REPORT
GEOTECHNICAL INVESTIGATION
PROPOSED HIGH-RISE DEVELOPMENT
65-71 AGNES STREET, MISSISSAUGA, ON

Prepared for

MR. BASHAR GHREIWATI

Prepared by

SIRATI & PARTNERS CONSULTANTS LIMITED

SIRATI & PARTNERS
Geotechnical Hydrogeological & Environmental Solutions

Project: SP21-826-10
October 27, 2021

12700 Keele Street, King City
Ontario L7B 1H5
Tel: 905.833.1582
Fax: 905.833.4488

TABLE OF CONTENTS

1. INTRODUCTION

Sirati & Partners Consultants limited (SIRATI) was retained by Mr. Bashar Ghreiwati (the Client) to undertake a geotechnical investigation for the proposed residential development located at 65-71 Agnes Street in Mississauga, Ontario.

A copy of the proposed site plan, prepared by Tregebov Cogan Architecture, dated November 2, 2020, was provided to SIRATI.

It is understood that the Client intends to develop the property to comprise a 28-storey mixed-use building with 3 to 5 levels of underground parking. The proposed site is located on the north side of Agnes Street and west of Cook Street in the City of Mississauga. The property has an approximate area of 3,609 square meters (0.36ha), with 71.0 m of frontage along Agnes Street. The subject lands are currently occupied by two single detached homes.

The purpose of the geotechnical investigation was to obtain information regarding subsurface conditions at borehole locations and provide recommendations pertaining to the followings:

1. Foundation bearing capacity in sound shale;
2. Perimeter shoring and foundation wall;
3. Drainage condition;
4. Seismic site classification.

This report is geotechnical in nature and only deals with geotechnical issues pertinent to the site and proposed development. Hydrogeological and Environmental studies were also conducted by SIRATI and reports are presented under separate covers.

This report is provided based on the terms of reference presented above and, on the assumption, that the design will be in accordance with the 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 of this office can be relied upon.

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 the Client and its architects and designers. Third party use of this report without Sirati & Partners Consultants Limited (SIRATI) consent is prohibited. The limitation conditions presented in **Appendix B** form an integral part of the report and they must be considered in conjunction with this report.

2. FIELD AND LABORATORY WORK

A total of five (5) boreholes (BH 1 through BH 5, see Drawing 1 for the borehole location plan) were drilled by SIRATI between April 26th and 29th, 2020, extending to the depths ranging between 4.8 m (BH5) and 21.1 m (BH 2) below existing ground surface (bgs).

Boreholes were drilled with hollow stem continuous flight auger equipment by a drilling sub-contractor under the direction and supervision of SIRATI 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.

Bedrock coring was carried out in selected boreholes (BH1 and BH2), in accordance with the ASTM D 2113 test method. Bedrock was cored using HQ size core barrel to the termination depths of the boreholes. Photographs of the rock cores are presented in **Appendix A**.

The drilling of all boreholes was conducted by a drilling sub-contractor under the direction and supervision of SIRATI staff.

Two (2) soil samples were subjected to grain size and hydrometer analyses and gradation curves are presented in Figure 7.

Monitoring wells were installed at three (3) borehole locations (BH1, BH3, and BH4) for long-term (stabilized) groundwater level monitoring.

The elevations at the borehole locations were surveyed by SIRATI personnel using a differential GPS system and varied from 112.6 m to 114.2 m.

3. SITE AND SUBSURFACE CONDITIONS

The borehole location plan is shown on Drawing 1. Notes on soil descriptions are presented on Drawing 1A. The subsurface conditions in the boreholes are presented in the individual borehole logs (Encl. 2 to 6 inclusive). The soil and groundwater conditions in the boreholes are summarized in the following paragraphs.

3.1 SOIL CONDITIONS

Topsoil: A surficial layer of topsoil was encountered at all boreholes, with the thickness of 100 mm to 300 mm.

It should be noted that the thickness of the topsoil observed at the borehole locations may not be representative for the entire site and should not be relied on to calculate the amount of topsoil that need to be stripped from the site.

Fill/Probable Fill: A layer of fill material was encountered below the topsoil at the location of all boreholes. The fill layers consisted of sand, trace to some silt, and extended to depths ranging between 1.5 m (BH1 and BH4) and 2.3 mbgs (BH2, BH 3, and BH5).

The measured SPT 'N' values in the fill material ranged from 4 to 32 blows per 0.3 m penetration, indicating a very loose to dense condition.

The moisture content of the fill/probable fill material was found ranging from 5% to 11%, indicating moist condition.

Grain size and hydrometer analyses of one (1) representative sample of the fill/probable fill layer (BH3/SS3) was conducted, and the results are presented in Figure 7 with the following fractions:

Clay: 4%
Silt: 15%
Sand: 80%
Gravel: 1%

Cohesionless Soil deposit: Cohesionless soil deposit consisting of sand, trace silt or silt was encountered underlying the fill layer at the location of all boreholes, extending to the depth of 3.1 m to 3.3 mbgs.

The measured SPT 'N' values in the cohesionless soil deposit varies from 20 to over 50 blows per 0.3 m, indicating compact to very dense condition.

The moisture content of the cohesionless soil deposit ranged between 4% and 21%, indicating moist to wet condition.

Grain size and hydrometer analyses of one (1) representative sample of the cohesionless soil deposit (BH2/SS4) was conducted, and the results are presented in Figure 7 with the following fractions:

Clay: 1%
Silt: 9%
Sand: 89%
Gravel: 1%

SHALE BEDROCK: Inferred weathered shale bedrock was observed upon spoon refusal ranging in Elevations between 109.4 m and 110.9 m (Geodetic). The shale bedrock is of the Georgian Bay Formation. The material is colored grey and features an upper sub-unit. The upper (weak) sub-unit is approximately 1.5 m to 2.0 m thick, highly weathered (W4) to moderately weathered (W3) and fractured, and in a very poor to poor condition. It should be noted that the above indicated depths for the bedrock surface are approximate since the auger/HW casing penetrated the weathered shale, and therefore, the coring performed below the bedrock surface. SPT tests carried out in this sub-unit of the weathered shale bedrock measured N-values of more than 50 blows for less than 300 mm sampler penetration.

The layer is followed by a less weathered sub-unit of rock which is in fair to excellent condition.

Bedrock coring was carried out in less weathered sub-unit of bedrock at boreholes BH1 and BH2 during the intrusive drilling operation to verify the quality of the bedrock. Based on the examination of the rock core samples retrieved, the bedrock in less weathered sub-unit consisted of less weathered shale with interbedded layers of grey limestone/siltstone and occasional horizontal and vertical fractures. Rock core photographs are presented in **Appendix A**.

Approximate depth, length and Rock Quality Designation (R. Q. D.) of the cored samples are presented in the respective borehole logs. Detailed descriptions of the index properties and results of laboratory testing are presented in the following paragraphs.

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 was generally good which ranged from 95% to 100% with an average value of 99%.

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 48% to 100%.

Rock Quality Designation (RQD)

The rock quality designation index is obtained by measuring the length of intact recovered rock core pieces which are longer than 100 mm and expressing their sum 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. The recorded RQD values for the cored runs ranged from 0% to 100%, indicating a “Very Poor” to “Excellent” rock quality, and the average of 80.1% suggests a rock of generally “fair quality”.

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 limestone layers. The percentage of the “hard layers” per core run ranges between 0% and 37.5%, averaging approximately 10.4%. The thickness of these layers varied but was generally less than 100 mm. This rock formation, however, is known to contain very strong limestone or siltstone layers up to 600 mm in thickness. 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 1m in thickness.

3.2 GROUNDWATER CONDITIONS

Table 2 shows the observed stabilized groundwater table on May 10, 2021, measured in the monitoring wells of BH1, BH3, and BH4. Groundwater was also measured in an existing monitoring well (MW2,

old), adjacent to BH2. The groundwater was found to vary between 3.2 m and 5.3 m depth, corresponding to geodetic elevations ranging between 109.7 m and 108.0 m. The higher groundwater table was generally observed in shallow monitoring wells.

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events. Long-term groundwater monitoring observation is recommended.

Table 2: Groundwater Levels Observed in the monitoring wells.

BH No.	Date of Drilling	Date of Observation	Depth of Groundwater below existing ground (m)	Elevation of Groundwater (m)
BH/MW1	April 29, 2021	May 10, 2021	5.3	108.0
BH/MW3	April 29, 2021	May 10, 2021	3.2	109.4
BH/MW4	April 29, 2021	May 10, 2021	4.1	109.7
MW2 (Old)	N/A	May 10, 2021	4.7	108.1

4. DISCUSSION AND RECOMMENDATIONS

It is understood that the Client intends to develop the property with a 28-storey high-rise building with 3 to 5 levels of underground parking.

The recommendations are based on the subsurface soil and groundwater conditions encountered during the investigation and interpretation of the factual data presented in this report. The soil conditions may vary between and beyond the borehole locations.

At the time of preparing this report, the proposed design grades (i.e. finished floor slab elevation and foundations) were not provided. The following engineering recommendations regarding the geotechnical design aspects of the building foundations should be reviewed once the final design grades and foundations have been finalized.

Where comments are made on construction, they are provided to highlight those aspects which could affect the design of the project, and for which special provision may be required during construction.

Those requiring information on aspects of construction should make their own interpretation of the factual information, provided such interpretation may affect selections, proposed construction methods, scheduling and the like.

The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by SIRATI to validate the information for use during the construction stage.

The following provides limited recommendations regarding foundation condition, drainage, excavation support, earth pressure and seismic site class.

4.1 FOUNDATION CONDITIONS

The tower with three (3) to five (5) levels of underground parking can be supported by spread and strip footings founded on sound shale bedrock, designed for a bearing capacity of 4.0 MPa at the serviceability limit state (SLS) and 6.0 MPa at the ultimate limit state (ULS).

All footing bases should be evaluated by this office at the time of construction. In the event where rubble zones, faults, etc. are encountered in the shale bedrock, the footings would have to be lowered to competent rock. Soft layers were observed in BH1 from 17.8 m to 20.1 m, corresponding to geodetic elevations of 95.5 m and 93.2 m, respectively. No foundation shall be installed at this depth. Once the number of basements is determined, SIRATI shall be consulted to review and finalize the depth of the shallow foundations.

During excavation, care is needed to avoid fracturing, loosening or softening the shale at the foundation level. Loose, broken or remolded shale under the foundation, unless removed, may cause excessive differential settlements. Shale bedrock, immediately above the foundation level should be removed carefully at the latest possible stage before pouring concrete and construction to minimize softening due to weathering.
Footing bases should be protected by a concrete skim coat (~50 mm thick) if concrete placement does not occur on the same day after excavation.

Footings at different elevations should be located such that higher footings are set below a line drawn up at 1 Horizontal to 1 Vertical (1H:1V) from the near edge of the lower footing in bedrock. This concept should also be applied to excavations for new foundations in relation to existing footings or underground services.

The total and differential settlements of footings placed on the bedrock in accordance with the above recommendations, are expected to be small and well within the normally tolerated limits of 25 mm and 19 mm, respectively.

All foundations exposed to freezing conditions must be provided with at least 1.2 m of earth cover or equivalent insulation for frost protection, depending on the final grade requirements.

4.2. FLOOR SLAB AND PERMANENT DRAINAGE

With three (3) to five (5) levels of underground parking at or below the approximate geodetic elevations of 104.4 m and 98.4 m, respectively, the underground floor slab can be supported on grade. It is recommended that the exposed subgrade be inspected and approved by the Geotechnical Engineer prior to the placement of any granular fill or concrete. A granular layer consisting of at least 200 mm of 19 mm Crusher Run Limestone (CRL) or OPSS Granular A should be placed under the floor slab as a bedding layer. The CRL or the OPSS Granular A should be compacted to 100% of its SPMDD.

The base of any floor slab excavation that is left exposed longer than 24 hours or is exposed to frost should be suitably covered to prevent degradation of the exposed founding stratum with the construction of a mud mat.

A perimeter and underfloor drainage system will be required for buildings with basement. The perimeter drainage system in bedrock shall be comprised of vertical drainage board installed on the bedrock surface, overlain by a layer of waterproofing. Typical drainage and backfill recommendations are illustrated on Drawing 8.

5. EXCAVATION SUPPORT

The stratigraphy at the site was found to be comprised of approximately 3.1 m to 3.3 m of overburden, underlain by bedrock of Georgian Bay Formation. The upper 1.5 m to 2.0 m of the bedrock is expected to be weathered. The excavation is expected to pass through fill/native overburden and weathered/sound shale deposits. The groundwater was observed to be at an average depth of 4.3 m.

Given the limited spacing of the development to the property boundaries, excavation support will be required. The excavation in the overburden can be supported by soldier piles and timber lagging, caisson walls, or soil nailing with shotcrete and wire mesh. The excavation support in bedrock can be in the form of rock pins, and where necessary shotcrete. A specialist shoring design contractor shall be retained for temporary excavation support design.

A 75 mm-thick layer of Styrofoam shall be placed between the waterproofing layer and the foundation wall in the bedrock. The layer will eliminate the risk of rock squeeze on the foundation wall in the long-term.

The shoring system must be designed in accordance with the Fourth Edition of the Canadian Foundation Engineering Manual. The soil parameters estimated to be applicable for this design are as follows:

1) Earth Pressure Coefficients

   (a) where movement must be minimal, K_0=0.50

   (b) where minor movement (.002H) can be tolerated, K_a=0.33

   (c) passive earth pressure for soldier piles (unfactored), K_p=3.0 for the very dense soils

2) For stability check
   ϕ= 30°
   c= 0
   γ = 21 kN/m^3
   Surcharge is to be determined by shoring contractor.

3) For earth anchors:

Bond values of 50 kPa and 600 kPa are suggested in native soil and sound bedrock, respectively; these values depend on anchor installation methods and grouting procedures. Higher bond values can be achieved in pressure grouted anchors.

Safe net bearing value for soldier pile caissons base assuming clean dry hole in sound shale bedrock is q = 1.5 MPa.

Casing will be required during the construction of the tiebacks to prevent caving of soils. 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 soils from caving during the installation period. Measures will be required to prevent the loss of soil through the spaces between the lagging boards (if used). This could be achieved by installing a geotextile filter cloth behind the lagging boards.

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 m below the top of level ground surface. Anchors will require casing when penetrating through wet sand and silt layers. The suggested bond values provided above are preliminary since the contractor's installation procedures will determine the actual soil/rock to concrete bond value. Hence, the contractor must decide on a capacity and confirm its availability. All anchors must be tested as indicated in the Foundation Manual, 4th edition.

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 results 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% H.

6. EARTH PRESSURES

The lateral earth and water pressure acting within the overburden and weathered bedrock on the underground walls can be calculated by the following formula:

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

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

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

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

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

Where,

p	=	lateral earth and water pressure in kPa acting at a depth of z below ground surface
K	=	earth pressure coefficient = 0.5
	=	unit weight of soil/weathered bedrock above groundwater table, assuming = 22.0 kN/m^3
g_1	=	submerged unit weight of soil/weathered bedrock below groundwater table, assuming γ_1 = 12.2 kN/m^3
g_w	=	unit weight of water, assuming γ_w = 9.8 kN/m^3
z	=	depth below ground surface to point of interest, in meters
d_w	=	depth of groundwater table below ground surface, in meters
q	=	value of surcharge in kPa
p_w	=	hydrostatic water pressure in kPa (to be neglected if effective drainage is installed)

The above lateral earth pressure shall be applied within the overburden and weathered shale depths. This could be assumed from surface to 107.0 m ASL.

Given the relatively high unconfined compressive strength of sound shale, the lateral earth pressure can be assumed to be constant from 107.0 m ASL to the base of the excavation and equal to the design pressure at 108 m ASL.

7. EARTHQUAKE CONSIDERATIONS

Based on the borehole information and according to Table 4.1.8.4.A of OBC 2012, the subject site for the proposed buildings with one level of underground parking can be classified as “Class B” for seismic site response.

8. GENERAL COMMENTS ON REPORT

Sirati & Partners Consultants Limited (SIRATI) 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, SIRATI will assume no responsibility for interpretation of the recommendations in the report.

The comments given in this report are intended only for the guidance of design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc., would be much greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

The limitation conditions presented in **Appendix B** form an integral part of the report and they must be considered in conjunction with this report.

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

Yours truly,

SIRATI & PARTNERS CONSULTANTS LIMITED

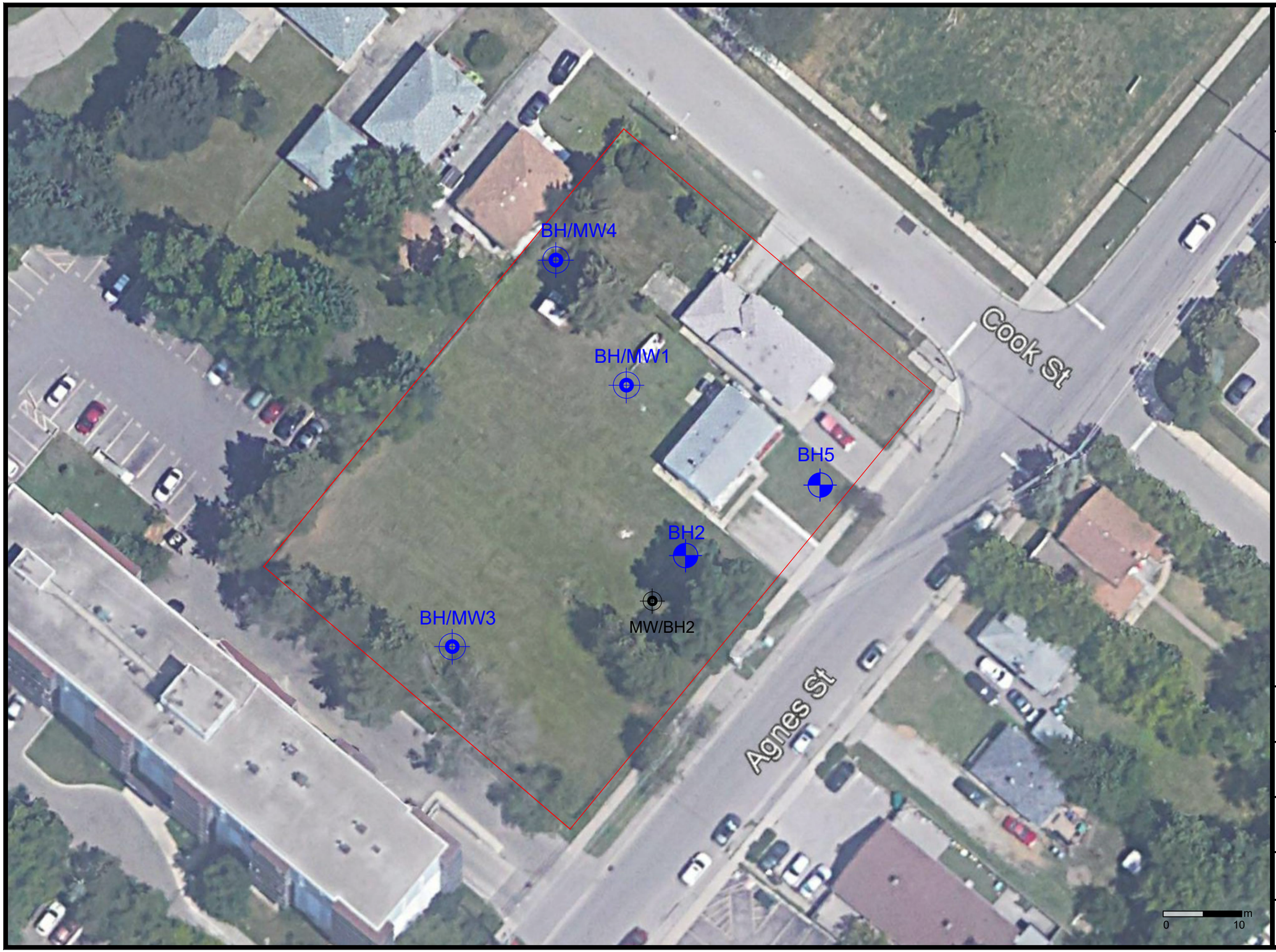
Hamid Sarabadani, M.Sc., P.Eng.
Geotechnical Engineer

Meysam Najari, Ph. D.
Geotechnical Designer

Archie Sirati, Ph.D., P. Eng.
Principal Geotechnical Engineer

LICENSED PROFESSIONAL ENGINEER
A. SIRATI
100186600
OCT. 27/21
PROVINCE OF ONTARIO

Drawings



SIRATI & PARTNERS
Geotechnical Hydrogeological & Environmental Solutions
12700- Keele Street
King City, ON. L7B 1H5
Phone# 905 833 1582, Fax#905 833 5360

North:

Legend:

- Borehole location
- Montoring Well location
- Montoring Well location (Existing)

Project Title:
Geotechnical Investigations

Site Location:
15 & 17 Agnes Street, Mississauga, ON,

Figure Title:
Borehole Location Plan

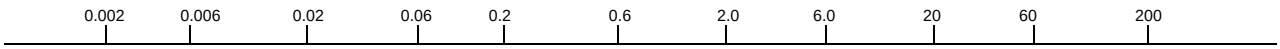
Scale:	Project Number:
As Shown	SP21-826-00
Date:	**Figure Number:**
April 2021	1

Drawing 1A: Notes on Sample Descriptions

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by Sirati & Partners Consultants Limited also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has 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 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.

LOG OF BOREHOLE BH1

PROJECT: Geotechnical Investigation
CLIENT: Bashar Ghreiwati
PROJECT LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario
DATUM: Geodetic
BH LOCATION: N 4826125.23 E 611451.625

DRILLING DATA
Method: Hollow Stem Auger/HQ Coring
Diameter: 150 mm/63 mm
Date: Apr-28-2021 to Apr-29-2021

REF. NO.: SP21-826-00
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
113.3					
0.0 / 113.0	**TOPSOIL** 300 mm thick				
0.3	**PROBABLE FILL:** sand, some silt, trace gravel, brown, moist, very loose to loose	1	SS	3	113
		2	SS	7	
111.8					112
1.5	**SAND:** trace silt, greyish brown, moist, dense	3	SS	30	
		4	SS	35	111
110.2					
3.1	INFERRED BEDROCK **GEORGIAN BAY FORMATION** GREY, **SHALE BEDROCK**, interbedded with **SILTSTONE** and **LIMESTONE**	5	SS	50/ 50mm	
		6	SS	50	110
					109
	W. L. 108.0 m May 10, 2021				
		7	SS	50/ 75mm	107
		8	SS	60/ 75mm	106
	Rock coring started at 7.92m Refer to rock core log for detailed information	1	CORE		105
					104

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

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

SPCL SOIL LOG-DRAFT SP20-826-00.GPJ SPCL.GDT 21-5-27

LOG OF BOREHOLE BH1

PROJECT: Geotechnical Investigation
CLIENT: Bashar Ghreiwati
PROJECT LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario
DATUM: Geodetic
BH LOCATION: N 4826125.23 E 611451.625

DRILLING DATA
Method: Hollow Stem Auger/HQ Coring
Diameter: 150 mm/63 mm
Date: Apr-28-2021 to Apr-29-2021

REF. NO.: SP21-826-00
ENCL NO.: 2

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES 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
11	INFERRED BEDROCK **GEORGIAN BAY FORMATION** GREY, **SHALE BEDROCK**, interbedded with **SILTSTONE** and **LIMESTONE**(Continued)		2	CORE			103					
12			3	CORE			102					
13			4	CORE			101					
14			5	CORE			100					
15			6	CORE			99					
16			7	CORE			98					
17			8	CORE			97					
18							96					
19							95					
20							94					

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

SPCL SOIL LOG-DRAFT SP20-826-00.GPJ SPCL.GDT 21-5-27

LOG OF BOREHOLE BH1

PROJECT: Geotechnical Investigation
CLIENT: Bashar Ghreiwati
PROJECT LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario
DATUM: Geodetic
BH LOCATION: N 4826125.23 E 611451.625

DRILLING DATA
Method: Hollow Stem Auger/HQ Coring
Diameter: 150 mm/63 mm
Date: Apr-28-2021 to Apr-29-2021

REF. NO.: SP21-826-00
ENCL NO.: 2

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "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
21 92.3	INFERRED BEDROCK **GEORGIAN BAY FORMATION** GREY, **SHALE BEDROCK**, interbedded with **SILTSTONE** and **LIMESTONE**(Continued)						93					
21.0	**END OF BOREHOLE:**											

Note:
1. Monitoring well was installed upon completion of drilling.
2. Groundwater level observations:

Date	Depth (mbgs)
2021-05-10	5.32

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

SPCL SOIL LOG-DRAFT SP20-826-00.GPJ SPCL.GDT 21-5-27

LOG OF ROCK CORE BH1

PROJECT: Geotechnical Investigation
CLIENT: Bashar Ghreiwati
LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario
DATUM: Geodetic
BH LOCATION: N 4826125.23 E 611451.625

DRILLING DATA
Method: Hollow Stem Auger/HQ Coring
Diameter: 150 mm/63 mm
Date: Apr-28-2021 to Apr-29-2021

REF. NO.: SP21-826-00
ENCL NO.: 2

(m) ELEV / DEPTH	ROCK DESCRIPTION	GROUND WATER CONDITIONS	CORE SAMPLE NUMBER	CORE SAMPLE SIZE	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	HARD LAYER (%)	RQD (%)	FRACTURE INDEX (per 0.3 m)	DISCONTINUITIES	WEATHERING INDEX	HYDRAULIC CONDUCTIVITY (cm/sec)	POINT LOAD TEST UCS AXIAL (MPa)*	POINT LOAD TEST UCS DIAMETRAL (MPa)*	UNIAXIAL COMPRESSION (MPa)	DENSITY (g/cm³) E (GPa)
110.2	Rock Surface															
3.1	**GEORGIAN BAY FORMATION** Higly weathered (W4) to slightly weathered (W2), laminated to thinly bedded, dark grey to grey, **SHALE** and **LIMY SHALE**, interbedded with thinly laminated to thinly bedded with slightly weathered to fresh, light grey, **SILTSTONE** and **LIMESTONE**. Bedding almost horizontal (θ=90°)	▽ W. L. 108.0 m May 10, 2021														
105.4																
7.9	Slightly weathered (W2), **SHALE** and **LIMY SHALE**(68.3% to 98.4%), interbedded with **SILTSTONE** and **LIMESTONE** (1.6% to 31.7%). Bedding almost horizontal (θ=90°) Hard layers (siltstone and limestone) generally found to be less than 50mm thick except for noted depths		1		98	78	11.9	78	2 2 1 1 2	Fracture: 8.09m-8.20m, θ=0° Fragmented zone: 8.50m-8.52m	W2					
103.9	Run 1 hard rock: 11.9%															
9.5	Hard layers (limestone/siltstone) 7.92m (76mm) 8.1m (102mm) Run 2 hard rock: 31.7%, soft layer: 8.6% Hard layer (limestone/siltstone) 9.45m (203mm) 10.26m (89mm) 10.50m (89mm) Soft layers at: 9.65m (25mm) 10.24m (25mm) 10.41m (51mm)		2		97	81	31.7	72	2 1 1 5 2	Soft layer 9.65m ~ 9.68m (W5 to W4) 10.24m ~ 10.26m (W5 to W4) 10.41m ~ 10.46m (W5 to W4)	W2					
102.4																
11.0	Run 3 hard rock: 7.6%, soft layer: 1.7% Hard layer (limestone/siltstone) 11.29m (51mm) Soft layer at 11.13m (25mm)		3		98	85	7.6	80	3 2 1 2 1	Fracture: 11.38m-11.40m, θ=0° 11.13m ~ 11.15m (W4 to W3)	W2					
100.8																
12.5	Run 4 hard rock: 9.2% Hard layer (limestone/siltstone) 12.78m (76mm)								1 1							

Continued Next Page

Weathering Index: W1-Fresh, W2-Slightly weathered, W3-Moderately weathered, W4-Highly weathered, W5-Completely weathered θ=dangle to the core axis

E = Modulus of Elasticity
*: UCS [Mpa] ≈ 24 $I_{S(50)}$

LOG OF ROCK CORE BH1

PROJECT: Geotechnical Investigation
CLIENT: Bashar Ghreiwati
LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario
DATUM: Geodetic
BH LOCATION: N 4826125.23 E 611451.625

DRILLING DATA
Method: Hollow Stem Auger/HQ Coring
Diameter: 150 mm/63 mm
Date: Apr-28-2021 to Apr-29-2021

REF. NO.: SP21-826-00
ENCL NO.: 2

(m) ELEV / DEPTH	ROCK DESCRIPTION	GROUND WATER CONDITIONS	CORE SAMPLE NUMBER	CORE SAMPLE SIZE	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	HARD LAYER (%)	RQD (%)	FRACTURE INDEX (per 0.3 m)	DISCONTINUITIES	WEATHERING INDEX	HYDRAULIC CONDUCTIVITY (cm/sec)	POINT LOAD TEST UCS AXIAL (MPa)*	POINT LOAD TEST UCS DIAMETRAL (MPa)*	UNIAXIAL COMPRESSION (MPa)	DENSITY (g/cm³) E (GPa)
14 99.3	Slightly weathered (W2), **SHALE** and **LIMY SHALE**(68.3% to 98.4%), interbedded with **SILTSTONE** and **LIMESTONE** (1.6% to 31.7%). Bedding almost horizontal (θ=90°) Hard layers (siltstone and limestone) generally found to be less than 50mm thick except for noted depths *(continued)* Run 5 hard rock: 15.8% Hard layer (limestone/siltstone) 14.63m (89mm)		4		98	97	9.2	97	1 1 2		W2					
14.0									0	Fracture: 14.63m-14.72m, θ=0°						
15			5		100	92	15.8	73	0 2 0		W2					
97.8									0							
15.5	Run 6 hard rock: 1.6%, soft layer: 5.0% Soft layers at: 16.14m (38mm) 16.47m (38mm)								0						11.06	
16			6		100	85	1.6	85	2 0 4	16.14m ~ 16.18m (W4) 16.47m ~ 16.51m (W4)	W2					
17 96.3									2							
17.1	Highly weathered (W4) to slightly weathered (W3), **SHALE** and **LIMY SHALE**(98.3% to 100%), interbedded with **SILTSTONE** and **LIMESTONE**(0% to 1.7%). Bedding almost horizontal (θ=90°) Hard layers (siltstone and limestone) generally found to be less than 50mm thick except for noted depths Run 7 soft layer: 23.8%								1 0	Fragmented zone: 18.45m-18.49m 18.59m-18.62m						
18			7		100	48	0	25	9 7	17.81m ~ 17.83m (W4 to W3) 17.86m ~ 17.88m (W4 to W3) 17.96m ~ 18.00m (W4 to W3)	W4 to W3					
94.8									20	18.21m ~ 18.39m (W4 to W3) 18.47m ~ 18.54m (W4 to W3)						
18.6	Soft layers at: 17.81m (25mm) 17.86m (25mm) 17.96m (38mm) 18.21m (178mm) 18.47m (76mm) 18.59m (25mm) Run 8 hard rock: 1.7%, soft layer: 20.0% Soft layers at: 18.59m (51mm) 18.69m (38mm) 18.75m (127mm) 19.20m (13mm) 19.79m (25mm) 19.96m (25mm) 20.09m (25mm)									18.59m ~ 18.64m (W4 to W3) 18.69m ~ 18.73m (W4 to W3) 18.75m ~ 18.87m (W4 to W3)						
19			8		100	48	1.7	40	21 5 5 7	Fracture: 19.66m-19.69m, θ=5° Fragmented zone: 19.14m-19.20m 19.76m-19.79m 19.89m-19.93m 19.2m ~ 19.22m (W4 to W3)	W4 to W3					
20 93.2									8	19.79m ~ 19.81m (W4 to W3) 19.96m ~ 19.99m (W4 to W3) 20.09m ~ 20.12m (W4 to W3)						
20.1	Slightly weathered (W2) **SHALE** and **LIMY SHALE**(86.1%), interbedded with **SILTSTONE** and **LIMESTONE**(13.9%). Bedding almost horizontal (θ=90°) Hard layers (siltstone and limestone) generally found to be								2							
21 92.3			9		100	86	13.9	86	1 1		W2					
21.0	less than 50mm thick except for noted depths Run 9 hard rock: 13.9%, soft layer: 2.8% Hard layer (limestone/siltstone) 20.27m (76mm) **END OF BOREHOLE:**															

Note:
1. Monitoring well was installed upon completion of drilling.
2. Groundwater level observations:

Date	Depth (mbgs)
2021-05-10	5.32

SPCL ROCK CORE-2016-DRAFT SP20-826-00.GPJ SPCL.GDT 21-5-27

Weathering Index: W1-Fresh, W2-Slightly weathered, W3-Moderately weathered, W4-Highly weathered, W5-Completely weathered θ=angle to the core axis

E = Modulus of Elasticity
*: UCS [Mpa] ≈ 24 $I_{S(50)}$

LOG OF BOREHOLE BH2

PROJECT: Geotechnical Investigation
CLIENT: Bashar Ghreiwati
PROJECT LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario
DATUM: Geodetic
BH LOCATION: N 4826104.229 E 611460.574

DRILLING DATA
Method: Hollow Stem Auger/HQ Coring
Diameter: 150 mm/63 mm
Date: Apr-26-2021 to Apr-27-2021

REF. NO.: SP21-826-00
ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
113.2					
0.0 / 113.0	**TOPSOIL** 250 mm thick				
0.3	**PROBABLE FILL:** sand, trace to some silt, brown, moist, loose to compact	1	SS	32	113
		2	SS	12	112
		3	SS	7	
111.0					111
2.3	**SAND:** trace silt, greyish brown, moist, dense	4	SS	69	
110.0		5	SS	50/75mm	110
3.2	INFERRED BEDROCK **GEORGIAN BAY FORMATION** GREY, **SHALE BEDROCK**, interbedded with **SILTSTONE** and **LIMESTONE**				
		6	SS	50/75mm	109
	Rock coring started at 4.98m Refer to rock core log for detailed information	1	CORE		
		2	CORE		108
					107
		3	CORE		106
					105
		4	CORE		
					104

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
1	89	9	1

GROUND WATER CONDITIONS

SPCL SOIL LOG-DRAFT SP20-826-00.GPJ SPCL.GDT 21-5-27

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 BH2

PROJECT: Geotechnical Investigation
CLIENT: Bashar Ghreiwati
PROJECT LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario
DATUM: Geodetic
BH LOCATION: N 4826104.229 E 611460.574

DRILLING DATA
Method: Hollow Stem Auger/HQ Coring
Diameter: 150 mm/63 mm
Date: Apr-26-2021 to Apr-27-2021

REF. NO.: SP21-826-00
ENCL NO.: 3

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 (%) GR SA SI CL
(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	"N" BLOWS 0.3 m							
	INFERRED BEDROCK **GEORGIAN BAY FORMATION** GREY, **SHALE BEDROCK**, interbedded with **SILTSTONE** and **LIMESTONE**(Continued)		5	CORE			103					
11												
			6	CORE			102					
12							101					
			7	CORE								
13							100					
14												
			8	CORE			99					
15												
							98					
16			9	CORE								
							97					
17												
							96					
18			10	CORE								
							95					
19												
							94					
20			11	CORE								

SPCL SOIL LOG-DRAFT SP20-826-00.GPJ SPCL.GDT 21-5-27

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 BH2

PROJECT: Geotechnical Investigation
CLIENT: Bashar Ghreiwati
PROJECT LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario
DATUM: Geodetic
BH LOCATION: N 4826104.229 E 611460.574

DRILLING DATA
Method: Hollow Stem Auger/HQ Coring
Diameter: 150 mm/63 mm
Date: Apr-26-2021 to Apr-27-2021

REF. NO.: SP21-826-00
ENCL NO.: 3

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "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
	INFERRED BEDROCK **GEORGIAN BAY FORMATION** GREY, **SHALE BEDROCK**, interbedded with **SILTSTONE** and **LIMESTONE**(Continued)						93					
21 92.1			12	CORE								
21.1	**END OF BOREHOLE**											

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

SPCL SOIL LOG-DRAFT SP20-826-00.GPJ SPCL.GDT 21-5-27

LOG OF ROCK CORE BH2

PROJECT: Geotechnical Investigation

CLIENT: Bashar Ghreiwati

LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario

DATUM: Geodetic

BH LOCATION: N 4826104.229 E 611460.574

DRILLING DATA

Method: Hollow Stem Auger/HQ Coring

Diameter: 150 mm/63 mm

Date: Apr-26-2021 to Apr-27-2021

REF. NO.: SP21-826-00

ENCL NO.: 3

(m) ELEV / DEPTH	ROCK DESCRIPTION	GROUND WATER CONDITIONS	CORE SAMPLE NUMBER	CORE SAMPLE SIZE	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	HARD LAYER (%)	RQD (%)	FRACTURE INDEX (per 0.3 m)	DISCONTINUITIES	WEATHERING INDEX	HYDRAULIC CONDUCTIVITY (cm/sec)	POINT LOAD TEST UCS AXIAL (MPa)*	POINT LOAD TEST UCS DIAMETRAL (MPa)*	UNIAXIAL COMPRESSION (MPa)	DENSITY (g/cm³) E (GPa)
110.0	Rock Surface															
3.2	**GEORGIAN BAY FORMATION** Highly weathered (W4) to moderately weathered (W3), laminated to thinly bedded, dark grey to grey, **SHALE** and **LIMY SHALE**, interbedded with thinly laminated to thinly bedded with slightly weathered to fresh, light grey, **SILTSTONE** and **LIMESTONE**. Bedding almost horizontal (θ=90°) Hard layers (siltstone and limestone) generally found to be less than 50mm thick except for noted depths															
108.3											W3 to W4					
5.0			1		100	54	37.5	0	5	Fragmented zone: 5.01m-5.05m 5.11m-5.13m Soft layer 5.13m ~ 5.16m (W4 to W3)	W4 to W3					
5.1	Run 1 hard rock: 37.5% Hard layer (limestone/siltstone) 5.05m (57mm) Moderately weathered (W3) to slightly weathered (W2) **SHALE** and **LIMY SHALE** (71.7% to 97.6%), interbedded with **SILTSTONE** and **LIMESTONE** (2.4% to 28.3%). Bedding almost horizontal (θ=90°)		2		100	85	2.4	76	7 0 1 1 6	Fragmented zone: 5.22m-5.27m 6.52m-6.57m	W3 to W2					
106.5	Hard layers (siltstone and limestone) generally found to be less than 50mm thick except for noted depths															
6.7	Run 2 hard rock: 2.4%, soft layer: 1.6% Soft layer at: 5.13m (25mm) Run 3 hard rock: 11.7%, soft layer: 17.5% Hard layer (limestone/siltstone) 7.95m (152mm)		3		95	67	11.7	52	9 13 1 14 0	Fracture: 6.83m-6.86m, θ=55° Fragmented zone: 6.93m-6.99m 7.16m-7.21m 7.82m-7.85m 6.78m ~ 6.83m (W4 to W3) 7.14m ~ 7.19m (W4 to W3) 7.21m ~ 7.24m (W4 to W3) 7.77m ~ 7.90m (W4 to W3)	W3 to W2					
105.0																
8.2	Soft layers at: 6.78m (51mm) 7.14m (51mm) 7.21m (25mm) 7.77m (127mm) Run 4 hard rock: 13.6%, soft layer: 11.0% Hard layer (limestone/siltstone) 8.23m (76mm) Soft layers at: 8.75m (64mm) 8.92m (64mm) 9.4m (38mm)		4		100	64	13.6	56	3 10 10 4 4	Fragmented zone: 8.88m-8.92m 9.47m-9.50m 8.75m ~ 8.81m (W4) 8.92m ~ 8.98m (W4) 9.4m ~ 9.44m (W4)	W3 to W2					
103.5																
9.8	Run 5 hard rock: 28.3%, soft layer: 11.6% Hard layer (limestone/siltstone) 9.83m (51mm) 10.46m (279mm) Soft layers at: 9.96m (89mm) 10.07m (51mm) 10.13m (6mm) 10.16m (25mm)		5		97	72	28.3	63	9 8 1 2 2	Fragmented zone: 10.07m-10.10m 11.05m-11.07m 9.96m ~ 10.05m (W4) 10.07m ~ 10.12m (W4) 10.13m ~ 10.14m (W4) 10.16m ~ 10.19m (W4)	W3 to W2					
102.0																
11.3	Run 6 hard rock: 10.0%, soft layer: 15.8% Hard layer (limestone/siltstone) 11.89m (64mm) Soft layers at: 11.54m (76mm) 11.66m (64mm) 12.70m (102mm)		6		98	69	10.0	61	11 7 2 0 11	Fragmented zone: 11.33m-11.38m 12.55m-12.59m 12.67m-12.73m 11.54m ~ 11.62m (W4 to W3) 11.66m ~ 11.72m (W4 to W3) 12.7m ~ 12.80m (W4 to W3)	W3 to W2					
100.4																
12.8	Run 7 hard rock: 4.2%, soft layer: 10.2% Soft layers at:								10	13m ~ 13.08m (W3)						

Continued Next Page

Weathering Index: W1-Fresh, W2-Slightly weathered, W3-Moderately weathered, W4-Highly weathered, W5-Completely weathered

θ = angle to the core axis

E = Modulus of Elasticity

*: UCS [Mpa] ≈ 24 $I_{S(50)}$

LOG OF ROCK CORE BH2

PROJECT: Geotechnical Investigation
CLIENT: Bashar Ghreiwati
LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario
DATUM: Geodetic
BH LOCATION: N 4826104.229 E 611460.574

DRILLING DATA
Method: Hollow Stem Auger/HQ Coring
Diameter: 150 mm/63 mm
Date: Apr-26-2021 to Apr-27-2021

REF. NO.: SP21-826-00
ENCL NO.: 3

(m) ELEV / DEPTH	ROCK DESCRIPTION	GROUND WATER CONDITIONS	CORE SAMPLE NUMBER	CORE SAMPLE SIZE	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	HARD LAYER (%)	RQD (%)	FRACTURE INDEX (per 0.3 m)	DISCONTINUITIES	WEATHERING INDEX	HYDRAULIC CONDUCTIVITY (cm/sec)	POINT LOAD TEST UCS AXIAL (MPa)*	POINT LOAD TEST UCS DIAMETRAL (MPa)*	UNIAXIAL COMPRESSION (MPa)	DENSITY (g/cm³) E (GPa)
14	13.00m (76mm) 14.12m (76mm) Moderately weathered (W3) to slightly weathered (W2) **SHALE** and **LIMY SHALE** (71.7% to 97.6%), interbedded with **SILTSTONE** and **LIMESTONE** (2.4% to 28.3%). Bedding almost horizontal (θ=90°)		7		98	75	4.2	73	4 1 2 7	Fracture: 13.31m-13.34m, θ=0° Fragmented zone: 13.08m-13.12m *(continued)* 14.12m ~ 14.20m (W3)	W3 to W2					
98.9																
14.3	Hard layers (siltstone and limestone) generally found to be less than 50mm thick except for noted depths *(continued)* Run 8 hard rock: 8.5%, soft layer: 14.4% Hard layer (limestone/siltstone) 14.97m (76mm) Soft layers at: 15.14m (102mm) 15.44m (102mm) 15.56m (13mm)		8		98	67	8.5	62	1 2 11 10 12	Fracture: 14.95m-14.96m, θ=0° Fragmented zone: 15.74m-15.82m 15.14m ~ 15.24m (W3) 15.44m ~ 15.54m (W4 to W3) 15.56m ~ 15.57m (W3)	W3 to W2					
15																
97.4																
15.9	Slightly weathered (W2) to fresh (W1) **SHALE** and **LIMY SHALE** (88.9% to 98.3%), interbedded with **SILTSTONE** and **LIMESTONE** (1.7% to 11.1%). Bedding almost horizontal (θ=90°) Hard layers (siltstone and limestone) generally found to be less than 50mm thick except for noted depths Run 9 hard rock: 1.7% Run 10 hard rock: 1.7%		9		100	100	1.7	100	0 0 0 0 0		W2 to W1					
16																
17																
95.9																
17.4			10		97	100	1.7	100	0 0 1 1 0		W2 to W1					
18																
94.3																
19 18.9	Run 11 hard rock: 6.7%		11		100	97	6.7	93	2 0 0 0 2		W2 to W1				10.94	
20																
92.8																
20.4	Run 12 hard rock: 11.1%		12		100	100	11.1	100	0 0		W2 to W1					
21 92.1																
21.1	**END OF BOREHOLE**															

SPCL ROCK CORE-2016-DRAFT SP20-826-00.GPJ SPCL.GDT 21-5-27

Weathering Index: W1-Fresh, W2-Slightly weathered, W3-Moderately weathered, W4-Highly weathered, W5-Completely weathered θ=dangle to the core axis

E = Modulus of Elasticity
*: UCS [Mpa] ≈ 24 $I_{S(50)}$

LOG OF BOREHOLE BH3

PROJECT: Geotechnical Investigation
CLIENT: Bashar Ghreiwati
PROJECT LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario
DATUM: Geodetic
BH LOCATION: N 4826091.036 E 611429.998

DRILLING DATA
Method: Hollow Stem Auger/HQ Coring
Diameter: 150 mm/63 mm
Date: Apr-29-2021 to Apr-29-2021

REF. NO.: SP21-826-00
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
112.6								
112.5 0.1	**TOPSOIL** 100mm thick							
	PROBABLE FILL: sand, trace to some silt, trace clay, brown, moist, loose to compact		1	SS	6		112	
1			2	SS	7			
			3	SS	21		111	1 80 15 4
2 110.3								
2.3	**SAND:** trace silt, greyish brown, moist, dense		4	SS	35		110	
3 109.4								
3.2	INFERRED BEDROCK **GEORGIAN BAY FORMATION** GREY, **SHALE BEDROCK**, interbedded with **SILTSTONE** and **LIMESTONE**		5	SS	100/ 200mm	▽	W. L. 109.4 m May 10, 2021	
4							109	
			6	SS	100/ 75mm		108	
5 107.4								
5.2	**END OF BOREHOLE:**							

Note:
1. Monitoring well was installed upon completion of drilling.
2. Groundwater level observations:

Date	Depth (mbgs)
2021-05-10	3.19

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

SPCL SOIL LOG-DRAFT SP20-826-00.GPJ SPCL.GDT 21-5-27

LOG OF BOREHOLE BH4

PROJECT: Geotechnical Investigation
CLIENT: Bashar Ghreiwati
PROJECT LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario
DATUM: Geodetic
BH LOCATION: N 4826140.981 E 611442.558

DRILLING DATA
Method: Hollow Stem Auger/HQ Coring
Diameter: 150 mm/63 mm
Date: Apr-29-2021 to Apr-29-2021

REF. NO.: SP21-826-00
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
113.8							
0.0 / 113.5	**TOPSOIL** 300mm thick		1	SS	3		
0.3	**PROBABLE FILL:** sand, trace to some silt, brown, moist, very loose to loose		2	SS	4		113
1 / 112.3							
1.5	**SAND:** trace silt, greyish brown, moist, dense		3	SS	40		112
2			4	SS	55		
3 / 110.6							111
3.2	**SILT:** some clay, grey, moist, compact		5	SS	20		
	INFERRED BEDROCK **GEORGIAN BAY FORMATION** GREY, **SHALE BEDROCK**, interbedded with **SILTSTONE** and **LIMESTONE**					W. L. 109.7 m May 10, 2021	110
4							
			6	SS	50/ 50mm		109
5 / 108.3							
5.5	**END OF BOREHOLE:**						

Note:
1. Monitoring well was installed upon completion of drilling.
2. Groundwater level observations:

Date	Depth (mbgs)
2021-05-10	4.14

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

SPCL SOIL LOG-DRAFT SP20-826-00.GPJ SPCL.GDT 21-5-27

LOG OF BOREHOLE BH5

PROJECT: Geotechnical Investigation

CLIENT: Bashar Ghreiwati

PROJECT LOCATION: 65 and 71 Agnes Street, Mississauga, Ontario

DATUM: Geodetic

BH LOCATION: N 4826112.461 E 611476.665

DRILLING DATA

Method: Hollow Stem Auger/HQ Coring

Diameter: 150 mm/63 mm

Date: Apr-29-2021 to Apr-29-2021

REF. NO.: SP21-826-00

ENCL NO.: 6

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
114.2 / 0.0	**TOPSOIL** 300mm thick				
113.9 / 0.3	**PROBABLE FILL:** sand, trace to some silt, brown, moist, very loose to loose	1	SS	2	114
		2	SS	4	
		3	SS	10	113
112.0 / 2.3	**SAND:** trace silt, greyish brown, moist to wet, dense	4	SS	31	112
111.1 / 3.0	**SILT:** trace clay, trace sand, grey, moist, compact	5	SS	60/ 225mm	111
110.8 / 3.3	INFERRED BEDROCK **GEORGIAN BAY FORMATION** GREY, **SHALE BEDROCK**, interbedded with **SILTSTONE** and **LIMESTONE**				110
109.5 / 4.8	**END OF BOREHOLE**	6	SS	50/ 50mm	

GROUND WATER CONDITIONS

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

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

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

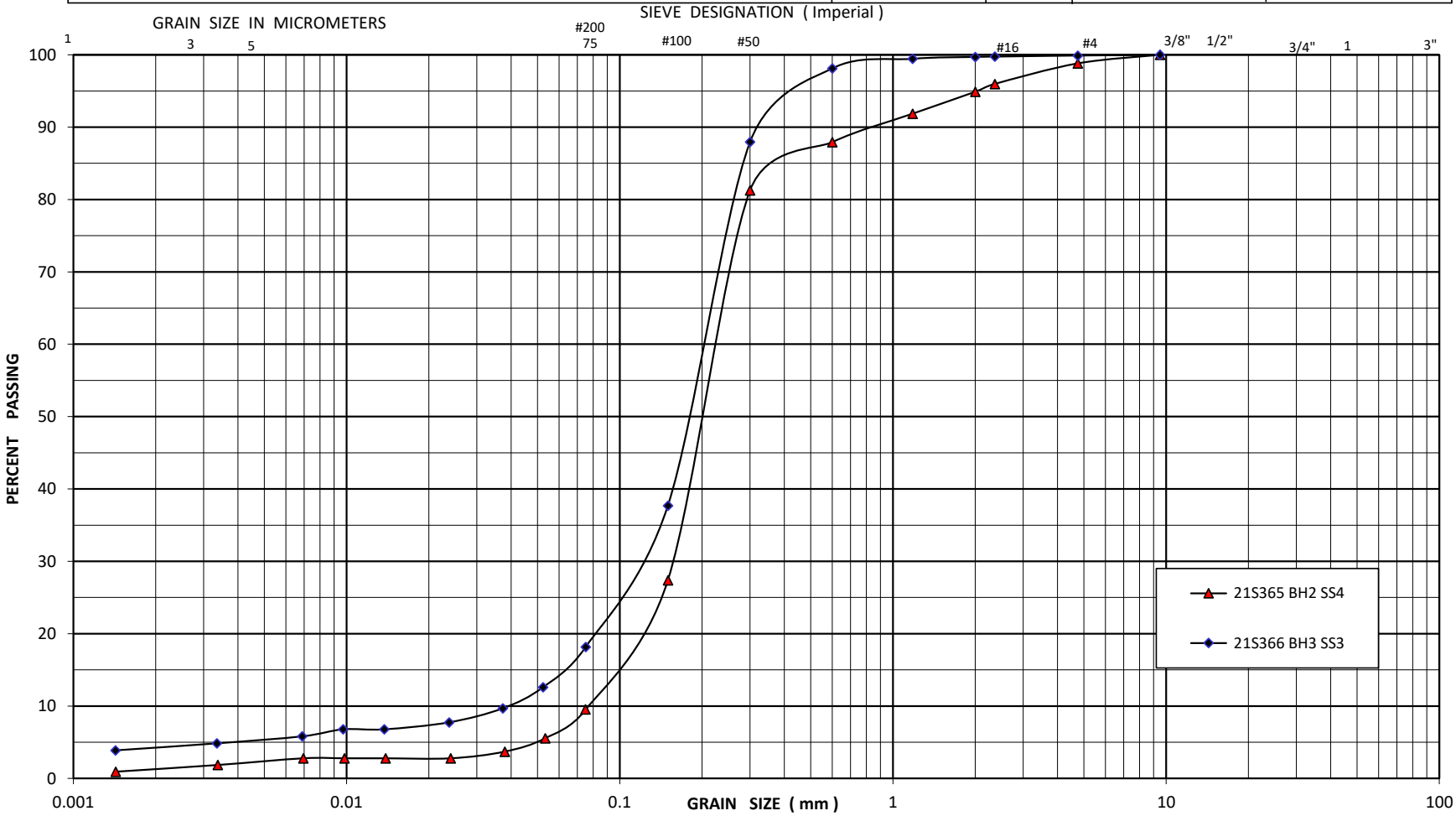
SPCL SOIL LOG-DRAFT SP20-826-00.GPJ SPCL.GDT 21-5-27

SIRATI & PARTNERS

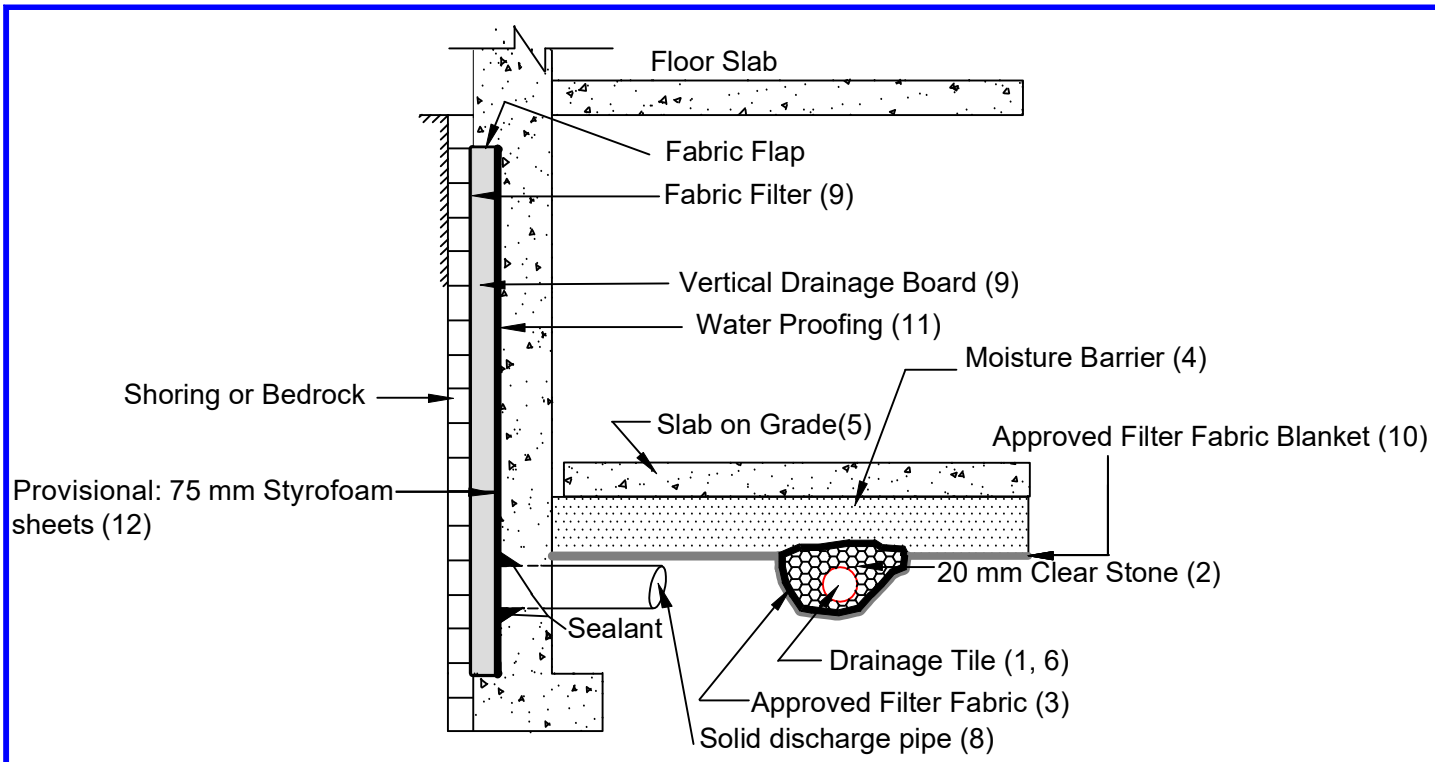
GRAIN SIZE DISTRIBUTION

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



Project No.	:	SP21-826-00
Date	:	17 May 2021
Figure No.	:	7



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. Where in bedrock, a 75 mm-thick layer of Styrofoam shall be placed between the foundation wall and the waterproofing to avoid long-term rock squeeze to the foundation wall.
13. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

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

APPENDIX A

PHOTOGRAPHS OF THE ROCK CORES

BH1 (Run 1): 7.9 m – 9.5 m

BH1 (Run 2): 9.5 m – 11.0 m

BH1 (Run 3): 11.0 m – 12.5 m

BH1 (Run 4): 12.5 m – 14.0 m

BH1 (Run 5): 14.0 m – 15.5 m

BH1 (Run 6): 15.5 m – 17.1 m

BH1 (Run 7): 17.1 m – 18.6 m

BH1 (Run 8): 18.6 m – 20.1 m

BH1 (Run 9): 20.1 m – 21.0 m

BH2 (Run 1): 5.0 m – 5.1m

BH2 (Run 2): 5.1 m – 6.7 m

BH2 (Run 3): 6.7 m – 8.0 m

BH2 (Run 3): 8.0 m – 8.2 m

BH2 (Run 4): 8.2 m – 9.8 m

BH2 (Run 5): 9.8 m – 11.3 m

BH2 (Run 6): 11.3 m – 12.8 m

BH2 (Run 7): 12.8 m – 14.3 m

BH2 (Run 8): 14.3 m – 15.9 m

BH2 (Run 9): 15.9 m – 17.4 m

BH2 (Run 10): 17.4 m – 18.9 m

BH2 (Run 11): 18.9 m – 20.4 m

BH2 (Run 12): 20.4 m – 21.1 m

Appendix B: Limitation and Use of 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 Sirati & Partners Consultants Limited (SIRATI) at the time of preparation. Unless otherwise agreed in writing by SIRATI, 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 borehole 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 boreholes may differ from those encountered at the borehole 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 borehole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc. Professional judgement was exercised in gathering and analyzing data and formulation of recommendations using current industry guidelines and standards. Similar to all professional persons rendering advice, SIRATI cannot act as absolute insurer of the conclusion we have reached. No additional warranty or representation, expressed or implied, is included or intended in this report other than stated herein the report.

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 boreholes 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. SIRATI 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. Any user of this report specifically denies any right to claims against the Consultant, Sub-Consultants, their officers, agents and employees in excess of the fee paid for professional services.

SIRATI engagement hereunder is subject to and condition upon, that SIRATI not being required by the Client, or any other third party to provide evidence or testimony in any legal proceedings pertaining to this finding of this report or providing litigations support services which may arise to be required in respect of the work produced herein by SIRATI. It is prohibited to publish, release or disclose to any third party the report produced by SIRATI pursuant to this engagement and such report is produced solely for the Client own internal purposes and which shall remain the confidential proprietary property of SIRATI for use by the Client, within the context of the work agreement. The Client will and does hereby remise and forever absolutely release SIRATI, its directors, officers, agents and shareholders of and from any and all claims, obligations, liabilities, expenses, costs, charges or other demands or requirements of any nature pertaining to the report produced by SIRATI hereunder. The Client will not commence any claims

against any Person who may make a claim against SIRATI in respect of work produced under this engagement.