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Factual Geotechnical Report Proposed Rehabilitation Structures 401 & 402

Lameque Wharf, New Brunswick





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Submitted to:

Public Services and Procurement Canada
1045 Main Street, Unit 100
Moncton, New Brunswick
E1C 1H1

Factual Geotechnical Report Proposed Rehabilitation Structures 401 & 402

Lameque Wharf, New Brunswick

February 27, 2018
Project: 10456.73

GEMTEC Consulting Engineers & Scientists Limited
77 Rooney Crescent
Moncton, NB, Canada
E1E 4M4

February 27, 2018

File: 10456.73 – R01

Public Services and Procurement Canada
1045 Main Street, Unit 100
Moncton, New Brunswick
E1C 1H1

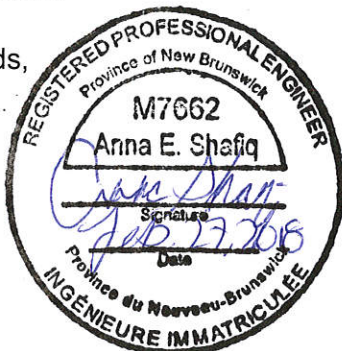
Attention: Mr. Jean Girouard, P.Eng.

**Re: Factual Geotechnical Report – Proposed Rehabilitation, Structures 401 & 402
Lameque Wharf, Lameque, New Brunswick**

Enclosed is our factual geotechnical report for the above noted project. This report was prepared by Anna Shafiq, M.A.Sc., P.Eng. and reviewed by Corey Keats, M.Sc.E., P.Eng.

Do not hesitate to contact the undersigned if you have any questions or require additional information.

Regards,



Anna Shafiq, M.A.Sc., P.Eng.

A handwritten signature in black ink, appearing to read "Corey Keats".

Corey Keats, M.Sc.E., P.Eng.

Enclosures
N:\Files\10400\10456.73\Report\2018aes0223-R01.docx

EXECUTIVE SUMMARY

The following factual geotechnical report pertains to the proposed rehabilitation to structures 401 and 402 at the Lameque Wharf in Lameque, New Brunswick. Nine boreholes were advanced through the existing concrete deck at Petit-Shippagan Wharf to depths of 3.1 to 18.4 metres below top of deck elevation. The geotechnical investigation determined the subsurface conditions at the site generally consist of the wharf's concrete deck underlain by gravel fill, which in turn is underlain by sandstone fill. A thin layer of silty sand underlies the sandstone fill with bedrock underlying the silty sand layer.

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1.0 INTRODUCTION

GEMTEC Consulting Engineers and Scientists Limited (GEMTEC) was retained by Public Services and Procurement Canada (PSPC) to undertake a geotechnical investigation in support of proposed rehabilitation to structures 401 and 402 along the Lameque Wharf in Lameque, New Brunswick (herein referred to as the “site”). This investigation was conducted according to the requirements of the Standing Offer Contract (EC373-180283/001/MCT) between PSPC and GEMTEC.

The purpose of this investigation was to identify the general subsurface conditions at the site. This report contains a general description of the area under investigation and a summary of the field work carried out. This report presents our findings for geotechnical purposes only; the investigation outlined in this report is strictly geotechnical in nature and should not be viewed as an environmental assessment of the site.

2.0 SITE DESCRIPTION

The Lameque is located near the south-eastern corner of Shippagan Harbour, in the town of Lameque, New Brunswick. The town of Lameque is located on Lameque Island at the north-eastern end of the Acadian Peninsula in New Brunswick. The wharf is accessed from Rue du Quai via NB Route 313.

Structures 401 and 402 are located to the south of the wharf. An armour stone breakwater is located west of the structures, with additional structures located north. An asphaltic concrete parking area is located to the east of Structures 401 and 402.

Structures 401 and 402 are Steel Sheet Pile (SSP) structures with a concrete deck. The investigated structures show visible signs of deterioration, including corrosion and perforation of the SSP walls, as well as cracking and settlement of the concrete slab, particularly at the edges of the wharf.

A borehole location plan showing site features is included in Appendix A.

3.0 REVIEW OF GEOLOGY MAPS

Digital surficial geology mapping of New Brunswick indicates that the area of the site generally consists of blankets and plains of Late Wisconsinan and/or Early Holocene aged marine sediments consisting of sand, silt, some gravel and clay generally 0.5 to 3.0 metres thick.

Digital bedrock geology mapping of New Brunswick indicates that these overburden soils rest on Late Carboniferous aged terrestrial sediments of red to grey sandstone, conglomerate and siltstone of the Pictou group.

4.0 SUBSURFACE INVESTIGATION

Nine boreholes (BH18-01 to BH18-10, excluding BH18-03) were advanced at the site between February 5 and 13, 2018 in the presence of GEMTEC geotechnical personnel. Due to ice cover at the time of investigation and the deteriorating condition of the wharf, boreholes could not be advanced from a barge nor advanced over the edge of the structure into the harbour. Therefore, boreholes were advanced through the existing concrete deck at structures 401 and 402. Borehole locations were selected by GEMTEC based on access and site features.

The boreholes were advanced to depths ranging from 3.1 to 18.4 metres below the top of deck elevation. The work was carried out using a track-mounted geotechnical drill rig provided and operated by Lantech Drilling Services Incorporated.

During borehole advancement, overburden soil samples were collected by GEMTEC personnel. Bedrock cores were collected from eight borehole locations using an HQ sized core barrel (63.5 mm diameter). Standard Penetration Test (SPT) N-Values and Rock Quality Designation (RQD) values were recorded during overburden soil and bedrock collection, respectively. Local soil and bedrock stratigraphy were visually catalogued throughout the investigation. Termination depth ranged between 0.8 and -14.6 metres, chart datum.

The borehole locations and elevations were surveyed by GEMTEC using our high precision GPS equipment. Elevations referenced in this report and on the attached logs are based on chart datum.

A site and borehole location plan is presented in Appendix A. Descriptive terms and detailed borehole logs are appended (Appendix B). Laboratory testing results are included in Appendix C and select site photos are presented in Appendix D.

5.0 SUBSURFACE CONDITIONS

5.1 General

The soil stratigraphy presented in the borehole logs are representative of subsurface conditions at the specific borehole locations only. Boundaries between soil and bedrock zones on the logs are often not distinct, but rather are transitional and have been interpreted. Subsurface conditions at locations other than the borehole locations may vary from the conditions reported in the borehole logs. The soil and bedrock descriptions in this report are based on commonly accepted methods of classification and identification employed in geotechnical practice. Classification and identification of soil involves judgement and GEMTEC does not guarantee descriptions as exact, but infers accuracy to the extent that is common in current geotechnical practice.

The geotechnical investigation determined the subsurface conditions at the site generally consist of the wharf's concrete deck underlain by gravel fill, which in turn is underlain by sandstone fill. A thin layer of silty sand underlies the sandstone fill with bedrock underlying the silty sand layer.

A summary of the subsurface conditions encountered at the site are presented in Table 5.1.

Table 5.1 – Summary of Subsurface Conditions

Borehole	Borehole Elevation ¹	Borehole Depth	Concrete & Fill Thickness	Silty Sand Thickness	Glacial Till Thickness	Bedrock Elevation ¹
(metres)						
18-01	3.9	12.3	6.9	0.2	0.8	-4.0
18-02	4.0	12.2	7.3	0.3	--	-3.6
18-04	3.9	10.8	5.8	0.6	--	-2.5
18-05	3.9	10.9	7.0	0.2	--	-3.3
18-06	3.9	12.4	7.2	0.9	--	-4.2
18-07	3.8	3.1	3.1 ²	--	--	--
18-08	3.8	14.6	7.9	--	0.6	-4.7
18-09	3.8	16.7	7.9	0.5	3.5	-8.1
18-10	3.8	18.4	9.1	2.3	2.4	-10.1

Notes: 1. Elevations reference chart datum.

2. Hole terminated due to encountering an unknown object; full thickness of fill layer is undetermined.

5.2 Asphaltic Concrete & Concrete Deck

Asphaltic concrete was encountered at the surface of two boreholes (BH18-01 and BH18-02) measuring approximately 100 millimetres thick.

The wharf's concrete deck surface was encountered at the surface of the remaining borehole locations. The thickness of the concrete deck surface is approximately 220 millimetres thick.

5.3 Fill

A thin layer of red to reddish-brown sand and gravel fill was encountered underlying the asphaltic concrete or concrete in all boreholes locations. The thickness of the sand and gravel fill measures approximately 100 to 200 millimetres thick.

Sandstone fill was encountered in all borehole locations underlying the sand and gravel fill. The thickness of the sandstone fill layer ranges from 5.5 (BH18-04) to 8.8 (BH18-10) metres. Based on the SPT N-values averaging 21, the compactness of the sandstone fill can be described as compact.

5.4 Silty Sand

A thin layer of grey to black silty sand with shell fragments was encountered underlying the sandstone fill in five borehole locations. The thickness of the silty sand ranges from 0.1 to 0.6 metres.

Grey to reddish-brown clayey silt was encountered in two borehole locations: BH18-06 and BH18-10. The clayey silt measures approximately 0.9 and 2.3 metres, respectively.

5.5 Glacial Till

Glacial till was encountered underlying the sandstone fill in BH18-08, underlying the silty sand of BH18-01 and BH18-09 and underlying the silt of BH18-10. Glacial till is a heterogeneous mixture of all grain sizes, but for this site may generally be described as reddish-brown silty sand and gravel with trace clay. SPT N-values recorded within the glacial till range from 18 to 48, averaging 27. Therefore, the glacial till can be described as compact. The glacial till was encountered at depths of 7.0 (BH18-01) to 11.4 (BH18-10) metres below top of concrete deck with the thickness of the glacial till layer ranging from 0.6 (BH18-08) to 3.5 (BH18-09) metres.

Laboratory index testing undertaken on two representative samples of the glacial till shows that the material comprises 6 to 30% gravel, 33 to 59% sand, and 11 to 60% silt and clay sized particles. The moisture contents of the glacial till ranges from approximately 13 to 17%.

5.6 Bedrock

Red to brown mudstone bedrock was encountered in all boreholes, except BH18-07 which was terminated prior to reaching bedrock elevations. Based on RQD values averaging 52%, the overall quality of the mudstone bedrock can be described as poor and severely fractured with close fracture spacing (60 to 200 millimetres).

Grey fine-grained sandstone bedrock was encountered overlying the mudstone bedrock of BH18-01 and underlying the mudstone bedrock of BH18-10. RQD values of 30 and 35%, respectively, indicate that the overall quality of the encountered sandstone bedrock is poor and severely fractured with close fracture spacing (60 to 200 millimetres).

Two rock cores were broken to determine the representative compressive strength of the encountered bedrock. The compressive strengths of 1.4 and 48.6 MPa indicate the mudstone can be described as very weak to moderately strong. Photos of select core photos are included in Appendix D. Rock cores will be available for viewing at the GEMTEC Moncton laboratory.

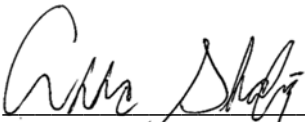
6.0 CLOSURE

This report is factual in nature and does not offer any geotechnical recommendations. Should recommendations be desired, GEMTEC would be pleased to offer them upon request.

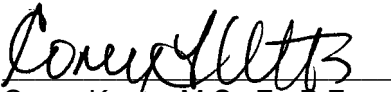
This report has been prepared for the sole benefit of our client, PSPC. The report may not be relied upon by any other person or entity without the express written consent of both GEMTEC and our client, PSPC.

Any use that a third party makes of this report, or any reliance or decisions made based on it, is the responsibility of such third parties. GEMTEC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust this factual report provides sufficient information for your present purposes. If you have any questions concerning this report, do not hesitate to contact the undersigned.



Anna Shafiq, M.A.Sc., P.Eng.
Geotechnical Materials Engineer
GEMTEC



Corey Keats, M.Sc.E., P.Eng.
President
GEMTEC




APPENDIX A

Borehole Layout & Site Features

N: \\DRAWINGS\\10400\\10456.73\\1045673 - BOREHOLE LOCATION PLAN.DWG,11 X 17, 18/02/28 10:08:57 AM





Legend.

 BOREHOLE LOCATION

Notes.

1. All information computed in HT2 NAD83/(CSRS) format and referenced to monument 90B9023 with a chart datum elevation of 4.259m.

Drawn By	DGH	Checked By
Calculations By		Checked By
Date	FEBRUARY 2018	
Project	SOA EC373-180283/001/MTC - LAMEQUE WHARF STRUCTURE 401 AND 402 GEOTECHNICAL INVESTIGATION	
Drawing	BOREHOLE LOCATION PLAN	
Scale	1:1000  0 20 40 60m	
File No.	Drawing	Revision No.
1045673	APPENDIX 1	0

 **GEMTEC**
CONSULTING ENGINEERS
AND SCIENTISTS



APPENDIX B

Descriptive Terms and Borehole Logs



DESCRIPTIVE TERMS BOREHOLE / TEST PIT LOGS

GRAIN SIZE

0.01

0.1

1.0

10

100

1000 mm

SILT CLAY

F

M

C

GRAVEL

COBBLE

BOULDER

0.08

0.4

2

5

80

200

DESCRIPTIVE TERMINOLOGY

0%

10%

20%

35%

weight % of material

TRACE

SOME

ADJECTIVE

and > 35%

trace clay, etc.

some gravel, etc.

silty, etc.

noun > 35% and main fraction

sand and gravel, etc.

COMPACTNESS GRANULAR SOILS

SPT N-VALUES

0 - 4

4 - 10

10 - 30

30 - 50

> 50

DESCRIPTION

VERY LOOSE

LOOSE

COMPACT

DENSE

VERY DENSE

CONSISTENCY COHESIVE SOILS

Cu, kPa

0 - 12

12 - 25

25 - 50

50 - 100

100 - 200

> 200

SPT N-VALUES

0 - 2

2 - 4

4 - 8

8 - 15

15 - 30

> 30

DESCRIPTION

VERY SOFT

SOFT

FIRM

STIFF

VERY STIFF

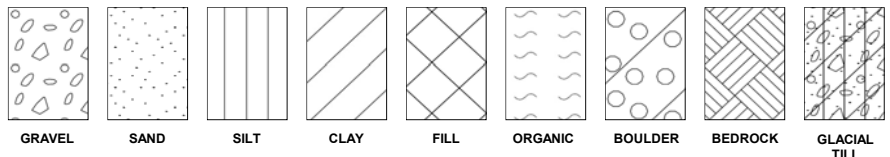
HARD

ROCK	RQD	OVERALL QUALITY			FRACTURE SPACING		
	0 - 25	VERY POOR, VERY SEVERELY FRACTURED			VERY CLOSE 20 - 60 mm		
	25 - 50	POOR, SEVERELY FRACTURED			CLOSE 60 - 200 mm		
	50 - 75	FAIR, FRACTURED			MODERATE 200 - 600 mm		
	75 - 90	GOOD, MODERATELY JOINTED			WIDE 600 - 2000 mm		
	90 - 100	EXCELLENT, INTACT			VERY WIDE 2 - 6 m		
COMP.STRENGTH, MPa		1 - 5	5 - 25	25 - 50	50 - 100	100 - 250	> 250
DESCRIPTION		VERY WEAK	WEAK	MODERATE	STRONG	VERY STRONG	EXTREMELY STRONG

SAMPLE TYPES (location to scale on log)

S	SPLIT TUBE	G	GRAB / SHOVEL
T	SHELBY TUBE	H	CARVED BLOCK
P	PISTON	K	SLOTTED
F	AUGER	V	IN-SITU VANE
W	WASH	NR	NO RECOVERY

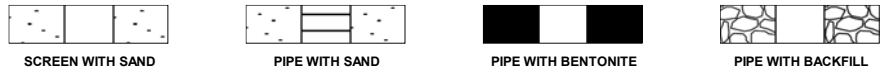
LOG SYMBOLS



WELL SYMBOLS

ROCK CORES A (30 mm); B (41 mm);

N (54 mm); H (63 mm)



N - standard penetration test; blows by 475 J drop hammer to advance standard 50 mm O.D. split tube sampler 0.3 m ●

RQD - percent of core consisting of hard, sound pieces in excess of 100 mm long (excluding machine breaks)

RECOVERY - sample recovery expressed as percentage or length

Cu - shear strength, kPa; vane Φ ; penetrometer \blacksquare ; unconfined \odot ; Uc unconfined compressive strength

Sr - shear strength, remoulded; vane \otimes ; penetrometer \square

Dd - dry density; t/m³

W - natural moisture content, percent *

PL - plastic limit; percent —

LL - liquid limit; percent —

ND - non-detect, total petroleum hydrocarbons (TPH) not detected in soil

GROUNDWATER LEVEL ∇

SEEPAGE ∇



BOREHOLE LOGS

Client Public Works & Government Services Canada

Proj No. 10456.73

BOREHOLE

Project Geotechnical Investigation

Date Drilled 13.Feb.2018

BH18-01

Page 1 of 1

Location Lameque Wharf, Lameque NB

Ground Level, m 3.88

Datum: Chart

Logged By TD

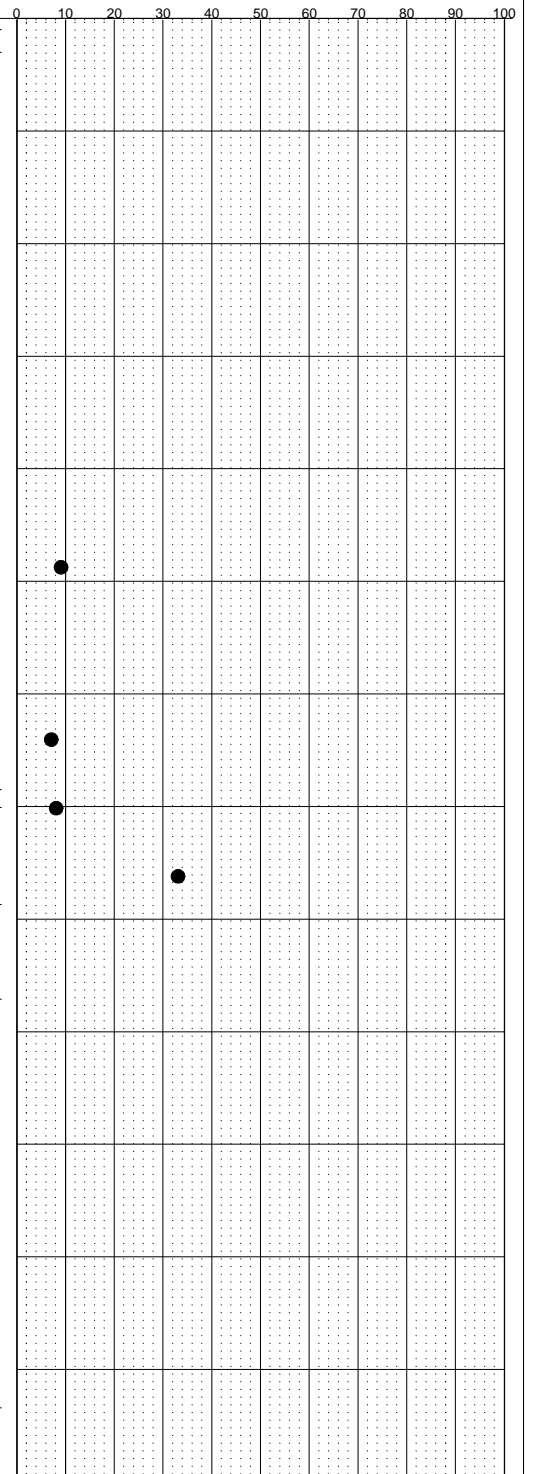
0 25 Undrained Shear Strength - kPa 75 100

○ Unconfined Compression
⊕ Field Vane Test
■ Pocket Penetrometer
⊗ Remoulded

Water Content & Atterburg Limits
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m

W_P W_L

DEPTH m	SAMPLE				LOG	DESCRIPTION
	No	TYPE	N (RQD)	REC (mm)		
0						0.10 ASPHALTIC CONCRETE 3.78 p.30 FILL 3.58 Red to brown sand and gravel Sandstone fill, weak
1						
2						
3						
4						
5	1	S	9	175		
6						
7	2	S	7	250		
	3	S	8	400		6.85 -2.97 7.01 SAND and SILT -3.13 Grey to black sand and silt, some shells GLACIAL TILL Red to brown silty sand and gravel, trace clay
8	5	HQ	30	1473		7.87 SANDSTONE BEDROCK -3.99 Grey fine-grained sandstone bedrock
9						8.71 -4.83 MUDSTONE BEDROCK Red to brown mudstone bedrock
10	6	HQ	58	1520		
11	7	HQ	50	1520		
12						12.34 -8.46 End of borehole at 12.3 metre below existing top of deck





BOREHOLE LOGS

Client Public Works & Government Services Canada

Proj No. 10456.73

BOREHOLE

Project Geotechnical Investigation

Date Drilled 13.Feb.2018

BH18-02

Page 1 of 1

Location Lameque Wharf, Lameque NB

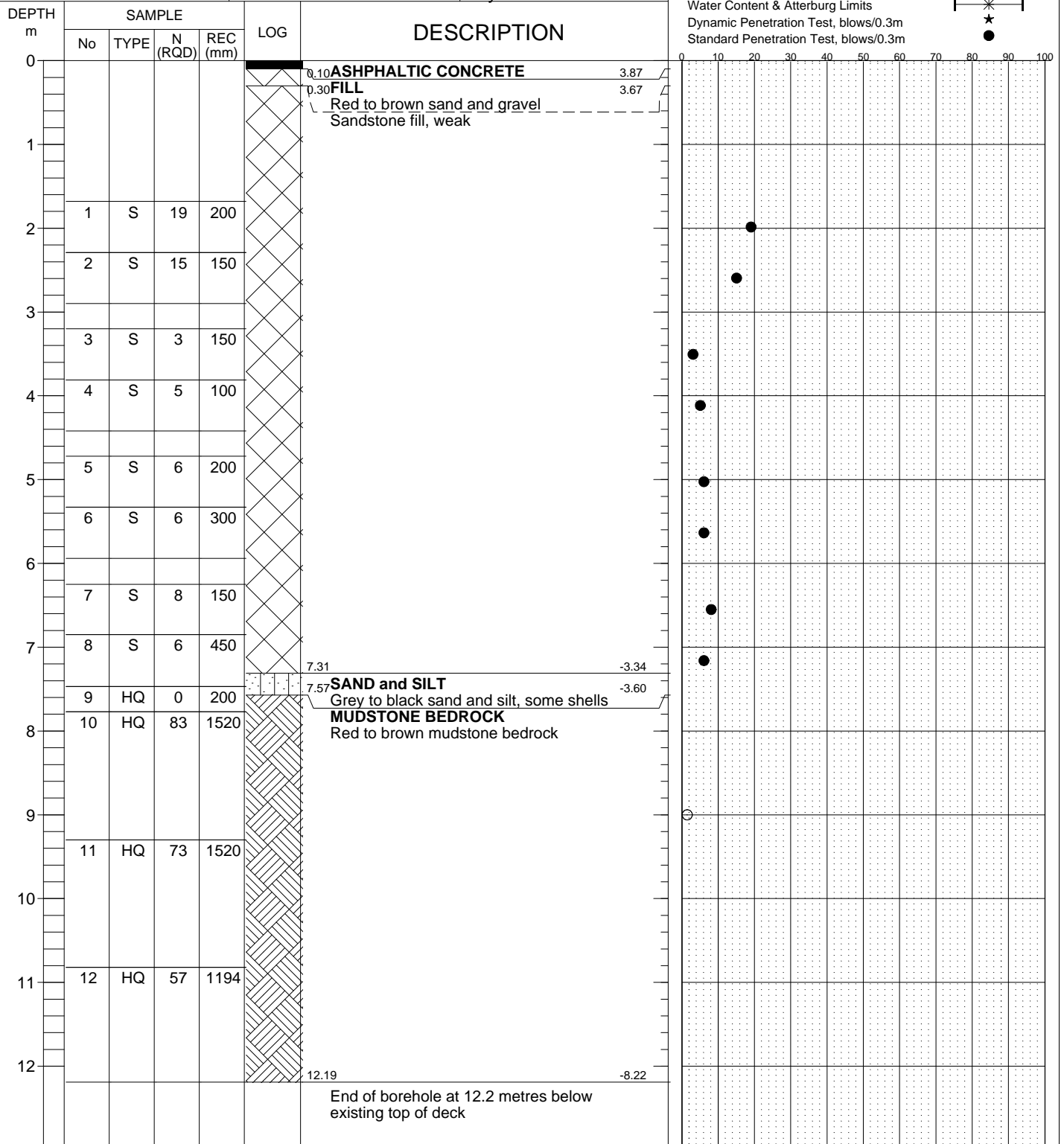
Ground Level, m 3.97

Datum:

Chart

Logged By

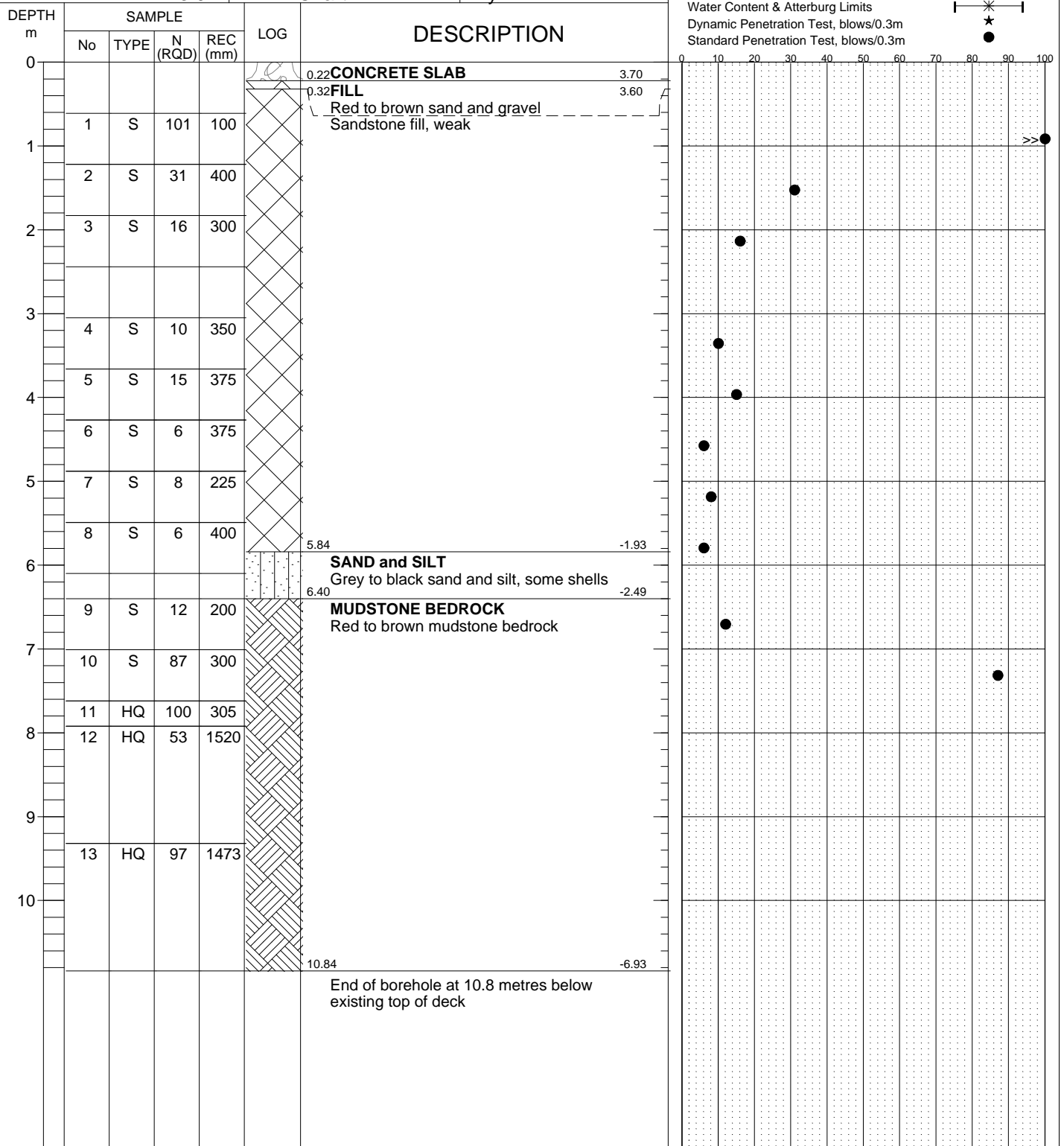
TD



BOREHOLE LOGS

Client	Public Works & Government Services Canada	Proj No.	10456.73	BOREHOLE
Project	Geotechnical Investigation	Date Drilled	05.Feb.2018	BH18-04
Location	Lameque Wharf, Lameque NB			Page 1 of 1

Ground Level, m	3.92	Datum:	Chart	Logged By	TD
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BOREHOLE LOGS

Client Public Works & Government Services Canada

Proj No. 10456.73

BOREHOLE

Project Geotechnical Investigation

Date Drilled 06.Feb.2018

BH18-05

Page 1 of 1

Location Lameque Wharf, Lameque NB

Ground Level, m

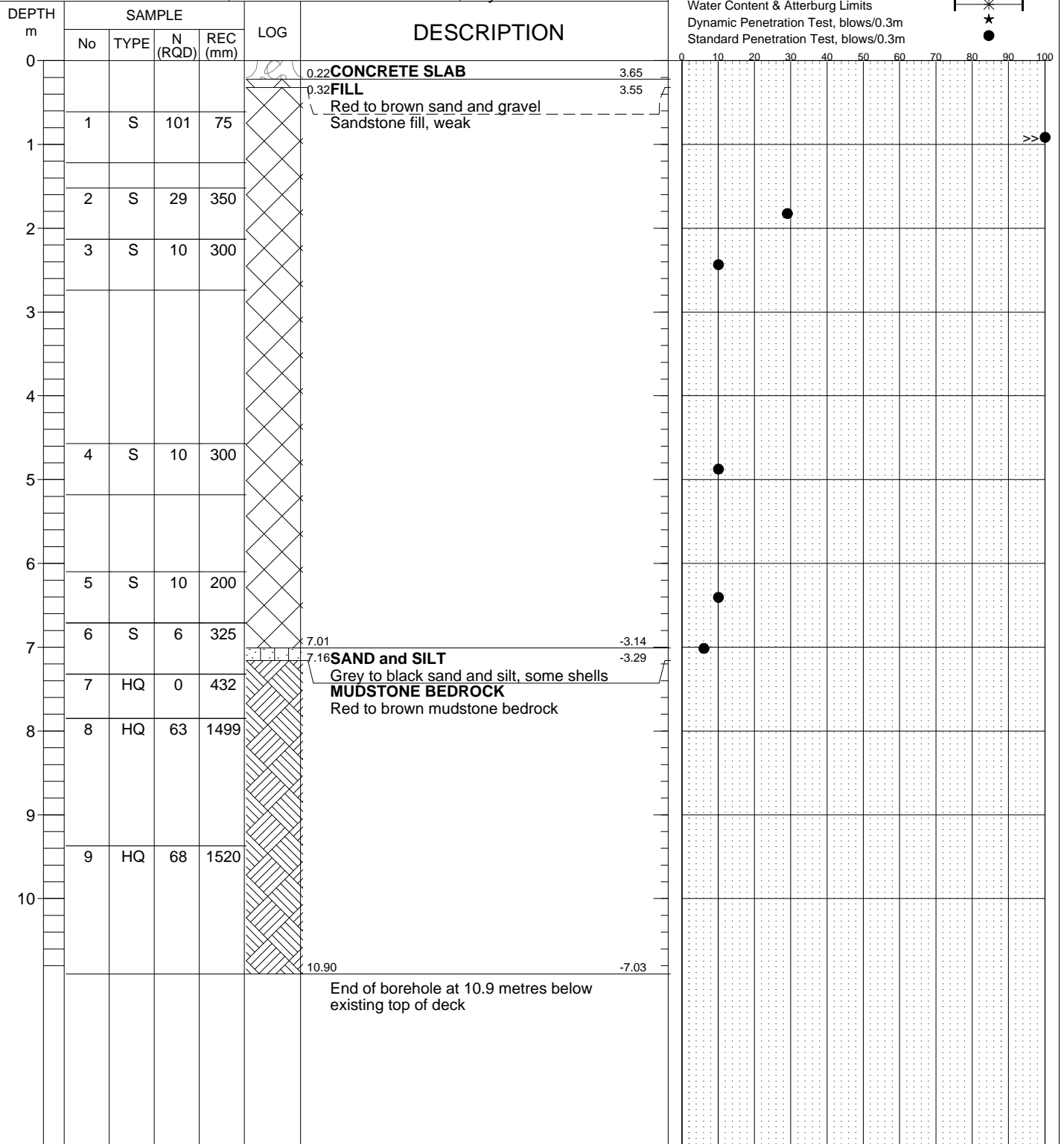
3.87

Datum:

Chart

Logged By

TD





BOREHOLE LOGS

Client Public Works & Government Services Canada

Proj No. 10456.73

BOREHOLE

Project Geotechnical Investigation

Date Drilled 06.Feb.2018

BH18-06

Page 1 of 1

Location Lameque Wharf, Lameque NB

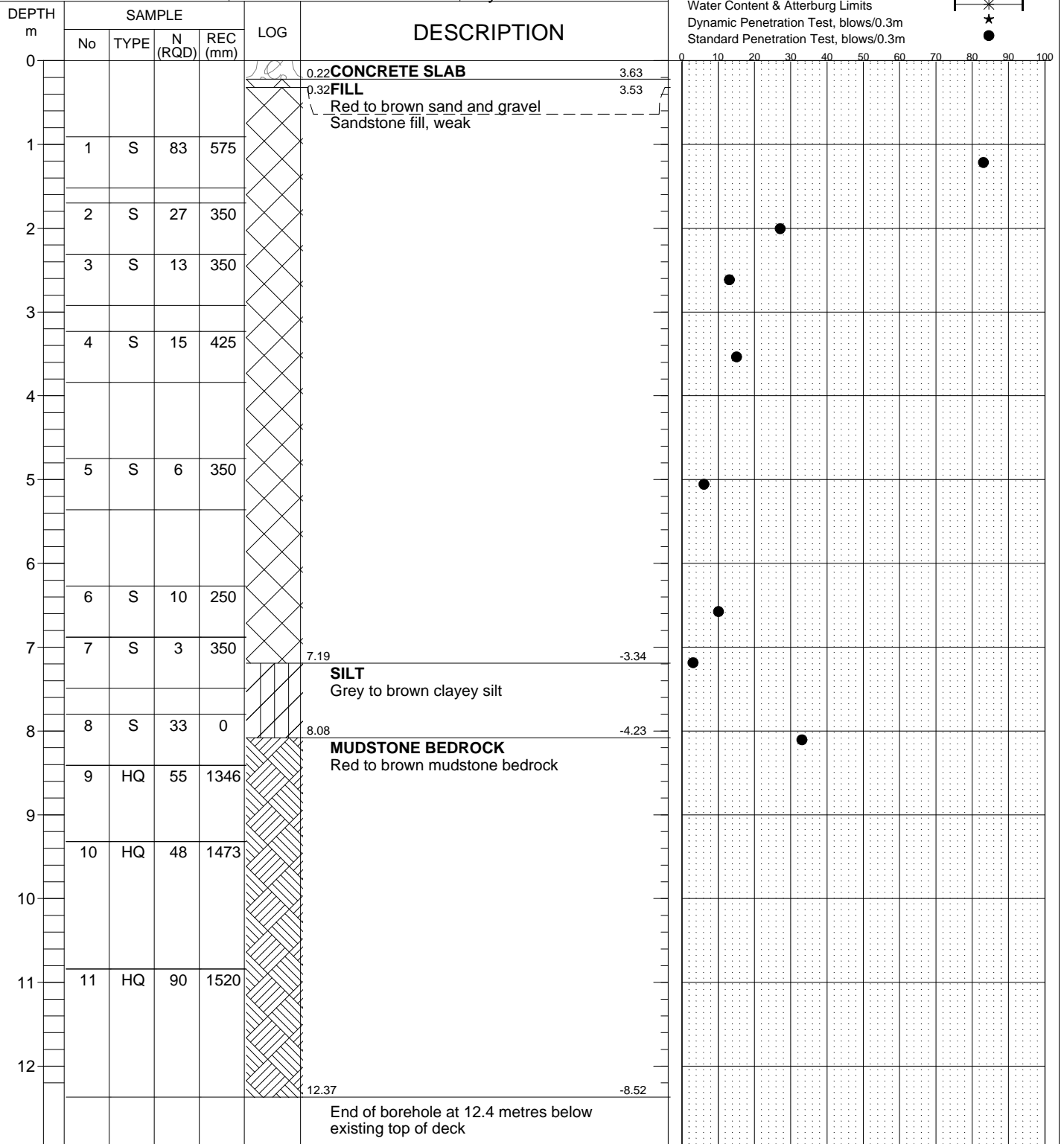
Ground Level, m 3.85

Datum:

Chart

Logged By

TD





BOREHOLE LOGS

Client Public Works & Government Services Canada

Proj No. 10456.73

BOREHOLE

Project Geotechnical Investigation

Date Drilled 06.Feb.2018

BH18-07

Page 1 of 1

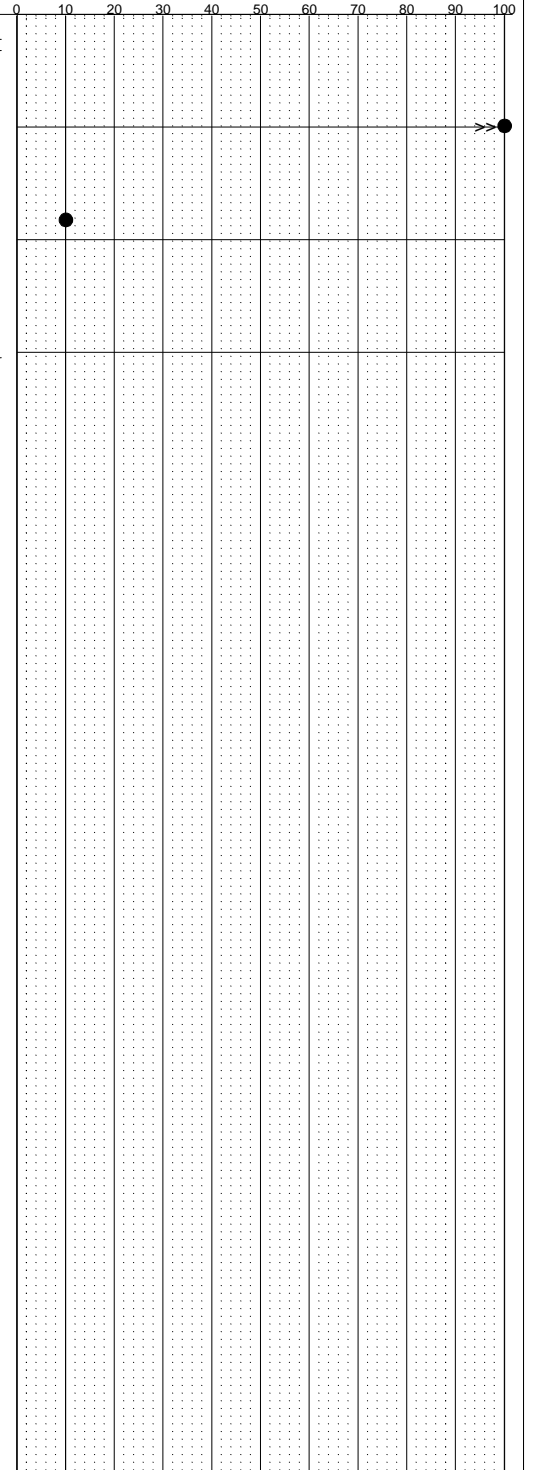
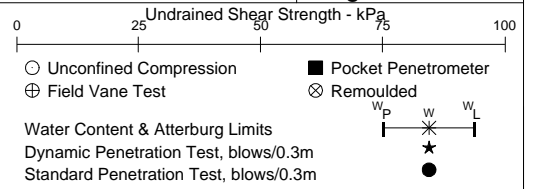
Location Lameque Wharf, Lameque NB

Ground Level, m 3.81

Datum: Chart

Logged By TD

DEPTH m	SAMPLE				LOG	DESCRIPTION
	No	TYPE	N (RQD)	REC (mm)		
0						0.22 CONCRETE SLAB 3.59
						0.32 FILL 3.49
						Red to brown sand and gravel
						Sandstone fill, weak
1	1	S	101	120		
	2	S	10	300		
2						
3						
						3.05 0.76
						End of borehole at 3.1 metres below existing top of deck Borehole was terminated due to encountering an unknown object





BOREHOLE LOGS

Client Public Works & Government Services Canada

Proj No. 10456.73

BOREHOLE

Project Geotechnical Investigation

Date Drilled 07.Feb.2018

BH18-08

Page 1 of 2

Location Lameque Wharf, Lameque NB

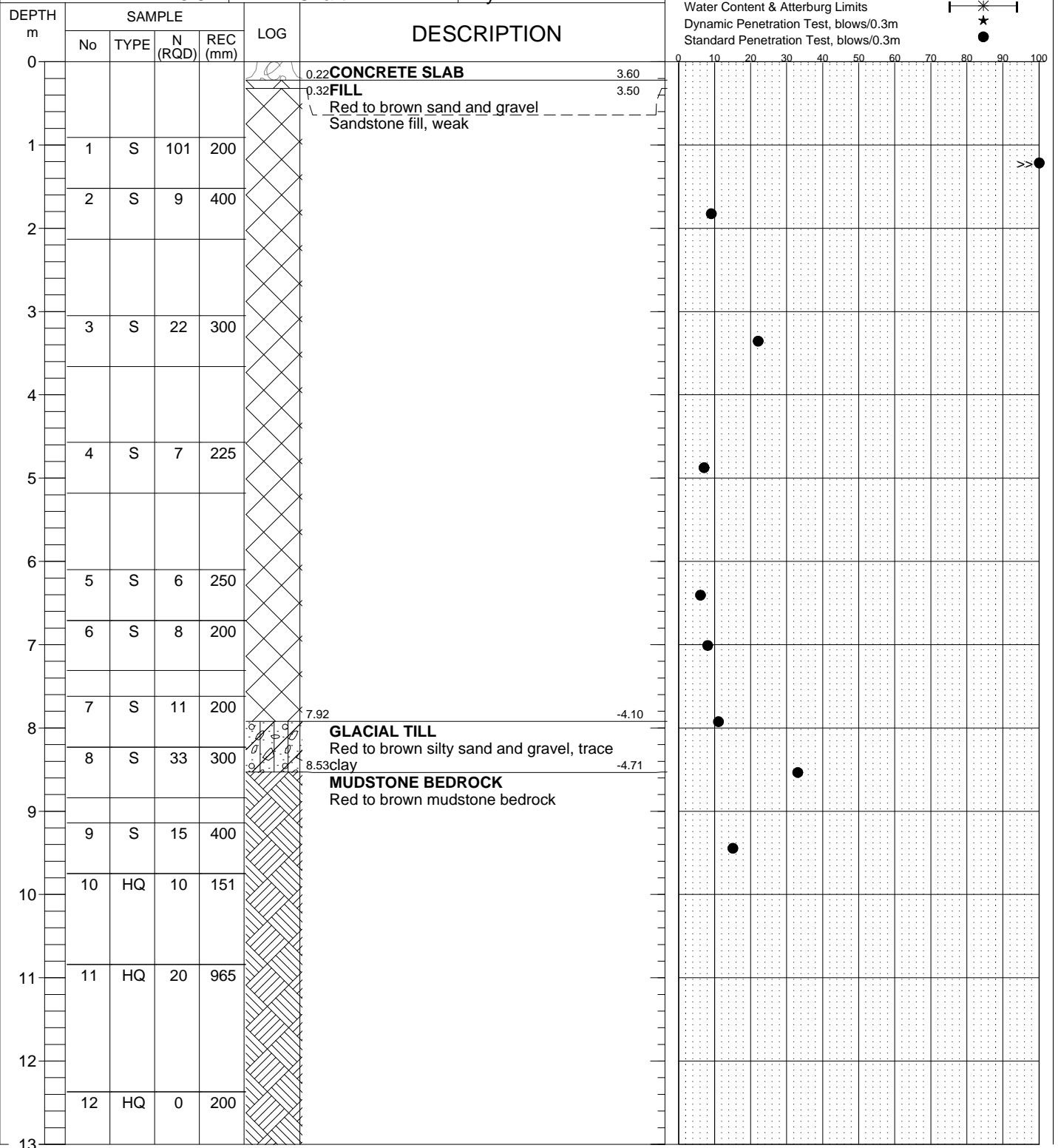
Ground Level, m 3.82

Datum:

Chart

Logged By

TD





BOREHOLE LOGS

BOREHOLE
BH18-08
Page 2 of 2

Undrained Shear Strength - kPa

Logged By	TD
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○ Unconfined Compression ■ Pocket Penetrometer
 ⊕ Field Vane Test ⊗ Remoulded

Water Content & Atterburg Limits
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m

⊗ Remoulded




Diagram illustrating the remoulded state of a soil specimen under compression. The specimen is represented by a horizontal bar with a central point marked by a star. The left end is labeled W_P and the right end is labeled W_L . The central point is labeled W .

DEPTH m	SAMPLE				LOG	DESCRIPTION
	NO.	TYPE	N	REG.		
1.0	1	CLAY	1	1		CLAY, 1.0m
2.0	2	SAND	2	2		SAND, 2.0m
3.0	3	CLAY	3	3		CLAY, 3.0m
4.0	4	SAND	4	4		SAND, 4.0m
5.0	5	CLAY	5	5		CLAY, 5.0m
6.0	6	SAND	6	6		SAND, 6.0m
7.0	7	CLAY	7	7		CLAY, 7.0m
8.0	8	SAND	8	8		SAND, 8.0m
9.0	9	CLAY	9	9		CLAY, 9.0m
10.0	10	SAND	10	10		SAND, 10.0m

13-

SAMPLE

--	--

DESCRIPTION

13-

No

TYPE

N

REC

LOG

14-

13

HO

63

152



14.55

-10.73

End of borehole at 14.6 metres below
existing top of deck

BOREHOLE LOGS

Client Public Works & Government Services Canada

Proj No. 10456.73

BOREHOLE

Project Geotechnical Investigation

Date Drilled 07.Feb.2018

BH18-09

Page 1 of 2

Location Lameque Wharf, Lameque NB

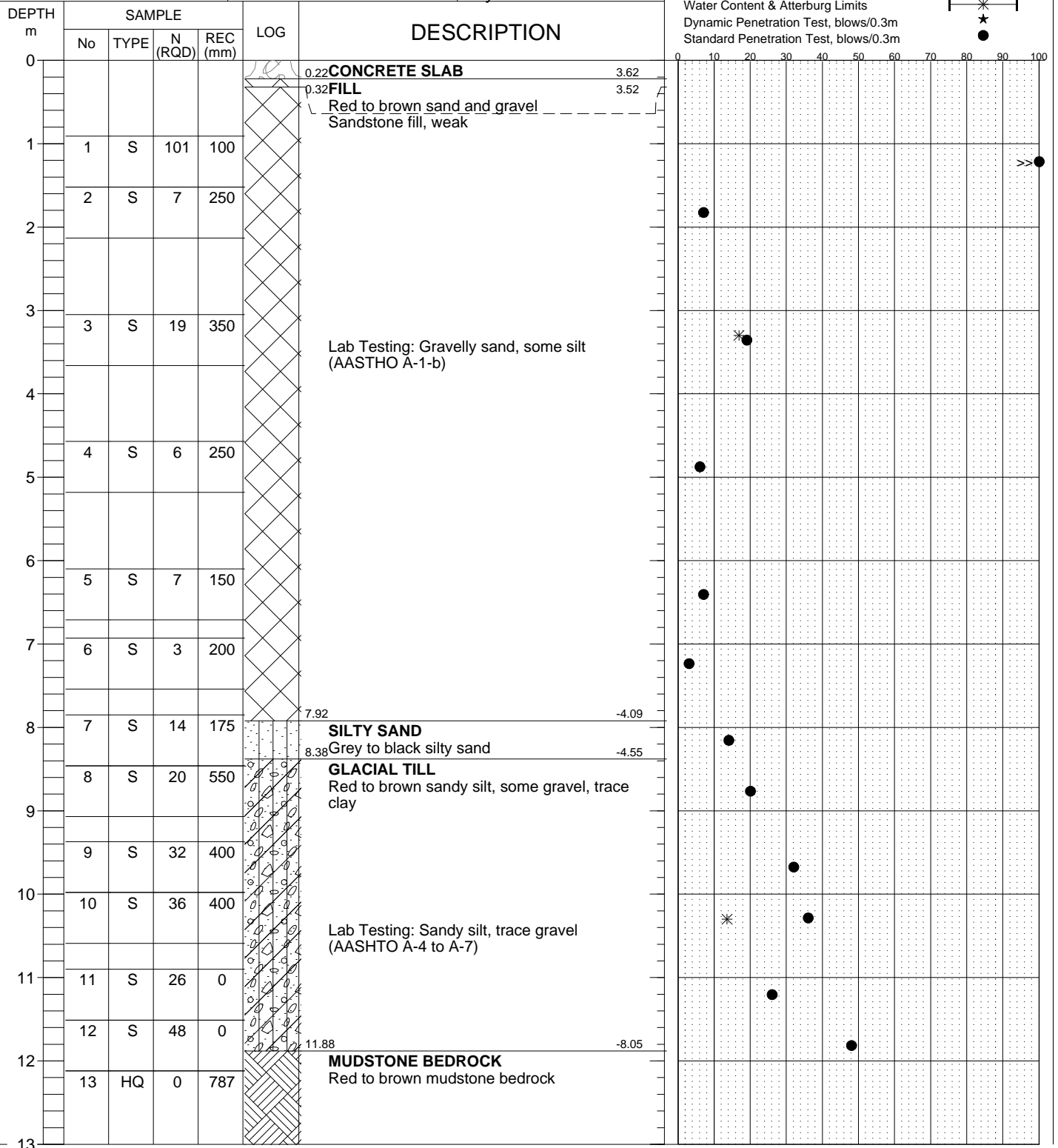
Ground Level, m 3.84

Datum:

Chart

Logged By

TD





BOREHOLE LOGS

Client Public Works & Government Services Canada

Proj No. 10456.73

BOREHOLE

Project Geotechnical Investigation

Date Drilled 07.Feb.2018

BH18-09
Page 2 of 2

Location Lameque Wharf, Lameque NB

Ground Level, m 3.84

Datum: Chart

Logged By TD

DEPTH m

SAMPLE

No TYPE N (RQD) REC (mm)

LOG

DESCRIPTION

13

14 HQ 60 1520

14

15

15 HQ 72 1520

16

16.69

-12.86

End of borehole at 16.7 metres below existing top of deck

0 25 Undrained Shear Strength - kPa 75 100

○ Unconfined Compression
⊕ Field Vane Test

■ Pocket Penetrometer
⊗ Remoulded

Water Content & Atterburg Limits
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m

W_P W_L

0 10 20 30 40 50 60 70 80 90 100



BOREHOLE LOGS

Client Public Works & Government Services Canada

Proj No. 10456.73

BOREHOLE

Project Geotechnical Investigation

Date Drilled 08.Feb.2018

BH18-10

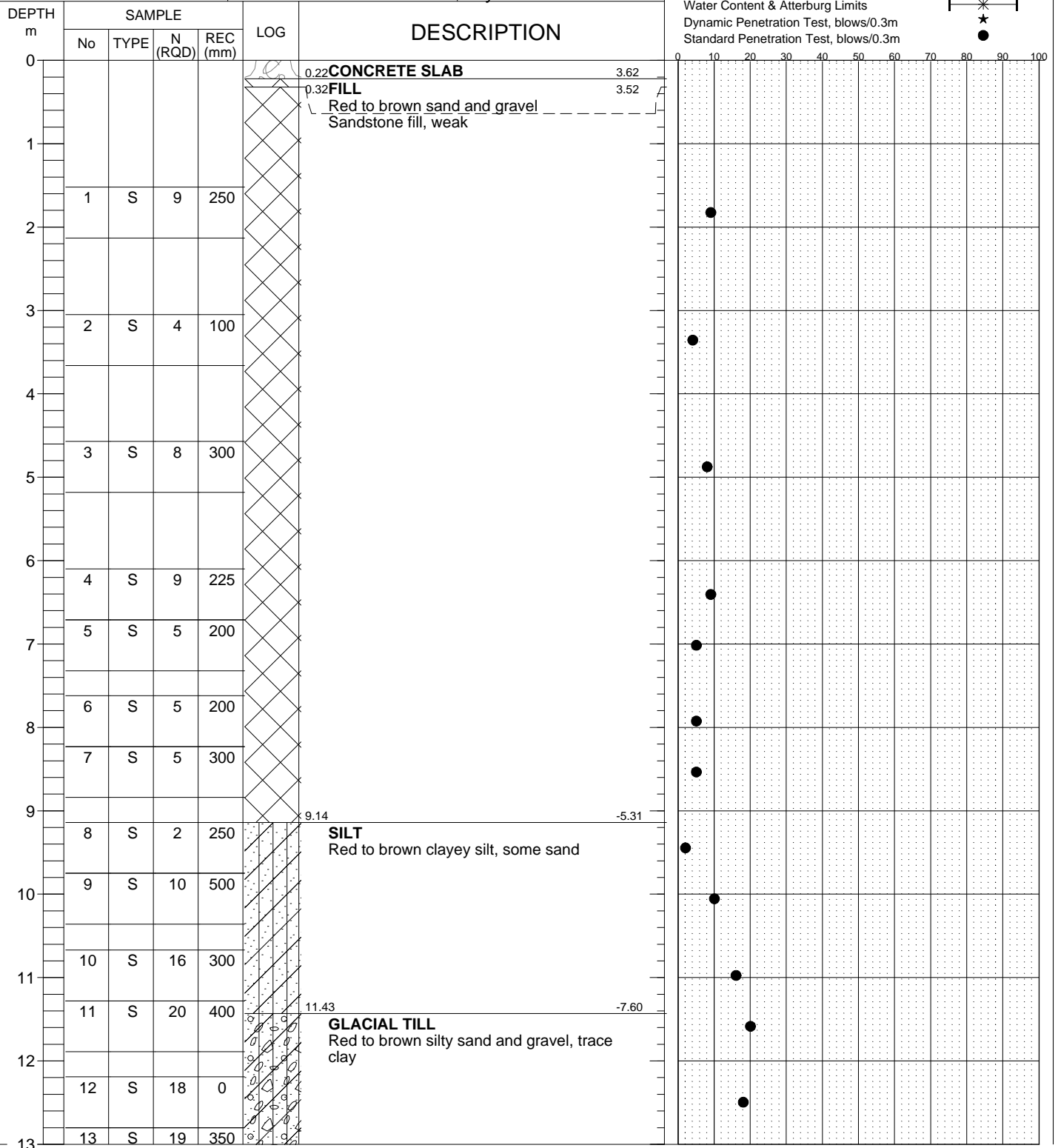
Page 1 of 2

Location Lameque Wharf, Lameque NB

Ground Level, m 3.84

Datum: Chart

Logged By TD





BOREHOLE
BH18-10
Page 2 of 2

Logged	
By	TD

Water Content & Atterburg Limits
Dynamic Penetration Test, blows/0.3m
Standard Penetration Test, blows/0.3m



APPENDIX C

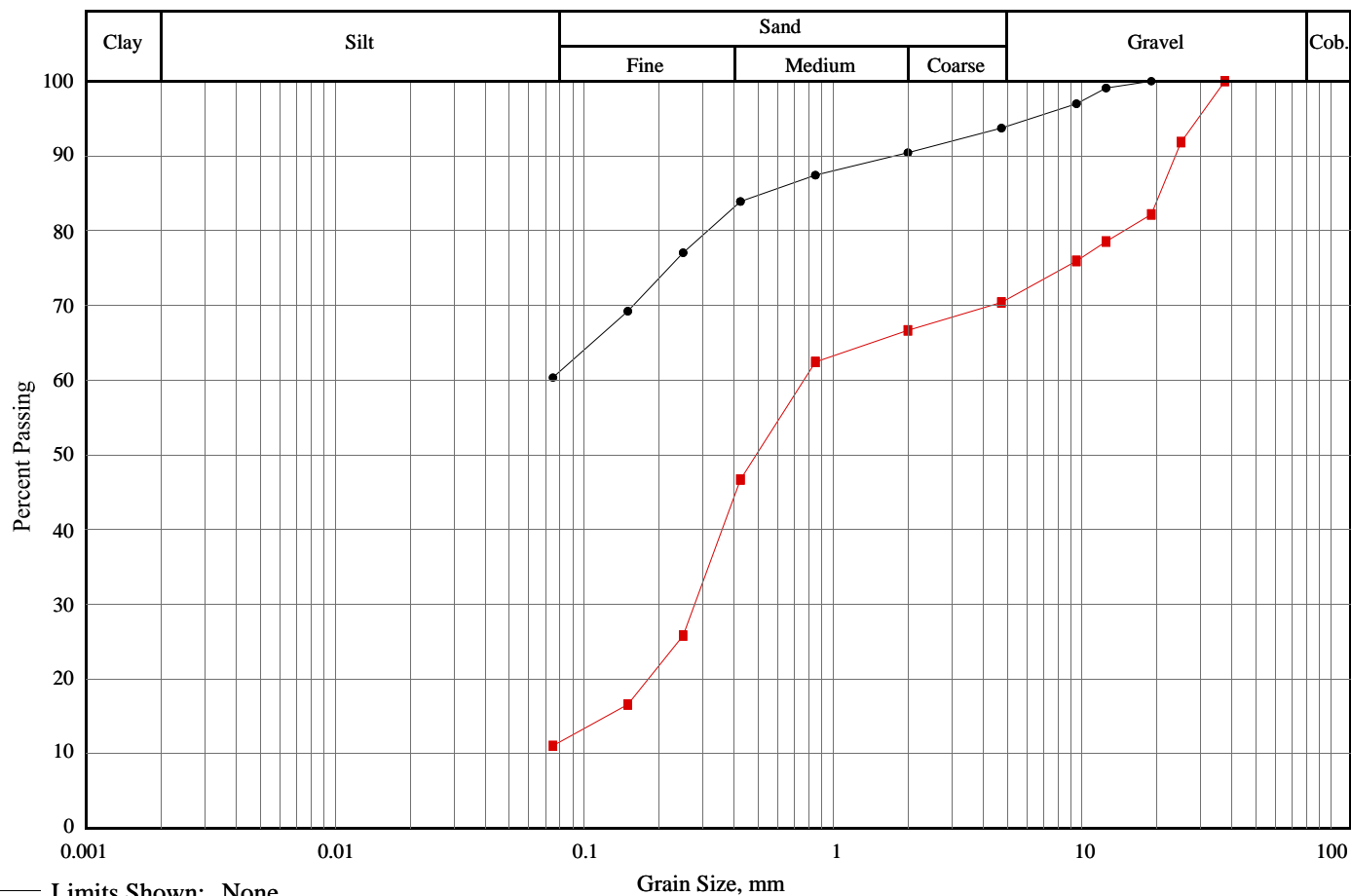
Laboratory Testing Results



GEMTEC
CONSULTING ENGINEERS
AND SCIENTISTS


Client: Public Services and Procurement Canada (PSPC)
Project: SOA EC373-180283/001/MTC - Lameque wharf Structu
Project #: 1045673

Soils Grading Chart




Line Symbol	Description	Borehole/ Test Pit	Sample Number	Depth	% Cob.+ Gravel	% Sand	% Silt	% Clay	Date Sampled
—●—	GLACIAL TILL	BH18-09	S10	10.0-10.6m	6.3	33.4	60.3		18/02/15
—■—	SANDSTONE FILL	BH18-09	S3	3.0-3.6m	29.6	59.4	11.0		18/02/15

Line Symbol	Sample Description	AASHTO	D ₁₀	D ₁₅	D ₅₀	D ₈₅	% 5-75µm
—●—	Sandy silt , trace gravel	A-4 to A-7	---	---	---	0.53	---
—■—	Gravelly sand , some silt	A-1-b	---	0.12	0.49	20.59	---

 GEMTEC CONSULTING ENGINEERS AND SCIENTISTS	Client	Public Services and Procurement Canada (PSPC)	Moisture Content and Density
	Project:	SOA EC373-180283/001/MTC - Lameque wharf Structu	
	Project #:	1045673	

Borehole: BH18-09	Date/Time Sampled: 18/02/15 10:10:00 AM	Mass of Cont. + Wet Soil, g:	701.70
Depth: 10.0-10.6m	Date/Time Tested: 18/02/26 10:11:46 AM	Mass of Cont. + Dry Soil, g:	638.70
Sample: S10		Mass of Container, g:	171.90
Description: GLACIAL TILL		Moisture Content, %:	13.50
		Sample Length, mm:	
		Sample Diameter, mm:	
		Sample Mass, g:	
		Sample Volume, mm ³	
		Wet Density, kg/m ³	
		Dry Density, kg/m ³	
Borehole: BH18-09	Date/Time Sampled: 18/02/15 10:11:00 AM	Mass of Cont. + Wet Soil, g:	910.30
Depth: 3.0-3.6m	Date/Time Tested: 18/02/26 10:11:46 AM	Mass of Cont. + Dry Soil, g:	803.60
Sample: S3		Mass of Container, g:	168.70
Description: SANDSTONE FILL		Moisture Content, %:	16.81
		Sample Length, mm:	
		Sample Diameter, mm:	
		Sample Mass, g:	
		Sample Volume, mm ³	
		Wet Density, kg/m ³	
		Dry Density, kg/m ³	

	Client: Public Services and Procurement Canada (PSPC)	<h1>Rock Core Compressive Strength</h1>
	Project: SOA EC373-180283/001/MTC - Lameque wharf Structure 401 and 402, Geotechnic	
	Project #: 1045673	

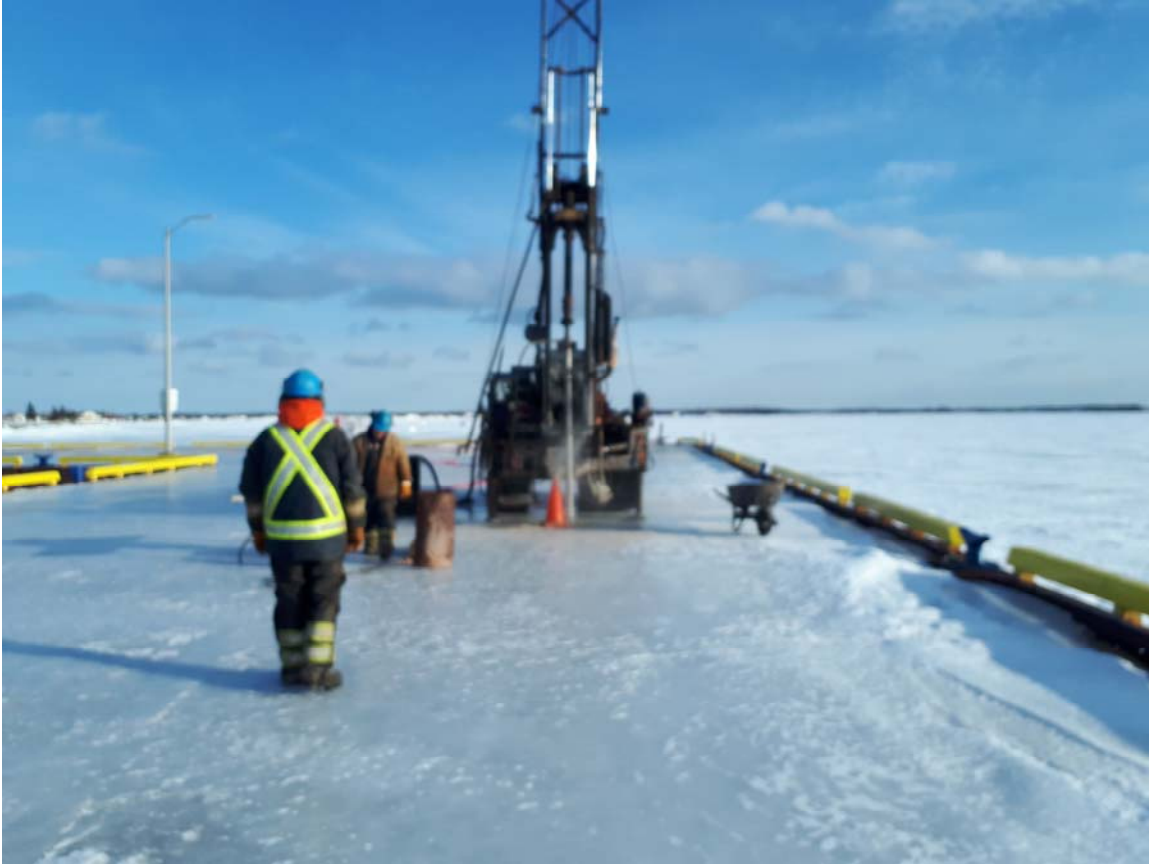
Date/Time Sampled: 18/02/26 8:49:00 AM	Date/Time Tested: 18/02/26 8:50:48 AM
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BH	Sample No	Depth	Description	Diameter, mm	Area, mm ²	Length After Capping, mm	L/D	Load, kN	Comp. Str., MPa
BH18-02	HQ10	9.0m	MUDSTONE BEDROCK	46.0	1662	89	1.93	2.380	1.4
BH18-10	HQ15	14.8m	MUDSTONE BEDROCK	62.0	3019	81	1.31	147.490	48.6



APPENDIX D

Select Site & Rock Core Photos



Overview of the site.



Mudstone bedrock extracted from BH18-04. 6.4 to 10.4 metres below existing top of deck.



Mudstone bedrock extracted from BH18-05. 7.2 to 10.9 metres below existing top of deck.



Mudstone bedrock extracted from BH18-06. 8.1 to 12.4 metres below existing top of deck.

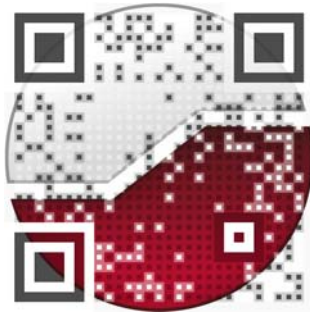


Mudstone bedrock extracted from BH18-09. 11.9 to 16.7 metres below existing top of deck.



Bedrock extracted from BH18-10. Mudstone: 14.0 to 16.7 metres below existing top of deck. Sandstone: 16.7 to 18.4 metres below existing top of deck.

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