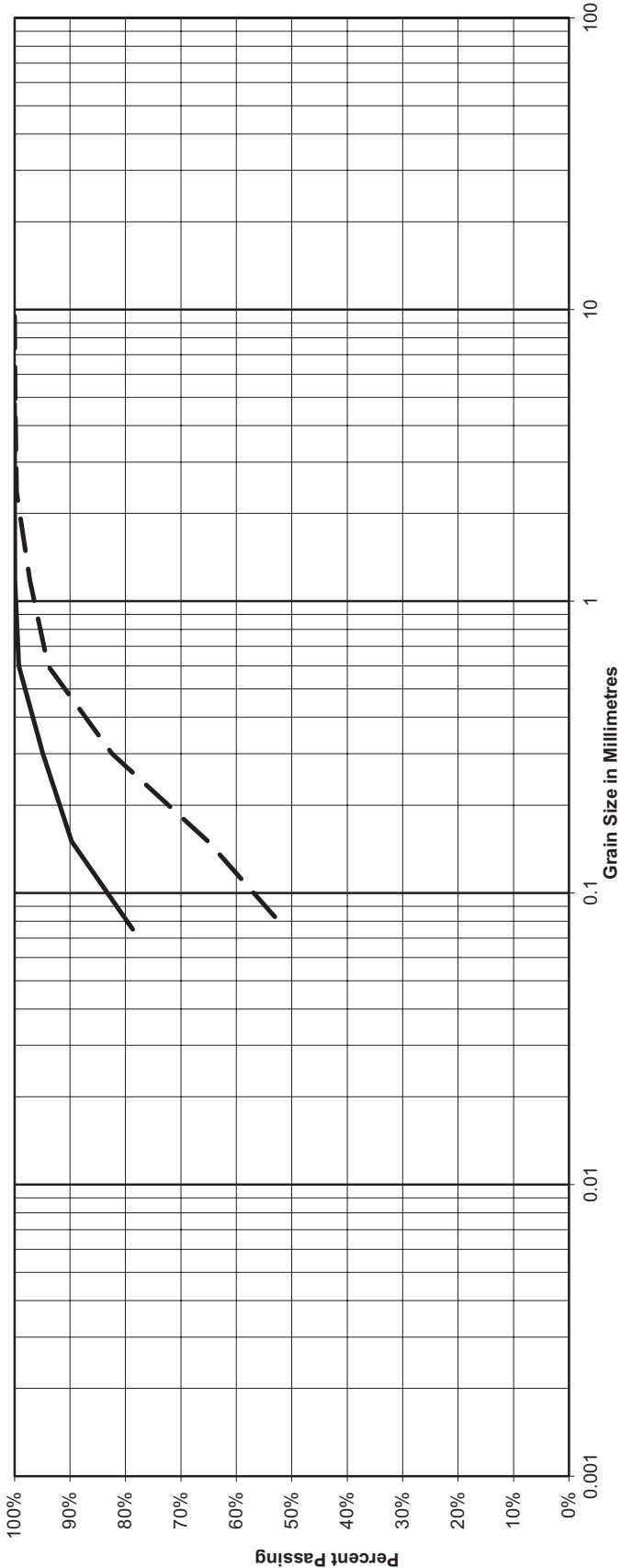
t: 1.902.405.4696 | f: 1.902.405.4693
219 Waverley Road, Suite 200
Dartmouth, NS B2X 2C3
<http://harboursideengineering.ca>

CLIENT
LOCATION
PROJECT No.

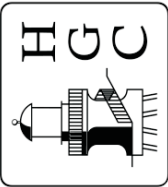
Small Craft Harbours
New Harbour Wharf
163537

GRAIN SIZE DISTRIBUTION

Silt and Clay		Sand			Gravel	
		fine	medium	coarse	fine	coarse



CURVE	BOREHOLE / TESTPIT	SAMPLE	DEPTH (m)	SOIL FRACTION			SOIL DESCRIPTION
				GRAVEL	SAND	SILT/CLAY	
---	BH 7	ST 3	1.22 - 1.83	0%	21%	79%	ORGANIC SILT
---	BH 7	ST 8	4.78 - 5.08	0%	49%	51%	Sandy ORGANIC SILT



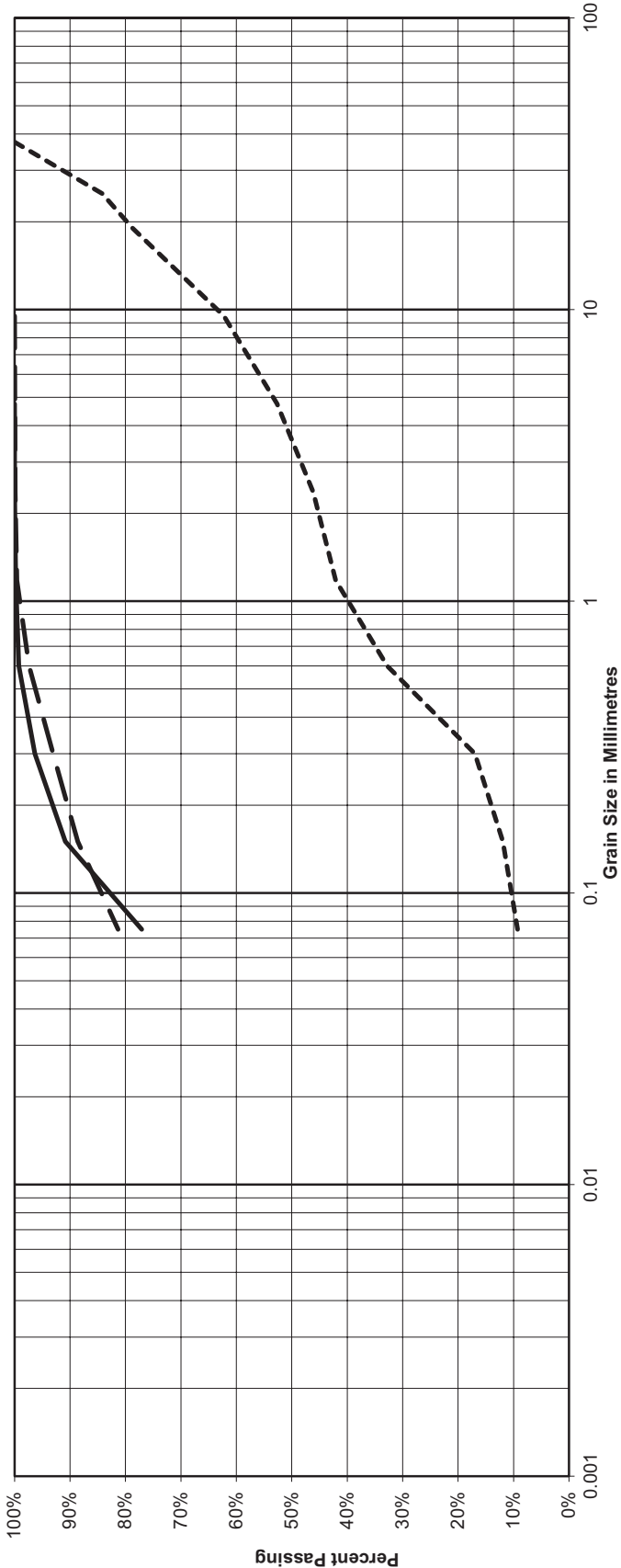
t: 1.902.405.4696 | f: 1.902.405.4693
219 Waverley Road, Suite 200
Dartmouth, NS B2X 2C3
<http://harboursideengineering.ca>

CLIENT
LOCATION
PROJECT No.

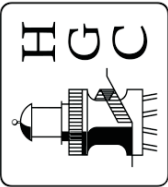
Small Craft Harbours
New Harbour Wharf
163537

GRAIN SIZE DISTRIBUTION

Silt and Clay		Sand			Gravel	
		fine	medium	coarse	fine	coarse



CURVE	BOREHOLE / TESTPIT	SAMPLE	DEPTH (m)	SOIL FRACTION			SOIL DESCRIPTION
				GRAVEL	SAND	SILT/CLAY	
—	BH 9	ST 2	0.79 - 1.40	0%	23%	77%	ORGANIC SILT with sand
- - -	BH 9	ST 4	2.03 - 2.64	0%	19%	81%	ORGANIC SILT with sand
- . - . -	BH 9	SS 5	2.64 - 3.25	47%	43%	9%	GRAVEL with silt and sand



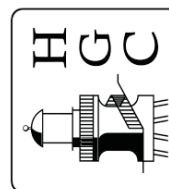
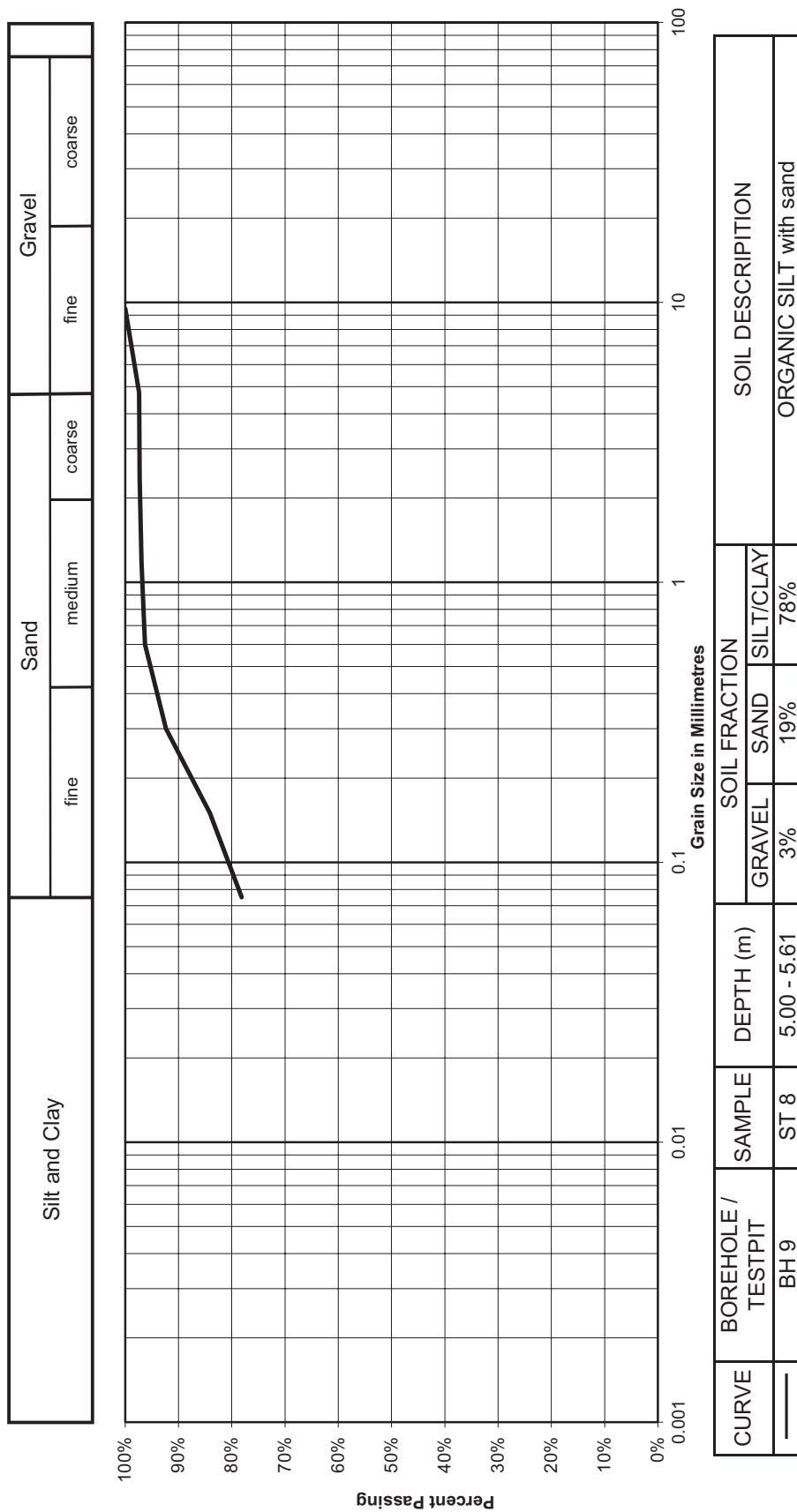
t: 1.902.405.4696 | f: 1.902.405.4693
219 Waverley Road, Suite 200
Dartmouth, NS B2X 2C3
<http://harboursideengineering.ca>

CLIENT
LOCATION
PROJECT No.

Small Craft Harbours
New Harbour Wharf
163537

Checked: WTM

GRAIN SIZE DISTRIBUTION



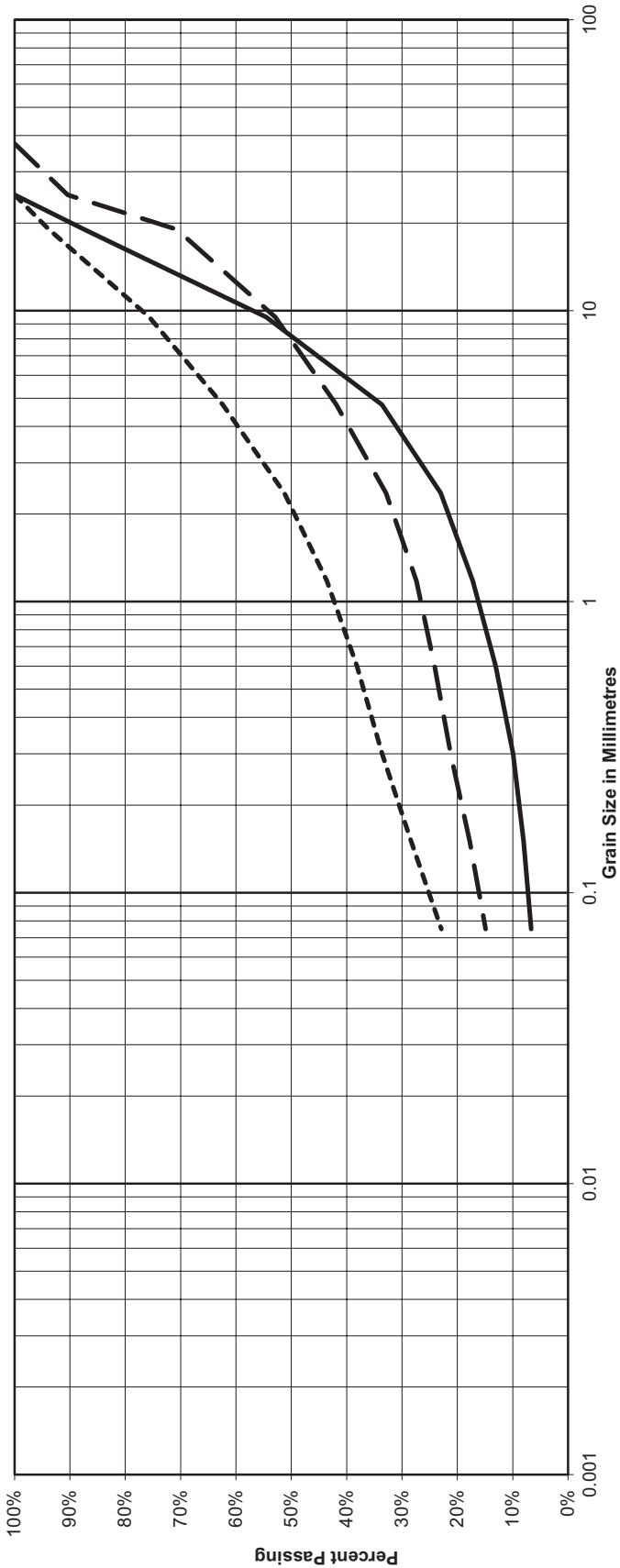
t: 1.902.405.4696 | f: 1.902.405.4693
219 Waverley Road, Suite 200
Dartmouth, NS B2X 2C3
<http://harboursideengineering.ca>

CLIENT
LOCATION
PROJECT No.

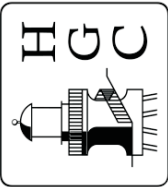
Small Craft Harbours
New Harbour Wharf
163537

GRAIN SIZE DISTRIBUTION

Silt and Clay		Sand			Gravel	
		fine	medium	coarse	fine	coarse



CURVE	BOREHOLE / TESTPIT	SAMPLE	DEPTH (m)	SOIL FRACTION			SOIL DESCRIPTION
				GRAVEL	SAND	SILT/CLAY	
—	BH 10	SS 2	0.61 - 1.22	66%	27%	7%	GRAVEL with silt and sand
- - -	BH 10	SS 5	2.11 - 2.72	58%	27%	15%	silty GRAVEL with sand
- . - . -	BH 10	SS 7	4.06 - 4.67	38%	39%	23%	silty SAND with gravel



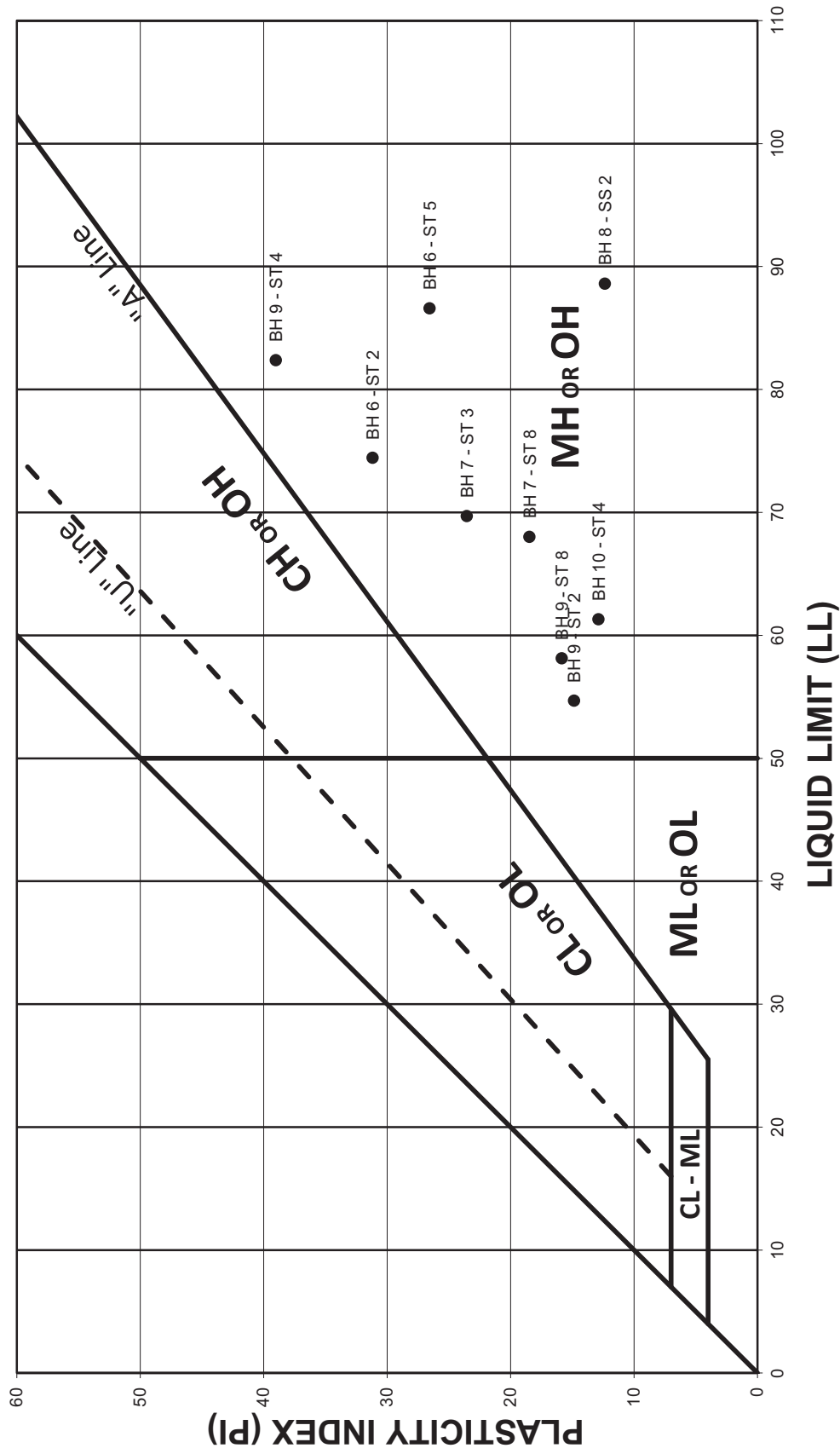
t: 1.902.405.4696 | f: 1.902.405.4693
219 Waverley Road, Suite 200
Dartmouth, NS B2X 2C3
<http://harboursideengineering.ca>

CLIENT
LOCATION
PROJECT No.

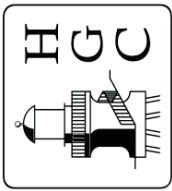
Small Craft Harbours
New Harbour Wharf
163537

Checked: WTM

ATTERBERG LIMITS



PROJECT No.: 163537



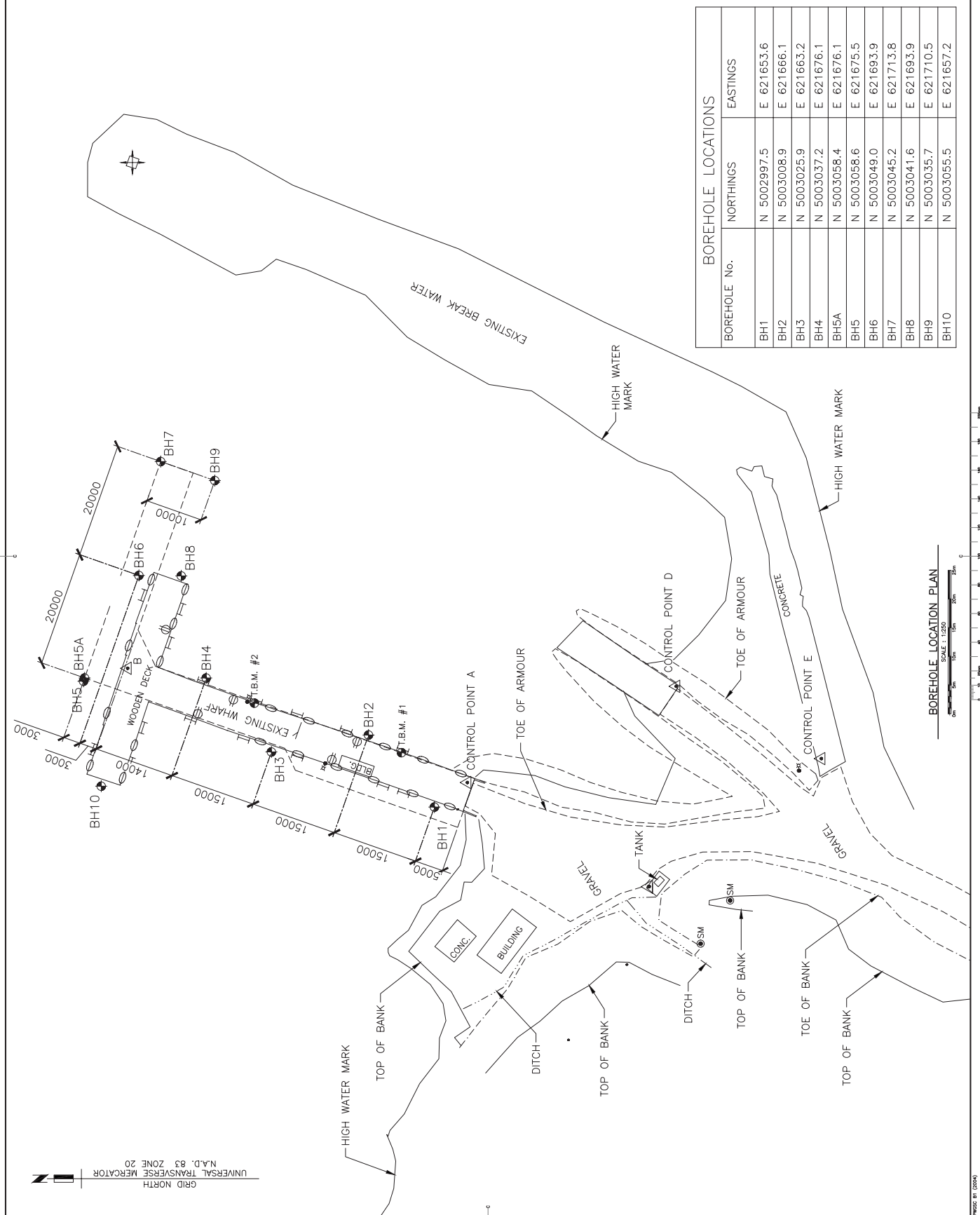
t: 1.902.405.4696 | f: 1.902.405.4693
219 Waverley Road, Suite 200
Dartmouth, NS B2X 2C3
<http://harboursideengineering.ca>

CLIENT
LOCATION
PROJECT No.

PWGSC
New Harbour Wharf
163537

APPENDIX C

Drawing 163537-1 Borehole Location Plan



APPENDIX D

Terms of Reference

DESCRIPTION OF SERVICES

DATE: July 13, 2016

1.0 Purpose:

Geotechnical drilling/sampling/testing is required at the New Harbour SCH Facility, Guysborough County, NS to determine existing subsurface soil strata for the construction of a proposed new wharf. Existing wharf, which is barricaded due to its' deteriorated state, consists of a timber block and span stem and a full cribwork "T".

2.0 SCOPE OF WORK

2.1 Location of Borings

It is proposed that 9 **boreholes** (Appendix "A") be drilled by conventional means and completed at the location shown on the attached plan. The Contractor will be responsible for surveying all test locations indicated; the actual field location of the drilled borehole shall be accurately measured. Changes in the number or location of boreholes may occur at the request of the Harbour Authority of New Harbour. The actual field location of the drilled boreholes shall be accurately located using UTM (Nad 83) or other method approved by the Harbour Authority (i.e. using fixed structure located on site). All vertical controls will be referred to Chart Datum using the closest established BM of the Canadian Hydrographic Services or a site specific benchmark as identified on Appendix "A".

Changes in the number or location of boreholes may only occur at the request or with the approval of the Harbour Authority of New Harbour.

The firm will have to make arrangements with the local harbour contact (Matthew Sangster 902-870-0606) to have access to the site. The contractor will be responsible to coordinate with the local harbour contact the removal or moving of boats that might interfere with doing the work. Contractor should note that the existing wharf structure is barricaded to all vehicular traffic.

2.2 Elevation and Depth of Boreholes

All borehole elevations shall be referenced to Chart Datum and shall be measured from a fixed benchmark. Elevations shall be measured accurately.

All boreholes shall be advanced into overburden of a continuous N value over a full 6 meters of 20 or greater. If bedrock is encountered it shall be drilled for 3 meters of rock core recovery into the bedrock.

2.3 Sampling and Identification of Boreholes

Samples shall be collected from the boreholes and shall be maintained in waterproof, rigid-sidewall, containers for further testing. All samples shall be properly identified, including site, borehole number and depth or elevation of sample, and shall become the property of the Harbour Authority of New Harbour.

Samples and Standard Penetration Tests shall be obtained commencing at harbour bottom/ ground surface and then continuous in all boreholes unless otherwise specified. Thin wall tests (Shelby Tubes) shall be attempted where Standard Penetration Test results of less than three (3) blows per 300 mm travel are encountered. Good sample recovery is essential. Rock cores shall be taken when cobbles, boulders or bedrock is encountered in boreholes.

2.4 Field Presentation of Results

The Contractor shall inform the Harbour Authority of New Harbour of the soil types encountered in the boreholes prior to demobilizing equipment from the site.

2.5 Laboratory Testing - Analysis

For the purpose of soil classification for the site, the Contractor shall carry out the testing required to accurately classify the materials encountered on samples from each strata. The Contractor shall perform the listed necessary tests as identified in appendix B required to accurately perform this work. Samples selected for laboratory testing will be directed by the Harbour Authority of New Harbour. Soil properties and soil description shall be referenced to the Canadian Foundation Engineering Manual or Canadian Standards Association.

2.6 Factual Report

The Contractor shall provide four (4) bound copies of the Factual Report on completion of the work for each of the specified site locations. The Factual Reports shall include no less than the following;

- a) Investigation Procedures Used
- b) Site Description
- c) Subsurface Soil Description from Laboratory Tests
- d) Borehole Logs
- e) Laboratory Report
- f) Borehole Location Plan
- g) Copy of Terms of Reference

The report recommendations and geotechnical conclusions should be presented separately, so that these recommendations may be excluded from the tendering documents if the owner so desires. Such recommendations must cover a variety of activities, such as alternative founding depths/elevations with recommended design bearing values, pile design considerations, Estimates of potential settlements, recommended safe slopes of banks or excavation walls, earth pressures for shoring design, dewatering requirements, soil stabilization, etc. The recommendation should be made with due consideration to the construction proposed by the user, in order to provide the most economic viable alternatives available for consideration.

In this case, consideration shall be given to gravity structures such as cribwork or pilework structures such as a berlin wall type structure.

Digital version of the report shall also be provided to Small Craft Harbours, on behalf of the Harbour Authority of New Harbour by email (Johnathan.beaton@dfo-mpo.gc.ca).

2.7 Familiarization with Site and Physical Aspects

The Contractor shall be familiar with access to the site and anticipated subsurface conditions at the site as to determine the type and quantity of equipment, facilities and supplies needed to execute the work satisfactorily. Failure to do so will not relieve the Contractor of his responsibility for successfully performing the work. Access on the wharf structure by vehicular traffic is prohibited. Additional supporting documentation is being provided as reference material and should only act as a supplement to the site examination by the contractor. Supplemental Material being provided includes historical geotechnical information (Appendix "C") and 2012 air photo (Appendix "D").

2.8 Supervision (Supervisory Field Technician or Equivalent)

The field work is to be supervised in the field, full time, by an experienced Geotechnical technician or equivalent, (minimum three (3) years applicable experience).

3.0 SCHEDULING

The Contractor shall define and adhere to a timetable for the proposed investigation. The field work and report must be completed by September 15, 2016.

4.0 PAYMENT FOR SERVICES

The basis for successful selection will be the lowest total tendered amount for bid items as shown in Appendix B. These items are inclusive of services for job monitoring, locating boreholes and a complete soil description report.

5.0 PROVISION FOR STANDBY TIME

Provision for standby time shall be as outlined below and at the rates identified in Appendix 'B'.

5.1 Drilling Operations

The Contractor shall submit an hourly rate for the drill crew and equipment, inclusive of all costs and expenses, at which standby will be charged. The maximum daily chargeable standby time will be eight (8) hours and shall be measured such that the total of hours worked plus standby time does not exceed ten (10) hours per day, five (5) days per week (Monday to Friday), or as otherwise agreed to by the Harbour Authority of New Harbour. No payment will be considered for standby prior to drilling the first borehole or upon completion of the last borehole. Mobilization/demobilization between boreholes will not be measured for payment.

5.2 Supervisory Field Technician or Equivalent

No allowance will be made for standby as a result of wave conditions up to a maximum of 0.30 meters.

An hourly rate, inclusive of all expenses, shall be submitted for the supervisory field technician or equivalent for standby time. Standby time shall be paid during drill-rig breakdown and non-operational time to a daily maximum of eight (8) hours and shall be measured such that the total of hours worked plus standby time does not exceed ten (10) hours per day, five (5) days per week (Monday to Friday), or as otherwise agreed to by the Harbour Authority of New Harbour.

5.3 Occupational Health and Safety:

1. Construction Safety Measures

- .1 Observe and enforce construction safety measures required by National Building Code, Provincial Government, Workmen's Compensation Board and municipal statutes and authorities. Prepare construction site safety plan as per 5.3.7.

TERMS OF REFERENCE
Geotechnical Drilling/ Sampling /Testing
New Harbour, Guysborough County, Nova Scotia
Project No: F5406-160007

.2 In event of conflict between any provisions of above authorities the most stringent provision will apply.

2. Fire Safety Requirements

.1 Comply with requirements of standard for Building Construction Operations FCC No.301 Standard for Construction Operations, June 1982, issued by Fire Commissioner for Canada.

.2 Continually maintain on the construction site an approved, workable 2.5 kg or equivalent multi-purpose dry chemical extinguisher for each welding and cutting unit which shall be located so as to be readily accessible to the operator.

.3 At least one 10 kg or equivalent multipurpose dry chemical extinguisher should be located on site and be readily available during the working day.

3. Overloading

.1 Ensure no part of Work is subjected to a load which will endanger its safety or will cause permanent deformation.

.2 The Contractor is advised that use of heavy equipment on or close to existing structure(s) is at Contractor's risk and responsibility.

.3 Repair any damage to existing structure caused by Contractor.

4. Falsework

.1 Design and construct falsework in accordance with CSA S269.1 (latest edition).

5. Scaffolding

.1 Design and construct scaffolding in accordance with CSA S269.2 (latest edition).

6. Hazardous Materials

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada and Health and Welfare Canada.

.2 Deliver copies of WHMIS data sheets to Harbour Authority Representative on delivery of materials.

.3 Train staff regarding handling of plant treated wood products and use of field treatment materials.

7. Construction Site Safety Plan

Carry out all work of this contract placing maximum emphasis on safety for workers and other authorized persons working or circulating on the construction site.

Notwithstanding other safety requirements specified in this section or in any other section of the Specifications, the Contractor shall prepare a written site specific Construction Safety Plan outlining all procedures and safe work practices which must be followed by all personnel

TERMS OF REFERENCE**Geotechnical Drilling/ Sampling /Testing****New Harbour, Guysborough County, Nova Scotia****Project No: F5406-160007**

working or circulating on the construction site. This safety plan shall address and conform to the Provincial Safety Act and Regulations, except where noted in the contract documents the requirement to conform to a more stringent Act or Regulation. Develop the Plan in collaboration with the various subcontractors, who will be carrying out work at the site at any time during the construction period, to ensure that all pertinent types of work activity are addressed in the Plan by related safety procedures which must be followed when carrying out such work. It is the Contractor's responsibility to ensure that all workers and authorized persons working or circulating on the construction site become familiar with all safety measures specified in the Plan. These measures and the means of communicating them to all persons must be addressed in the Safety Plan, in a clear and specific manner.

Prior to commencement of work the Safety Plan must be posted on the construction site in a common location, visible for all workers and authorized persons working or circulating on the construction site to see. Ensure that all employees are advised of such safety Plan and of the location where it is posted.

The Contractor shall use measures to ensure that all workers and any authorized persons entering onto the construction site are notified of and abide by the posted safety rules and procedures. The Harbour Authority of New Harbour or their representative reserves the right to demand the removal of any persons not complying with the Safety Plan. Any person removed from the site shall not be permitted re-entry onto the construction site.

The Safety Plan shall be developed immediately upon notification of contract award and be completed prior to the commencement of work. Revise such Plan as required when changes to planned work procedures occur or when directed by any Safety Officer from any authority having jurisdiction. Submit the Safety Plan and any revised version to the Harbour Authority of New Harbour or their representative for information and retention purposes only. The submission of the Safety Plan to the Harbour Authority of New Harbour shall not relieve the Contractor of any legal obligations as specified by the Provincial Safety Acts or Regulations.