UPDATED REPORT ON

Preliminary Geotechnical Investigation
150 Steeles Avenue East
Milton, Ontario

PREPARED FOR:

Neatt Communities

Project No: 21-122-106
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1. INTRODUCTION

DS Consultants Ltd. (DS) was retained by Neatt Communities to provide updated preliminary geotechnical engineering design recommendations for the proposed development located at 150 Steeles Avenue East in Milton, Ontario.

The site was previously developed and used for industrial purposes. The previously existing structures on the site have since been demolished to make way for the proposed new development.

DS previously prepared a preliminary geotechnical investigation report for the site (report titled: "Preliminary Geotechnical Investigation, 150 Steeles Avenue East, Milton, Ontario", dated July 20, 2021, based on the findings of six (6) boreholes (BH21-1 to BH21-6) drilled on the site by DS in April 2021 to depths ranging from 15.6 to 22.6 m below ground surface. The proposed development plan was understood to consist of a residential development which will include the construction of multiple buildings with up to three (3) and potentially up to five (5) levels of underground parking. The locations of boreholes from the previous investigation (BH21-1 to BH21-6) are shown on **Drawing 1**, appended to this report.

It is now understood that the proposed development will consist of thirteen residential blocks (Blocks 01 to 11 and Blocks TH01 and TH02). Blocks 01 to 11 will include eleven (11) buildings (with fourteen (14) 9 to 25 storey towers and four (4) midrise buildings). Block TH01 and TH02 will each include a series of 3-storey townhouse blocks. The proposed structures will have generally up to three (3) levels of underground parking, however, the design is still evolving and subject to change, and could include up to 4-levels of underground parking.

The current borehole drilling program includes twenty-six (26) additional boreholes (BH23-1 to BH23-26) including bedrock coring at six selected boreholes, drilled within the footprints of the proposed buildings at the Site, as shown on **Drawing 1**.

Concurrently with the Geotechnical Investigation program, a Hydrogeological Study has been carried out by DS, and the results are addressed separately.

As noted before, it is understood that the design is still evolving and subject to change. As such, additional boreholes may be required should the building locations/orientations change, or the current subsurface information obtained, not suffice.

The purpose of this geotechnical investigation was to determine the subsurface conditions at borehole locations and from the findings of the new and previous boreholes, make geotechnical recommendations for the following:

1. Foundations
2. Floor slabs and permanent drainage

3. Excavations and groundwater control

4. Temporary shoring

5. Earth pressures

6. Earthquake considerations

This report is provided on the basis of the terms of reference presented above and on the assumption that the design will be in accordance with applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations can cater to the changed design.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. The format and contents are guided by client specific needs and economics and do not conform to generalized standards for services. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for Neatt Communities, its architect, and designers. Use of this report by third party without DS consent is prohibited.

2. FIELD AND LABORATORY WORK

In addition to the previous boreholes (BH21-1 to BH21-6) carried out for the preliminary geotechnical investigation, the fieldwork for this supplemental investigation was carried out by DS during the period between March 29 and May 1, 2023, at which time, a total of twenty-six (26) boreholes (BH23-1 to BH23-26), see **Drawing 1**) were drilled/cored to depths ranging from 13.8 to 24.4 m below existing ground surface. The boreholes were drilled to bedrock surface with solid stem continuous flight auger/mud rotary equipment by a drilling sub-contractor under the direction and supervision of DS personnel. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method. Upon encountering the bedrock surface, shale bedrock was cored from a depth of 19.6 to 23.2 m in BH23-1, from a depth of 16.5 to 20.2 m in BH23-6, from a depth of 17.1 to 21.8 m in BH23-9, from a depth of 20.9 to 24.4 m in BH23-19, from a depth of 16.1 to 19.4 m in BH23-23, and from a depth of 15.3 to 18.7 m in BH23-24. The bedrock was cored with HQ-2 double tube wireline equipment providing 63 mm dia. rock core samples. The coring was carried out under the full-time supervision of a representative from DS who identified and described the rock samples, noting and recording the percentages of total and solid rock core recovery, RQD values, fracture index and the percentage and thicknesses of hard layers.

The recovered soil samples were logged in the field and returned to the DS laboratory for detailed examination by the project engineer and for laboratory testing.

In addition to visual examination in the laboratory, all the recovered soil samples were tested for moisture contents and results are presented on the respective borehole logs. Grain size analyses and Atterberg Limits tests were conducted on selected soil samples from the current 2023 boreholes and the results are presented on individual logs and on **Drawings 35, 36, 39 and 40**. Thirteen selected soil samples from DS boreholes carried out in 2021 were tested for grain size analyses and two samples were tested for Atterberg Limits testing. Gradation curves for the grain size analyses for 2021 boreholes are presented on **Drawings 37 and 38**. Atterberg Limits test results are presented on **Drawing 41**.

Water level observations were made during drilling but were not made upon completion of drilling due to mud drilling techniques. Monitoring wells were installed in boreholes BH23-4, BH23-6, BH23-9, BH23-10, BH23-11, BH23-13, BH23-15, BH23-16, BH23-19, BH23-20, BH23-24, and BH23-26 to monitor long-term stabilized groundwater levels and for hydrogeological testing. Monitoring wells were also installed in all of the previous 2021 boreholes (BH21-1 to BH21-6) to monitor long-term stabilized groundwater levels and for hydrogeological testing, at the time of that investigation.

Prior to drilling operations, all underground utilities were cleared at the borehole locations by the representatives of the public and private utilities locate companies.

The ground surface elevations at the borehole locations were undertaken by DS personnel, using the differential GPS unit. It should be noted that the elevations at the as-drilled borehole locations were not provided by a professional surveyor and should be considered to be approximate.

3. SITE AND SUBSURFACE CONDITIONS

The borehole location plan is shown on **Drawing 1**. General notes on sample description are provided on **Drawing 1A**. The subsurface conditions in the boreholes (BH23-1 to BH23-26 and BH21-1 to BH21-6) are presented in the individual borehole logs presented on **Drawings 2 to 33**. Generalized subsurface profiles are presented in **Drawings 34A to 34D.**

3.1 Soil and Bedrock Conditions

Topsoil/Fill Materials: Boreholes BH21-1, BH21-2, BH21-5, and BH21-6 were drilled on grass and encountered 130 to 230 mm thick surficial topsoil layer. It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative for the site and should not be relied on to calculate the amount of topsoil at the site. At the time of the 2023 field investigation, site remediation and some associated grading/backfilling works were being carried out, as such, topsoil present at the time of the 2021 investigation had since been removed, and there was no surficial topsoil observed in BH23-1 to BH23-26. A 180 mm thick layer of granular fill was observed at the ground surface in BH23-8.

Fill material was encountered in all boreholes, extending to depths ranging from 0.8 m to 6.3 m below ground surface. The fill was heterogeneous, consisting of silty clay to clayey silt, silty sand to sandy silt and sand and gravel. Rootlets, organics, and topsoil were also observed in fill material. Inclusions of asphalt debris were also noted in BH23-5, BH23-7, BH23-17, BH23-18 and BH23-22. The fill was found to be in a loose to very dense state (firm to hard consistency) with measured SPT 'N' values ranging from 4 to more than 50 blows per 300mm of penetration.

Cohesive Deposits (Clayey Silt to Silty Clay Till): Below the fill materials in Boreholes BH23-1 to BH23-11, BH23-13 to BH23-26 and BH21-1 to BH21-6, clayey silt to silty clay till deposits were encountered and extended to depths ranging from 2.2 to 12.2 m below ground surface. Other layers of clayey silt till, clayey silt and silt and clay deposits were encountered below cohesionless deposits in Boreholes BH23-4, BH23-7, BH23-8, BH23-10, BH23-11, BH23-12, BH23-15, BH23-20, BH23-23, BH23-24, BH23-25, BH21-1, BH21-2, BH21-3 and BH21-5, at depths ranging from 4.9 to 15.2 m and extended to depths ranging from 6.1 to 16.7 m below ground surface. These deposits were found to have a stiff to hard consistency with occasional stiff layers, with measured SPT 'N' values ranging from measured 9 to more than 50 blows per 300 mm of penetration. Occasional cobble and boulders were present within the hard till deposits.

Grain size analyses of six (6) clayey silt to silty clay till samples (BH23-8/SS4, BH23-12/SS8, BH23-22/SS9, BH23-24/SS11, BH21-1/SS6, and BH21-2/SS10) were conducted and the results are presented in **Drawings 35, 35 and 37**, with the following fractions:

Clay: 13% to 20%

Silt: 43% to 59%

Sand: 18% to 27%

Gravel: 7% to 20%

Atterberg Limits testing was carried out on the six (6) clayey silt to silty clay till samples (BH23-8/SS4, BH23-12/SS8, BH23-22/SS9, BH23-24/SS11, BH21-1/SS6, and BH21-2/SS10), and the results are provided on the respective borehole logs, and summarized below:

Liquid Limit: 19.8 to 25.4%

Plastic Limit: 13.8 to 16.2%

Plasticity Index: 6 to 9.2

Sandy Silt to Silty Sand Till: Below the clayey silt till, and/or silt and clay and cohesionless deposits in Boreholes BH23-2, BH23-3, BH23-4, BH23-6, BH23-7, BH23-9 to BH23-15, BH23-17 to BH23-19, BH23-22, to BH23-26, BH21-1, BH21-3, BH21-5 and BH21-6, sandy to silty sand till deposits were encountered at depths ranging from 7.6 to 19.8 m and extended to depths ranging from 8.8 to 21.6 m below ground surface. This deposit was found to be in a compact to very dense state with measured SPT 'N' values ranging from 13 to more than 50 blows per 300mm of penetration.

Grain size analyses of four (4) samples from sandy silt to silty sand till deposits (BH23-6/SS11, BH23-9/SS12, BH21-3/SS12, BH21-6/SS15) were conducted and the results are presented in **Drawings 35, 37 and 38**, with the following fractions:

Clay: 3%to 10%

Silt: 28% to 49%

Sand: 30% to 65%

Gravel: 5% to 27%

Cohesionless Deposits (Sandy Silt, Silty Sand, Sand, Silt Gravelly Sand/Sandy Gravel and Sand and Gravel): Below the fill in in BH23-12 and cohesive deposits and sandy silt till in the remaining boreholes, water bearing cohesionless deposits of sandy silt, silty sand, sand, silt gravelly sand/sandy gravel and sand and gravel were encountered. The cohesionless deposits were found wet below depths ranging from 4.5 to 12.2m below ground surface. These deposits were found to be generally in a compact to very dense state present in a loose to very dense state with measured SPT 'N' values ranging from 7 to more than 50 blows per 300mm of penetration.

Grain size analyses of twenty-two (22) samples from cohesionless soils (BH23-2/SS11&SS13, BH23-3/SS7, BH23-4/SS13, BH23-10/SS5, BH23-13/SS13, BH23-14/SS11, BH23-15/SS9, BH23-17/SS8, BH23-19/SS12&SS14, BH23-22/SS15, BH23-23/SS8, BH21-1/SS9, BH21-1/SS11, BH21-1/SS14, BH21-3/SS6, BH21-3/SS7, BH21-4/SS10, BH21-4/SS11, BH21-5/SS9 and BH21-6/SS13) were conducted and the results are presented in **Drawings 35 to 38**, with the following fractions:

Clay: 1%to 7%

Silt: 10% to 95%

Sand: 1% to 87%

Gravel: 0% to 49%

Till/Shale Complex: Till/Shale complex deposit was encountered overlying the bedrock in Boreholes BH23-6, BH23-9, BH23-13, BH23-16, BH23-21, BH23-26, BH21-4, BH21-5, and BH21-6 and found to have a hard consistency/very dense relative density with measured SPT 'N' values of more than 50 blows per 300 mm. Occasional cobble and boulders should be expected in the till deposit. The till/shale complex consisted of glacial tills with generally clayey silt or sandy silt texture mixed with highly weathered shale.

SHALE BEDROCK: Shale bedrock belonging to Queenston Formation was found in all boreholes except BH21-2 (and BH23-26, where the possible bedrock surface is inferred from auger refusal) was at approximate depths varying from 13.8 to 22.0 m below the existing ground, corresponding to elevations varying from 187.7 to 192.6 m, as presented in **Table 1** below.

Because of the method of drilling and sampling, the surface elevations of the bedrock can be different than indicated on the borehole logs. With augering, the auger may penetrate some of the highly weathered shale and the coring may therefore begin below the bedrock surface. Commonly the overburden overlying the shale contains slabs of limestone which would give a false indication of the bedrock level. Similarly, the depth of weathering cannot be determined accurately due to the presence of limestone layers.

Table 1: Depth and Elevation of Top of Bedrock

Borehole No.	Ground Surface Elevation (m)	Depth of Shale Bedrock Surface below Existing Ground (m)	Approximate Elevation of Shale Bedrock Surface (m)	Notes
BH23-1	208.3	19.6	188.7	Bedrock was cored from 19.6 to 23.2 m
BH23-2	207.2	18.3	188.9	Bedrock was augered
BH23-3	207.3	15.3	192.0	Bedrock was augered
BH23-4	206.7	18.2	188.5	Bedrock was augered
BH23-5	207.1	16.7	190.4	Bedrock was augered
BH23-6	208.0	15.4	192.6	Bedrock was cored from 16.5 to 20.2 m
BH23-7	207.0	16.8	190.2	Bedrock was augered
BH23-8	207.5	16.7	190.8	Bedrock was augered
BH23-9	206.2	17.0	189.2	Bedrock was cored from 17.1 to 21.8 m
BH23-10	206.2	17.5	188.7	Bedrock was augered
BH23-11	206.4	15.2	191.2	Bedrock was augered
BH23-12	206.0	13.7	192.3	Bedrock was augered
BH23-13	206.3	17.0	189.3	Bedrock was augered
BH23-14	206.4	18.0	188.4	Bedrock was augered
BH23-15	206.2	15.1	191.1	Bedrock was augered
BH23-16	206.6	18.0	188.6	Bedrock was augered
BH23-17	205.9	18.2	187.7	Bedrock was augered
BH23-18	208.5	18.5	190.0	Bedrock was augered
BH23-19	209.5	20.0	189.5	Bedrock was cored from 20.9 to 24.4 m
BH23-20	204.6	15.2	189.4	Bedrock was augered
BH23-21	205.7	16.7	189.0	Bedrock was augered
BH23-22	210.4	22.0	188.4	Bedrock was augered
BH23-23	204.7	16.0	188.7	Bedrock was cored from 16.1 to 19.4 m
BH23-24	206.4	15.2	191.2	Bedrock was cored from 15.3 to 18.7 m
BH23-25	206.1	15.3	190.8	Bedrock was augered
BH23-26	204.3	13.8	190.5	Auger Refusal on Possible Bedrock at 13.8 m
BH21-1	208.3	18.3	190.0	Bedrock was augered
BH21-3	206.6	16.8	189.8	Bedrock was augered

BH21-4	206.3	18.3	188.0	Bedrock was augered
BH21-5	205.5	15.3	190.2	Bedrock was augered
BH21-6	210.5	21.6	188.9	Bedrock was augered

Because of the method of drilling and sampling, the surface elevations of the bedrock can be different than indicated on the borehole logs. With augering, the auger may penetrate some of the more weathered shale and the coring may therefore begin below the bedrock surface. Commonly the overburden overlying the shale contains slabs of limestone which would give a false indication of the bedrock level. Similarly, the depth of weathering cannot be determined accurately due to the presence of limestone layers.

Shale bedrock was cored at six (6) borehole locations (BH23-1, BH23-6, BH23-9, BH23-19, BH23-23, and BH23-24). General comments on shale bedrock in the Greater Toronto area are presented in **Appendix A**. Photographs of recovered bedrock cores are also presented in **Appendix A.**

Total Core Recovery (TCR):

The total core recovery indicates the total length of rock core recovered, expressed as a percentage of the actual length of the core run. The total core recovery in the corehole ranged from 40 to 100 %.

Solid Core Recovery (SCR):

The solid core recovery is the total length of solid, full diameter rock core that was recovered, expressed as a percentage of the length of the core run. Solid core recovery ranged from 0 to 98 % and was generally consistent for the depths cored. SCR value of 0 % was generally present in the weathered/fractured zone of the rock in BH23-9 between 17.8 and 19.3 m depths. The SCR index was generally influenced by the orientations of the fractures. SCR was low when fractures oblique to the borehole axis were intercepted.

Rock Quality Designation (RQD):

The rock quality designation index is obtained by measuring the total length of recovered rock core pieces which are longer than 100 mm and expressing their sum total length as a percentage of the length of the core run. RQD is a function of the frequency of joints, bedding plane partings and fractures in the rock cores. While the use of double tube core barrels provided reasonably good protection of the core during drilling and core retrieval, the fissile nature of the shale greatly influences the RQD values of the rock cores. Consequently, it is believed that the RQD values recorded underestimate the rock quality classification of the laminated fissile shale. The recorded RQD values in the cores ranged from 0 to 95 percent.

Hard Layers:

Based on the visual examination of the rock cores, an attempt was made to identify and record the thickness and percentages of the relatively harder siltstone and limestone layers. The percentage of the "hard layers" per core run ranges between 6 and 33 %. The thickness of these layers varied but was generally less than 150 mm, however, thicker layers to be as much as 750 to 900 mm have been observed at other sites in GTA. The layers are actually lenses and they can vary significantly in thickness over short distance. Encountering such thick layers should be anticipated. It is also common to encounter closely spaced groupings of thin strong limestone/siltstone layers which individually may only be 25 to 50 mm thick but collectively can be 1 m in thickness.

Methane Gas:

Methane gas is anticipated in the bedrock. Appropriate care and monitoring are essential in all confined bedrock excavations, particularly for caissons. Stress relief features such as folds and faults are common in the shale bedrock. **Appendix A** presents more details and general comments about the shale bedrock.

3.2 Groundwater Conditions

Sixteen (16) boreholes (BH23-4, BH23-6, BH23-9, BH23-10, BH23-11, BH23-13, BH23-15, BH23-16, BH23-19, BH23-20, BH23-24, BH23-26 and BH21-1 to BH21-6) were equipped with 50mm dia. monitoring wells. The groundwater measured on May 9, 2023 in the monitoring wells installed in BH23-4, BH23-6, BH23-9, BH23-10, BH23-11, BH23-13, BH23-15, BH23-16, BH23-19, BH23-20, BH23-24, and BH23-26 and on May 7, 2021 in the monitoring wells installed in BH21-1 to BH21-6 and was found to be in the range of 6.69 to 13.0 m below ground surface, corresponding to Elev. 197.5 m to 200.4m. **Table 2** summarizes the depth and elevation of water level readings in monitoring wells.

Table 2: Groundwater Levels Observed in Monitoring Wells

	Ground Elevation (masl)	Well Depth (mbgs)	Screened Interval (mbgs)	Date of Observation	Depth to Water (mbgs)	Groundwater Elevation (masl)
BH23-4	206.7	18.2	13.6 – 18.2	May 9, 2023	8.65	198.0
BH23-6	208.0	15.2	12.2 – 15.2	May 9, 2023	9.48	198.5
BH23-9	206.2	16.8	12.2 – 16.8	May 9, 2023	8.55	197.7
BH23-10	206.2	10.4	7.2 – 10.4	May 9, 2023	8.43	197.8
BH23-11	206.4	15.2	9.1 – 15.2	May 9, 2023	8.26	198.2
BH23-13	206.3	9.1	6.1 – 9.1	May 9, 2023	8.43	197.8
BH23-15	206.2	10.7	7.6 – 10.7	May 9, 2023	8.01	198.2
BH23-16	206.6	10.2	7.0 – 10.2	May 9, 2023	8.94	197.7
BH23-19	209.5	13.7	10.7 – 13.7	May 9, 2023	11.91	197.6
BH23-20	204.6	15.2	9.1 – 15.2	May 9, 2023	7.02	197.6
BH23-24	206.4	18.7	15.7 – 18.7	May 9, 2023	7.17	199.2
BH23-26	204.3	10.7	7.6 – 10.7	May 9, 2023	6.69	197.6
BH21-1	208.31	18.1	16.7-19.8	May 7, 2021	9.9	198.4
BH21-2	207.64	12.1	9.1-12.1	May 7, 2021	7.2	200.4
BH21-3	206.57	13.4	12.2-15.2	May 7, 2021	7.2	199.4
BH21-4	206.34	15.5	12.2-15.2	May 7, 2021	8.6	197.7
BH21-5	205.47	12.3	9.1-12.1	May 7, 2021	6.8	198.7
BH21-6	210.53	22.6	19.3-22.3	May 7, 2021	13.0	197.5

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.

4. FOUNDATIONS

It is understood that the site will be re-developed for residential use. It is also understood that the proposed development will consist of thirteen residential blocks (Blocks 01 to 11 and Blocks TH01 and TH02). Blocks 01 to 11 will include eleven (11) buildings (with fourteen (14) 9 to 25 storey towers and four (4) midrise buildings). Block TH01 and TH02 will each include a series of 3-storey townhouse blocks. The proposed structures will have generally up to three (3) levels of underground parking, however, the design is still evolving and subject to change, and could include up to 4-levels of underground parking.

4.1 Proposed Buildings with up to 3 and potentially 4 Levels Basement

Based on the information from boreholes BH23-1 to BH23-26 and BH21-1 to BH21-6, the proposed buildings with up to three (3) levels of basement and potentially four (4) levels of basement can be supported by spread and strip footings/raft foundations founded on the clayey silt till, sandy silt till, sands and silts or gravelly sand/sand and gravel for a bearing capacity of 150 to 500 kPa at SLS (Serviceability Limit States), and for a factored geotechnical resistance of 225 to 750 kPa at ULS (Ultimate Limit States).

The bearing values and the corresponding founding elevations of the native soils at the borehole locations are summarized in **Table 3**.

Table 3: Bearing Values and Founding Levels of Spread Footings

BH No.	Ground Surface Elevation (m)	Founding Soils	Bearing Capacity at SLS (kPa)	Bearing Capacity at ULS (kPa)	Minimum Depth below Existing Ground (m)	Elevation (m)
BH23-1	208.3	Clayey Silt Till	200	300	2.3	206.0
		Clayey Silt Till/Silt	500	750	9.3	199.0
BH23-2	207.2	Clayey Silt Till	200	300	2.5	204.7
			300	450	6.4	200.8
		Sandy Silt Till/Silt	500	750	8.0	199.2
BH23-3	207.3	Clayey Silt Till/Sand Silt	200	300	2.0	205.3
			150	225	7.0	200.3
		Sandy Silt Till	200	300	9.3	198.0
		Silt/Sandy Silt Till	500	750	11.0	196.3
BH23-4	206.7	Clayey Silt Till	300	450	1.8	204.9

		Clayey Silt Till/Silt	400	600	6.3	200.4
		Silt/Sandy Silt Till	500	750	15.5	191.2
BH23-5	207.1	Clayey Silt Till	300	450	1.8	205.3
		Clayey silt Till/ Sandy Silt/Silt	500	750	3.5	203.6
BH23-6	208.0	Clayey Silt Till/Silt	300	450	2.6	205.4
		Sandy Silt Till	500	750	11.0	197.0
BH23-7	207.0	Clayey Silt Till	400	600	2.0	205.0
		Clayey /silt Till/Silt	500	750	6.1	200.9
BH23-8	207.5	Clayey Silt Till	300	450	1.8	205.7
		Silty Sand	250	375	7.0	200.5
		Silt	500	750	10.7	196.8
BH23-9	206.2	Clayey Silt Till	200	300	1.5	204.7
			150	225	4.0	202.2
		Sand and Gravel/Silty Sand	500	750	7.6	198.6
BH23-10	206.2	Clayey Silt Till	300	450	1.5	204.7
		Silt to Sandy Silt	500	750	3.5	202.7
		Silt	400	600	11.0	195.2
		Sandy Silt	500	750	13.7	192.5
BH23-11	206.4	Clayey Silt Till	300	450	1.5	204.9
		Clayey Silt Till	500	750	6.1	200.3
BH23-12	206.0	Sandy Silt /Sand and Gravel/Clayey Silt Till	500	750	1.5	204.5
BH23-13	206.3	Clayey Silt Till	200	300	1.5	204.8
		Sandy Silt /Silty Sand	150	225	4.0	202.3
			400	600	6.1	200.2
		Silt	500	750	15.2	191.1
BH23-14	206.4	Clayey Silt Till	400	600	2.0	204.4
		Sandy Silt/Silt	500	750	6.1	200.3

BH23-15	206.2	Clayey Silt Till Clayey Silt Till/Silt	300 500	450 750	3.4 7.8	202.8 198.4
BH23-16	206.6	Clayey Silt Till Sandy Silt/Silt	200 300 500	300 450 750	2.1 3.0 6.1	204.5 203.6 200.5
BH23-17	205.9	Clayey Silt Till Sandy Silt/Silty Sand	300 500	450 750	1.5 3.0	204.4 202.9
BH23-18	208.5	Clayey Silt Till Clayey Silt Till/Sandy Silt	300 500	450 750	5.0 6.1	203.5 202.4
BH23-19	209.5	Clayey Silt Till Silty Sand	300 500	450 750	5.0 18.6	204.5 190.9
BH23-20	204.6	Clayey Silt Till Silt	200 300 500	300 450 750	1.5 6.1 12.2	203.1 198.5 192.4
BH23-21	205.7	Clayey Silt Till Sandy Silt to Silty Sand	300 500	450 750	2.0 3.6	203.7 202.1
BH23-22	210.4	Clayey Silt Till Silt Gravelly Sand	200 150 500	300 225 750	6.6 11.5 15.2	203.8 198.9 195.2
BH23-23	204.7	Clayey Silt Till Sandy Silt Till	300 500	450 750	2.3 9.4	202.4 195.3
BH23-24	206.4	Clayey Silt Till	300 500	450 750	1.5 6.1	204.9 200.3
BH23-25	206.1	Clayey Silt Till Sandy Silt	300 500	450 750	2.0 4.6	204.1 201.5
BH23-26	204.3	Clayey Silt Till Sandy Silt Till	300 500	450 750	1.5 9.0	202.8 195.3
BH21-1	208.3	Clayey Silt Till Sandy Silt Till	200 150 300	300 225 450	2.0 5.5 7.6	206.3 202.8 200.7
BH21-2	206.6	Clayey Silt Till Silt Clayey Silt Till	200 150 200 500	300 225 300 750	2.0 4.0 6.1 9.1	205.6 203.6 201.5 198.5
BH21-3	206.3	Sandy Silt Silt	300 500	450 750	2.3 7.6	204.3 199.0
BH21-4	205.5	Clayey Silt Till	300	450	2.0	204.3
BH21-5	210.5	Clayey Silt Till	300	450	2.0	203.5

		Sandy Silt Till	500	750	7.6	197.9
BH21-6	208.3	Clayey Silt Till Sandy Silt Sandy Silt Till	200 150 500	300 225 750	6.2 10.0 12.5	204.3 200.5 198.0

It should be noted that in Boreholes BH23-3, BH23-9, BH23-13, BH23-22, BH21-1, BH21-2, and BH21-6 weaker soils are anticipated below depths 7.0 m, 4.0 m, 4.0 m, 11.5 m, 5.5 m, 4 m and 10 m, respectively. The designer must ensure that the lower weaker soil is not overstressed if footing is founded at the upper stronger soil. A load spread of 2 vertical to 1 horizontal can be assumed below footings to calculate the stress at depth below.

4.2 Drilled Caissons

Alternatively, for the proposed buildings with up to 4 levels of basement, drilled caissons founded in shale bedrock can also be adopted to support the proposed structures.

For compression capacity of the caissons in sound bedrock, the bearing capacity can consist of end bearing capacity and skin friction bearing capacity.

The end bearing capacity for the caissons in sound bedrock at minimum 2.0 m below the bedrock surface can be designed for 5.0 MPa at SLS and 7.0 MPa at ULS.

The skin friction bearing capacity can be calculated using skin friction values of 0.5 MPa at SLS and 0.7 MPa at ULS between caisson shaft and sound bedrock. Sound bedrock is considered to be 2.0 m below bedrock surface. The skin friction in the top 2.0 m weathered bedrock and in the soils must be ignored. The skin friction capacity will increase with the caisson socket depth in bedrock. The total bearing capacity (skin friction + end bearing) of the caissons should not exceed 12 MPa at SLS and 17 MPa at ULS.

Due to the presence of hard limestone/siltstone layers in the bedrock, bedrock coring will be required for the installation of the caissons.

For closely spaced caissons, group effect should be considered on the skin friction bearing capacity, using a reduction factor (Beta), Beta = 0.5 + 0.5*X/(2.5B). In the equation, X represents the centre-to-centre distance between adjacent caissons, and B is the diameter of the caissons. If the centre-to-centre distance between the adjacent caissons is equal to or greater than 2.5 times its diameter (2.5B), the group effect on skin friction bearing capacity can be ignored. Group effect on end bearing capacity of caissons can be ignored.

The presence of groundwater table in the overburden soils overlying the shale bedrock will make the construction of the caissons difficult. An oversize liner will be required and must be sealed in the underlying bedrock. Sealing of the liner will be difficult where limestone layers are present at the surface above the shale and coring of the limestone layer will be required to advance the casing. All caisson holes and bases must be inspected by this office on full time basis to ensure that the caisson

bases are founded on sound bedrock and free from mud and loose/disturbed materials. The side of the caisson holes in bedrock must be clean and free from mud and other unsuitable materials to ensure that the design skin friction between the bedrock and the caisson concrete can be achieved. The caisson holes and bases can be inspected by down-hole camera. Tremie method will be required if the concrete is poured below water.

4.3 Other Comments of Foundations

The above noted bearing capacity values provided in Sections 4.1 and 4.2 are preliminary and must be verified once the design has been finalized/refined with exact numbers of basement and number of storey of the proposed buildings and the locations of the buildings. Additional boreholes may be required once the final design and finish floor elevations are available.

Foundations designed to the specified bearing capacities at the serviceability limit states (SLS) are expected to settle less than 25 mm total and 19 mm differential.

Dewatering will be required for foundation installation below groundwater.

All footing bases must be inspected by this office prior to pouring concrete.

Where it is necessary to place footings in soils at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing.

All foundations exposed to seasonal freezing conditions must have at least 1.2 m of soil cover for frost protection.

In the vicinity of the existing buried utilities, all footings must be lowered to undisturbed native soils, or alternatively the services must be structurally bridged.

Prior to placing concrete, all foundation bases must be inspected by qualified geotechnical personnel to confirm the design bearing value. The drilling contractor must provide evidence that the caisson bases are clean from any mud and water prior to pouring the concrete.

It should be noted that the recommended bearing capacities have been calculated by DS from the borehole information for the preliminary design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by DS to validate the information for use during the construction stage.

5. FLOOR SLAB AND PERMANENT DRAINAGE

Feasibility studies of permanent underfloor drainage and perimeter drainage were carried out in the hydrogeological investigation, to estimate seepage rates into the permanent drainage systems. If it is not feasible to install permanent underfloor and perimeter drainages, tanked basement structures can be considered.

If it is feasible to install perimeter and underfloor drainages, the basement floor slab can be supported on grade provided all fill and surficially loose/softened soils are removed and the base thoroughly proof rolled. The fill required to raise the grade can consist of inorganic soil, placed in shallow lifts, and compacted to 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

A moisture barrier consisting of at least 200 mm of 19 mm clear crushed stone should be installed under the floor slab. A perimeter and underfloor drainage system will be required. Typical drainage and backfill recommendations are illustrated on **Drawings 42 and 43** for shored excavation system and **Drawing 44** for open cut excavation.

The exposed subgrade will consist of cohesionless silty and sandy soils below the water table; all openings including the subgrade must be covered or wrapped with filter fabric, typically a Class II non-woven textile with a filtration opening size (F.O.S.) of 50 to 100 µm. Above the filter fabric, we recommend that 60 mm thick concrete sand be placed to prevent the loss of silt fines through the filter fabric. It is imperative that both the filter fabric and concrete sand are placed on the subgrade.

6. ELEVATOR PITS AND SUMP PITS

It is anticipated that some elevator pits and sump pits will be installed in cohesionless deposits of sand, silt, sandy silt to silty sand below the groundwater table. In this case, drainage systems at the base level of the pits are not recommended, due to the concern of loss of fines. The pits can be designed as water-tight structures, and water pressure on the pit walls and the slab should be considered, assuming the water table at about 0.3m below the adjacent basement floor.

7. FROST PROTECTION

All footings/caissons exposed to seasonal freezing conditions must have at least 1.2 metres of soil cover for frost protection.

There is no official rule governing the required founding depth for footings below unheated basement floors. Certainly, it will not be greater than the 1.2 m required in Southern Ontario for exterior footings. Un-monitored experience indicates that a shallower depth ranging from 0.82 to 0.9 m for interior column footings and 0.6 m for wall footings has been successful where 2 or more basement levels apply. The 0.82 m depth is believed to be close to the minimum structural requirement for interior column footings. Adjacent to air shafts and entrance and exit doors, a footing depth of 1.2 m below floor level is required or, alternatively, insulation protection must be provided.

It is also emphasized that underfloor drainage and/or an adequate free draining gravel base is required to minimize the risk of floor dampness. Floor dampness could lead to temporary icing and the risk of accidents.

8. EXCAVATIONS AND BACKFILL

Excavations can be carried out with heavy hydraulic backhoe. The groundwater table was found to be at a depth ranging from 6.69 to 13.0 m below ground surface corresponding to Elev. 197.5 m to 200.4m in the boreholes. Positive dewatering such as well points will be required prior to any excavation below the groundwater table. The groundwater table must be lowered to at least 1.0 m below the excavation base. A contractor specializing in dewatering should be retained to design the dewatering systems.

Dewatering will also be required for shoring lagging in the cohesionless deposits below the groundwater table.

DS has carried out a hydrogeological investigation at the subject site in conjunction with the geotechnical investigation which will comment on the type and extent of the groundwater control (both temporary and permanent drainage) required at this site.

For buildings with deep basement below groundwater, especially with three or more levels of basement, consideration should be given to installing a continuous cut-off caisson wall at least 1.5 m into bedrock along the perimeter walls to cut-off the groundwater seepage from the cohesionless deposits of silty sand to sandy silt, silt, sand, sand and gravel to sandy gravel/gravelly sand.

It should be noted that the native soils may contain boulders. Large obstructions may also be present in the fill materials. Provisions must be made in the excavation contract for the removal of boulders in the till and large obstructions in the fill material.

All excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, the existing fill and native firm to stiff clayey silt to silty clay (till) can be classified as Type 3 Soil above the groundwater table and Type 4 Soil below the groundwater table. The very stiff to hard clayey silt to silty clay till can be classified as Type 2 Soil above the groundwater table and Type 3 Soil below groundwater table. The cohesionless sandy deposits (sandy silt to silty sand till, sand, silt, sandy silt to silty sand, sand and gravel, sandy gravel/gravelly sand) can be classified as Type 3 Soil above the groundwater table and Type 4 Soil below the groundwater table.

Select inorganic suitable fill material and the native soils free from topsoil and organics can be used as general construction backfill where it can be suitably compacted, provided its moisture content is within 2 percent of its optimum. Depending on the time of construction and weather, some excavated material may be too wet to compact and will require aeration prior to its use. Loose lifts of soil, which are to be compacted, should not exceed 200 mm.

The excavated soils are not considered to be free draining. Where free draining backfill is required, imported granular fill such as OPSS Granular B should be used.

It should be noted that the excavated soils are subject to moisture content increase during wet weather which would make these materials too wet for adequate compaction. Stockpiles should be compacted at the surface or be covered with tarpaulins to minimize moisture uptake.

9. TEMPORARY SHORING

The proposed excavations may be supported by a temporary shoring system consisting of timber lagging and soldier piles. A tightly braced caisson wall may be required to support adjacent structures. The requirement for caisson walls to support adjacent structures is given on **Drawing 45**.

Dewatering will be required for shoring lagging in cohesionless (sandy) soils below groundwater table.

For buildings with deep basement below groundwater table, consideration should be given to a continuous caisson wall to cut off the water seepage from cohesionless deposits of sandy silt to silty sand, silt, sand, sand and gravel to sandy gravel/sandy gravel, by extending the caisson wall 1.5 m into the bedrock.

The shoring system must be designed in accordance with the 4th Edition of the Canadian Foundation Engineering Manual. The surcharge loading from adjacent structures must be considered. The soil parameters estimated to be applicable for this design are as follows:

1) Earth Pressure Coefficients for shoring

   (a) where movement must be minimal K=0.45

   (b) where minor movement (.002H) can be tolerated K=0.30

   (c) passive earth pressure for soldier piles (unfactored) Kp=3.0

2) For stability check

   $\phi = 30^\circ$

   c= 0

   $\gamma = 21\ kN/m^3$

   Surcharge is to be determined by shoring contractor

3) For rock anchors

   An allowable bond stress of 600 kPa for sound shale bedrock can be used for the design of anchors.

An allowable bond value of 75 to 100 kPa is suggested for post grouted anchors in the very stiff to hard and dense to very dense deposits. However, these suggested bond values are preliminary since the

contractor's installation methods and grouting procedures will determine the actual soil to concrete bond value. Hence, the contractor must decide on a capacity and confirm its availability by field load testing. All anchors must be tested as indicated in the Foundation Manual, 4th Edition.

The soldier piles should be installed in pre-augered holes taken below the deepest excavation. The holes should be filled with concrete below the excavation level and half bag mix above the base of the excavation. The concrete strength must be specified by the shoring designer. Temporary liners will be required to help prevent the sandy deposits from caving during the installation period. Positive measures may be required to prevent the loss of soil through the spaces between the lagging boards. This could probably be achieved by placing well-graded sand and gravel behind the lagging boards or by installing a geotextile filter cloth.

Soil anchors will be required to support the shoring. The anchors must be of a length that meets the Canadian Foundation Manual recommendations. It is important to note that the minimum length lies beyond the 45 - $\phi/2$ + .15H line drawn from the base of the soldier pile and the overall stability of the system must be checked at each anchor level.

The top anchor must not be placed lower than 3.0 metres below the top of level ground surface. Anchors will require casing when penetrating through wet sand and silt layers.

Adhesion on the buried caisson shaft or behind the shoring system must be neglected when designing this shoring system.

Movement of the shoring system is inevitable. Vertical movements will result from the vertical load on the soldier piles resulting from the inclined tiebacks and inward horizontal movement resulting from earth and water pressures. The magnitude of this movement can be controlled by sound construction practices, and it is anticipated that the horizontal movement will be in the range of 0.1 to 0.25% of shoring height (H). Vertical movements increase the horizontal movements because of the reduced stress in the inclined anchors and must be kept well below this value.

To ensure that movements of the shoring are within an acceptable range, monitoring must be carried out. Vertical and horizontal targets on the soldier piles must be located and surveyed before excavation begins.

Weekly readings during excavation should show that the movements will be within those predicted; if not, the monitoring results will enable directions to be given to improve the shoring.

10. EARTH AND WATER PRESSURES

The lateral earth and water pressure acting at any depth on basement walls can be calculated as follows:

In soils above the groundwater table ($z < d_w$):

$$p = K (\gamma z + q)$$

In soils below the groundwater table ($z \geq d_w$):

$$p = K \{\gamma\, d_w + \gamma_1 (z - d_w) + q\} + p_w$$

$$\text{In which, } p_w = \gamma_w (z - d_w)$$

where p	=	lateral earth and water pressure in kPa acting at a depth of z below ground surface
K	=	earth pressure coefficient, K=0.4
γ	=	unit weight of soil above groundwater table, assuming γ = 21 kN/m^3
γ_1	=	submerged unit weight of soil below groundwater table, assuming γ_1 = 11 kN/m^3
γ_w	=	unit weight of water, assuming γ_w = 9.8 kN/m^3
z	=	depth below ground surface to point of interest, in metres
d_w	=	depth of groundwater table below ground surface, in metres
q	=	value of surcharge in kPa
p_w	=	hydrostatic water pressure in kPa

When the basement wall is poured against the shoring caisson wall, the basement wall as well as the shoring caisson wall should be designed for hydrostatic pressure, even though a drainage board is provided between the basement wall and the caisson wall.

11. EARTHQUAKE CONSIDERATIONS

Based on the existing borehole information and according to Table 4.1.8.4.A of OBC 2012, the subject site for the proposed building with up to three or four levels of basement can be classified as “Class D” for seismic site response.

For some proposed buildings, it may be possible to classify the site as ‘Class C’, provided field seismic shear wave velocity measurement is to be carried out at the site to confirm the ‘Class C’ classification.

12 GENERAL COMMENTS AND LIMITATIONS OF REPORT

DS Consultants Ltd. (DS) should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, DS will assume no responsibility for interpretation of the recommendations in the report.

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to DS at the time of preparation. Unless otherwise agreed in writing by DS, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the test hole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

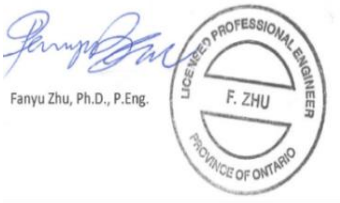
The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

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. DSCL accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

DS CONSULTANTS LTD

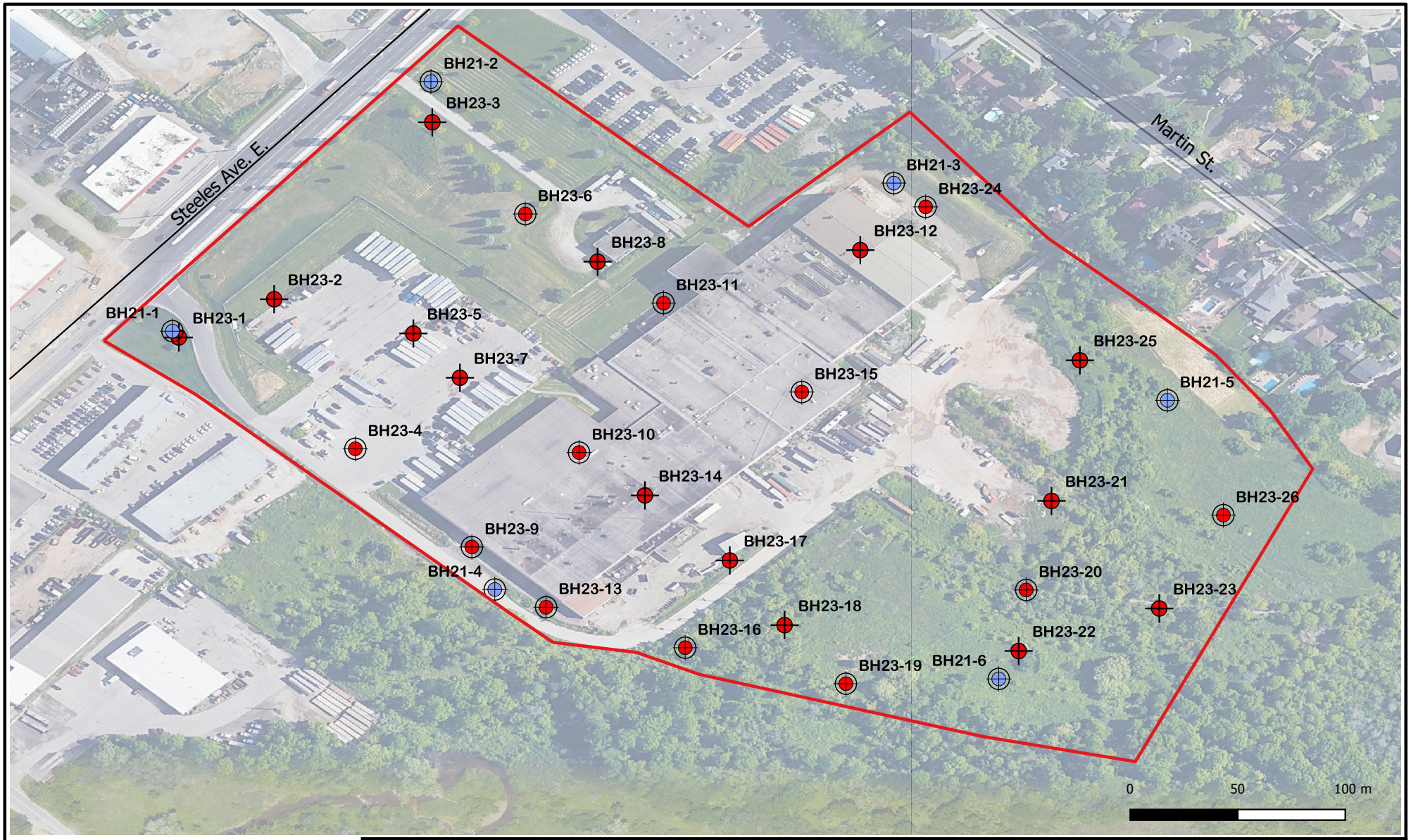
Osbert (Ozzie) Benjamin, P.Eng.
Senior Geotechnical Engineer



Fanyu Zhu, Ph.D., P.Eng.
Principal Engineer

Shabbir Bandukwala, M.Eng., P.Eng.
Principal Engineer

Drawings



Legend

- Approx Site Boundary
- Monitoring Well (Drilled 2021)
- Borehole (Drilled 2023)
- Monitoring Well (Drilled 2023)

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Project: GEOTECHNICAL INVESTIGATION
150 Steeles Avenue East, Milton, ON

Title: **BOREHOLE LOCATION PLAN**

N

Client: NEATT COMMUNITIES

Size:	Approved By:	Drawn By:	Date:
8.5 x 11	O.B	K.T	May 2023
Rev: 0	Scale: As Shown	Project No.: 21-122-106	Figure No.: 1

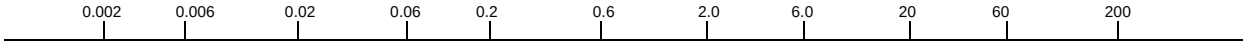
Image/Map Source: *Google Satellite Image*

Drawing 1A: Notes On Sample Descriptions

1. All sample descriptions included in this report generally follow the Unified Soil Classification. Laboratory grain size analyses provided by DSCL also follow the same system. Different classification systems may be used by others, such as the system by the International Society for Soil Mechanics and Foundation Engineering (ISSMFE). Please note that, with the exception of those samples where a grain size analysis and/or Atterberg Limits testing have been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

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LOG OF BOREHOLE BH23-1

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818975.16 E 589155.56

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-26-2023

REF. NO.: 21-122-106
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
208.3					
0.0	**FILL:** surface vegetation over clayey silt, trace sand, trace gravel, brown, moist, firm to hard	1	SS	6	
	mixed with crusher run limestone,	2	SS	40	
206.7	dark brown to black at 0.8m				
1.6	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, trace weathered shale pieces, brown, moist, stiff to hard	3	SS	14	
		4	SS	20	
		5	SS	23	
		6	SS	39	Switched to Mud Rotary
	boulders inferred at 6.1m	7	SS	15	
	boulders inferred at 7.6m	8	SS	16	
	rock fragments at 9.1m	9	SS	50/ 150mm	
197.6					
10.7	**SILT:** some sand to sandy, trace clay, trace gravel, brown, wet, dense to very dense	10	SS	62	
		11	SS	66	
		12	SS	32	
		13	SS	50	
191.5					
16.8	**SANDY SILT:** trace clay, brown, wet, very dense	14	SS	73	
190.0					
18.3	**SAND:** some gravel, trace silt, reddish brown, wet, very dense	15	SS	60	
188.7					
19.6	**SHALE BEDROCK:** Queenston Formation, reddish brown,	R1	RC		
188.1					
20.2	weathered TCR=83%, SCR=62%, RQD=25% Hard layers=8%, Maximum hard layer thickness=25mm	R2	RC		
186.6					
21.7	TCR=98%, SCR=86%, RQD=75% Hard layers=13%, Maximum hard layer thickness=50mm	R3	RC		
185.1	TCR=98%, SCR=90%, RQD=90%				
23.2	Hard layers=12%, Maximum hard layer thickness=50mm				
	END OF BOREHOLE:				
	Notes:				
	1) Water at depth of 10.7m during				

GROUND WATER CONDITIONS

ELEVATION: 208, 206, 204, 202, 200, 198, 196, 194, 192, 190, 188, 186

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

LOG OF BOREHOLE BH23-1

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818975.16 E 589155.56

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-26-2023

REF. NO.: 21-122-106
ENCL NO.: 2

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m							GR SA SI CL
	drilling.											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH23-2

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4819000.74 E 589199.81

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Mar-29-2023

REF. NO.: 21-122-106
ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
207.2 / 0.0	**FILL:** silty clay, trace rootlets, trace gravel, trace sand, brown, moist, firm	1	SS	6	
		2	SS	7	
205.0 / 2.2	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, occasional cobble, brown, moist, very stiff to hard	3	SS	6	
		4	SS	33	
		5	SS	36	
	grey below 4.5m	6	SS	16	
		7	SS	30	
199.7 / 7.5	**SANDY SILT TILL:** trace clay, trace gravel, brown, moist, dense	8	SS	43	Switched to mud rotary
198.2 / 9.0	**SILT:** trace to some clay, trace sand, trace gravel, brown, moist to wet, dense to very dense	9	SS	78	
	grey to brown at 10.6m sandy silt layer at 10.9m	10	SS	64	
	reddish brown, wet at 12.0m	11	SS	30	0 1 95 4
193.6 / 13.6	**SANDY SILT TILL:** trace clay, some gravel, reddish brown, moist to very moist, very dense	12	SS	52	
192.0 / 15.2	**GRAVELLY SAND:** trace clay, some silt, reddish brown, wet, very dense	13	SS	50/ 150 mm	34 50 13 3
	no recovery at 16.8 m	14	SS	50/ 25 mm	
188.9 / 18.4	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	15	SS	50/ 25 mm	
	END OF BOREHOLE:				

Notes:
1) Water at the depth of 9.0m during drilling.

ELEVATION: 206, 204, 202, 200, 198, 196, 194, 192, 190

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100
SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE; 20 40 60 80 100
PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%): 10 20 30
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-3

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4819114.98 E 589271.5

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-13-2023

REF. NO.: 21-122-106
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
207.3												
0.0 / 205.8	**FILL:** silty clay to clayey silt, trace rootlets, trace gravel, trace sand, brown, moist, stiff		1	SS	12							
			2	SS	12		206					
1.5 / 203.9	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace to some gravel, occasional cobble, brown, moist, very stiff to hard		3	SS	26							
			4	SS	27							
3.4 / 202.4	**SILTY SAND:** trace clay, trace gravel, brown, moist, dense		5	SS	49		204					
4.9 / 200.3	**SAND:** some silt, trace gravel, trace clay, brown, wet, compact to dense		6	SS	34							
			7	SS	25		202					1 77 17 5
7.0 / 198.3	**SILT:** trace clay, trace sand, grey, wet, loose		8	SS	9		200					
9.0 / 196.6	**SANDY SILT TILL:** trace clay, some gravel, grey, wet, compact		9	SS	19		198					
10.7 / 195.2	**SILT:** trace sand, trace clay, grey to brown, wet, very dense		10	SS	62		196					
12.1 / 192.0	**SANDY SILT TILL:** trace clay, trace to some gravel, reddish brown, moist, very dense trace shale fragments at 13.7m		11	SS	50/ 130mm		194					
			12	SS	50/ 100mm							
15.4	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered		13	SS	50/ 50mm		192					
	END OF BOREHOLE:											

Notes:
1) Water encountered at 5.5m during drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-4

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818905.77 E 589238.19

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-12-2023

REF. NO.: 21-122-106
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"
206.7 / 0.0	**FILL:** silty sand, black staining, some organics, black, moist, compact	1	SS	12
205.8 / 0.9	**FILL:** silty clay, trace gravel, trace sand, brown, moist, stiff	2	SS	19
2	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, occasional cobble, brown, moist, very stiff to hard	3	SS	27
		4	SS	45
4		5	SS	33
202.2 / 4.5	**SILT:** trace clay, brown, wet, compact	6	SS	21
200.7 / 6.0	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, hard	7	SS	38
199.2 / 7.5	**SILT:** trace sand, trace clay, brown, wet, compact to very dense	8	SS	69
10		9	SS	44
12 / 194.6		10	SS	27
12.1	**SILTY SAND:** trace clay, some gravel, brown, wet, dense	11	SS	34
193.1 / 13.6	**SANDY SILT TILL:** trace clay, some gravel, occasional cobble, reddish brown, moist to wet, dense	12	SS	39
14 / 191.6 / 15.1	**SILT:** trace sand, trace clay, reddish brown, wet, very dense	13	SS	75
16 / 190.1 / 16.6	**SANDY SILT TILL:** trace clay, occasional cobbles, reddish brown, wet, very dense	14	SS	50/ 152mm
18 / 188.5 / 188.2	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	15	SS	50/ 76mm
18.4	**END OF BOREHOLE:**			

Notes:
1) 50mm. dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water Level(mbgl):
May 9, 2023	8.65

W. L. 198.0 m
May 09, 2023

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
0	9	88	3

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-5

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818979.41 E 589264.69

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Mar-29-2023

REF. NO.: 21-122-106
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
207.1 / 0.0	**FILL:** silty sand mixed with asphalt, trace gravel, black, moist, compact	1	SS	16	
206.7 / 0.4					
206.2 / 0.9	**FILL:** silty clay, trace sand, trace gravel, brown, moist, very stiff	2	SS	24	206
2	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown, moist, very stiff to hard	3	SS	24	
		4	SS	30	204
4		5	SS	44	
202.6 / 4.5	**SANDY SILT:** trace clay, trace gravel, brown, moist, dense	6	SS	46	202
6					
200.8 / 6.3	clayey silt seam at 6.1m	7	SS	75	
	SILT: trace to some clay, trace sand, brown to grey, wet, dense to very dense				200
8	brown below 7.6m	8	SS	52	
		9	SS	65	198
10					
		10	SS	42	196
12		11	SS	36	
					194
14		12	SS	81	
192.0 / 15.1	**GRAVELLY SAND:** trace clay, reddish brown, wet, very dense	13	SS	63	192
16					
190.4 / 16.8	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	14	SS	50/130mm	
	END OF BOREHOLE: Notes: 1) Water at depth of 6.3m during drilling.				

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Switched to Mud Rotary

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH23-6

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4819056.32 E 589315.49

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-03-2023

REF. NO.: 21-122-106
ENCL NO.: 7

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GR SA SI CL
208.0					
0.0	**FILL:** silty clay, trace sand, trace gravel, brown, moist, firm to stiff	1	SS	9	
		2	SS	5	
2 205.7		3	SS	4	
2.3	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown, moist, very stiff to hard	4	SS	28	
		5	SS	39	
4					
		6	SS	49	
6 202.0					
6.0	**SILT:** some clay, trace sand, brown, wet, compact	7	SS	29	
8		8	SS	28	
199.0					
9.0	**SILTY SAND:** some gravel to gravelly, trace clay, brown, wet, compact to very dense	9	SS	27	
10					
		10	SS	66	
12 195.9					
12.1	**SANDY SILT TILL:** some clay, trace gravel, reddish brown, moist, very dense	11	SS	50/ 100 mm	8 33 49 10
194.3					
14 193.7	**GRAVELLY SAND:** trace clay,	12	SS	50/ 50mm	
14.1	reddish brown, wet, very dense				
	CLAYEY SILT TILL/SHALE COMPLEX: sandy, trace gravel, reddish brown, moist, hard	13	SS	50/ 50mm	
192.6					
15.4	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered				
16 191.5					
16.5	TCR=98%, SCR=68%, RQD=25%	R1	RC		
190.7	Hard layers=10%, Maximum hard layer thickness=25mm				
17.3	TCR=94%, SCR=84%, RQD=49%	R2	RC		
18 189.2	Hard layers=25%, Maximum hard layer thickness=75mm				
18.8	TCR=96%, SCR=90%, RQD=83%	R3	RC		
	Hard layers=18%, Maximum hard layer thickness=150mm				
20 187.8					
20.2	**END OF BOREHOLE:**				
	Notes:				
	1) 50mm dia. monitoing well installed upon completion.				
	2) Water Level Readings:				
	Date: Water Level (mbgl):				
	May 9, 2023 9.48				

GROUND WATER CONDITIONS: W. L. 198.5 m, May 09, 2023

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH23-7

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818951.06 E 589286.17

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Mar-31-2023

REF. NO.: 21-122-106
ENCL NO.: 8

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
207.0					
0.0 / 206.2	**FILL:** silty sand with asphalt, trace gravel, dark brown, moist, dense	1	SS	38	
0.8 / 205.5	**FILL:** silty clay, trace gravel, brown, moist, very stiff	2	SS	24	
1.5	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown, moist, very stiff to hard	3	SS	26	
		4	SS	41	
		5	SS	45	
4 / 202.5					
4.5 / 201.0	**SILTY SAND:** trace clay, silt seams, brown, moist, compact	6	SS	29	Switched to mud rotary
6.0 / 199.5	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, hard	7	SS	70	
7.5	**SILT:** trace clay, trace sand, brown, moist to wet, dense to very dense	8	SS	91	
	wet below 9.0m	9	SS	50/ 130mm	
10		10	SS	52	
12	reddish brown below 12.2m	11	SS	39	
193.3					
13.7	**SANDY SILT TILL:** some clay to clayey, trace to some gravel, reddish brown, wet to very moist, very dense	12	SS	50	
		13	SS	50/ 150mm	
16 / 190.2					
190.8 / 16.9	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	14	SS	50/ 100mm	
	END OF BOREHOLE: Notes: 1) Water encountered at depth of 9.0m during drilling.				

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)
ELEVATION: 206 204 202 200 198 196 194 192
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH23-8

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4819026.37 E 589349.02

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-13-2023

REF. NO.: 21-122-106
ENCL NO.: 9

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
207.5												
207.3 0.2	**GRANULAR FILL:** sand and gravel,180mm		1	SS	18							
206.6 0.9	**FILL:** silty clay, trace sand, trace gravel, brown, moist, very stiff		2	SS	22		206					
2	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace to some gravel, occasional cobble, brown, moist, very stiff to hard		3	SS	24							
			4	SS	37		204					11 27 43 19
4 203.0			5	SS	36							
4.5	**SILT:** trace clay, trace sand, brown, wet, dense		6	SS	32		202					
6 201.5 6.0	**SILTY SAND:** trace clay, brown, moist to wet, compact		7	SS	29							
8	wet below 7.6m		8	SS	19		200					
198.5 9.0	**SAND AND GRAVEL:** silty, brown, wet, dense		9	SS	42		198					
10 196.9 10.6	**SILT:** trace sand, trace clay, brown, wet, very dense		10	SS	75		196					
12 195.4 12.1	**SILTY SAND:** trace clay, reddish brown, wet, very dense		11	SS	77							
193.9 14 13.6	**GRAVELLY SAND:** trace silt, brown, wet, very dense		12	SS	50/ 150mm		194					
192.4 15.1	**CLAYEY SILT TILL:** sandy, trace to some gravel, reddish brown, moist, hard		13	SS	50/ 130mm		192					
16 190.8 190.6 16.9	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered		14	SS	50/ 25mm							
	END OF BOREHOLE: Notes: 1) Water at depth of 4.5m during drilling.											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH23-9

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818843.68 E 589293.67

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-03-2023

REF. NO.: 21-122-106
ENCL NO.: 10

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
206.2					
206.0 0.2	**FILL:** sand and gravel, trace cobble, brown, moist, compact	1	SS	18	
205.3 0.9	**FILL:** clayey silt, brown, moist, very stiff	2	SS	23	
2	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown, moist, stiff to hard silt layers below 2.3m	3	SS	41	
		4	SS	26	
		5	SS	26	
4					
		6	SS	9	Switched to mud rotary
	brown below 5.1m				
6	wet silt layer at 6.0m	7	SS	12	
198.7					
7.5	**SAND AND GRAVEL:** trace silt, brown, wet, very dense	8	SS	50	
8 197.2					
9.0	**SILTY SAND:** some gravel to gravelly, trace clay, brown, wet, dense to very dense	9	SS	58	
10		10	SS	38	
12 194.2					
12.0	**GRAVELLY SAND:** trace silt, brown to reddish brown, wet, very dense	11	SS	64	
192.5					
14 13.7	**SILTY SAND TILL:** trace clay, trace gravel, brown to reddish brown, wet, compact to dense	12	SS	38	5 65 27 3
	gravelly sand seams, reddish brown at 15.2m	13	SS	29	
16 190.0					
16.2	**CLAYEY SILT TILL/SHALE COMPLEX:** sandy, trace gravel, reddish brown, moist, hard	14	SS	50/75mm	
189.2					
189.0 17.1	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	R1	RC		
188.4 18 17.8	TCR=83%, SCR=0%, RQD=0% Hard layer=12%, Maximum hard layer thickness=50mm	R2	RC		
186.9 19.3	Fragmented zone TCR=40%, SCR=23%, RQD=15% Hard layer=6%, Maximum hard layer thickness=50mm	R3	RC		
20 185.9 20.3	TCR=98%, SCR=98%, RQD=71% Hard layer=21%, Maximum hard layer thickness=75mm	R4	RC		
184.4 21.8	TCR=95%, SCR=95%, RQD=95% Hard layer=28%, Maximum hard layer thickness=75mm				
	END OF BOREHOLE: Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings:				

W. L. 197.7 m
May 09, 2023

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

ELEVATION: 206 204 202 200 198 196 194 192 190 188 186

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH23-9

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818843.68 E 589293.67

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-03-2023

REF. NO.: 21-122-106
ENCL NO.: 10

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT (w_P w w_L) WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%)
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m							GR SA SI CL
	Date: Water Level(mbgl): May 9, 2023 8.55											

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH23-10

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818904.21 E 589342.87

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-06-2023

REF. NO.: 21-122-106
ENCL NO.: 11

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
206.2					
0.0 / 205.3	**FILL:** sandy silt, trace gravel, brown, moist, compact	1	SS	12	206
0.9	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, occasional cobble, brown, moist, very stiff to hard	2	SS	21	
2 / 204.0		3	SS	33	
2.2	**SILT TO SANDY SILT:** trace clay, brown, moist, dense to very dense	4	SS	38	204
4		5	SS	50/ 150mm	
201.3					
4.9	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, hard	6	SS	50/ 100mm	202
6 / 200.1					
6.1	**SANDY SILT:** trace clay, brown, moist, very dense	7	SS	77	200
	wet below 7.5m	8	SS	70	
8 / 197.2					198
9.0	**SILT:** trace clay, brown, wet, dense	9	SS	47	
10					196
		10	SS	37	
12 / 194.2					
12.0	**GRAVELLY SAND:** trace silt, greyish brown, wet, dense	11	SS	31	194
192.5					
14 / 13.7	**SANDY SILT:** trace clay, brown, wet, very dense	12	SS	55	192
191.0					
15.2	**SANDY SILT TILL:** some clay, some gravel, reddish brown, wet to moist, very dense	13	SS	50/ 75mm	
16		14	SS	50/ 75mm	190
188.7					
188.6 / 17.6	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	15	SS	50/ 25mm	
	END OF BOREHOLE:				

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water level(mbgl):
May 9, 2023	8.43

W. L. 197.8 m
May 09, 2023

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)				
GR	SA	SI	CL	
0	30	64	6	
				Switched to Mud Rotary

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ 3=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-11

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4819000.84 E 589380.1

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-28-2023

REF. NO.: 21-122-106
ENCL NO.: 12

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
206.4					
0.0 / 205.6	**FILL:** silty clay mixed with crusher run limestone, trace sand, brown, moist, stiff	1	SS	13	206
0.8	**CLAYEY SILT TO SILTY CLAY TILL:** trace sand, trace gravel, brown to reddish brown, moist, very stiff	2	SS	23	
2	silt pockets at 2.3m	3	SS	25	
203.3		4	SS	28	204
3.1	**SILT:** trace to some sand, trace clay, trace gravel, brown, moist, dense	5	SS	49	
4 / 201.8					
4.6	**SANDY SILT:** trace clay, trace to some gravel, brown, moist, dense	6	SS	36	202
6 / 200.4					
6.0	**CLAYEY SILT TILL:** sandy, some gravel, very moist to wet gravelly sand and silty sand pockets/seams, trace clay, brown, moist, hard	7	SS	44	
8	50mm wet gravelly sand at 7.6m wet gravelly sand layer at 7.9m	8	SS	58	200
197.3					
9.1	**SILT:** trace sand, trace gravel, trace clay, brown, wet, very dense	9	SS	50/ 50mm	
10 / 195.5					196
10.9	**SANDY SILT TILL:** some clay, trace to some gravel, reddish brown, wet, very dense	10	SS	50/ 75mm	
12	cobble/boulder at 12.2m	11	SS	50/ 75mm	194
14		12	SS	50/ 50mm	
191.2					192
191.2 / 15.3	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	13	SS	50/ 50mm	
	END OF BOREHOLE:				

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date: Water Level(mbgl):
May 9, 2023 8.26

W. L. 198.2 m
May 09, 2023

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Switched to Mud Rotary

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-12

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4819035.74 E 589471.62

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-18-2023

REF. NO.: 21-122-106
ENCL NO.: 13

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
206.0					
0.0 / 205.0	**FILL:** silty clay, trace gravel, brown, moist, firm crushed stones at 0.8m	1	SS	5	
1.0	**SANDY SILT:** trace clay, trace gravel, brown, moist, loose to very dense	2	SS	7	
		3	SS	47	204
		4	SS	42	
4 / 201.5		5	SS	65	202
4.5 / 200.0	**SAND AND GRAVEL:** some silt, brown, moist, very dense	6	SS	50/ 130mm	
6.0	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, hard	7	SS	37	200
8 / 197.0		8	SS	50/ 130mm	198
9.0	**SANDY SILT TILL:** trace clay, trace to some gravel, silt layers, brown to reddish brown, wet, very dense	9	SS	50/ 150mm	
10		10	SS	50/ 25mm	196
12 / 194		11	SS	50/ 75mm	
192.3					
192.2 / 13.8	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	12	SS	50/ 50mm	
	END OF BOREHOLE:				

Notes:
1) Water at depth of 9.0m during drilling.

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
	8	25	50	17

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ● ε_f=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-13

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818805.29 E 589328.75

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-04-2023

REF. NO.: 21-122-106
ENCL NO.: 14

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m
206.3				
0.0 / 205.4	**FILL:** sand and gravel mixed with clayey silt, trace cobble, some sand, brown, moist, very stiff	1	SS	19
0.9	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace to some gravel, brown, moist, stiff to hard	2	SS	26
		3	SS	26
		4	SS	29
		5	SS	33
	wet silt layer at 4.5 m	6	SS	12
200.3				
6.0	**SANDY SILT TO SILTY SAND:** trace clay, trace gravel, brown, moist, dense to very dense	7	SS	33
	gravelly at 7.5m	8	SS	50/ 150mm
197.3				
9.0	**SILT:** trace clay, trace sand, brown, wet, dense	9	SS	41
195.7				
10.6	**SANDY SILT TO SILTY SAND:** trace clay, brown to reddish brown, wet, dense	10	SS	34
		11	SS	35
192.7				
13.6	**SANDY SILT TILL:** some clay, trace to some gravel, reddish brown, wet, dense	12	SS	39
191.1				
15.2	**SILT:** some sand, trace clay, reddish brown, wet, very dense	13	SS	52
189.5				
189.3	**SANDY SILT TILL/SHALE COMPLEX:** reddish brown, moist, very dense	14	SS	50/ 150mm
188.8				
17.5	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	15	SS	50/ 51mm
	END OF BOREHOLE:			

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water level(mbgl):
May 9, 2023	8.43

GROUND WATER CONDITIONS: W. L. 197.8 m, May 09, 2023

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
0	17	80	3

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-14

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818877.08 E 589373.37

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-06-2023

REF. NO.: 21-122-106
ENCL NO.: 15

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
206.4					
0.0 / 205.6	**FILL:** sand and gravel with clayey silt, some sand, brown, moist, stiff	1	SS	11	
0.8 / 204.8	**FILL:** clayey silt, some sand, trace cobbles, brown, moist, stiff	2	SS	10	
1.6	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown, moist, hard	3	SS	33	
	silty sand layer at 2.6m	4	SS	40	
		5	SS	35	
4 / 201.9					
4.5	**SANDY SILT:** trace clay, brown, moist to wet, dense to very dense	6	SS	36	
6	trace boulders at 6.0m	7	SS	58	Switched to Mud Rotary
	trace gravel, wet at 7.5m	8	SS	50/ 150mm	
8	sandy silt to silt, wet at 9.0m	9	SS	62	
10 / 195.8					
10.6	**SILT:** trace clay, trace sand, brown, wet, dense	10	SS	47	
12 / 194.3					
12.1	**GRAVELLY SAND:** some silt, trace clay, greyish brown, wet, very dense	11	SS	50	29 51 17 3
192.8					
13.6	**SANDY SILT TO SILTY SAND:** trace clay, brown to reddish brown, wet, dense	12	SS	32	
14 / 191.2					
15.2	**SANDY SILT TILL:** trace to some clay, some gravel, reddish brown, moist, very dense	13	SS	50/ 150mm	
16	trace shale fragments at 16.7m	14	SS	50/ 150mm	
188.4					
188.0	**SHALE BEDROCK:** Queenston				
18.4	Formation, reddish brown, weathered	15	SS	50/ 25mm	
	END OF BOREHOLE:				
	Notes:				
	1) Water at the depth of 7.6m during drilling.				

GROUND WATER CONDITIONS

ELEVATION: 206, 204, 202, 200, 198, 196, 194, 192, 190, 188

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-15

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818944.21 E 589445.23

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-18-2023

REF. NO.: 21-122-106
ENCL NO.: 16

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GR SA SI CL
206.2					
0.0	**FILL:** sand and gravel mixed with silty sand, trace clay, brown, moist, loose to compact	1	SS	18	
204.7		2	SS	9	
1.5	**FILL:** silty clay, greyish brown, moist, firm	3	SS	7	
203.9					
2.3	**FILL:** silty sand, gravelly, brown, wet, compact	4	SS	10	
203.1					
3.1	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown, moist, very stiff to hard	5	SS	26	
		6	SS	41	
200.2					
6.0	**SILTY SAND:** trace clay, brown, moist, compact to very dense	7	SS	28	
198.4	gravelly wet zone at 7.5m	8	SS	51	
7.8	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, hard				
197.2					
9.0	**SILT:** trace clay, trace sand, trace gravel, brown, wet, dense to very dense	9	SS	51	1 1 95 3
		10	SS	40	
194.1					
12.1	**SANDY SILT TILL:** trace clay, trace gravel, brown to reddish brown, moist to very moist, very dense	11	SS	75	
	wet at 13.7m	12	SS	50/ 150mm	
191.1					
~~190.8~~	~~**SHALE BEDROCK:** Queenston~~	13	SS	50/ 50mm	
15.3	Formation, reddish brown, weathered				
	END OF BOREHOLE:				

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water Level(mbgl):
May 9, 2023	8.01

W. L. 198.2 m
May 09, 2023

DYNAMIC CONE PENETRATION RESISTANCE PLOT
SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT
WATER CONTENT (%)
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)
REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-16

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818780.9 E 589393.09

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-12-2023

REF. NO.: 21-122-106
ENCL NO.: 17

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
206.6					
0.0 / 204.9	**FILL:** clayey silt, trace rootlets, trace to some organics, trace cobbles, dark brown to brown, moist, firm moist to wet at 0.8m	1	SS	5	206
1.7 / 202.1	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown, moist, very stiff to hard	2	SS	5	
		3	SS	16	
		4	SS	21	204
		5	SS	37	
4.5 / 200.6	**SILT:** trace clay, trace sand, brown, wet, dense	6	SS	31	202
6.0 / 197.6	**SANDY SILT:** trace clay, trace gravel, brown, moist, dense to very dense clayey silt till layer at 6.1m	7	SS	54	200
		8	SS	49	198
9.0 / 196.0	**SILT:** trace clay, trace sand, brown, wet, dense	9	SS	49	
10.6 / 194.5	**SANDY SILT:** trace clay, brown, moist, dense	10	SS	40	196
12.1 / 189.9	**GRAVELLY SAND TO SAND AND GRAVEL:** trace clay, trace silt, brown to reddish brown, wet, dense to very dense	11	SS	42	194
		12	SS	40	
		13	SS	50/ 25mm	192
16.7 / 188.6	**CLAYEY SILT TILL/SHALE COMPLEX:** sandy, trace gravel, reddish brown, moist, hard	14	SS	50/ 100mm	190
18.0 / 188.2	**SHALE BEDROCK:** Queenston				
18.4	Formation, reddish brown, weathered	15	SS	50/ 50mm	
	END OF BOREHOLE:				

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date: Water level(mbgl):
May 9, 2023 8.94

GROUND WATER CONDITIONS: W. L. 197.7 m, May 09, 2023

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Switched to Mud Rotary

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-17

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818836.85 E 589413.41

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: Apr-10-2023

REF. NO.: 21-122-106
ENCL NO.: 18

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
205.9						
0.0 / 205.0	**FILL:** silty clay, trace asphalt prices, some sand, trace gravel, brown, moist, firm	1	SS	5		
0.9	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, trace cobbles, brown, moist, very stiff to hard	2	SS	20		
2		3	SS	32	204	
202.9		4	SS	24		
3.0	**SANDY SILT TO SILTY SAND:** trace clay, trace gravel, brown, moist, dense to very dense	5	SS	46		
4		6	SS	50/ 130mm	202	
6		7	SS	50	200	
8		8	SS	41	198	2 73 20 5
196.9						
9.0	**SAND AND GRAVEL:** trace clay, greyish brown, wet, very dense	9	SS	54		
10 / 195.3					196	
10.6	**SILT:** trace clay, trace sand, brown, wet, dense	10	SS	33		
12 / 193.8					194	
12.1	**GRAVELLY SAND:** trace silt, brownish grey, wet, very dense	11	SS	56		
192.3						
13.6	**SILT:** trace sand, trace clay, brown, wet, very dense	12	SS	51	192	
14 / 190.8						
15.1	**SANDY SILT TILL:** trace to some clay, trace gravel, reddish brown, wet to moist, very dense	13	SS	50/ 25mm		
16		14	SS	50/ 25mm	190	
18 / 187.7					188	
~~187.6~~ 18.3	~~**SHALE BEDROCK:** Queenston~~ Formation, reddish brown, weathered	15	SS	50/ 25mm		
	END OF BOREHOLE:					
	Notes: 1) Water at depth of 7.6m during drilling.					

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-18

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818795.9 E 589440

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200 mm
Date: May-01-2023

REF. NO.: 21-122-106
ENCL NO.: 19

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
208.5							
0.0	**FILL:** clayey silt, some sand, trace asphalt pieces, trace to some organics, black to brown, moist, firm to stiff		1	SS	5		208
			2	SS	7		
2			3	SS	6		
			4	SS	8		206
	trace rootlets at 3.1m		5	SS	8		
4							
203.9							204
4.6	**CLAYEY SILT TO SILTY CLAY TILL:** trace sand, trace gravel, brown to reddish brown, very stiff to hard		6	SS	25		
6	gravelly sand seams at 6.0m		7	SS	46		202
8			8	SS	50/ 50mm		
199.5							200
9.0	**SANDY SILT:** trace clay, brown, wet, dense to very dense		9	SS	50/ 150mm		
10							198
			10	SS	52		
12							
			11	SS	53		196
14			12	SS	34		
193.4							194
15.1	**GRAVELLY SAND:** trace silt, brown, wet, very dense		13	SS	64		
16							
191.8							192
16.7	**SANDY SILT TILL:** some clay to clayey, trace gravel, weathered shale fragments, reddish brown, moist, very dense		14	SS	50/ 130mm		
18							
190.0							190
189.9	**SHALE BEDROCK:** Infered		15	SS	50/ 100mm		
18.6	bedrock at 18.5m						
	END OF BOREHOLE:						
	Notes:						
	1) Water encountered at depth of 9.1m during drilling.						

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH23-19

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818758 E 589468.23

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-21-2023

REF. NO.: 21-122-106
ENCL NO.: 20

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
209.5												
0.0	**FILL:** silty sand, trace rootlets, some gravel, trace organics, dark brown to brown, moist, compact		1	SS	14		209					
1			2	SS	14							
208.0							208					
1.5	**FILL:** clayey silt, brown, moist, firm		3	SS	7							
2												
207.2							207					
2.3	**FILL:** sandy silt, trace to some organics, brown to grey, moist, loose		4	SS	5							
3			5	SS	5		206					
4												
204.8							205					
4.7	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace to some gravel, brown, moist, very stiff to hard		6	SS	26							
5							204					
6	300mm silt layer at 6.0m		7	SS	38							
7							203					
8			8	SS	50/ 130mm		202					
200.5												
9.0	**SAND:** some silt, trace clay, trace to some gravel, brown, moist to wet, compact to very dense		9	SS	50/ 130mm		201					
10							200					
11	silt pockets, wet at 10.7m		10	SS	64		199					
12						W. L. 197.6 m May 09, 2023	198					
13	gravelly below 12.2m		11	SS	disturbed		197					
14			12	SS	34		196					0 81 16 3
194.3							195					
15.2	**GRAVELLY SAND:** some silt, trace clay, brown, wet, dense to very dense		13	SS	48		194					
16							193					
17			14	SS	37							30 57 10 3
18							192					

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

LOG OF BOREHOLE BH23-19

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818758 E 589468.23

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-21-2023

REF. NO.: 21-122-106
ENCL NO.: 20

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	"N" BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
190.9												
18.6	**SILTY SAND:** trace clay, trace gravel, brown, wet, very dense		15	SS	84		191					
19												
189.7							190					
20			16	SS	50/ 130mm							
189.6	**SANDY SILT TILL:** trace clay,											
20.0	trace gravel, reddish brown, moist to wet, very dense											
188.6	**SHALE BEDROCK:** Queenston						189					
21	Formation, reddish brown,		R1	RC								
188.3	weathered											
21.2	TCR=100%, SCR=33%, RQD=33%		R2	RC			188					
187.6	Hard layers=33%, Maximum hard layer thickness=100mm											
22	21.9 TCR=96%, SCR=96%, RQD=75%											
	Hard layers=21%, Maximum hard layer thickness=50mm		R3	RC			187					
23	TCR=98%, SCR=94%, RQD=93%											
186.1	Hard layer=17%, Maximum hard											
23.4	layer thickness=50mm						186					
	TCR=74%, SCR=74%, RQD=74%		R4	RC								
24	Hard layer=13%, Maximum hard											
185.1	layer thickness=75mm											
24.4	**END OF BOREHOLE:**											

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water Level(mbgl):
May 9, 2023	11.91

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH23-20

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818819.38 E 589551.08

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-28-2023

REF. NO.: 21-122-106
ENCL NO.: 21

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
204.6 / 0.0	**FILL:** silty clay, trace sand, trace gravel, brown, moist, firm	1	SS	7		204
203.7 / 0.9	**CLAYEY SILT TO SILTY CLAY TILL:** trace sand, trace gravel, trace weathered shale fragements, brown to reddish brown, moist, stiff to hard	2	SS	11		
		3	SS	30		202
		4	SS	30		
		5	SS	32		
	grey at 4.6m	6	SS	16		200
198.6 / 6.0	**SILT:** with gravel/cobble fragments, sand seams, brown, wet, compact to dense	7	SS	31	▽	198
	gravelly sand layer at 7.6m	8	SS	22		
195.6 / 9.0	**SILTY SAND:** trace clay, some gravel, brown, wet, compact coarse sand layer at 9.3m	9	SS	26		196
193.8 / 10.8	**CLAYEY SILT TILL:** sandy, trace gravel, reddish brown, moist, hard	10	SS	39		194
192.4 / 12.2	**SILT:** trace sand, trace gravel, brown, wet, very dense	11	SS	85		192
191.0 / 13.6	**GRAVELLY SAND:** trace silt, trace cobbles, brown, wet, very dense	12	SS	62		
189.4 / 15.2	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	13	SS	50/ 25mm		190
189.3 / 15.3	**END OF BOREHOLE:**					

W. L. 197.6 m
May 09, 2023

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water Level(mbgl):
May 9, 2023	7.02

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Switched to Mud Rotary

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

DS CONSULTANTS LTD.
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LOG OF BOREHOLE BH23-21

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818876.28 E 589562.87

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-19-2023

REF. NO.: 21-122-106
ENCL NO.: 22

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
205.7					
0.0	**FILL:** clayey silt, trace rootlets, brown, moist, stiff to very stiff	1	SS	14	
204.1		2	SS	24	
1.6	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown, moist, very stiff to hard	3	SS	25	
		4	SS	30	
202.1		5	SS	46	
3.6	**SANDY SILT TO SILTY SAND:** trace clay, trace to some gravel, brown to reddish brown, moist to wet, dense to very dense	6	SS	53	
	wet below 6.0m	7	SS	50/100mm	Switched to Mud Rotary
	moist to wet at 7.6m	8	SS	50/130mm	
		9	SS	58	
		10	SS	48	
	some gravel to gravelly below 12.1m	11	SS	68	
		12	SS	50/150mm	
190.5					
15.2	**CLAYEY SILT TILL/SHALE COMPLEX:** sandy, trace gravel, reddish brown, moist, hard	13	SS	50/150mm	
189.0					
16.7	**SHALE BEDROCK:** Queenston formation, reddish brown,	14	SS	50/50mm	
188.4					
17.3	weathered				
	END OF BOREHOLE:				
	Notes: 1) Water at the depth of 6.0m during drilling.				

ELEVATION: 204, 202, 200, 198, 196, 194, 192, 190

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH23-22

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818780.5 E 589548.71

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-24-2023

REF. NO.: 21-122-106
ENCL NO.: 23

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
210.4							
0.0	**FILL:** clayey silt, trace rootlets, trace organics, trace cobbles, brown, moist, firm to very stiff mixed with asphalt above 0.8m	1	SS	23		210	
		2	SS	7			
2		3	SS	7			
	black staining silty sand, rock piece at 2.3m	4	SS	6		208	
		5	SS	9			
4							
	trace organics, grey at 4.6m	6	SS	6		206	
6 204.1							
6.3	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown, moist to very moist, very stiff to hard	7	SS	32		204	Switched to Mud rotary
8		8	SS	33		202	
		9	SS	39			7 24 49 20
10						200	
	greyish brown at 10.7m	10	SS	28			
12 198.2							
12.2	**SILT:** trace sand, trace clay, greyish brown, wet, compact	11	SS	11		198	
14	some sand to sandy at 13.7m	12	SS	15			
195.2						196	
15.2	**GRAVELLY SAND:** some silt, trace clay, brown, wet, very dense	13	SS	50/ 100mm			
16		14	SS	50/ 150mm		194	
18							
	silty at 18.3m	15	SS	70		192	25 38 32 5
190.6	silty sand pockets at 19.6m						
20 19.8	**SAND:** some silt, some gravel, brown, wet, very dense	16	SS	50/ 150mm		190	
189.1							
21.3	**SANDY SILT TILL:** trace clay, trace gravel, reddish brown, very	17	SS	50/ 130mm			
22 188.4	moist, very dense						
~~188.3~~		18	SS	50/ 50mm			
22.1	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered						
	END OF BOREHOLE:						
	Notes: 1) Water at depth of 12.2m during drilling.						

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ε=3% Strain at Failure

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LOG OF BOREHOLE BH23-23

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818808.89 E 589613.71

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-25-2023

REF. NO.: 21-122-106
ENCL NO.: 24

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
204.7 / 0.0	**GRANULAR FILL:** sand and gravel, 50mm	1	SS	6	
	FILL: silty clay, trace rootlets, trace gravel, brown, moist, firm to stiff	2	SS	9	
203.2 / 1.5	black organic matter at 0.8m	3	SS	15	
2	**CLAYEY SILT TO SILTY CLAY TILL:** trace sand, trace gravel, brown to reddish brown, moist, very stiff ot hard	4	SS	30	
		5	SS	33	
4					
	silt pockets, grey at 4.9m	6	SS	31	Switched to Mud Rotary
6	gravelly sand layer at 6.1m	7	SS	64	
197.1 / 7.6	**SAND:** some silt, some gravel, trace clay, reddish brown, wet, dense to very dense	8	SS	36	10 74 12 4
8	gravelly sand pocket at 9.1m	9	SS	63	
195.3 / 9.4	**SANDY SILT TILL:** some clay, trace gravel, reddish brown, very moist, very dense				
10 / 194.0	**CLAYEY SILT TILL:** some sand to sandy, trace gravel, reddish brown, moist, hard	10	SS	50/ 130mm	
10.7 / 12 / 192.5	**SILT:** trace sand, trace clay, trace gravel, brown, wet, dense to very dense	11	SS	50/ 100mm	
14	some sand to sandy at 13.7m	12	SS	45	
189.5 / 15.2	**CLAYEY SILT TILL:** sandy, trace gravel, trace shale fragments,	13	SS	50/ 75mm	
16 / 188.7 / 186.6	reddish brown, moist, hard	14	SS	50/ 150mm	
16.1 / 187.4	**SHALE BEDROCK:** reddish brown, weathered TCR=79%, SCR=69%, RQD=51%	R1	RC		
17.3	Hard layers=6%, Maximum hard layer thickness=25mm				
18	TCR=93%, SCR=93%, RQD=75%	R2	RC		
185.9 / 18.8 / 185.3	Hard layers=16%, Maximum hard layer thickness=50mm TCR=100%, SCR=91%, RQD=60%	R3	RC		
19.4	Hard layers=25%, Maximum hard layer thickness=50mm				
	END OF BOREHOLE:				
	Notes: 1) Water at depth of 7.6m during drilling.				

GROUND WATER CONDITIONS

ELEVATION: 204, 202, 200, 198, 196, 194, 192, 190, 188, 186

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-24

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4819063.77 E 589501.56

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-14-2023

REF. NO.: 21-122-106
ENCL NO.: 25

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
206.4					
0.0 / 205.6	**FILL:** clayey silt mixed with sand and gravel, brown, moist, very stiff	1	SS	16	206
0.8	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, brown, moist, very stiff to hard	2	SS	18	
2 / 204.1		3	SS	50/ 130mm	
2.3	**SILTY SAND TO SANDY SILT:** trace clay, trace gravel, brown, moist, dense to very dense	4	SS	50	204
		5	SS	43	
4 / 201.9					
4.5	**SILT:** trace clay, trace sand, brown, wet, dense	6	SS	32	202
6 / 200.4					
6.0	**CLAYEY SILT TILL:** sandy, trace gravel, brown, moist, hard	7	SS	65	200
					W. L. 199.2 m May 09, 2023
8	wet gravelly silty sand at 7.6m boulder at 7.8m	8	SS	50/ 130mm	
197.4					198
9.0	**SANDY SILT TILL:** some clay, trace gravel, brown to reddish brown, wet, very dense	9	SS	64	
10 / 195.8					196
10.6	**CLAYEY SILT TILL:** some sand to sandy, some gravel, trace weathered shale fragments, greyish brown, moist, hard	10	SS	85	
12	gravelly at 12.2m	11	SS	52	194
14	reddish brown below 13.7m	12	SS	56	192
191.2					
191.2 / 190.8	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	13	SS	50/ 25mm	
16 / 15.8		R1	RC		
	TCR=62%, SCR=28%, RQD=23% Hard layer=28%, Maximum hard layer thickness=150mm	R2	RC		190
189.1					
17.3	TCR=90%, SCR=65%, RQD=40% Hard layer=18%, Maximum hard layer thickness=75mm	R3	RC		
18 / 187.7					188
18.7	TCR=73%, SCR=70%, RQD=47% Hard layer=11%, Maximum hard layer thickness=50mm				
	END OF BOREHOLE:				
	Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings:				
	Date: Water Level(mbgl): May 9, 2023 7.17				

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
20	19	45	16

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

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LOG OF BOREHOLE BH23-25

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818966.99 E 589574.67

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-19-2023

REF. NO.: 21-122-106
ENCL NO.: 26

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
206.1 / 0.0	**FILL:** clayey silt, brown, moist, very stiff	1	SS	15		
204.5		2	SS	17		
1.6	**CLAYEY SILT TILL:** sandy, some gravel, brown, moist, very stiff	3	SS	25		204
203.1		4	SS	29		
3.0	**SANDY SILT:** trace clay, trace gravel, brown, moist, dense to very dense	5	SS	38		
4		6	SS	50/130mm		202
200.1						
6.0	**CLAYEY SILT TILL:** sandy, trace gravel, brownish grey, moist, hard	7	SS	50/100mm		200
8	brown at 7.6m	8	SS	50/130mm		198
197.1						
9.0	**SILT:** trace clay, brown, wet, very dense	9	SS	50/130mm		
10						196
195.5						
10.6	**SANDY SILT TILL:** some clay, trace to some gravel, brown, wet, very dense	10	SS	50/50mm		
12		11	SS	50/130mm		194
14	reddish brown below 13.6m	12	SS	50/75mm		192
190.8						
190.5 / 15.4	**SHALE BEDROCK:** Queenston Formation, reddish brown, weathered	13	SS	50/75mm		
	END OF BOREHOLE:					

Notes:
1) Water at depth of 9.1m during drilling.

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Switched to mud rotary

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

DS CONSULTANTS LTD.
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LOG OF BOREHOLE BH23-26

PROJECT: Geotechnical Investigation
CLIENT: Neatt Communities
PROJECT LOCATION: 150 Steeles Ave. East, Milton, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818868.04 E 589642.14

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200 mm
Date: Apr-20-2023

REF. NO.: 21-122-106
ENCL NO.: 27

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"
204.3				
0.0 / 203.4	**FILL:** silty clay, trace gravel, brown, moist, stiff	1	SS	10
0.9	**CLAYEY SILT TO SILTY CLAY TILL:** sandy, trace gravel, trace rock fragment, brown, moist, hard	2	SS	34
		3	SS	38
		4	SS	45
		5	SS	33
199.8				
4.5	**SILTY SAND:** some gravel to gravelly, trace clay, brown, moist, compact to dense	6	SS	45
	silt pockets at 6.1m	7	SS	22
196.8				
7.5	**SAND:** trace silt, some gravel, brown, wet, dense	8	SS	40
195.3				
9.0	**SANDY SILT TILL:** trace clay, some gravel, brown, moist to wet, very dense	9	SS	75
193.7				
10.6	**SILTY SAND:** trace clay, trace gravel, greyish brown, wet, dense	10	SS	49
192.2				
12.1	**CLAYEY SILT TILL/SHALE COMPLEX:** sandy, trace gravel, reddish brown, moist, hard	11	SS	50/ 130mm
190.5				
13.8	auger refusal at possible bedrock at 13.8m	12	SS	50/ 75mm
	END OF BOREHOLE:			

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water Level(mbgl):
May 9, 2023	6.69

W. L. 197.6 m
May 09, 2023

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)
REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

DS SOIL LOG-2021-FINAL 21-122-106.GPJ DS.GDT 23-7-12

DS CONSULTANTS LTD.
Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH21-1

PROJECT: Geotechnical Investigation
CLIENT: NEATT Communities
PROJECT LOCATION: 150 Steeles Avenue East, Milton
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818979.312 E 589152.467

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Apr-27-2021

REF. NO.: 21-122-100
ENCL NO.: 28

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
208.3							
208.0 0.3	**TOPSOIL:** 130mm	1	SS	5		208	
207.5 0.8	**FILL:** silty clay, trace sand, trace gravel, trace cobble, brown, moist, firm	2	SS	50/100mm			
206.8 1.5	**FILL:** sand and gravel, dense	3	SS	18			
2	**CLAYEY SILT TILL:** sandy, trace gravel, green/red modelling, brown, moist, stiff to very stiff	4	SS	19		206	
		5	SS	21			
4						204	
	grey below 4.6m	6	SS	21			16 22 45 17
6							
	stiff at 6.3m	7	SS	9		202	
200.7							
8 7.6	**SANDY SILT TILL:** trace clay, trace gravel, trace cobble, brown, moist, very dense	8	SS	51/130mm		200	
199.2							
9.1	**SANDY SILT TO SILT:** trace clay, brown, moist, very dense	9	SS	60	▽		1 29 63 7
10 198.3							
10.0	**CLAYEY SILT:** trace sand, trace gravel, grey, moist, very stiff					W. L. 198.4 m May 07, 2021	
		10	SS	28			
12 196.1							
12.2	**SILT:** trace sand, trace clay, grey, wet, compact to very dense	11	SS	74		196	96 4
14		12	SS	21		194	
193.1							
15.2	**SANDY SILT TILL:** trace clay, trace gravel, trace limestone, grey, moist, dense	13	SS	35		192	
16 191.5							
16.8	**SAND AND GRAVEL:** trace silt, trace clay, grey, wet, dense	14	SS	54			49 33 15 3
18 190.0							
18.3	**QUEENTSON FORMATION BEDROCK:** reddish brown	15	SS	50/130mm		190	
188.5							
19.8	**END OF BOREHOLE:**	16	SS	spoon bouncing			

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water Level (mbgl):
May 7, 2021	9.9

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH21-2

PROJECT: Geotechnical Investigation
CLIENT: NEATT Communities
PROJECT LOCATION: 150 Steeles Avenue East, Milton
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4819140.003 E 589270.783

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Apr-27-2021

REF. NO.: 21-122-100
ENCL NO.: 29

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	ELEVATION
207.6 / 0.0	**TOPSOIL:** 150mm	1	SS	4	
207.4 / 0.2	**FILL:** clayey silt, trace gravel, trace topsoil, trace rootlets, brown, moist, firm to stiff	2	SS	9	
206.1 / 1.5	**CLAYEY SILT TILL:** trace sand, trace gravel, trace cobble, brown, moist, very stiff	3	SS	20	206
		4	SS	23	
		5	SS	40	204
	grey and stiff at 4.6m	6	SS	9	
201.5 / 6.1	**SILT:** trace clay, brown, wet, compact	7	SS	17	202
		8	SS	15	
198.5 / 9.1	**CLAYEY SILT TILL:** sandy, trace gravel, trace cobble, brown to reddish brown, moist, hard	9	SS	56	198
		10	SS	50/130mm	196
		11	SS	50/130mm	
		12	SS	75	194
192.4 / 15.2	**SANDY SILT TILL/SHALE COMPLEX:** trace clay, trace gravel, fragments of shale, reddish brown, wet, very dense	13	SS	50/130mm	192
190.7 / 16.9	**END OF BOREHOLE:**	14	SS	50/12mm	

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water Level (mbgl):
May 7, 2021	7.2

W. L. 200.4 m
May 07, 2021

Switched to Mud Rotary

GR SA SI CL: 10 18 59 13

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

DS CONSULTANTS LTD.
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LOG OF BOREHOLE BH21-3

PROJECT: Geotechnical Investigation
CLIENT: NEATT Communities
PROJECT LOCATION: 150 Steeles Avenue East, Milton
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4819078.816 E 589486.246

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Apr-26-2021

REF. NO.: 21-122-100
ENCL NO.: 30

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION
206.6 / 0.0							206
206.2 / 0.4	**FILL:** sand and gravel, trace topsoil, trace silt, trace clay, brown, moist, compact		1	SS	18		
205.8 / 0.8	**FILL:** clayey silt, trace gravel, brown, moist, very stiff		2	SS	16		
204.3 / 2.3	**CLAYEY SILT TILL:** trace sand, trace gravel, occasional cobble, brown, moist, stiff to very stiff		3	SS	24		
			4	SS	47		204
202.0 / 4.6	**SANDY SILT:** trace clay, occasional gravel, brown, moist, dense		5	SS	47		
	SILTY SAND : trace clay, trace gravel, trace cobble, brown, wet, compact to dense		6	SS	28		202
			7	SS	39		
199.0 / 7.6	**SILT:** trace sand, brown, wet, very dense		8	SS	52/ 130mm	W. L. 199.4 m May 07, 2021	200
197.5 / 9.1	**CLAYEY SILT TILL:** some sand, trace gravel, trace cobble, reddish brown, very moist, hard		9	SS	51/ 75mm		198
			10	SS	50/ 130mm		196
192.9 / 13.7	**SANDY SILT TILL:** trace clay, trace gravel, occasional cobble, reddish brown, very moist, very dense		11	SS	51/ 130mm		194
			12	SS	51/ 130mm		
			13	SS	57/ 130mm		192
189.8 / 16.8	**QUEENSTON FORMATION BEDROCK:** reddish brown		14	SS	56/ 50mm		190
188.2 / 18.4	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings. Date: Water Level (mbgl): May 7, 2021 7.2		15	SS	55/ 25mm		

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
	60	36	4	
	21	55	19	5
	18	34	38	10
Switched to Mud Rotary				

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH21-4

PROJECT: Geotechnical Investigation
CLIENT: NEATT Communities
PROJECT LOCATION: 150 Steeles Avenue East, Milton
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818816.531 E 589304.818

DRILLING DATA
Method: Hollow Stem Auger/ Mud Rotary
Diameter: 200mm
Date: Apr-23-2021

REF. NO.: 21-122-100
ENCL NO.: 31

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
206.3							
0.0 / 204.8	**FILL:** sand and gravel, trace silt, trace clay, brown, moist, compact		1	SS	21		206
			2	SS	13		
1.5	**CLAYEY SILT TILL:**trace sand, trace gravel, trace cobble, brown, moist, very stiff to hard		3	SS	24		
			4	SS	27		204
			5	SS	33		
			6	SS	22		202
198.7			7	SS	58		200
7.6 / 197.2	**SILTY SAND:** trace clay, brown, moist, very dense		8	SS	70		198
9.1 / 195.6	**SILT :** some sand, trace clay, trace gravel, grey, wet, compact		9	SS	25	W. L. 197.7 m May 07, 2021	196
10.7	**SAND:** trace clay, some silt, grey, wet, compact to dense		10	SS	disturbe		
	some gravel at 12.2m		11	SS	33		194
			12	SS	31		192
			13	SS	26		
189.5							190
16.8 / 188.0	**SANDY SILT TILL/ SHALE COMPLEX:** trace clay, trace gravel, trace limestone, reddish brown, very moist, very dense		14	SS	52		188
~~187.9~~ / 18.5	**QUEENTSON FORMATION BEDROCK:** reddish brown		15	SS	60/ 25mm		
	END OF BOREHOLE:						

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water Level (mbgl):
May 7, 2021	8.6

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH (kPa)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL
	0	87	12	1
	12	79		(11)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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LOG OF BOREHOLE BH21-5

PROJECT: Geotechnical Investigation
CLIENT: NEATT Communities
PROJECT LOCATION: 150 Steeles Avenue East, Milton
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818941.399 E 589615.141

DRILLING DATA
Method: Hollow Stem Auger
Diameter: 200mm
Date: Apr-22-2021

REF. NO.: 21-122-100
ENCL NO.: 32

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
205.5 / 0.0	**TOPSOIL:** 230mm	1	SS	4			
205.3 / 0.2	**FILL:** clayey silt, trace gravel, trace topsoil, trace rootlets, brown, moist, firm to stiff	2	SS	8		Bentonite	
204.0 / 1.5	**CLAYEY SILT TILL:** sandy, trace gravel, trace cobble, brown, moist, very stiff to hard	3	SS	23		204	
		4	SS	37			
		5	SS	44		202	
201.2 / 4.3	**SAND:** trace clay, trace silt, brown, moist, compact	6	SS	29		200	
199.4 / 6.1	**CLAYEY SILT TILL:** sandy, trace gravel, trace cobble, brown, moist, very hard	7	SS	30	▽	W. L. 198.7 m May 07, 2021	
197.9 / 7.6	**SANDY SILT TILL:** trace clay, trace gravel, occasional cobble, brown, moist, dense	8	SS	50/ 127mm			
196.7 / 8.8	**SANDY SILT:** trace clay, trace gravel, brown, wet, very dense	9	SS	57		196	1 38 58 3
194.9 / 10.6	**SILT:** trace clay, trace sand, brown, wet, very dense	10	SS	70		Slotted pipe 194	
193.3 / 12.2	**SILTY SAND TILL:** trace clay, trace gravel, grey, wet, very dense	11	SS	77			
191.8 / 13.7	**SANDY SILT TILL/SHALE COMPLEX:** trace clay, trace sand, reddish brown, very moist, dense	12	SS	50/ 100mm		192 Bentonite	
190.2 / 15.3	**QUEENTSON FORMATION**	13	SS	60/ 75mm		190	
189.9 / 15.6	**BEDROCK:** limestone, reddish brown						
	END OF BOREHOLE:						

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Readings:

Date:	Water Level (mbgl):
May 7, 2021	6.8

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED + FIELD VANE & Sensitivity
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ε=3% Strain at Failure

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LOG OF BOREHOLE BH21-6

PROJECT: Geotechnical Investigation
CLIENT: NEATT Communities
PROJECT LOCATION: 150 Steeles Avenue East, Milton
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4818762.846 E 589539.712

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Apr-22-2021

REF. NO.: 21-122-100
ENCL NO.: 33

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
210.5 / 0.0	**TOPSOIL:** 180mm	1	SS	7	
210.3 / 0.2	**FILL:** clayey silt, trace gravel, trace topsoil, brown, moist, firm to very stiff				
		2	SS	22	
	some organics at 3.5m	3	SS	13	
		4	SS	5	
204.4 / 6.1	**CLAYEY SILT TILL:** some sand, trace gravel, brown, moist, very stiff	5	SS	23	
		6	SS	26	
202.1 / 8.4	**SANDY SILT:** trace clay, brown, wet, dense	7	SS	39	
199.5 / 11.0	**SILT AND SILTY CLAY:** interbedded, trace sand, grey, moist, stiff	8	SS	13	
198.1 / 12.4	**SANDY SILT TILL** trace clay, trace gravel, brown, moist, very dense	9	SS	51	Switched to Mud Rotary
		10	SS	77	
195.3 / 15.2	**GRAVELLY SAND:** trace clay, brown, moist, very dense	11	SS	51	
		12	SS	59	
192.3 / 18.2	**SANDY GRAVEL:** trace clay, some silt, brown, moist, very dense	13	SS	104/ 275mm	47 38 12 3
190.7 / 19.8	**SANDY SILT TILL:** trace clay, trace gravel, reddish brown, wet, very dense	14	SS	50/ 100mm	
188.9 / 21.6	**QUEENSTON FORMATION BEDROCK:** reddish brown	15	SS	50/ 50mm	27 30 36 7
187.9 / 22.6	**END OF BOREHOLE:**	16	SS	63/ 50mm	

Notes:
1) 50mm dia. monitoring well installed upon completion.
2) Water Level Reading:

Date:	Water Level (mbgl):
May 7, 2021	13

Bentonite

W. L. 197.5 m
May 07, 2021

DYNAMIC CONE PENETRATION RESISTANCE PLOT
SHEAR STRENGTH (kPa)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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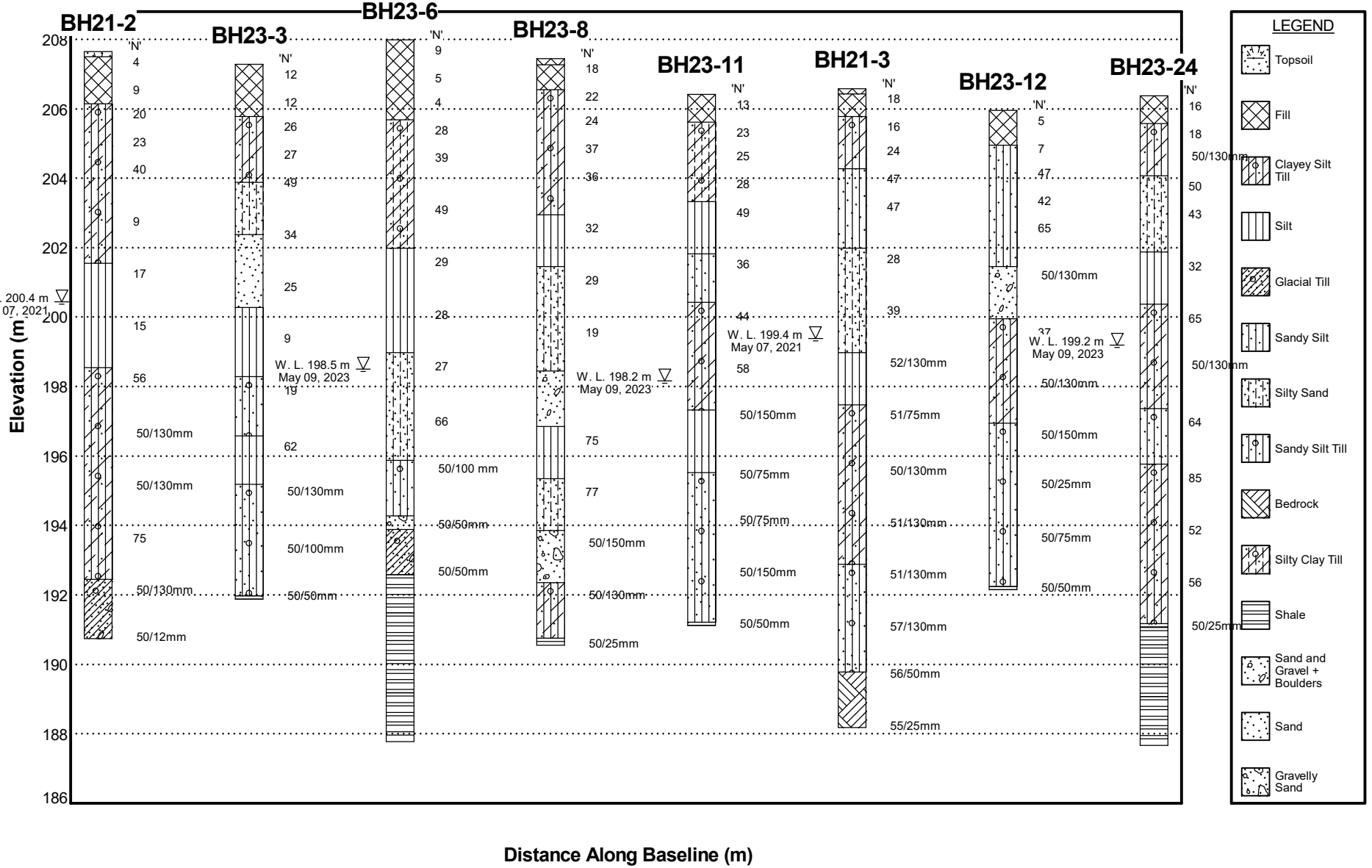

Distance Along Baseline (m)

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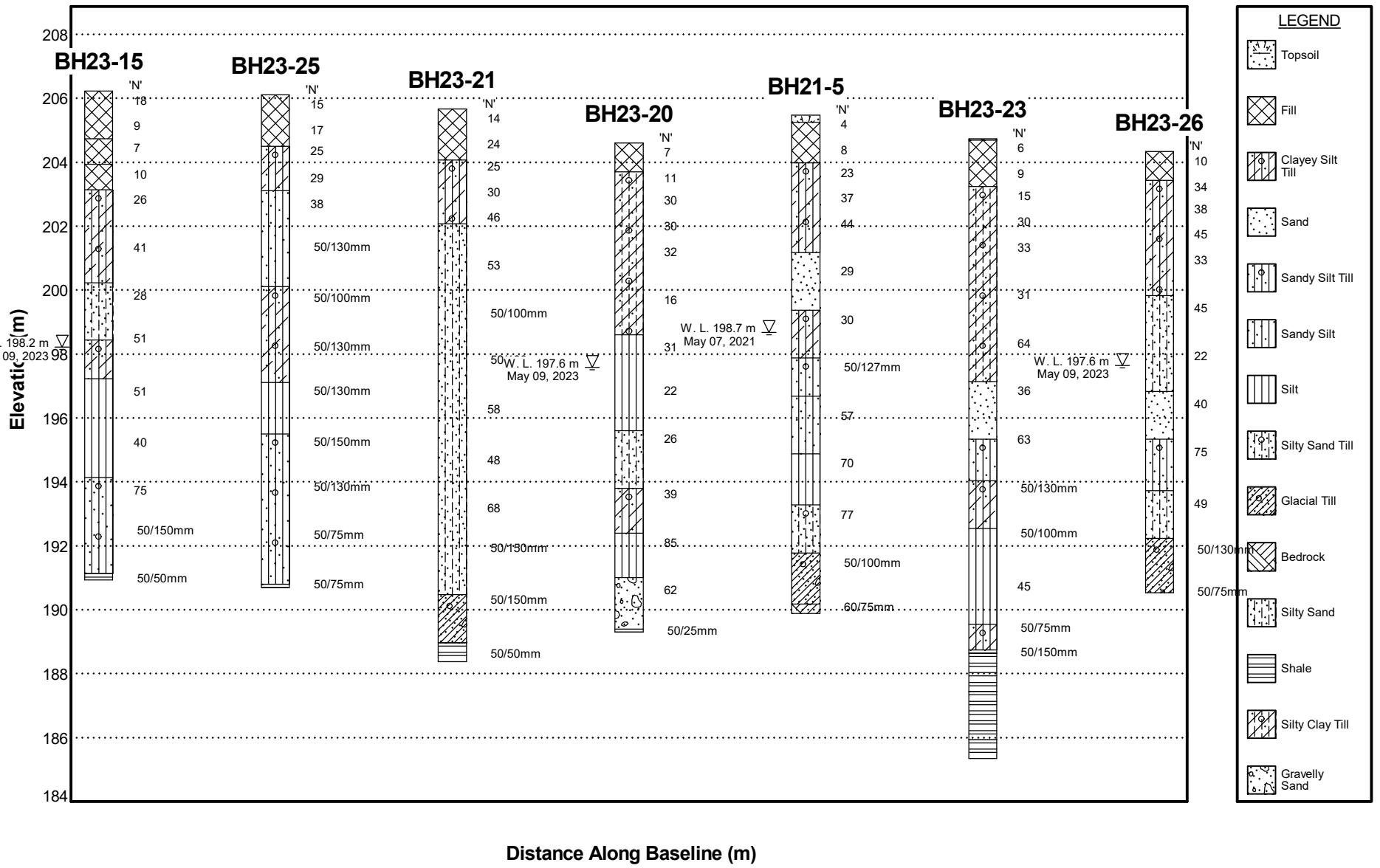
Generalized Sub-surface Profile (NTS)

DRAWING NO.	34A
JOB NO.	21-122-100
DATE	July 12, 2023

DS FENCE (M) COPY 21-122-100. GEO.GPJ DS.GDT 7/12/23



Distance Along Baseline (m)

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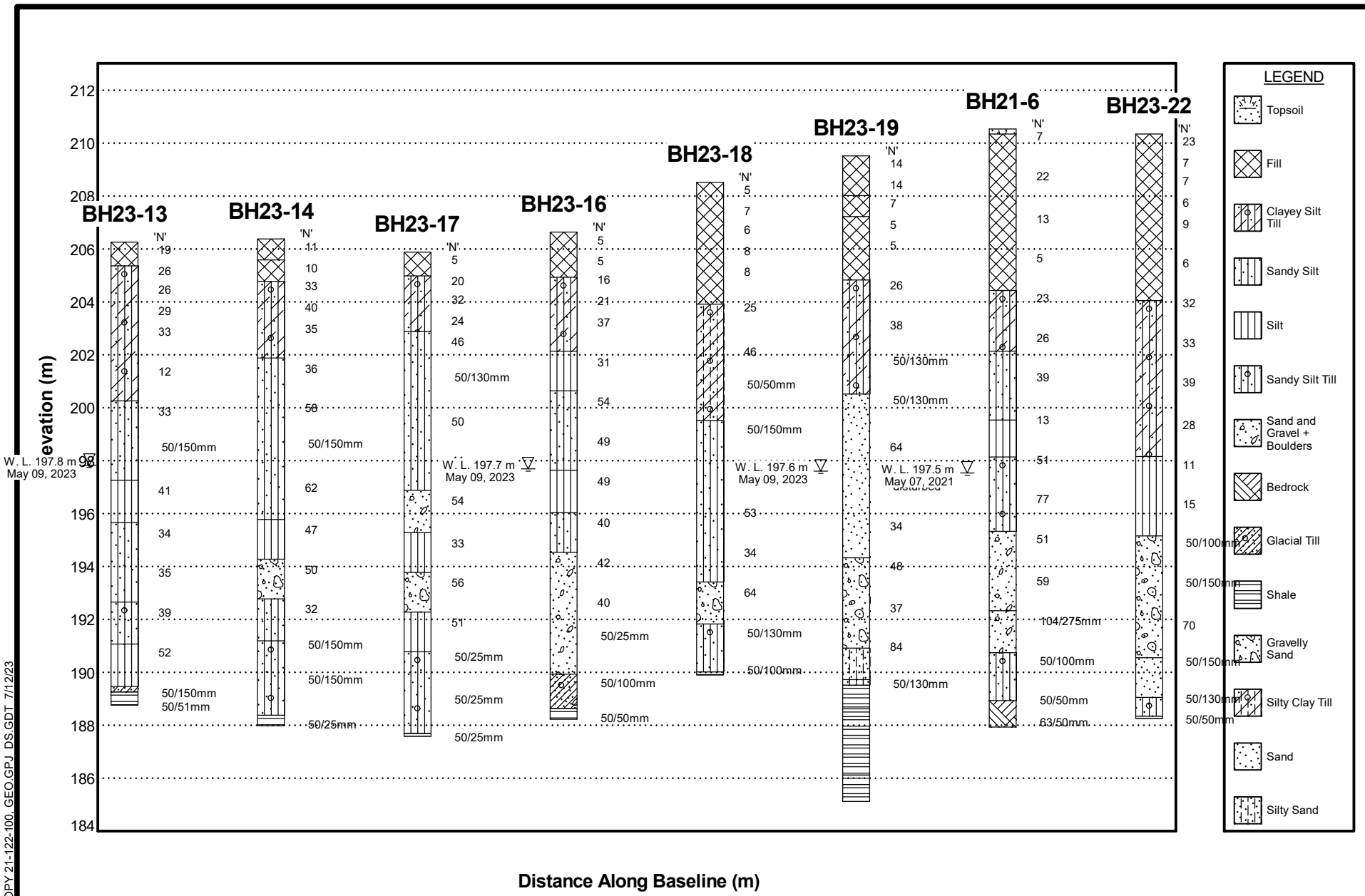
Generalized Sub-surface Profile (NTS)

DRAWING NO.	34B
JOB NO.	21-122-100
DATE	July 12, 2023

DS FENCE (M) COPY 21-122-100_GEO.GPJ DS.GDT 7/12/23



Distance Along Baseline (m)

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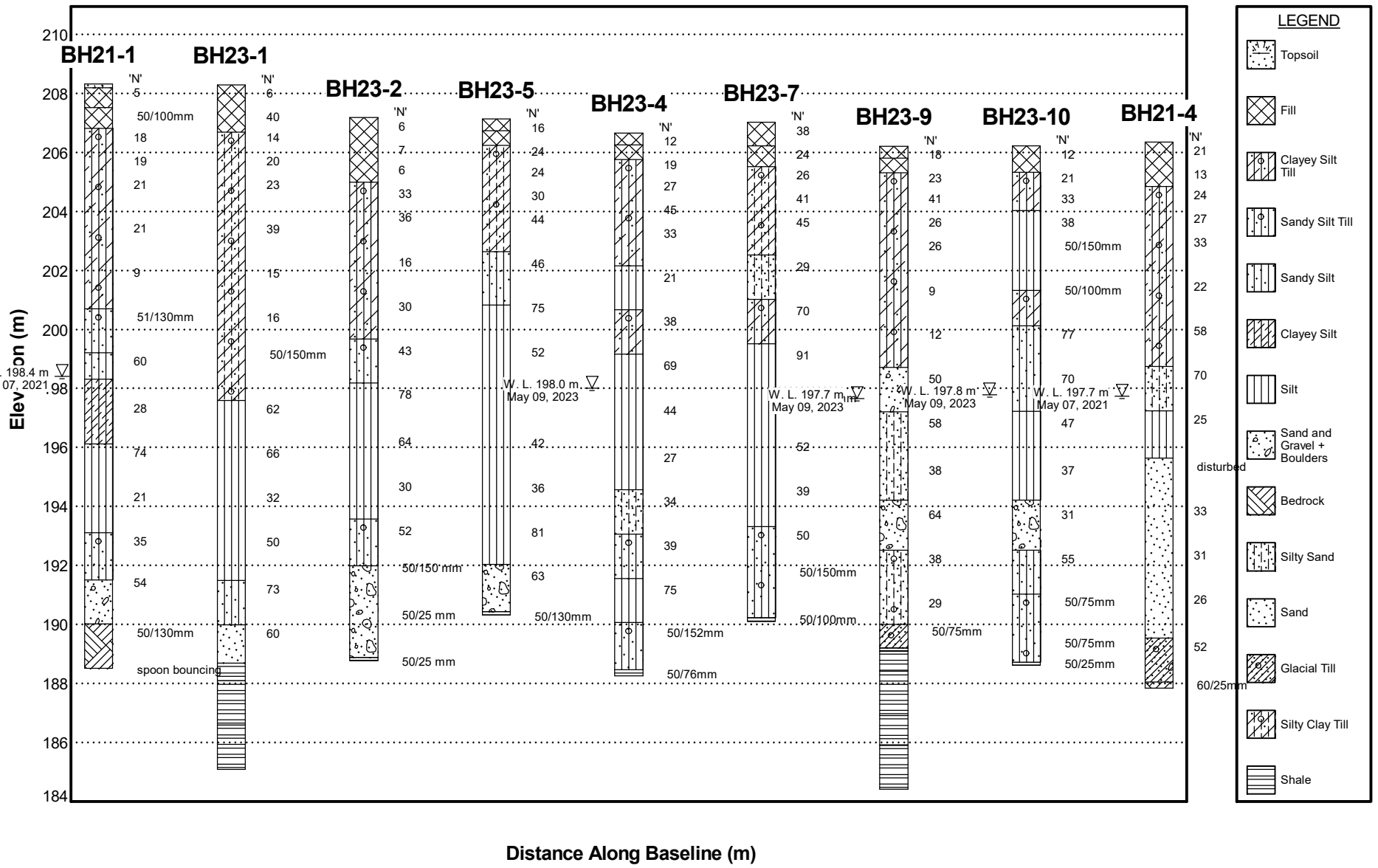
Generalized Sub-surface Profile (NTS)

DRAWING NO.	34C
JOB NO.	21-122-100
DATE	July 12, 2023

DS FENCE (M) COPY 21-122-100. GEO.GPJ DS.GDT 7/12/23



Distance Along Baseline (m)

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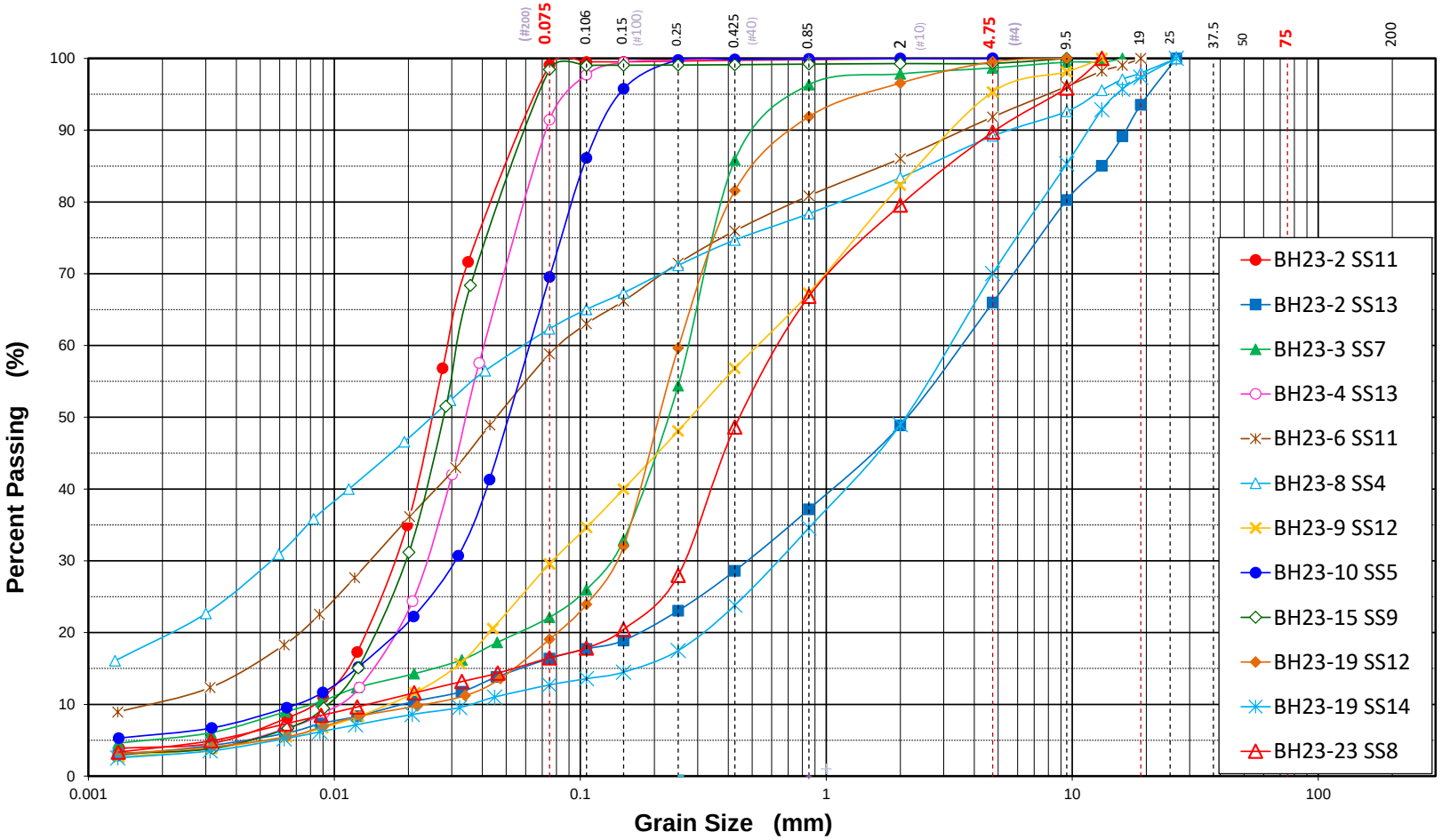
Generalized Sub-surface Profile (NTS)

DRAWING NO.	34D
JOB NO.	21-122-100
DATE	July 12, 2023

DS FENCE (M) COPY 21-122-100 GEO.GPJ DS.GDT 7/12/23

Particle Size Distribution (ASTM-D421/D422)

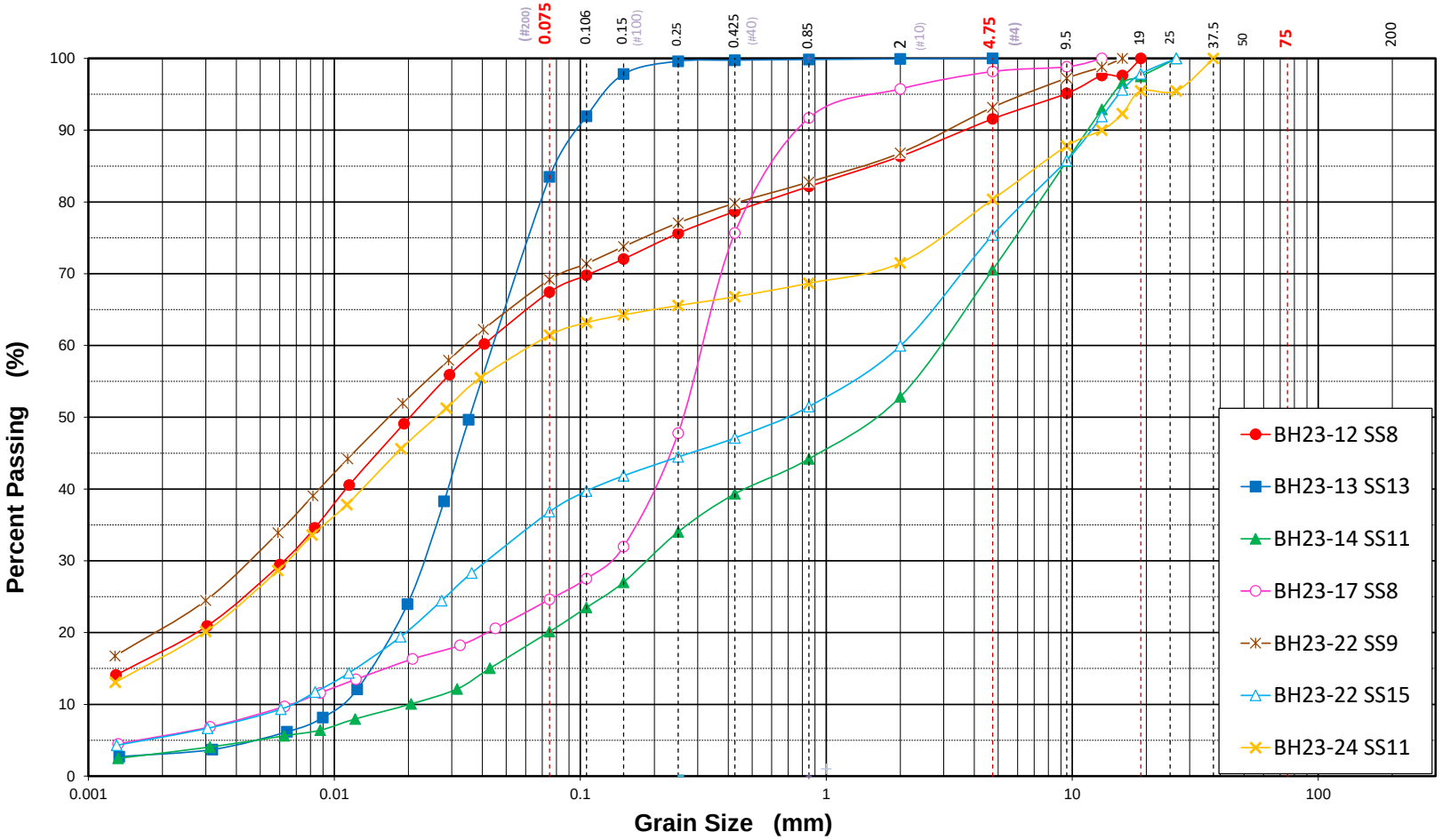


Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	

DS CONSULTANTS LTD.
6221 Highway 7, Unit 16
Vaughan, Ontario, L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Project	**Additional Geotechnical and Hydrogeological Services**	Project No	**21-122-106**
Location	**150 Steeles Ave E, Milton, ON**	Date	**Apr-28-2023**
Client	Neatt Communities	Figure No	35

Particle Size Distribution (ASTM-D421/D422)



Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	

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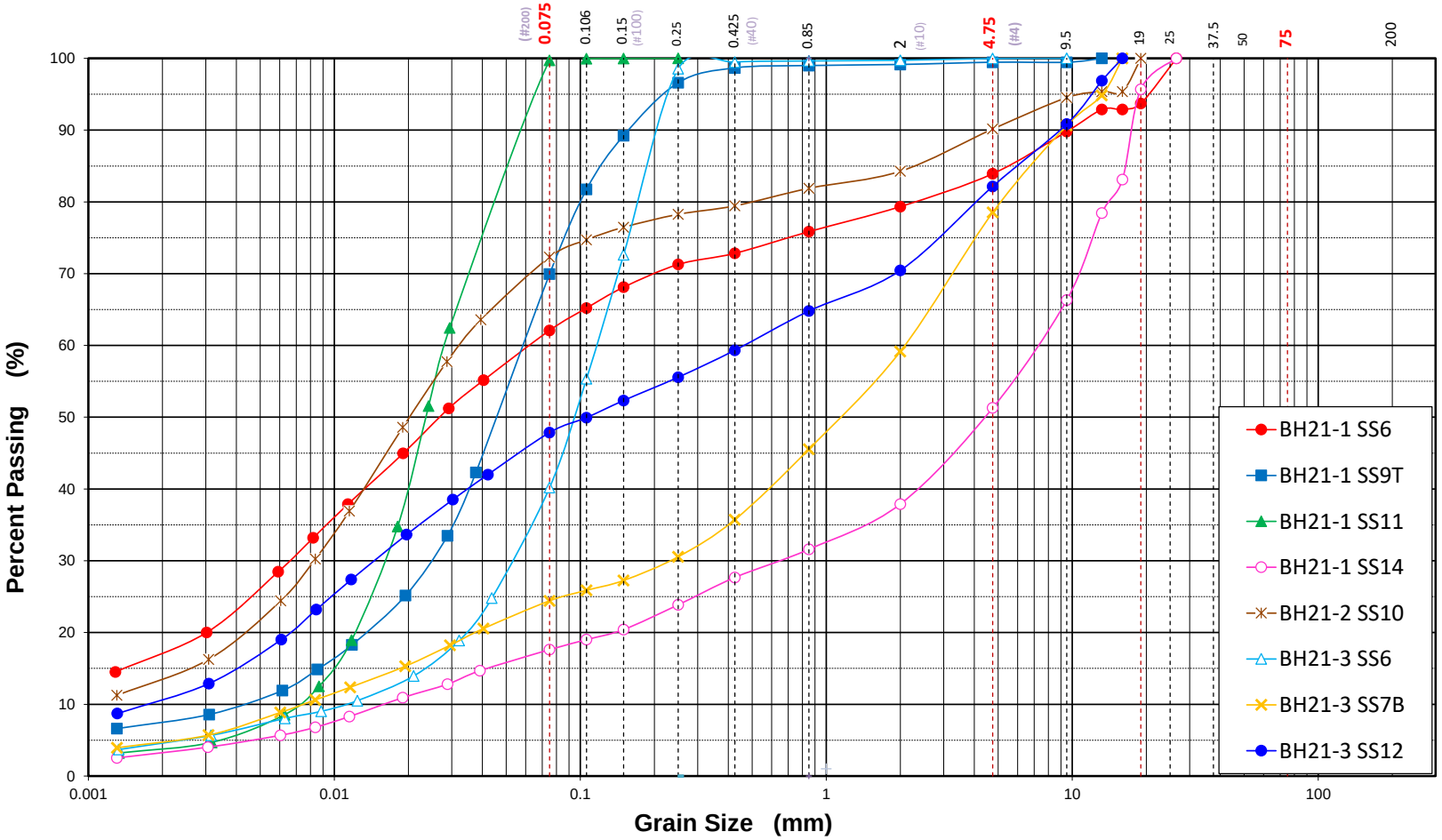
Project	**Additional Geotechnical and Hydrogeological Services**	Project No	**21-122-106**
Location	**150 Steeles Ave E, Milton, ON**	Date	**Jun-16-2023**
Client	Neatt Communities	Figure No	36

Particle Size Distribution (ASTM-D421/D422)



Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	

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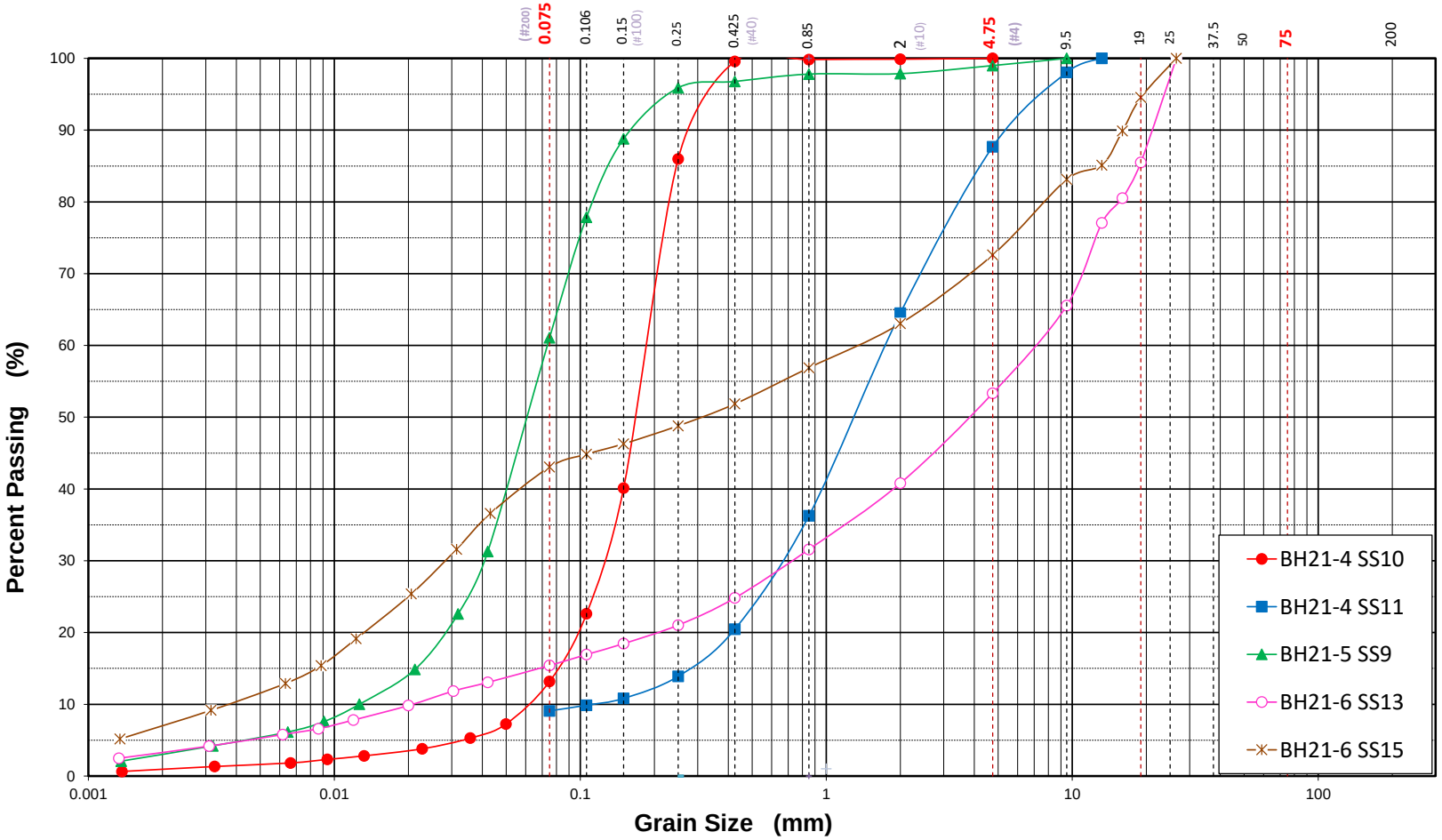
Project	**Enviro Geo Investigations, 150 Steeles Ave E**	Project No	**21-122-100**
Location	**150 Steeles Ave E., Brampton, ON**	Date	**May-14-2021**
Client	**Neatt Communities**	Figure No	37

Particle Size Distribution (ASTM-D421/D422)



Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	

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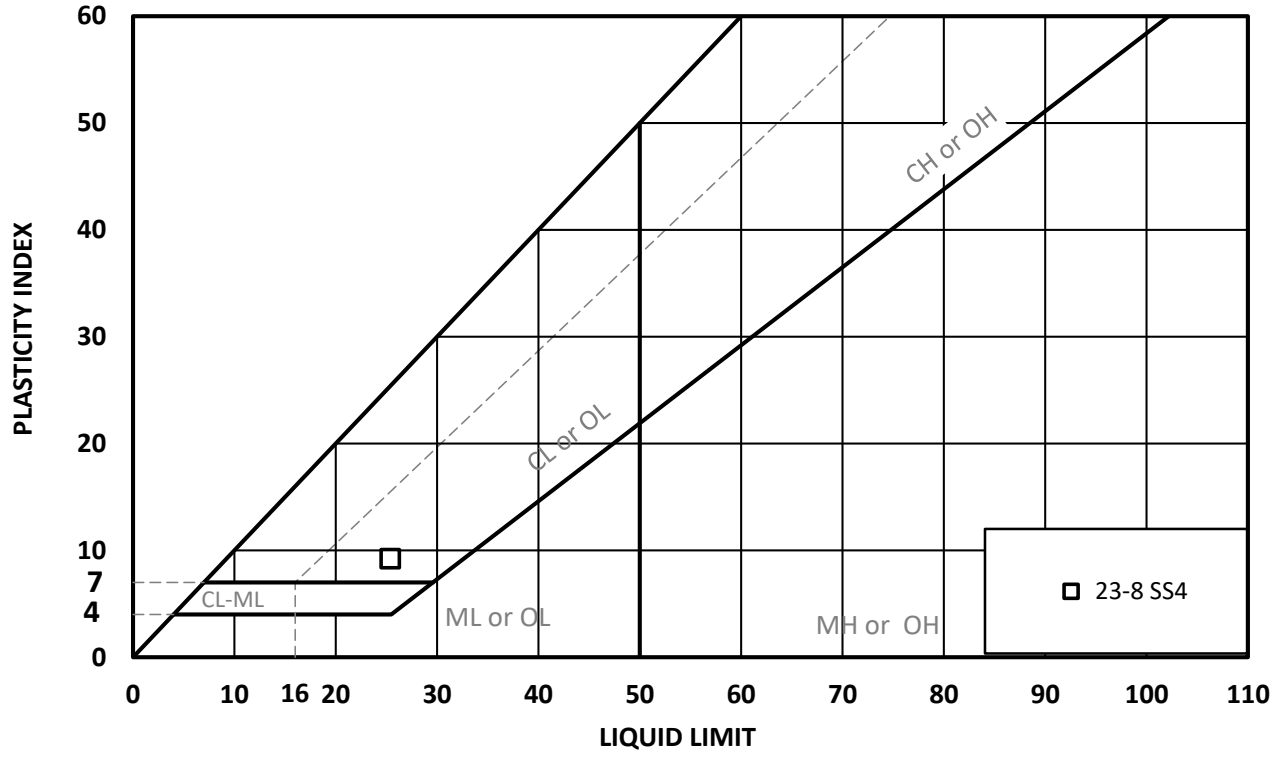
Project	**Enviro Geo Investigations, 150 Steeles Ave E**	Project No	**21-122-100**
Location	**150 Steeles Ave E., Brampton, ON**	Date	**May-20-2021**
Client	**Neatt Communities**	Figure No	38

Atterberg Test (ASTM D-4318)



Code	Sample ID	Sample No.		Moisture Contant (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	**USCS Symbol**
1	☐	23-8	SS4	11	25.4	16.2	9.2	CL

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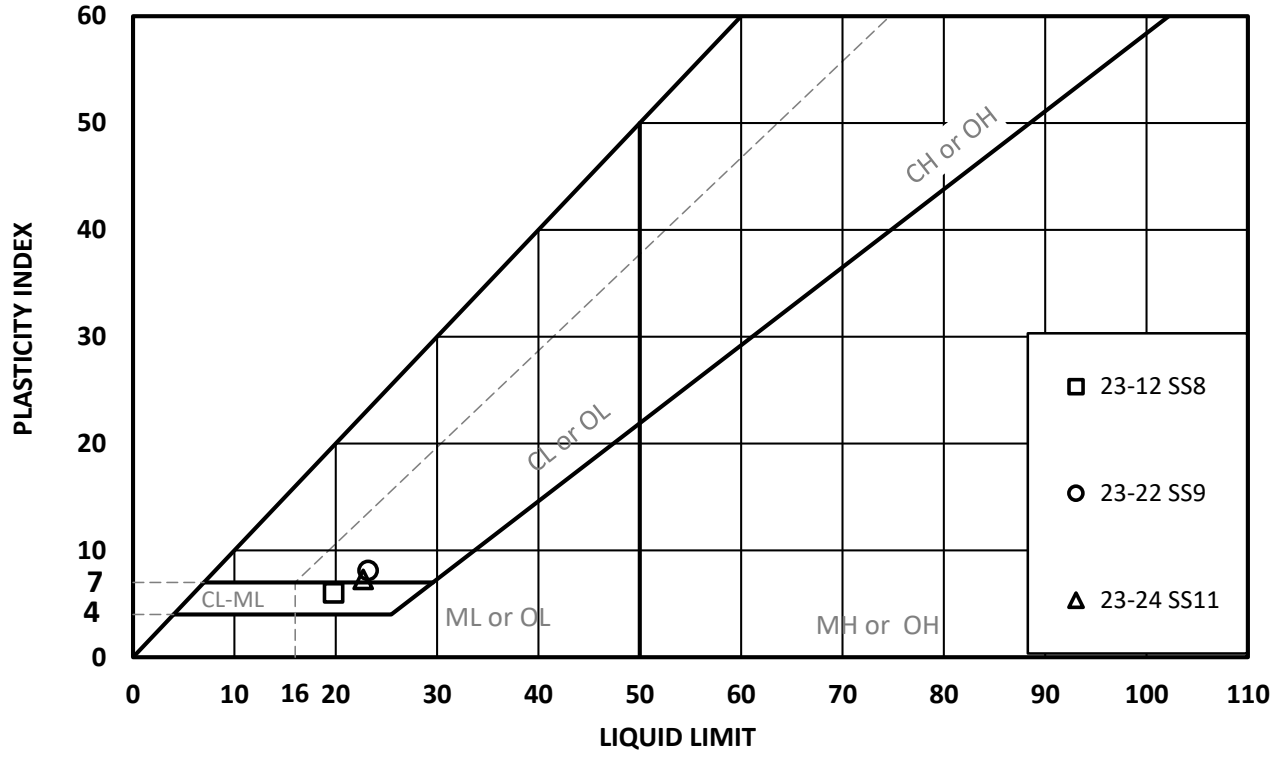
Project	**Additional Geotechnical and Hydrogeological Services**	Project No	**21-122-106**
Location	**150 Steeles Ave E, Milton, ON**	Date	**Apr-28-2023**
Client	Neatt Communities	Figure No	39

Atterberg Test (ASTM D-4318)



Code	Sample ID	Sample No.		Moisture Contant (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Symbol
1	□	23-12	SS8	12	19.8	13.8	6	CL-ML
2	○	23-22	SS9	13	23.2	15.1	8.1	CL
3	△	23-24	SS11	14	22.7	15.4	7.3	CL

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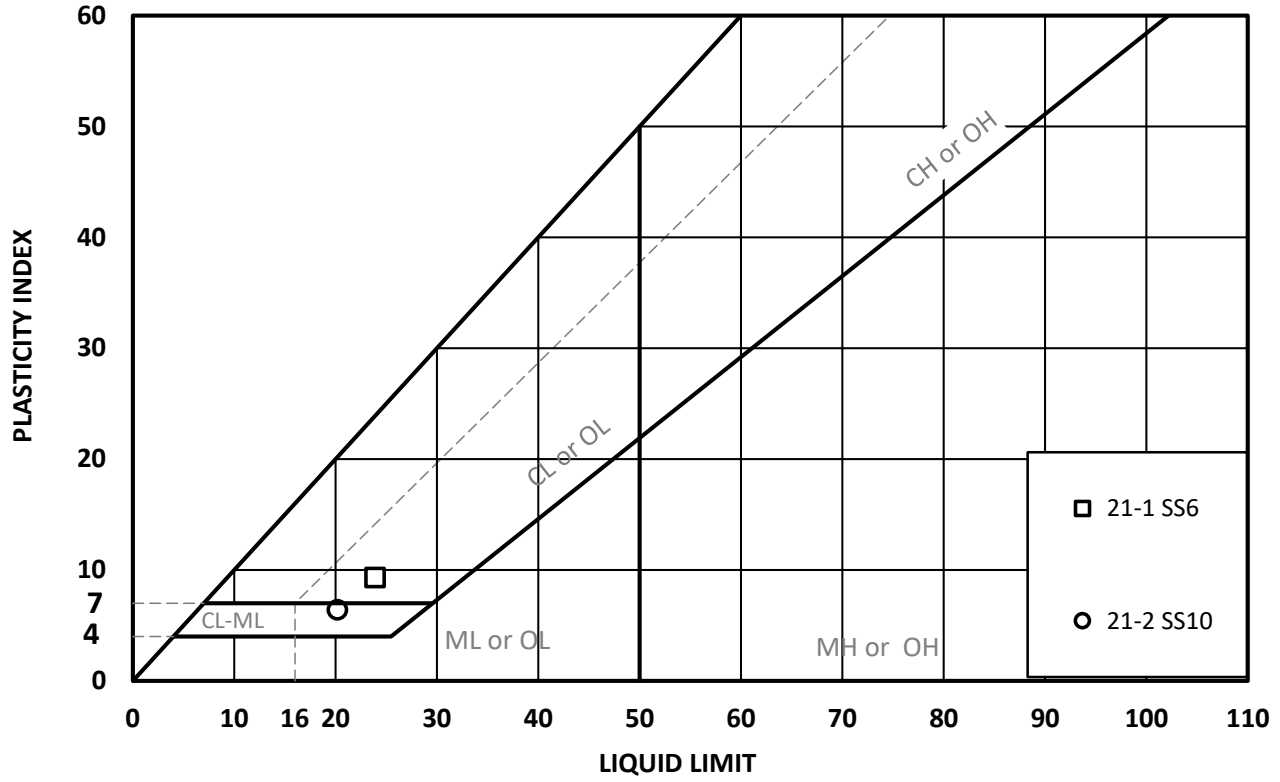
Project	Additional Geotechnical and Hydrogeological Services	Project No	21-122-106
Location	150 Steeles Ave E, Milton, ON	Date	Jun-16-2023
Client	Neatt Communities	Figure No	40

Atterberg Test (ASTM D-4318)



Code	Sample ID	Sample No.		Moisture Contant (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	**USCS Symbol**
1	□	21-1	SS6	11	23.9	14.6	9.3	CL
2	○	21-2	SS10	14	20.2	13.8	6.4	CL-ML

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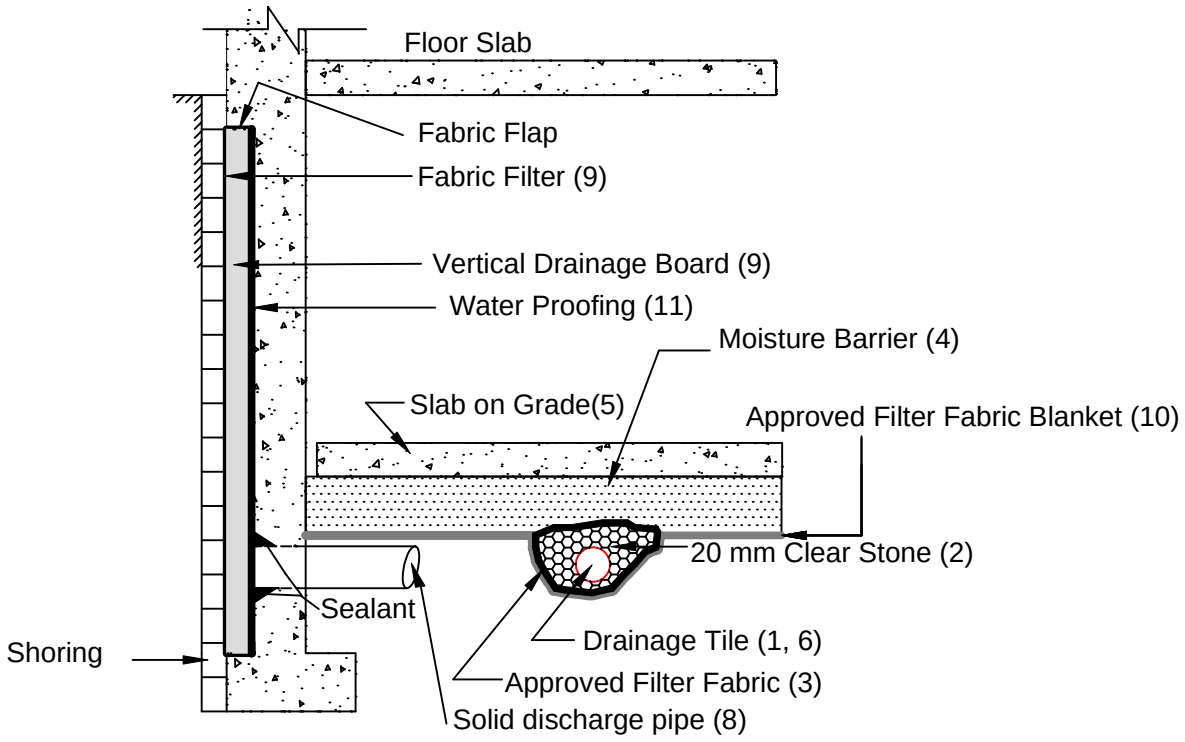
Project	**Enviro Geo Investigations, 150 Steeles Ave E**	Project No	**21-122-100**
Location	**150 Steeles Ave E., Brampton, ON**	Date	**May-17-2021**
Client	**Neatt Communities**	Figure No	41

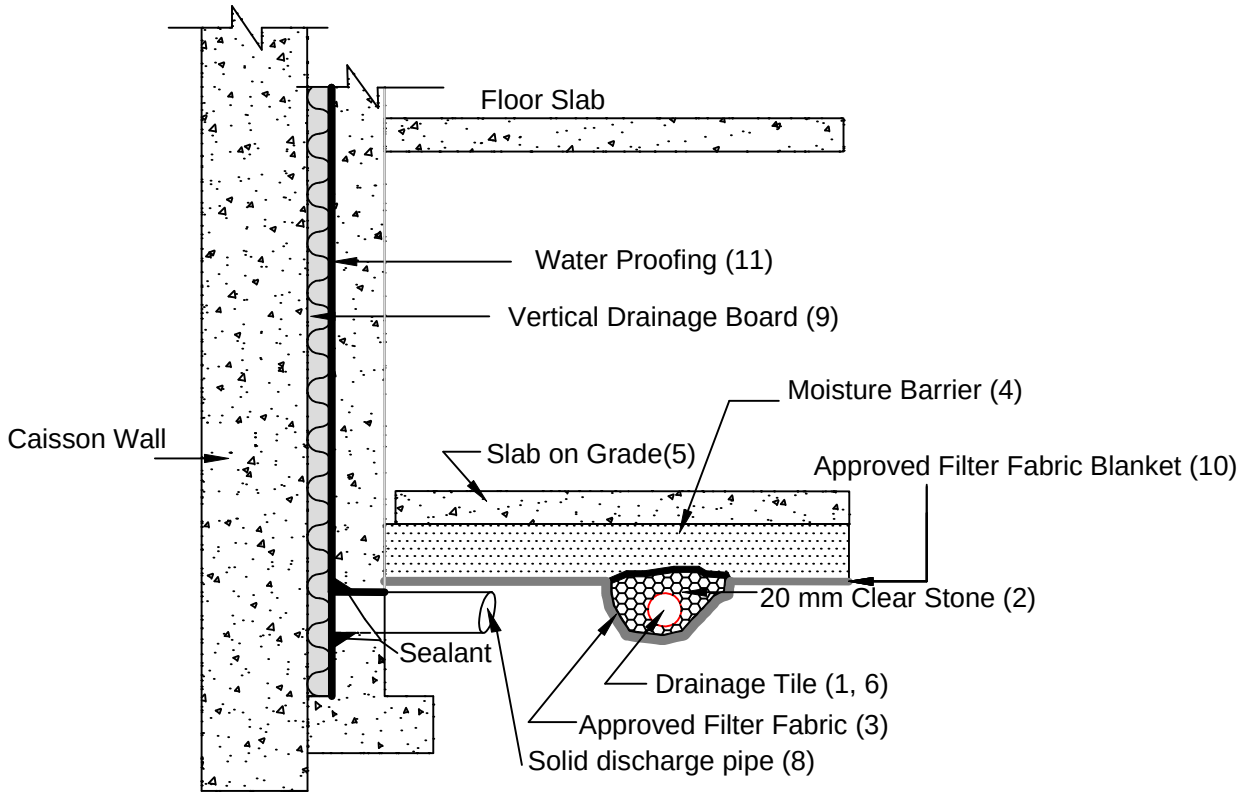


EXTERIOR FOOTING

Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet, spaced between columns.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
5. Slab on grade should not be structurally connected to the wall or footing.
6. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
7. Do not connect the underfloor drains to perimeter drains.
8. Solid discharge pipe located at the middle of each bay between the solider piles, approximate spacing 2.5 m, outletting into a solid pipe leading to a sump.
9. Vertical drainage board with filter cloth should be kept a minium of 1.2 m below exterior finished grade.
10. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
11. The basement walls should be water proofed using bentonite or equivalent water-proofing system.
12. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

DRAINAGE RECOMMENDATIONS
Shored Basement wall with Underfloor Drainage System
(not to scale)

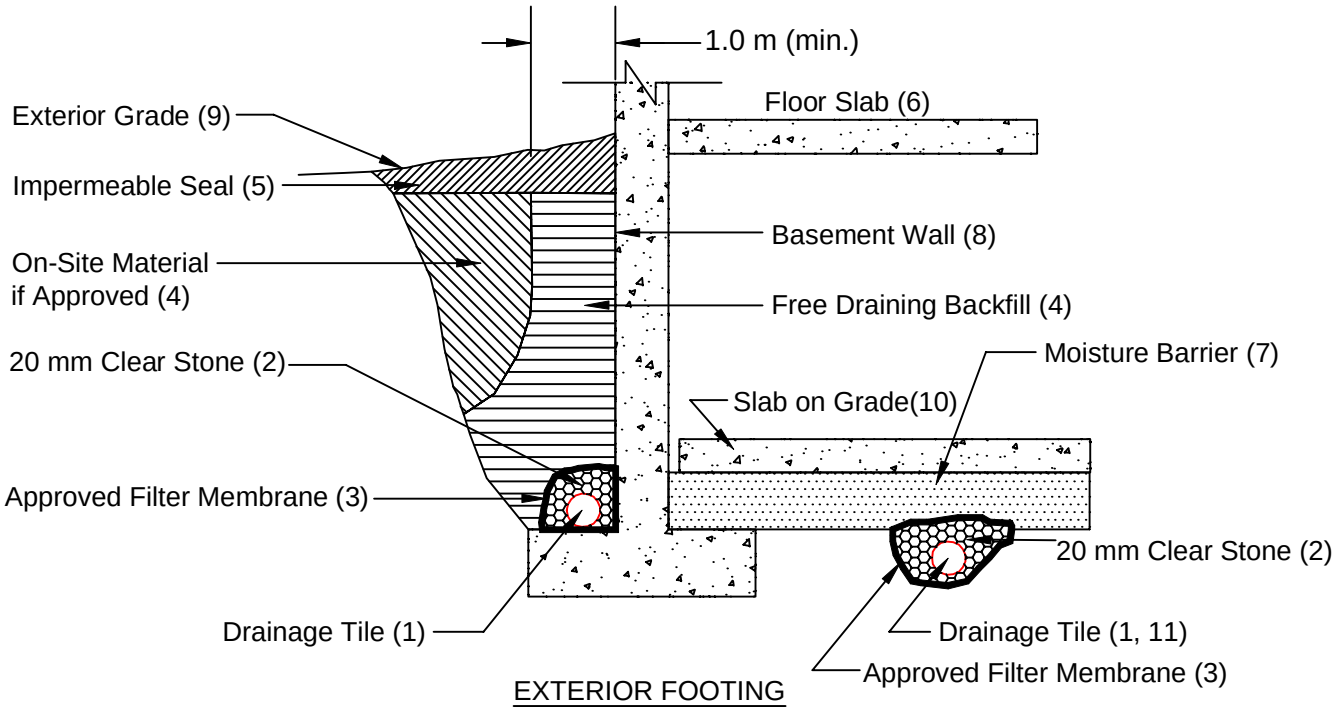


EXTERIOR FOOTING

Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet, spaced between columns.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
5. Slab on grade should not be structurally connected to the wall or footing.
6. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
7. Do not connect the underfloor drains to perimeter drains.
8. Solid discharge pipe located at the middle of each bay between the solider piles, approximate spacing 2.5 m, outletting into a solid pipe leading to a sump.
9. Vertical drainage board mira-drain 6000 or eqivalent with filter cloth should be continous from bottom to 1.2 m below exterior finished grade.
10. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
11. The basement walls must be water proofed using bentonite or equivalent water-proofing system.
12. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

DRAINAGE RECOMMENDATIONS
Shored Basement wall with Underfloor Drainage System
(not to scale)



EXTERIOR FOOTING

Notes

1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet.
2. 20 mm (3/4") clear stone - 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
4. Free Draining backfill - OPSS Granular B or equivalent compacted to the specified density. Do not use heavy compaction equipment within 450 mm (18") of the wall. Use hand controlled light compaction equipment within 1.8 m (6') of wall. The minimum width of the Granular 'B' backfill must be 1.0 m.
5. Impermeable backfill seal - compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted. Maximum thickness of seal to be 0.5 m.
6. Do not backfill until wall is supported by basement and floor slabs or adequate bracing.
7. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
8. Basement wall to be damp proofed /water proofed.
9. Exterior grade to slope away from building.
10. Slab on grade should not be structurally connected to the wall or footing.
11. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab.
12. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
13. The entire subgrade to be sealed with approved filter fabric (Terrafix 270R or equivalent) if non-cohesive (sandy) soils below ground water table encountered.
14. Do not connect the underfloor drains to perimeter drains.
15. Review the geotechnical report for specific details.

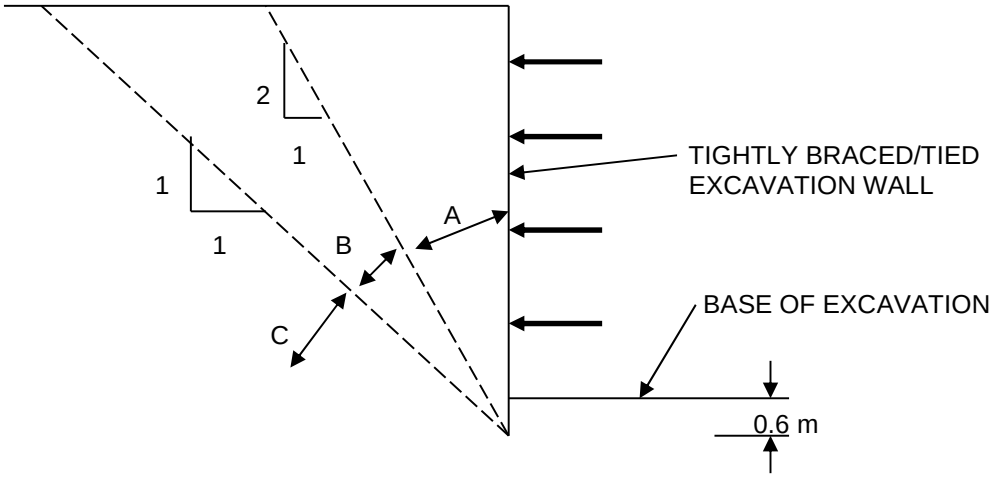
DRAINAGE AND BACKFILL RECOMMENDATIONS
Basement with Underfloor Drainage

(not to scale)

Project: 21-122-106 **Drawing 45**

Guidelines for Underpinning in Soil and Excavation Support

Existing foundations located within Zone A normally require underpinning, especially for heavy structures. For some foundations in Zone A, it may be possible to eliminate underpinning and control foundation movement by tightly braced excavation walls, such as caisson walls.



Zone A Foundations located within this zone normally require underpinning. Horizontal and vertical pressures on the excavation wall of non underpinned foundations must be considered

Zone B Foundations located within this zone normally do not require underpinning. Horizontal and vertical pressures on the excavation wall of non underpinned foundations must be considered

Zone C Underpinning to structures is normally founded in this zone. Lateral pressure from underpinning is not normally considered

(Reference: Figure 26.27 from Canadian Foundation Engineering Manual, 4th Edition)

Appendix A

General Comments - Bedrock in Greater Toronto Area
Photographs of Rock Cores

General Comments – Bedrock in Greater Toronto Area

The bedrock that makes spread footings or caissons a popular choice for high-rise foundation support is a shale or shale limestone composition. The highest member, the Queenston Formation, is generally found west of Toronto, while the Georgian Bay Formation underlies most of Metro Toronto, with the Collingwood Formation east of Toronto. The Queenston is, relatively speaking, the weaker of the three formations that are likely to support caissons or footings.

The Georgian Bay as well as the Queenston and Collingwood Formation are of Middle Ordovician Age. It is defined as the rock unit that overlies the bluish grey shales of the Collingwood Formation and is in turn overlain by the red shale of the Queenston Formation. The Georgian Bay Formation consists of bluish and grey shale with interbeds of sandstone, limestone and dolostone. Towards the west where the Georgian Bay formation underlies the Queenston Formation, the limestone content increases significantly and limestone and/or sandstone may comprise as much as 70 to 90 percent of the bedrock. The hard layers are usually less than about 100 to 150 mm thick but some layers are much thicker. The thicker layers have been observed to be as much as 750 to 900 mm at some sites. The layers are actually lenses and they can vary significantly in thickness over short distances.

The upper portion of the bedrock is commonly weathered for a depth of 600 to 1000 mm and within this weathered zone hard limestone layers or lenses are common. These hard limestone layers can result in contractual problems for augers and can provide misleading bedrock elevations. Where the weathering is more extensive a shale till layer may be found above the bedrock. In the sound bedrock, the limestone, sandstone, dolostone is hard to very hard.

Stress relief features such as folds and faults are common in the bedrock. In these features, the rock is heavily fractured and sheared, and contains layers of shale rubble and clay. Weathering is much deeper than the surrounding rock in these features and often there is a lateral migration of the stress relief features resulting in sound unweathered bedrock overlying fractured and weather bedrock. The stress relief features are usually in the order of 4 to 6 m wide, but the depth can vary from 4 to 5 m to in excess of 10 m. These features occur randomly.

The bedrock contains significant high locked in horizontal stresses. These stresses can impose significant loads on tunnel walls but the slower rate of construction for basements allows for a relaxation of these stresses and they are not normally a problem for basement construction.

Groundwater seepage below the top 1000 mm is generally small, however, at several locations in Toronto and Mississauga large quantities have been encountered.

Bedding joints in the bedrock are very close-to-close, smooth planar in the shale and rough planar in the limestone. Significant vertical jointing is common.

Where the bedrock was cored, a detailed description of the rock core is appended to the borehole log.

Design features related to the bedrock are discussed in other sections of this report, and these general comments must be considered with these comments.

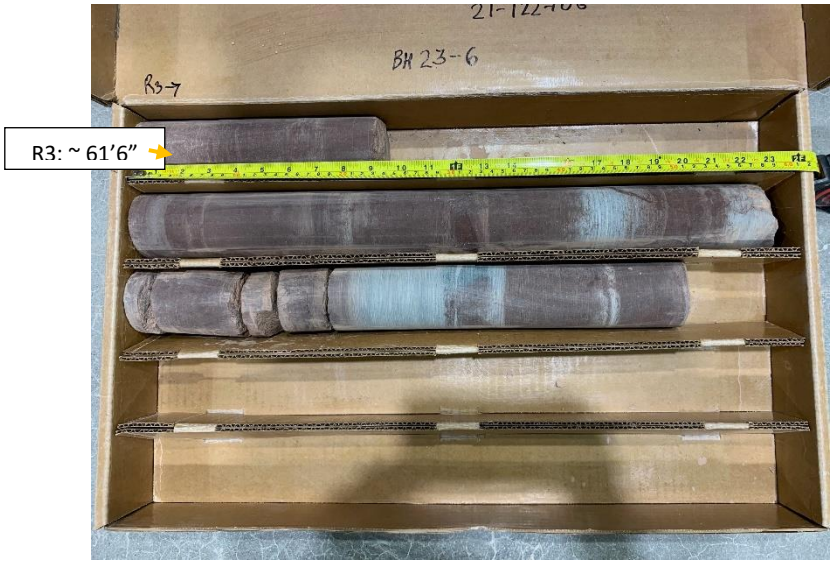
Methane gas exists in the bedrock, normally below the top 1000 mm and more concentrated with depth. Appropriate care and monitoring are essential in all confined bedrock excavations, particularly caissons and tunnels.

21-122-106
BH 23-1

R1: ~ 64’3” ~ 66’3”
R2: ~ 66’3” ~ 71’3”
R3: ~ 71’3” ~ 76’ 3”

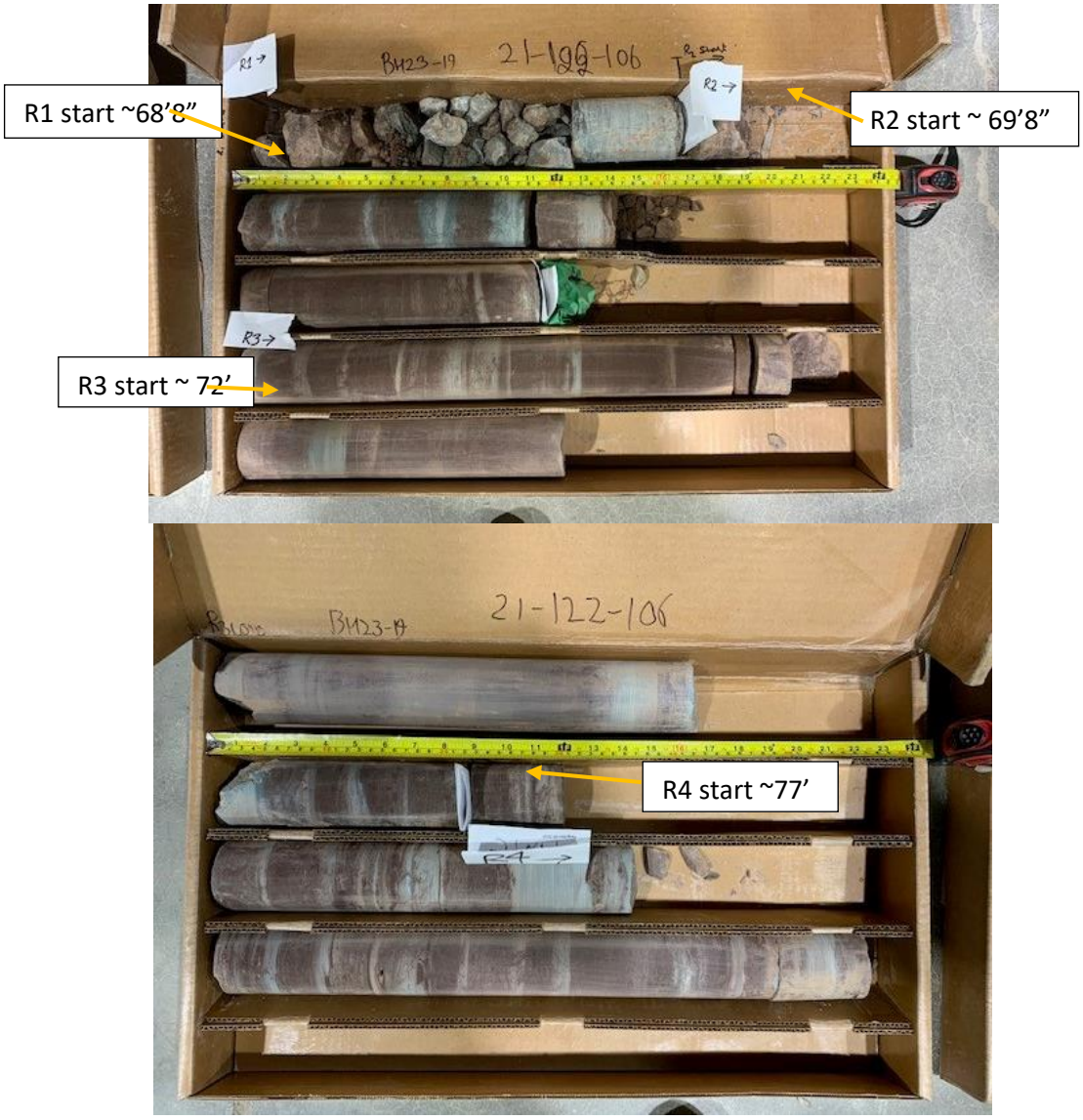
21-122-106
BH 23-6

R1: ~54’3” ~56’7”
R2: ~ 56’7” ~ 61’6”
R3: ~ 61’6” ~66’



21-122-106
BH 23-9
R1: ~55’9” ~58’5”
R2: ~ 58’5” ~ 63’5”
R3: ~ 63’5” ~66’3”
R4: ~ 66’3” ~71’8”

21-122-106
BH 23-19
R1: ~68’8” ~69’8”
R2: ~ 69’8” ~ 72’
R3: ~ 72’ ~ 77’
R4: ~ 77’ ~80’4”



21-122-106
BH 23-23

R1: ~ 52’7” ~ 56’6”
R2: ~ 56’6” ~ 61’7”
R3: ~ 61’7” ~ 63’ 6”

R1 Start ~ 52’7”

R2 Start ~ 56’6”

R3 Start ~ 61’7”

21-122-106
BH 23-24

R1: ~50’3 ~51’9”
R2: ~ 51’9” ~ 56’10”
R3: ~ 56’10” ~ 61’7”