Houle Chevrier Engineering

Geotechnical Investigation
Subsurface Conditions
Marine Oil Exposure Simulator
Environment Canada
335 River Road
Ottawa, Ontario

a GEMTEC company

Houle Chevrier Engineering

Submitted to:

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Geotechnical Investigation
Subsurface Conditions
Marine Oil Exposure Simulator
Environment Canada
335 River Road
Ottawa, Ontario

August 30, 2016
Project: 63274.04

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

This report presents the factual results of a geotechnical investigation carried out at the North Wing of Environmental Canada's 335 River Road facility in Ottawa, Ontario. The purpose of the investigation was to identify the general subsurface and existing foundation conditions at the site.

This investigation was carried out in general accordance with our proposal dated January 27, 2016.

2.0 PROJECT DESCRIPTION

Plans are being prepared to construct a cold room in the North Wing of Environmental Canada's 335 River Road facility in Ottawa, Ontario. The cold room will be used to operate a large scale Marine Oil Exposure simulator. It is understood that the proposed plans include:

- Removal/replacement of the existing floor slab within the portion of the cold room;
- Construction of an insulated floor within the cold room; and
- Construction of a storage building adjacent to the existing building.

3.0 PREVIOUS INVESTIGATIONS

3.1 Exp Services Inc.

As part of a geotechnical investigation for future site servicing upgrades, Exp Services Inc. advanced one (1) borehole, number BH1, in the area of the proposed Marine Oil Simulator. Details of the borehole are provided in the Exp Services Inc. letter titled: "Geotechnical Investigation, Proposed Pumping Station, 225 River Road, City of Ottawa, Ontario", dated January 27, 2015.

In general, the borehole encountered fill material followed by layered deposits of clay and silty sand over limestone bedrock. The bedrock surface was encountered in BH1 at 23.5 metres below ground surface (elevation 68.8 metres). The groundwater level within a monitoring well installed in BH1 was at 2.0 metres depth (elevation 90.3 metres) in June 2014.

The approximate location of the borehole previously advanced by Exp Services Inc. is shown on the Test Hole Location Plan, Figure 2. A copy of the borehole record is provided in Appendix B for reference.

3.2 Houle Chevrier Engineering Ltd.

As part of a supplemental geotechnical investigation for future site servicing upgrades, Houle Chevrier Engineering Ltd. advanced one (1) seismic piezocone probe (SCPTu), numbered SCPTu 15-1, in the area of the proposed Marine Oil Simulator. The probe data was used to

estimate soil behaviour type, horizontal hydraulic conductivity, standard penetration N values, and shear wave velocity. Estimates of the above soil parameters are provided in our letter titled: "Supplemental Geotechnical Investigation, Sewage Lift Station, 335 River Road, Ottawa, Ontario", dated March 15, 2016; however, it is noted that the average shear wave velocity (V_s) measured between about 0.4 and 13.1 metres below ground surface was about 209 metres per second.

The approximate location of the SCPTu previously advanced by Houle Chevrier Engineering Ltd. is shown on the Test Hole Location Plan, Figure 2. A copy of the Record of SCPTu sheet is provided in Appendix B for reference.

4.0 SUBSURFACE INVESTIGATION

The field investigation was carried out on March 15, 2016. During that time, two (2) test holes, numbered 16-1 and 16-2, were advanced at the site. The test holes were advanced by Marathon Drilling Co. Ltd. of Greely, Ontario.

At test hole 16-1, the existing concrete floor slab was saw cut and the underlying granular fill materials were excavated by hand to about 0.9 metres below ground surface in order to expose the existing pad footing. A conventional borehole was then advanced using portable drilling equipment from the existing underside footing elevation to about 3.4 metres below ground surface.

Test hole 16-2 was advanced in the area of the proposed storage building to about 2.4 metres below ground surface. Test hole 16-2 consisted of a conventional borehole advanced using portable drilling equipment.

Continuous standard penetrations tests (SPT) were carried out in the test holes, where possible, and samples of the soils encountered were recovered using a 50 millimetre diameter split barrel sampler. The split barrel sampler was advanced using 31.75 kilogram hammer dropped at 0.76 metre height (i.e., using a one half weight drive hammer). The penetration values that were obtained using the one half weight drive hammer were corrected by dividing by a factor of 2.

Following the field work, the soil samples were returned to our laboratory for examination by a geotechnical engineer. Select samples of the soil were tested for water content, grain size distribution and Atterberg Limits testing.

Descriptions of the subsurface conditions logged in the test holes are provided on the Record of Test Hole sheets in Appendix A. The results of the soil classification testing are provided on the Record of Test Hole sheets and on Figures A1 through A4 in Appendix A.

The test hole locations were selected by Houle Chevrier Engineering Ltd personnel and positioned at the site relative to existing site features. The approximate locations of the test holes are shown on the Test Hole Location Plan, Figure 2.

5.0 SUBSURFACE CONDITIONS

5.1 General

As previously indicated, the subsurface conditions identified in the test holes are given on the Record of Test Hole sheets in Appendix A. The test hole logs indicate the subsurface conditions at the specific test locations only. Boundaries between zones on the logs are often not distinct, but rather are transitional and have been interpreted. The precision with which subsurface conditions are indicated depends on the method of drilling, the frequency and recovery of samples, the method of sampling, and the uniformity of the subsurface conditions. Subsurface conditions at other than the test locations may vary from the conditions encountered in the test holes. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties.

The soil 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 Houle Chevrier Engineering Ltd. does not guarantee descriptions as exact, but infers accuracy to the extent that is common in current geotechnical practice.

The following presents an overview of the subsurface conditions encountered in the test holes advanced during this investigation.

5.2 Proposed Cold Room (Test hole 16-1)

5.2.1 Existing Interior Pad Footing

The following summarizes our observations made on the existing pad footing exposed in test hole 16-1:

- The concrete slab was measured to be 190 millimetres thick and is underlain by 720 millimetres of fill material consisting of grey, crushed sandy gravel, some silt.
- One (1) grain size distribution test was undertaken on the fill underlying the slab. The results are provided on Figure A1 (Appendix A). The fines content of the fill material underlying the slab was measured to be 12 percent. The water content of the fill material ranges between 4 and 5 percent.
- The top of the footing is located about 300 millimetres below the underside of the concrete floor slab, projects about 560 millimetres from the center of the column, and is about 420 millimetres thick.
- The footing was found to bear on the native, weathered silty clay at about 910 millimetres below ground surface.

- A vapour barrier was noted below the existing concrete slab.

5.2.2 Silty Clay

A layer of silty clay was encountered underlying the fill material at a depth of about 0.9 metres. The thickness of the silty clay layer at this location is about 2.1 metres.

The upper portion of the silty clay has been desiccated to form a weathered grey brown crust. The SPT N values within the weathered crust range from 8 to 11 blows per 0.3 metres of penetration. Based on our local experience, N values within the silty clay deposit which are greater than about 2 blows per 0.3 metres would be indicative of a stiff to very stiff consistency. The water content of the weathered silty clay ranges between 28 and 45 percent.

Below the weathered zone, at about 2.1 metres below ground surface, the silty clay is grey in colour. The water content of the grey silty clay was found to be 50 percent.

The SPT N value measured in the grey silty clay was 3 blows per 0.3 metres of penetration.

The results of an Atterberg limits test carried out on a sample of the weathered silty clay are provided on Figure A4 in Appendix A. The results are summarized in Table 4.1.

Table 4.1 – Summary of Atterberg Limit Test Results

Test Hole	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index
16-1 (Sample No.3)	28.1	42.6	21.2	21.4

This testing indicates that the weathered silty clay has a low plasticity. The water content of the sample tested is between the measured liquid and plastic limit values.

5.2.3 Sand and Silt

Deposits of sand and silt were encountered below the silty clay at a depth of about 3.0 metres. One (1) STP test carried out in the sand and silt gave N values of 2 blows per 0.3 metres of penetration, which reflects a very loose relative density.

A grain size distribution curve for a sample of the sand and silt is provided on Figure A3 in Appendix A. The water content of the sand and silt was found to be 31 percent.

Test hole 16-1 was terminated within the sand and silt at 3.4 metres below ground surface.

5.2.4 Existing Exterior Footings

The existing exterior footings were not exposed as part of this investigation; however, based on the structural drawings for the existing building, the following foundation geometry should be anticipated:

- The underside of footing level of the exterior is located between 1.5 to 1.8 metres below finished exterior grade.
- The exterior strip footings have a width of 450 millimetres and a thickness of 200 millimetres. The exterior pad footings have a width of 1,200 millimetres. The thickness of the exterior pad footings is not shown on the structural drawings.

5.3 Proposed Storage Building (Test hole 16-2)

5.3.1 Fill Material

A surficial layer of topsoil fill was encountered at test hole 16-2. The topsoil consists of dark brown sandy silt to silty sand containing some organic material and gravel. The thickness of the topsoil is about 100 millimetres. The water content of the topsoil fill material was found to be 40 percent.

At test hole 16-2, the topsoil is underlain by fill material composed of grey brown silty clay with some gravel and miscellaneous debris. The combined thickness of the fill material is about 1.8 metres at this location.

The SPT N values measured within the fill material range from 3 to 10 blows per 0.3 metres of penetration, which reflects a stiff to very stiff consistency.

The water content of the silty clay fill material ranges between 18 and 33 percent.

5.3.2 Silty Sand

A native deposit of grey brown silty sand was encountered below the fill material at test hole 16-2. The SPT N value measured in sand was 1 blow per 0.3 metres of penetration, which reflects a very loose relative density. The borehole was terminated within the silty sand at 2.4 metres below surface due to caving of the borehole.

A grain size distribution curve for a sample of the silty sand recovered from test hole 16-2 is provided on Figure A2 in Appendix A. The water content of the silty sand was found to be 25 percent.

5.4 Groundwater Conditions

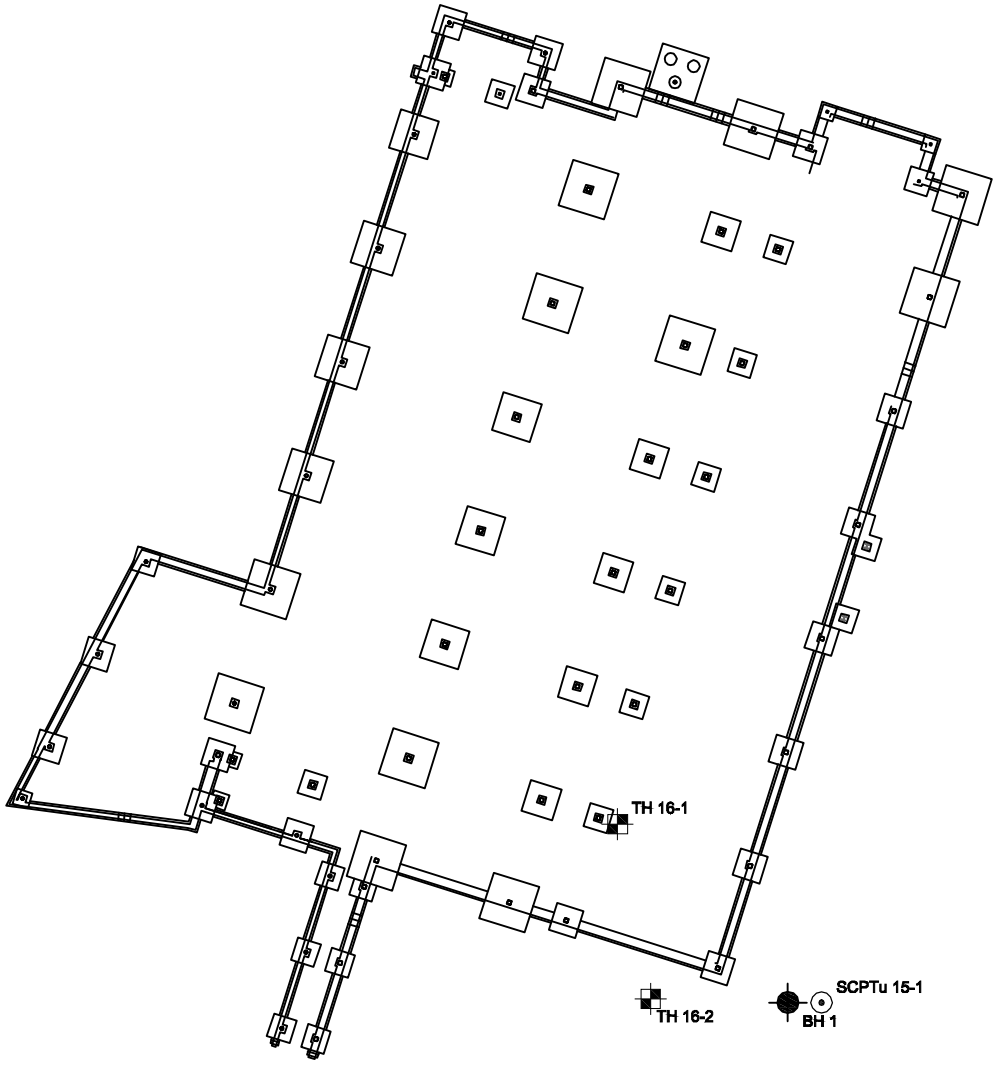
The groundwater conditions in the open test holes were observed prior to backfilling. Groundwater seepage was observed at about 1.5 and 1.8 metres below ground surface in test holes 16-1 and 16-2, respectively.

It should be noted that the groundwater observations observed in the open test holes do not necessarily reflect stabilized groundwater conditions. Groundwater levels may be higher during wet periods of the year such as early spring or following periods of precipitation.

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

Blasco Vijayabaskaran, E.I.T.

Johnathan A. Cholewa, Ph.D., P.Eng.



LEGEND

TH 16-1 — TEST HOLE LOCATION IN PLAN
(current investigation by Houle Chevrier Engineering Ltd.)

CPTu 15-1 — PROBE HOLE LOCATION IN PLAN
(current investigation by Houle Chevrier Engineering Ltd.)

BH 1 — BOREHOLE LOCATION IN PLAN
(previous investigation by EXP Services Inc., 2014)

1:400

0 8 16 24m

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Project	Drawing
GEOTECHNICAL INVESTIGATION 335 RIVER ROAD	TEST HOLE LOCATION PLAN

Drwn By	Chkd By	Date	Project No.	Revision No.	
P.C.	J.C.	AUGUST 2016	63274.04	4	**FIGURE 1**

APPENDIX A

List of Abbreviations and Symbols
Record of Test Hole Sheets
Laboratory Results (Figures A1 to A4)

LIST OF ABBREVIATIONS AND TERMINOLOGY

SAMPLE TYPES

AS auger sample
CA casing sample
CS chunk sample
BS Borros piston sample
DO drive open
MS manual sample
RC rock core
ST slotted tube
TO thin-walled open Shelby tube
TP thin-walled piston Shelby tube
WS wash sample

PENETRATION RESISTANCE

Standard Penetration Resistance, N

The number of blows by a 63.5 kg hammer dropped 760 millimetre required to drive a 50 mm drive open sampler for a distance of 300 mm. For split spoon samples where less than 300 mm of penetration was achieved, the number of blows is reported over the sampler penetration in mm.

Dynamic Penetration Resistance

The number of blows by a 63.5 kg hammer dropped 760 mm to drive a 50 mm diameter, 60° cone attached to 'A' size drill rods for a distance of 300 mm.

WH

Sampler advanced by static weight of hammer and drill rods.

WR

Sampler advanced by static weight of drill rods.

PH

Sampler advanced by hydraulic pressure from drill rig.

PM

Sampler advanced by manual pressure.

SOIL TESTS

C consolidation test
H hydrometer analysis
M sieve analysis
MH sieve and hydrometer analysis
U unconfined compression test
Q undrained triaxial test
V field vane, undisturbed and remoulded shear strength

SOIL DESCRIPTIONS

Relative Density	'N' Value
Very Loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	over 50

Consistency	Undrained Shear Strength (kPa)
Very soft	0 to 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	over 100

LIST OF COMMON SYMBOLS

c_u undrained shear strength
e void ratio
C_c compression index
c_v coefficient of consolidation
k coefficient of permeability
I_p plasticity index
n porosity
u pore pressure
w moisture content
w_L liquid limit
w_P plastic limit
ϕ^1 effective angle of friction
γ unit weight of soil
γ^1 unit weight of submerged soil
σ normal stress

RECORD OF TEST HOLE 16-1

PROJECT: 63274.04

LOCATION: See Borehole Location Plan, Figure 2

BORING DATE: March 15, 2016

SHEET 1 OF 1

DATUM: N/A

SPT HAMMER: 31.75 kg; drop 0.76 m

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Open Excavation Uncased	Ground Surface Concrete Floor Slab							Concrete Mix
		Grey, crushed sandy gravel, some silt (FILL MATERIAL)		0.19	1	C.S.		M (see Fig A1)	Granular Backfill
					2	C.S.			
1		Stiff to very stiff, grey brown SILTY CLAY with occassional silty sand seams (WEATHERED CRUST)		0.91	3	50 D.O.	8	(see Fig A4)	Bentonite
					4	50 D.O.	11		
2	Portable Drilling Equipment Uncased	Stiff to very stiff, grey SILTY CLAY, trace sand		2.13	5	50 D.O.	3		
3		Very loose, grey SAND and SILT, some clay		2.97	6	50 D.0.	2	MH (see Fig A3)	Groundwater seepage observed at 1.52 metres below ground surface on March 15, 2016
		End of borehole Note: The penetration values have been corrected by dividing by a factor of 2.		3.35					
4									

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20, 40, 60, 80

SHEAR STRENGTH Cu, kPa: nat. V - + Q -●; rem. V - ⊕ U -○; 20, 40, 60, 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-5}, 10^{-4}, 10^{-3}, 10^{-2}

WATER CONTENT, PERCENT: Wp, W, Wl; 20, 40, 60, 80

DEPTH SCALE

1 to 20

Houle Chevrier Engineering

LOGGED: A.N.

CHECKED: J.C.

BOREHOLE LOG 6327404_BOREHOLE LOGS_GNT_V01_2016-03-15.GPJ HOULE CHEVRIER 2015.GDT 4-14-16

PROJECT: 63274.04

RECORD OF TEST HOLE 16-2

SHEET 1 OF 1

LOCATION: See Borehole Location Plan, Figure 2

DATUM: N/A

BORING DATE: March 15, 2016

SPT HAMMER: 31.75 kg; drop 0.76 m

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (20 40 60 80) nat. V - + Q -● rem. V - ⊕ U -○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-5} 10^{-4} 10^{-3} 10^{-2}) / WATER CONTENT, PERCENT (Wp W Wl, 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	Portable Drilling Equipment Uncased	Ground Surface									
		Dark brown sandy silt / silty sand, some organic material, trace to some gravel (TOPSOIL / FILL)		0.10							
		Stiff to very stiff, grey brown silty clay, some gravel with miscellaneous debris (FILL MATERIAL)			1	50 D.O.	10				Bentonite
1					2	50 D.O.	6				
					3	50 D.O.	3				
		Very loose, grey brown SILTY SAND, trace gravel		1.75	4	50 D.O.	1			M (see Fig A2)	
2		End of Borehole		2.44							Groundwater seepage observed at 1.83 metres below ground surface on March 15, 2016
		Note: The penetration values have been corrected by dividing by a factor of 2									
3											
4											

DEPTH SCALE

1 to 20

Houle Chevrier Engineering

LOGGED: A.N.

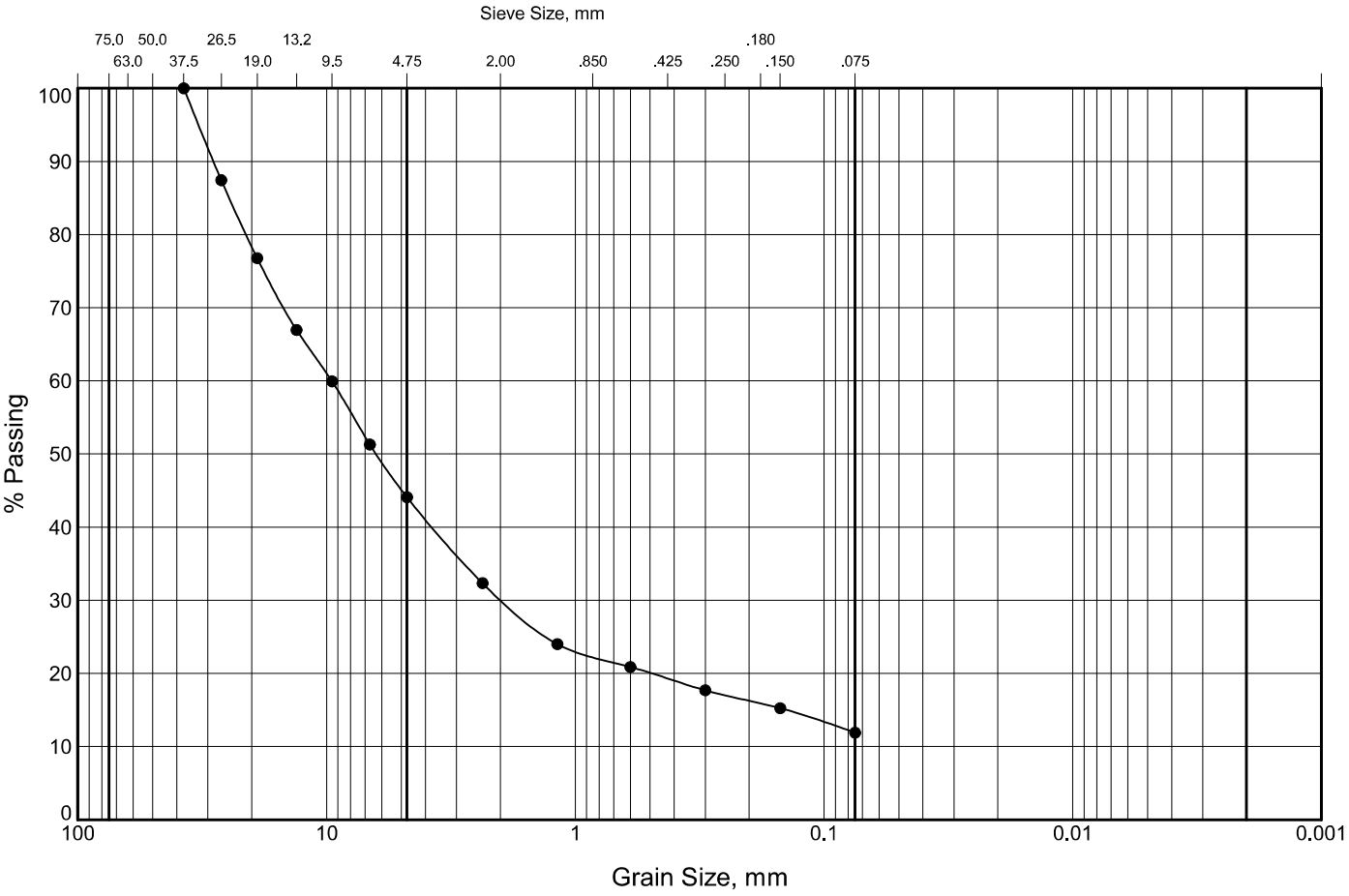
CHECKED: J.C.

BOREHOLE LOG 6327404_BOREHOLE LOGS_GNT_V01_2016-03-15.GPJ HOULE CHEVRIER 2015.GDT 4-14-16

GRAIN SIZE DISTRIBUTION

FILL

FIGURE A1



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Borehole	Sample	Depth (m)	% Gravel	% Sand	% Silt & Clay
●	16-1	1	0.2 - 0.5	56	32	12

Houle Chevrier Engineering

Date: April 2016

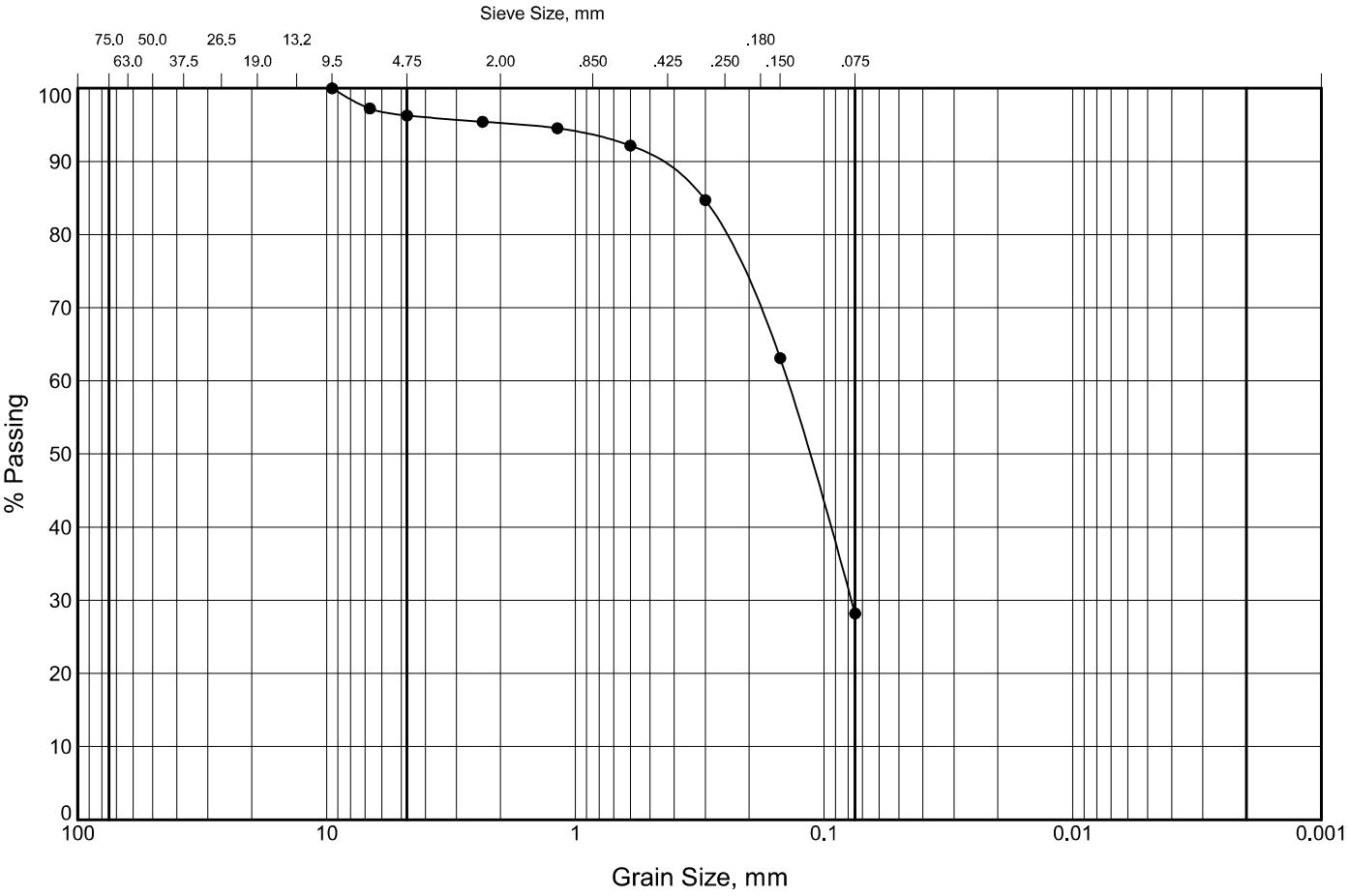
Project: 63274.04

SOILS GRAIN SIZE GRAPH UNIFIED % (SIEVE) 6327404_BOREHOLE LOGS_GNT_V01_2016-03-15.GPJ HOULE CHEVRIER FEB 9 2011.GDT 4-11-16

GRAIN SIZE DISTRIBUTION

SILTY SAND

FIGURE A2



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Borehole	Sample	Depth (m)	% Gravel	% Sand	% Silt & Clay
●	16-2	4	1.8 - 2.4	4	68	28

Houle Chevrier Engineering

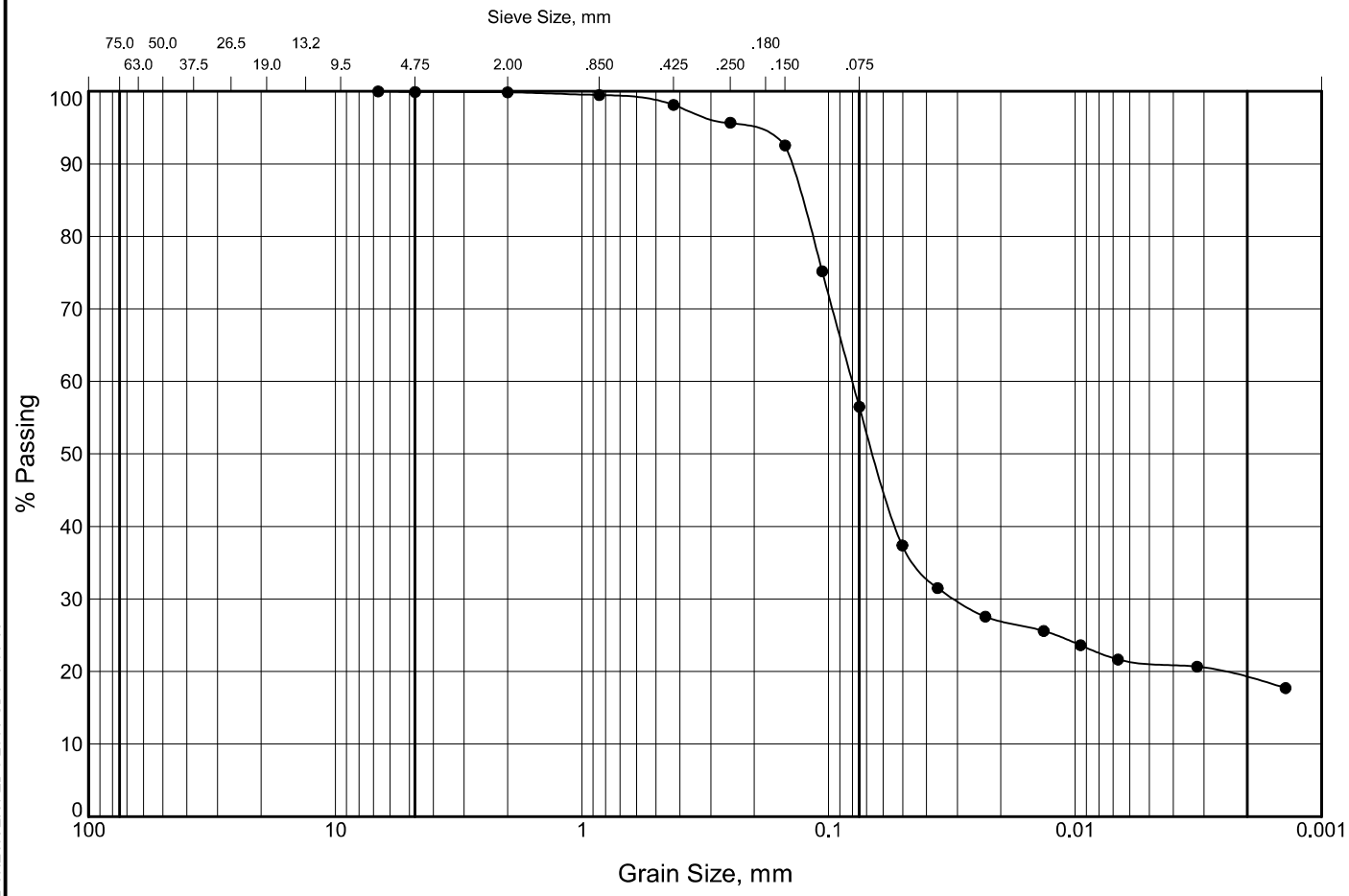
Date: April 2016

Project: 63274.04

SOILS GRAIN SIZE GRAPH UNIFIED % (SIEVE) 6327404_BOREHOLE LOGS_GNT_V01_2016-03-15.GPJ HOULE CHEVRIER FEB 9 2011.GDT 4-11-16

GRAIN SIZE DISTRIBUTION
SAND AND SILT

FIGURE A3



COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

Legend	Borehole	Sample	Depth (m)	% Gravel	% Sand	% Silt	% Clay
●	16-1	6	2.7 - 3.4	0	43	38	19

Houle Chevrier Engineering

Date: April 2016

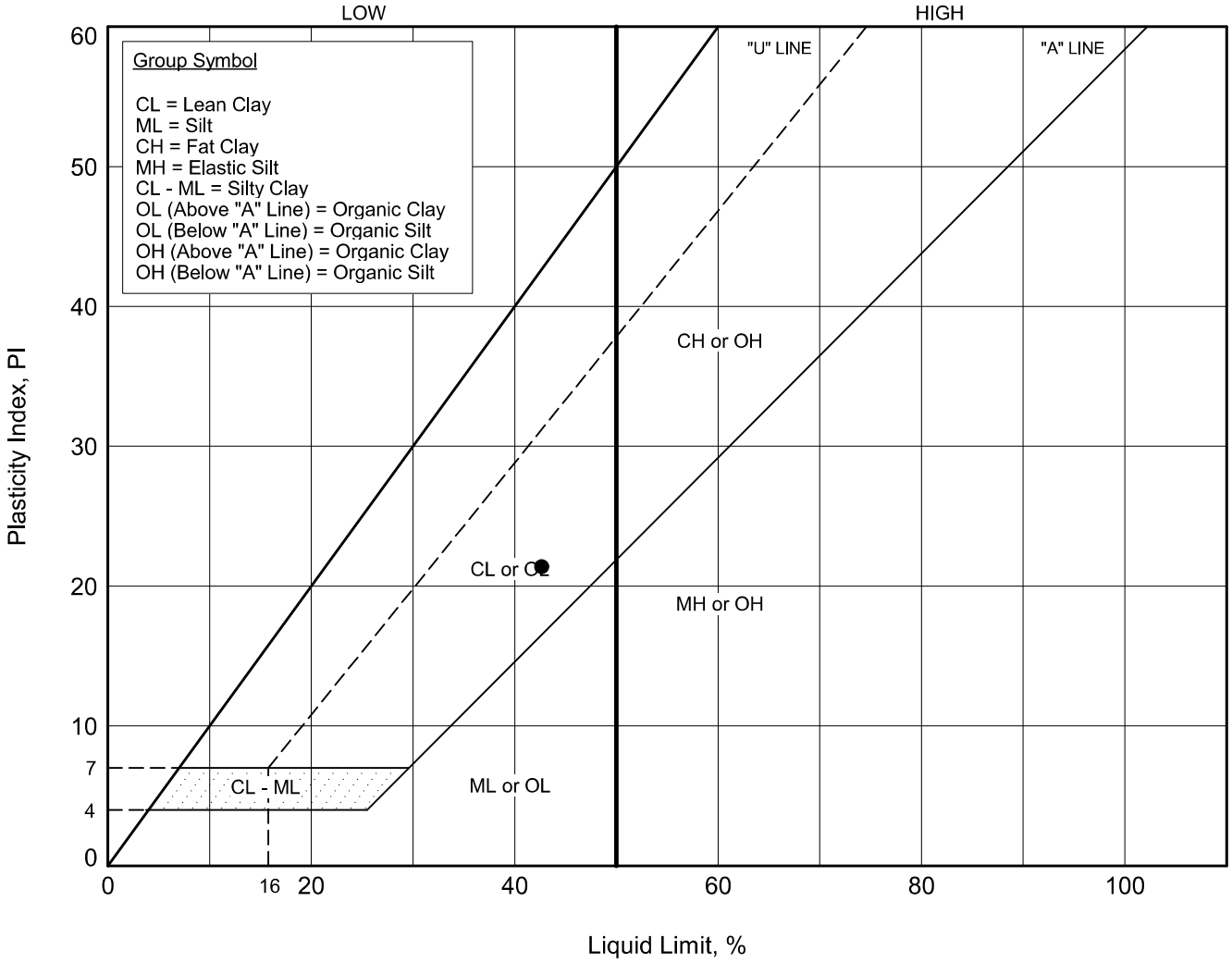
Project: 63274.04

SOILS GRAIN SIZE GRAPH UNIFIED % (HYDRO) 6327404_BOREHOLE LOGS_GNT_V01_2016-03-15.GPJ HOULE CHEVRIER FEB 9 2011.GDT 4-11-16

PLASTICITY CHART

SILTY CLAY

FIGURE A4



Legend	Borehole	Sample	Depth (m)	LL %	PL %	PI %
●	16-1	3	0.9 - 1.5	42.6	21.2	21.4

Houle Chevrier Engineering

Project Name:

Date: April 2016

Project: 63274.04

HCE ATTERBERG LIMITS 6327404_BOREHOLE LOGS_GNT_V01_2016-03-15.GPJ HOULE CHEVRIER FEB 9 2011.GDT 4-11-16

APPENDIX B

Previous Investigations
Record of Borehole Sheet BH1
Record of SCPTu Sheet 15-1

Log of Borehole 1

Project No: OTT-00216422-A0

Project: Geotechnical Investigation - Proposed Pumping Station

Location: Environment Canada - 335 River Road, Ottawa, ON

Figure No. 3

Page. 1 of 2

Date Drilled: 5/22/14

Drill Type: CME-75 (Truck Mount)

Datum: Geodetic

Logged by: MD Checked by: JS

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth
		TOPSOIL ~ 100 mm	92.3	0
		Brown sand with trace silt and organics, moist (loose)	92.2	
		SAND AND GRAVEL FILL	91.9	
		Brown, grey, moist, (loose)		
		CLAY		
		Brownish grey to grey, moist to wet, (very stiff)	90.27	2
			89.8	
		SILTY SAND		
		Grey, wet, (very loose to loose)		
		- trace shell pieces		
		- fine grained		
			85.6	
		CLAY		
		Grey, wet, (very stiff)		
			83.6	
		SILTY SAND		
		Grey, wet, (loose to dense)		
		- trace shell pieces		
		- fine grained		

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60
SAMPLES
Natural Unit Wt. kN/m³

Depth 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

7 9 7 106 s = 3.4 5 2 4 2 5 2 101 s = 8.4 7 27 27 35

Continued Next Page

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A 51 mm diameter monitoring with 4.6 m of screen was installed in the borehole upon completion
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00216422-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
22	2.0	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	23.49 - 23.87	100	0
2	23.87 - 25.26	73	38
3	25.26 - 26.77	99	86

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 6/10/14

Log of Borehole 1

Project No: OTT-00216422-A0

Project: Geotechnical Investigation - Proposed Pumping Station

Figure No. 3

Page. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		SILTY SAND Grey, wet, (loose to dense) - trace shell pieces - fine grained *(continued)*	77.3	15 16 17 18 19 20 21 22 23 24 25 26	5(24 61 50/150mm			
		LIMESTONE BEDROCK Grey, very poor quality to good quality	68.8					
		Borehole Terminated at 26.8 m Depth	65.5					

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A 51 mm diameter monitoring with 4.6 m of screen was installed in the borehole upon completion
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00216422-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
22	2.0	

CORE DRILLING RECORD

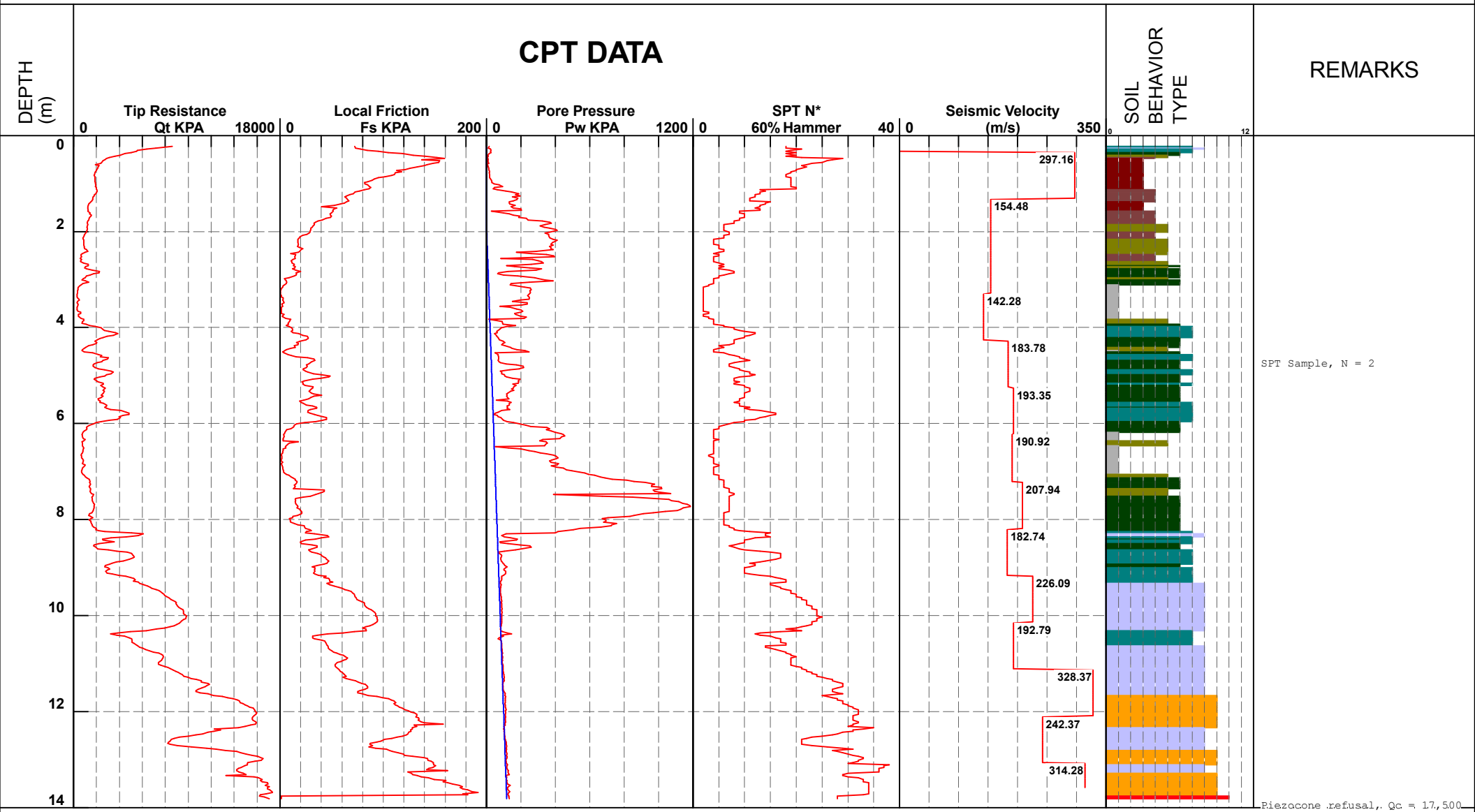
Run No.	Depth (m)	% Rec.	RQD %
1	23.49 - 23.87	100	0
2	23.87 - 25.26	73	38
3	25.26 - 26.77	99	86

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 6/10/14

Houle Chevrier Engineering Ltd.

Operator	LB	Cone Number	DDG1335	Location	335 River Rd
Job No.	15-072	Date and Time	7/23/2015 6:18:31 AM	CPT No.	SCPTu 15-1
Groundwater Depth	1.89 m (assumed)	Ground Elev.			

CPT DATA



- 1 - sensitive fine grained
- 2 - organic material
- 3 - clay
- 4 - silty clay to clay
- 5 - clayey silt to silty clay
- 6 - sandy silt to clayey silt
- 7 - silty sand to sandy silt
- 8 - sand to silty sand
- 9 - sand
- 10 - gravelly sand to sand
- 11 - very stiff fine grained (*)
- 12 - sand to clayey sand (*)

geotechnical

environmental

hydrogeology

materials testing & inspection

experience • knowledge • reliability