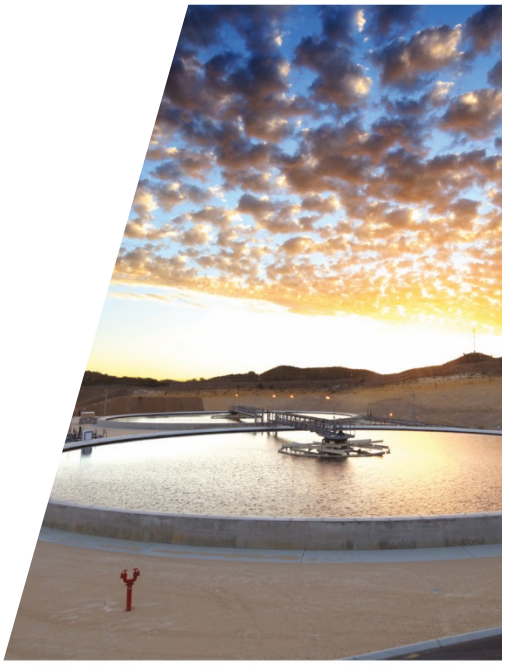
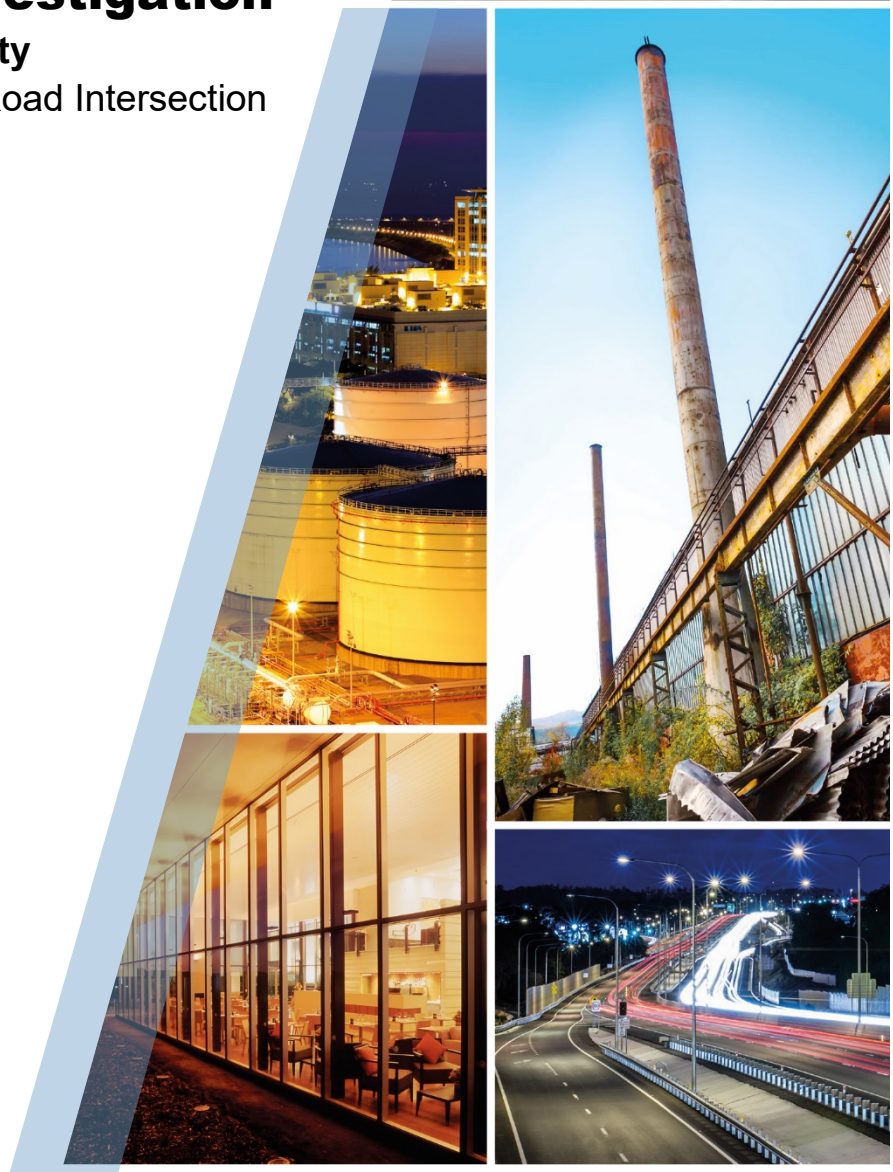


Geotechnical Investigation

Proposed Sortation Facility

Leikin Drive and Merivale Road Intersection
Nepean, Ontario

Medusa LP



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Appendix Index

1. Introduction

The technical services of GHD were retained by Medusa LP (Client), represented by Mr. Russell Beach, to carry out a Geotechnical Investigation for the construction of a new sortation facility located east of the Leikin Drive and Merivale Road intersection, in Nepean, Ontario.

The investigation was carried out in accordance with GHD's Offer of Professional Services Nº. 11226724-01-Rev-1, dated April 15, 2021.

Note that the current Site was previously partially investigated by Fondex in November of 1991 (Report Nº. O-A756-A). The geotechnical information provided within this previous investigative report was reviewed and considered while preparing the scope for the current investigation. Borehole logs deemed pertinent have been included in this report.

The purpose of the geotechnical investigation was to evaluate the subsoil conditions within the proposed distribution centers footprint in order to provide geotechnical comments and recommendations for the design and construction of the new structure.

This report presents the complete description and findings of our Geotechnical Investigation and provides recommendations and comments regarding the design of the foundations, as well as the construction of the proposed sortation facility.

In addition, this report is accompanied by a series of six appendices:

Appendix A	Site Location Plan *(Drawing Nº. 11227097-A1-1A)*
Appendix B	GHD Borehole Reports and Rock Photographs
Appendix C	GHD Test Pit Reports and Photographs
Appendix D	GHD Piezocone (CPT) Sounding Reports Preconsolidation Profile Graphs D1 and D2 Dissipation Profile Graph D3
Appendix E	Fondex Borehole Reports, November 1991
Appendix F	Geotechnical Laboratory Results

This report is subject to a number of limiting conditions due to the inherent nature of geological, geotechnical, and hydrogeological profiles determined by investigative fieldwork. The applicable limitations of this study are explained following the technical section of this report. These limitations are an integral part of this report and the reader is strongly encouraged to inform himself/herself in order to facilitate their comprehension, interpretation, and use of this document.

2. Site and Project Descriptions

The investigated site is located just west of the Leikin Drive/Merivale Road intersection in Nepean, Ontario and is bounded by agricultural land and subsequently Merivale Road and Leikin Drive to the East, by a agricultural land to the North and West, and by Bill Leathem/Longfields Drive and Paragon Avenue to the south.

A gravel road bisects the lower half of the site from East to West. At the time the investigation was completed, the portion of the site situated North of the gravel road was plowed and used for agriculture purposes. The portion of the site located South of the gravel access road consists mostly in barren grassland with shrubs and small trees.

Note than an apparent earth fill mound covered with vegetation was observed just North of the Bill Leathem Drive and Paragon Avenue Intersection, south of the gravel access road.

The site is relatively flat with site grade elevations generally varying between 90.3 meters (m) and 90.7 m at GHD sounding locations. The maximum grade elevation recorded at a GHD sounding location on the aforementioned soil mound is 95.2 m.

According to the project details provided by Medusa LP, the project will consist in the construction a single storey sortation facility which will encompass an area of 25,090 square meters (m^2) (270,000 square feet (ft^2)).

Currently, a finished floor elevation of 91.8 m has been established by Medusa LP. As such, a site grade raise, up to 1.4 m will be required within the proposed sortation facility building footprint.

The proposed building will be surrounded to the North and South by concrete loading dock areas and subsequently heavy-duty asphaltic pavement trailer circulation and parking areas. The loading dock areas will be located roughly 1.2 m below the top of the future interior slab on grades, near an approximate elevation of 90.6 m.

In addition, a light-duty asphaltic parking area is proposed just West of the sortation facility building footprint.

Trailer access to the site will be possible along a proposed private road along the southern limit of the site, running East to West between Paragon Avenue and Leikin Drive. A second trailer access is proposed along Longfield Drive, at the western limit of the site. Employee access is also proposed along Longfield Drive

The drawing N$^{o.}$ 11227097-A1-1A, presented in the Appendix A of this report, illustrates current site conditions, proposed building and exterior asphaltic and concrete structure configurations as well as the location of the various investigative soundings completed by GHD.

3. Geotechnical Investigation Objectives

An initial review of the previously completed Fondex Report suggests that the site stratigraphy consists of a native silt and clay, overlying a clayey silt deposit followed by a glacial till deposit and ultimately bedrock.

Although, bedrock was not encountered within borehole N$^{o.}$ BH-09 previously completed by Fondex and located within the proposed sortation facility building footprint, surrounding Fondex boreholes would suggest bedrock roughly 20 m below grade.

According to the available Fondex borehole logs, the silt and clay deposit is initially stiff to very stiff, while a firm to stiff consistency was identified beyond the initial 3 m of the deposit.

Based on the proposed development details and readily available geotechnical information, the following important topics required assessment in order to provide geotechnical comments and recommendations with respect to the proposed construction:

- the extent and depth/thickness of the firm to stiff silty clay/clayey silt deposit;
- the depth of underlying till and the bedrock stratums;
- the evaluation of the geotechnical properties of the said clay, the glacial till and the bedrock stratums;
- the hydraulic conditions across the expansion footprint.

This evaluation is required in order to provide geotechnical comments and recommendations specific to the proposed construction, namely

- the foundation design (foundation types as well as the limit states capacities);
- the potential soil improvement techniques for building foundations and slabs if applicable for this site;
- the seismic site classification;
- the earthworks design for both interior building and the exterior slabs (concrete aprons) as well as flexible pavement structures;
- the excavation works;
- the general construction recommendations.

4. Methods of Investigation

The following bullets briefly summarize the field and laboratory work scope completed for this investigation:

- Advancement of nine boreholes across the investigated site. Six of these boreholes were advanced within the proposed building footprints (identified as boreholes Nos. BH-01 to BH-6). The three remaining boreholes were advanced within surrounding pavement and stormwater pond areas (identified as boreholes Nos. BH-11 to BH-13). The majority of the boreholes (BH-01, BH-04 to BH-06 and BH-11 to BH-13) were sampled to depths varying between 6.1 m and 10.5 m BGS and completed with a dynamic penetration test to penetration refusal. The borehole Nos. BH-02, BH-03, both located within the proposed building footprint, were drilled within bedrock to depths of 23.62 m and 22.81 m BGS. In-situ vane shear test were completed at these two borehole locations to measure the undrained shear strength and aid in calibration of the CPT results.
- Installation of two piezometers and one open standpipe within boreholes Nos. BH-02 and BH-03 and installation of one open standpipe within boreholes Nos. BH-01, BH-04 to BH-06 and BH-11 to BH-13 in order to evaluate the underground water conditions across the proposed development.
- Completion of cone penetration test (CPT) at 11 locations (identified as CPT-01 to CPT-08, CPT-14, CPT-16 and CPT-18) to a maximum depth of 22 m BGS to assess subsurface soil conditions at each location. The CPT is an in-situ instrumentation/tool to assess soil stratigraphy and soil strength parameters in a continuous fashion.
- Excavation of 32 test pits across the Site to depths varying between 1.5 and 3.4 m BGS to assess topsoil layer thickness, reworked native thickness and condition of the existing fill materials to determine stripping requirements.
- Geotechnical soil/rock sampling in all of the boreholes and the test pits .
- Geotechnical laboratory sampling on selected representative soils samples recovered throughout the field investigation activities.

The field and laboratory testing programs were established by GHD in consultation with the Client. All of the field work activities were carried out between April 19, 2021, and May 7th 2021,under the constant supervision or a member of GHD's technical staff.

The following subsections describe in more detail the various scope elements carried out during this investigation.

4.1 Surveying

Prior to conducting the field investigation, the preliminary concept plan No. DE20073 A-100 showing the proposed sortation facility was provided by the Client. This plan served to position all required soundings in order to complete the geotechnical investigation.

All soundings on the Site were positioned by GHD field personnel using a portable Leica Global Positioning System (GPS) receiver unit, which uses satellite positioning. The sounding coordinates and elevations mentioned in the present report refer to the geodetic system MTM 09 NAD 83.

Table 4.1 provides a listing of the geodetic coordinates recorded at each sounding location.

Table 4.1 Sounding Geodetic Coordinates (m)

Sounding Nº.	X	Y	Z
Boreholes			
BH-01	366477.63	5017942.84	90.59
BH-02	366599.58	5018011.41	90.61
BH-03	366427.79	5017867.93	90.52
BH-04	366567.28	5017946.11	90.50
BH-05	366518.80	5017869.42	90.47
BH-06	366640.09	5017937.35	90.53
BH-11	366474.05	5017740.71	95.01
BH-12	366605.03	5017606.53	90.31
BH-13	366809.62	5017824.83	90.38
Test Pits			
TP-01	366239.17	5017861.22	90.67
TP-02	366350.84	5017942.36	90.59
TP-03	366431.00	5017938.38	90.52
TP-04	366475.95	5018013.03	90.46
TP-05	366565.38	5018013.45	90.60
TP-06	366603.70	5018084.52	90.61
TP-15	366292.49	5017826.88	90.65
TP-16	366351.68	5017860.36	90.62
TP-17	366450.06	5017904.30	90.59
TP-18	366524.80	5017946.17	90.55
TP-19	366584.28	5017980.12	90.68
TP-20	366653.21	5017996.11	90.52
TP-24	366263.59	5017757.81	90.68
TP-25	366326.97	5017764.92	90.71
TP-26	366386.21	5017798.30	90.68
TP-27	366471.14	5017866.88	90.58
TP-28	366545.67	5017908.90	90.71
TP-29	366605.43	5017942.56	90.72
TP-30	366492.78	5017827.93	90.56
TP-31	366627.41	5017903.27	90.41
TP-35	366558.20	5017809.80	90.46
TP-36	366701.14	5017889.70	90.34
TP-40	366658.89	5017827.60	90.51
TP-43	366526.59	5017723.06	93.75
TP-44	366587.94	5017715.58	90.55
TP-45	366763.13	5017843.19	90.52
TP-46	366877.48	5017907.62	90.36
TP-47	366973.39	5017961.21	90.31
TP-49	366510.78	5017662.81	90.87

Table 4.1 Sounding Geodetic Coordinates (m)

Sounding Nº.	X	Y	Z
TP-49PILE	NA	NA	92.87
TP-50	366472.03	5017605.63	90.55
TP-51	366550.34	5017657.78	90.42
TP-52	366538.82	5017605.51	92.69
Piezocone Soundings			
CPT-01	366408.63	5017902.81	90.59
CPT-02	366547.14	5017980.74	90.54
CPT-03	366600.93	5018008.51	90.58
CPT-04	366424.87	5017866.60	90.48
CPT-05	366497.25	5017906.97	90.66
CPT-06	366615.31	5017978.32	90.46
CPT-07	366448.33	5017830.41	90.53
CPT-08	366587.51	5017909.64	90.55
CPT-14	366235.90	5017866.97	90.59
CPT-16	366660.47	5017830.11	90.46
CPT-18	366453.29	5017675.76	90.89

4.2 Boreholes

The drilling work was carried out using a track-mounted drill rig (CMC-55) under the full-time supervision of GHD technical representative. The boreholes were advanced using hollow stem augers or casing methodology to balance any potential hydraulic uplift pressures. Soil samples were collected every 0.75 m intervals to the confirmation of the firm silty clay/clayey silt deposit and 1.5 m intervals thereafter to the termination depth of the borehole within boreholes drilled to bedrock. All samplings were conducted using a 50 mm outside diameter split-spoon sampler (SS) in general accordance with the specifications of the Standard Penetration Test Method (ASTM D1587-8). In addition, at each borehole location the relative density or consistency of the subsurface soil layers were measured using the Standard Penetration Test (SPT) method, by counting the number of blows ('N') required to drive a conventional split-barrel soil sampler 0.3 m depth.

Additionally, intact (undisturbed) samples (ST) of the cohesive silty clay/clayey silt deposit were retrieved at relevant depths using thin-walled "Shelby" tubes (ASTM D1587) for testing purposes in our soils laboratory.

Borehole Nºs. BH-01, BH-04 to BH-06, BH-12 and BH-13 were completed with a dynamic penetration tests using the same drill rig used to complete the boreholes. The physical elements of the completed DCPTs such as the hammer weight and falling height are equivalent to SPT testing according to ASTM D1586. However, rather than using a split spoon sampler, a solid 60-degree cone was attached to the end of a rod for conducting DCPT. The results of DCPT are recorded in terms of the number of blows required to drive the penetrometer for a distance of 30 cm, which is called N30.

Finally, bedrock samples were recovered in borehole Nºs. BH-02 and BH-03 using an "NQ" caliber core barrel.

The borehole locations are illustrated in drawing N°. 11227097-A1-1A. The corresponding GHD borehole reports are presented in Appendix B.

4.3 Piezocone Soundings (CPT)

The cone penetration tests (CPTs) were carried out on eleven selected locations across the site. The CPTs were performed according to the requirements of the ASTM Standards D5778-12. The soundings were terminated at probe penetration or deviation refusals. Within CPTs, the tip resistance q_t, the pore pressure u_2 generated by the probe penetration and the skin friction f_s were measured at depth intervals of 1 cm allowing continuous profiles of these parameters to be obtained. These parameters were used to estimate the soil parameters such as undrained shear strength and the preconsolidation stress that is required for detailed geotechnical settlement analysis.

Two seismic profiles were also completed within CPTs N°s. CPT-03 and CPT-04. The seismic profiles are determined by measuring the average shear wave velocity (Vs) along the CPT's which are produced by providing a vibration on the ground surface and then measuring the response at the CPT probe depth.

The CPT sounding locations are illustrated in drawing N°. 11227097-A1-1. The corresponding CPT reports are presented in Appendix D.

4.4 Vane Shear Tests

Two vane shear tests were performed in boreholes N°s. BH-02 and BH-03, near respective piezocone soundings N°s. CPT-03 and CPT-04, in order to define the shear strength values within the silty clay/clayey silt deposit and to calibrate shear strength values estimated from the CPT results. The measured shear strength values are illustrated on the corresponding BH and CPT reports. The shear strength values are equally illustrated on the borehole reports presented in Appendix B. The said CPT reports are presented in Appendix D.

4.5 Test Pit Excavations

A total of 32 test pits were completed by means of a mechanical shovel to depths varying between 1.5 and 3.4 m BGS to assess topsoil layer thickness, reworked native thickness, condition of existing fill materials to determine stripping requirements as well as to assess the condition of the underlying native soils.

The Test Pit reports are presented in Appendix C.

4.6 Geotechnical Laboratory Testing

All of the recovered geotechnical soil and rock samples were transported to our Montreal office laboratory where they were logged and visually identified for presentation purposes in this report. The borehole samples will be stored for a period of 6 months, after which they will be discarded, unless otherwise requested by the Client. The test pit samples will be discarded once the final report is issued to the Client.

Geotechnical laboratory testing was conducted on representative samples of the subsoil. The purpose of these laboratory tests was to determine the geotechnical engineering properties of the

subsoil stratas encountered throughout the investigations. The geotechnical laboratory-testing program consisted of:

- 24 water content determinations on selected soil samples (NQ 2501-170);
- 7 grain-size analysis on selected soil samples (LC 21-040);
- 2 hydrometer analysis on selected soil samples (NQ 2501-025);
- 15 consistency limits measurements on selected soil samples (NQ 2501-092);
- 2 oedometric consolidation tests on selected soil samples (ASTM D-2435).

The detailed results of the geotechnical laboratory tests are presented in Appendix F and are summarized in Section 5 of this report.

4.7 Open Standpipes and Piezometric Installations

Piezometers (PZ) or open standpipes (OS) were installed in the cavity of selected drilled boreholes in order to define the hydraulic conditions across the investigated site. Depths and elevations of these probes are presented hereafter in Table 4.2.

Table 4.2 Depths and Elevations of Piezometer and Open Standpipe Installations (m)

Borehole N°.	Installation N°.	Installation Elevation	Probe Depth	Probe Elevation
BH-01	OS-01	90.59	9.15	81.44
BH-02	PZ-02a	90.61	7.55	83.06
	PZ-02b		13.61	77.00
	OS-02		4.85	85.76
BH-03	PZ-03a	90.52	7.70	82.82
	PZ-03b		13.23	77.29
	OS-03		6.76	83.76
BH-04	OS-04	90.50	6.10	84.40
BH-05	OS-05	90.47	6.10	84.37
BH-06	OS-06	90.53	5.96	84.57
BH-11	OS-11	95.01	10.67	84.34
BH-12	OS-12	90.31	5.99	84.32
BH-13	OS-13	90.38	10.46	79.92

OS: Open Standpipe
PZ: Piezometer

Short duration dissipation tests (approximately 10 to 15 minutes) were also performed during all piezocone soundings to define the at-rest pore pressure u_o at refusal depth. The obtained dissipation curves for each sounding are illustrated on Graph D3 presented in Appendix D while their results are discussed in Section 6.

5. Soil Description

The subsoil conditions encountered at the Site generally consist of surficial topsoil or remoulded native soil and localized fill layers overlying a silt and clay deposit of variable thickness, a clayey silt deposit, a glacial till deposit and ultimately bedrock.

Table 5.1 presents an overview of the depth/elevation of each subsoil stratum encountered at the various sounding locations completed during the field investigation.

Table 5.1 Subsoil Stratigraphy Depth and Elevation (m)

Sounding No.	Sounding Elev.	Remoulded Native Soil/Top soil (thickness)	Fill (thickness)	Silt and Clay Crust		Silt and Clay Deposit		Clayey Silt Deposit		Loose to Compact Till Deposit		Bedrock		End of Sounding	
				Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.
BH-01	90.59	0.14	--	0.14	90.45	3.81	86.78	13.5[1]	77.1[1]	19.5[1]	71.1[1]			21.16*	69.43*
BH-02	90.61	0.10	--	0.10	90.51	3.40	87.21	9.15	81.46	10.67	79.94	22.13	68.48	23.62	66.99
BH-03	90.52	0.13	--	0.13	90.39	3.50	87.02	12.19	78.33	16.20	74.32	19.97	70.55	22.81	67.71
BH-04	90.50	0.13	--	0.13	90.37	3.25	87.25	11.5[1]	79.0[1]	15.0[1]	75.6[1]			22.73*	67.77*
BH-05	90.47	0.15	--	0.15	90.32	3.27	87.20	13.0[1]	77.5[1]	18.0[1]	72.5[1]			22.05*	68.42*
BH-06	90.53	0.16	--	0.16	90.37	3.05	87.48	13.5[1]	77.0[1]	19.5[1]	71.0[1]			21.97*	68.56*
BH-11	95.01	0.30	5.34	5.64	89.37	9.90	85.11	--	--	--	--	--	--	10.51	84.50
BH-12	90.31	0.05	0.56	0.61	89.70	3.05	87.26	11.5[1]	77.8[1]	14.5[1]	75.8[1]			17.53*	72.78*
BH-13	90.38	0.09	--	0.09	90.29	3.81	86.57	13.0[1]	77.4[1]	14.0[1]	76.4[1]			19.46*	70.92*
Piezocone Soundings															
CPT-01[2]	90.59	--	--	--	--	3.50	87.09	12.75	77.84	17.00	73.59	--	--	19.08**	71.48**
CPT-02[2]	90.54	--	--	--	--	3.50	87.04	13.00	77.54	20.50	70.04	--	--	20.92**	69.59**
CPT-03[2]	90.58	--	--	--	--	3.50	87.08	10.50	80.08	16.00	74.58	--	--	20.72**	69.79**
CPT-04[2]	90.48	--	--	--	--	3.50	86.98	12.50	77.98	17.00	73.48	--	--	18.89**	71.56**
CPT-05[2]	90.66	--	--	--	--	3.00	87.66	14.00	76.66	18.25	72.41	--	--	18.63**	71.99**

Table 5.1 Subsoil Stratigraphy Depth and Elevation (m)

Sounding No.	Sounding Elev.	Remoulded Native Soil/Top soil (thickness)	Fill (thickness)	Silt and Clay Crust		Silt and Clay Deposit		Clayey Silt Deposit		Loose to Compact Till Deposit		Bedrock		End of Sounding	
				Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.
CPT-06[2]	90.46	--	--	--	--	3.25	87.21	12.25	78.21	15.50	74.96	--	--	17.10**	73.35**
CPT-07[2]	90.53	--	--	--	--	4.00	86.53	12.25	78.28	14.50	76.03	--	--	15.62**	74.88**
CPT-08[2]	90.55	--	--	--	--	3.50	87.05	14.50	76.05	19.50	71.05	--	--	21.93**	68.58**
CPT-14[2]	90.59	--	--	--	--	4.00	86.59	10.25	80.34	15.75	74.84			18.37**	72.17**
CPT-16[2]	90.46	--	--	--	--	4.00	86.46	13.00	77.46	18.00	72.46	--	--	20.66**	69.78**
CPT-18[2]	90.89	--	--	--	--	4.00	86.89	12.25	78.64	18.00	72.89	--	--	18.66**	72.19**
Test Pits															
TP-01	90.67	0.30	--	0.30	90.37	--	--	--	--	--	--	--	--	2.80	87.87
TP-02	90.59	0.30	--	0.30	90.29	--	--	--	--	--	--	--	--	3.00	87.59
TP-03	90.52	0.30	--	0.30	90.22	--	--	--	--	--	--	--	--	2.90	87.62
TP-04	90.46	0.30	--	0.30	90.16	--	--	--	--	--	--	--	--	3.10	87.36
TP-05	90.60	0.30	--	0.30	90.30	--	--	--	--	--	--	--	--	3.00	87.60
TP-06	90.61	0.30	--	0.30	90.31	--	--	--	--	--	--	--	--	3.00	87.61
TP-15	90.65	0.30	--	0.30	90.35	--	--	--	--	--	--	--	--	2.80	87.85
TP-16	90.62	0.30	--	0.30	90.32	--	--	--	--	--	--	--	--	3.00	87.62

Table 5.1 Subsoil Stratigraphy Depth and Elevation (m)

Sounding No.	Sounding Elev.	Remoulded Native Soil/Top soil (thickness)	Fill (thickness)	Silt and Clay Crust		Silt and Clay Deposit		Clayey Silt Deposit		Loose to Compact Till Deposit		Bedrock		End of Sounding	
				Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.
TP-17	90.59	0.30	--	0.30	90.29	--	--	--	--	--	--	--	--	1.45	89.14
TP-18	90.55	0.30	--	0.30	90.25	--	--	--	--	--	--	--	--	1.50	89.05
TP-19	90.68	0.30	--	0.30	90.38	--	--	--	--	--	--	--	--	1.50	89.18
TP-20	90.52	0.30	--	0.30	90.22	--	--	--	--	--	--	--	--	3.00	87.52
TP-24	90.68	0.50	--	0.50	90.18	--	--	--	--	--	--	--	--	3.00	87.68
TP-25	90.71	0.30	--	0.30	90.41	--	--	--	--	--	--	--	--	3.30	87.41
TP-26	90.68	0.30	--	0.30	90.38	--	--	--	--	--	--	--	--	2.90	87.78
TP-27	90.58	0.30	--	0.30	90.28	--	--	--	--	--	--	--	--	1.50	89.08
TP-28	90.71	0.30	--	0.30	90.41	--	--	--	--	--	--	--	--	1.50	89.21
TP-29	90.72	0.30	--	0.30	90.42	--	--	--	--	--	--	--	--	1.45	89.27
TP-30	90.56	0.30	--	0.30	90.26	--	--	--	--	--	--	--	--	3.00	87.56
TP-31	90.41	0.30	--	0.30	90.11	--	--	--	--	--	--	--	--	3.00	87.41
TP-35	90.46	0.30	--	0.30	90.16	--	--	--	--	--	--	--	--	3.00	87.46
TP-36	90.34	0.30	--	0.30	90.04	--	--	--	--	--	--	--	--	3.00	87.34
TP-40	90.51	0.30	--	0.30	90.21	--	--	--	--	--	--	--	--	3.00	87.51

Table 5.1 Subsoil Stratigraphy Depth and Elevation (m)

Sounding No.	Sounding Elev.	Remoulded Native Soil/Top soil (thickness)	Fill (thickness)	Silt and Clay Crust		Silt and Clay Deposit		Clayey Silt Deposit		Loose to Compact Till Deposit		Bedrock		End of Sounding	
				Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.	Depth	Elev.
TP-43	93.75	--	>3.35	--	--	--	--	--	--	--	--	--	--	3.35	90.40
TP-44	90.55	0.50	--	0.50	90.05	--	--	--	--	--	--	--	--	3.00	87.55
TP-45	90.52	0.30	--	0.30	90.22	--	--	--	--	--	--	--	--	3.00	87.52
TP-46	90.36	0.30	--	0.30	90.06	--	--	--	--	--	--	--	--	3.00	87.36
TP-47	90.31	0.60	--	0.60	89.71	--	--	--	--	--	--	--	--	3.00	87.31
TP-49	90.87	--	0.70	0.70	90.17	--	--	--	--	--	--	--	--	3.00	87.87
TP-49Pile	92.87	--	2.00	--	--	--	--	--	--	--	--	--	--	2.00	90.87
TP-50	90.55	0.20	--	0.20	90.35	--	--	--	--	--	--	--	--	3.00	87.55
TP-51	90.42	0.30	--	0.30	90.12	--	--	--	--	--	--	--	--	3.00	87.42
TP-52	92.69	--	2.70	2.70	89.99	--	--	--	--	--	--	--	--	3.32	89.37
Notes:	*: Borehole terminated upon dynamic penetration test refusal on very dense till or probable bedrock **: CPT terminated upon cone penetration refusal or deviation [1] Approximate stratigraphy depth interpreted based on DCPT results [2]:Approximate stratigraphy depth interpreted based on CPT results --: Stratigraphy not encountered, not sampled or not interpreted														

The different soil units encountered across the Site are briefly described in the following paragraphs. Detailed descriptions of the units are presented in the borehole and test pit reports in the Appendices B and C while the interpreted stratigraphy based on the CPT tests results are presented in the Appendix D.

5.1 Topsoil/Remoulded Native Soil

All soundings revealed a surficial topsoil layer or remoulded native soil layers most likely due to historical agricultural activities on Site. The topsoil and remoulded native soil consist of a clayey silt with traces of sand with the presence of rootlets and organics. The topsoil and remoulded native soil thickness varies between 0.1 m to 0.7 m at the various soundings locations.

It should be noted that the thickness of topsoil may vary between borehole and test pit locations. Classification of this material was based solely on visual and textural evidence; testing of organic content or other constituents was not carried out as it was not part of this scope of work.

5.2 Fill

Apparent earth fill mounds covered with vegetation were observed just North of the Bill Leathem Drive and Paragon Avenue Intersection, south of the gravel access road. The sounding N$^{os.}$ BH-11, TP-43, TP-49Pile, TP-52 completed on these mounds confirmed the presence of a brown and moist clayey silt fill layer. A maximum fill thickness of 5.34 m was recorded within borehole N$^{o.}$ BH-11.

In addition, a 0.6 m thick surficial fill layer was also encountered within borehole N$^{o.}$ BH-12, located in the vicinity of these mounds.

The presence of buried organics was observed within the fill layers.

5.3 Silt and Clay Deposit

Below the aforementioned layer, a native silt and clay deposit was encountered within all the soundings at depths varying between 0.10 m and 0.70 m (Elevations comprised between 89.4 m and 90.5 m) with the exception of soundings N$^{os.}$ BH-11 and TP-52 located on fill mounds, where the silt and clay deposit was encountered below surficial fill at respective depths of 5.64 m and 2.70 m (Elevations of 89.37 m and 89.99 m).

Within the majority of the boreholes and test pits, the initial 2.5 m to 4.3 m of the silt and clay deposit is stiff to very stiff with measured undrained shear strength values generally varying between 50 kPa to 120 kPa, brown to grey and moist, corresponding to a clayey crust. Beyond the crust, the silt and clay deposit become grey, very moist to saturated.

Four grain-size distribution and tests were carried out on selected representative silt and clay deposit samples recovered during the field investigation. The grain-size distribution test results are summarized in the table below. The distribution test curves are illustrated on the grain-size distribution reports presented in the Appendix E.

Table 5.2 Summary of the Grain-Size Distribution Analyzes – Silt and Clay Deposit

Sounding (Sample) Nº.	Sample Depth (m)	Water Content, w_o (%)	Grain-Size Distribution (%)				Classification (USCS)
			Gravel	Sand	Silt	Clay	
			> 5 mm	*5 mm – 0.08 mm*	*0.08 mm – 0.002 mm*	*< 0.002 mm*	
BH-01 (TM-5)	3.39-3.53	45	0	7	93		CH
BH-01 (SS-11)	9.15-9.76	68	0	7	93		CH
BH-02 (SS-3)	1.52-2.13	27	0	10	90		CL
BH-03 (SS-11)	8.23-8.84	66	0	4	96		CL

Furthermore, 10 representative silt and clay deposit samples recovered during the field investigation were subjected to Atterberg Limit determinations. The plasticity chart indicating the test results are presented in Appendix E. The results are also summarized in Table 5.3 below.

Table 5.3 Summary of the Atterberg Limits Test Results – Silt and Clay Deposit

Sounding (Sample) Nº.	Sample Depth (m)	Water Content, w_o (%)	Atterberg Limits				Classification (USCS)
			Liquid Limit, w_L (%)	Plastic Limit, w_P (%)	Plastic Index, I_P (%)	Liquid Index, I_L (%)	
BH-01 (TM-5)	3.39-3.53	45	52	21	31	0.77	CH
BH-01 (SS-11)	9.15-9.76	68	50	24	26	1.69	CH
BH-02 (SS-3)	1.52-2.13	27	38	17	21	0.48	CL
BH-02 (TM-07)	4.81-4.98	54	47	22	25	1.28	CL
BH-03 (SS-11)	8.23-8.84	66	48	23	25	1.72	CL
BH-03 (TM-13)	10.87-11.02	58	41	22	19	1.89	CL

Table 5.3 Summary of the Atterberg Limits Test Results – Silt and Clay Deposit

Sounding (Sample) Nº.	Sample Depth (m)	Water Content, w_o (%)	Atterberg Limits				Classification (USCS)
			Liquid Limit, w_L (%)	Plastic Limit, w_P (%)	Plastic Index, I_P (%)	Liquid Index, I_L (%)	
TP-01 (GS-3)	0.80-1.50	33	63	26	37	0.19	CH
TP-25 (GS-3)	0.70-2.10	37	53	24	29	0.45	CH
TP-35 (GS-3)	0.70-1.80	30	59	25	34	0.15	CH
TP-44 (GS-3)	0.80-1.80	39	74	34	40	0.13	CH

Based on these analysis results, the silt and clay deposit generally has the characteristics of medium to high to medium plasticity clay and can be classified as a “CL or CH” soil in accordance with Unified Soil Classification System (USCS) classification.

Based on the vane profiles measured both within the boreholes and the CPT soundings, the grey silt and clay deposit, below the initial crust, can be characterized as firm to stiff with measured shear strength values generally varying between 35 kPa and 60 kPa down to the bottom of the deposit which was encountered 9.2 to 12.2 m BGS within the two deep boreholes and 10.5 to 14.5 m BGS within the eleven CPT’s completed across the site.

The undrainded shear strength measures in each borehole and interpreted in each CPT are illustrated on the detailed borehole and cpt reports respectively presented in the Appendices B and D.

Two oedometer consolidation tests were completed on intact clay samples recovered from borehole Nºs. BH-02 and BH-03. Table 5.4 below summarizes the results of these consolidation tests.

Table 5.4 Summary of the Oedometer Consolidation Tests Results – Silt and Clay Deposit

Sounding (Sample) Nº.	Sample Depth (m)	Initial Void Ratio, e_0	Recompression Index, C_r	Compression Index, C_c	Preconsolidation Pressure, σ'_p (kPa)	Vertical Pressure, σ'_v (kPa)	OCR
BH-02/ST-7	4.81-4.98	1.56	0.07	0.87	167	42	4
BH-03/ST-13	10.87-11.02	1.50	0.06	1.13	176	81	2.2

The underlying preconsolidation profile for each CPT sounding is illustrated on Graph D1 presented in Appendix D. The Consolidation test results in Table 5.4 and the CPT results in Graph D1 suggest

that the clayey deposit is over consolidated with OCR values ranging between 4 in the upper part of the deposit and 1.5 in its the lower part.

The overall thickness of the silt and clay deposit generally varies between 9.0 m and 14.0 m across the Site.

The borehole Nº. BH-11 was terminated in the silt and clay deposit at a depth of 10.5 m (Elevation of 84.5 m).

Sampling within boreholes Nºs. BH-01, BH-04 to BH-06, BH-12 and BH-13 were terminated at depths varying between 5.9 m to 11.3 m (Elevations comprised between 79.1 m and 84.6 m) within the silt and clay deposit.

5.4 Clayey Silt Deposit

Underlying the silt and clay deposit, a native stratified clayey silt deposit was encountered within the deep borehole Nºs. BH-02 and BH-03 at respective depths of 9.2 m and 12.2 m (Elevations of 81.46 m and 78.33 m) and within all CPT soundings at interpreted depths varying between 10.5 m and 14.5 m (Elevations comprised between 80.1 m and 76.1 m).

The deposit is globally firm to stiff with measured shear strength values generally above 40 kPa, is grey in colour, saturated and stratified with thin layers of clay, silt or sand layers.

One hydrometer and one grain-size distribution tests were carried out on selected representative clayey silt deposit samples recovered during the field investigation. The grain-size distribution and hydrometer test results are summarized in the table below. The distribution test curves are illustrated on the hydrometer and grain-size distribution reports presented in the Appendix E.

Table 5.5 Summary of the Grain-Size Distribution and Hydrometer Analyzes - Clayey Silt Deposit

Sounding (Sample) Nº.	Sample Depth (m)	Water Content, w_o(%)	Grain-Size Distribution (%)				Classification (USCS)
			Gravel	Sand	Silt	Clay	
			> 5 mm	*5 mm – 0.08 mm*	*0.08 mm – 0.002 mm*	*< 0.002 mm*	
BH-02 (SS-11/SS-12)	9.15-9.76	25	0	2	98		CL-ML
BH-03 (SS-14)	12.19-12.80	39	0	6	67	27	CL

Two representative clayey silt deposit samples recovered during the field investigation were also subjected to Atterberg Limit determinations. The plasticity chart indicating the test results are presented in Appendix E. The results are also summarized in Table 5.6 below.

Table 5.6 Summary of the Atterberg Limits Test Results – Clayey Silt Deposit

Sounding (Sample) No.	Sample Depth (m)	Water Content, w_o (%)	Atterberg Limits				Classification (USCS)
			Liquid Limit, w_L (%)	Plastic Limit, w_P (%)	Plastic Index, I_P (%)	Liquid Index, I_L (%)	
BH-02 (SS-11/SS-12)	9.15-9.76	25	27	22	5	0.60	CL-ML
BH-03 (SS-14)	12.19-12.80	39	26	18	8	2.63	CL

Based on these analysis results, the clayey silt deposit generally has the characteristics of low plasticity clay and low plasticity silt and can be classified as a “CL and CL-ML” soil in accordance with Unified Soil Classification System (USCS) classification.

Note that the Nilcon Vane profiles in borehole No. BH-02 was terminated upon penetration refusal at a depth of 11.1 m on a probable sandy layer.

5.5 Glacial Till Deposit

Below the clayey silt deposit, a glacial till deposit was encountered at respective depths of 10.7 m and
16.2 m below existing site grades (Elevations of 79.9 m and 74.3 m) in the deep borehole Nos. BH-02 and BH-03 and in all CPT soundings at depths varying between 14.5 m and 20.5 m (Elevations comprised between 70.0 m and 76.0 m).

The glacial till deposits sampled in boreholes Nos. BH-02 and BH-03 is primarily composed of a silt and sand matrix with variable proportions of gravel (ranging from traces to gravelly) and traces of clay. The presence of cobbles was also observed within the borehole No. BH-02.

The glacial till deposits can initially be generally characterized as being in a very loose to loose state, based on the Standard penetration N values recorded varying between 1 and 6 throughout the sampling procedures. Beyond respective depths of 18 m and 17 m BGS within these same boreholes, slightly higher SPT values ranging between 9 and 20 were recorded, indicative of a generally compact soil matrix.

One hydrometer and two grain-size distribution tests were carried out on selected representative till deposit samples. The results are presented in the table below. The distribution test curves are illustrated on the grain-size distribution reports presented in Appendix E.

Table 5.7 Summary of the Grain-Size Distribution and Hydrometer Analyzes – Glacial Till Deposit

Sounding (Sample) Nº.	Sample Depth (m)	Water Content, w_o(%)	Grain-Size Distribution (%)				Classification (USCS)
			Gravel	Sand	Silt	Clay	
			> 5 mm	5 mm – 0.08 mm	0.08 mm – 0.002 mm	< 0.002 mm	
BH-02 (SS-14/SS-15)	11.43-12.80	8	22	42	36		SM
BH-02 (SS-19)	15.24-15.85	8	26	40	A		SM
BH-03 (SS-18)	18.29-18.90	9	25	45	23	7	SM

Three representative till deposit samples recovered during the field investigation were also subjected to Atterberg Limit determinations. The plasticity chart indicating the test results are presented in Appendix E. The results are also summarized in Table 5.8 below.

Table 5.8 Summary of the Atterberg Limits Test Results – Glacial Till Deposit

Sounding (Sample) Nº.	Sample Depth (m)	Water Content, w_o (%)	Atterberg Limits				Classification (USCS)
			Liquid Limit, w_L (%)	Plastic Limit, w_P (%)	Plastic Index, I_P (%)	Liquid Index, I_L (%)	
BH-02 (SS-14/SS-15)	11.43-12.80	8	14	12	2	--	SM
BH-02 (SS-19)	15.24-15.85	8	13	11	2	--	SM
BH-03 (SS-18)	18.29-18.90	9	15	13	2	--	SM

Based on these analysis results, the glacial till deposits can be characterized as a “SM” soil in accordance with the USCS classification system.

All CPT soundings were terminated upon probe refusal at depths varying between 15.6 m and 21.9 m (Elevations comprised between 68.6 m and 74.9 m). Note that these refusals do not necessarily equate to compact or dense glacial till nor bedrock levels as probe refusals may be a function of both end bearing refusal or probe deviation.

The boreholes Nºs. BH-01, BH-04 to BH-06, BH-12 and BH-13 were terminated with standard penetration tests to refusal on probable very dense glacial till or bedrock, to depths varying between 17.5 m to 22.7 m (Elevations comprised between 72.78 m and 67.77 m).

5.6 Bedrock

Directly below the glacial till deposit, bedrock was encountered and recovered within borehole Nos. BH-02 and BH-03 at respective depths of 22.13 m and 19.97 m (Elevations of 68.48 m and 70.55 m).

The cored bedrock consists of a grey dolomite (sedimentary rock). The recovered bedrock within both boreholes can be described as fair to good rock quality with recorded rock quality designation (RQD) values varying between 61% to 86% and overall core recovery value varying between 74% and 86 % .

The boreholes Nos. BH-01, BH-04 to BH-06, BH-12 and BH-13 were completed with a standard penetration tests to refusal on probable bedrock, down to depths ranging between 17.5 m to 22.7 m (Elevations comprised between 72.78 m and 67.77 m).

The borehole Nos. BH-02 and BH-03 were terminated within the bedrock at depths of 23.62 m and 22.81 m (Elevations of 66.99 m and 67.71 m), respectively.

6. Groundwater Conditions

Groundwater levels were measured on May 6th and May 19, 2020, within the piezometers (PZ) and open standpipes (OS) installed within selected boreholes. The recorded values are presented in Table 6.1.

Table 6.1 Groundwater Depths and Elevations (m)

Borehole No.	Installation No.	Installation Elevation	Probe Depth	Probe Elevation	Water Depth	Water Elevation	Water Depth	Water Elevation
					6/5/2021		19/05/2021	
BH-01	OS-01	90.59	9.15	81.44	1.01	89.58	0.83	89.76
BH-02	PZ-02a	90.61	7.55	83.06	1.09	89.52	1.10	89.51
	PZ-02b		13.61	77.00	1.40	89.21	1.35	89.26
	OS-02		4.85	85.76	1.02	89.59	0.93	89.68
BH-03	PZ-03a	90.52	7.70	82.82	1.12	89.40	1.10	89.42
	PZ-03b		13.23	77.29	1.09	89.43	1.31	89.21
	OS-03		6.76	83.76	0.89	89.63	0.86	89.66
BH-04	OS-04	90.50	6.10	84.40	0.81	89.69	0.81	89.69
BH-05	OS-05	90.47	6.10	84.37	1.03	89.44	0.92	89.55
BH-06	OS-06	90.53	5.96	84.57	1.08	89.45	1.10	89.43
BH-11	OS-11	95.01	10.67	84.34	8.74	86.27	5.40	89.61
BH-12	OS-12	90.31	5.99	84.32	1.18	89.13	1.12	89.19
BH-13	OS-13	90.38	10.46	79.92	1.08	89.30	0.80	89.58

OS: Open Standpipe
PZ: Piezometer

Table 6.2 below summarizes the results of the dissipation tests recorded upon CPT penetration refusal.

Table 6.2 Dissipation Tests Results (m)

Sounding N°.	Test Depth	Corresponding Elevation	At-rest Pore Pressure (kPa)	Piezometric Level Depth	Piezometric Level Elevation
CPT-01	19.11	71.48	173	1.46	89.13
CPT-02	20.89	69.65	197	0.79	89.75
CPT-03	20.79	69.79	192	1.20	89.38
CPT-04	18.92	71.56	167	1.88	88.60
CPT-05	14.1	76.56	131	0.73	89.93
CPT-06	17.11	73.35	149	1.91	88.55
CPT-07*	15.65	74.88	--	--	--
CPT-08*	21.97	68.58	--	--	--
CPT-14	10.13	80.46	92	0.74	89.85
CPT-16	13.08	77.38	120	0.84	89.62
CPT-18	12.56	78.33	105	1.85	89.04
Notes:	*: Unstabilized test --: Not interpreted				

The water level reading results and dissipation test results suggest (almost)[1] hydrostatic conditions across the entire site within the silt and clay and underlying clayey silt deposits

It should be noted, however, that water levels may vary seasonally or after periods of heavy precipitation.

7. Discussion and Recommendations

7.1 Description of the Project

According to the information provided by Medusa LP, the project will consist in the construction a single storey sortation facility located just west of the Leikin Drive/Merivale Road Intersection in Nepean, Ontario.

The proposed sortation facility building will encompass an area of 25,090 m^2 (270,000 ft^2).

Currently, a finished floor elevation of 91.8 m has been established by Medusa LP. As such, a site grade raise, up to 1.3 m will be required within the proposed sortation facility building footprint.

The proposed building will be surrounded to the North, East and South by concrete loading dock areas and subsequently heavy-duty asphaltic pavement trailer circulation and parking areas. The loading dock areas will be located roughly 1.2 m below the top of the future interior slab on grade, near an approximate elevation of 90.6 m. In addition, a light-duty asphaltic parking area is proposed

[1] A slight downward flow gradient of about 0.04 was measured from the piezometers installed in BH-03.

just West of the sortation facility building footprint. Based on these proposed elevations, it is assumed that the final exterior light and heavy duty pavement grades will be placed near existing site grades.

Trailer access to the site will be possible along a proposed private road along the southern limit of the site, running East to West between Paragon Avenue and Leikin Drive. A second trailer access is proposed along Longfield Drive, at the western limit of the site. Employee access is also proposed along Longfield Drive.

Details with respect to typical column loads were currently unavailable at the time this report was prepared. However, a slab live load of 25 kPa was considered for foundation and slab design comments and recommendations.

Based on the aforementioned information, the geotechnical findings at the sounding locations, and assuming they are representative of the subsoil conditions across the entire Site, the following geotechnical recommendations and comments are presented.

7.2 Geotechnical Summary

Below the surficial topsoil/reworked native the majority of the soundings completed within the sortation facility building footprint revealed the presence of a thick silty clay/clayey silt deposit followed by a generally loose to compact glacial till deposit and ultimately bedrock.

Considering the relatively firm nature of the silty clay/clayey silt deposit beyond its initial stiff layer (initial 3 m) and to significant depth, the proposed site grade raise, proposed slab loading and subsequent foundation loads would render the said deposit to a normally consolidated state. This consolidation state is illustrated on Figure D2 presented in Appendix D[2].

As such, based on the proposed site development requirements, the site, in its current condition, is not suitable to support a normal slab on grade nor conventional foundations as such a construction would lead to excessive plastic settlements.

According to existing site conditions, four foundation and slab options present themselves for this site in order to allow for the proposed development:

Option 1:

Building foundations and slab supported by a deep piled foundation system that could consist of steel (H-pile or tube) piles driven torefusal upon or within the underlying bedrock.

Option 2:

The installation of a rigid inclusion system in order to improve current site conditions and render the site suitable for a conventional slab and foundations.

[2] This graph shows only effective stresses after site raise and slab loads. Footing loads are not considered in the graph and may move the stresses state closer to yield conditions.

Options 3 and 4:

Building foundations either structurally supported by a deep pile foundations or conventional foundations supported by rigid inclusions combined with the use of light weight fill below the building footprint to allow for construction of a standard slab on grade

Geotechnical comments and recommendations of these four options aimed at preventing excessive settlement while obtaining a uniform performance of the building expansion elements are presented in the subsections below.

7.3 Site Preparation

Based on the conditions encountered in the boreholes and test pits, the majority Site is covered by a surficial topsoil/reworked native layer overlying a native silty clay to clayey silt deposit. The topsoil/reworked native layer contains rootlets and organics. Locally, where earth mounds are present, a layer of fill overlies the underlying native silty clay to clayey silt deposit.

The surficial topsoil/reworked native soils and fill should be removed/stripped from the footprint of the proposed building and pavement areas prior to site grading activities and should not be used as backfill.

All excavated materials should be managed off-Site in accordance with current environmental regulations.

The subgrade soils exposed after the removal of the surficial topsoil, reworked native and unsuitable fill will consist of competent native silty clay / clayey silt soils. Prior to Site grading activity, the exposed subgrade soils should be visually inspected, compacted, and proof rolled using large axially loaded equipment. Any soft, organic, or unacceptable areas should be removed as directed by the Geotechnical Engineer and replaced with suitable engineered materials.

If imported materials are required to raise Site grades to design levels, then potential source Sites should be evaluated for geotechnical and environmental quality prior to acceptance. It is recommended that any proposed engineered fill be comprised of clean earth material, free of topsoil and deleterious materials, and is at a moisture content ±2% of the laboratory optimum for compaction.

Any new engineered backfill used to raise Site grades should be composed of clean granular materials meeting the OPSS.MUNI 1010 Granular ‘’A’’ specifications.

All engineered backfill should be placed in thin lifts not exceeding 300 mm and should be uniformly compacted to at least 98 percent of the SPMDD.

The geotechnical properties of all materials used for grading must be reviewed and approved by the Client’s geotechnical consultant, prior to beginning backfilling operations.

The silty clay soils cannot be reused as engineered fill. Furthermore, the use of recycled materials beneath the building expansion footprint is strictly prohibited.

It is important to note that the exposed native subsoil will be extremely sensitive to disturbance by water, traffic, and circulation of mechanical equipment. As such construction operations should be carried out in a fashion to avoid excessive remoulding of the subsoil and to minimize the necessity of

over-excavation. Given this, proper drainage of the site will need to be implemented prior to any construction works. If required, depending on climatic conditions and traffic loading, hauling roads could be built to promote stable access and to prevent remoulding of the exposed subsoil during construction activities.

7.4 Excavation Slope

The Occupational Health and Safety Act (OHSA) regulations require that if workmen must enter an excavation deeper than 1.2 m, the excavation must be suitably sloped and/or braced in accordance with the OHSA requirements. OHSA specifies maximum slope of the excavations for four broad soil types as summarized in the following table:

Table 7.1 Maximum Slope Inclinations based on Soil Types (OHSA)

Soil Type	Base of Slope	Maximum Slope Inclination
1	Within 1.2 m of bottom	One horizontal to one vertical
2	Within 1.2 m of bottom of trench	One horizontal to one vertical
3	From bottom of excavation	One horizontal to one vertical
4	From bottom of excavation	Three horizontal to one vertical

OHSA Section 226 defines the four soil types as follows:

Type 1 Soil:

1. Hard, very dense and only able to be penetrated with difficulty by a small sharp object;
2. Has a low natural moisture content and a high degree of internal strength;
3. Has no signs of water seepage;
4. Can be excavated only by mechanical equipment.

Type 2 Soil:

1. Very stiff, dense and can be penetrated with moderate difficulty by a small sharp object;
2. Has a low to medium natural moisture content and a medium degree of internal strength; and
3. Has a damp appearance after it is excavated.

Type 3 Soil:

1. Stiff to firm and compact to loose in consistency or is previously excavated soil;
2. Exhibits signs of surface cracking;
3. Exhibits signs of water seepage;
4. If it is dry may run easily into a well-defined conical pile; and
5. Has a low degree of internal strength.

Type 4 Soil:

1. Soft to very soft and very loose in consistency, very sensitive and upon disturbance is significantly reduced in natural strength;
2. Runs easily or flows unless it is completely supported before excavating procedures;

3. Has almost no internal strength;
4. wet or muddy; and
5. Exerts substantial fluid pressure on its supporting system. Ontario Regulation 213/91, s. 226 (5).

The native silty clay/clayey silt soils underlying the Site can be considered Type 3 soils above groundwater level, and Type 4 below groundwater table.

Unsupported side slopes should, however, be adjusted depending on the true subsoil conditions encountered during excavation work and flatter side slopes than those mentioned above may be required locally. Furthermore, no vertical unbraced excavations should be performed in the soil.

Depending on the climatic conditions and duration of the work, impermeable membranes may be required in order to prevent erosion and the development of local instabilities in the excavation slopes (soils).

During the excavation, excavated material, machinery or equipment should not be placed closer than one meter or to the equivalent excavation depth (whichever is larger) from the top of the excavation sidewalls and the safety guidelines provided by OHSA (Section 226) should be strictly adhered to for the open cut excavations.

Considering the necessity of excavations close to or below the underground water table, water infiltration during the earthworks operations should be anticipated. However, due to the relatively low permeability of the native subsoil and depth of excavation, no major groundwater problems are foreseen at this time for such operations. Infiltration into the excavations should be readily handled with ordinary sumps and pumps.

A smooth bucket (blade) should be used for all excavations within the underlying native silty clay/clayey silt deposit in order to avoid excessive disturbance to the bottom of the excavation.

7.5 Building Foundations and Interior Slabs

As previously mentioned in Section 7.2, given the firm nature of the silty clay deposit to significant depth which covers the site, the required site grade raise as well as slab and foundation loading conditions would result in the normally consolidated deposit to experience significant differential and total settlement of all elements founded directly on the existing subgrade.

As such, the site in its current condition, is not suitable to support a conventional slab on grade nor a conventional foundation system.

As previously stated, according to existing site conditions, four foundation and slab options present themselves for this site in order to allow for the proposed development:

Option 1:

Building foundations and slab supported by a deep piled foundation system that could consist of steel (H-pile or tube) piles driven to refusal upon or within the underlying bedrock.

Option 2:

The installation of a rigid inclusion system in order to improve current site conditions and render the site suitable for a conventional slabs and foundations.

Options 3 and 4: Building foundations either structurally supported by a deep pile foundations or conventional foundations supported by rigid inclusions combined with the use of light weight fill below the building footprint to allow for construction of a standard slab on grade.

All four building slab and foundation options are discussed in the subsequent subsections.

7.5.1 Deep Foundation System for Both Building Foundations and Slab

As previously stated, a deep foundation system to support both the building foundations and slab systems would consist of steel (H-pile or circular) piles driven to refusal within or upon the underlying bedrock.

The ultimate axial capacity for piles driven to refusal upon bedrock may be determined using the method provided in Section 18 of the Canadian Foundation Engineering Manual (CFEM), 2006, 4th Edition, while using the parameters given in Table No. 7.4.

Table 7.2 Geotechnical Design Parameters for Driven Piles

Geotechnical Parameters	Symbol (Unit)	Driven Piles		
		Silty Clay	Glacial Till	Bedrock
Submerged Unit Weight	γ' (kN/m^3)	6	10	16
Friction Coefficient	β	0,3	0,5	-
End Bearing Coefficient	N_t	--	--	150

Within Limit States calculations, the factored geotechnical axial resistance obtained with the geotechnical resistance factor Φ of 0.4 must be compared to the coefficients and load combinations obtained from the CNB 2005. This coefficient should be applied during design of the piles and the actual capacities confirmed by on-Site testing.

In the event that the structural engineer wishes to calculate the pile's capacity based on allowable calculations, the pile's allowable bearing capacity can be obtained by dividing the ultimate axial capacity obtained by the geotechnical method listed above by a factor of 3.

Based on the borehole results, pile driving should not be particularly difficult or damageable to the piles down to the dense till deposits. From this point onwards, the pile-driving conditions may be more challenging.

The pile lengths will be a function of the chosen type of piles, driving/drilling method, the presence of a driving shoe and the embedment criteria.. For practical purposes, end bearing piles should be embedded a minimum of 3.0 m within the bearing strata (in this case the dense till deposit, if present, or the underlying bedrock surface).

The type of pile shoe will depend on the type of pile selected, however, for steel tubes and H-piles, a conical point or hard bite, as provided by the Associated Pile and Fitting (APF) would be suitable for

penetrating dense till and potential fractured bedrock. These recommendations are provided by the pile manufacturer.

It is recommended that a wave equation analysis be carried out for the final design of driven steel piles based on the information obtained from the geotechnical investigation and the equipment used on site. This method will allow the best possible match between hammer type and weight and the type of pile and soil conditions. It will also allow driving stresses to be validated.

The pile design should be reviewed based on the analysis. A driving record for each pile, including pile dimensions, hammer type and weight, number of blows, etc. should be kept. Any particular behaviour, such as uplift of adjacent piles should be noted and reported such that corrective measures can be taken.

In order to validate pile design and refusal characteristics, it is recommended that load tests be carried out on selected piles in order to confirm the allowable working load of the piles, as determined during design. Maximum test loads should be limited to twice the allowable design load on the pile, and 90% of the structural resistance of the pile during driving conditions.

Once the load tests are completed, a resistance factor Φ of 0.5 could be applied in order to obtain factored axial resistance at ultimate limit states.

Furthermore, a pile driving analysis (PDA) should be considered during pile construction in order to help establish the termination criteria of the piles. PDA testing is beneficial as it allows the designer to implement a higher soil resistance factor (Φ = 0.5) and can assist in detecting problems during installation, such as poor hammer performance or high driving stresses.

Full time inspection by a qualified geotechnical personnel, independent of the contractor, is required during pile driving operations.

The anticipated settlement of the structure with a properly installed piled foundation system would be negligible and would be a function of the elastic compression of the support members. The settlement value of the piles under maximum live and dead loads should be confirmed by load tests.

The structural slab foundation should incorporate a granular base layer consisting of at least 300 mm of Granular ‘A’ material as per Ontario Provincial Standard Specifications (OPSS form 1010), compacted to at least 100% of the material's SPMDD. It is also recommended that a vapour barrier be installed to limit vapour emission through the concrete slab.

7.5.2 Slab on Grade and Shallow Foundations Placed on a Rigid Inclusion System

Rendering the site suitable to support a conventional slab on grade and shallow conventional footings would require site improvement operations. Based on the site stratigraphic profile, which includes a thick firm silty clay/clayey silt deposit across the site, such site improvement operations would involve the installation of rigid inclusions in order to transfer the loads induced by a conventional construction (loads from conventional footings and slab) to the competent deeper stratum below the firm silty clay/clayey silt and loose to very loose silty sand/sandy silt deposits, in this particular case, the underlying bedrock.

Rigid inclusions are composed of concrete columns with diameters generally ranging between 300 to 450 mm and spaced approximately 1 to 2 m center to center depending on soils characteristics and loading requirements. The rigid inclusions are drilled using a hallow stem auger system and filled with concrete upon drilling to practical refusal within the underlying dense to very dense substratum, in this case the underlying bedrock. To adequately distribute loads from building foundations and slabs to the rigid inclusions and subsequently the competent substratum, a transfer pad usually composed of Granular 'A' or Granular 'B Type 2' crushed stone material as per Ontario Provincial Standard Specifications (OPSS form 1010) crushed stone (generally a minimum of 600 mm thick) is placed between the top of the rigid inclusions and the bottom the foundation and slab elements.

Note that the rigid inclusion sizes, spacing as well as the minimum transfer pad thickness presented above are for information purposes only and should be confirmed by the soil improvement designer and contractor.

Specifically, the design and methodology for the implementation of the rigid inclusions should be completed by a specialized contractor having experience with this type of soil improvement technique. As the soil improvement design (inclusion size, depth and spacing, transfer pad composition and thickness, permanent long-term water table conditions, required site grade raise, etc.) is integral to the optimum and uniform performance of the building foundation and slab on grade systems within the required soil improvement area, the soil improvement designer/contractor is responsible for their design and subsequent construction of the improved soil area.

The inclusions should be designed to account for long-term stabilized water conditions as well as the development of negative skin friction.

Static load tests must be completed on selected inclusions. These load tests are required to validate the serviceability and ultimate bearing capacity values considered for design.

Once the site prepared as prescribed in Section N$^{o.}$ 7.3 and improved using the appropriate soil improvement techniques discussed above (installation of a rigid inclusion system), the site would be suitable to support a conventional foundation system.

As the bearing capacity values are an integral part of the rigid inclusion design, these values must be determined and confirmed by the soil improvement designer and contractor. However, serviceability bearing capacities in the range of 150 to 250 kPa are generally achievable for such designs. Serviceability design values should be provided for a maximum of 25 mm of total settlement and maximum of 19 mm differential settlement.

Similarly, the site would also be suitable to support a normal slab on grade, structurally separated from the columns and foundation walls following the completion of the site preparation works prescribed in Section N$^{o.}$ 7.3 and the implementation of the appropriate soil improvement techniques described above (installation of a rigid inclusion system).

The slab on grade foundation should incorporate a final granular base layer consisting of at least 300 mm of Granular 'A' material as per Ontario Provincial Standard Specifications (OPSS form 1010), compacted to at least 100% of the material's SPMDD. It is also recommended that a vapour barrier be installed to limit vapour emission through the concrete slab.

The modulus of subgrade reaction within the soil improvement zone is an integral part of the soil improvement design and thus should be confirmed by the soil improvement designer/contractor.

7.5.3 Foundations on Piles or Rigid Inclusions Combined with a Slab on Grade using Lightweight Fill

Two additional construction options that may be considered would involve the use of either piles or rigid inclusions to support the building foundations combined with light weight fill in order to render the site suitable for a slab on grade construction.

The requirements stated in Section N$^{o.}$ 7.3 regarding site preparation would also apply for these options. Based on the soil stratigraphy and underlying silty clay/clayey silt strength parameters combined with a 25 kPa slab live load, the site is not permissible for any grade raise below the building footprint.

The slab on grade foundation should incorporate a final granular base layer consisting of at least 300 mm of Granular 'A' material as per Ontario Provincial Standard Specifications (OPSS form 1010), compacted to at least 100% of the material's SPMDD. It is also recommended that a vapour barrier be installed to limit vapour emission through the concrete slab.

As such, the lightweight fill thickness would need to account for the entirely of the site grade raise including the required 300 mm of crushed stone immediately below the slab.

7.5.4 General Comments

From a strict engineering point of view options N$^{os.}$ 1 and 2 would ensure optimal performance and behavior of the slab and foundation elements as both would rest on the same supporting structure. As such, both of these options present minimal risk of differential behaviour between both the building slabs and foundations.

Both remaining options (which involve the use of light weight fill) have also been successfully completed on various projects. However such designs cannot eliminate all risk of differential movement or behavior between both structures as the slab would be considered as a "floating element" while the building foundations would be supported on rigid elements, in this case, piles or rigid inclusions. That being said, the financial benefits of such a design may outweigh such a risk and could be evaluated by the developer depending on building performance requirements.

7.5.5 Frost Depth

All of the exterior building foundations (exterior pile caps, grade beams, footings, etc) for heated structures should be placed at least 1.5 m beneath the final exterior grade in order to provide adequate frost protection.

Building foundations for unheated structures or isolated exterior foundations (retaining walls, signs, lamp posts, etc.) should be placed at least 1.8 m beneath the final exterior grade in order to provide adequate frost protection

Note that exterior building foundation sections (even for a heated structure) with exposed foundation walls, such as foundation walls at dock areas must be considered unheated for frost protection design purposes.

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7.5.6 Seismic Classification

Based on the soil characteristics, on the stratigraphy and strength parameters within the boreholes, the piezocone soundings, laboratory test results and in accordance with Table 4.1.8.4.A of the 2010 National Building Code of Canada, the Site can be classified as Site Class “D”.

7.6 Exterior Slabs

In order to avoid the potential detrimental effects of freeze-thaw cycles on the good behaviour of exterior concrete slabs around the proposed building, we recommend that a non-frost susceptible base layer, such as a Granular ‘A’ as per Ontario Provincial Standard Specifications (OPSS Form 1010), be used under the exterior slabs down to a depth of 1.8 m below the top of the slabs.

This base layer should be placed in thin lifts not exceeding 300 mm and compacted to a minimum of 98 percent SPMDD.

The base layer should also be properly drained by means of a French drain in order to prevent water accumulation under the slabs. Note that this requirement also applies to the exterior concrete aprons.

Transition slopes of 3.0 H / 1.0 V should be provided at the edges of the various slabs between the non-frost susceptible granular foundation and the surrounding soils (silty clay/clayey silt deposit), over the entire frost depth of 1.8 m.

A possible alternative to the placement of non-frost susceptible base material to a depth of 1.8 m below exterior slabs grades could include the use of sufficient insulation material under the slabs to replace the equivalent amount granular base backfill omitted to frost depth. As a general rule of thumb, one inch 25 mm of insulation is equivalent to 300 mm of non-frost susceptible material.

In any case, the slabs should incorporate a granular base layer consisting of at least 300 mm of OPSS Granular ‘A’ compacted to at least 100% of the material's SPMDD.

Exterior slab designs specific to the concrete aprons, including minimum granular base thicknesses are presented in the following section.

7.7 Exterior Pavement Structures

The recommended pavement structures provided below are based on an estimate of the subgrade soil properties determined from the field tests, and visual examination/textural classification of the soil samples as well as the following preliminary traffic design parameters:

- 20-year light and heavy flexible pavement design.
- 30-year heavy duty rigid pavement design
- 2,400-passenger vehicles 2 way (1215 in and 1215 out)
- 700 tractor trailers 2 way (350 in and 350 out)

- The assumption of unilateral directional flow
- Assumption of 1 lane per direction
- Vehicle factor of 1.97 for trailers and 0.00209 for passenger vehicles

The following flexible (asphaltic concrete) and rigid (concrete) preliminary pavement designs for the proposed local driveways and parking areas can be considered. These design values should be considered preliminary and should be confirmed once precise traffic data is obtained from the traffic study.

Table 7.3 Recommended Pavement Design (Flexible Pavement Structure) – 20-Year Design Life

Pavement Structure Element	Compaction Requirement	Layer Thickness (mm)		
		Light-Duty (Car Parking Areas) Option 1	Light-Duty (Car Parking Areas) Option 2	Heavy-Duty (Delivery Areas)
Surface Course OPSS 1150 HL1 Hot Mix	OPSS 310, Table 8	40	70	40
Base Course OPSS 1150 HL8 HS Hot Mix Asphalt	OPSS 310, Table 8	50	-	120 (in two lifts)
Granular A Base (19 mm crusher run limestone)	100 % SPMDD	300	300	300
Granular B Type II Subbase (50 mm crusher run limestone)	100 % SPMDD	400	400	500

Table 7.4 Recommended Pavement Design (Rigid Pavement Structure) – 30-Year Design Life

Pavement Structure Element	Compaction Requirement	Layer Thickness (mm)
Concrete Aprons		
Reinforced Concrete	N/A	225
Base Course: Granular A (19 mm crusher run limestone)	100 Percent of SPMDD ASTM D698	300
Granular B Type II Subbase (50 mm crusher run limestone)	100 Percent of SPMDD ASTM D698	300
Granular B Type I Subbase (Sand and Gravel)	100 Percent of SPMDD ASTM D698	975

Note that two light-duty options are provided. Option 1 presents the conventional light-duty design with typical asphalt lift thicknesses. A second option is also provided with a single thicker lift thickness as an economic benefit. Note that the pavement contractor is responsible for ensuring adequate compaction of the asphalt and base layers as per OPSS.

The rigid pavement structure above ensures 30-year structural design life as well as complete protection against frost down to a depth of 1.8 m below exterior grade. As previously mentioned in Section N$^{o.}$ 7.7, the possible alternative to the placement of non-frost susceptible base material to a depth of 1.8 m below exterior slabs grades could include the use of sufficient insulation material under the slabs to replace the equivalent amount granular base backfill omitted to frost depth. As a general rule of thumb, one inch 25 mm of insulation is equivalent to 300 mm of non-frost susceptible material. In any case the minimum concrete, Granular A and Granular B type II thicknesses (825 mm) would apply to ensure aeqquate structural capacity of the concrete aprons for a 30-year design life.

It is noted that the pavement granular base and subbase layers can consist of sand and gravel or crushed limestone, as specified above. The material gradation and durability requirements of the selected granular courses should meet OPSS 1010 specifications.

The pavement design considers that construction will be carried out during dry periods of the year and that the subgrade is competent. If the subgrade becomes excessively wet or rutted during construction activities, additional subbase material may be required. The need for additional subbase material is best determined during construction.

Concrete slabs will crack randomly from natural actions during curing such as shrinkage or curling. Therefore, joints are vital for concrete pavements to control cracking and horizontal movements of the slabs. Proper joints should be installed including transverse and longitudinal contraction and construction joints, and isolation joints. Joint design and construction should be carried out in accordance with the OPSS/OPSD requirements.

The installation of additional reinforcing steel within the concrete slabs are to the discretion of the design engineers. Where required a preliminary Subgrade Reaction Modulus (MSR) of 20 MPa/m could be used for the design of the rigid pavement reinforcement.

The installation of a geotextile membrane at the subgrade level is required to prevent contamination of the sub-base layers with fines particles.

Transitions should be provided between new rigid and adjacent flexible pavement structures that do not offer complete protection against frost to avoid differential movement between both adjoining structures as well as premature deterioration. Alternatively soil transition suggested in section 7.7 remains applicable.

To maintain the integrity of the pavement at the Site, subdrains should be installed at all catchbasins and along the perimeter of the parking lot.

Grading adjacent to pavement areas should be designed so that water is not allowed to pond adjacent to the outside edges of the pavement.

Although current design does not include any site grade raise within the exterior pavement areas, maximum permissible site grade raise for such areas should be limited to 1.2 m in order to avoid plastic settlements.

7.8 Underground Service Trenches

Underground service lines, if any, can be founded on either undisturbed native soils or a prepared fill subgrade. The suitability of the foundation soils to provide adequate support for buried services must be verified and confirmed on the Site at the time of construction/installation by qualified geotechnical personnel experienced in such work.

The frost penetration depth for the region of Ottawa is considered as 1.8 m in accordance with Ontario Provincial Standard Drawing (OPSD) 3090.101. Accordingly, underground services should be located below the depth of frost penetration and in accordance with City of Ottawa specifications.

Note that the City of Ottawa specifies that watermains and sewer require respective minimum soil cover above of 2.4 and 2.0 m. Where the available cover is less than required, thermal rigid insulation should be used as specified in the City of Ottawa specifications.

The bedding and sand cover materials should be adequately compacted to provide support and protection to the service pipes. Provided the base area of the underground service line is free of all soft/loose and deleterious materials, the pipe bedding should comply with a Class B bedding configuration as per the requirements of OPSD 802.031 and OPSD 802.032 (rigid pipe) and/or OPSD 802.010 (flexible pipe). Where disturbance of the trench base has occurred, because of surface water or groundwater seepage and the like, the disturbed soils should be sub-excavated and replaced with suitably compacted granular fill.

Backfilling of trenches can be accomplished by reusing the excavated soils or similar fill material or imported granular soil, provided the moisture content of the material is maintained within ±2% of optimum and the fill is free of topsoil, organics and any deleterious material. The fill placed in excavated trenches should be in loose lifts not exceeding 200 mm thick and compacted to not less than 95% of its Standard Proctor Maximum Dry Density (SPMDD).

Due to the relatively low permeability of the native subsoil and depth of excavation, no major groundwater problems are foreseen at this time for such excavations. Infiltration into the excavations should be readily handled with ordinary sumps and pumps.

To avoid draining the surrounding clay deposit we recommend that clay plugs be placed within the trenches. The plug thicknesses, spacing and height could be established once Civil drawing completed and should comply with City of Ottawa detail S8.

7.9 General Construction

7.9.1 Frost Depth

A frost-penetration depth of 1.8 m (for non-heated structures) and 1.5 m (for heated structures) should be used for the design depth the foundations. Adequate coverage by soil backfill or thermal insulation should be provided to this depth to protect against detrimental-frost-action during the winter season.

7.9.2 Sensitivity of the Subsoils

The native subsoil is saturated and susceptible to strength loss and deformation by construction traffic. Therefore, care must be taken to protect the exposed subgrade from excess moisture and from construction traffic.

7.9.3 Site Inspection

It is recommended that all of the excavations be inspected and approved by qualified soil personnel to ensure that soil conditions correspond to those encountered in the boreholes and test pits, and that all the excavations are dry and free of disturbed soils and the like.

All of the backfilling operations should also be supervised to ensure that proper material is employed and that full compaction is achieved.

It is recommended that all piling operations be controlled under full-time supervision by qualified geotechnical personnel. A strict control on the refusal set and elevation, as well as on the deviation and verticality of steel piles, is essential for adequate performance.

The effect of vibrations upon adjacent structures caused by pile driving should be monitored and pre-construction surveys of existing defects within nearby structures should be carried out where necessary.

7.9.4 Winter Construction

The subsoil encountered across the Site is frost-susceptible and freezing conditions could cause problems to the structure. As preventive measures, the following recommendations are presented:

- During winter construction, exposed surfaces to support foundations and slabs must be protected-against-freezing by means of loose straw and tarpaulins, heating, etc.
- Alternatively, frost depth design for unheated conditions would apply for all buildings foundations which are not adequately protected against frost during winter season construction.
- Care must be exercised so that the sidewalks and/or asphalt pavements do not interfere with the opening of doors during the winter when the soils are subject to frost heave. This problem may be minimized by any one of several means, such as keeping the doors well above outside grade, installing structural slabs at the doors, and by using well-graded backfill and positive drainage, etc.
- Because of the frost heave potential of the soils during winter, it is recommended that the trenches for exterior underground services be excavated with shallow transition slopes in order to minimize the abrupt change in density between the granular backfill, which is relatively non-frost susceptible, and the more frost-susceptible native soils.

8. Limitations of the Investigation

This report is intended solely for Medusa LP and other parties explicitly identified in the report, and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse,

redistribution of, or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. The Client shall defend, indemnify and hold GHD harmless from any liability arising from, or related to, the Client's unauthorized distribution of the report. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current Site use, ground surface elevations and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of geotechnical engineering professions currently practising under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

All details of design and construction are rarely known at the time of completion of a geotechnical study. The recommendations and comments made in this report are based on our subsurface investigation and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, GHD will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design. By issuing this report, GHD is the geotechnical engineer of the record. It is recommended that GHD be retained during construction of all foundations and during earthwork operations to confirm the conditions of the subsoil are actually similar to those observed during our study. The intent of this requirement is to verify that conditions encountered during construction are consistent with the findings in the report and that inherent knowledge developed as part of our study is correctly carried forward to the construction phases.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments included in this report are based on the results obtained at the test locations of only nine (9) boreholes, thirteen (13) piezocone soundings and thirty-two (32) test pits. The subsurface conditions confirmed at the fifty-four (54) test locations may vary at other locations. The subsurface conditions can also be significantly modified by the construction activities on Site (ex. : excavation, dewatering and drainage, blasting, pile driving, etc.). These conditions can also be modified by exposure of soils or bedrock to humidity, dry periods or frost. Soil and groundwater conditions between and beyond the test locations may differ both horizontally and vertically from those encountered at the test locations and conditions may become apparent during construction which could not be detected or anticipated at the time of our investigation. Should any conditions at the Site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations. If changed conditions are identified during construction, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by GHD is completed.

All of Which is Respectfully Submitted.

GHD

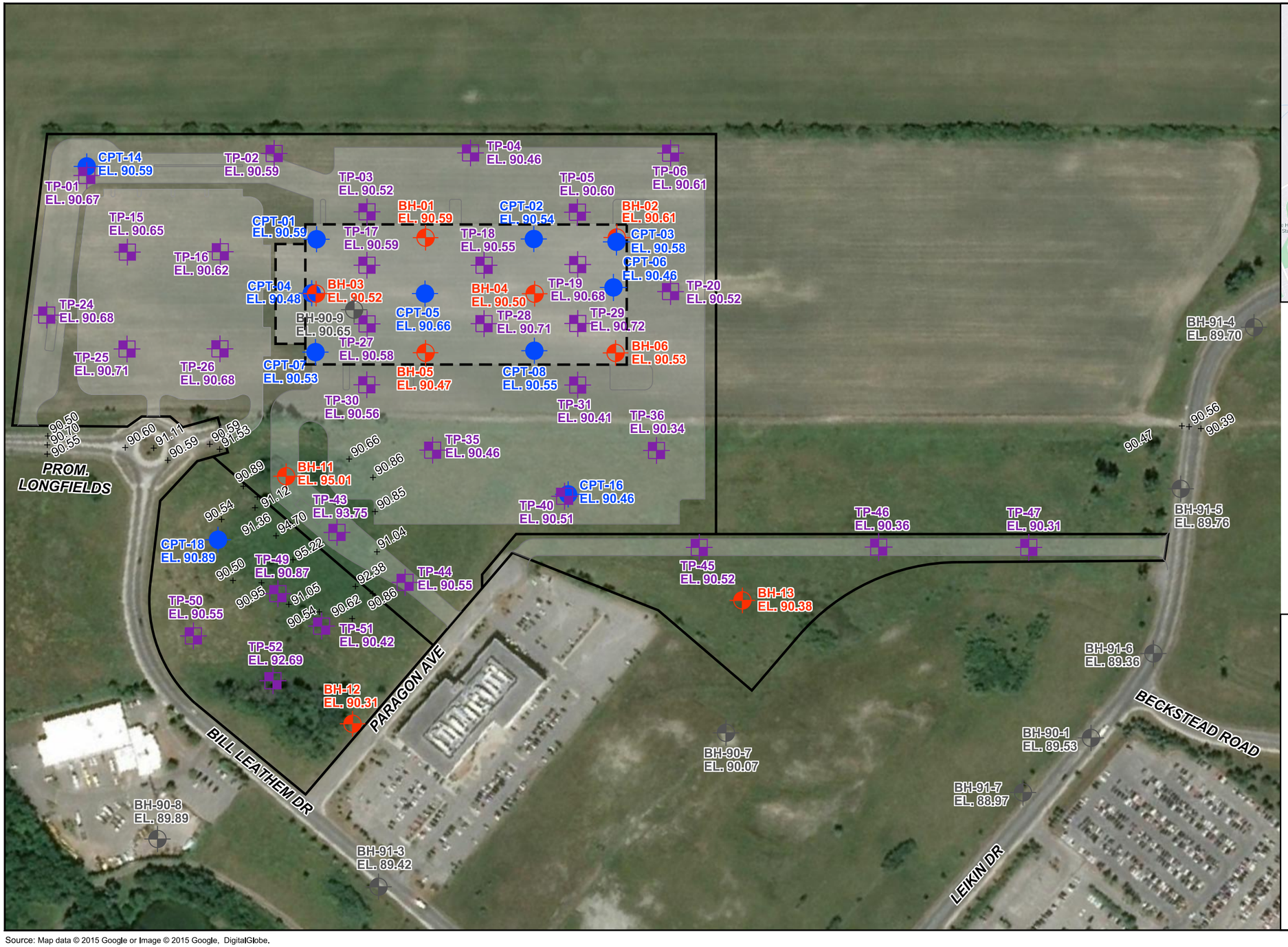
Marc-Andre Richard, B.Eng.
OIQ No.: 5090394

Alexander Fiorilli, P.Eng.
OIQ No.: 146002

Kamel Hamouche, P.Eng, Ph. D.
OIQ No.: 120072

Appendices

Appendix A
Site Location Plan (Drawing No. 11227097-A1-1)



KEY PLAN

LEGEND

CPT-01 EL. 90,59	PIEZOCONE SOUNDING AND NUMBER GROUND SURFACE ELEVATION (m)
BH-01 EL. 90,59	BOREHOLE AND NUMBER GROUND SURFACE ELEVATION (m)
TP-01 EL. 90,67	TEST PIT AND NUMBER GROUND SURFACE ELEVATION (m)
BH-90-01 EL. 89,53	EXISTING BOREHOLE AND NUMBER GROUND SURFACE ELEVATION (m) *(FONDEX, REF. No. 0-A756-A1, NOV. 1991)*
+90.54	GROUND SURFACE ELEVATION (m)
	PROPERTY LIMITS
	PROPOSED BUILDING

Source: Map data © 2015 Google or Image © 2015 Google, DigitalGlobe.

SCALE = 1:3000
0 30 60 90m

BENCHMARK:
RTCM-REF 3696 (GPS Antenna)
EL. 98.527m (Geodetic)

DRAWN BY:
T. NGUYEN / I. CARON

CHECKED BY:
M.-A. RICHARD

GHD

MEDUSA LP
LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO
PROPOSED SORTATION FACILITY

GEOTECHNICAL INVESTIGATION
SOUNDING LOCATIONS

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31/05/2021

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Appendix B
GHD Borehole Reports and Rock Photographs

A- Soil Sampling

Soil samples are normally recovered with a split-spoon sampler or a thin-walled Shelby tube. The split spoon is dynamically driven into the ground and takes a remoulded sample of the soil found at depth. A standard penetration test is thereby obtained, and is described in the following paragraph. The Shelby tube is pushed into the ground to obtain undisturbed samples of clay or clayey soils. Rock samples are obtained by drilling a core barrel into the rock formation; the diameter of the recovered sample varies with the size of the drilling bit used.

B- Standard Penetration Test (SPT)

A standard penetration test consists of driving a standard split-spoon sampler into the soil be dropping a 140 lb. weight (63.5 kg) from a height of 30 inches (76 cm). The sampler is driven 18 inches (45 cm) into the soil and the number of blows of the drop weight is recorded for every 6 inches (15 cm) of penetration. The total number of blows for the last 12 inches (30 cm) of penetration is the standard penetration index ("N" value). This value obtained at regular intervals provides vital information from which the density, compressibility and bearing capacity of the various soil horizons can be estimated. The test is however seldom used in clayey soils.

C- Dynamic Penetration Test

A dynamic penetration test (or cone penetration test) is similar to a standard penetration test with the difference that the split-spoon sampler is replaced by a conical point 10 cm^2 in area. The number of blows is recorded continuously for every foot of penetration (30 cm) thus obtaining a systematic indication of the relative density of the materials encountered at depth. This test also helps in determining the depth to a dense soil horizon or bedrock.

Note: The presence of large gravel, cobbles or boulders in the subsoil may distort the results of both the standard penetration test and the dynamic penetration test by giving abnormally high resistance values. When it becomes impossible to drive the cone deeper a refusal ("R") is then recorded.

D- Shear Test

An undrained shear test may be carried out by pushing into the undisturbed soil a vane shear apparatus consisting of a four-bladed vane connected to a rod and by measuring the torque value required to shear the clay. This test may be repeated at regular intervals and the torque values calculated to obtain the undrained shear strength of the clay at each test level. The shear strength profiles permit the calculation of the allowable bearing capacity of the clay. The apparatus used is the "Nilcon" of Scandinavian origin.

E- Permeability Test (Lefranc)

This test consists of determining the coefficient of permeability K of the soil around a permeable lens of known dimensions and which has been formed below the driving shoe. The procedure used is the falling head method. Tests of the Lefranc type are carried out in soils with average granulometry and average permeability.

F- Packer Test

This test is conducted in bedrock by sealing off a section of the borehole with one or two inflatable rubber packers and then pumping water into the isolated section of the hole. The permeability of the rock adjacent to the isolated section of the borehole is measured as a function of the pumping head (pressure) and rate of water loss (absorption) from the sealed-off section over a fixed period of time.

G- Menard Pressuremeter Test

The pressuremeter test developed by Menard (1956) consists of laterally loading the sidewalls of a borehole by dilating a cylindrical probe. The test permits the determination of the modulus E_M and the limit pressure p_l, which are a measure of the strength of the soil, and enables the calculation of the bearing capacity and settlements for foundations.

Notes on Borehole and Test Pit Reports

Soil description :

Each subsurface stratum is described using the following terminology. The relative density of granular soils is determined by the Standard Penetration Index ("N" value), while the consistency of clayey sols is measured by the value of undrained shear strength (Cu).

Classification (Unified system)

Clay	< 0.002 mm		
Silt	0.002 to 0.075 mm		
Sand	0.075 to 4.75 mm	fine	0.075 to 4.25 mm
		medium	0.425 to 2.0 mm
		coarse	2.0 to 4.75 mm
Gravel	4.75 to 75 mm	fine	4.75 to 19 mm
		coarse	19 to 75 mm
Cobbles	75 to 300 mm		
Boulders	>300 mm		

Terminology

"trace"	1-10%
"some"	10-20%
adjective (silty, sandy)	20-35%
"and"	35-50%

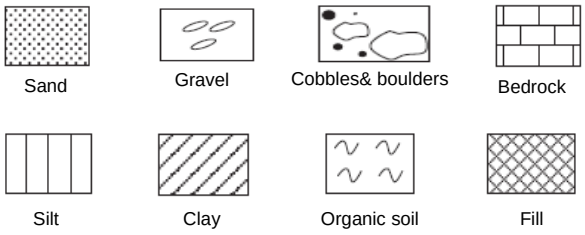
Relative density of granular soils	Standard penetration index "N" value (BLOWS/ft – 300 mm)
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Consistency of cohesive soils	Undrained shear strength (Cu) (P.S.F)	(kPa)
Very soft	<250	<12
Soft	250-500	12-25
Firm	500-1000	25-50
Stiff	1000-2000	50-100
Very stiff	2000-4000	100-200
Hard	>4000	>200

Rock quality designation

"RQD" (%) Value	Quality
<25	Very poor
25-50	Poor
50-75	Fair
75-90	Good
>90	Excellent

STRATIGRAPHIC LEGEND



Samples:

Type and Number

The type of sample recovered is shown on the log by the abbreviation listed hereafter. The numbering of samples is sequential for each type of sample.

SS: Split spoon
ST: Shelby tube
AG: Auger
SSE, GSE, AGE: Environmental sampling
PS: Piston sample (Osterberg)
RC: Rock core
GS: Grab sample

Recovery

The recovery, shown as a percentage, is the ratio of length of the sample obtained to the distance the sampler was driven/pushed into the soil

RQD

The "Rock Quality Designation" or "RQD" value, expressed as percentage, is the ratio of the total length of all core fragments of 4 inches (10 cm) or more to the total length of the run.

IN-SITU TESTS:

N: Standard penetration index
R: Refusal to penetration
N_c: Dynamic cone penetration index
Cu: Undrained shear strength
Pr: Pressure meter
k: Permeability
ABS: Absorption (Packer test)

LABORATORY TESTS:

I_p: Plasticity index
W_l: Liquid limit
Wp: Plastic limit
H: Hydrometer analysis
GSA: Grain size analysis
A: Atterberg limits
w: Water content
γ: Unit weight
C: Consolidation
CS: Swedish fall cone
CHEM: Chemical analysis
O.V.: Organic vapor

BOREHOLE REPORT

Borehole No. BH-01

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366477.6
Y : 5017942.8
Z : 90.59

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.83

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-19
Date (finish) : 2021-04-19

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water content (%) △ C_u (Field, kPa); Atterberg limits (%) □ C_u (Lab, kPa); "N" Standard penetration test value; "N_C" Dynamic penetration test value; 10 20 30 40 50 60 70 80 90
0.00	90.59		Ground surface								
			Topsoil:		SS-1A						
0.14	90.45		Clayey silt, traces of sand								
			Native soil: Stiff to very stiff, brown silt and clay, moist		SS-1B	72			1-2-4-4	6	
0.90	89.69		becoming grey		SS-2	100			4-5-7-8	12	
1.52	89.07		becoming with presence of silt beddings		SS-3	100			2-2-3-3	5	
2.28	88.31		becoming stiff, very moist		SS-4	100			1-2-1-2	3	
					ST-5	100	GSA A w				
3.81	86.78		becoming firm, saturated		SS-6	100			1-0-0-1	0	
					SS-7	100			1-0-0-1	0	
					SS-8	100			1-0-0-1	0	
6.10	84.49		becoming with presence of silt beddings		SS-9	100			1-0-0-1	0	
7.62	82.97		becoming grey to dark grey		SS-10	100			1-0-0-0	0	

Water level: 0.83 m

See the attached explicative note for the complete list of symbols and abbreviations

BOREHOLE REPORT

Borehole No. BH-01

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366477.6
Y : 5017942.8
Z : 90.59

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.83

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-19
Date (finish) : 2021-04-19

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD
8.00	82.59		Ground surface							
					SS-11	100	GSA A w		1-0-0-0	0
9.76	80.83		End of sampling Beginning of dynamic penetration test							

○ Water content (%) △ C_u (Field, kPa)
w_P w_L Atterberg limits (%) □ C_u (Lab, kPa)
● "N" Standard penetration test value
▲ "N_C" Dynamic penetration test value

10 20 30 40 50 60 70 80 90

Water level

9.0
10.0
11.0
12.0
13.0
14.0
15.0

0 0 0 0 0 0 0 0 0 1 0 1 1 5 4 5 4 5 6 5 6

BOREHOLE REPORT

Borehole No. BH-01

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366477.6
Y : 5017942.8
Z : 90.59

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.83

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-19
Date (finish) : 2021-04-19

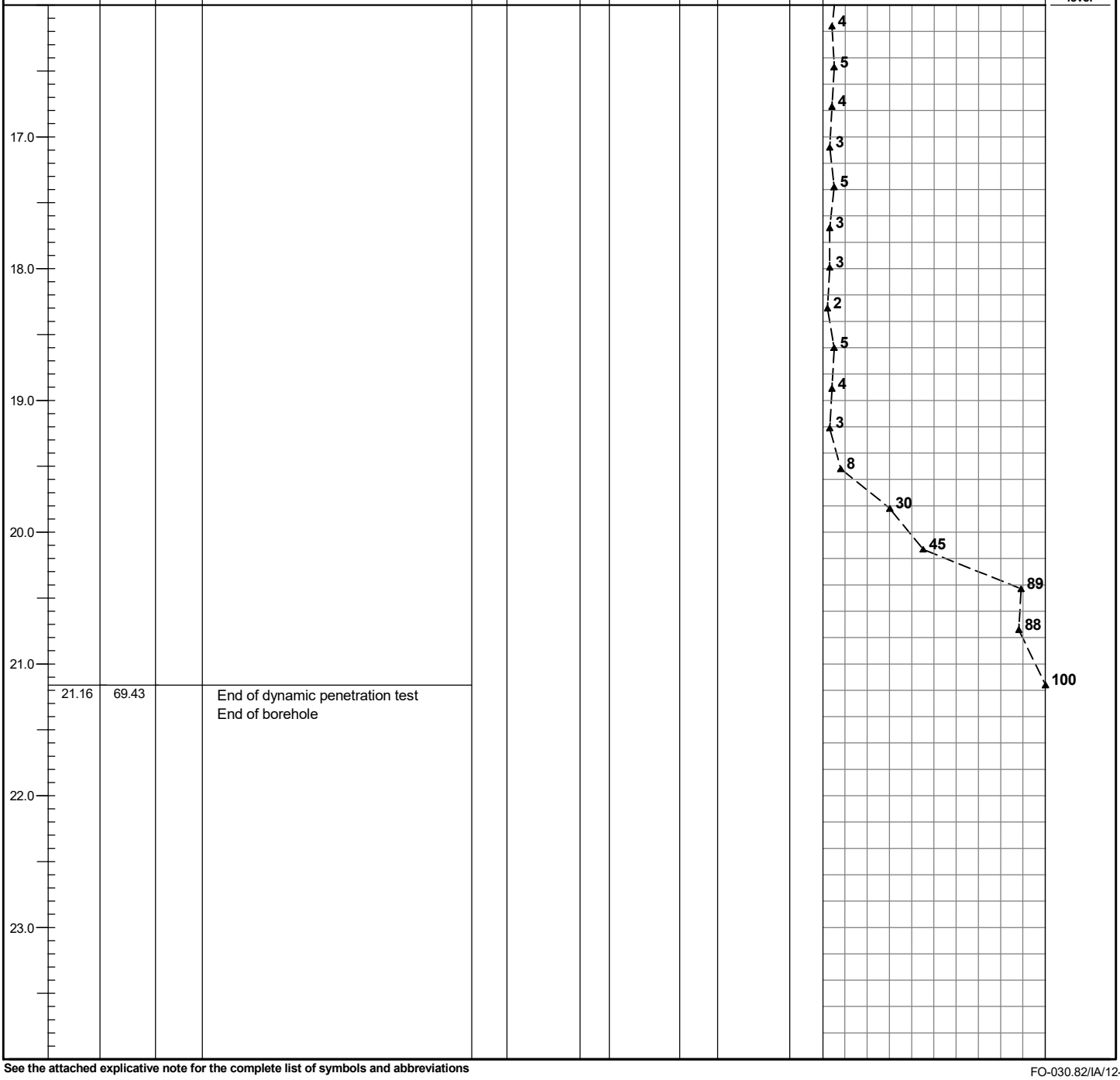
SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD
16.00	74.59		Ground surface							10 20 30 40 50 60 70 80 90 Water level
21.16	69.43		End of dynamic penetration test End of borehole							

○ Water content (%) △ C_u (Field, kPa)
w_P w_L Atterberg limits (%) □ C_u (Lab, kPa)
● "N" Standard penetration test value
▲ "N_C" Dynamic penetration test value



See the attached explicative note for the complete list of symbols and abbreviations

BOREHOLE REPORT

Borehole No. BH-02

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366599.6
Y : 5018011.4
Z : 90.61

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 1.1 0.93 ; 1.35

Location plan : 11220797-A1-1

Borehole type : Auger + Casing
Core bit size : B+NQ
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-21
Date (finish) : 2021-04-22

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD
0.00	90.61		Ground surface							
0.10	90.51		**Topsoil:** Clayey silt, traces of sand		SS-1A					
			Native soil: Stiff to very stiff, grey-brown silt and clay, moist		SS-1B	54			1-2-4-4	6
1.00	89.61		becoming grey		SS-2	100			3-4-6-6	10
1.52	89.09		becoming with presence of sand beddings		SS-3	82	GSA A w		2-3-3-3	6
2.28	88.33		becoming stiff		SS-4	100			1-1-1-1	2
3.40	87.21		becoming firm, saturated		SS-5	100			1-0-0-1	0
					SS-6	100			1-0-0-1	0
					ST-7	100	A w			
					SS-8	100			1-0-0-1	0
6.10	84.51		becoming with presence of silt beddings		SS-9	100			1-0-0-1	0
					SS-10	100			1-0-0-1	0

TESTS RESULTS: ○ Water content (%) △ C_u (Field, kPa); w_P w_L Atterberg limits (%) □ C_u (Lab, kPa); ● "N" Standard penetration test value; ▲ "N_C" Dynamic penetration test value

10 20 30 40 50 60 70 80 90

Water level: 0.93 m, 1.1 m, 1.35 m

See the attached explicative note for the complete list of symbols and abbreviations

BOREHOLE REPORT

Borehole No. BH-02

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366599.6
Y : 5018011.4
Z : 90.61

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 1.1 0.93 ; 1.35

Location plan : 11220797-A1-1

Borehole type : Auger + Casing
Core bit size : B+NQ
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-21
Date (finish) : 2021-04-22

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD
8.00	82.61		Ground surface							
9.15	81.46		Stiff, grey clayey silt, traces of sand, saturated		SS-11	49	GSA A w		1-0-0-0	0
					SS-12	51			4-3-2-2	5
10.67	79.94		Loose to very loose, grey silty and gravelly sand, traces of clay, saturated		SS-13	100			1-2-2-2	4
					SS-14	71	GSA A w		1-1-4-1	5
					SS-15	100			2-1-0-3	1
					SS-16	57			3-1-1-2	2
					SS-17	100			1-1-1-3	2
					SS-18	13			1-1-0-1	1
					SS-19	72	GSA A w		1-5-1-1	6

TESTS RESULTS: ○ Water content (%) △ C_u (Field, kPa); w_P w_L Atterberg limits (%) □ C_u (Lab, kPa); ● "N" Standard penetration test value; ▲ "N_C" Dynamic penetration test value

10 20 30 40 50 60 70 80 90

Water level

BOREHOLE REPORT

Borehole No. BH-02

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366599.6
Y : 5018011.4
Z : 90.61

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 1.1 0.93 ; 1.35

Location plan : 11220797-A1-1

Borehole type : Auger + Casing
Core bit size : B+NQ
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-21
Date (finish) : 2021-04-22

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water level
16.00	74.61		Ground surface							10 20 30 40 50 60 70 80 90	
					SS-20	85			2-1-2-9	3	
17.0					SS-21	61			4-1-1-1	2	
18.0											
18.29	72.32		becoming compact		SS-22	28			4-5-5-6	10	
19.0											
19.10	71.51		becoming with presence of cobbles								
20.0					SS-23	49			15-7-13-8	20	
21.0											
21.21	69.40		becoming dense		SS-24	62			17-21 29-28	50	
22.0											
22.13	68.48		**Bedrock:** Grey dolomite, fair rock quality		RC-25	74				*61*	
22.78	67.83		becoming good rock quality								
23.0					RC-26	95				*86*	
23.62	66.99		End of borehole								

Water content (%) △ C_u (Field, kPa)
Atterberg limits (%) □ C_u (Lab, kPa)
"N" Standard penetration test value
"N_C" Dynamic penetration test value

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : BH-02 Core box – Dry rock

Photo 2 : BH-02 Core box – Wet rock

BOREHOLE REPORT

Borehole No. BH-03

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366427.8
Y : 5017867.9
Z : 90.52

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 1.1 0.86 ; 1.31

Location plan : 11220797-A1-1

Borehole type : Auger + Casing
Core bit size : B+NQ
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-19
Date (finish) : 2021-04-20

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water level
0.00	90.52		Ground surface								
			Topsoil:		SS-1A						
0.13	90.39		Clayey silt, traces of sand								
			Native soil: Stiff to very stiff, brown silt and clay, moist		SS-1B	48			2-3-4-5	7	
					SS-2	100			4-8-7-7	15	
1.10	89.42		becoming brey-brown								
1.52	89.00		becoming stiff, grey with presence of sand beddings		SS-3	100			2-2-3-4	5	
					SS-4	100			1-2-2-2	4	
					SS-5	100			1-1-1-1	2	
3.50	87.02		becoming firm, saturated								
					SS-6	100			1-0-0-1	0	
4.57	85.95		becoming with presence of cobbles		SS-7	69			6-5-4-4	9	
					SS-8	100			2-1-0-0	1	
					SS-9	100			1-0-0-1	0	
					ST-10	0					

TESTS RESULTS: ○ Water content (%) △ C_u (Field, kPa); w_P w_L Atterberg limits (%) □ C_u (Lab, kPa); ● "N" Standard penetration test value; ▲ "N_C" Dynamic penetration test value

10 20 30 40 50 60 70 80 90

Water level: 0.86 m, 1.1 m, 1.31 m

See the attached explicative note for the complete list of symbols and abbreviations

BOREHOLE REPORT

Borehole No. BH-03

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366427.8
Y : 5017867.9
Z : 90.52

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 1.1 0.86 ; 1.31

Location plan : 11220797-A1-1

Borehole type : Auger + Casing
Core bit size : B+NQ
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-19
Date (finish) : 2021-04-20

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD
8.00	82.52		Ground surface							
8.23	82.29		becoming with presence of silt beddings		SS-11	100	GSA A w		2-1-1-1	2
					ST-12	100				
					ST-13	100	A w			
12.19	78.33		Firm to stiff, grey clayey silt, traces of sand, saturated		SS-14	100	GSA - H A w		1-0-0-0	0
					ST-15	0				
					SS-16	100			1-1-1-1	2

TESTS RESULTS: ○ Water content (%) △ C_u (Field, kPa) | w_P w_L Atterberg limits (%) □ C_u (Lab, kPa) | ● "N" Standard penetration test value | ▲ "N_C" Dynamic penetration test value

10 20 30 40 50 60 70 80 90

Water level

See the attached explicative note for the complete list of symbols and abbreviations

BOREHOLE REPORT

Borehole No. BH-03

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366427.8
Y : 5017867.9
Z : 90.52

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 1.1 0.86 ; 1.31

Location plan : 11220797-A1-1

Borehole type : Auger + Casing
Core bit size : B+NQ
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-19
Date (finish) : 2021-04-20

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water content (%) △ C_u (Field, kPa); Atterberg limits (%) □ C_u (Lab, kPa); "N" Standard penetration test value; "N_C" Dynamic penetration test value (10 20 30 40 50 60 70 80 90)
16.00	74.52		Ground surface								
16.20	74.32		Compact to loose, grey gravelly and silty sand, traces of clay, saturated								
					SS-17	59			2-6-6-7	12	
					SS-18	64	GSA - H A w		3-3-6-7	9	
					SS-19	43			27 50/8cm	R	
19.97	70.55		**Bedrock:** Grey dolomite, good rock quality		RC-20	97				79	
			- joint from 20.75 to 20.76m								
			- fractured from 21.26 to 21.36m		RC-21	92				76	
22.81	67.71		End of borehole								

Water level

Photo 3 : BH-03 Core box – Dry rock

Photo 4 : BH-03 Core box – Wet rock

Borehole No. BH-03

Proposed Sortation Facility
Leikin Drive and Merivale Road Intersection, Nepean, Ontario

BOREHOLE REPORT

Borehole No. BH-04

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366567.3
Y : 5017946.1
Z : 90.50

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.81

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-19
Date (finish) : 2021-04-19

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water level
0.00	90.50		Ground surface							10 20 30 40 50 60 70 80 90	
0.13	90.37		**Topsoil:** Clayey silt, traces of sand		SS-1A						
			Native soil: Stiff to very stiff, brown silt and clay, moist		SS-1B	64			2-3-4-5	7	
0.61	89.89		becoming grey-brown		SS-2	100			5-5-5-5	10	
1.52	88.98		becoming grey with presence of sand beddings		SS-3	100			2-2-3-2	5	
2.28	88.22		becoming stiff, very moist		SS-4	100			1-1-1-1	2	
3.25	87.25		becoming firm, saturated		SS-5	100			1-0-1-1	1	
					SS-6	100			1-0-0-1	0	
					ST-7	100					
5.33	85.17		becoming with presence of silt beddings		SS-8	100			1-0-0-1	0	
					SS-9	100			1-0-0-0	0	
6.71	83.79		End of sampling Beginning of dynamic penetration test							0 0 0 0 0	

Water content (%) △ C_u (Field, kPa)
Atterberg limits (%) □ C_u (Lab, kPa)
"N" Standard penetration test value
"N_C" Dynamic penetration test value

Water level: 0.81 m

See the attached explicative note for the complete list of symbols and abbreviations

BOREHOLE REPORT

Borehole No. BH-04

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366567.3
Y : 5017946.1
Z : 90.50

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.81

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-19
Date (finish) : 2021-04-19

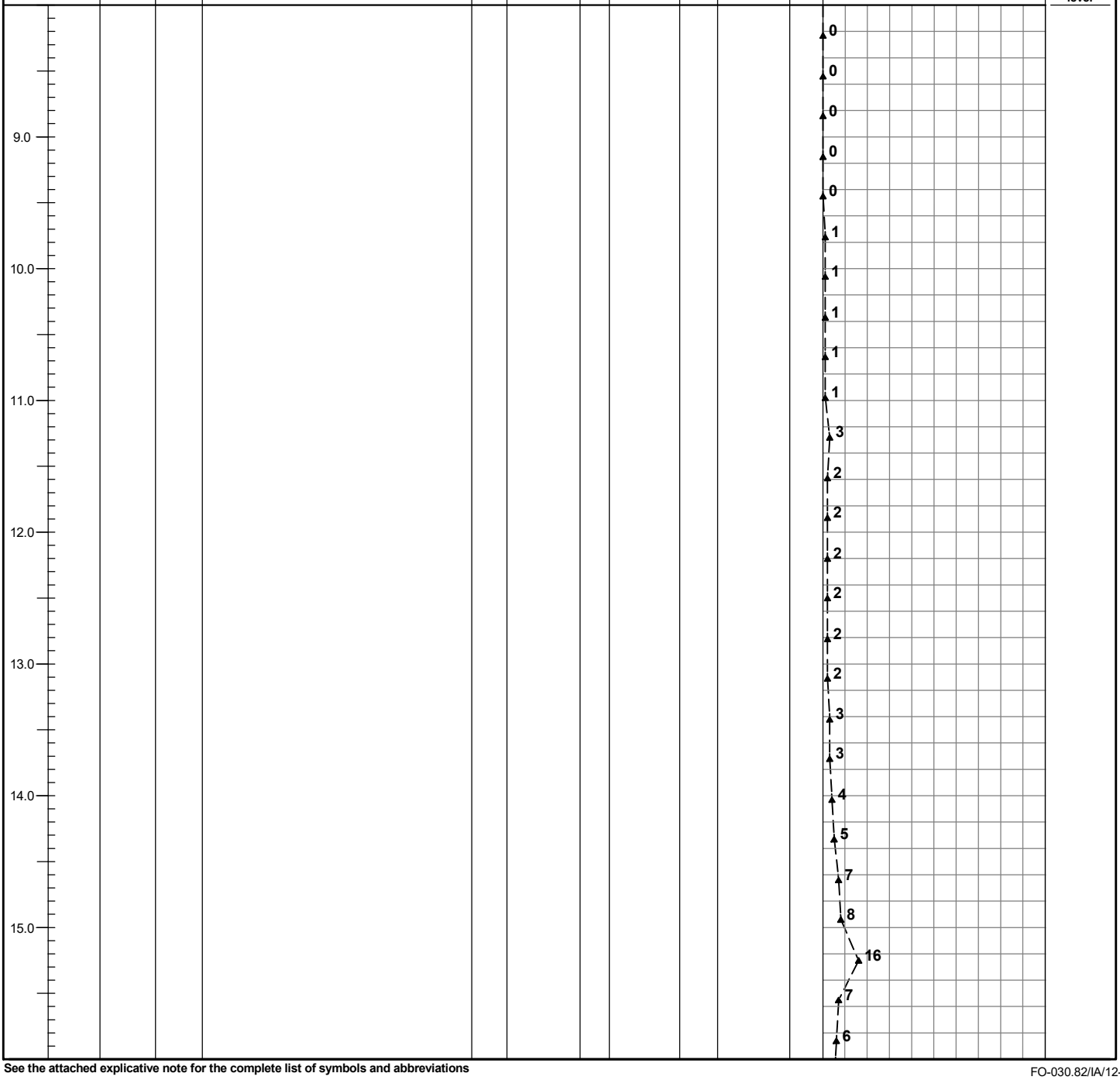
SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water level
8.00	82.50		Ground surface							10 20 30 40 50 60 70 80 90	

○ Water content (%) △ C_u (Field, kPa)
w_P w_L Atterberg limits (%) □ C_u (Lab, kPa)
● "N" Standard penetration test value
▲ "N_C" Dynamic penetration test value



BOREHOLE REPORT

Borehole No. BH-04

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366567.3
Y : 5017946.1
Z : 90.50

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.81

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-19
Date (finish) : 2021-04-19

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water content (%) △ C_u (Field, kPa); Atterberg limits (%) □ C_u (Lab, kPa); "N" Standard penetration test value; "N_C" Dynamic penetration test value; 10 20 30 40 50 60 70 80 90; Water level
16.00	74.50		Ground surface								
17.0										5	
										6	
										23	
										15	
										12	
										8	
18.0										9	
										11	
										8	
19.0										8	
										8	
										9	
										13	
20.0										10	
										11	
										11	
										13	
21.0										15	
										18	
										34	
22.0										45	
										100	
22.73	67.77		End of dynamic penetration test End of borehole								
23.0											

See the attached explicative note for the complete list of symbols and abbreviations

BOREHOLE REPORT

Borehole No. BH-05

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366518.8
Y : 5017869.4
Z : 90.47

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.92

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-28
Date (finish) : 2021-04-28

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water level
0.00	90.47		Ground surface							10 20 30 40 50 60 70 80 90	
			Topsoil:		SS-1A						
0.15	90.32		Clayey silt, traces of sand								
			Native soil: Stiff to very stiff, brown silt and clay, moist		SS-1B	92			1-3-5-5	8	
0.81	89.66		becoming grey-brown		SS-2	82			2-5-6-5	11	
1.52	88.95		becoming grey with presence of sand beddings		SS-3	100			2-2-3-3	5	
2.28	88.19		becoming stiff, very moist		SS-4	100			1-2-1-2	3	
3.27	87.20		becoming firm, saturated		SS-5	100			1-0-1-0	1	
					SS-6	100			1-0-0-1	0	
					ST-7	100					
					SS-8	100			1-0-0-0	0	
5.94	84.53		End of sampling								
6.10	84.37		Beginning of dynamic penetration test							0 0 1 0 0 1 0	0.92 m

Water content (%) △ C_u (Field, kPa)
Atterberg limits (%) □ C_u (Lab, kPa)
"N" Standard penetration test value
"N_C" Dynamic penetration test value

See the attached explicative note for the complete list of symbols and abbreviations

BOREHOLE REPORT

Borehole No. BH-05

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)

X : 366518.8
Y : 5017869.4
Z : 90.47

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.92

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-28
Date (finish) : 2021-04-28

SAMPLE TYPE
- SS(E) - Split Spoon (Environment)
- RC(E) - Rock diamond core
- AU(E) - Auger
- TEE - Sampling Tube Environment
- ST - Shelby tube
- GS(E) - Grab sample

SAMPLE STATE
- Remoulded
- Intact
- Diamond drilling
- Lost

TEST SYMBOL
- GSA: grain size analysis
- CA: chemical analysis
- w_L: liquid limit
- w_P: plastic limit
- w : water content
- C_u: undrained shear strength
- S_T: sensitivity
- Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water level
8.00	82.47		Ground surface							10 20 30 40 50 60 70 80 90	

○ Water content (%) △ C_u (Field, kPa)
w_P w_L Atterberg limits (%) □ C_u (Lab, kPa)
● "N" Standard penetration test value
▲ "N_C" Dynamic penetration test value

9.0
10.0
11.0
12.0
13.0
14.0
15.0

0 1 0 1 0 1 0 1 1 1 1 2 3 1 2 2 2 4 4 5 4 4 3 4 4 4

BOREHOLE REPORT

Borehole No. BH-05

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366518.8
Y : 5017869.4
Z : 90.47

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.92

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-28
Date (finish) : 2021-04-28

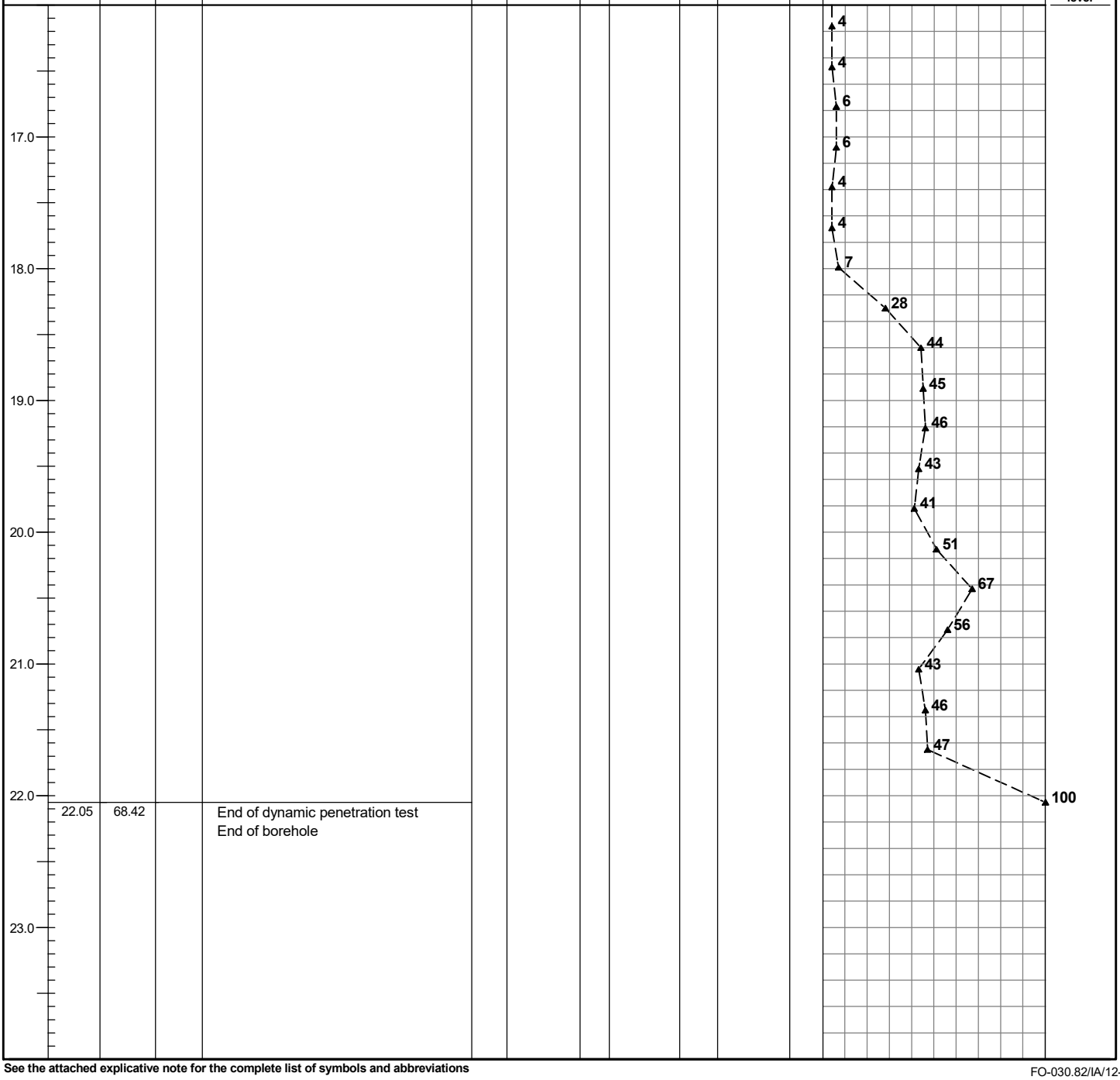
SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD
16.00	74.47		Ground surface							10 20 30 40 50 60 70 80 90 Water level
22.05	68.42		End of dynamic penetration test End of borehole							

○ Water content (%) △ C_u (Field, kPa)
w_P w_L Atterberg limits (%) □ C_u (Lab, kPa)
● "N" Standard penetration test value
▲ "N_C" Dynamic penetration test value



BOREHOLE REPORT

Borehole No. BH-06

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366640.1
Y : 5017937.4
Z : 90.53

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 1.1

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-28
Date (finish) : 2021-04-28

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water level
0.00	90.53		Ground surface							10 20 30 40 50 60 70 80 90	
	0.16	90.37	**Topsoil:** Clayey silt, traces of sand		SS-1	44			2-3-5-5	8	
	0.61	89.92	**Native soil:** Stiff to very stiff, brown silt and clay, moist								
1.0			becoming compact, grey-brown		SS-2	100			3-4-6-6	10	
	1.52	89.01	becoming very moist		SS-3	46			2-3-3-4	6	
2.0	2.28	88.25	becoming stiff, saturated		SS-4	89			2-1-2-1	3	
3.0	3.05	87.48	becoming with presence of silt beddings		SS-5	100			1-1-1-1	2	
	3.81	86.72	becoming firm, saturated		SS-6	100			1-0-0-1	0	
4.0					SS-7	100			1-0-0-0	0	
5.0					ST-8	100					
6.0	5.94	84.59	End of sampling								
	6.10	84.43	Beginning of dynamic penetration test							1 0 0 1 0 0 1	
7.0											

Water level: 1.1 m

Water content (%) △ C_u (Field, kPa)
Atterberg limits (%) □ C_u (Lab, kPa)
"N" Standard penetration test value
"N_C" Dynamic penetration test value

BOREHOLE REPORT

Borehole No. BH-06

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)

X : 366640.1
Y : 5017937.4
Z : 90.53

▼ - WATER LEVEL

Date : 2021-05-19
Depth (m) : 1.1

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-28
Date (finish) : 2021-04-28

SAMPLE TYPE

SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE

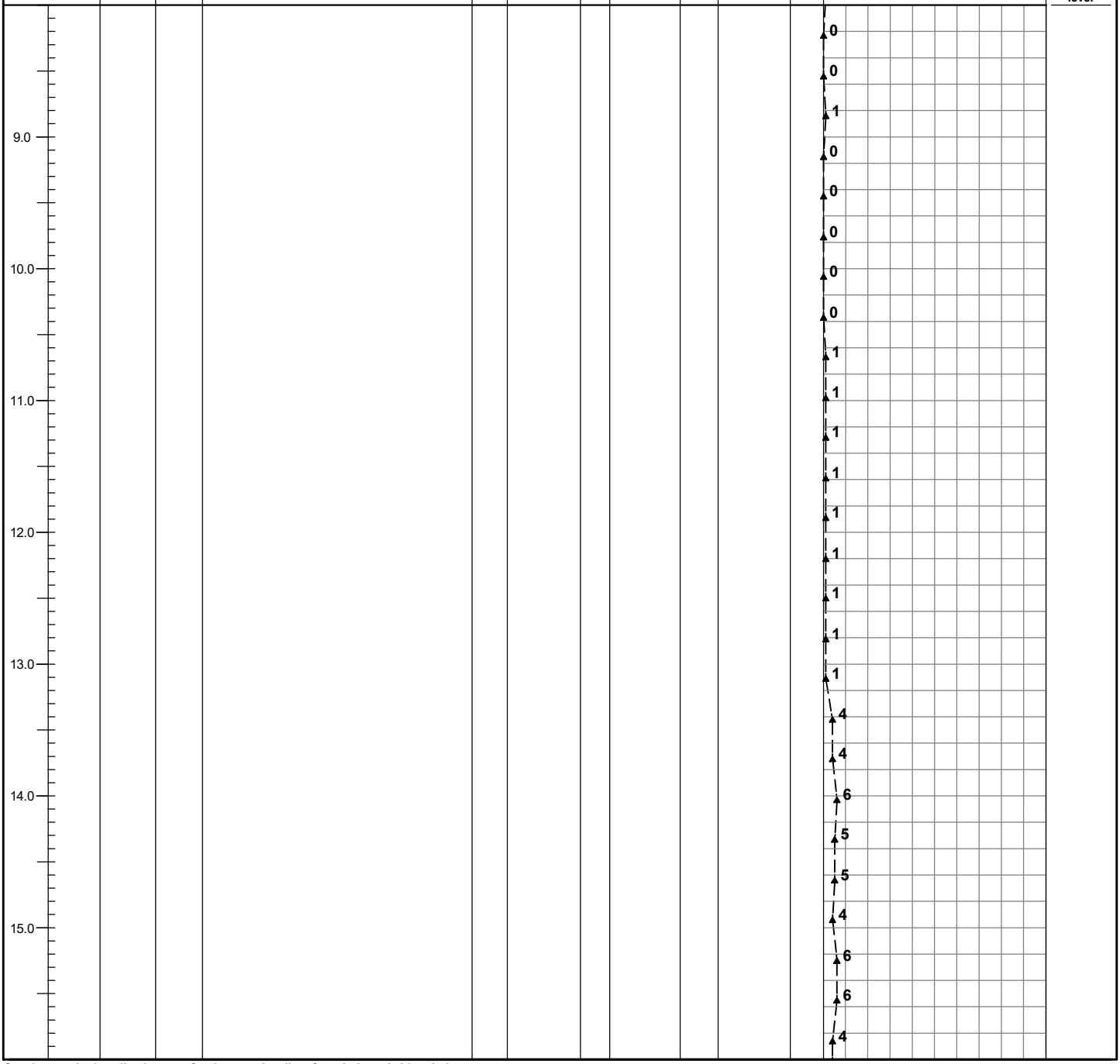
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL

GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water level
8.00	82.53		Ground surface							10 20 30 40 50 60 70 80 90	

○ Water content (%) △ C_u (Field, kPa)
w_P w_L Atterberg limits (%) □ C_u (Lab, kPa)
● "N" Standard penetration test value
▲ "N_C" Dynamic penetration test value



BOREHOLE REPORT

Borehole No. BH-06

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366640.1
Y : 5017937.4
Z : 90.53

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 1.1

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-28
Date (finish) : 2021-04-28

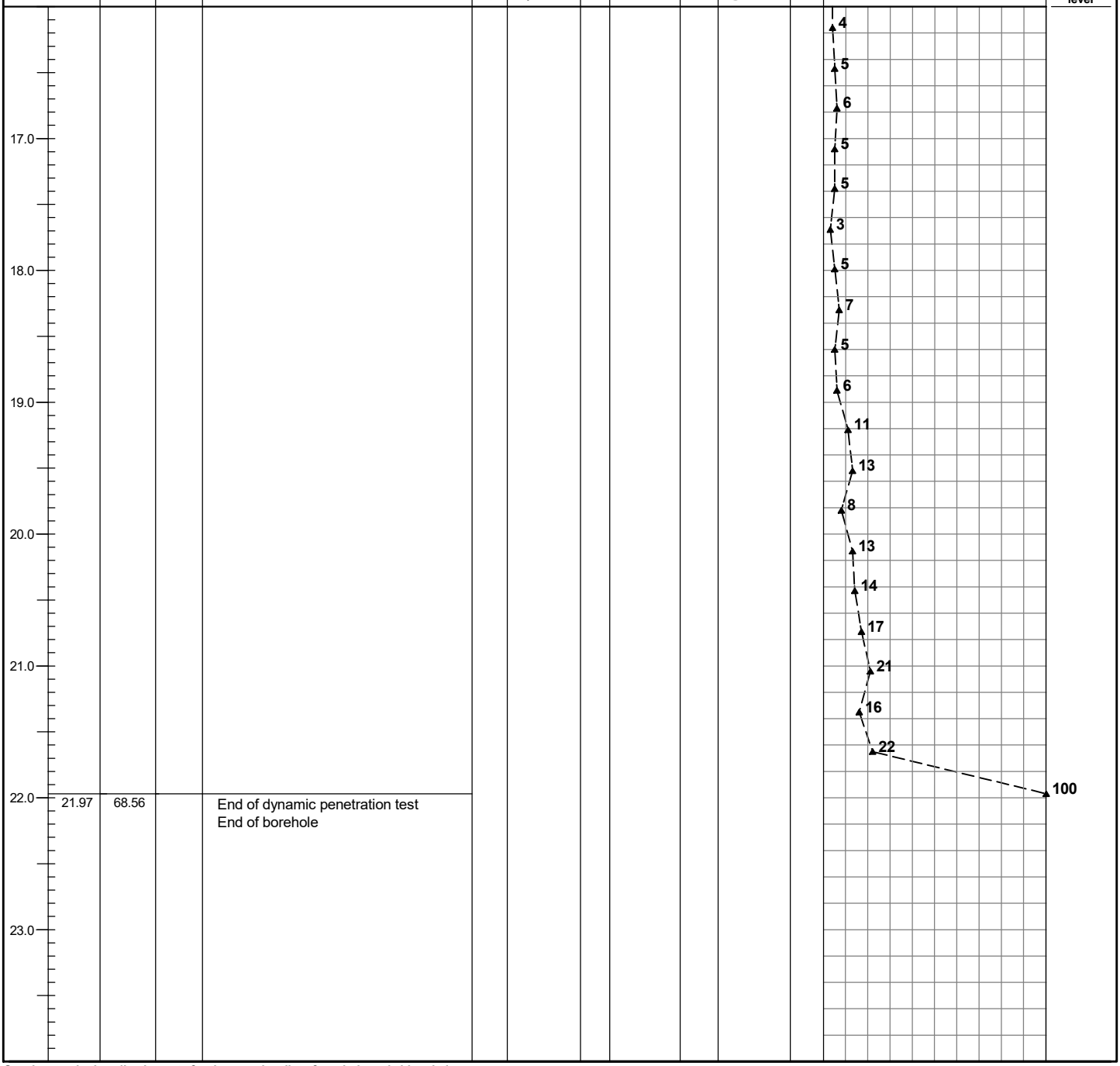
SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD
16.00	74.53		Ground surface							10 20 30 40 50 60 70 80 90 Water level
21.97	68.56		End of dynamic penetration test End of borehole							

○ Water content (%) △ C_u (Field, kPa)
w_P w_L Atterberg limits (%) □ C_u (Lab, kPa)
● "N" Standard penetration test value
▲ "N_C" Dynamic penetration test value



BOREHOLE REPORT

Borehole No. BH-11

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366474.0
Y : 5017740.7
Z : 95.01

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 5.4

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-29
Date (finish) : 2021-04-29

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water content (%) ○ / Atterberg limits (%) ⊢⊣ / "N" Standard penetration test value ● / "N_C" Dynamic penetration test value ▲ / C_u (Field, kPa) △ / C_u (Lab, kPa) □ (10 20 30 40 50 60 70 80 90)
0.00	95.01		Ground surface								Water level
			Topsoil: Clayey silt, traces of sand								
0.30	94.71		**Fill:** Stiff to very stiff, brown clayey silt, moist. Presence of topsoil		SS-1 SSE-1	48			2-2-4-7	6	
					SS-2 SSE-2	66			4-5-7-7	12	
1.42	93.59		becoming grey with traces of sand and gravel		SS-3A SSE-3A SS-3B SSE-3B	61			4-7-9-9	16	
1.83	93.18		becoming with presence of topsoil inclusion		SS-4 SSE-4	82			3-5-9-8	14	
					SS-5 SSE-5	48			3-4-8-8	12	
					SS-6 SSE-6	89			3-4-6-6	10	
					SS-7 SSE-7	54			2-4-5-5	9	
					SS-8 SSE-8	64			2-4-5-6	9	
					SS-9 SSE-9	70			5-8-10-10	18	
5.64	89.37		**Native soil:** Stiff to very stiff, brown silt and clay, moist. Presence of topsoil		SS-10A SSE-10A SS-10B SSE-10B	82			2-3-5-5	8	
					SS-11 SSE-11	100			2-2-2-2	4	
					SS-12	100			2-2-2-1	4	
					SS-13	100			1-1-2-2	3	

Water level: 5.4 m

See the attached explicative note for the complete list of symbols and abbreviations

BOREHOLE REPORT

Borehole No. BH-11

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366474.0
Y : 5017740.7
Z : 95.01

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 5.4

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-29
Date (finish) : 2021-04-29

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	10 20 30 40 50 60 70 80 90
8.00	87.01		Ground surface								
8.33	86.68		becoming stiff, very moist with presence of beddings of sand		SS-14	100			1-1-2-1	3	
					ST-15	100					
					SS-16	100			1-0-0-1	0	
10.51	84.50		End of borehole								

○ Water content (%) △ C_u (Field, kPa)
w_P w_L Atterberg limits (%) □ C_u (Lab, kPa)
● "N" Standard penetration test value
▲ "N_C" Dynamic penetration test value

Water level

9.0
10.0
11.0
12.0
13.0
14.0
15.0

BOREHOLE REPORT

Borehole No. BH-12

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366605.0
Y : 5017606.5
Z : 90.31

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 1.12

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-28
Date (finish) : 2021-04-28

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

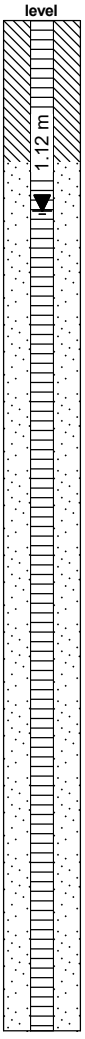
Depth (m)	Elevation (m)	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD
0.00	90.31	Ground surface		SS-1A					
0.05	90.26	**Topsoil:** Loose, dark brown silt, moist							
		Fill: Stiff, brown silty clay, moist		SS-1B	57			2-3-3-3	6
0.61	89.70	**Native soil:** Stiff to very stiff, brown silt and clay, moist		SS-2	100			4-5-6-8	11
				SS-3	100			4-4-5-5	9
2.28	88.03	becoming stiff, grey-brown		SS-4	100			2-1-2-1	3
3.05	87.26	becoming grey		ST-5	100				
3.81	86.50	becoming firm, very moist		SS-6	100			1-0-0-1	0
4.57	85.74	becoming saturated		SS-7	100			1-0-0-0	0
				SS-8	100			1-0-0-0	0
5.94	84.37	End of sampling							
6.10	84.21	Beginning of dynamic penetration test							1
									1
									2
									3
									3
									3
									3

TESTS RESULTS

○ Water content (%) △ C_u (Field, kPa)
w_P w_L Atterberg limits (%) □ C_u (Lab, kPa)
● "N" Standard penetration test value
▲ "N_C" Dynamic penetration test value

10 20 30 40 50 60 70 80 90

Water level



See the attached explicative note for the complete list of symbols and abbreviations

BOREHOLE REPORT

Borehole No. BH-12

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366605.0
Y : 5017606.5
Z : 90.31

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 1.12

Location plan : 11220797-A1-1

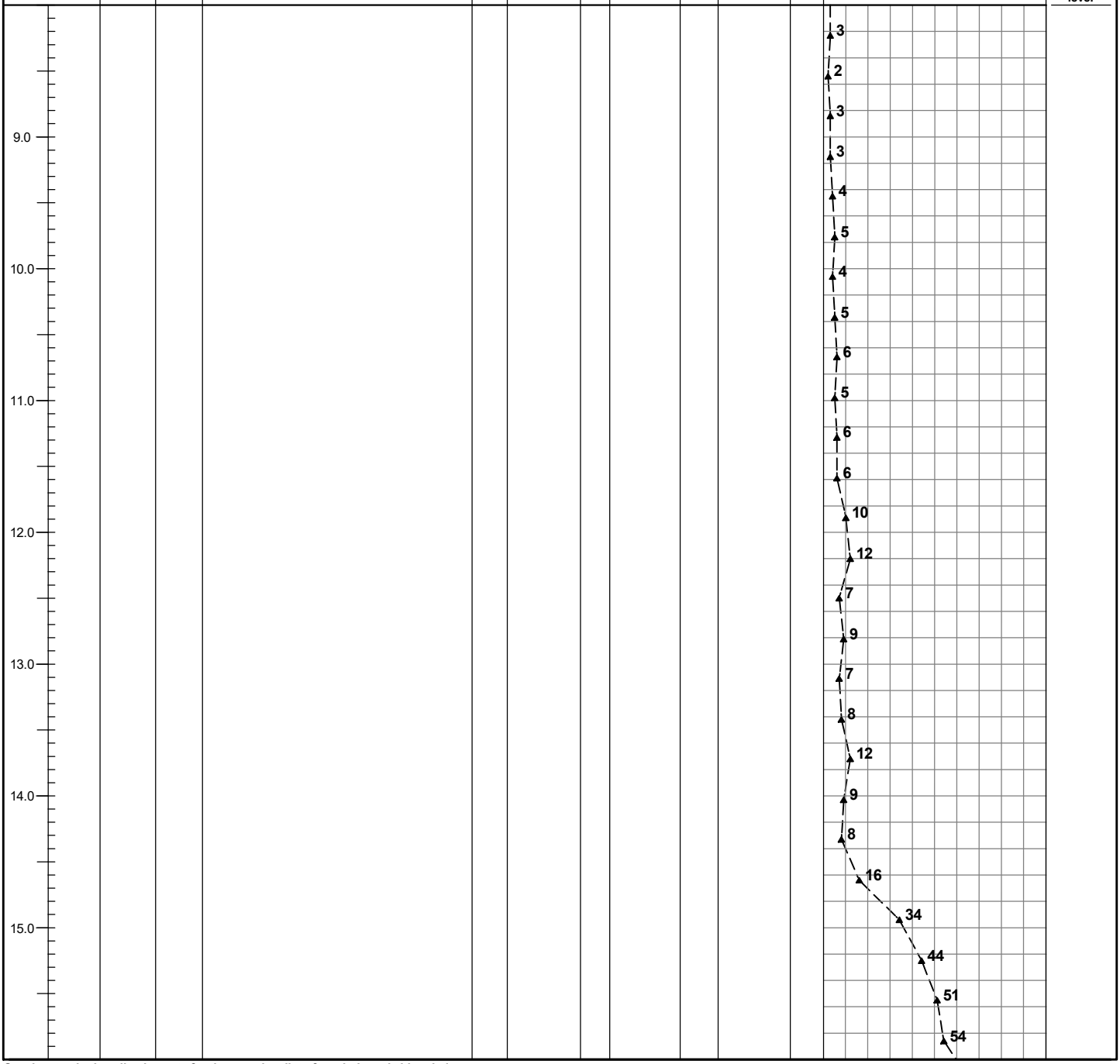
Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-28
Date (finish) : 2021-04-28

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD
8.00	82.31		Ground surface							



See the attached explicative note for the complete list of symbols and abbreviations

BOREHOLE REPORT

Borehole No. BH-12

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366605.0
Y : 5017606.5
Z : 90.31

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 1.12

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-28
Date (finish) : 2021-04-28

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water content (%), Atterberg limits (%), "N" Standard penetration test value, "N_C" Dynamic penetration test value, C_u (Field, kPa), C_u (Lab, kPa)
16.00	74.31		Ground surface								10 20 30 40 50 60 70 80 90 Water level
											66
											77
											76
17.0											93
											100
17.53	72.78		End of dynamic penetration test End of borehole								
18.0											
19.0											
20.0											
21.0											
22.0											
23.0											

BOREHOLE REPORT

Borehole No. BH-13

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366809.6
Y : 5017824.8
Z : 90.38

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.8

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-29
Date (finish) : 2021-04-29

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS	
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD	Water level
0.00	90.38		Ground surface								
0.09	90.29		**Topsoil:** Loose, dark brown silt, moist		SS-1A						
			Native soil: Stiff to very stiff, grey silt and clay, moist		SS-1B	84			2-3-4-4	7	
					SS-2	100			6-5-7-8	12	
1.52	88.86		becoming with presence of beddings of sand		S-S3	100			2-3-3-3	6	
2.28	88.10		becoming stiff		SS-4	100			1-1-1-1	2	
3.05	87.33		becoming very moist		SS-5	100			1-0-1-0	1	
3.81	86.57		becoming firm, saturated with presence of shells		SS-6	100			1-0-0-1	0	
					SS-7	100			1-0-0-1	0	
					SS-8	100			1-0-0-0	0	
					ST-9	100					

TESTS RESULTS: ○ Water content (%) △ C_u (Field, kPa); w_P w_L Atterberg limits (%) □ C_u (Lab, kPa); ● "N" Standard penetration test value; ▲ "N_C" Dynamic penetration test value

10 20 30 40 50 60 70 80 90

Water level: 0.8 m

BOREHOLE REPORT

Borehole No. BH-13

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366809.6
Y : 5017824.8
Z : 90.38

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.8

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-29
Date (finish) : 2021-04-29

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD
8.00	82.38		Ground surface							
					SS-10	100			1-0-0-0	0
10.67	79.71		becoming with presence of beddings of silt		SS-11	100			1-0-0-0	0
11.28	79.10		End of borehole Beginning of dynamic penetration test							1, 2, 3, 3, 2, 3, 9, 8, 8, 11, 27, 20, 13, 17, 14, 17

TESTS RESULTS: ○ Water content (%) △ C_u (Field, kPa); w_P w_L Atterberg limits (%) □ C_u (Lab, kPa); ● "N" Standard penetration test value; ▲ "N_C" Dynamic penetration test value

10 20 30 40 50 60 70 80 90

Water level

BOREHOLE REPORT

Borehole No. BH-13

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DESCRIBED BY: F. ARGUIN VERIFIED BY: M.-A. RICHARD / A. FIORILLI

GEODETIC COORDINATES (MTM, NAD-83) (m)
X : 366809.6
Y : 5017824.8
Z : 90.38

▼ - WATER LEVEL
Date : 2021-05-19
Depth (m) : 0.8

Location plan : 11220797-A1-1

Borehole type : Auger
Core bit size : B
Hammer type : Automatic
Energy ratio :
Date (start) : 2021-04-29
Date (finish) : 2021-04-29

SAMPLE TYPE
SS(E) - Split Spoon (Environment)
RC(E) - Rock diamond core
AU(E) - Auger
TEE - Sampling Tube Environment
ST - Shelby tube
GS(E) - Grab sample

SAMPLE STATE
Remoulded
Intact
Diamond drilling
Lost

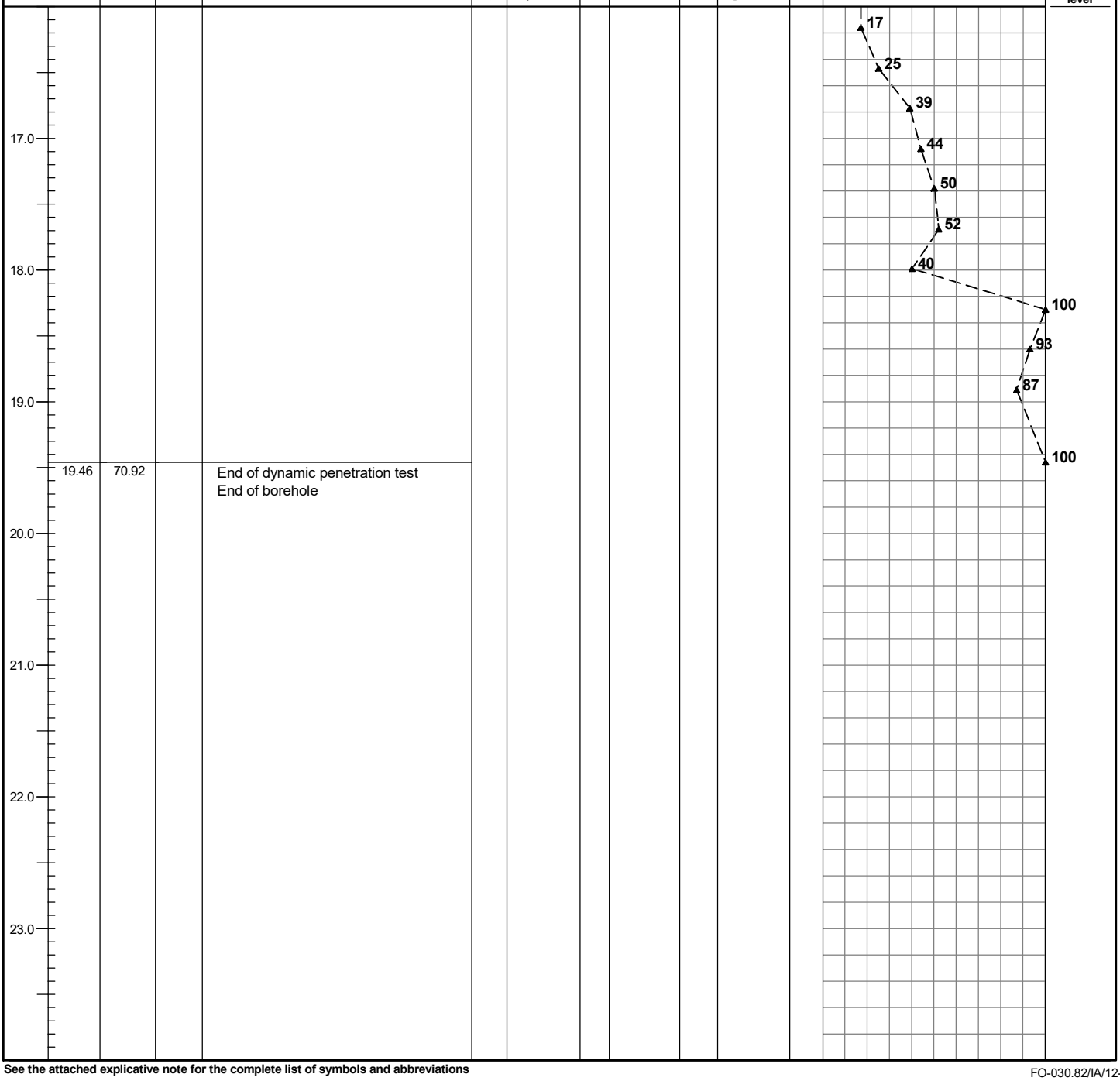
TEST SYMBOL
GSA: grain size analysis
CA: chemical analysis
w_L: liquid limit
w_P: plastic limit
w : water content
C_u: undrained shear strength
S_T: sensitivity
Dup: duplicate sample

STRATIGRAPHY				SAMPLE						TESTS RESULTS
Depth (m)	Elevation (m)	Symbol	Description	State	Type and Number	Recovery %	Other tests	PID (ppm)	6 in / 15 cm Blow counts (sampler size)	N, N_C or RQD
16.00	74.38		Ground surface							
19.46	70.92		End of dynamic penetration test End of borehole							

○ Water content (%) △ C_u (Field, kPa)
w_P w_L Atterberg limits (%) □ C_u (Lab, kPa)
● "N" Standard penetration test value
▲ "N_C" Dynamic penetration test value

10 20 30 40 50 60 70 80 90

Water level



See the attached explicative note for the complete list of symbols and abbreviations

Appendix C
GHD Test Pit Reports and Photographs

TEST PIT REPORT

TEST PIT No. TP-01

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366239.2
Y : 5017861.2
Z : 90.67

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.67		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1 GSE-1		
0.30	90.37		**Native soil:** Stiff to very stiff, brown-grey silt and clay, very moist	GS-2		
0.80	89.87		becoming grey	GS-3	w = 33.0% Wl = 63.0% Wp = 26.0 %	
1.50	89.17		becoming stiff, saturated	GS-4		
2.80	87.87		End of test pit Note: Slight water infiltration at 2.80m			<

Photo 1 : TP-01 excavation.

Photo 2 : TP-01 materials.

Test Pit No. TP-01
Proposed Sortation Facility
Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-02

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366350.8
Y : 5017942.4
Z : 90.59

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.59					
			Remoulded native soil / topsoil: Clayey silt, traces of sand. Traces of roots and organics	GS-1		
0.30	90.29		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.89		becoming grey	GS-3		
1.50	89.09		becoming stiff, saturated	GS-4		
3.00	87.59		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-02 excavation.

Photo 2 : TP-02 materials.

Test Pit No. TP-02
Proposed Sortation Facility

Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-03

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366431.0
Y : 5017938.4
Z : 90.52

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.52					
			Remoulded native soil / topsoil: Clayey silt, traces of sand. Traces of roots and organics	GS-1		
0.30	90.22		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.82		becoming grey, very moist	GS-3		
1.80	88.72		becoming stiff with traces of sand, saturated	GS-4		
2.90	87.62		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-03 excavation.

Photo 2 : TP-03 materials.

TEST PIT REPORT

TEST PIT No. TP-04

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366476.0
Y : 5018013.0
Z : 90.46

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.46					
			Remoulded native soil / topsoil: Clayey silt, traces of sand. Traces of roots and organics	GS-1 GSE-1		
0.30	90.16		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.76		becoming very moist	GS-3		
1.60	88.86		becoming stiff with traces of sand, grey, saturated	GS-4 GS-5		
3.10	87.36		End of test pit Note: Slight water infiltration at 3.10m			<

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-04 excavation.

Photo 2 : TP-04 materials.

TEST PIT REPORT

TEST PIT No. TP-05

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366565.4
Y : 5018013.4
Z : 90.60

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.60					
			Remoulded native soil / topsoil: Clayey silt, traces of sand. Traces of roots and organics	GS-1		
0.30	90.30		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.90		becoming grey, very moist	GS-3		
				GS-4		
2.20	88.40		becoming stiff, saturated	GS-5		
3.00	87.60		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-05 excavation.

Photo 2 : TP-05 materials.

Test Pit No. TP-05
Proposed Sortation Facility

Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-06

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366603.7
Y : 5018084.5
Z : 90.61

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-04

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-04

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.61		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1 GSE-1		
0.30	90.31		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.80	89.81		becoming grey, very moist	GS-3		
1.80	88.81		becoing stiff, saturated	GS-4		
3.00	87.61		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-06 excavation.

Photo 2 : TP-06 materials.

Test Pit No. TP-06
Proposed Sortation Facility
Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-15

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366292.5
Y : 5017826.9
Z : 90.65

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.65					
			Remoulded native soil / topsoil: Clayey silt, traces of sand. Traces of roots and organics	GS-1		
0.30	90.35		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.95		becoming grey, very moist	GS-3		
1.60	89.05		becoming stiff, saturated	GS-4		
2.80	87.85		End of test pit Note: Slight water infiltration at 2.80m			<

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-15 excavation.

Photo 1 : TP-15 materials.

TEST PIT REPORT

TEST PIT No. TP-16

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366351.7
Y : 5017860.4
Z : 90.62

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.62		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1 GSE-1		
0.30	90.32		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.80	89.82		becoming grey, very moist	GS-3		
1.50	89.12		becoming stiff, saturated	GS-4 GS-5		
3.00	87.62		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-16 excavation.

Photo 2 : TP-16 materials.

Test Pit No. TP-16
Proposed Sortation Facility
Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-17

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366450.1
Y : 5017904.3
Z : 90.59

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.59					
			Remoulded native soil / topsoil: Clayey silt, traces of sand. Traces of roots and organics	GS-1		
0.30	90.29		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.80	89.79		becoming grey, very moist	GS-3		
1.45	89.14		End of test pit Note: No water infiltration			

0.5 — 1.0 — 1.5 — 2.0 — 2.5 — 3.0 — 3.5 — 4.0 — 4.5

Photo 1 : TP-17 excavation.

Photo 10 : TP-17 materials.

TEST PIT REPORT

TEST PIT No. TP-18

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366524.8
Y : 5017946.2
Z : 90.55

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.55					
			Remoulded native soil / topsoil: Clayey silt, traces of sand. Traces of roots and organics	GS-1		
0.30	90.25		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.90	89.65		becoming grey, very moist	GS-3		
1.50	89.05		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-18 excavation.

Photo 2 : TP-18 materials.

Test Pit No. TP-18
Proposed Sortation Facility

Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-19

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366584.3
Y : 5017980.1
Z : 90.68

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-04

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-04

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.68		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1 GSE-1		
0.30	90.38		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.98		becoming grey, very moist	GS-3		
1.50	89.18		End of test pit Note: No water infiltration			

0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5

Photo 1 : TP-19 excavation.

Photo 1 : TP-19 materials.

TEST PIT REPORT

TEST PIT No. TP-20

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366653.2
Y : 5017996.1
Z : 90.52

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-04

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-04

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.52		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1 GSE-1		
0.30	90.22		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.82		becoming grey, very moist	GS-3		
1.40	89.12		becoming stiff with traces of sand, saturated	GS-4 GS-5		
3.00	87.52		End of test pit Note: Slight water infiltration at 3.0m			<

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-20 excavation.

Photo 2 : TP-20 materials.

TEST PIT REPORT

TEST PIT No. TP-24

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366263.6
Y : 5017757.8
Z : 90.68

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.68		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1		
0.50	90.18		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
1.00	89.68		becoming grey, very moist	GS-3		
2.00	88.68		becoming stiff, saturated	GS-4		
3.00	87.68		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-24 excavation.

Photo 2 : TP-24 materials.

Test Pit No. TP-24
Proposed Sortation Facility
Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-25

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366327.0
Y : 5017764.9
Z : 90.71

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.71		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1 GSE-1		
0.30	90.41		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	90.01		becoming grey, very moist to saturated	GS-3	w = 37.0% WI = 53.0% Wp = 24.0 %	
2.10	88.61		Firm, grey sandy and clayey silt, saturated	GS-4		
2.90	87.81		Stiff, grey clayey silt, saturated	GS-5		
3.30	87.41		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-25 excavation.

Photo 2 : TP-25 materials.

Test Pit No. TP-25
Proposed Sortation Facility
Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-26

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366386.2
Y : 5017798.3
Z : 90.68

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.68					
			Remoulded native soil / topsoil: Clayey silt, traces of sand. Traces of roots and organics	GS-1		
0.30	90.38		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.98		becoming grey, very moist	GS-3		
1.80	88.88		becoming stiff, saturated	GS-4		
2.90	87.78		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-26 excavation.

Photo 2 : TP-26 materials.

TEST PIT REPORT

TEST PIT No. TP-27

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366471.1
Y : 5017866.9
Z : 90.58

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.58		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1 GSE-1		
0.30	90.28		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.88		becoming grey, very moist	GS-3		
1.50	89.08		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-27 excavation.

Photo 2 : TP-27 materials.

TEST PIT REPORT

TEST PIT No. TP-28

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366545.7
Y : 5017908.9
Z : 90.71

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.71		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1 GSE-1		
0.30	90.41		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.80	89.91		becoming grey, very moist	GS-3		
1.50	89.21		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Photo 1 : TP-28 excavation.

Photo 2 : TP-28 materials.

TEST PIT REPORT

TEST PIT No. TP-29

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366605.4
Y : 5017942.6
Z : 90.72

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-04

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-04

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.72		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1		
0.30	90.42		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	90.02		becoming grey, very moist	GS-3		
1.45	89.27		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-29 excavation.

Photo 2 : TP-29 materials.

TEST PIT REPORT

TEST PIT No. TP-30

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366492.8
Y : 5017827.9
Z : 90.56

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-03

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-03

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.56		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1 GSE-1		
0.30	90.26		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.86		becoming grey, very moist	GS-3		
1.70	88.86		becoming stiff with traces of sand	GS-4		
2.60	87.96		Stiff, grey sandy and clayey silt, saturated	GS-5		
3.00	87.56		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-30 excavation.

Photo 2 : TP-30 materials.

TEST PIT REPORT

TEST PIT No. TP-31

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366627.4
Y : 5017903.3
Z : 90.41

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-04

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-04

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.41		**Remoulded native soil / topsoil:** Clayey silt, traces of sand. Traces of roots and organics	GS-1 GSE-1		
0.30	90.11		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.80	89.61		becoming grey, very moist	GS-3		
1.70	88.71		becoming stiff with traces of sand, saturated	GS-4		
3.00	87.41		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-31 excavation.

Photo 2 : TP-31 materials.

TEST PIT REPORT

TEST PIT No. TP-35

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366558.2
Y : 5017809.8
Z : 90.46

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-05

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-05

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.46					
			Topsoil: Brown clayey silt, moist. Traces of roots and organics	GS-1		
0.30	90.16		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.76		becoming grey, very moist	GS-3	w = 30.0% WI = 59.0% Wp = 25.0 %	
1.80	88.66		becoming stiff, very moist to saturated	GS-4		
3.00	87.46		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-35 excavation.

Photo 2 : TP-35 materials.

TEST PIT REPORT

TEST PIT No. TP-36

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366701.1
Y : 5017889.7
Z : 90.34

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-05

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-05

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.34					
			Topsoil: Brown clayey silt, moist. Traces of roots and organics	GS-1		
0.30	90.04		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.64		becoming stiff, grey, very moist to saturated	GS-3		
				GS-4		
3.00	87.34		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-36 excavation.

Photo 2 : TP-36 materials.

Test Pit No. TP-36
Proposed Sortation Facility
Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-40

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366658.9
Y : 5017827.6
Z : 90.51

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-06

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-06

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.51		**Topsoil:** Brown clayey silt, moist. Traces of roots and organics	GS-1 GSE-1		
0.5				GS-2		
0.60	89.91		**Native soil:** Stiff, grey silt and clay, very moist			
1.0				GS-3		
1.5						
1.60	88.91		becoming stiff with traces of sand, very moist to saturated			
2.0				GS-4		
2.5						
				GS-5		
3.0						
3.00	87.51		End of test pit Note: Slight water infiltration at 3.0m			<
3.5						
4.0						
4.5						

See the attached explicative note for the complete list of symbols and abbreviations

Photo 7 : TP-40 excavation.

Photo 8 : TP-40 materials.

TEST PIT REPORT

TEST PIT No. TP-43

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366526.6
Y : 5017723.1
Z : 93.75

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-05

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-05

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	93.75		**Fill:** Stiff, brown clayey silt mixed with roots and organics, moist	GS-1		
0.50	93.25		Grey to brown clayey silt, moist	GS-2		
				GS-3		
				GS-4		
				GS-5		
				GS-6		
3.35	90.40		End of test pit Note: No water infiltration			

0.5 — 1.0 — 1.5 — 2.0 — 2.5 — 3.0 — 3.5 — 4.0 — 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-43 excavation.

Photo 2 : TP-43 materials.

Test Pit No. TP-43
Proposed Sortation Facility
Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-44

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366587.9
Y : 5017715.6
Z : 90.55

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-05

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-05

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.55					
			Topsoil: Brown clayey silt, moist. Traces of roots and organics	GS-1		
0.5						
0.50	90.05		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.75	89.80		becoming grey, very moist			
1.0				GS-3	w = 39.0% Wl = 74.0% Wp = 34.0 %	
1.5						
1.80	88.75		becoming stiff with traces of sand			
2.0						
2.5				GS-4		
3.0						
3.00	87.55		End of test pit Note: No water infiltration			
3.5						
4.0						
4.5						

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-44 excavation.

Photo 2 : TP-44 materials.

Test Pit No. TP-44
Proposed Sortation Facility
Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-45

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366763.1
Y : 5017843.2
Z : 90.52

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-06

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-06

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.52					
			Topsoil: Brown clayey silt, moist. Traces of roots and organics	GS-1 GSE-1		
0.30	90.22		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.60	89.92		becoming grey, very moist	GS-3		
1.60	88.92		becoming stiff with traces of sand, very moist to saturated	GS-4 GS-5		
3.00	87.52		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-45 excavation.

Photo 2 : TP-45 materials.

TEST PIT REPORT

TEST PIT No. TP-46

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366877.5
Y : 5017907.6
Z : 90.36

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-06

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-06

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.36					
			Topsoil: Brown clayey silt, moist. Traces of roots and organics	GS-1 GSE-1		
0.30	90.06		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.66		becoming grey with traces of sand, very moist	GS-3		
1.60	88.76		becoing stiff very moist to saturated	GS-4		
3.00	87.36		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-46 excavation.

Photo 2 : TP-46 materials.

TEST PIT REPORT

TEST PIT No. TP-47

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366973.4
Y : 5017961.2
Z : 90.31

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-06

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-06

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.31		**Topsoil:** Brown clayey silt, moist. Traces of roots and organics	GS-1 GS-2		
0.60	89.71		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-3		
1.70	88.61		becoming stiff with traces of sand, vert moist to saturated	GS-4		
3.00	87.31		End of test pit Note: No water infiltration			

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-47 excavation.

Photo 2 : TP-47 materials.

Test Pit No. TP-47
Proposed Sortation Facility

Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-49

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366510.8
Y : 5017662.8
Z : 90.87

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-05

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-05

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.87					
			Fill: Brown clayey silt, moist. Presence of roots and organics	GS-1		
0.5						
0.70	90.17		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
1.0						
1.30	89.57		becoming stiff, grey, very moist to saturated	GS-3		
1.5						
2.0						
				GS-4		
2.5						
3.0						
3.00	87.87		End of test pit Note: No water infiltration			
3.5						
4.0						
4.5						

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-49 excavation.

Photo 2 : TP-49 materials.

TEST PIT REPORT

TEST PIT No. TP-49PILE

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X :
Y :
Z : 92.90

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-05

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-05

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	92.90		**Fill:** Brown clayey silt, moist	GS-1 GSE-1		
0.5				GS-2 GSE-2		
1.0				GS-3 GSE-3		
1.5				GS-4 GSE-4		
2.0	2.00		End of test pit Note: No water infiltration			
2.5						
3.0						
3.5						
4.0						
4.5						

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-49-PILE excavation.

Test Pit No. TP-49-PILE
Proposed Sortation Facility
Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-50

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366472.0
Y : 5017605.6
Z : 90.55

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-05

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-05

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.55					
			Topsoil: Brown clayey silt, moist. Traces of roots and organics	GS-1		
0.20	90.35		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.70	89.85		becoming grey, very moist	GS-3		
1.50	89.05		becoming stiff, saturated	GS-4		
				GS-5		
3.00	87.55		End of test pit Note: Slight water infiltration at 3.0m			<

Photo 1 : TP-50 excavation.

Photo 1 : TP-50 materials.

TEST PIT REPORT

TEST PIT No. TP-51

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366550.3
Y : 5017657.8
Z : 90.42

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-05

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-05

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	90.42					
			Topsoil: Brown clayey silt, moist. Traces of roots and organics	GS-1		
0.30	90.12		**Native soil:** Stiff to very stiff, brown silt and clay, moist	GS-2		
0.80	89.62		becoming grey	GS-3		
1.60	88.82		becoming stiff with traces of sand, moist to very moist	GS-4		
3.00	87.42		End of test pit Note: No water infiltration			

0.5 — 1.0 — 1.5 — 2.0 — 2.5 — 3.0 — 3.5 — 4.0 — 4.5

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-51 excavation.

Test Pit No. TP-51
Proposed Sortation Facility

Leikin Drive and Merivale Road Intersection, Nepean, Ontario

TEST PIT REPORT

TEST PIT No. TP-52

CLIENT: MEDUSA LP

PROJECT: PROPOSED SORTATION FACILITY

LOCATION: LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

GEODETIC COORDINATES (m) (MTM, NAD-83)
X : 366538.8
Y : 5017605.5
Z : 92.69

< - INFILTRATION

▼ - WATER LEVEL

DESCRIBED BY: M. CHÉNIER

DATE: 2021-05-05

VERIFIED BY: M.-A. RICHARD / A. FIORILLI

DATE: 2021-05-05

Sample type

CA : Chemical analysis
PS : Proctor Sample
MSS: Manual split spoon
AU: Auger
RC : Rock core
GS(E) : Grab sample (environment)

Manual tests

PA : Panda (q_d)
PP : Portable penetrometer (C_u)
DP: Dynamic penetrometer (E_{25})
GVT: Geonor Vane tester (C_u)

Depth (m)	Elevation (m)	Symbol	STRATIGRAPHY	Sample type & Number	Tests Type	▼ / <
0,0	92.69		**Fill:** Brown clayey silt, moist	GS-1		
0.5				GS-2		
1.0				GS-3		
1.5				GS-4		
2.0				GS-5		
2.5						
2.70	89.99		**Native soil:** Stiff, grey clayey silt, very moist	GS-6		
3.0						
3.32	89.37		End of test pit Note: No water infiltration			
3.5						
4.0						
4.5						

See the attached explicative note for the complete list of symbols and abbreviations

Photo 1 : TP-52 excavation.

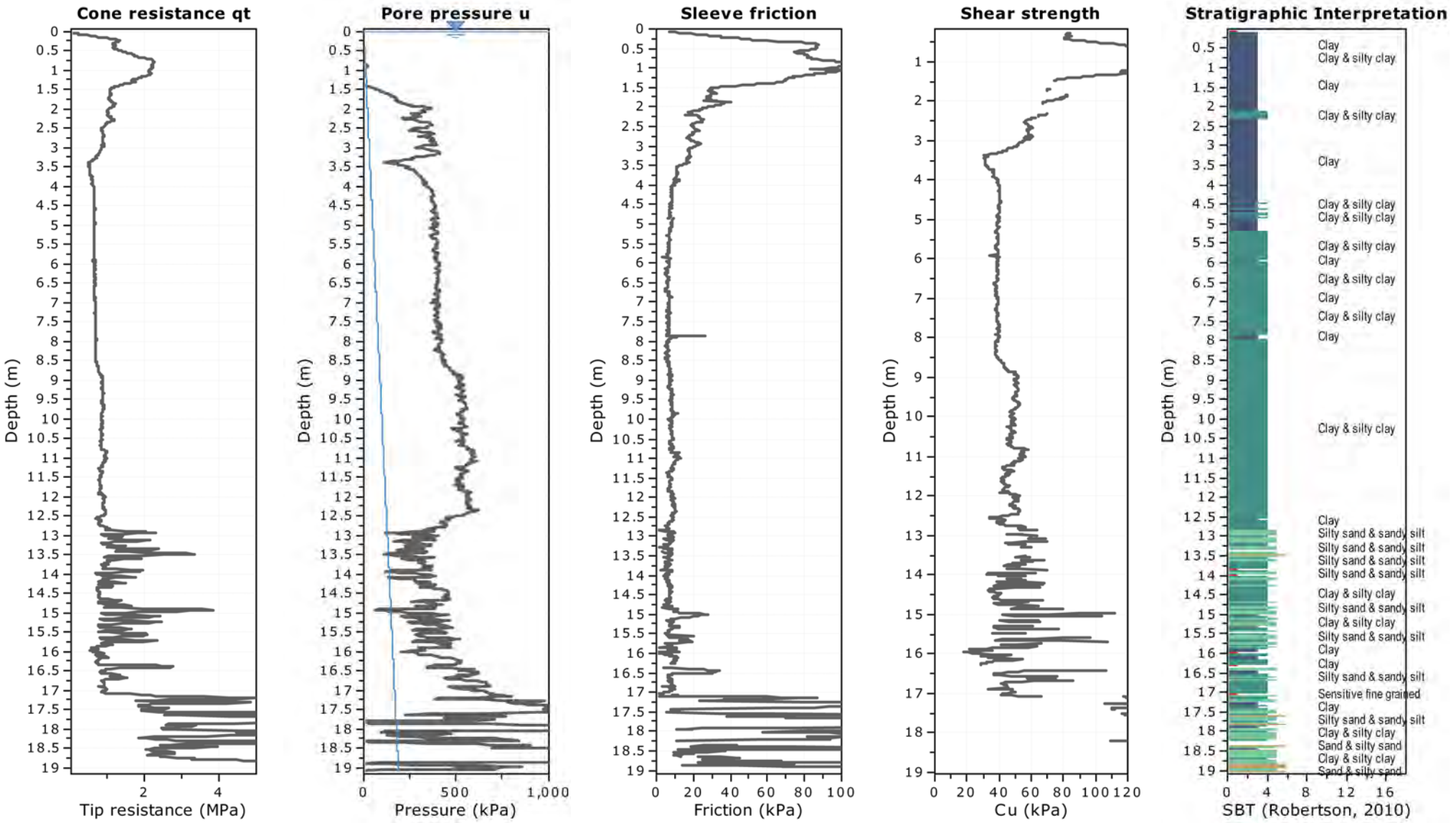
Photo 2 : TP-52 materials.

Appendix D
GHD Piezocone (CPT) Reports
Preconsolidation Profile Graphs D1 and D2
Dissipation Profile Graph D3

11227097-A1
Performed by Stratum CPT
Interpreted by Marc-Andre Richard, ing. jr
Verified by Kamel Hamouche, ing. Ph. D.

Project: Geotechnical Investigation - Proposed Sortation Facility
Location: Leikin Drive and Merival Road Intersection, Nepean, Ontario

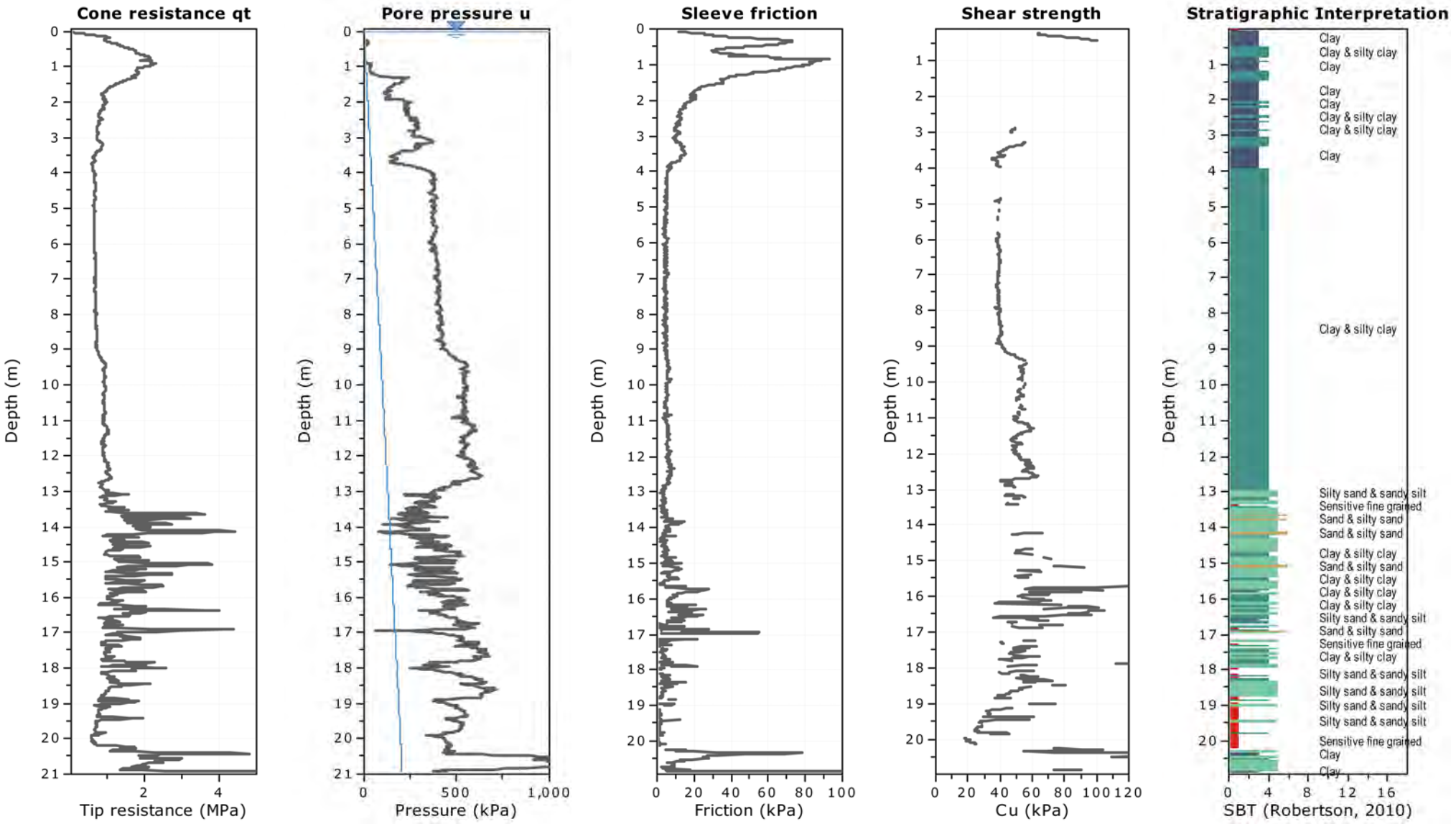
CPT-01
Total depth: 19.08 m



11227097-A1
Performed by Stratum CPT
Interpreted by Marc-Andre Richard, ing. jr
Verified by Kamel Hamouche, ing. Ph. D.

Project: Geotechnical Investigation - Proposed Sortation Facility
Location: Leikin Drive and Merival Road Intersection, Nepean, Ontario

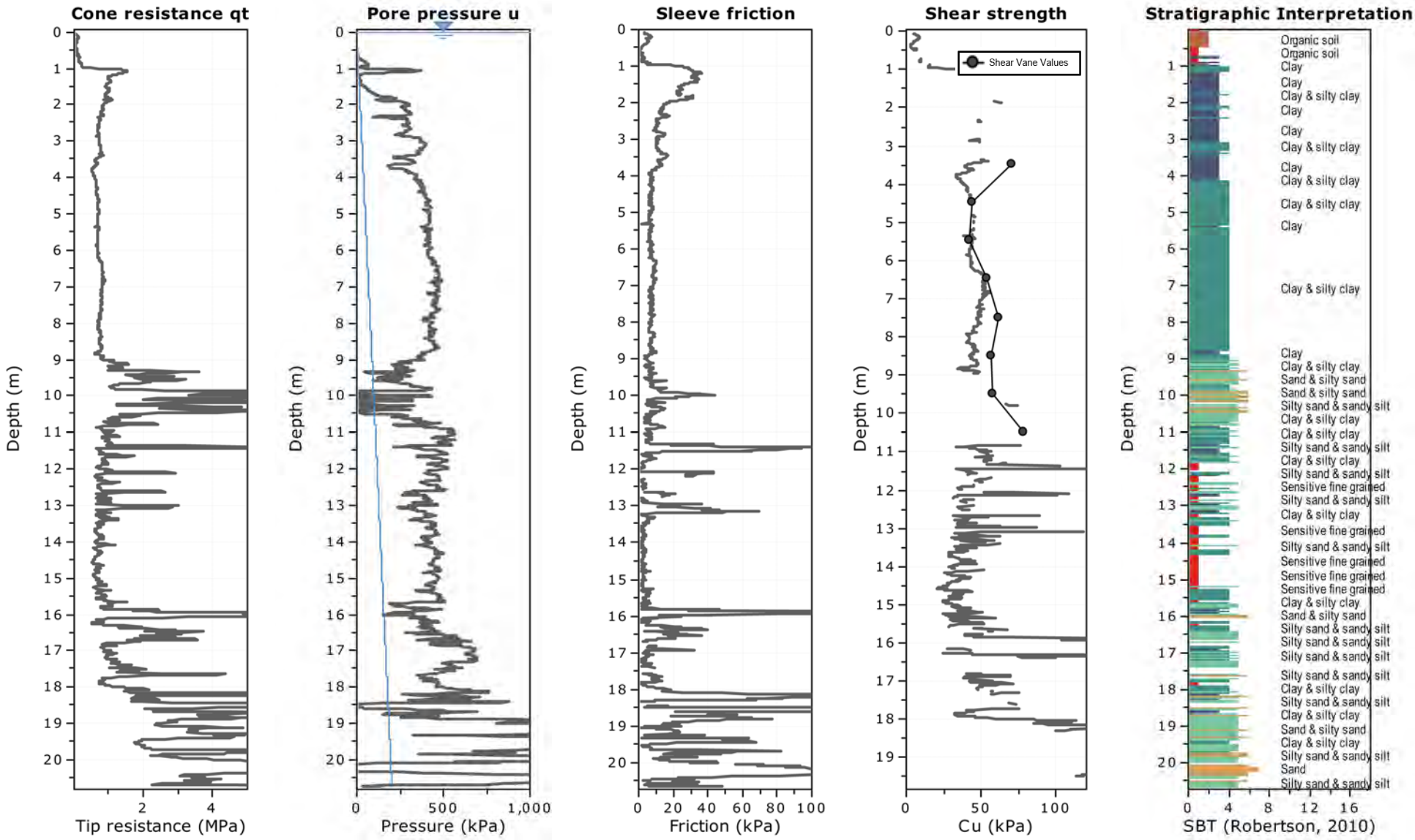
CPT-02
Total depth: 20.92 m



11227097-A1
Performed by Stratum CPT
Interpreted by Marc-Andre Richard, ing. jr
Verified by Kamel Hamouche, ing. Ph. D.

Project: Geotechnical Investigation - Proposed Sortation Facility
Location: Leikin Drive and Merival Road Intersection, Nepean, Ontario

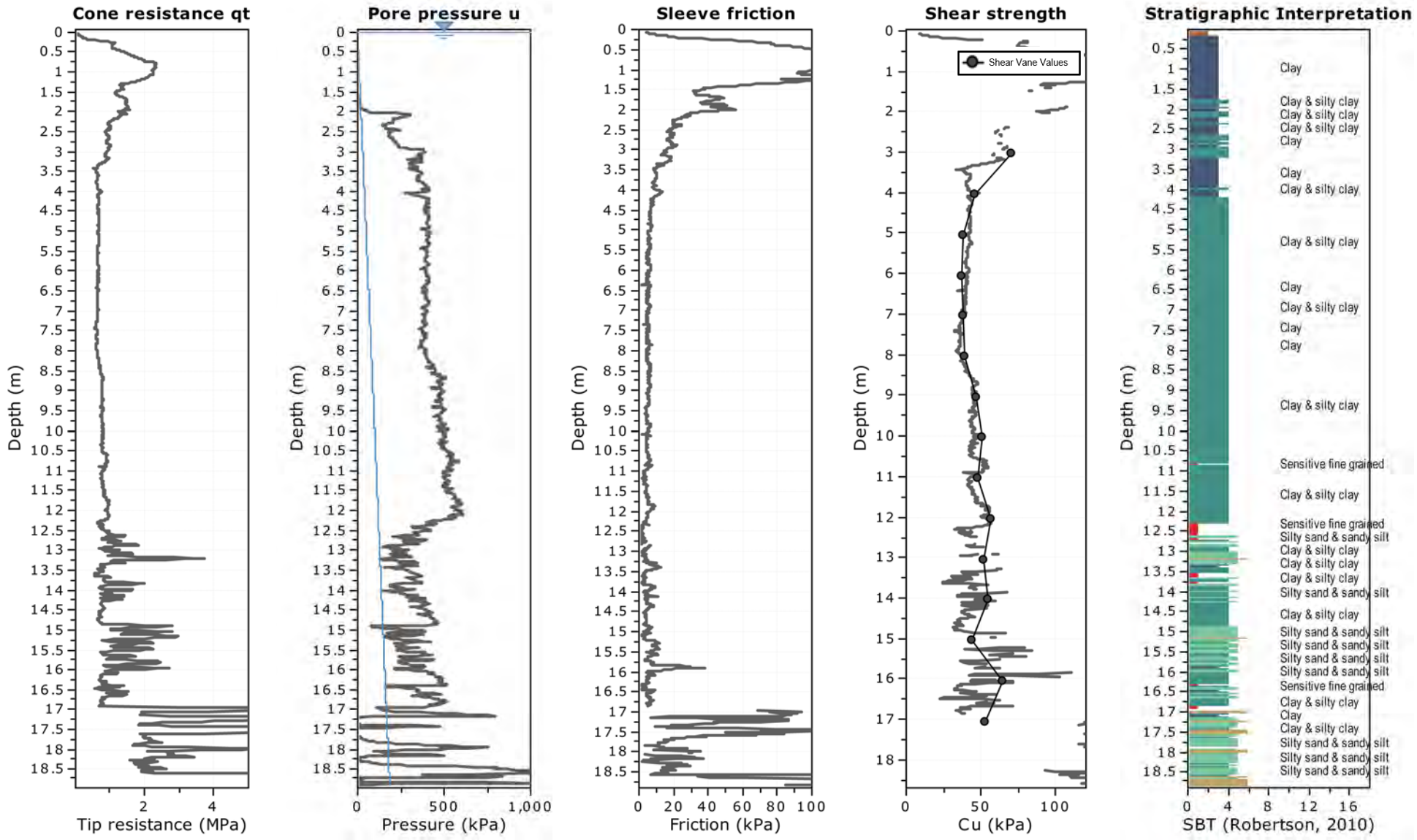
CPT-03
Total depth: 20.72 m



11227097-A1
Performed by Stratum CPT
Interpreted by Marc-Andre Richard, ing. jr
Verified by Kamel Hamouche, ing. Ph. D.

Project: Geotechnical Investigation - Proposed Sortation Facility
Location: Leikin Drive and Merival Road Intersection, Nepean, Ontario

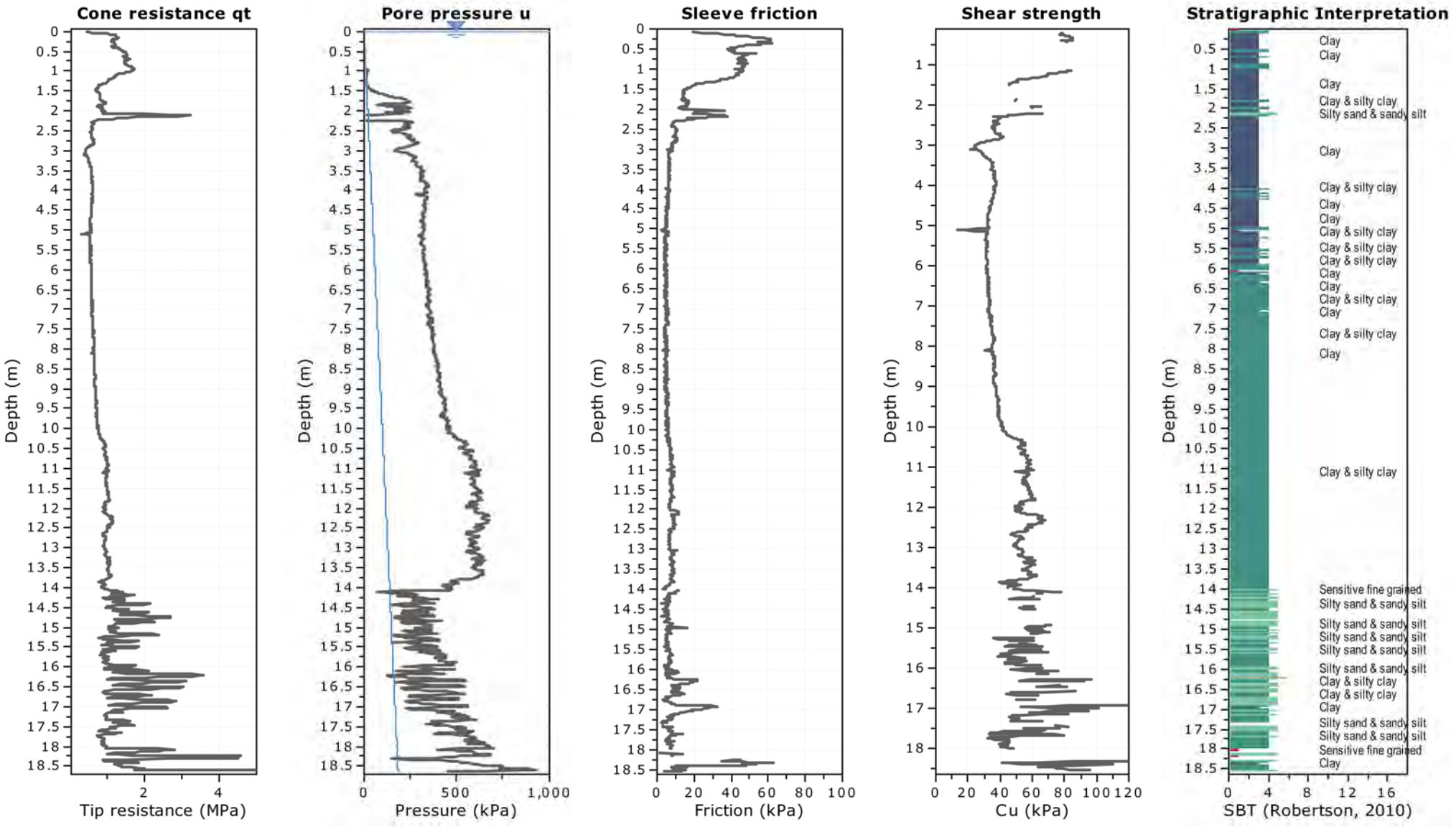
CPT-04
Total depth: 18.89 m



11227097-A1
Performed by Stratum CPT
Interpreted by Marc-Andre Richard, ing. jr
Verified by Kamel Hamouche, ing. Ph. D.

Project: Geotechnical Investigation - Proposed Sortation Facility
Location: Leikin Drive and Merival Road Intersection, Nepean, Ontario

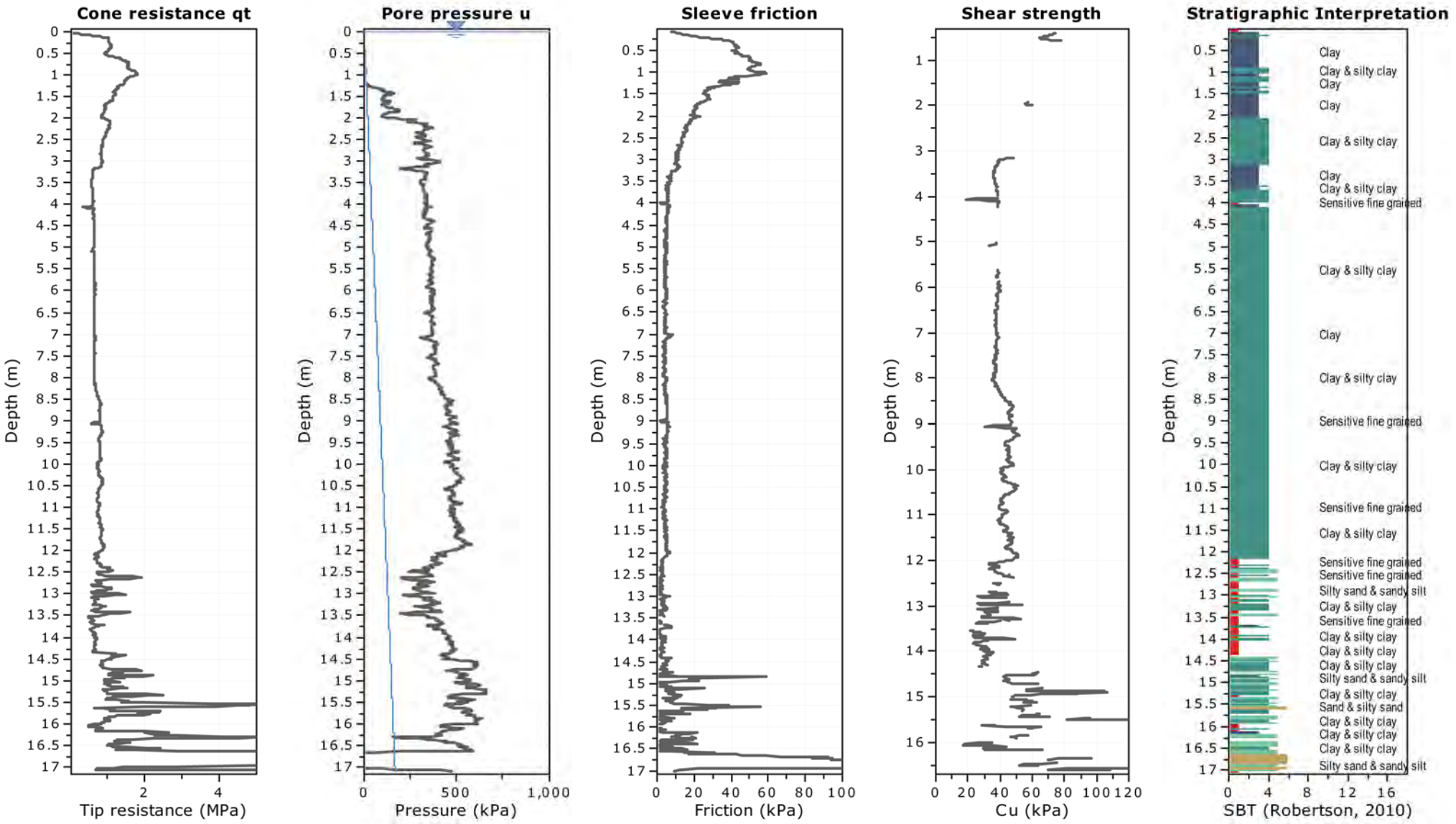
CPT-05
Total depth: 18.63 m



11227097-A1
Performed by Stratum CPT
Interpreted by Marc-Andre Richard, ing. jr
Verified by Kamel Hamouche, ing. Ph. D.

Project: Geotechnical Investigation - Proposed Sortation Facility
Location: Leikin Drive and Merival Road Intersection, Nepean, Ontario

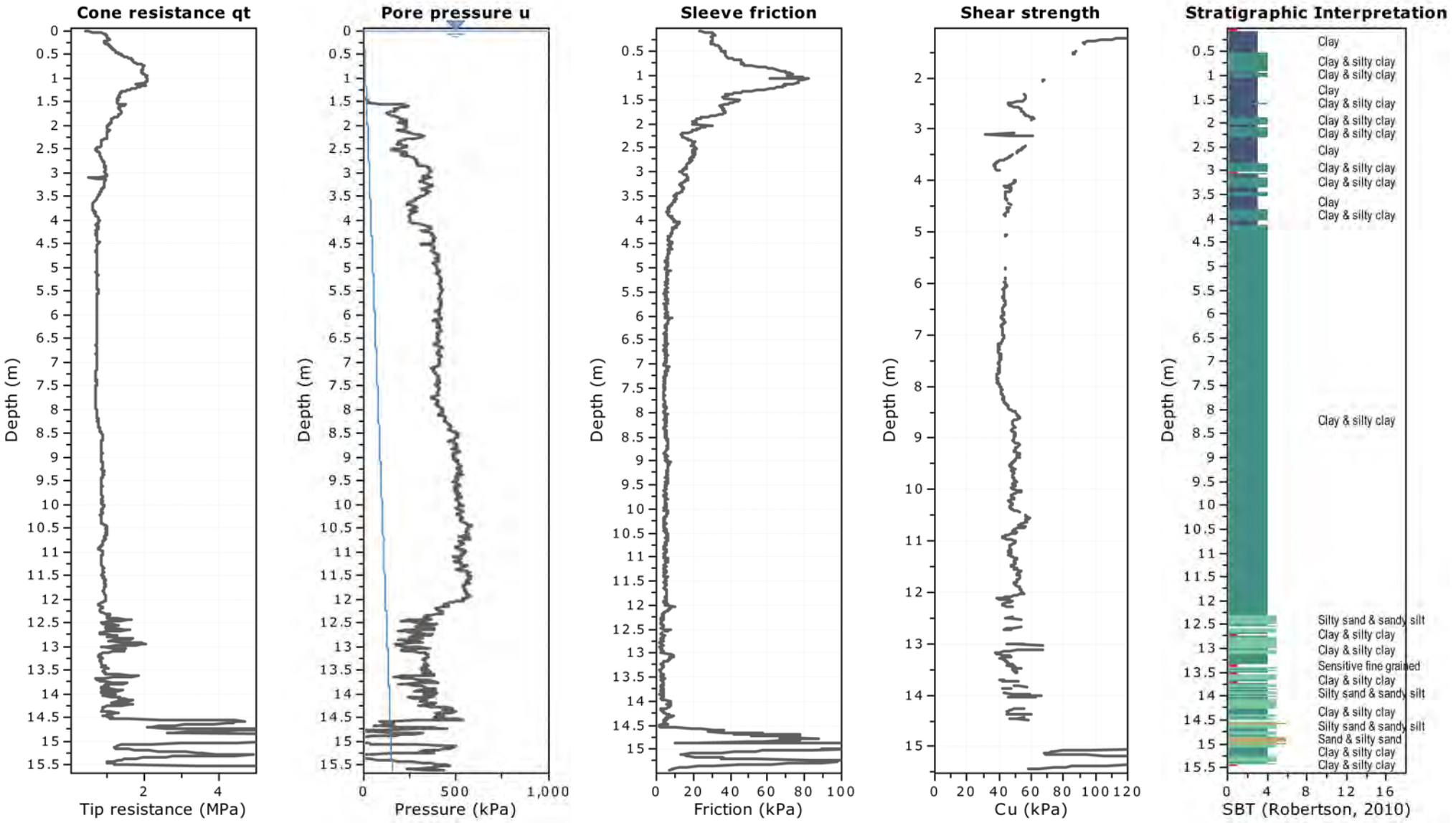
CPT-06
Total depth: 17.10 m



11227097-A1
Performed by Stratum CPT
Interpreted by Marc-Andre Richard, ing. jr
Verified by Kamel Hamouche, ing. Ph. D.

Project: Geotechnical Investigation - Proposed Sortation Facility
Location: Leikin Drive and Merival Road Intersection, Nepean, Ontario

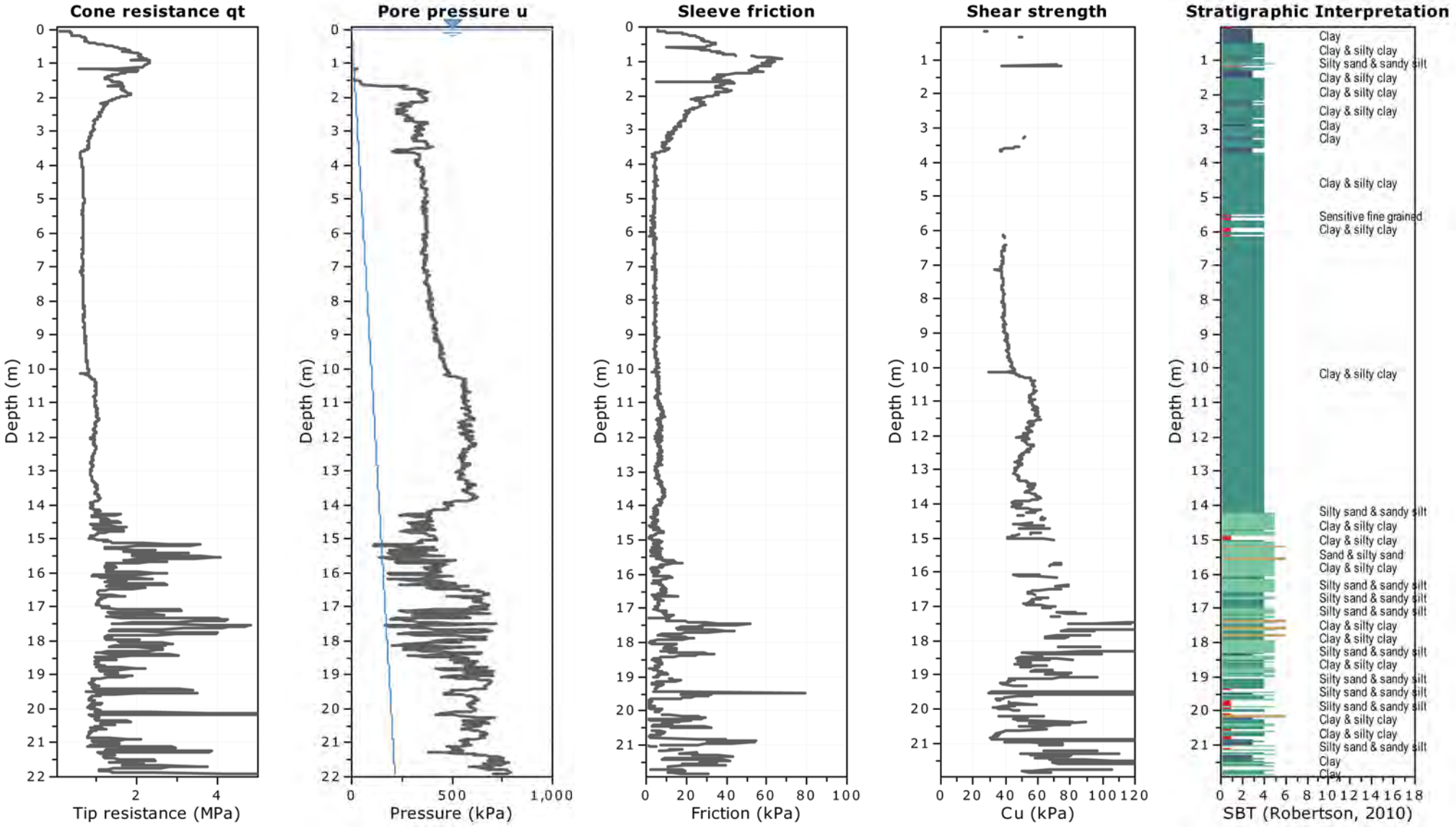
CPT-07
Total depth: 15.62 m



11227097-A1
Performed by Stratum CPT
Interpreted by Marc-Andre Richard, ing. jr
Verified by Kamel Hamouche, ing. Ph. D.

Project: Geotechnical Investigation - Proposed Sortation Facility
Location: Leikin Drive and Merival Road Intersection, Nepean, Ontario

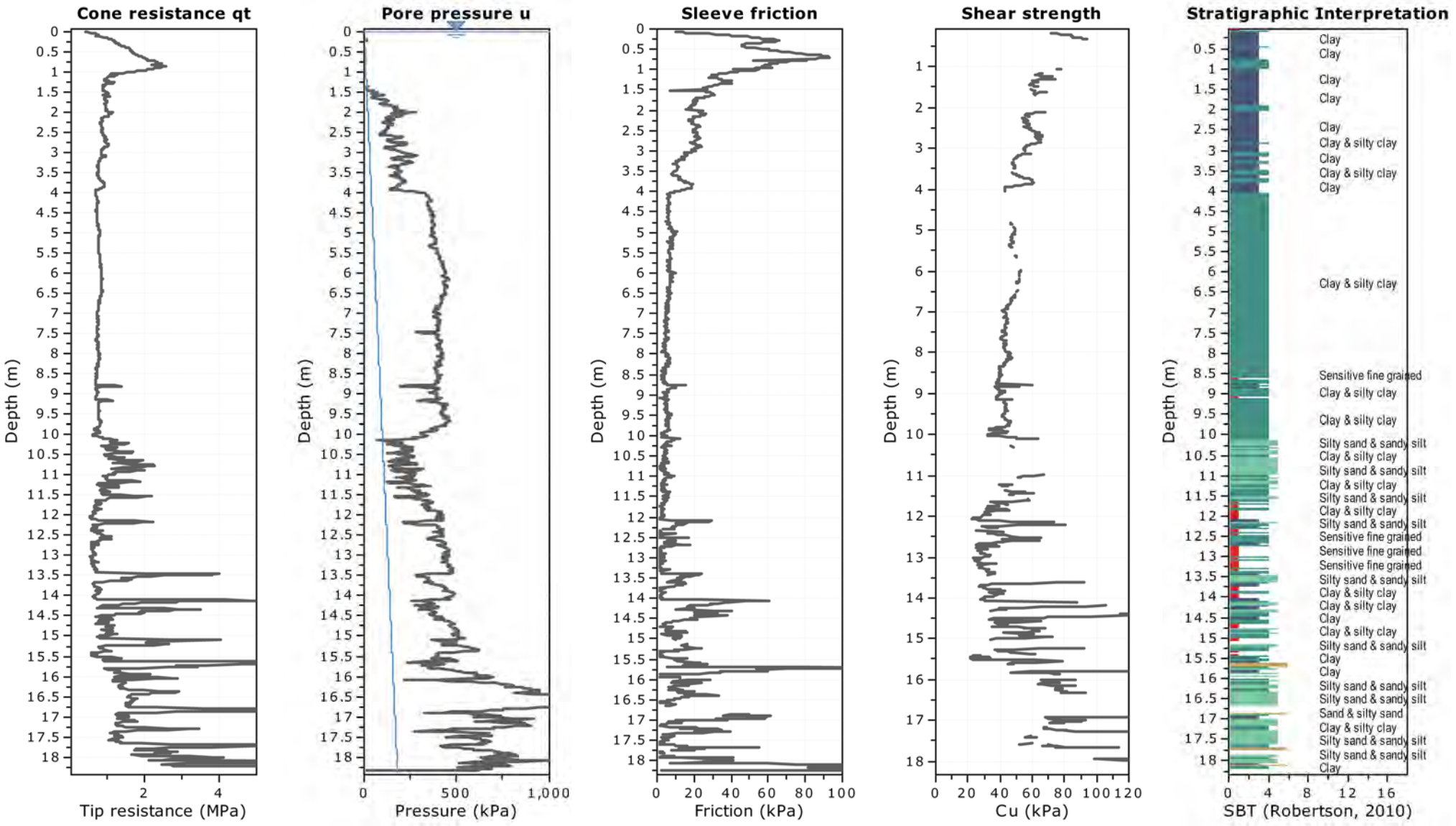
CPT-08
Total depth: 21.93 m



11227097-A1
Performed by Stratum CPT
Interpreted by Marc-Andre Richard, ing. jr
Verified by Kamel Hamouche, ing. Ph. D.

Project: Geotechnical Investigation - Proposed Sortation Facility
Location: Leikin Drive and Merival Road Intersection, Nepean, Ontario

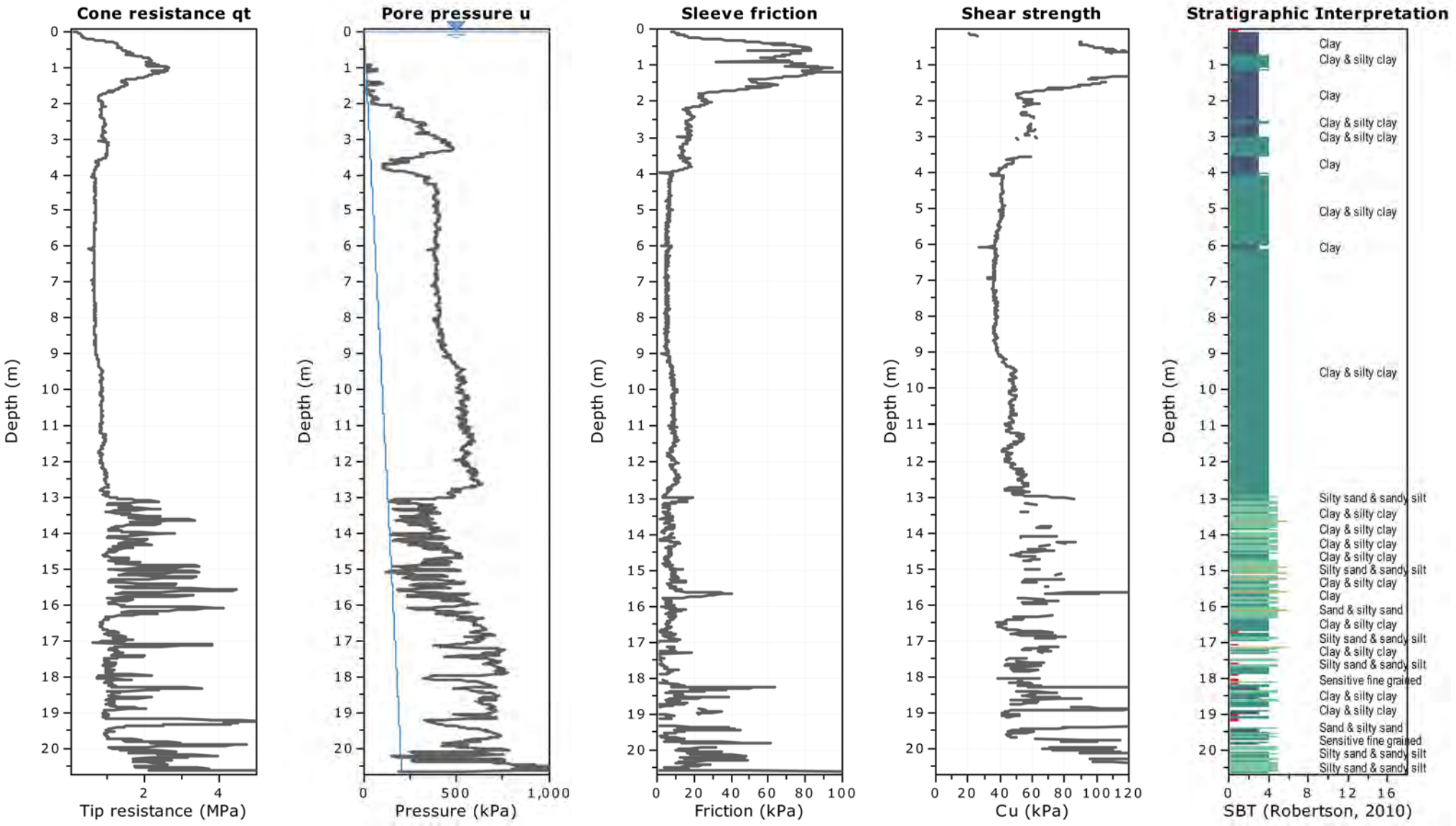
CPT-14
Total depth: 18.37 m



11227097-A1
Performed by Stratum CPT
Interpreted by Marc-Andre Richard, ing. jr
Verified by Kamel Hamouche, ing. Ph. D.

Project: Geotechnical Investigation - Proposed Sortation Facility
Location: Leikin Drive and Merival Road Intersection, Nepean, Ontario

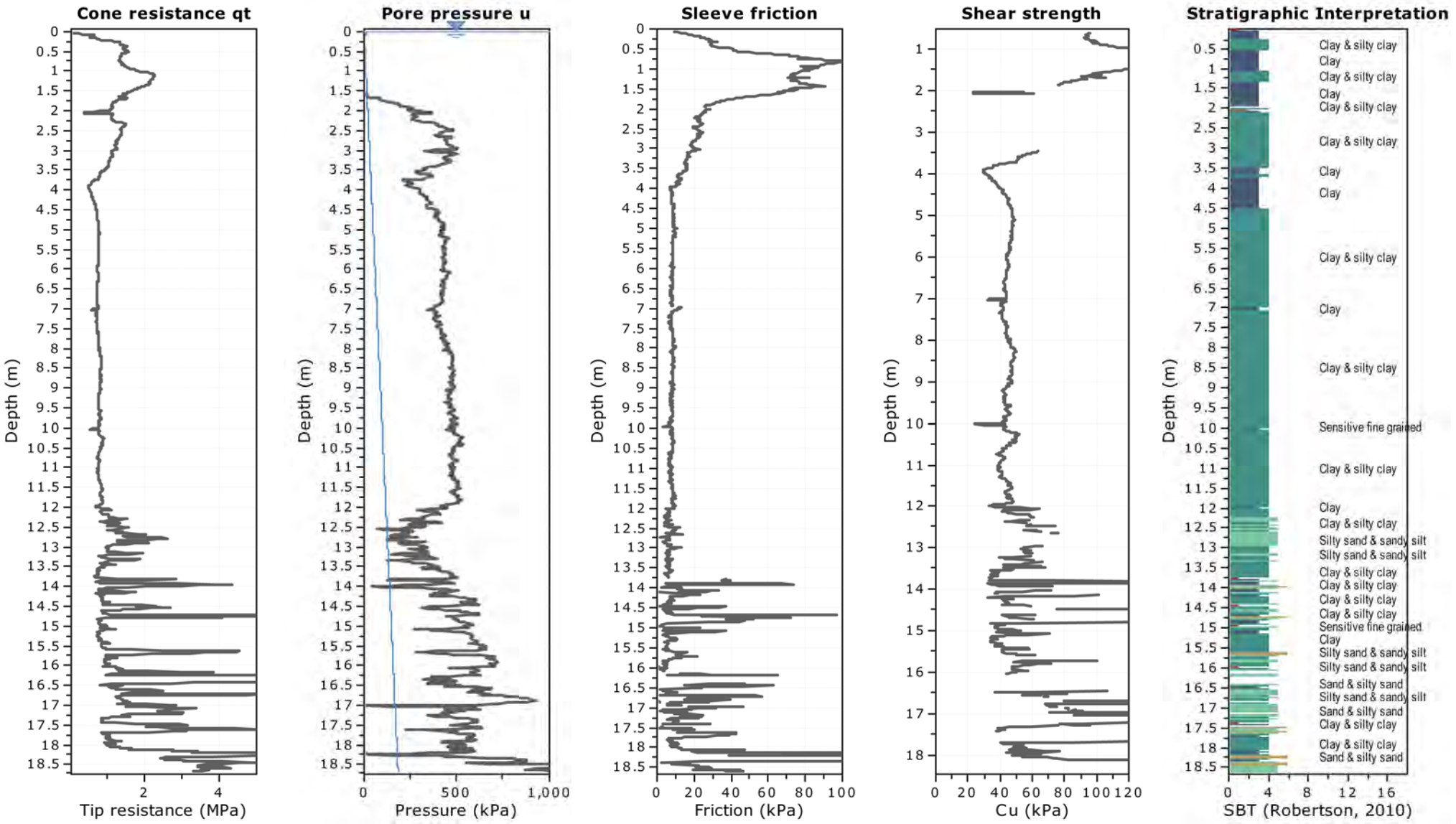
CPT-16
Total depth: 20.66 m



11227097-A1
Performed by Stratum CPT
Interpreted by Marc-Andre Richard, ing. jr
Verified by Kamel Hamouche, ing. Ph. D.

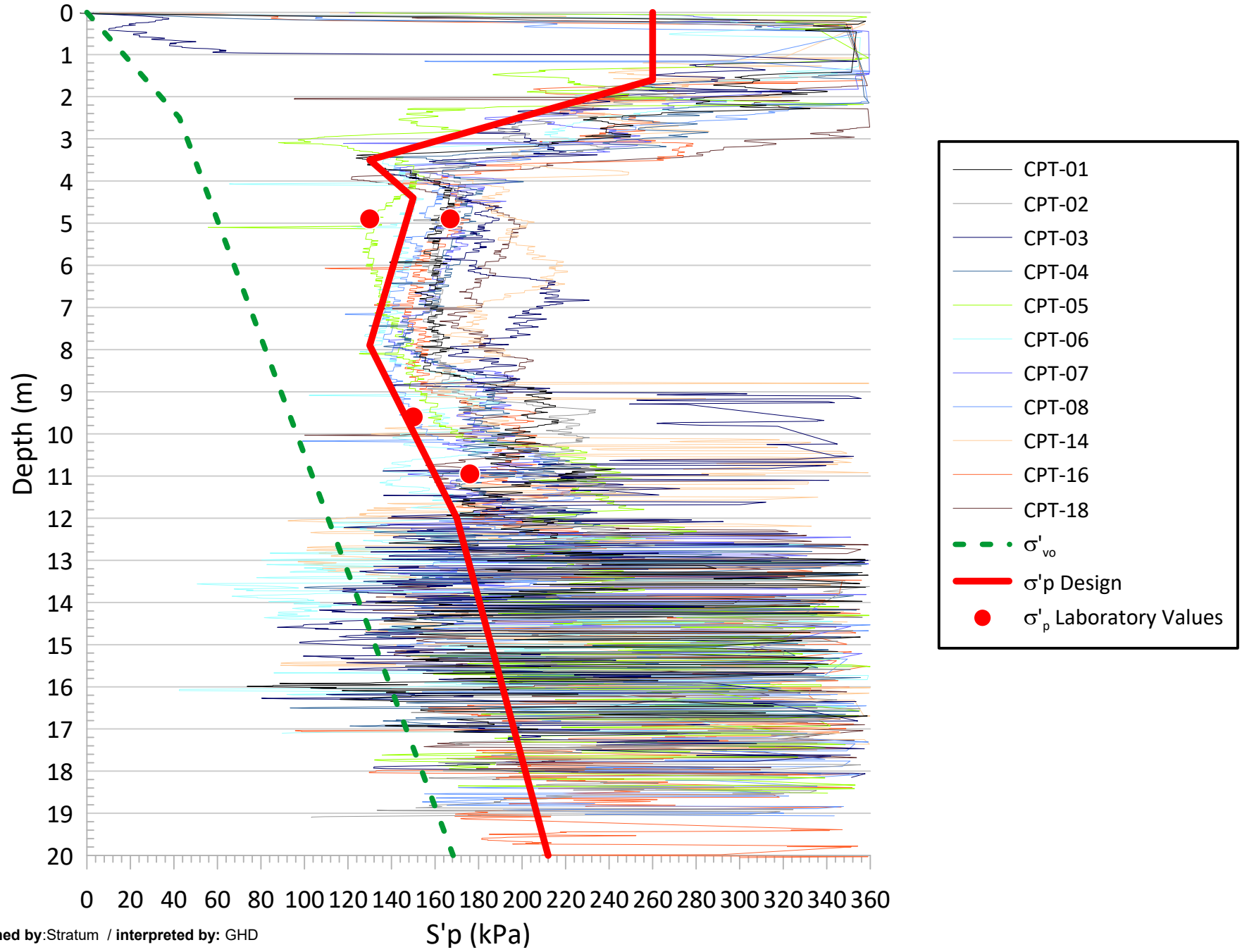
Project: **Geotechnical Investigation - Proposed Sortation Facility**
Location: **Leikin Drive and Merival Road Intersection, Nepean, Ontario**

CPT-18
Total depth: 18.66 m



Graph D1
Preconsolidation Profile

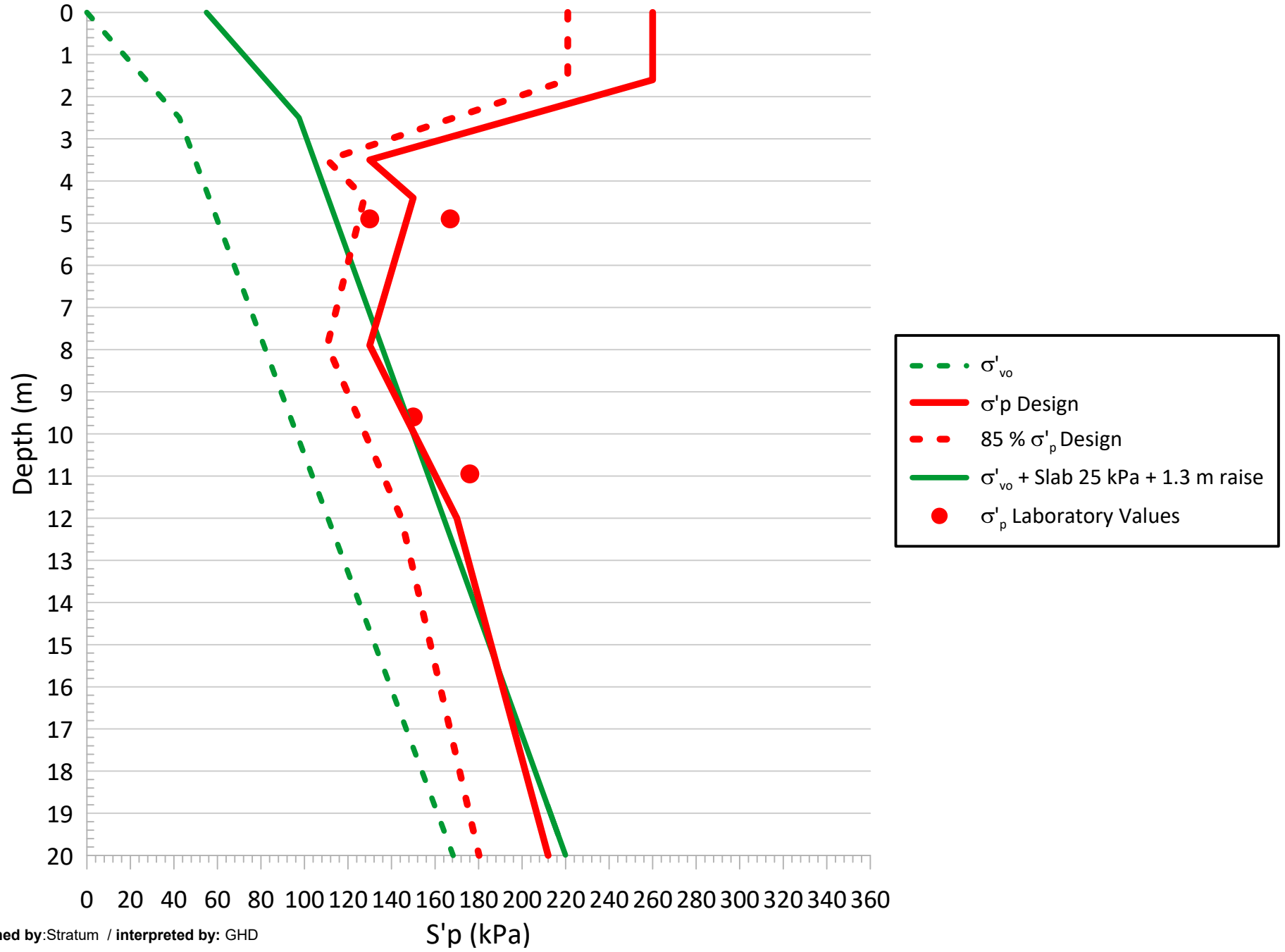
Project (No) : 11227097-A1



Performed by:Stratum / **interpreted by:** GHD

Project (No) : 11227097-A1

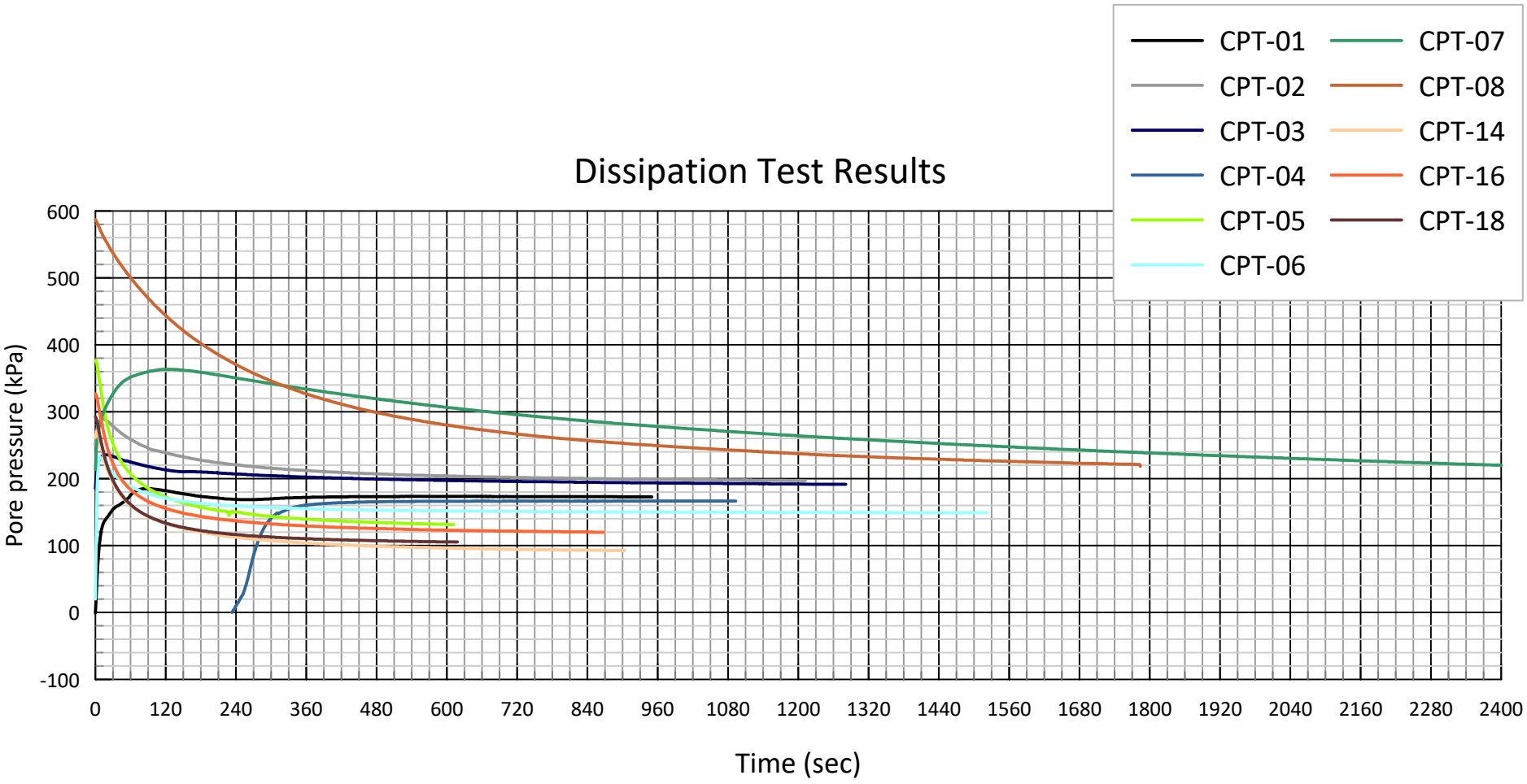
Graph D2
Preconsolidation Profile



Performed by:Stratum / **interpreted by:** GHD

Graph D3
Dissipation Profile Graph

Project (No) : 11227097-A1



Performed by:Stratum / **interpreted by:** GHD

Appendix E
Fondex Borehole Reports, November 1991

O-A756-A

FONDEX

BOREHOLE NUMBER BH-91-3

PROJECT South Merivale Business Park

LOCATION Merivale Rd. & Highway 16, Nepean, Ont.

DATUM Ass. Geodetic BOREHOLE TYPE CME-55, Hollow Stem

DRILLING DATE Oct 18/91

REPORT DATE Nov/91

DRAWN BY M.K.

Elev. / Depth (m)	DESCRIPTION	STRATIGRAPHY	SAMPLES NUMBER	TYPE	BLOWS (N)	% RECOVERY
89.42						
0.00	Silty Clay					
	-very stiff, brown, occasional oxidation stains and silty seams trace white shells, moist.		1	SS	2	
1.00						
2.00						
3.00			2	SS	4	
	-becoming, grey, stiff, wet					
4.00			3	SS	WH	
5.00	-becoming, layered, with silty seams.					
6.00			4	SS	WH	
82.42						
7.00	(continued on next page)					

DYNAMIC PENETRATION RESISTANCE BLOWS
0 20 40 60 80

SHEAR STRENGTH kPa
FIELD VANE SHEAR *
LAB VANE SHEAR ●
0 50 100 150 200 250

● undisturbed
○ remolded

CONSISTENCY:
NATURAL MOISTURE CONTENT (W)
LIQUID LIMIT (W)
PLASTIC LIMIT (Wp)
% 0 20 40 60 80

O-A756-A

FONDEX

BOREHOLE NUMBER BH-91-3

PROJECT South Merivale Business Park
LOCATION Merivale Rd. & Highway 16, Nepean, Ont.
DATUM Ass. Geodetic BOREHOLE TYPE CME-55, Hollow Stem

DRILLING DATE Oct 18/91
REPORT DATE Nov/91
DRAWN BY M.K.

Elev. / Depth	DESCRIPTION	STRATIGRAPHY	SAMPLES: NUMBER	TYPE	(N) BLOWS	% RECOVERY
82.42						
7.00	Clayey Silt -Loose to compact, grey interbeded clay seams, wet.		5	SS	WH	
8.00						
9.00			6	SS	2	
10.00						
			7	SS	6	
78.19	End of Borehole					
11.23						

DYNAMIC PENETRATION RESISTANCE BLOWS
0 20 40 60 80

SHEAR STRENGTH kPa
FIELD VANE SHEAR •
LAB VANE SHEAR ●
0 50 100 150 200 250

CONSISTENCY:
NATURAL MOISTURE CONTENT (W) ——
LIQUID LIMIT (W) ——o——
PLASTIC LIMIT (Wp) ——|——
% 0 20 40 60 80

Notes
-piezometer installed and destroyed

O-A756-A

FONDEX

BOREHOLE NUMBER BH-91-4

PROJECT South Merivale Business Park

LOCATION Merivale Rd. & Highway 16, Nepean, Ont.

DATUM Ass. Geodetic BOREHOLE TYPE CME-55, Hollow Stem

DRILLING DATE Oct 21/91

REPORT DATE Nov/91

DRAWN BY M.K.

Elev. / Depth (m)	DESCRIPTION	STRATIGRAPHY	SAMPLES: NUMBER	TYPE	BLOWS (N)	% RECOVERY
89.70 / 0.00	Silty Clay					
	-very stiff, brown occasional oxidation stains and silty seams moist.					
1.00			1	SS	5	
2.00	-becoming grey with occasional white shells					
			2	SS	2	
3.00						
4.00	-becoming stiff, wet with interbeded layered silty seams.		3	SS	WH	
5.00						
6.00			4	SS	WH	
82.70						
7.00	(continued on next page)					

DYNAMIC PENETRATION RESISTANCE BLOWS
0 20 40 60 80

SHEAR STRENGTH kPa
FIELD VANE SHEAR •
LAB VANE SHEAR ●
0 50 100 150 200 250

● undisturbed
○ remolded

CONSISTENCY:
NATURAL MOISTURE CONTENT (W)
LIQUID LIMIT (W)
PLASTIC LIMIT (Wp)
0 20 40 60 80 %

▼ G.W.L. (elev. 85.3)

O-A756 -A

FONDEX

BOREHOLE NUMBER BH-91-4

PROJECT South Merivale Business Park

LOCATION Merivale Rd. & Highway 16, Nepean, Ont.

DATUM Ass. Geodetic BOREHOLE TYPE CME-55, Hollow Stem

DRILLING DATE Oct 21/91

REPORT DATE Nov/91

DRAWN BY M.K.

Elev. Depth (m)	DESCRIPTION	STRATIGRAPHY	SAMPLES NUMBER	TYPE	BLOWS (N)	% RECOVERY
82.70						
7.00	Clayey Silt -loose to compact, grey interbeded clay seams, wet.		5	SS	WH	
8.00						
9.00			6	SS	WH	
10.00						
78.47	End of Borehole		7	SS	4	
11.23						

DYNAMIC PENETRATION RESISTANCE BLOWS
0 20 40 60 80

SHEAR STRENGTH kPa
FIELD VANE SHEAR •
LAB VANE SHEAR ●
0 50 100 150 200 250

CONSISTENCY:
NATURAL MOISTURE CONTENT (W)
LIQUID LIMIT (W)
PLASTIC LIMIT (Wp)
0 20 40 60 80 %

Notes

1. Piezometer installed
2. Water Level

date	depth
Nov 1	4.4 m

O-A756-A

FONDEX

BOREHOLE NUMBER BH-91-5

PROJECT South Merivale Business Park

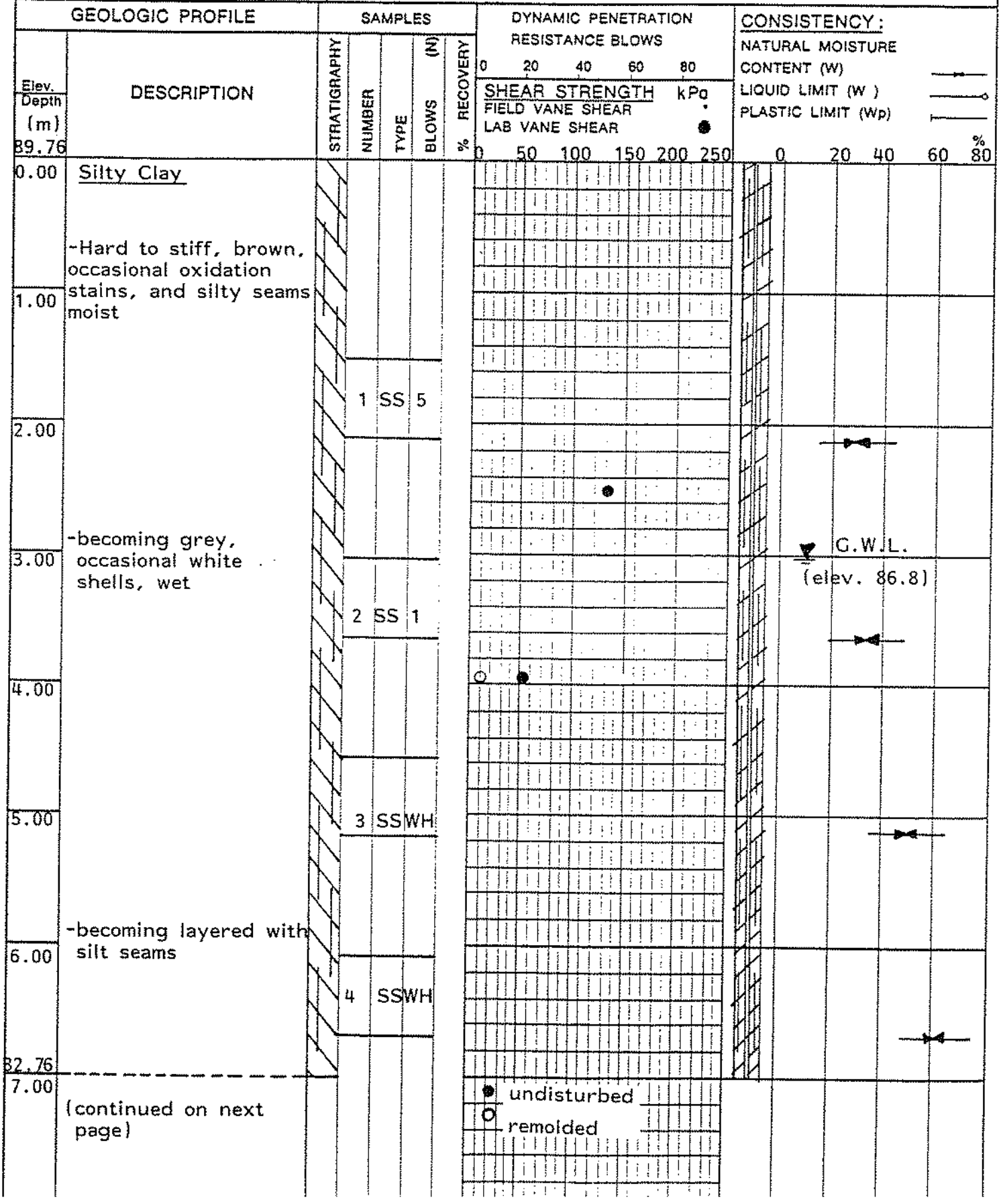
LOCATION Merivale Rd. & Highway 16, Nepean, Ont.

DATUM Ass. Geodetic BOREHOLE TYPE CME-55, Hollow Stem

DRILLING DATE Oct 21/91

REPORT DATE Nov/91

DRAWN BY M.K.



O-A756-A

FONDEX

BOREHOLE NUMBER BH-91-5

PROJECT South Merivale Business Park

LOCATION Merivale Rd. & Highway 16, Nepean, Ont.

DATUM Ass. Geodetic BOREHOLE TYPE CME-55, Hollow Stem

DRILLING DATE Oct 21/91

REPORT DATE Nov/91

DRAWN BY M.K.

Elev. / Depth (m)	DESCRIPTION	STRATIGRAPHY	SAMPLES: NUMBER	TYPE	BLOWS (N)	% RECOVERY
82.76						
7.00	Clayey Silt -loose to compact, grey interbeded with clay seams, wet.					
			5	SS	WH	
8.00						
			6	SS	WH	
9.00						
10.00						
			7	SS	WH	
78.53	End of Borehole					
11.23						

DYNAMIC PENETRATION RESISTANCE BLOWS
0 20 40 60 80

SHEAR STRENGTH kPa
FIELD VANE SHEAR •
LAB VANE SHEAR ●
0 50 100 150 200 250

CONSISTENCY:
NATURAL MOISTURE CONTENT (W)
LIQUID LIMIT (W)
PLASTIC LIMIT (Wp)
0 20 40 60 80 %

Notes

1. Piezometer installed
2. water level

Date	Level
Nov 1	3.0 m

O-A756-A

FONDEX

BOREHOLE NUMBER BH-91-6

PROJECT South Merivale Business Park

LOCATION Merivale Rd. & Highway 16, Nepean, Ont.

DATUM Ass. Geodetic BOREHOLE TYPE CME-55, Hollow Stem

DRILLING DATE Oct 21/91

REPORT DATE Nov/91

DRAWN BY M.K.

GEOLOGIC PROFILE		SAMPLES					DYNAMIC PENETRATION RESISTANCE BLOWS 0 20 40 60 80 / SHEAR STRENGTH kPa (FIELD VANE SHEAR •, LAB VANE SHEAR ●) 0 50 100 150 200 250	CONSISTENCY: NATURAL MOISTURE CONTENT (W), LIQUID LIMIT (W), PLASTIC LIMIT (Wp) 0 20 40 60 80 %
Elev. Depth (m)	DESCRIPTION	STRATIGRAPHY	NUMBER	TYPE	BLOWS (N)	% RECOVERY		
89.36								
0.00	Silty Clay							
	-very stiff, brown, occaisional oxidation stains and silty seams moist							
1.00			1	SS	5			
2.00								
	- becoming stiff, grey, presence of white shells, wet							
3.00			2	SS	2			
4.00			3	SS	WH			
5.00	-becoming layered with silty seams.							
6.00			4	SS	WH			
82.36								
7.00	(continued on next page)						● undisturbed ○ remolded	

O-A756-A

FONDEX

BOREHOLE NUMBER BH-91-6

PROJECT South Merivale Business Park

LOCATION Merivale Rd. & Highway 16, Nepean, Ont.

DATUM Ass. Geodetic BOREHOLE TYPE CME-55, Hollow Stem

DRILLING DATE Oct 21/91

REPORT DATE Nov/91

DRAWN BY M.K.

Elev. / Depth (m)	DESCRIPTION	STRATIGRAPHY	SAMPLES NUMBER	TYPE	BLOWS (N)	RECOVERY %
82.36						
7.00	Clayey Silt -loose to compact, grey interbeded clay seams, wet.		5	SS	WH	
8.00						
9.00			6	SS	WH	
10.00						
78.13	End of Borehole		7	SS	WH	
11.23						

DYNAMIC PENETRATION RESISTANCE BLOWS
0 20 40 60 80

SHEAR STRENGTH kPa
FIELD VANE SHEAR •
LAB VANE SHEAR ●
0 50 100 150 200 250

CONSISTENCY:
NATURAL MOISTURE CONTENT (W)
LIQUID LIMIT (W)
PLASTIC LIMIT (Wp)
% 0 20 40 60 80

Notes

- Piezometer installed and destroyed

O-A756-A

FONDEX

BOREHOLE NUMBER BH-91-7

PROJECT South Merivale Business Park

LOCATION Merivale Rd. & Highway 16, Nepean, Ont.

DATUM Ass. Geodetic BOREHOLE TYPE CME-55, Hollow Stem

DRILLING DATE Oct 21/91

REPORT DATE Nov/91

DRAWN BY M.K.

Elev. Depth (M)	DESCRIPTION	STRATIGRAPHY	SAMPLES: NUMBER	TYPE	BLOWS (N)	% RECOVERY
88.97						
0.00	Silty Clay					
	-very stiff, borwn, occasional silty seams and oxidation stains, presence of white fossils, moist.		1	SS	3	
1.00						
2.00			2	SS	3	
3.00	- becoming grey, stiff, wet					
4.00			3	SS	WH	
5.00	-becoming layered with silty seams					
6.00			4	SS	WH	
81.97						
7.00	(continued on next page)					

DYNAMIC PENETRATION RESISTANCE BLOWS
0 20 40 60 80

SHEAR STRENGTH kPa
FIELD VANE SHEAR •
LAB VANE SHEAR ●
0 50 100 150 200 250

● undisturbed
○ remolded

CONSISTENCY:
NATURAL MOISTURE CONTENT (W)
LIQUID LIMIT (W)
PLASTIC LIMIT (Wp)
0 20 40 60 80 %

G.W.L. (Elev. 85.0)

O-A756-A

FONDEX

BOREHOLE NUMBER BH-91-7

PROJECT South Merivale Business Park

LOCATION Merivale RD. & Highway 16, Nepean, Ont.

DATUM Ass. Geodetic BOREHOLE TYPE CME-55, Hollow Stem

DRILLING DATE Oct 21/91

REPORT DATE Nov/91

DRAWN BY M.K.

Elev. / Depth (m)	DESCRIPTION	STRATIGRAPHY	SAMPLES NUMBER	TYPE	(N) BLOWS	% RECOVERY
81.97						
7.00	Clayey Silt -loose to compact, grey, interbeded with clay seams, wet.		5	SS	WH	
8.00						
9.00			6	SS	1	
10.00						
77.74	End of Borehole		7	SS	1	
11.23						

DYNAMIC PENETRATION RESISTANCE BLOWS
0 20 40 60 80

SHEAR STRENGTH kPa
FIELD VANE SHEAR •
LAB VANE SHEAR ●
0 50 100 150 200 250

CONSISTENCY:
NATURAL MOISTURE CONTENT (W)
LIQUID LIMIT (W)
PLASTIC LIMIT (Wp)
0 20 40 60 80 %

Notes

- piezometer installed
- Water Level

Date	Depth
Nov 1	4.0 m

O-A756

FONDEX

BOREHOLE NUMBER BH-1 (1 of 3)

PROJECT Geotechnical Investigation — DRILLING DATE June 22/90

LOCATION South Merivale Business Park — REPORT DATE July/90

DATUM Geodetic — BOREHOLE TYPE CME-55 — DRAWN BY M.T.W.

Elev. / Depth	DESCRIPTION	STRATIGRAPHY	NUMBER	TYPE	BLOWS (N)	RECOVERY %
89.53						
0.0	Corn and 330 mm clayey topsoil over		1	SS	9	
1.0	Silty Clay: occasional thin beds of silt and fine sand, trace shells; hard to stiff, olive-brown, moist		2	SS	4	
2.0			3	SS	2	
3.0			4	SS	2	
85.72 / 3.81	becoming firm to soft, grey, and wet		5	SS	-	
4.0			6	ST	-	
5.0						
6.0	Trace charcoal-grey organic spots		7	SS	-	
82.82 / 6.71	becoming stiff					
7.0			8	SS	1	
8.0						
9.0			9	SS	1	
10.0	Continued on next sheet					

DYNAMIC PENETRATION RESISTANCE BLOWS 0 20 40 60 80

SHEAR STRENGTH kPa

FIELD VANE SHEAR *

LAB VANE SHEAR x

50 100 150 200

CONSISTENCY:

NATURAL MOISTURE CONTENT (W) ——•——

LIQUID LIMIT (W_L) ——o——

PLASTIC LIMIT (W_P) ——|——

20 40 60 80 %

G.W.L. ▽ July 12/90 (piezo tip 'B')

G.W.L. ▽ July 12/90 (piezo. tip 'A')

in-situ

re-moulded

O-A756

FONDEX

BOREHOLE NUMBER BH-1 (2 of 3)

PROJECT Geotechnical Investigation

LOCATION South Merivale Busines Park

DATUM Geodetic BOREHOLE TYPE CME-55

DRILLING DATE June 22/90

REPORT DATE July/90

DRAWN BY M.T.W.

Elev. / Depth	DESCRIPTION	STRATIGRAPHY	NUMBER	TYPE	BLOWS (N)	RECOVERY %
79.53	CONTINUED					
10.0 / 78.53	Silty Clay: Stiff, Grey, wet					
11.0						
12.0	Clayey Silt: stratified, thin clay layers, loose, grey, wet		10	SS	4	
13.0						
14.0 / 75.20						
14.33						
15.0	Silt/Clay Till: some sand and gravel, loose to compact, grey, wet		11	SS	4	
16.0						
17.0						
18.0			12	SS	11	
70.33	Auger Refusal					
19.20	Sandstone Bedrock horizontal bedding, sound, light grey					
20.0	Continued next sheet					

DYNAMIC PENETRATION RESISTANCE BLOWS 0 20 40 60 80

SHEAR STRENGTH kPa

FIELD VANE SHEAR *

LAB VANE SHEAR x

CONSISTENCY:

NATURAL MOISTURE CONTENT (W)

LIQUID LIMIT (W_L)

PLASTIC LIMIT (W_P)

20 40 60 80 %

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FONDEX

BOREHOLE NUMBER BH-1 (3 of 3)

PROJECT Geotechnical Investigation — DRILLING DATE June 25/90

LOCATION South Merivale Business Park — REPORT DATE July/90

DATUM Geodetic — BOREHOLE TYPE CME-55 — DRAWN BY M. T. W.

GEOLOGIC PROFILE		SAMPLES					DYNAMIC PENETRATION RESISTANCE BLOWS 0 20 40 60 80	CONSISTENCY: NATURAL MOISTURE CONTENT (W) — LIQUID LIMIT (W_L) — PLASTIC LIMIT (W_P)
Elev. Depth	DESCRIPTION	STRATIGRAPHY	NUMBER	TYPE	BLOWS (N)	RECOVERY %	SHEAR STRENGTH kPa — FIELD VANE SHEAR * — LAB VANE SHEAR x	%
69.53	CONTINUED							
20.0	Sandstone Bedrock horizontal bedding, sound, light grey. Becoming less sandy and more dolimitic with depth		13	RC	55	89		
21.0			14	RC	64	100		
22.0			15	RC	64	100		
66.82								
22.71	End of Borehole							

Notes:

1. Two piezometer standpipes installed:
   A) Piezometer tip 'A' installed at 18.3m;
   B) Piezometer tip 'B' at 6.1 m;
   C) 500 mm thick Bentonite Seals at 18.0 m, 6.7m, and 5.5 m.

2. Water Level Record

Time	Water Level (m)		
		A	B
June 25/90	2.0 (in augers)		
June 26/90		13.3	4.1
July 6/90		7.9	2.5
July 12/90		9.0	2.4

3. ▲ Pocket Penetrometer Values

4. The low blow counts in values in the till may be attributed to saturated and disturbed conditions due to drilling

O-A756

FONDEX

BOREHOLE NUMBER BH-7

PROJECT Geotechnical Investigation

LOCATION South Merivale Business Park

DATUM Geodetic BOREHOLE TYPE CME-55

DRILLING DATE June 22/90

REPORT DATE July /90

DRAWN BY M.T.W.

Elev. / Depth	DESCRIPTION	STRATIGRAPHY	SAMPLES: NUMBER	TYPE	BLOWS (N)	RECOVERY %
90.07						
0.0	Corn and 250 mm clayey topsoil over					
			1	SS	7	
1.0	Silty Clay occasional silt and fine sand lenses, trace shells, very stiff to stiff, olive-brown, moist					
			2	SS	3	
2.0						
			3	SS	2	
3.0						
			4	SS	2	
86.26	becoming firm to soft,					
3.81	grey, wet		5	SS	-	
4.0						
			6	SS	-	
5.0						
6.0	Trace charcoal-grey organic spots		7	SS	-	
83.37						
6.7	End of Borehole					

DYNAMIC PENETRATION RESISTANCE BLOWS 0 20 40 60 80

SHEAR STRENGTH kPa

FIELD VANE SHEAR *

LAB VANE SHEAR 50 100 150 200 ×

CONSISTENCY:

NATURAL MOISTURE CONTENT (W)

LIQUID LIMIT (W_L)

PLASTIC LIMIT (W_P)

20 40 60 80 %

G.W.L. July 6/90

in-situ

re-moulded

Notes:

1. ▲ Pocket Penetrometer values
2. Standpipe piezometer installed to 6.1 m
3. Chemical Analysis performed on water sample obtained from 5 m depth
4. Water Level Record

Time	Water Level (m)
on compl.	5.0 (in augers)
June 25/90	1.8
June 26/90	1.8
July 6/90	1.9

Q-A756

FONDEX

BOREHOLE NUMBER BH-8

PROJECT Geotechnical Investigation
LOCATION South Merivale Business Park
DATUM Geodetic BOREHOLE TYPE CME-55

DRILLING DATE June 22/90
REPORT DATE July/90
DRAWN BY M.T.W.

Elev. / Depth	DESCRIPTION	STRATIGRAPHY	SAMPLES: NUMBER	TYPE	BLOWS (N)	RECOVERY %
89.89 / 0.0	Corn and 275 mm clayey topsoil over					
	Silty Clay: Trace fine sand, trace shells, very stiff to stiff, olive-brown, moist		1	SS	6	
1.0			2	SS	3	
2.0			3	SS	2	
3.0			4	SS	1	
			5	SS	1	
4.0 / 85.62	becoming soft to firm, grey, wet		6	SS	-	
4.27 / 5.0						
6.0 / 83.19	trace charcoal, grey organic spots		7	SS	-	
6.7	End of Borehole					

DYNAMIC PENETRATION RESISTANCE BLOWS 0 20 40 60 80

SHEAR STRENGTH kPa
FIELD VANE SHEAR *
LAB VANE SHEAR ×
50 100 150 200

CONSISTENCY:
NATURAL MOISTURE CONTENT (W)
LIQUID LIMIT (WL)
PLASTIC LIMIT (Wp)
20 40 60 80 %

G.W.L.
July 6/90

in situ
re-moulded

Note:
1. ▲ Pocket Penetrometer Values
2. Standpipe Piezometer installed to 6.1 m.
3. Water Level Records

Time	Water Level (m)
on comp. dry	(in augers)
June 25/90	2.3
June 26/90	2.3
July 6/90	2.3

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FONDEX

BOREHOLE NUMBER BH-9 (1 of 3)

PROJECT Geotechnical Investigation

DRILLING DATE June 26/90

LOCATION South Merivale Business Park

REPORT DATE July/90

DATUM Geodetic BOREHOLE TYPE CME-55

DRAWN BY M.T.W.

GEOLOGIC PROFILE		SAMPLES					DYNAMIC PENETRATION RESISTANCE BLOWS 0 20 40 60 80 / SHEAR STRENGTH kPa FIELD VANE SHEAR * LAB VANE SHEAR X 50 100 150 200	CONSISTENCY: NATURAL MOISTURE CONTENT (W) LIQUID LIMIT (W_L) PLASTIC LIMIT (W_P) % 20 40 60 80
Elev. / Depth	DESCRIPTION	STRATIGRAPHY	NUMBER	TYPE	BLOWS	RECOVERY %		
90.65								
0.0	Grass and 200 mm clayey topsoil over							
	Silty Clay:		1	SS	8			
1.0	Trace fine sand and silt lenses occasional shells, very stiff to stiff, olive-brown, moist		2	SS	3			G.W.L. July 12/90 Piezo 'B'
2.0			3	SS	-			
87.65	becoming firm, grey and wet							
3.0			4	SS	-			G.W.L. July 12/90 Piezo 'A'
86.84	Trace charcoal-grey organic spots to bottom of clay		5	SS	-			
3.81								
4.0			6	SS	-			
5.0								
6.0			7	SS	-			
7.0			8	ST	-		X	
8.0								
9.0			9	SS	-			
10.0	Continued on next sheet							

O-A756

FONDEX

BOREHOLE NUMBER BH-9 (2 of 3)

PROJECT Geotechnical Investigation

LOCATION South Merivale Business Park

DATUM Geodetic BOREHOLE TYPE CME-55

DRILLING DATE June 26/90

REPORT DATE July/90

DRAWN BY M.T.W.

GEOLOGIC PROFILE		SAMPLES					DYNAMIC PENETRATION RESISTANCE BLOWS 0 20 40 60 80 / SHEAR STRENGTH kPa FIELD VANE SHEAR * LAB VANE SHEAR × 50 100 150 200	CONSISTENCY: NATURAL MOISTURE CONTENT (W) LIQUID LIMIT (W_L) PLASTIC LIMIT (W_P) 20 40 60 80 %
Elev. / Depth	DESCRIPTION	STRATIGRAPHY	NUMBER	TYPE	BLOWS (N)	RECOVERY %		
80.65	Continued							
10.0	Silty Clay: firm, grey, wet							
11.0								
12.0			10	SS	-			
13.0								
14.0								
75.41 / 15.24	Transition to very loose clayey silt with occasional silty clay layers, grey, wet		11	SS	-			
16.0								
73.43 / 17.22	Clay/Silt/Sand/Gravel Till: occasional boulders, compact to dense, grey, wet							
18.0			12	SS	22			
19.0								
20.0	Continued on next page							

O-A756

FONDEX

BOREHOLE NUMBER BH-9 (3 of 3)

PROJECT Geotechnical Investigation — DRILLING DATE June 26/90

LOCATION South Merivale Business Park — REPORT DATE July/90

DATUM Geodetic — BOREHOLE TYPE CME-55 — DRAWN BY M.T.W.

GEOLOGIC PROFILE		SAMPLES					DYNAMIC PENETRATION RESISTANCE BLOWS 0 20 40 60 80 / SHEAR STRENGTH kPa FIELD VANE SHEAR * LAB VANE SHEAR x	CONSISTENCY: NATURAL MOISTURE CONTENT (W) LIQUID LIMIT (W_L) PLASTIC LIMIT (W_P) 20 40 60 80 %
Elev. / Depth	DESCRIPTION	STRATIGRAPHY	NUMBER	TYPE	BLOWS (N)	% RECOVERY		
70.65	Continued							
20.0	Clay/Silt/Sand/Gravel Till : dense, grey, wet, occasional boulders (auger refusal at 20.7 m)		13	RC				
21.0			14	SS	40			
68.91	Split spoon refusal							
21.74	End of Borehole							

Notes:

1. ▲ Pocket Penetrometer values
2. Two Piezometer standpipe installed.
   A) Piezometer tip 'A' installed at 21.3 m
   B) piezometer tip 'B' installed at 6.1 m
   C) 500 mm thick Bentonite seals at 20.7 m, 6.4 m, and 5.5 m.
3. Water Level Record

Time	'A'	'B'
July 6/90	3.0	1.5
July 12/90	3.1	1.7

4. 300 m of rock coring at a depth of 20.7 m (sample RC-13) confirmed the existence of a boulder

Appendix F
Geotechnical Laboratory Results

GRAIN SIZE ANALYSIS REPORT

CLIENT: MEDUSA LP

PROJECT : PROPOSED SORTATION FACILITY

LOCATION : LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

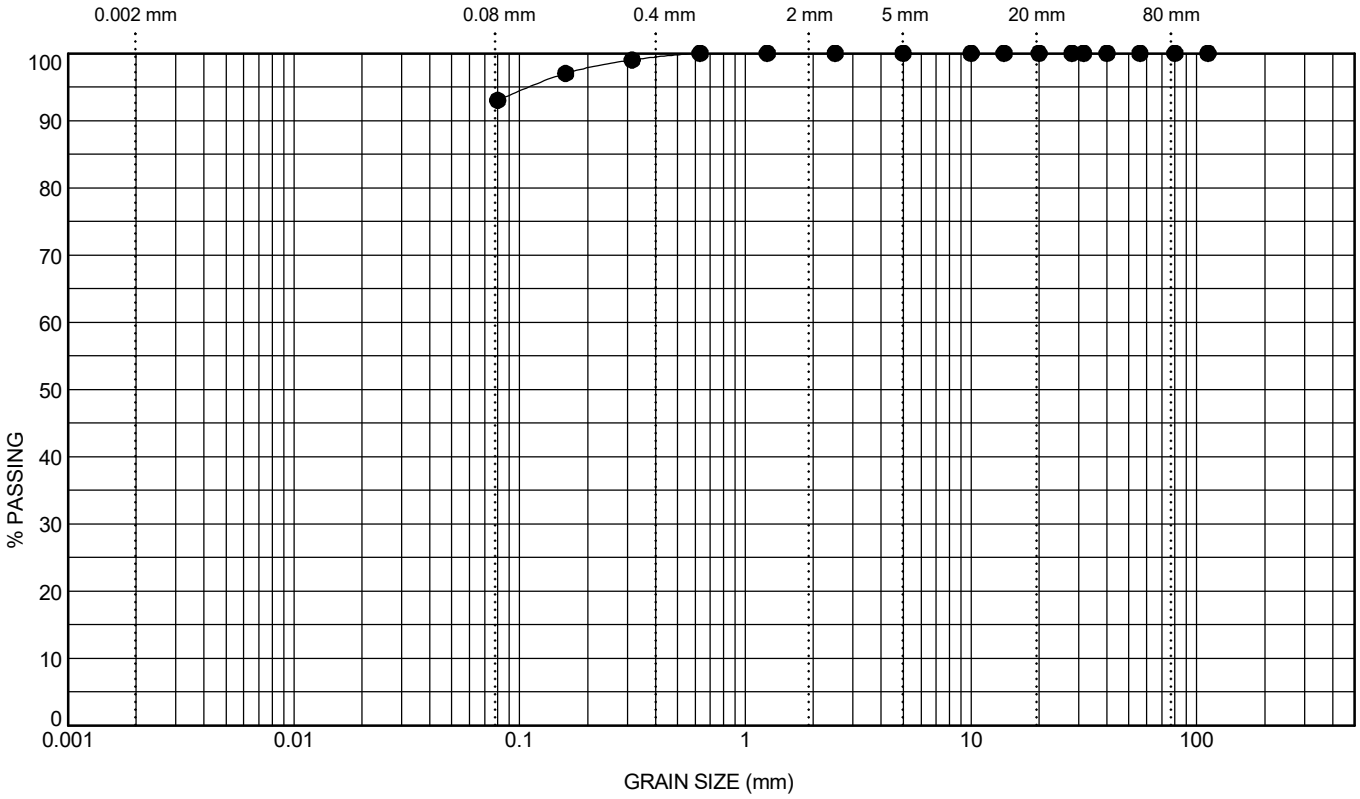
REFERENCE No. : 11227097-A1

BORING No. : BH-01

SAMPLE No. : ST-5

DEPTH : 3.05 m **DATE :** 5/11/2021

UNIFIED SOIL CLASSIFICATION (BASED ON THE STANDARD LC 21-040)



CLAY	SILT	SAND			GRAVEL		COBBLES AND BOULDERS
		fine	medium	coarse	fine	coarse	

Description	w (%)	W_L (%)	I_P (%)	Classification (1)
Silt, traces of sand	45	52	31	CH

(1) USCS

% Gravel	% Sand	% Silt and % Clay	c_U	c_C	D85	D60	D50	D30	D15	D10
0	7	73								

Remarks :

Prepared by : Mark Gamboz, B.Sc. Geology

Verified by : Mark Gamboz, B.Sc. Geology

GRAIN SIZE ANALYSIS REPORT

CLIENT: MEDUSA LP

PROJECT : PROPOSED SORTATION FACILITY

LOCATION : LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

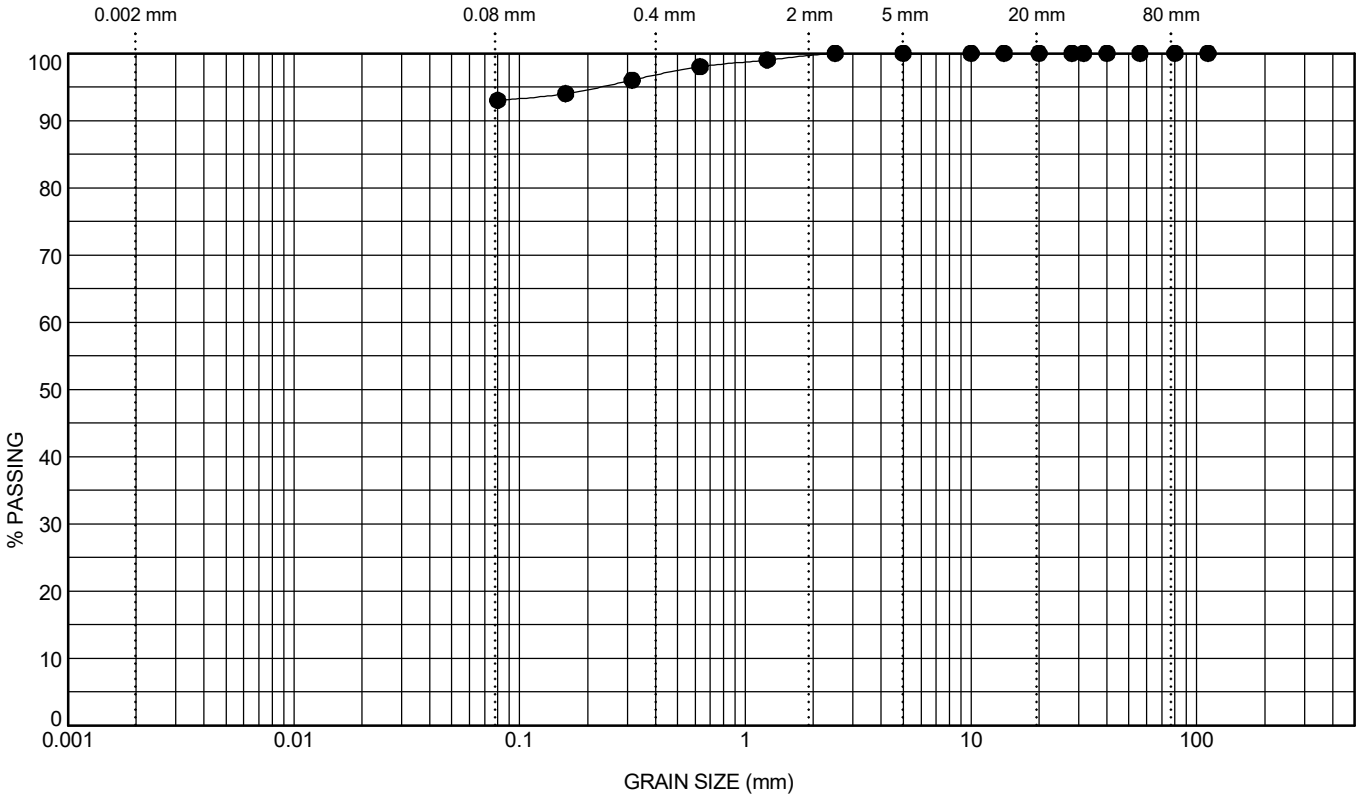
REFERENCE No. : 11227097-A1

BORING No. : BH-01

SAMPLE No. : SS-11

DEPTH : 9.15 m **DATE :** 5/11/2021

UNIFIED SOIL CLASSIFICATION (BASED ON THE STANDARD LC 21-040)



CLAY	SILT	SAND			GRAVEL		COBBLES AND BOULDERS
		fine	medium	coarse	fine	coarse	

Description	w (%)	W_L (%)	I_P (%)	Classification (1)
Silt, traces of sand	68	50	26	CH

(1) USCS

% Gravel	% Sand	% Silt and % Clay	c_U	c_C	D85	D60	D50	D30	D15	D10
0	7	93								

Remarks :

Prepared by : Mark Gamboz, B.Sc. Geology

Verified by : Mark Gamboz, B.Sc. Geology

GRAIN SIZE ANALYSIS REPORT

CLIENT: MEDUSA LP

PROJECT : PROPOSED SORTATION FACILITY

LOCATION : LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

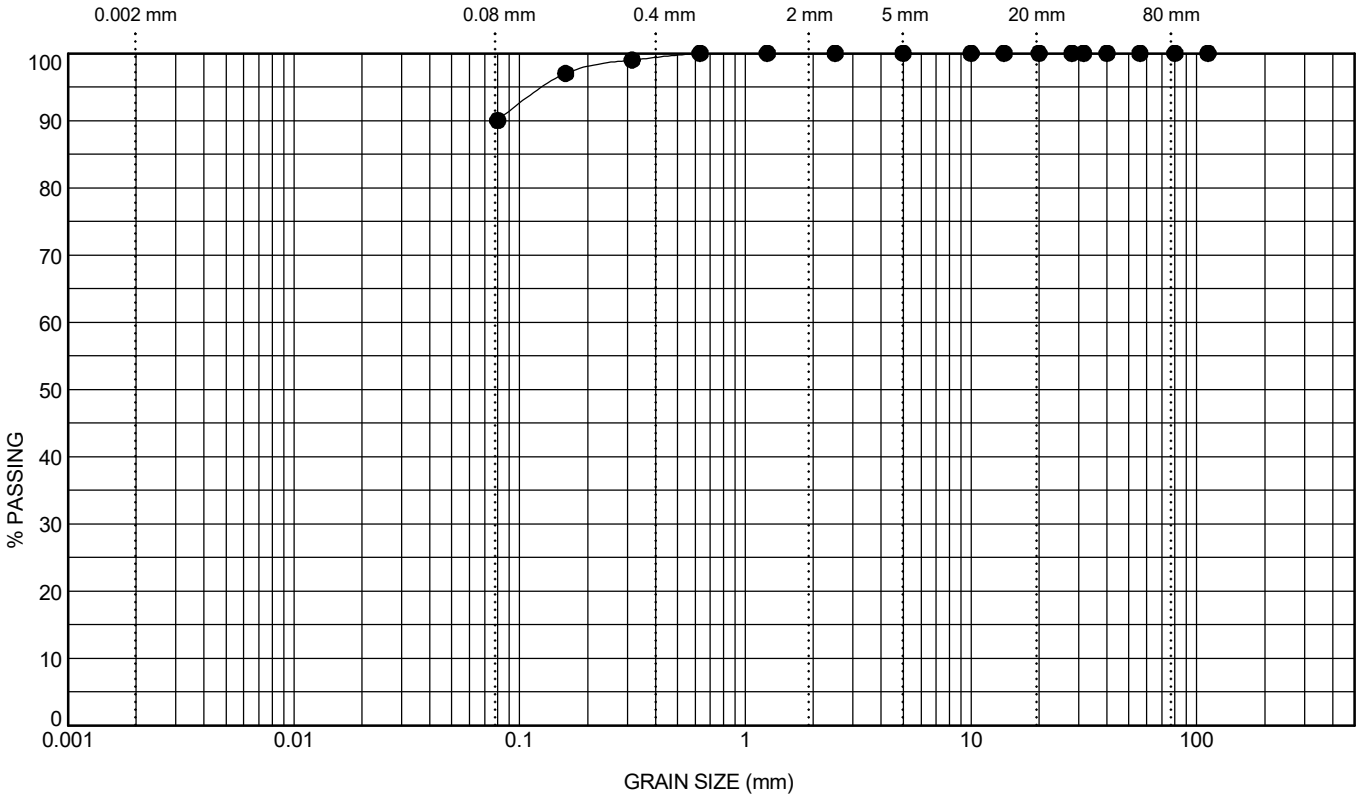
REFERENCE No. : 11227097-A1

BORING No. : BH-02

SAMPLE No. : SS-3

DEPTH : 1.52 m **DATE :** 5/11/2021

UNIFIED SOIL CLASSIFICATION (BASED ON THE STANDARD LC 21-040)



CLAY	SILT	SAND			GRAVEL		COBBLES AND BOULDERS
		fine	medium	coarse	fine	coarse	

Description	w (%)	W_L (%)	I_P (%)	Classification (1)
Silt, traces of sand	27	38	21	CL

(1) USCS

% Gravel	% Sand	% Silt and % Clay	c_U	c_C	D85	D60	D50	D30	D15	D10
0	10	90								

Remarks :

Prepared by : Mark Gamboz, B.Sc. Geology

Verified by : Mark Gamboz, B.Sc. Geology

GRAIN SIZE ANALYSIS REPORT

CLIENT: MEDUSA LP

PROJECT : PROPOSED SORTATION FACILITY

LOCATION : LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

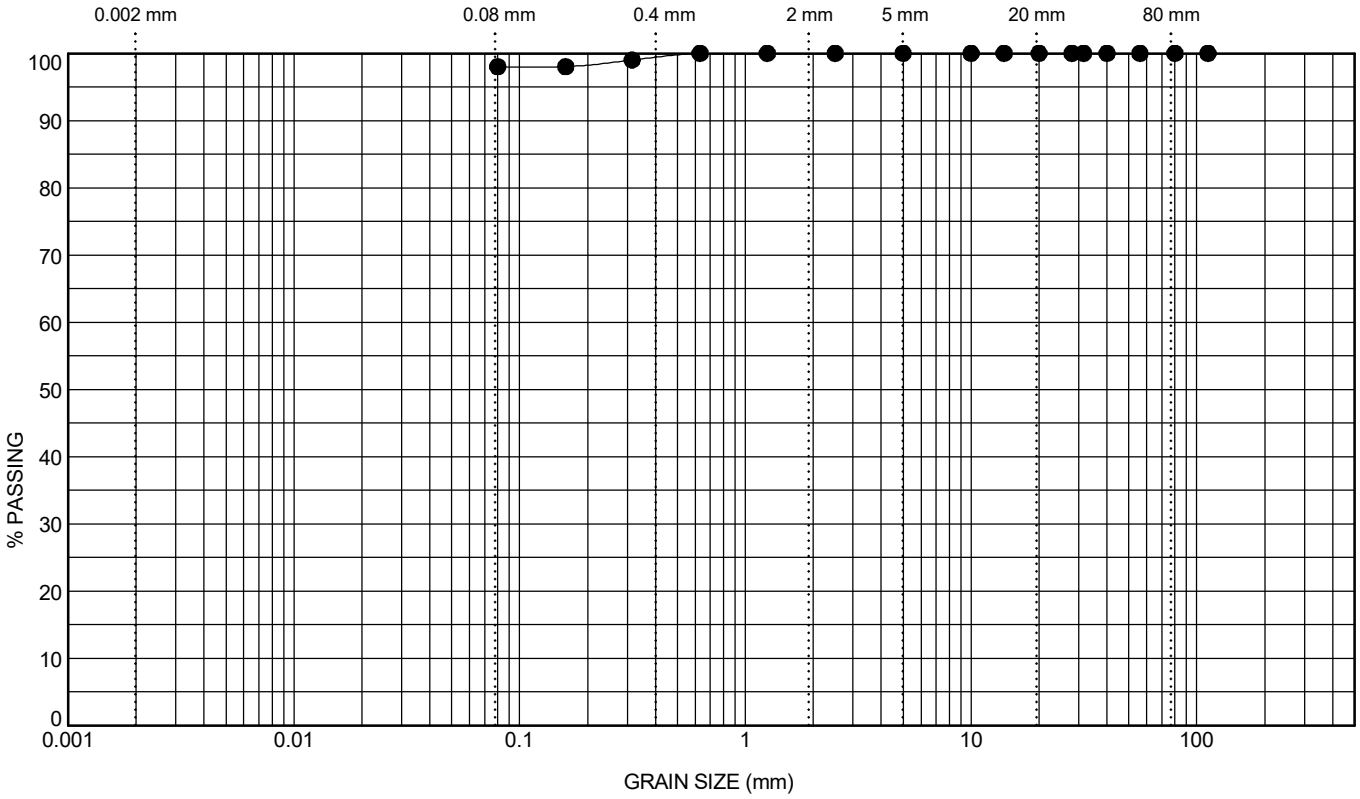
REFERENCE No. : 11227097-A1

BORING No. : BH-02

SAMPLE No. : SS-11

DEPTH : 9.15 m **DATE :** 5/11/2021

UNIFIED SOIL CLASSIFICATION (BASED ON THE STANDARD LC 21-040)



CLAY	SILT	SAND			GRAVEL		COBBLES AND BOULDERS
		fine	medium	coarse	fine	coarse	

Description	w (%)	W_L (%)	I_P (%)	Classification (1)
Silt, traces of sand	25	27	5	CL-ML

(1) USCS

% Gravel	% Sand	% Silt and % Clay	c_U	c_C	D85	D60	D50	D30	D15	D10
0	2	98								

Remarks :

Prepared by : Mark Gamboz, B.Sc. Geology

Verified by : Mark Gamboz, B.Sc. Geology

GRAIN SIZE ANALYSIS REPORT

CLIENT: MEDUSA LP

PROJECT : PROPOSED SORTATION FACILITY

LOCATION : LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

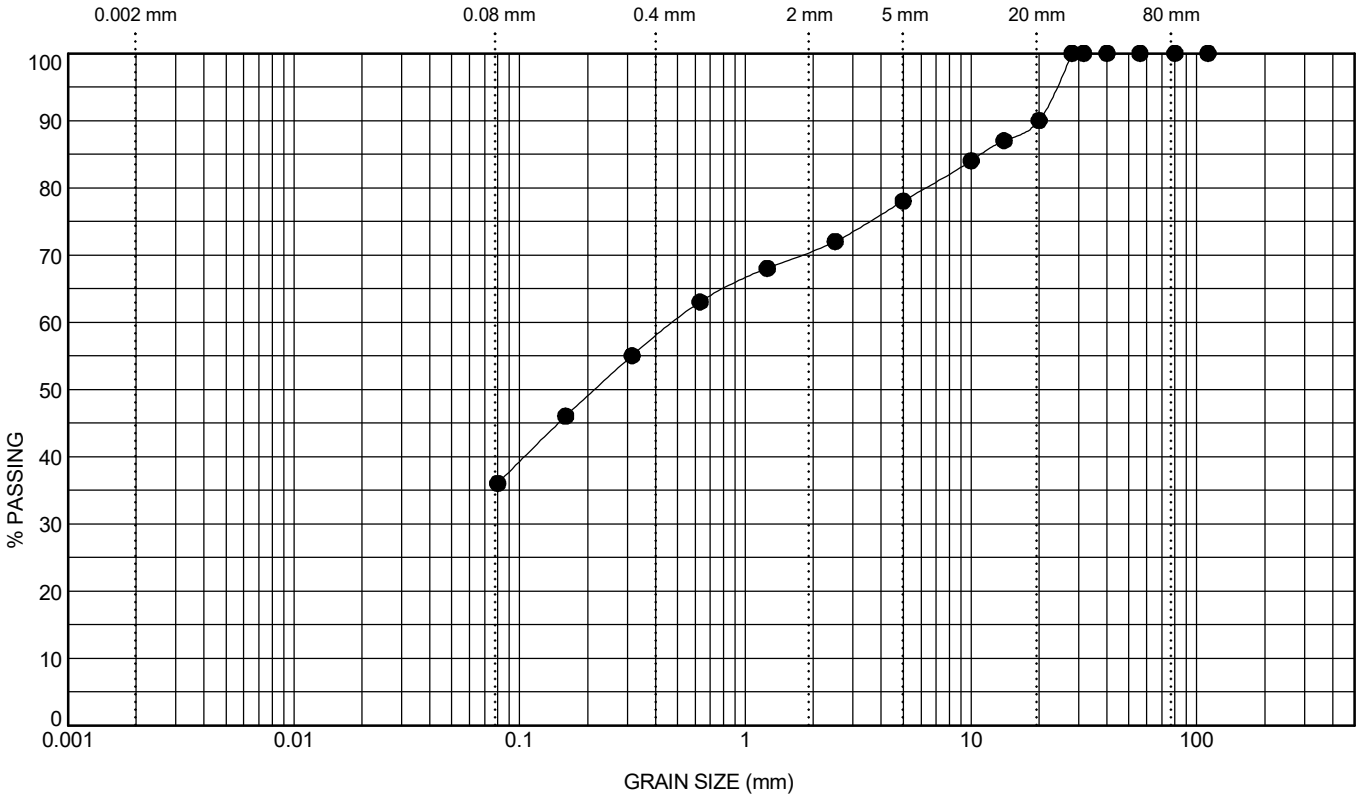
REFERENCE No. : 11227097-A1

BORING No. : BH-02

SAMPLE No. : SS-14

DEPTH : 11.43 m **DATE :** 5/11/2021

UNIFIED SOIL CLASSIFICATION (BASED ON THE STANDARD LC 21-040)



CLAY	SILT	SAND			GRAVEL		COBBLES AND BOULDERS
		fine	medium	coarse	fine	coarse	

Description	w (%)	W_L (%)	I_P (%)	Classification (1)
Gravelly sand and silt	8	14	2	SM

(1) USCS

% Gravel	% Sand	% Silt and % Clay	c_U	c_C	D85	D60	D50	D30	D15	D10
22	42	36								

Remarks :

Prepared by : Mark Gamboz, B.Sc. Geology

Verified by : Mark Gamboz, B.Sc. Geology

GRAIN SIZE ANALYSIS REPORT

CLIENT: MEDUSA LP

PROJECT : PROPOSED SORTATION FACILITY

LOCATION : LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

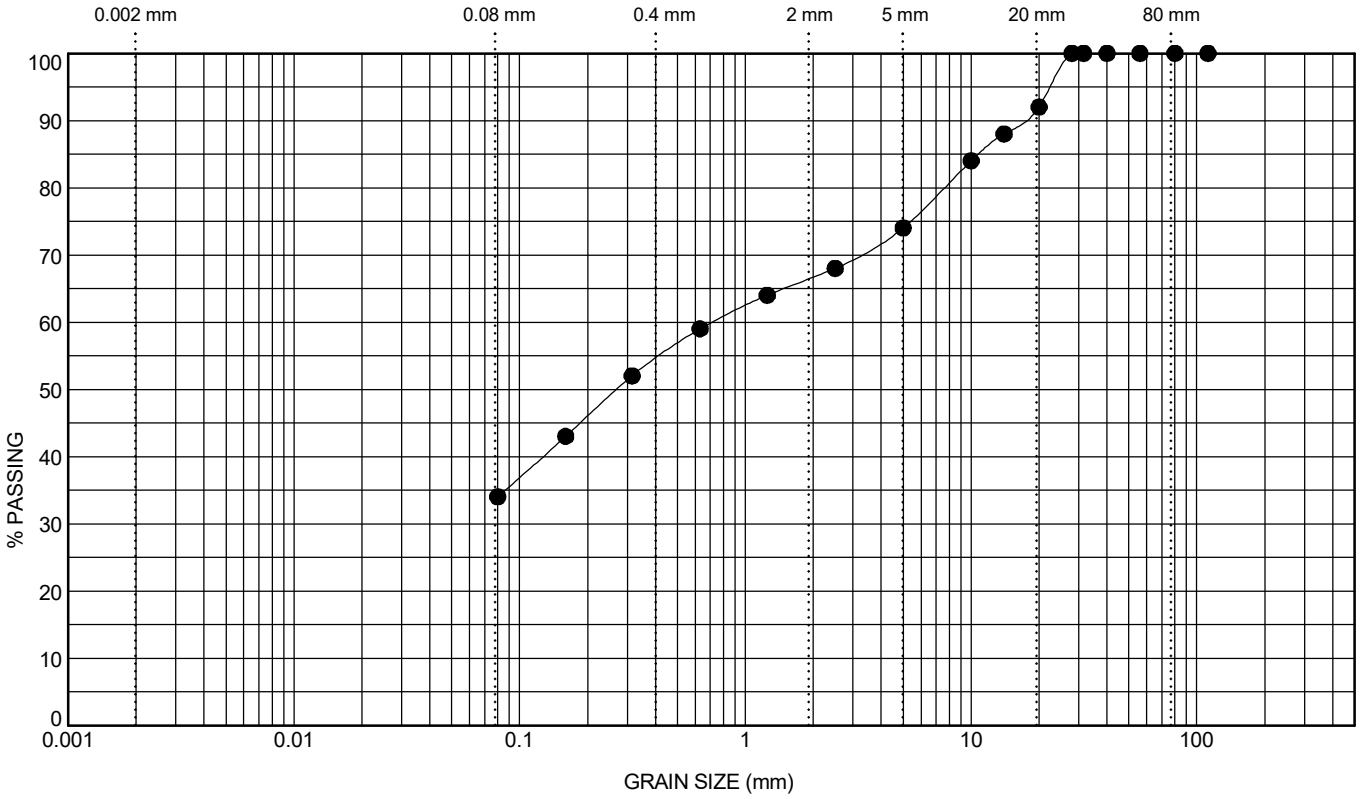
REFERENCE No. : 11227097-A1

BORING No. : BH-02

SAMPLE No. : SS-19

DEPTH : 15.24 m **DATE :** 5/11/2021

UNIFIED SOIL CLASSIFICATION (BASED ON THE STANDARD LC 21-040)



CLAY	SILT	SAND			GRAVEL		COBBLES AND BOULDERS
		fine	medium	coarse	fine	coarse	

Description	w (%)	W_L (%)	I_P (%)	Classification (1)
Silty and gravelly sand	8	13	2	SM

(1) USCS

% Gravel	% Sand	% Silt and % Clay	c_U	c_C	D85	D60	D50	D30	D15	D10
26	40	34								

Remarks :

Prepared by : Mark Gamboz, B.Sc. Geology

Verified by : Mark Gamboz, B.Sc. Geology

GRAIN SIZE ANALYSIS REPORT

CLIENT: MEDUSA LP

PROJECT : PROPOSED SORTATION FACILITY

LOCATION : LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

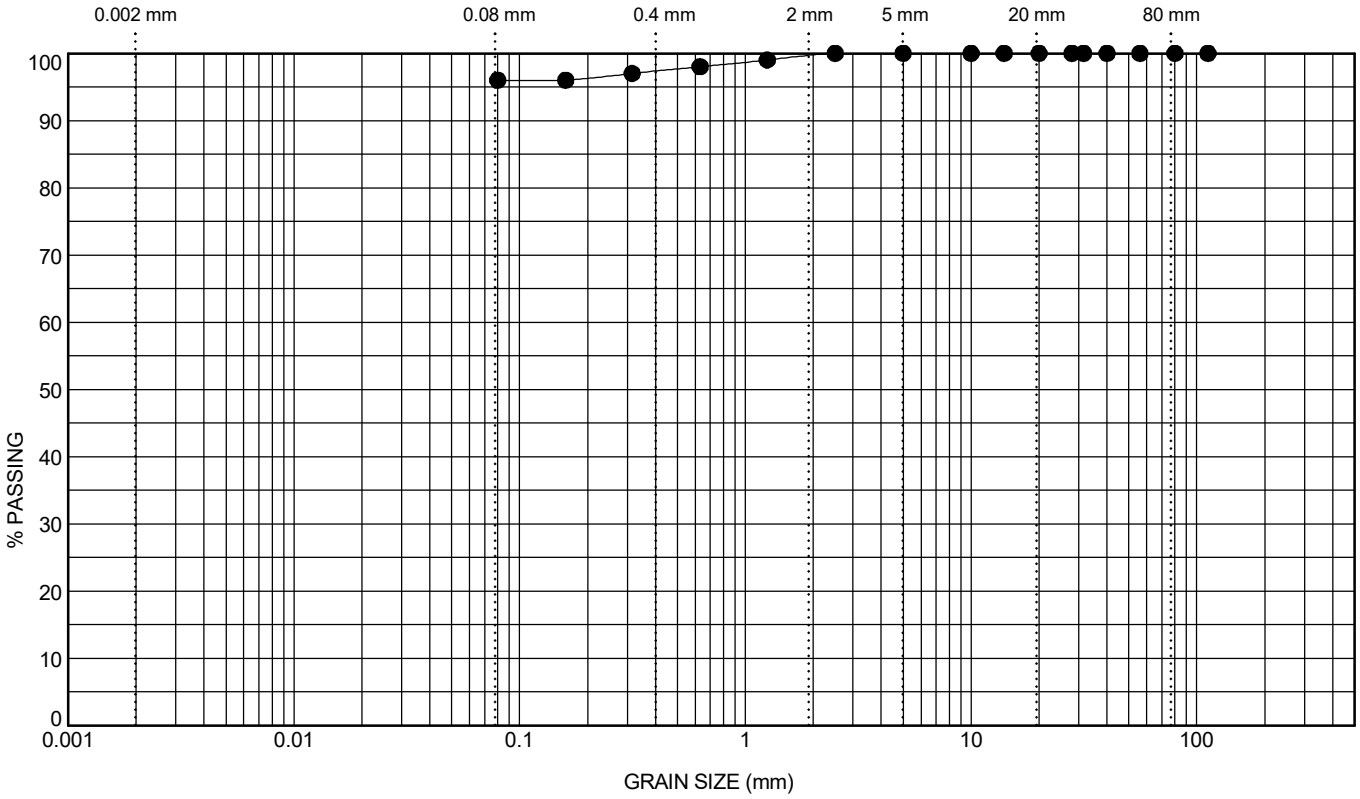
REFERENCE No. : 11227097-A1

BORING No. : BH-03

SAMPLE No. : SS-11

DEPTH : 8.23 m **DATE :** 5/11/2021

UNIFIED SOIL CLASSIFICATION (BASED ON THE STANDARD LC 21-040)



CLAY	SILT	SAND			GRAVEL		COBBLES AND BOULDERS
		fine	medium	coarse	fine	coarse	

Description	w (%)	W_L (%)	I_P (%)	Classification (1)
Silt, traces of sand	66	48	25	CL

(1) USCS

% Gravel	% Sand	% Silt and % Clay	c_U	c_C	D85	D60	D50	D30	D15	D10
0	4	96								

Remarks :

Prepared by : Mark Gamboz, B.Sc. Geology

Verified by : Mark Gamboz, B.Sc. Geology

GRAIN SIZE ANALYSIS REPORT
(WITH SEDIMENTATION)

CLIENT: MEDUSA LP

PROJECT : PROPOSED SORTATION FACILITY

LOCATION : LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

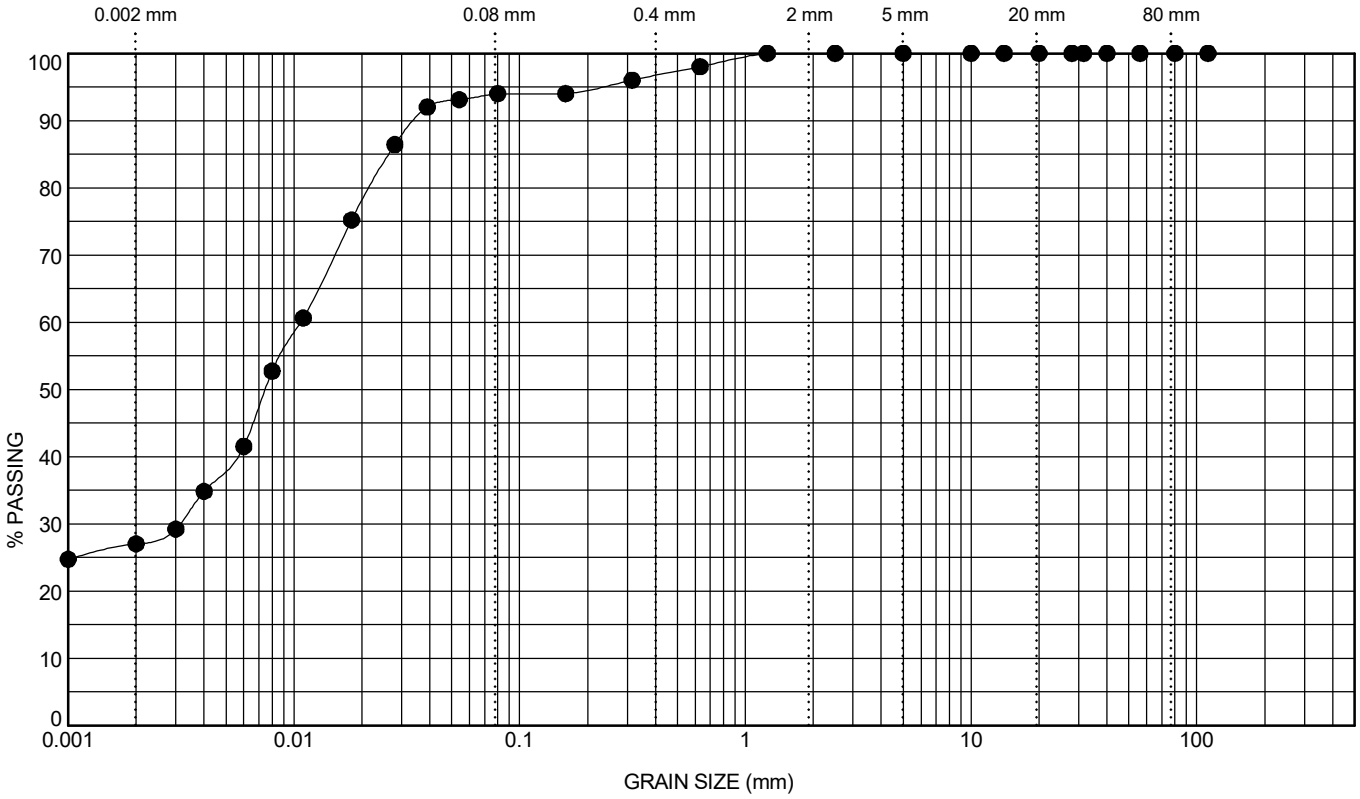
REFERENCE No. : 11227097-A1

BORING No. : BH-03

SAMPLE No. : SS-14

DEPTH : 12.19 m **DATE :** 5/11/2021

UNIFIED SOIL CLASSIFICATION (BASED ON THE STANDARD LC 21-040)



CLAY	SILT	SAND			GRAVEL		COBBLES AND BOULDERS
		fine	medium	coarse	fine	coarse	

Description	w (%)	W_L (%)	I_P (%)	Classification (1)
Clayey silt, traces of sand	39	26	8	CL

(1) USCS

% Gravel	% Sand	% Silt	% Clay	c_U	c_C	D85	D60	D50	D30	D15	D10
0	6	67	27								

Remarks :

Prepared by : Mark Gamboz, B.Sc. Geology

Verified by : Mark Gamboz, B.Sc. Geology

GRAIN SIZE ANALYSIS REPORT
(WITH SEDIMENTATION)

CLIENT: MEDUSA LP

PROJECT : PROPOSED SORTATION FACILITY

LOCATION : LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

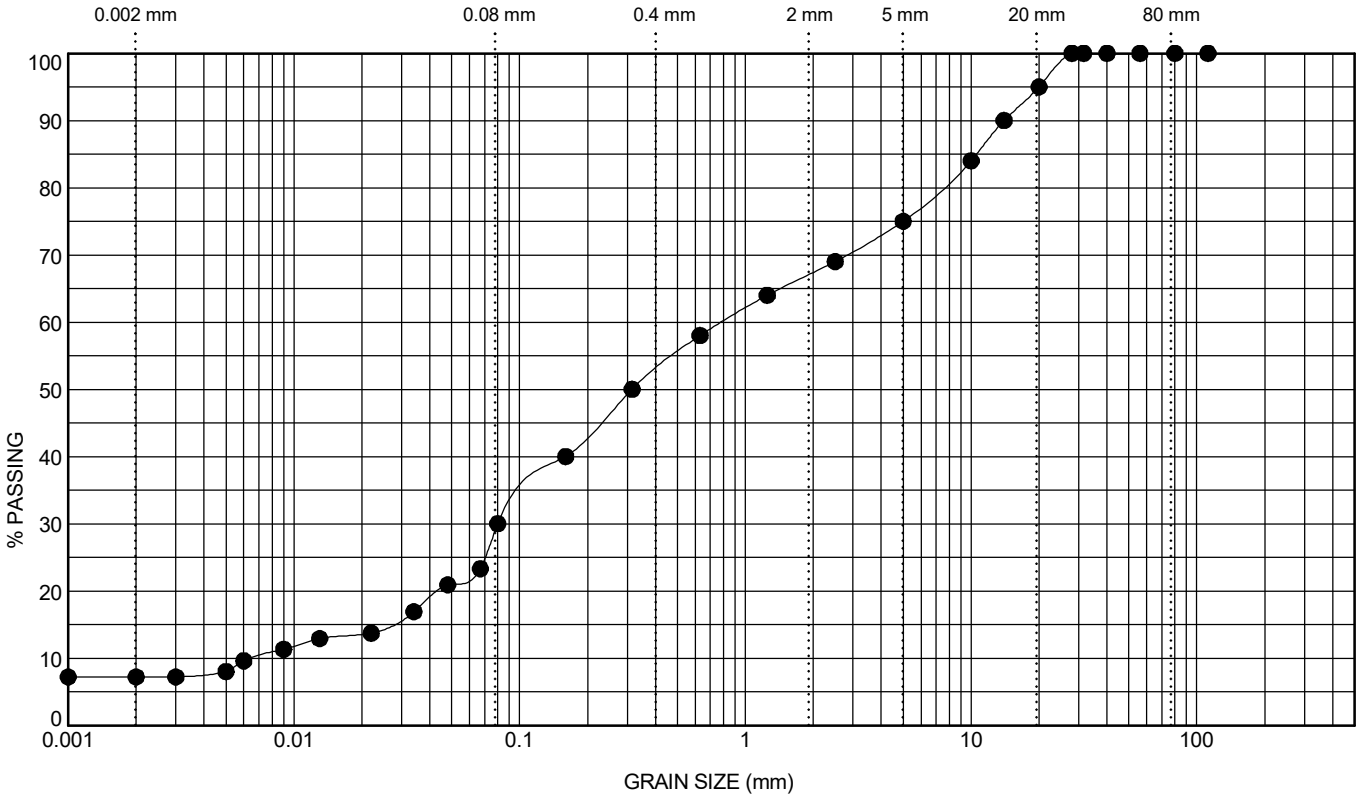
REFERENCE No. : 11227097-A1

BORING No. : BH-03

SAMPLE No. : SS-18

DEPTH : 18.29 m **DATE :** 5/11/2021

UNIFIED SOIL CLASSIFICATION (BASED ON THE STANDARD LC 21-040)



CLAY	SILT	SAND			GRAVEL		COBBLES AND BOULDERS
		fine	medium	coarse	fine	coarse	

Description	w (%)	W_L (%)	I_P (%)	Classification (1)
Gravelly and silty sand, traces of clay	9	15	2	SM

(1) USCS

% Gravel	% Sand	% Silt	% Clay	c_U	c_C	D85	D60	D50	D30	D15	D10
25	45	23	7								

Remarks :

Prepared by : Mark Gamboz, B.Sc. Geology

Verified by : Mark Gamboz, B.Sc. Geology

CLASSIFICATION OF FINE GRAINED SOILS

CLIENT : MEDUSA LP

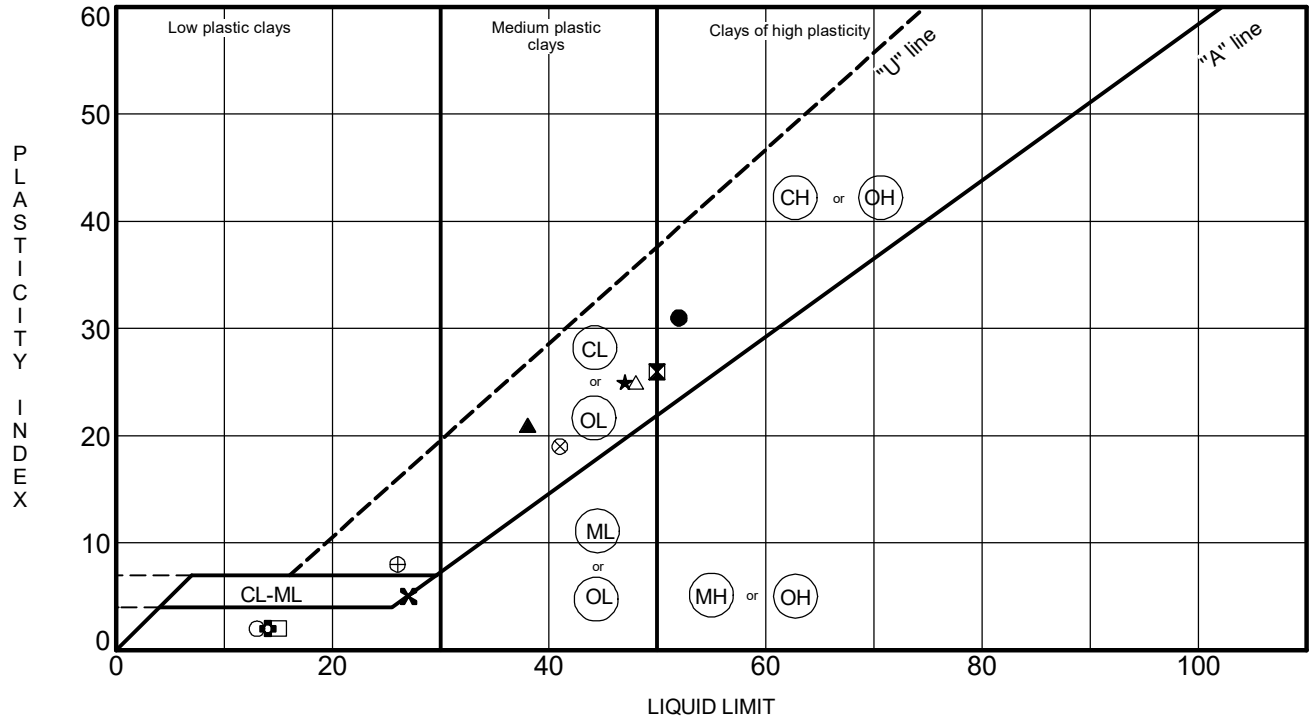
PROJECT : PROPOSED SORTATION FACILITY

REFERENCE No. : 11227097-A1

LOCATION : LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

DATE : 5/11/2021

Plasticity Chart (ASTM D2487)



	Bore No.	Sample	Depth	w	W_L	W_{L-S}	W_P	I_P	I_L	C_u	C_{ur}	S_T	Classification
●	BH-01	ST-5	3.05	45	52		21	31					CH
⊠	BH-01	SS-11	9.15	68	50		24	26					CH
▲	BH-02	SS-3	1.52	27	38		17	21					CL
★	BH-02	ST-7	4.57	54	47		22	25					CL
✕	BH-02	SS-11	9.15	25	27		22	5					CL-ML
✿	BH-02	SS-14	11.43	8	14		12	2					SM
○	BH-02	SS-19	15.24	8	13		11	2					SM
△	BH-03	SS-11	8.23	66	48		23	25					CL
⊗	BH-03	ST-13	10.67	58	41		22	19					CL
⊕	BH-03	SS-14	12.19	39	26		18	8					CL
□	BH-03	SS-18	18.29	9	15		13	2					SM

Legend

(CL) Inorganic clay of low plasticity
(OL) Organic silt
(CH) Inorganic clay of high plasticity
(ML) Inorganic silt
(OH) Organic clay and organic silt
(MH) Inorganic silt and very fine sand

w : Water content (%)
w_{L-S} : Oven dried liquid limit (%)
w_L : Liquid limit (%)
w_P : Plastic limit (%)
I_P : Plasticity index (%)

I_L : Liquidity index (%)
C_u : Intact undrained shear strength (kPa)
C_{ur} : Remoulded undrained shear strength (kPa)
S_T : Sensitivity

Prepared by : Mark Gamboz, B.Sc. Geology

Verified by : Mark Gamboz, B.Sc. Geology

CLASSIFICATION OF FINE GRAINED SOILS

REFERENCE No. : 11227097-A1

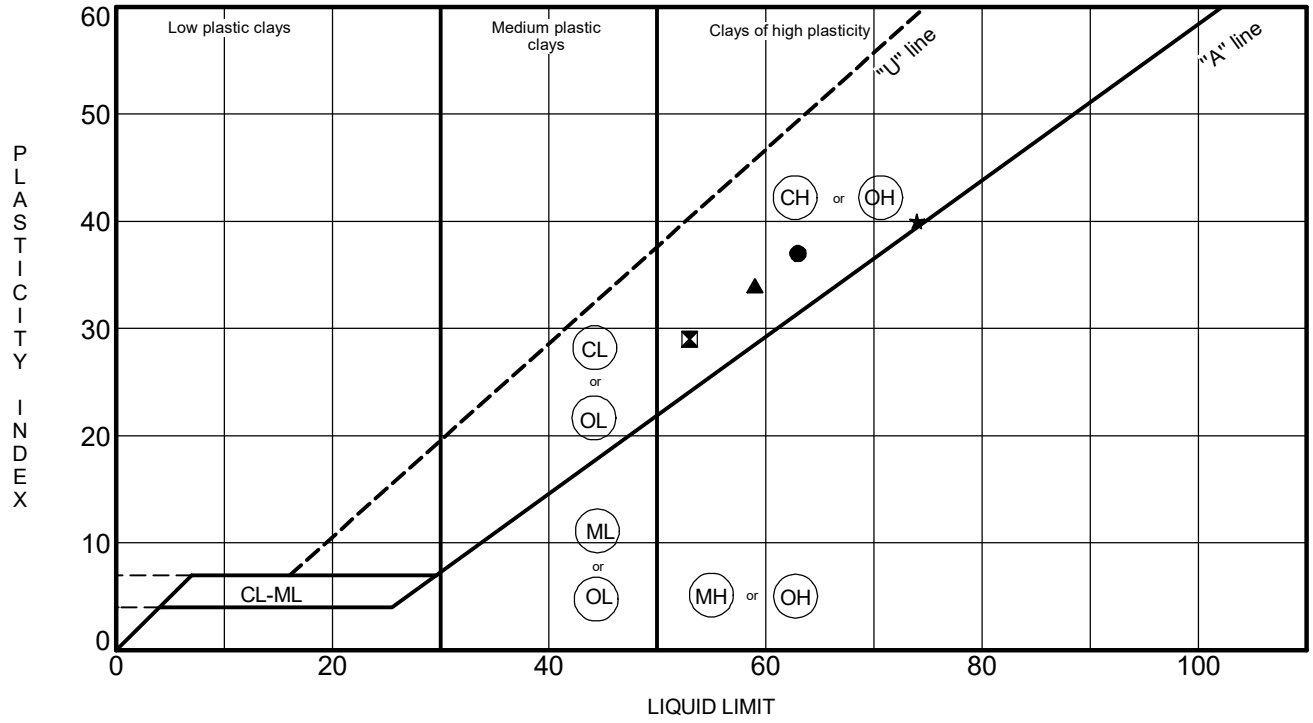
CLIENT : MEDUSA LP

LOCATION : LEIKIN DRIVE AND MERIVALE ROAD INTERSECTION, NEPEAN, ONTARIO

PROJECT : PROPOSED SORTATION FACILITY

DATE : 5/31/2021

Plasticity Chart (ASTM D2487)



	Bore No.	Sample	Depth	w	W_L	W_{L-S}	W_P	I_P	I_L	C_u	C_{ur}	S_T	Classification
●	TP-01	GS-3	0.80	33	63		26	37					CH
⊠	TP-25	GS-3	0.70	37	53		24	29					CH
▲	TP-35	GS-3	0.70	30	59		25	34					CH
★	TP-44	GS-3	0.75	39	74		34	40					CH

Legend

- (CL) Inorganic clay of low plasticity
- (OL) Organic silt
- (CH) Inorganic clay of high plasticity
- (ML) Inorganic silt
- (OH) Organic clay and organic silt
- (MH) Inorganic silt and very fine sand

w : Water content (%)
w_{L-S} : Oven dried liquid limit (%)
w_L : Liquid limit (%)
w_P : Plastic limit (%)
I_P : Plasticity index (%)

I_L : Liquidity index (%)
C_u : Intact undrained shear strength (kPa)
C_{ur} : Remoulded undrained shear strength (kPa)
S_T : Sensitivity

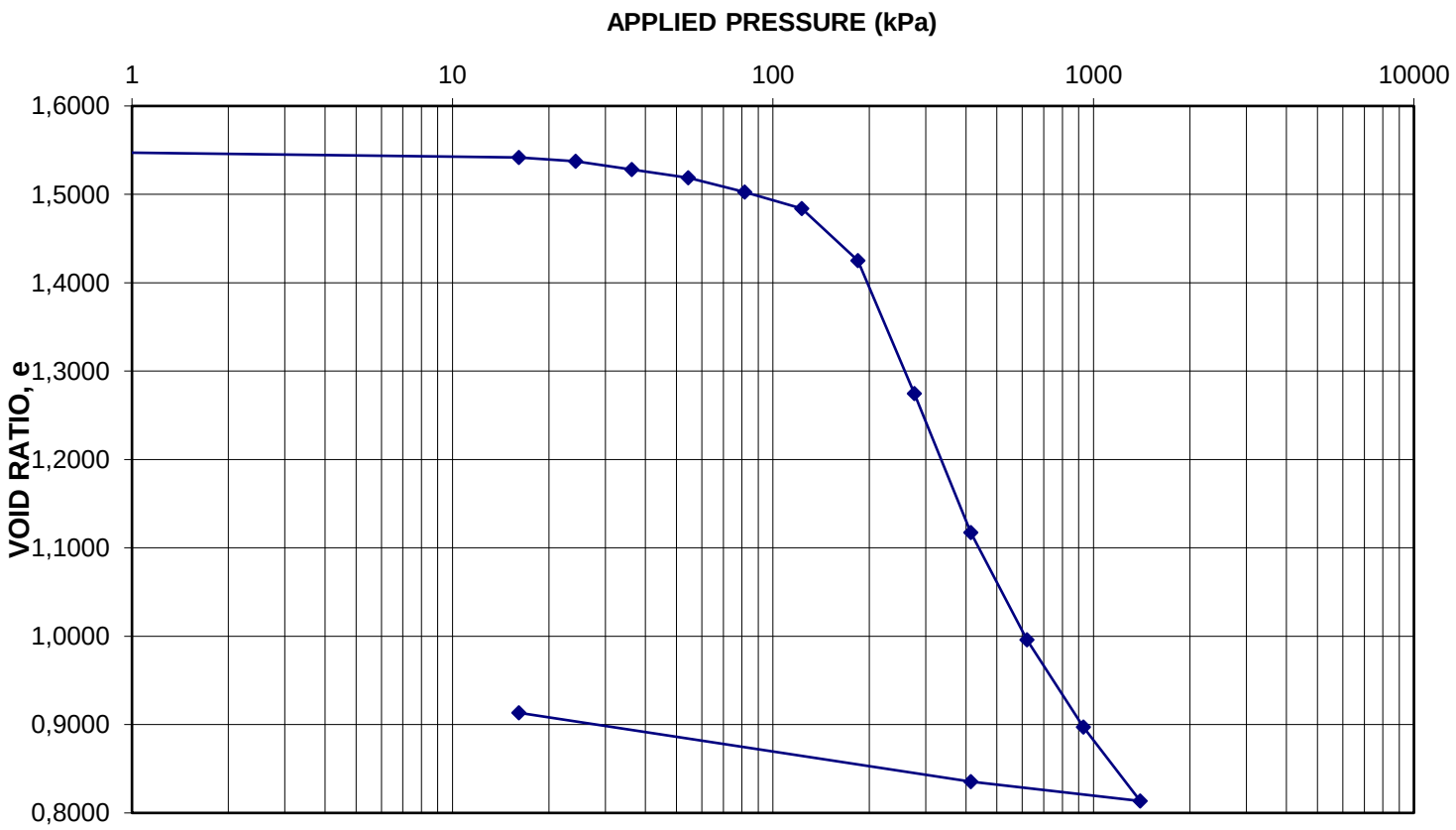
Prepared by : Mark Gamboz, B.Sc. Geology

Verified by : Mark Gamboz, B.Sc. Geology

Client:	Medusa LP	Lab No:	2021-S0081
Project:	Nepean, Ontario	Project No:	11227097-A1

Borehole No:	BH02	Sample No:	TM7	Depth:	4,81-4,98 m

Description of Material: CL (medium)



COMPRESSIBILITY PARAMETERS

s'_p Preconsolidation pressure (kPa):	167	e_o Initial void ratio:	1,5606
s'_{vo} Effective pressure:	42	c_r Recompression index:	0,07
$s'_p - s'_{vo}$ Overconsolidation:	125	c_c Compression index:	0,87
Overconsolidation ratio ("OCR"):	4,0	c_s Swelling index:	0,04

Size of Sample:	Diameter (mm):	63,52	Moisture Content (W) %		
	Height (mm):	25,48	Initial:	58,0	Final: 35,7

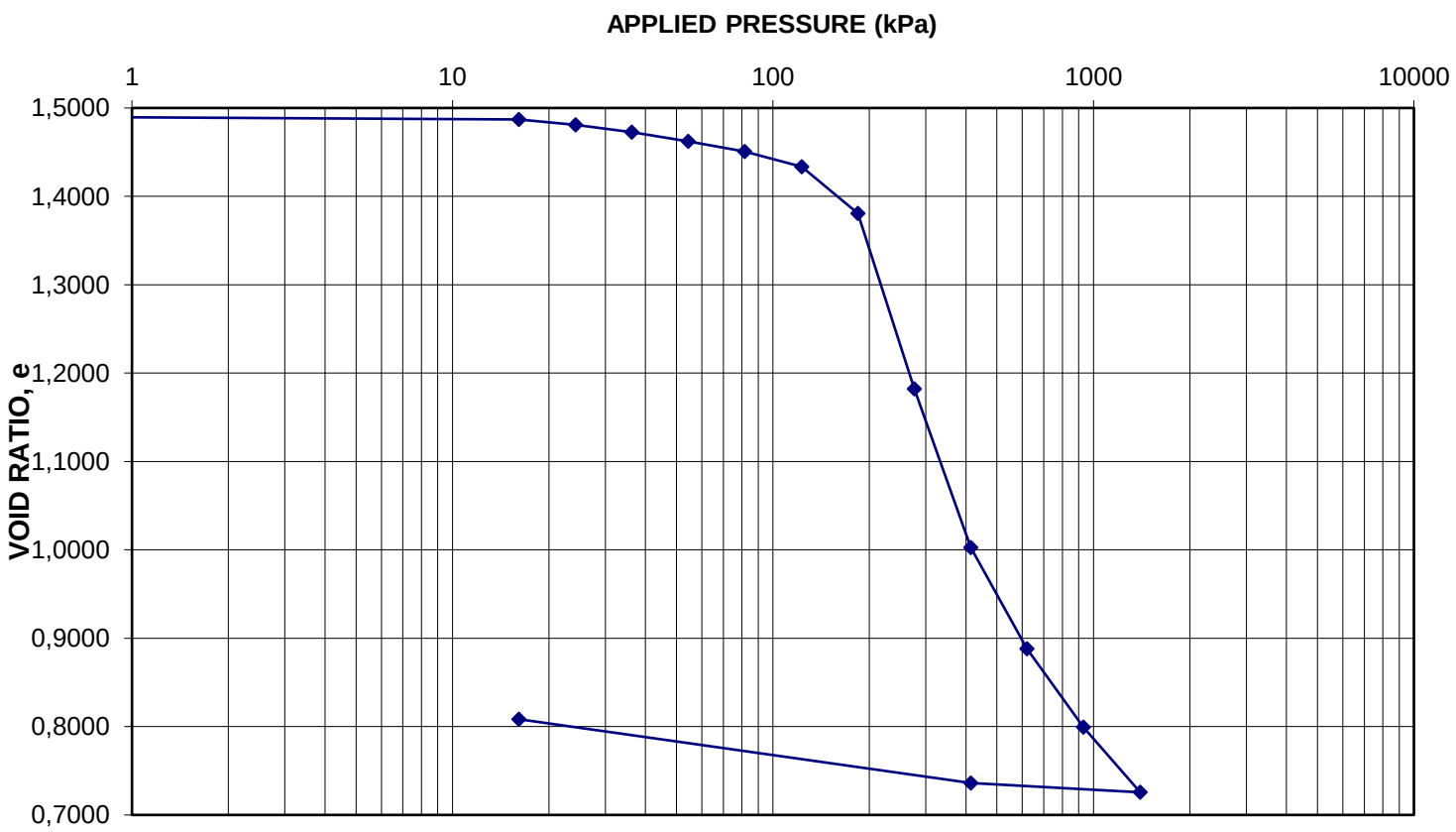
Notes:

Preformed By:	A. Azizi	Date:	2021-05-30
Checked By:	M. Gamboz	Date:	2021-06-04

Client:	Medusa LP	Lab No:	2021-S0081
Project:	Nepean, Ontario	Project No:	11227097-A1

Borehole No:	BH03	Sample No:	TM13	Depth:	10,87-11,02 m

Description of Material: CL (medium)



COMPRESSIBILITY PARAMETERS

s'_p Preconsolidation pressure (kPa):	176	e_o Initial void ratio:	1,4955
s'_{vo} Effective pressure:	81	c_r Recompression index:	0,06
$s'_p - s'_{vo}$ Overconsolidation:	95	c_c Compression index:	1,13
Overconsolidation ratio ("OCR"):	2,2	c_s Swelling index:	0,04

Size of Sample:	Diameter (mm):	63,52	Moisture Content (W) %		
	Height (mm):	25,48	Initial:	56,2	Final: 32,2

Notes:

Preformed By:	A. Azizi	Date:	2021-06-02
Checked By:	M. Gamboz	Date:	2021-06-07

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

Alexander Fiorilli
alexander.fiorilli@ghd.com
514.339.0100

Kamel Hamouche
kamel.hamouche@ghd.com
418.425.0817

www.ghd.com