Appendix A – Stantec Geotechnical Investigation 121910312

Geotechnical Investigation - Factual Report - West Point, Prince County, Prince Edward Island

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Report Prepared for:

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Job No. 121910312 - File No. 2988

January 15, 2010

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Job No. 121910312 - File No. 2988

Public Works and Government Services Canada
3 Queen Street (Cambridge Building)
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Attention: Mr. Terry Gee, P.Eng.

Dear Mr. Gee:

Reference: Geotechnical Investigation - Factual Report
West Point, Prince County, Prince Edward Island

This letter reports 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 at the site and, based on the conditions encountered, to provide geotechnical design parameters for the proposed harbour modifications.

PROCEDURE

The field work for the present investigation was carried out on December 7 and 8, 2009, and consisted of drilling three (3) boreholes at the site, designated BH-01, BH-02, and BH-03. A fourth borehole (BH-04) was requested but could not be accessed during low tide. The boreholes were drilled during low tide periods with a mobile auger drill rig equipped for soil sampling and bedrock coring. The boreholes were advanced to an average depth of 7.6 m below ground surface (i.e., harbour bottom) at the locations shown on the appended Drawing No. 2988-1.

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 ground surface elevations of the boreholes were established in the field by our personnel. The elevations were interpolated from the bathymetric survey plan provided and are referenced to Chart/Low Normal Tide (LNT) Datum.

SUBSURFACE CONDITIONS

The subsurface conditions encountered at the present borehole locations are shown in detail on the appended Borehole Records, are summarized on Table 1 (also appended) and are described below. Also appended are the Borehole Records for two previous (1988) boreholes and a Stratagraphic Section (Drawing No. 2988-2) that incorporates the present and previous subsurface information.

Marine Deposit

Marine deposited soils, comprised predominantly of sand, were encountered at the surface of each borehole and found to extend to depths ranging from 3.0 to 3.3 m below harbour bottom. The marine soil was found to vary in composition from a brown to dark brown sand to a brown gravelly sand. The deposit was found to contain trace to some silt and traces of shell fragments.

Standard Penetration Test N-values obtained within the upper 0.9 m of the marine deposit range from 1 to 9 indicating a variable but generally very loose relative density. N-values obtained below this level range from 14 to 56 with an overall average of 33 indicating a compact to dense relative density.

Grain size analyses (curves appended) performed on representative split spoon samples of the marine soil show it to contain 2 to 29 percent gravel, 61 to 93 percent sand and 4 to 10 percent fines (i.e., silt and clay sizes). The natural moisture content of selected samples was found to range from 9 to 29 percent with an average of 17 percent.

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

Parameter	Upper Layer (very loose)	Lower Layer (compact to dense)
Total Unit Weight	17 kN/m^3	20 kN/m^3
Submerged Unit Weight	7.2 kN/m^3	10.2 kN/m^3
Effective Friction Angle	26 degrees	32 degrees

Glacial Till

A glacial till stratum, ranging in thickness from 1.3 to 3.0 m, was encountered directly below the marine soil at the boreholes. The till was generally found to consist of a reddish brown gravelly silt and sand with some sandstone cobbles/layers. The till surface elevation was found to range from a high of el. -2.05 m at BH-01 to a low of el. -3.00 m at BH-03.

N-values obtained within the till range from 25 to 90 indicating a compact relative density. The N-values greater that 50 may be attributed to the presence of sandstone cobbles/layers within the till.

A grain size analysis (curve appended) performed on a representative split spoon sample of the till shows it to contain 31 percent gravel, 22 percent sand, and 47 percent fines. The till sample was found to have a natural moisture content of 12 percent.

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

Parameter	Native TIII
Total Unit Weight	20 kN/m^3
Submerged Unit Weight	10.2 kN/m^3
Effective Friction Angle	34 degrees

Bedrock

Sedimentary bedrock was encountered directly below the till stratum at the borehole locations. The rock core recovered consists predominantly of very weak to weak, reddish brown, fine to medium grained sandstone with some interbedding with hard reddish brown mudstone as noted on the Borehole Records.

The bedrock surface was encountered 4.0 to 5.1 m below harbour bottom at the present boreholes. The bedrock surface elevation was found to range from a low of el. -5.10 m at BH-01 to a high of el. -3.97 m at BH-02.

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 69 indicates fair quality, fractured bedrock.

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

Parameter	Native TIII
Total Unit Weight	23 kN/m^3
Submerged Unit Weight	13.2 kN/m^3
Effective Friction Angle	36 degrees

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 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 report meets your requirements at this time. Please contact us if you have any questions, or if we can be of further assistance.

Sincerely,

STANTEC CONSULTING LTD.

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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.

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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.

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SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

Topsoil	-	mixture of soil and humus capable of supporting vegetative growth
Peat	-	mixture of visible and invisible fragments of decayed organic matter
Till	-	unstratified glacial deposit which may range from clay to boulders
Fill	-	material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

Desiccated	-	having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure
Varved	-	composed of regular alternating layers of silt and clay
Stratified	-	composed of alternating successions of different soil types, e.g. silt and sand
Layer	-	> 75 mm in thickness
Seam	-	2 mm to 75 mm in thickness
Parting	-	< 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). The classification excludes particles larger than 76 mm (3 inches). 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 76 mm, visible organic matter, construction debris) is based upon the proportion of these materials present:

Trace, or occasional	Less than 10%
Some	10-20%
Frequent	> 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 N-Value (also known as N-Index). A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
Very Loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very Dense	>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	Undrained Shear Strength	
	kips/sq.ft.	kPa
Very Soft	<0.25	<12.5
Soft	0.25 - 0.5	12.5 - 25
Firm	0.5 - 1.0	25 - 50
Stiff	1.0 - 2.0	50 – 100
Very Stiff	2.0 - 4.0	100 - 200
Hard	>4.0	>200

ROCK DESCRIPTION

Terminology describing rock quality:

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

Rock quality classification is based on a modified core recovery percentage (RQD) in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. RQD was originally intended to be done on NW core; however, it can be used on different core sizes if the bulk of the fractures caused by drilling stresses are easily distinguishable from *in situ* fractures. The terminology describing rock mass quality based on RQD is subjective and is underlain by the presumption that sound strong rock is of higher engineering value than fractured weak rock.

Terminology describing rock mass:

Spacing (mm)	Joint Classification	Bedding, Laminations, Bands
> 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:

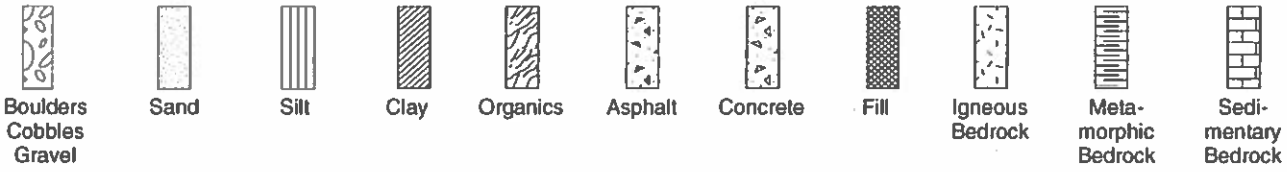
Strength Classification	Unconfined Compressive Strength (MPa)
Extremely Weak	< 1
Very Weak	1 – 5
Weak	5 – 25
Medium Strong	25 – 50
Strong	50 – 100
Very Strong	100 – 250
Extremely Strong	> 250

Terminology describing rock weathering:

Term	Description
Fresh	No visible signs of rock weathering. Slight discolouration along major discontinuities
Slightly Weathered	Discolouration indicates weathering of rock on discontinuity surfaces. All the rock material may be discoloured.
Moderately Weathered	Less than half the rock is decomposed and/or disintegrated into soil.
Highly Weathered	More than half the rock is decomposed and/or disintegrated into soil.
Completely Weathered	All the rock material is decomposed and/or disintegrated into soil. The original mass structure is still largely intact.

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.



Boulders, Cobbles, Gravel | Sand | Silt | Clay | Organics | Asphalt | Concrete | Fill | Igneous Bedrock | Meta-morphic Bedrock | Sedi-mentary Bedrock

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
WS	Wash 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 (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (305 mm) into the soil. 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 value 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 (305 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)

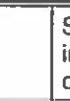
	Single packer permeability test; test interval from depth shown to bottom of borehole
	Double packer permeability test; test interval as indicated
	Falling head permeability test using casing
	Falling head permeability test using well point or piezometer

Table 1 - Borehole Summary - West Point

	Present Boreholes			Previous Boreholes	
Borehole Number	BH-01	BH-02	BH-03	BH 1	BH 2
Harbour Bottom el., m	1.00	0.60	0.30	-2.90	-1.80
Loose Marine Deposit Thickness, m	0.91	0.91	0.91	0.00	0.00
Compact Marine Deposit Thickness, m	2.14	2.39	2.39	0.50	1.50
Total Marine Deposit Thickness, m	3.05	3.30	3.30	0.50	1.50
Till Surface el., m	-2.05	-2.70	-3.00	-2.90	-
Till Thickness, m	3.05	1.27	1.27	1.30	-
Depth to Bedrock Surface, m	6.10	4.57	4.57	1.30	1.50
Bedrock Surface el., m	-5.10	-3.97	-4.27	-4.20	-3.30
Depth of Borehole, m	7.77	7.52	7.62	6.80	6.90

NOTES:

- the present boreholes (BH-01, BH-02, and BH-03) were drilled at the site on December 7 and 8, 2009 with a mobile auger drill rig
- the previous boreholes (BH 1 and BH 2) were drilled at the site on March 12 and 13, 1988 with a diamond drill rig
- harbour bottom elevations are referenced to Low Normal Tide (Chart) Datum

BOREHOLE RECORD

BOREHOLE No.: BH-01

PROJECT No.: 2988

CLIENT: Public Works and Government Services Canada

LOCATION: West Point Harbour, Prince County, PEI

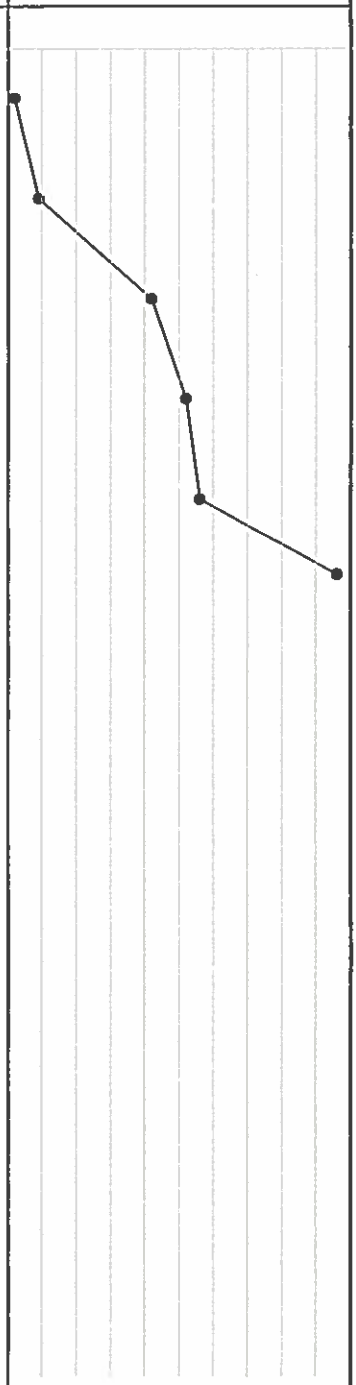
DATES: BORING: December 7 and 8, 2009 **WATER LEVEL:** Tidal

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
0	1.00	Harbour Bottom									
0.00		Very loose brown sand, trace silt, gravel, shell fragments: **Marine Deposit**			SS	1	100	2			
0.09					SS	2	550	9		23	S
0.91		Compact to dense brown gravelly sand, some silt, trace shell fragments: **Marine Deposit**			SS	3	300	42			
					SS	4	350	52		9	S
					SS	5	150	56			
-2.05					SS	6	150	96			
3.05					NQ	7	150		-		
		Compact reddish brown gravelly silt and sand, some sandstone cobbles/layers: **Till**			NQ	8	75		-		
					NQ	9	325		-		
-5.10											
6.10		Very weak to weak fine grained reddish brown sandstone interrbedded with hard reddish brown mudstone: **Bedrock**; extremely close to close joint spacing			NQ	10	83%		67		
-6.77											
7.77		End of Borehole									

SPT N-Value

10 30 50 70 90



BOREHOLE RECORD

Stantec

BOREHOLE No.: BH-02

PROJECT No.: 2988

CLIENT: Public Works and Government Services Canada

LOCATION: West Point Harbour, Prince County, PEI

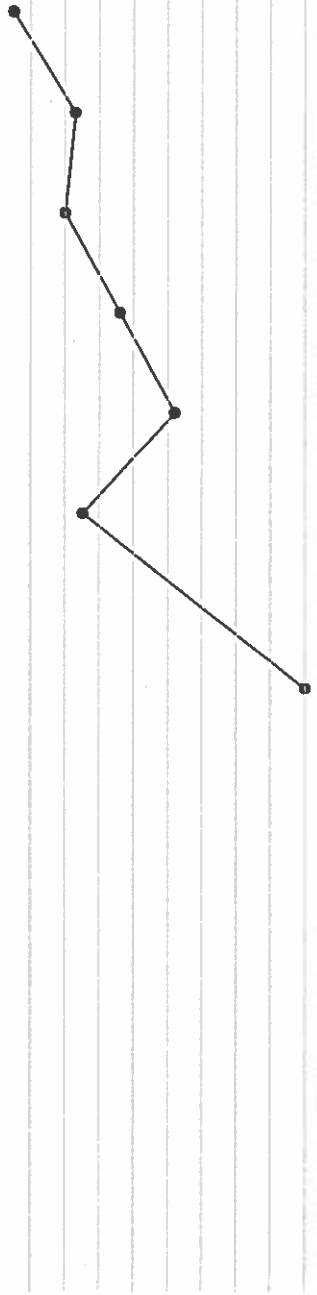
DATES: BORING: December 7 and 8, 2009 **WATER LEVEL:** Tidal

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
	0.60	Harbour Bottom									
0	0.00	Very loose reddish brown to dark brown sand, trace silt, gravel, shell fragments: **Marine Deposit**			SS	1	350	5			
1	-0.31				SS	2	600	23		16	S
1	0.91	Compact to dense brown *gravelly sand, some silt*, to *sand, some silt, gravel*, trace shell fragments: **Marine Deposit**			SS	3	500	20			
2					SS	4	300	36			
3					SS	5	350	52		12	S
	-2.70				SS	6	300	25			
	3.30	Compact reddish brown gravelly silt and sand, some sandstone cobbles/layers: **Till**									
4	-3.97				SS	7	75	90			
	4.57	Very weak to weak fine grained reddish brown sandstone interrbedded with hard reddish brown mudstone: **Bedrock**; extremely close to close joint spacing			NQ	8	88%		70		
5	-5.40										
6	6.00	Very weak to weak fine to medium grained reddish brown sandstone: **Bedrock**; extremely close to moderately close joint spacing			NQ	9	90%		68		
7	-6.92										
	7.52	End of Borehole									
8											

SPT N-Value

10 30 50 70 90



BOREHOLE RECORD

BOREHOLE No.: BH-03

PROJECT No.: 2988

CLIENT: Public Works and Government Services Canada

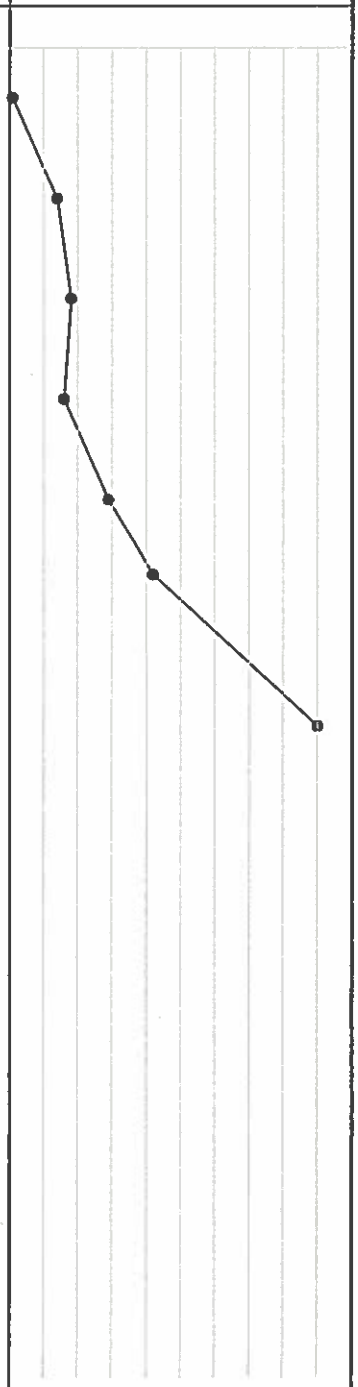
LOCATION: West Point Harbour, Prince County, PEI

DATES: BORING: December 8, 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
	0.30	Harbour Bottom									
0	0.00	Very loose reddish brown to dark brown sand, trace silt, gravel, shell fragments: **Marine Deposit**			SS	1	325	1			
	-0.61				SS	2	600	14		24	S
1	0.91	Compact to dense brown *gravelly sand, some silt*, to *sand, some silt, gravel*, trace shell fragments: **Marine Deposit**			SS	3	450	18			
2					SS	4	500	16		18	S
3					SS	5	475	29			
	-3.00				SS	6	250	42		12	S
	3.30	Compact reddish brown gravelly silt and sand, some sandstone cobbles/layers: **Till**									
4					SS	7	50	90			
	-4.27				NQ	8	100		-		
	4.57	Very weak to weak fine grained reddish brown sandstone: **Bedrock**; extremely close to close joint spacing			NQ	9	80%		62		
5											
6	-5.80										
	6.10	Very weak to weak fine to medium grained reddish brown sandstone: **Bedrock**; extremely close to moderately close joint spacing			NQ	10	92%		80		
7											
	-7.32										
	7.62	End of Borehole									
8											

SPT N-Value

10 30 50 70 90



BOREHOLE RECORD

BOREHOLE No. 1

CLIENT Public Works Canada

PROJECT No. P604

LOCATION West Point Breakwater

CASING SIZE BW

DATES: BORING March 12, March 13, 1988 WATER LEVEL -

DATUM LNT

DEPTH (FT.)	DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR ROD %	OTHER TESTS
0	0	-2.6							
		-2.9	Wood		SS	1	25		
		-3.4	Compact, red sand		SS	2	250	27	
	1		Hard, red, sandy silt TILL						
5		-4.2			SS	3	280	67	
	2				RC	4	54%	29	
10	3		Very severely fractured to severely fractured SILTSTONE and MUDSTONE with occasional seams of clay		RC	5	62%	37	
	4				RC	6	67%	45	
15	5								
20	6				RC	7	60%	17	
		-9.4							
	7		End of Borehole						
25	8								
30									

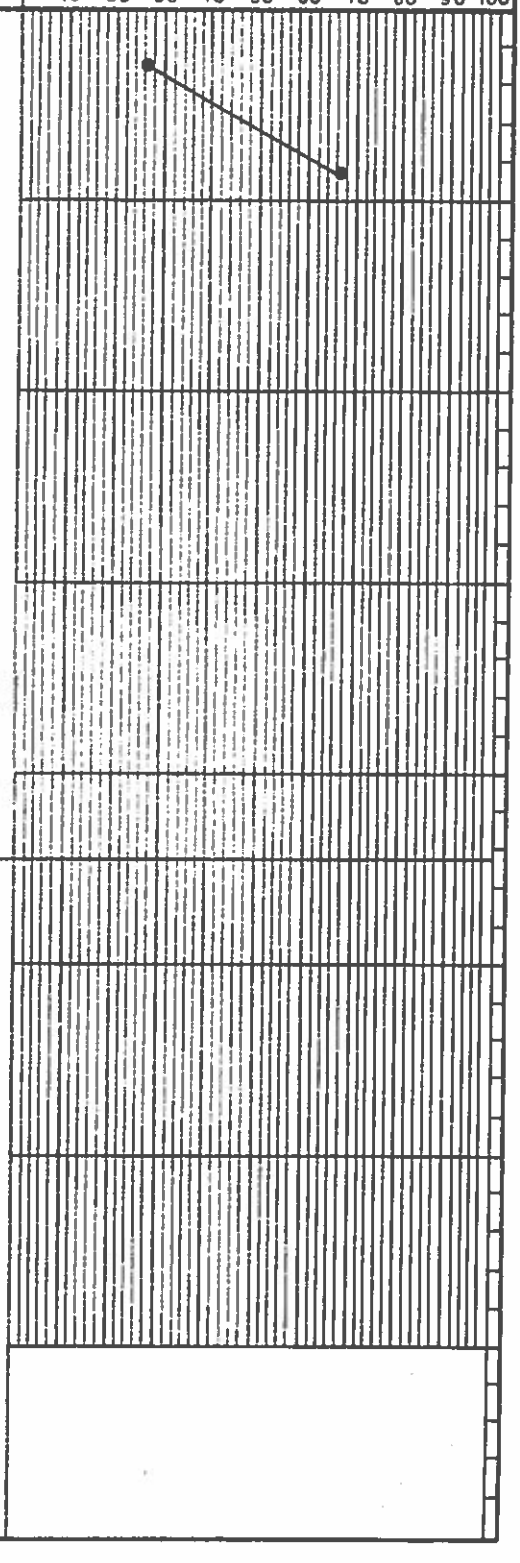
UNDRAINED SHEAR STRENGTH -

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC PENETRATION TEST x

STANDARD PENETRATION TEST, N-VALUE ●

10 20 30 40 50 60 70 80 90 100



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BOREHOLE RECORD

BOREHOLE No. 2

CLIENT Public Works Canada — PROJECT No. P604

LOCATION West Point Breakwater — CASING SIZE BW

DATES: BORING March 15,1988 — WATER LEVEL - — DATUM LNT

DEPTH (FT.)	DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR ROD %	OTHER TESTS
		-1.8							
0	0		Compact, red SAND bedded with very severely fractured sandstone		SS	1	330	19	
	1	-3.3							
5	2		Very severely fractured sandstone interbedded with conglomerate BEDROCK		RC	2	50%	0	
10	3				RC	3	33%	17	
	4	-5.7							
15	5		Very severely fractured to fractured Mudstone BEDROCK weak and weathered		RC	4	67%	31	
					RC	5	60%	0	
20	6				RC	6	100%	42	
	7	-8.7							
25	8		End of Borehole						
30	9								
	10								

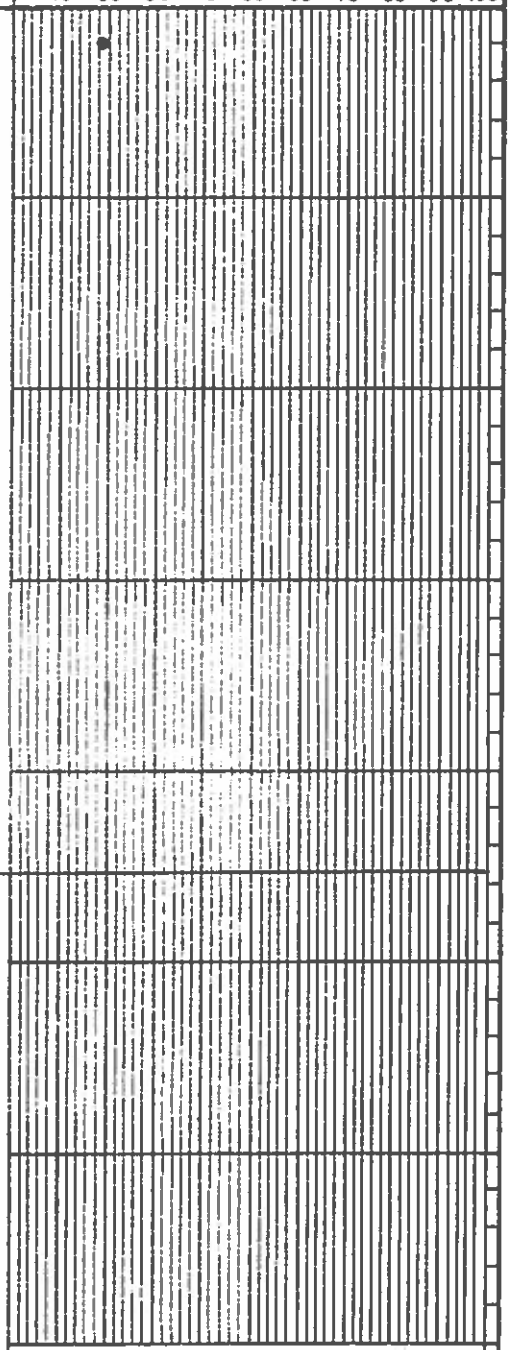
UNDRAINED SHEAR STRENGTH -

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC PENETRATION TEST X

STANDARD PENETRATION TEST, N-VALUE ●

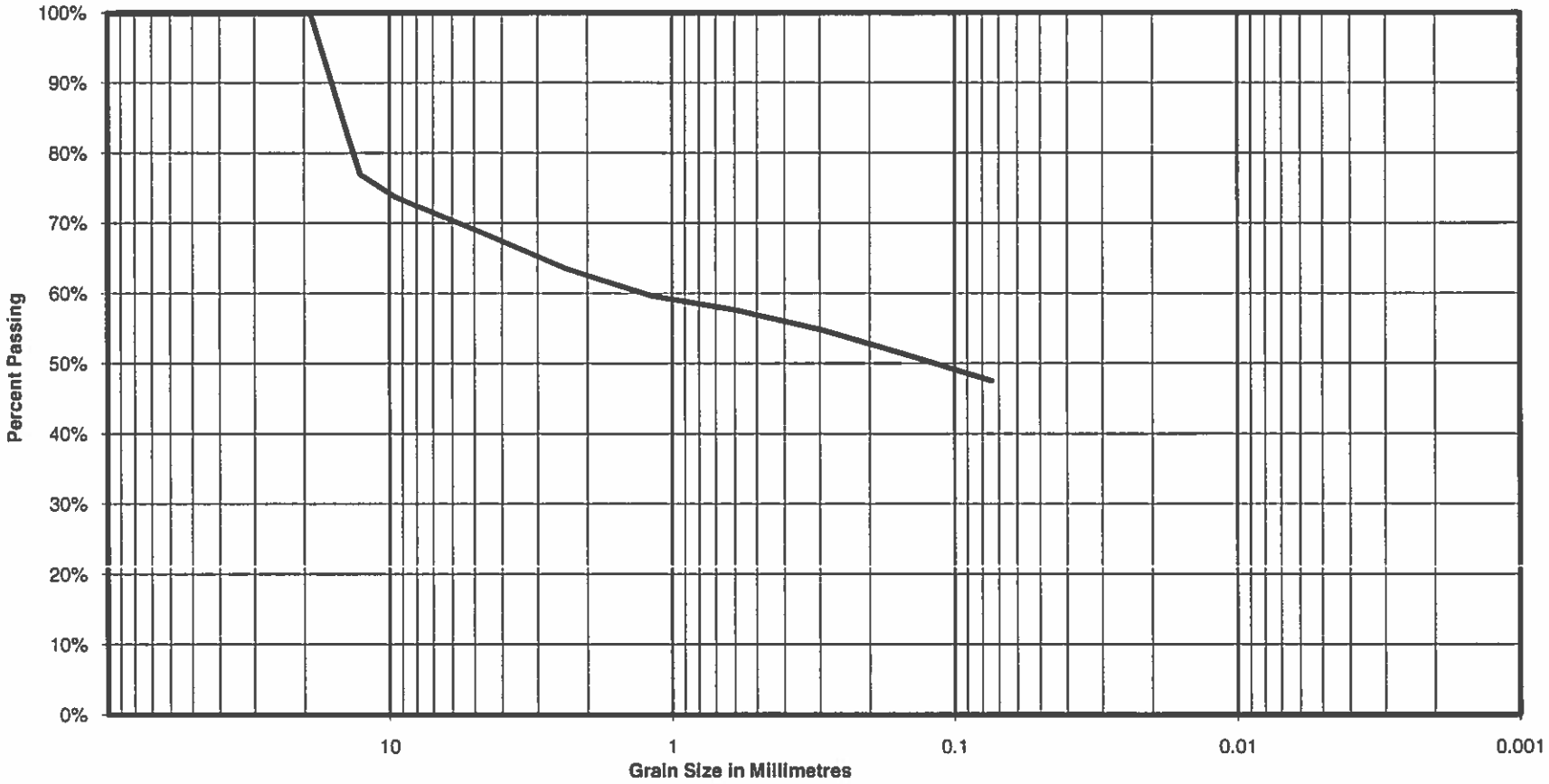
10 20 30 40 50 60 70 80 90 100



204 1/85

Approved:

Project Name: West Point



	Gravel		Sand			Silt and Clay
	Coarse	Fine	Coarse	Medium	Fine	

Unified Soil Classification System ASTM D 2487/2488

Curve	BOREHOLE/TESTPIT	SAMPLE	DEPTH (m)	Soil Fractions			Soil Description
				Gravel	Sand	Silt/Clay	
———	BH-03	6	3.2	31%	21%	47%	Gravelly silt and sand: Till

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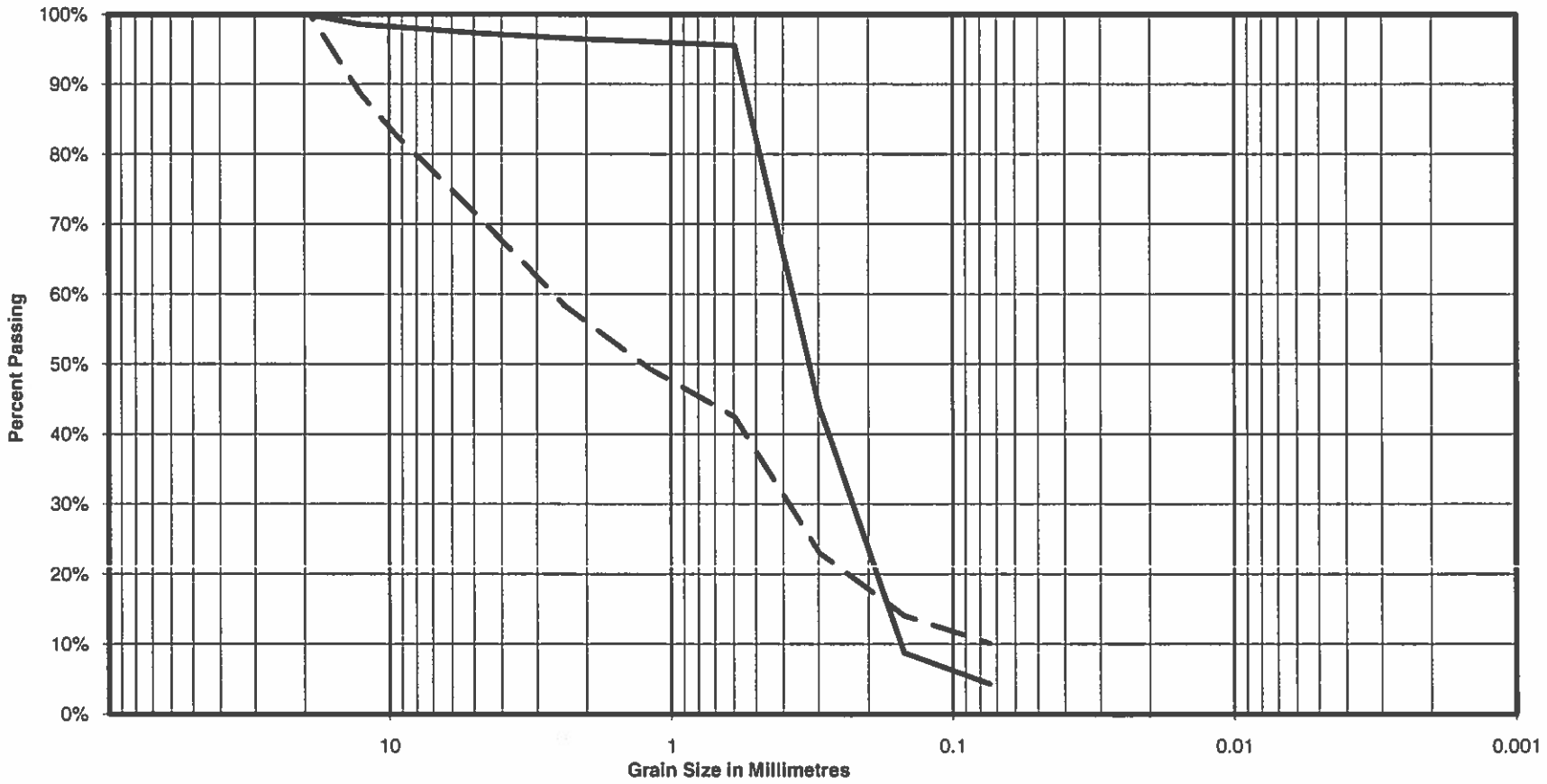
Project Name: West Point



	Gravel		Sand			Silt and Clay
	Coarse	Fine	Coarse	Medium	Fine	

Unified Soil Classification System ASTM D 2487/2488

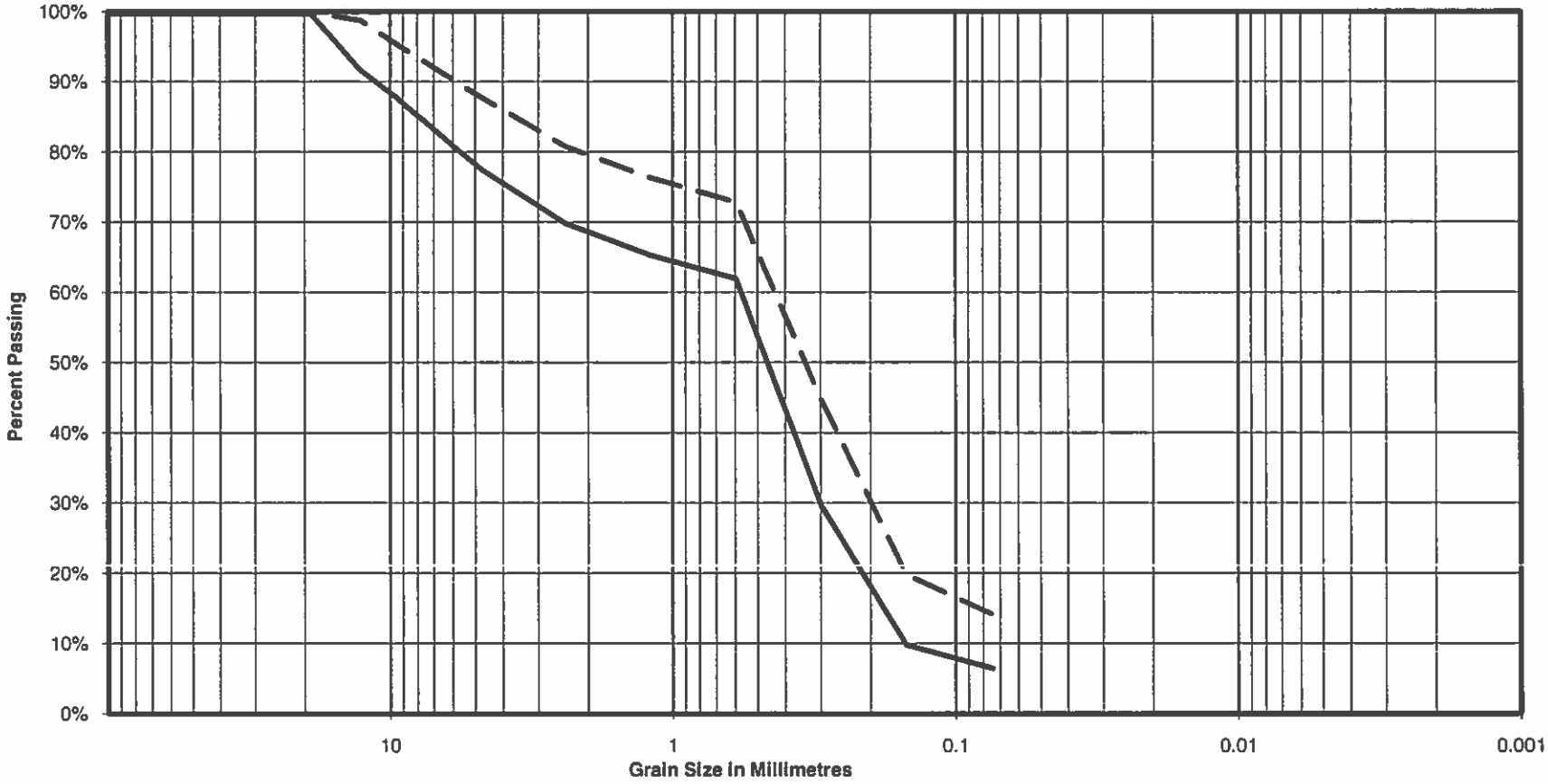
Curve	BOREHOLE/TESTPIT	SAMPLE	DEPTH (m)	Soil Fractions			Soil Description
				Gravel	Sand	Silt/Clay	
———	BH-01	2	0.9	3%	93%	4%	Sand, trace silt, gravel: Marine Deposit
— — -	BH-01	4	2.1	29%	61%	10%	Gravelly sand, some silt: Marine Deposit

Job No.: 2988

Stantec

Approved:

Project Name: West Point



	Gravel		Sand			Silt and Clay
	Coarse	Fine	Coarse	Medium	Fine	

Unified Soil Classification System ASTM D 2487/2488

Curve	BOREHOLE/TESTPIT	SAMPLE	DEPTH (m)	Soil Fractions			Soil Description
				Gravel	Sand	Silt/Clay	
———	BH-02	2	0.9	23%	71%	6%	Gravelly sand, trace silt: Marine Deposit
— — -	BH-02	5	2.7	12%	74%	14%	Sand, some silt, gravel: Marine Deposit

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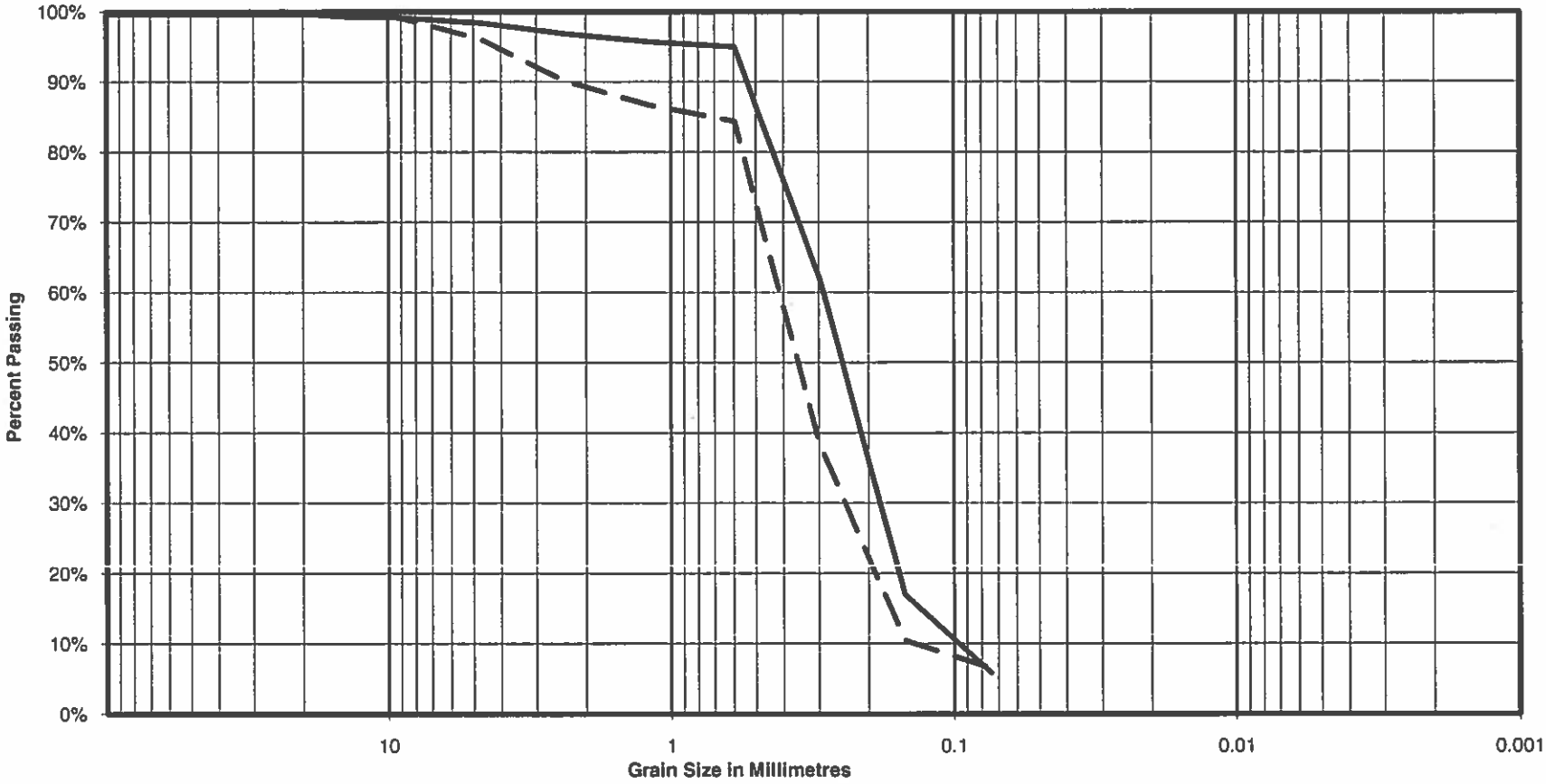
Job No.: 2988

Approved:

Project Name: West Point



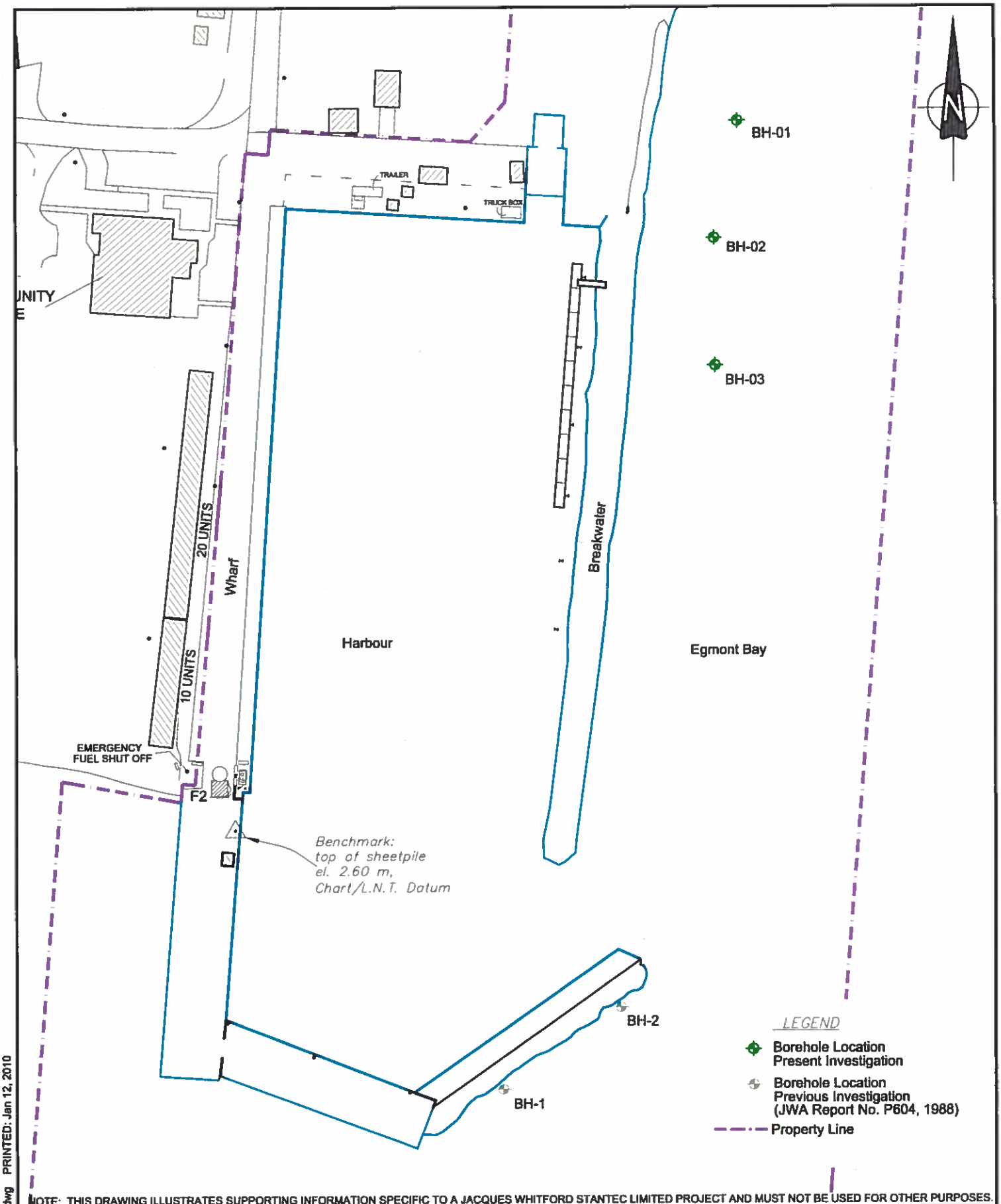
	Gravel		Sand			Silt and Clay
	Coarse	Fine	Coarse	Medium	Fine	

Unified Soil Classification System ASTM D 2487/2488

Curve	BOREHOLE/TESTPIT	SAMPLE	DEPTH (m)	Soil Fractions			Soil Description
				Gravel	Sand	Silt/Clay	
———	BH-03	2	0.9	2%	93%	6%	Sand, trace silt, gravel: Marine Deposit
— — -	BH-03	4	2.1	4%	90%	6%	Sand, trace silt, gravel: Marine Deposit

Stantec

Job No.: 2988



NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A JACQUES WHITFORD STANTEC LIMITED PROJECT AND MUST NOT BE USED FOR OTHER PURPOSES.

BOREHOLE LOCATION PLAN

PROPOSED WHARF MODIFICATIONS

WEST POINT HARBOUR, PRINCE COUNTY, PEI

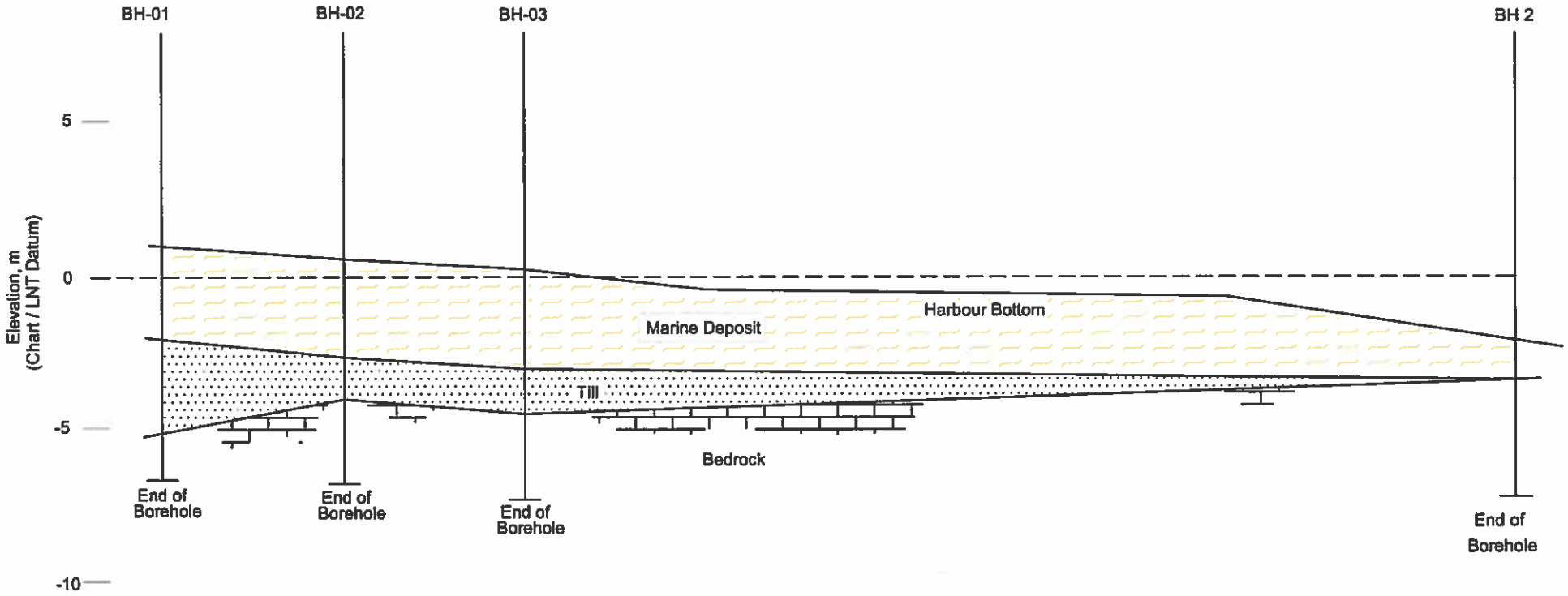
Client: PUBLIC WORKS AND GOVERNMENT SERVICE CANADA

Scale:	Job No.:	Dwg. No.:
1:1250	2988	2988-1

Date:	Dwn. By:	Appd. By:
2009/12/16	D.RIMMER	

Stantec

D:\CADD\7XXXX\2988-1.dwg PRINTED: Jan 12, 2010



Notes:
- BH-01, BH-02, BH-03 - Present Investigation

- BH 2 - Previous Investigation (JWA report No. P604, 1988)

- Subsurface conditions shown between boreholes are extrapolated from available information; actual conditions between borehole locations may differ from those shown

Scale 1:1000 (Horizontal)
1:200 (Vertical)

BOREHOLE STRATIGRAPHY

PROPOSED HARBOUR MODIFICATIONS
WEST POINT, PRINCE COUNTY, PEI

Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Scale:	Job No.:	Dwg. No.:
As Noted	2988	2988-2

Date:	Dwn. By:	Appd. By:
2010/01/11	D.RIMMER	

Stantec