Proposed Mixed-Use Redevelopment:

17 & 19 Ann Street, 84 & 90 High Street East and Part of 91 Park Street East, Mississauga, ON

Type of Document: Geotechnical Investigation

Client:
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Project Name:
10 WEST: 17 & 19 Ann Street, 84 & 90 High Street East and Part of 91 Park Street East, Mississauga, ON

Project Number:
BRM-00239423-E0

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Date Submitted:
December 17, 2021 (Revised)

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1. Legal Notification

This report was prepared by EXP Services Inc. for the account of 10 WEST GO GP Inc.

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 unless a reliance letter has been addressed to, or otherwise provides reliance to, such third party. EXP Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

2. Introduction

EXP Services Inc. (EXP) was retained by Mr. Anthony Di Santo of 10 WEST GO GP Inc (Client) to complete a Geotechnical Investigation carried out for a proposed mixed-use redevelopment in the City of Mississauga, Ontario.

The site is municipally addressed as and 84 & 90 High Street East, 17 and 19 Ann Street in Mississauga and includes the west portion of a park lot generally known as 91 Park Street East. It is located on the west side of Hurontario Street and is bound by High Street East to the south, Park Street East to the north and Ann Street to the west. The site is approximately 0.60 hectares (1.48 acres) in area and is currently occupied by one (1) commercial building, three (3) residential buildings and part of a landscaped park on the northeast portion of the site.

EXP understands that a mixed-use redevelopment is being proposed for the site. It is understood that the redevelopment will include a high-rise residential building of twenty-two (22) storeys high, with ground floor commercial and five (5) levels of underground parking. The originally proposed level of underground parking was four, however, EXP is advised that there will be up to five underground levels. The lowest level (P5) will be at approximately 15.5 metres below ground surface (mbgs) at the north-west portion of the site. The remaining part of the site will consist of public parks to the east and south of the proposed condominium to be conveyed to City and public spaces, while the existing two (2) residential buildings of 84 and 90 High Street East are to be maintained.

The purpose of this investigation was to determine the subsurface conditions at the site by drilling a limited number of boreholes and based on this information, to provide geotechnical engineering guidelines for the design and construction of the proposed development. Specifically, recommendations and/or comments regarding foundation type, allowable bearing pressures, groundwater conditions, excavation and backfill, slab-on-grade construction, permanent drainage requirements and earthquake considerations were to be provided.

The comments and recommendations given in this report are based on the assumption that the above-described design concept will proceed into construction. If changes are made either in the design phase or during construction, this office must be retained to review these modifications. The result of this review may be a modification of our recommendations or the requirement of additional field or laboratory work to check whether the changes are acceptable from a geotechnical viewpoint.

3. Procedure

The fieldwork for this investigation was carried out during the period of June 28 to July 8, 2021 and comprised of a total of ten (10) boreholes, designated Boreholes 1 to 10. Boreholes 1 to 7 were drilled to approximately 15.4 m to 15.9 m below the existing grade in the vicinity of the proposed twenty-two (22) storey residential building with (5) levels of underground parking. Boreholes 8 to10 were advanced to approximately 4.9 m to 5.3 m below the existing grade in the east and south portions of the site where the land will be conveyed to the City as parkland, to support a soil characterization program and address the City's concern pertaining to the soil condition beneath the existing parking area at 90 High Street East. Results of the soil characterization program are being presented under separate cover. The approximate borehole locations are shown on the attached Borehole Location Plan (Drawing No. 1).

Prior to the commencement of drilling operations, Ontario OneCall was contacted to clear underground services in the investigation areas. A private locator was also retained to scan around each borehole location to minimize the risk of contacting any buried utilities, both private and public.

All boreholes were advanced using a drill rig adapted for soil sampling purposes owned and operated by a specialist drilling contractor. A representative of EXP was present throughout the drilling operations to monitor and direct the drilling and sampling operations, log the borings, make groundwater observations during and upon completion of drilling, process the recovered samples and prepare the borehole logs. Representative samples of the subsurface soils were recovered at regular intervals using conventional 50 mm O.D. split spoon sampling equipment driven in accordance with Standard Penetration Test (SPT) procedures (ASTM D1586). Coring of the shale bedrock was carried out using an HQ size core barrel. All split spoon and rock core samples were returned to EXP's Brampton laboratory for testing which included moisture content and unit weight determinations on selected samples.

Water level observations were carried out in the open boreholes during the course of the fieldwork. Subsequent water level observations were carried out in monitoring wells installed in six (6) selected boreholes.

The locations of the boreholes were established in the field by EXP personnel based on a drawing provided by the client. Ground surface elevation (Geodetic) at each borehole location was derived from SOKKIA TopNET Live RTK Network with the use of a SOKKIA GCX3 Controller and are presented in the following Table 1.

Table 1: Ground Surface Elevation

Borehole Number	Geodetic Elevation (m)
1	82.72
2	82.38
3	81.03
4	81.48
5	82.38
6	82.09
7	82.21
8	82.59
9	81.41
10	81.21

4. Surface Conditions

4.1 Soil

The detailed soil profile encountered in each borehole and the results of laboratory moisture content determinations are indicated on the attached borehole logs. It should be noted the soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change.

The "Notes on Sample Descriptions" (Drawing No. 1A) preceding the borehole logs form an integral part of and should be read in conjunction with this report.

The following is a brief description of the soil conditions encountered during the investigation:

4.1.1 Topsoil

Topsoil of about 150 to 300 mm in thickness was encountered at the ground surface at Boreholes 1, 5, 7 and 10.

With respect to topsoil, it should be noted that topsoil measurements were carried out at the borehole locations only and could differ at other locations on the site. Consequently, topsoil quantities should not be established from the information provided at the borehole locations. If required, a more detailed test pit program should be carried out to more accurately quantify the amount of topsoil to be removed for construction purposes.

4.1.2 Pavement Structure

Pavement structure comprising asphalt with thickness ranging from about 25 to 50 mm underlain by granular base 125 to 530 mm in thickness was encountered at the Boreholes 2, 3, 4, 8 and 9.

4.1.3 Fill

Fill was encountered below the surficial pavement structure in Boreholes 2, 3, 4, 8, and 9, topsoil in Boreholes 1, 5, 7 and 10 and from surface in Borehole 6. The fill extends to depths ranging from about 0.9 to 3.1 m below existing ground surface (~Elevation 81.2 to 78.6 m). The fill comprises a mix of sand and gravel, sandy silt and clayey silt in various proportions. Moisture contents in the fill ranged from approximately 9 and 25 percent indicating moist to wet condition.

4.1.4 Sandy Silt

The fill was underlain by a sandy silt deposit at Boreholes 1 and 3. This deposit contains some clay with sand seams. It is generally brown in colour, has moisture contents of about 15 percent of dry mass indicating moist condition and is in a dense state of compactness (recorded ‘N’-value

of 37). The sandy silt extends to depths of about 1.7 to 2.3 m below existing ground surface (~Elevation 80.4 to 79.4 m).

4.1.5 Clayey Silt Till

A clayey silt till deposit was intersected below the fill at all borehole locations with the exception of Boreholes 1 and 3, where it underlies the sandy silt. This deposit contains a trace of sand and gravel with occasional cobble fragments, oxidations and weathered shale fragments. It is generally brown in colour changing to grey with increase in depth. It has moisture contents of about 7.9 to 15.6 percent of dry mass indicating moist condition and is in a stiff to hard state of consistency (recorded 'N'-value of 13 to over 100). Boreholes 8 to 10 were terminated in the clayey silt till at depths of approximately 4.9 to 5.2 m (~Elevation 76.7 to 75.9 m). The clayey silt till was fully penetrated in the remaining boreholes upon contact with bedrock at depths of approximately 7.4 to 9.2 m (~Elevation 74.8 to 73.2 m).

4.1.6 Shale Bedrock

Shale bedrock of the Georgian Bay Formation was encountered below the clayey silt till in Boreholes 1 to 7. The approximate elevation for the bedrock encountered at each borehole is presented in the individual borehole and core logs. Approximately 6.3 to 7.9 m of shale bedrock was cored in Boreholes 1 to 7. The detailed findings from the rock cores are presented in the respective rock core logs for each borehole.

Based on the rock core information, the shale bedrock comprises about 90 to 94% shale, 1 to 5% limestone, 4 to 8% siltstone and 0 to 2% rubble or clay seams. The core recovery ranged from about 67 to 100%. The Rock Quality Designation (RQD), a rock quality indicator, is defined as the sum of core lengths of 100 mm or greater divided by the total length of the drill run. The recorded RQD ranged from about 0 to 100%, indicating very poor to excellent (generally fair) quality. The shale bedrock generally consists of moderately soft bedded grey shale with some limestone and siltstone interbeds and is highly weathered in the upper zones becoming sound with depth. Boreholes 1 to 7 were terminated in the shale bedrock at depths ranging from about 15.4 to 15.9 m below existing ground surface (~Elevation 66.9 to 65.6 m).

The Georgian Bay Formation consists of bluish and grey shale with interbeds of sandstone, limestone and siltstone. Typically the hard layers comprise about 15 to 20 percent of the unit. 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 other sites. The layers are actually lenses and they can vary significantly in thickness over short distances.

Stress relief features such as folds and faults are common in the Georgian Bay Formation. In these features the rock is heavily fractured and sheared, and contains layers of shale rubble and clay. Due to the fracturing, these features may also be groundwater conduits, which could result in excessive water flow into excavations. Weathering is much deeper than the surrounding rock in these features and often there can be a lateral displacement 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. Such zones were not encountered in the seven boreholes cored at the site.

4.2 Groundwater Conditions

Groundwater conditions were assessed by taking readings in open holes during the course of the fieldwork and in monitoring wells installed in six (6) selected boreholes. The monitoring well in Borehole 2 was screened in clayey silt till. Monitoring wells in Boreholes 1, 3 and 5 to 7 were screened in bedrock. Short-term groundwater level observations are recorded on the attached borehole logs and summarized in the following Table 2.

Table 2: Summary of Observed Groundwater Levels

Borehole Number	Date of Completion	Depth to Groundwater Level Below Existing Grade/Elevation (m)		
		On completion of Augering to Bedrock	July 12, 2021	July 14, 2021
1	July 8, 2021	No Free Water	~7.5 / ~75.2	~8.4 / ~74.3
2	June 28, 2021	No Free Water	~4.8 / ~77.6	~6.6 / ~75.8
3	June 29, 2021	Not Recorded	~9.8 / ~71.2	~9.8 / ~71.3
5	July 5, 2021	No Free Water	~8.0 / ~74.4	~11.2 / ~71.2
6	July 6, 2021	No Free Water	~8.3 / ~73.8	~8.4 / ~73.7
7	July 7, 2021	No Free Water	~8.7 / ~73.5	~10.7 / ~71.6

Due to the short term observation period, these groundwater levels may not represent stabilized conditions and seasonal fluctuations of the groundwater level at the site should be anticipated.

5. Engineering Discussion and Recommendations

The site is municipally addressed as 84 and 90 High Street East, 17 and 19 Ann Street in Mississauga and includes the west portion of a park lot generally known as 91 Park Street East. It is located on the west side of Hurontario Street and is bound by High Street East to the south, Park Street East to the north and Ann Street to the west. It is currently occupied by one (1) residential dwelling being used for commercial purposes, three (3) residential dwellings and part of a landscaped park on the northeast portion of the site.

EXP understands that the proposed redevelopment will include demolishing the existing dwellings located at 17 & 19 Ann Street to accommodate the proposed one twenty-two storey condominium building with up to five (5) levels of underground parking. Boreholes 1 to 7 were investigated to provide the required recommendation for this future condominium building. The draft development plan indicated that the remaining portion of the site will include public parks, to be conveyed to city, to the east and south of the proposed condominium and public spaces, while the existing two (2) residential buildings located at 84 & 90 High Street East at the south end of the site will remain in place.

The following recommendations are provided for the consideration.

5.1 Foundation

The anticipated lowest basement level for the proposed condominium structure with five (5) levels of common below grade parking will be set at about 15.5 m below grade. The footings are therefore expected to be found at about 16.5 m below existing grade. The changes would result in having the foundations founded below the termination of the cored boreholes. Based on our knowledge of the area, we would anticipate that the bedrock would be of similar nature and is suitable to support the proposed structure.

At this revised level, the footings will be founded well into the sound shale bedrock based on the findings in Boreholes 1 to 7. The proposed structure can be supported by conventional spread and strip footings founded on the sound shale bedrock below any disturbed or weathered zones. A factored Ultimate Limit States (ULS) bearing value of 5.0 MPa can be used for the footing design. Serviceability Limit States (SLS) bearing values are not applicable to sound shale bedrock. All footing bases must be hand cleaned and evaluated by qualified geotechnical personnel prior to placement of concrete 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.

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 (thickness of about 1 m) should be removed carefully at the latest possible stage before concreting and construction to minimize degradation of the rock due to exposure to the weather.

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.

5.2 Foundation General

Footings which are to be placed at different elevations should be located such that the higher footing is set below a line drawn up at 1 horizontal to 1 vertical from the near edge of the lower footing. 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 well designed and constructed footings placed on sound shale are expected to be well within 12 mm and 6 mm, respectively.

It should be noted the recommended bearing capacity has been calculated by EXP from the borehole information for the design stage only. The investigation and comments are necessarily ongoing as new information on underground conditions becomes available. For example, it should be appreciated modification to the bearing levels may be required if unforeseen subsoil conditions are revealed after the excavation is exposed to full view or if final design decisions differ from those assumed in this report.

5.3 Temporary Shoring

Based on the anticipated building elevations and assumed plans for excavation to extend to the property boundaries, site constraints will not allow for an open cut excavation. Therefore, temporary shoring and localized shallow excavations will be required to facilitate footing and elevator pit installations.

The shoring should be designed to resist lateral load imposed by the adjacent soils and surcharge loadings. A shoring system comprising soldier pile and lagging, may be considered for the proposed development. A stiffer system, such as contiguous caisson wall, should be considered where existing building foundations and sensitive utility services need to be protected.

For a soldier pile and lagging system, the space behind the lagging boards must be filled with concrete sand. The lagging boards should retain all soil while allowing groundwater seepage from wet seams to drain from behind.

Unshored excavation heights should not exceed 1.2 m in the excavation as per the Occupational Health and Safety Act. However, the side slopes should be flattened where instability is noted.

The temporary shoring for this project should be designed on the basis of the state-of-the-art information given in the fourth edition of the Canadian Foundation Engineering Manual (CFEM).

The parameters that are considered to be applicable for this project and have been used successfully on many other deep excavations in the greater Toronto area, are as follows:

Earth pressure coefficient

= 0.25 (where small movements are permissible)

= 0.35 (where utilities, roads, sidewalks must be protected from significant movement, or where vibration from traffic is a factor)

= 0.40 (where adjacent building footings or movement sensitive services, i.e., gas and water mains, are above a line 60 degrees from the horizontal extending from the bottom edge of the excavation)

Approximate soil unit weight (γ)	= 22.0 kN/m^3
Approximate soil unit weight of shale	= 24.5 kN/m^3
Unit weight for groundwater (γ_w)	= 10.0 kN/m^3
Bond resistance for rock anchors in sound shale	= 700 kPa

A rectangular pressure distribution as outlined in the CFEM can be used for calculating the earth pressures. If the shoring system does not extend up to the top of the ground, the sloped bank should either be treated as a surcharge to the shoring system or alternatively, a higher earth pressure coefficient value (K_a), reflecting the sloping ground, should be used.

The recommended design parameters should be confirmed by load testing a number of anchors to 200% design load in accordance with the current edition of the CFEM. As a minimum for this site, at least four (4) anchor load tests should be carried out to verify the capacity of the anchors. The design for the production anchors should then be modified based on the test results, where necessary. All remaining anchors must be installed in similar procedures and proof tested to 1.33 times the design load.

It is recommended that the contract have a performance specification limiting movement. A maximum of 13 mm is generally acceptable for a street where sensitive utilities are not nearby. Otherwise, the engineering departments of the utility companies must be contacted to assess what movement is acceptable. Anchor spacing and elevation, and the timing of the excavation and anchoring operations are critical in determining the movements.

During winter months, the shoring walls should be covered with thermal blankets to prevent frost penetration behind the shoring system which may result in unacceptable movements.

EXP should be retained to review the shoring design, to monitor installation and testing of the system, and to monitor the shoring movements during all phases of the excavation. Inclinometers should be installed at locations where sensitive buildings or services lie close to the excavation. Careful monitoring is needed in any shored excavation, especially when buildings are located in close proximity. This is necessary not only to anticipate when and if additional support is needed, but also to provide data to meet claims from adjacent property owners. In this regard, it is essential that detailed precondition surveys be carried out on adjacent buildings.

5.4 Earth Pressure

The lateral earth pressure acting on basement walls may be calculated from the following equation:

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

where
- p = lateral earth pressure in kPa acting at depth h;
- K = earth pressure coefficient a value of 0.4 is recommended;
- γ = unit weight of retained soil, a value of 22 kN/m^3 is recommended for soil and 24.5 kN/m^3 for shale bedrock
- h = depth to point of interest in m; and
- q = equivalent value of any surcharge on the ground surface in kPa.

The foregoing expression assumes that the perimeter drainage system is effective to prevent hydrostatic pressure build-up behind the perimeter walls. All subsurface walls should be waterproofed.

If water is retained such as in the case of tanking the underground structure, submerged unit weight can be used for the retained soil below the groundwater table and full hydrostatic pressure should be added. The lateral earth pressures acting on basement walls may be calculated from the following expression:

$$p = K(\gamma h_1 + \gamma' h_2 + q) + \gamma_w h_2$$

where
- p = lateral earth pressure in kPa acting at depth h;
- K = earth pressure coefficient a value of 0.4 is recommended;
- γ = unit weight of retained soil, a value of 22 kN/m^3 for soil and 24.5 kN/m^3 for shale bedrock may be assumed
- h_1 = depth in meters above the water table
- γ' = effective unit weight of soil, a value of 12 kN/m^3 for soil and 14.5 kN/m^3 for shale bedrock may be assumed
- γ_w = unit weight of water (10 kN/m^3)
- h_2 = depth in metres below the water table; and
- q = equivalent value of surcharge on the ground surface in kPa

The basement walls should be designed to resist hydrostatic pressure imposed by the recorded groundwater level. All basement walls must be waterproofed to 1 m below the final exterior grade.

5.5 Excavation and Groundwater Control

Excavation for the proposed condominium structure with five (5) basement levels can be carried out utilizing heavy duty hydraulic type excavators and must be carried out in accordance with the latest edition of the Occupational Health and Safety Act (OHSA). The soil encountered at this site can be classified as follows:

- Fill — Type 3
- Sandy Silt — Type 2
- Clayey Silt Till — Type 2
- Shale Bedrock — Type 1

Excavation into shale bedrock is expected to be carried out by heavy dozers and excavators equipped with ripping teeth. Due to the presence of hard limestone layers within the shale bedrock, rock breaking equipment will likely be required for removal in some areas. The trimming of excavation faces is generally carried out using an excavator equipped with ripping teeth and/or vibrating breaker point. In mass excavation, it is possible to lift limestone slabs at joints and cracked edges and continue on with ripping and digging.

It should be noted that cobbles and boulders exist in glacial till deposits and their presence could influence the progress of excavation. Consequently, provisions should be made in the contract documents to cover any delays caused by boulder obstructions.

Some seepage of free water perched in the fill or from the more pervious seams within the native soil should be anticipated during construction. It should be possible to control and remove any such seepage by pumping from temporary sumps and ditches.

5.6 Floor Slab and Permanent Drainage

The anticipated finished floor elevation for the lowest basement slab for the five (5) levels of underground structure is expected to be set in shale bedrock.

For slab-on-grade construction on shale bedrock, all disturbed or broken rock should be removed from the underfloor area. Any over excavated areas should be brought up to design grades using approved materials described in the “Backfill Considerations” section of this report.

A 200 mm layer of 19 mm clear crushed stone should be placed between the prepared subgrade and the floor slab to serve as a moisture barrier.

Both perimeter and underfloor drainage will be required for the proposed condominium structure with five (5) levels of basement. Since the excavation will probably come up to the property boundary limits, commercially available wall drains, such as Terradrain 600, should be installed.

The wall drains should extend continuous laterally and from about 1.0 m below ground level to the base of the excavation. A suggested perimeter drainage system against shoring is shown on the enclosed Drawing No. 12. Full coverage of the basement walls is recommended.

A solid pipe should be installed to within 1 m of the exterior wall to collect seepage from the wall drains. Underfloor drains and perimeter drains should not be connected into the same collector pipe. See Drawing Nos. 12 and 13 for a recommended perimeter and underfloor drainage systems, respectively. Further comments can be provided once design plans are finalized.

Underfloor drainage pipes should be installed in all underground utility trenches to remove any water that may be accumulated below the slab on grade. The drainage pipes should be wrapped with a filter fabric. A minimum drain slope should suffice since the water can develop its own gradient within the drainage line.

The weeping tile should be connected to a system of 150 mm diameter collector pipes at 1% gradient which drains into the storm sump for removal off site. The sump should be placed close to the centre of the building in order to minimize the depth of the collector pipes. The water should first be drained into a sediment pit before draining into a second sump pit for removal. Adequate clean-out ports should be installed for each line of collector pipe to facilitate the cleaning of the pipes in the future. The connection into the sump pits must be sealed to prevent any leakage around the connection between the collector pipe and the sump pit. The layout and details of the underfloor drainage system should be reviewed by this office prior to construction.

Around the perimeter of the building the ground surface should be sloped on a positive grade away from the structure to promote surface water run-off and reduce groundwater infiltration adjacent to the foundations.

5.7 Backfill Considerations

Backfill used to satisfy underfloor slab requirements, in footings and service trenches, etc., should either be sand fill, such as Ontario Provincial Standard Specifications (OPSS) 1010 Granular 'B', high performance bedding (HPB – 6 mm limestone chips) or clear stone.

If Granular B is used, it should be placed in maximum lift thickness of 200 mm in the loose state. Each lift should be compacted to at least 98% standard Proctor maximum dry density before subsequent lifts are placed. The degree of compaction achieved in the field should be checked by in-place density tests. HPB or clear stone do not require compaction.

5.8 Unheated Garage

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. Unmonitored experience in the last few years indicates that a shallower depth ranging from 0.82 to 0.9 m for interior column footings and 0.4 m for wall footings has been successful where 2 or more basement levels apply. Adjacent to air shafts and entrance and exit doors, a footing depth of 1.2 m below floor surface level is required or, alternatively, insulation protection must be provided.

It should be emphasized that adequate perimeter drainage is essential in order to prevent frost action which could be detrimental to structures. 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.

5.9 Earthquake Considerations

The recommendations for the geotechnical aspects to determine the earthquake loading for design using the OBC 2012 (R2019) are presented below.

4.10.1 Subsoil Conditions

The subsoil and groundwater information at this site have been examined in relation to Section 4.1.8.4 of the OBC 2012 (R2019). The subsoils generally consist of fill, sandy silt, clayey silt till and shale bedrock. The foundation and the lowest basement slab of the proposed condominium structure with five (5) levels of underground parking will both be supported on shale bedrock.

4.10.2 Depth of Boreholes

Table 4.1.8.4.A. Site Classification for Seismic Site Response in OBC 2012 (R2019) indicated that to determine the site classification, the average properties in the top 30 m (below the lowest basement level) are to be used. The boreholes advanced in the vicinity of the proposed condominium structure terminated at depths of about 15.4 to 15.9 m below existing grade and terminated in sound shale bedrock. Therefore, the site classification recommendation would be based on the available information as well as our interpretation of conditions below the boreholes.

4.10.3 Site Classification

Based on the above assumptions and currently available information, the Site Class for the proposed condominium structure is “B” as per Table 4.1.8.4.A, Site Classification for Seismic Site Response, OBC 2012 (R2019).

5.10 Subsurface Concrete Structures

A native soil sample was analyzed for pH and sulphate concentrations and the test results are summarized in the following Table 3:

Table 3: Summary of pH and Sulphate Test Results

Sample Identification	Sample Location	pH	Sulphate (µg/g)
BH2 SS8	Borehole 2 – 6.1 to 6.7 m	7.88	130

The sulphate content of the sample analyzed indicates a negligible degree of sulphate attack on buried concrete structures. The Certificate of Analysis is included in Appendix A.

For information regarding the selection of cement type for subsurface concrete structures, reference is made to CSA Standard CAN 3-A23.

6. General Comments

The information presented in this report is based on a limited investigation designed to provide information to support an overall assessment of the current geotechnical conditions of the subject property. The conclusions presented in this report reflect site conditions existing at the time of the investigation.

EXP Services Inc. should be retained for a general review of the final design and specifications to verify this report has been properly interpreted and implemented. If not accorded the privilege of making this review, EXP 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. could be 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.

More specific information with respect to the conditions between samples or the lateral and vertical extent of materials may become apparent during excavation operations. The interpretation of the borehole information must, therefore, be validated during excavation operations. Consequently, during the future development of the property, conditions not observed during this investigation may become apparent; should this occur, EXP should be contacted to assess the situation and additional testing and reporting may be required. EXP has qualified personnel to provide assistance in regard to future geotechnical issues related to this property.

We trust this report is satisfactory for your purposes. Should you have any questions or comments, please do not hesitate to contact this office.

Yours truly,

EXP Services Inc.

Jason Byun, M. Sc.
Geotechnical Designer, Geotechnical Division

Stephen S. M. Cheng
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Date: 2021.12.17 11:41:49 -05'00'

Stephen S. M. Cheng, P. Eng.
Discipline Manager, Geotechnical Division

Drawings

Borehole Location Plan
Borehole and Core Logs
Suggested Exterior Drainage Against Shoring System
Drainage and Backfill Recommendations

COMPASS

Borehole Location

DRAWING TITLE:

BOREHOLE LOCATION PLAN

PROJECT NAME:

Geotechnical Investigation

SITE LOCATION:

Ann St and High St E
Mississauga, ON

PROJECT No.

BRM-00239423-E0

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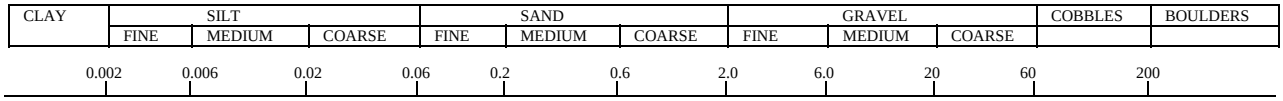
DRAWN BY: JB	**SCALE:** NTS
CHECKED BY: DD	**DRAWING No.** 1
DATE: Aug 6, 2021	

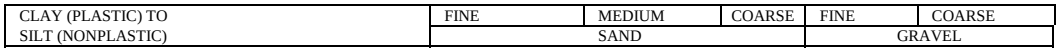
Notes on Sample Descriptions and Soil Types — Drawing 1A

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 **exp** also follow the same system. Others may use different classification systems; 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



EQUIVALENT GRAIN DIAMETER IN MILLIMETERS



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.

4. Excerpt from “OHSA Regulations for Construction Projects,” Part III, Section 226:

- **Soil Types**

Type 1 Soil

a) is hard, very dense and only able to be penetrated with difficulty by a small sharp object;
b) has a low natural moisture content and a high degree of internal strength;
c) has no signs of water seepage; and
d) can be excavated only by mechanical equipment.

Type 2 Soil

a) is very stiff, dense and can be penetrated with moderate difficulty by a small sharp object;
b) has a low to medium natural moisture content and a medium degree of internal strength; and
c) has a damp appearance after it is excavated.

Type 3 Soil

a) is stiff to firm and compact to loose in consistency or is previously excavated soil;
b) exhibits signs of surface cracking;
c) exhibits signs of water seepage;
d) if it is dry, may run easily into a well-defined conical pile; and
e) has a low degree of internal strength.

Type 4 Soil

a) is soft to very soft and very loose in consistency, very sensitive and upon disturbance is significantly reduced in natural strength;
b) runs easily or flows, unless it is completely supported before excavating procedures;
c) has almost no internal strength;
d) is wet or muddy; and
e) exerts substantial fluid pressure on its supporting system. O. Reg. 213/91, s. 226.

EXPLANATORY SHEET TO CORE LOG

Drawing 1B

Column No.	Description
1	Elevation of Geotechnical Boundary
2	Depth of Geotechnical Boundary in Borehole
3	Geological Symbol for Rock or Soil Material
4	General Description of Geotechnical Unit : Quantitative description including rock type (s), percentage of rock types, frequency and sizes of interbeds, colour, texture, weathering, strength and general joint spacing
5 - 11	Joint (Discontinuity) Characteristics
5	Number of Joints in Set: A rock mass can be intersected by a number of joint sets of varying orientations.
6	Joint Type : B = Bedding Joint; F = Fault; C = Cross Joint; S = Shear Plane
7	Orientation : Only variations in dip can be identified in core; dip direction is obtained from field mapping or orientated core.

F = Flat = 0 - 20°
D = Dipping = 20 - 50°
V = Vertical = 50 - 90°

8 Joint Spacing : This is an approximate measure of spacing between joints in specific joint sets.

VW	= Very Wide	≥ 3 m
W	= Wide	= 1 to 3 m
M	= Moderate	= 30 cm to 1 m
C	= Close	= 5 to 30 cm
VC	= Very Close	≤ 5 cm

9 Roughness :

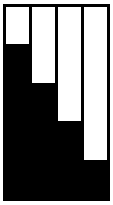
RU = Rough Undulating
RP = Rough Planar
SU = Smooth Undulating
SP = Smooth Planar
LU = Slickensided Undulating
LP = Slickensided Planar

10 Filling :

	Approximate ϕ_r
T = Tight, hard, non softening	25 - 35°
O = Oxidation, surface staining only	25 - 30°
SA = Slightly altered; clay free	25 - 30°
S = Sandy particles; clay free	25 - 35°
Si = Sandy and silty; minor clay	20 - 25°
NC = Non softening clays (< 5 mm)	16 - 24°
SO = Softening clays (< 5 mm)	12 - 16°
SC = Swelling clay fillings (< 5 mm)	6 - 12°

11 Aperture : Estimated size of joint opening

12 Degree of Weathering of Rock Material :

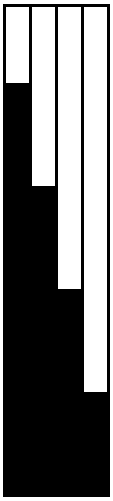


Unweathered	= no signs of discolouration or oxidation
Slightly weathered	= partial discolouration; fractures (joints) typically oxidized
Moderately weathered	= total discolouration
Highly weathered	= total discolouration; typically friable & pitted
Completely weathered	= resembles soil; rock structure usually preserved

EXPLANATORY SHEET TO CORE LOG

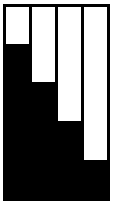
Column No. **Description**

13 Strength of Rock Material :



		Uniaxial Compressive Strength
Very high strength	= specimen can only be chipped by geological hammer	> 200 MPa
High strength	= specimen requires a number of blows to fracture it; cannot be scrapped with a pocket knife	50 - 200 MPa
Medium strength	= specimen can be fractured by a single blow of geological hammer; can be scrapped with pocket knife, not peeled	15 - 50 MPa
Low strength	= shallow indentations made with a firm blow of geological hammer; can be peeled by pocket knife with difficulty	4 - 15 MPa
Very low strength	= crumbles under firm blow with point of geological hammer; can be peeled by pocket knife	1 - 4 MPa

14 Fracture Frequency : Number of natural joints occurring over a metre length of core. All natural joints are counted irrespective of the number of joint sets.



Fracture Frequency		Joint Spacing	
< 0.3 /m	=	Very wide	= 3 m
0.3 – 1 /m	=	Wide	= 1 - 3 m
1 – 3 /m	=	Moderate	= 30 cm - 1 m
3 - 20 /m	=	Close	= 5 - 30 cm
> 20 /m	=	Very close	≤ 5 cm

15 Run Number : Drill run number

16 Core Recovery : Core recovery is the total length of core pieces, irrespective of their individual lengths, obtained in a core run and expressed as a percentage of the length of that core run.

17 Rock Quality Designation (RQD) : The total length of those pieces of sound core which are 10 cm or greater in length in a core run expressed as a percentage of the total length of that core run. Sound pieces of rack are those pieces separated by natural breaks and not machine breaks or subsequent artificial breaks.

RQD	Rock Mass Classification (After Deere)
0 - 25%	very poor
25 - 50%	poor
50 - 75%	fair
75 - 90%	good
90 - 100%	excellent

18 Water Recovery : The estimated water returning out of the casing

19 Water Colour : The colour of the water returning out of the casing

Log of Borehole 1

Project No. BRM-00239423-E0 | Drawing No. 2

Project: Environmental, Geotechnical and Hydrogeological Investigation | Sheet No. 1 of 2

Location: Ann St and High St E, Mississauga, ON

Date Drilled: July 8, 2021

Drill Type: Track - CME 55

Datum: Geodetic

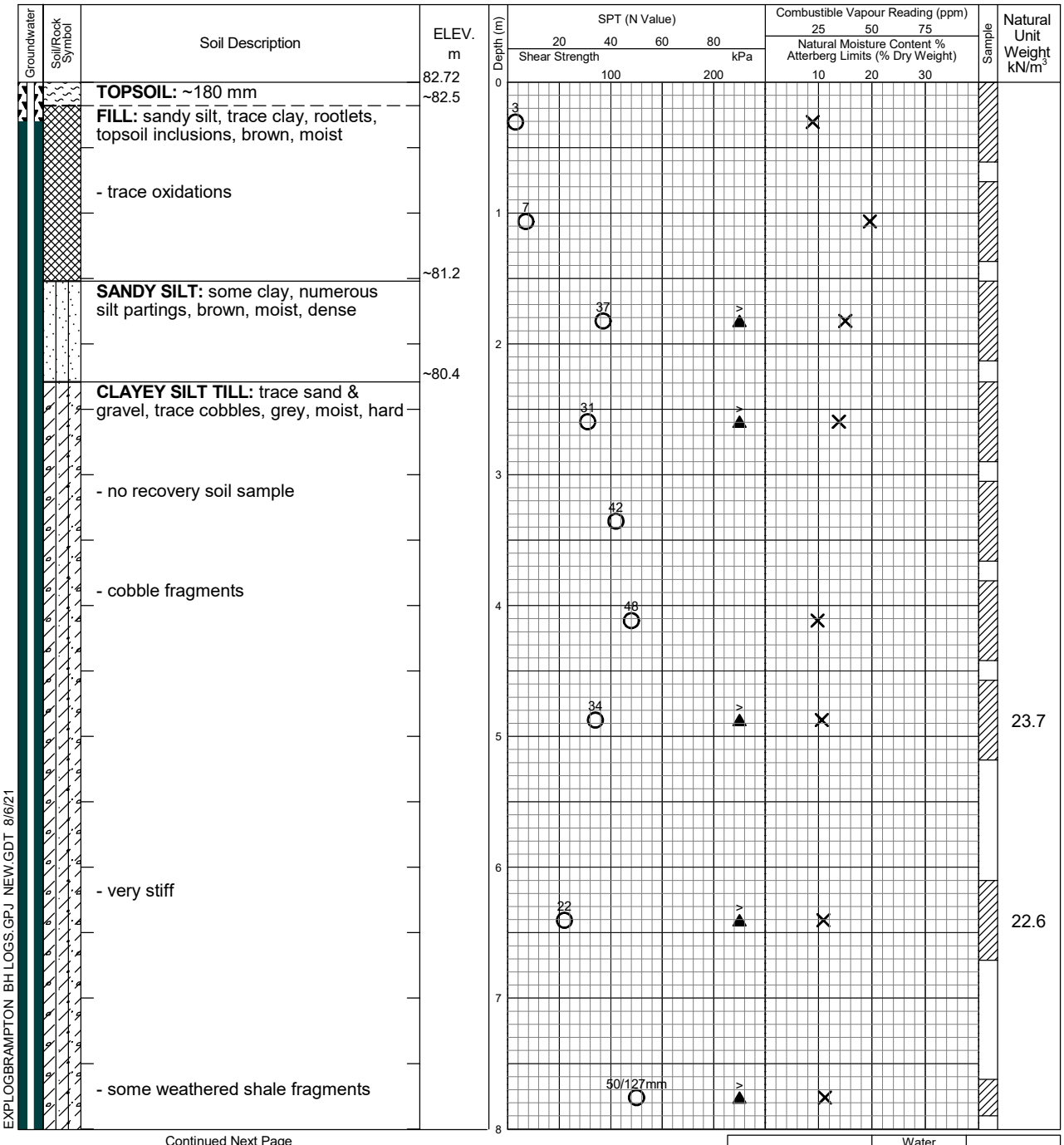
Auger Sample | Combustible Vapour Reading

SPT (N) Value | Natural Moisture

Dynamic Cone Test | Plastic and Liquid Limit

Shelby Tube | Undrained Triaxial at % Strain at Failure

Field Vane Test (S) | Penetrometer



Continued Next Page

Date	Water Level (m)	Hole Open to (m)
On completion	N/A	15.9
July 12, 2021	7.51	
July 14, 2021	8.39	

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Log of Borehole 1

Project No. BRM-00239423-E0 Drawing No. 2

Project: Environmental, Geotechnical and Hydrogeological Investigation Sheet No. 2 of 2

Soil Description	ELEV. m	Depth (m)
	74.72	8
	~74.3	
SHALE BEDROCK: Georgian Bay Formation, weathered, trace clay, grey	~74.1	
Coring Commenced		9
		10
		11
See Core Log for Details		12
		13
		14
	~66.8	15
END OF BOREHOLE		

SPT (N Value) 20 40 60 80
Shear Strength 100 200 kPa
50/25mm

Combustible Vapour Reading (ppm) 25 50 75
Natural Moisture Content % Atterberg Limits (% Dry Weight) 10 20 30

Sample

Natural Unit Weight kN/m^3

Date	Water Level (m)	Hole Open to (m)
On completion	N/A	15.9
July 12, 2021	7.51	
July 14, 2021	8.39	

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

ROCK CORE LOG

BH 1

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	82.7	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	07/08/21	07/08/21	B. Hesse	2a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Track - CME 55	HQ	1 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
74.4			See Borehole Log for Details															
74.1			**GEORGIAN BAY FORMATION**		C	V		RU		<5								
74.1			Shale interbedded with limestone and siltstone.															
74.0			Shale (92%): very fine to fine grained fissile, very thin to thick bedded, grey, low to very low strength, slightly-heavily weathered in upper portion, becoming unweathered with depth.															
73.8	9		Limestone (3%): fine grained, very thin to thin bedded, grey, medium strength, slightly weathered to unweathered.	1	B	F	VC C	SU RU		<5				1	100	77	100	grey
73.6			Siltstone (4%): fine grained, very thin to thin bedded, grey, calcareous, medium strength, slightly weathered to unweathered.															
73.4			Clay-filled joints (1%): highly weathered, very low strength intervals at following depth:															
73.2			10.08 to 10.11 m (30 mm thick), 10.92 to 10.93 m (10 mm thick)															
73.2			Discontinuities: bedding joints are smooth planar to smooth undulating in the shale layers and rough undulating in the limestone/siltstone interbedds.															
73.1			Vertical joints are rough undulating to rough planar and occured mainly in the limestone/siltstone litholgies at following depth:															
73.1			8.64 to 8.69 m; 10.92 to 10.93 m; 13.82 to 13.86 m															
73.0			Shale Rubble Zone was noted from 8.59 to 8.64 m (50 mm thick)															
73.0																		
72.9																		
72.9	10																	
72.8																		
72.8									NC	30								
72.8																		
72.7																		
72.6																		
72.6																		
72.6																		
72.5																		
72.5				1	B	F	VC C	SU RU		<5				2	100	51	100	grey
72.5																		
72.4																		
72.3																		
72.3																		
72.2																		
72.1	11								SO	10								
72.0																		
72.0																		
72.0																		
71.9																		
71.8																		
71.8																		
71.8																		
71.6																		
71.4																		
71.2																		
71.0																		
70.8	12																	
70.6				1	B	F	VC M	SU RU		<5				3	100	90	100	grey
70.5																		

exp.

ROCK CORE LOG

BH 1

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	82.7	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	07/08/21	07/08/21	B. Hesse	2a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Track - CME 55	HQ	2 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
70.2																		
70.2																		
69.9																		
69.9	13																	
69.5																		
69.3																		
				1	B	F	VC M	SU RU		<5				4	100	88	100	grey
68.9					C	V		RU		<5								
68.9																		
68.8																		
68.8	14																	
68.4																		
68.4																		
68.4																		
67.7	15																	
67.7				1	B	F	VC M	SP RU		<5				5	100	97	100	grey
67.6																		
67.2																		
66.8			End of Borehole at 15.9 m															
	16																	

EXP_ROCKCORE ANN ST & HIGH ST E.GPJ CORE_LOG.GDT 7/30/21

exp.

Log of Borehole 2

Project No. BRM-00239423-E0 | Drawing No. 3

Project: Environmental, Geotechnical and Hydrogeological Investigation | Sheet No. 1 of 2

Location: Ann St and High St E, Mississauga, ON

Date Drilled: June 28, 2021

Drill Type: Truck - CME 75

Datum: Geodetic

Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Field Vane Test (S)

Combustible Vapour Reading | Natural Moisture | Plastic and Liquid Limit | Undrained Triaxial at % Strain at Failure | Penetrometer

Soil Description	ELEV. m	Sample	Natural Unit Weight kN/m³
ASPHALT: ~ 50mm	82.38		
GRANULAR BASE: ~ 125mm	~82.3		
FILL: sand and gravel, black, moist	~82.3		
- clayey silt, trace sand, brown, moist			
- silt seams			
- trace gravel	~80.3		
CLAYEY SILT TILL: trace sand and gravel, grey, moist - very stiff			23.5
- hard			
- trace to some sand			
- trace sand, occasional cobbles			23.4
- occassional shale fragments			

Depth (m): 0 1 2 3 4 5 6 7 8

SPT (N Value): 20 40 60 80 — Shear Strength kPa: 100 200

SPT values: 6, 6, 31, 20, 40, 38, 31, 31, 50/102mm

Combustible Vapour Reading (ppm): 25 50 75

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

Continued Next Page

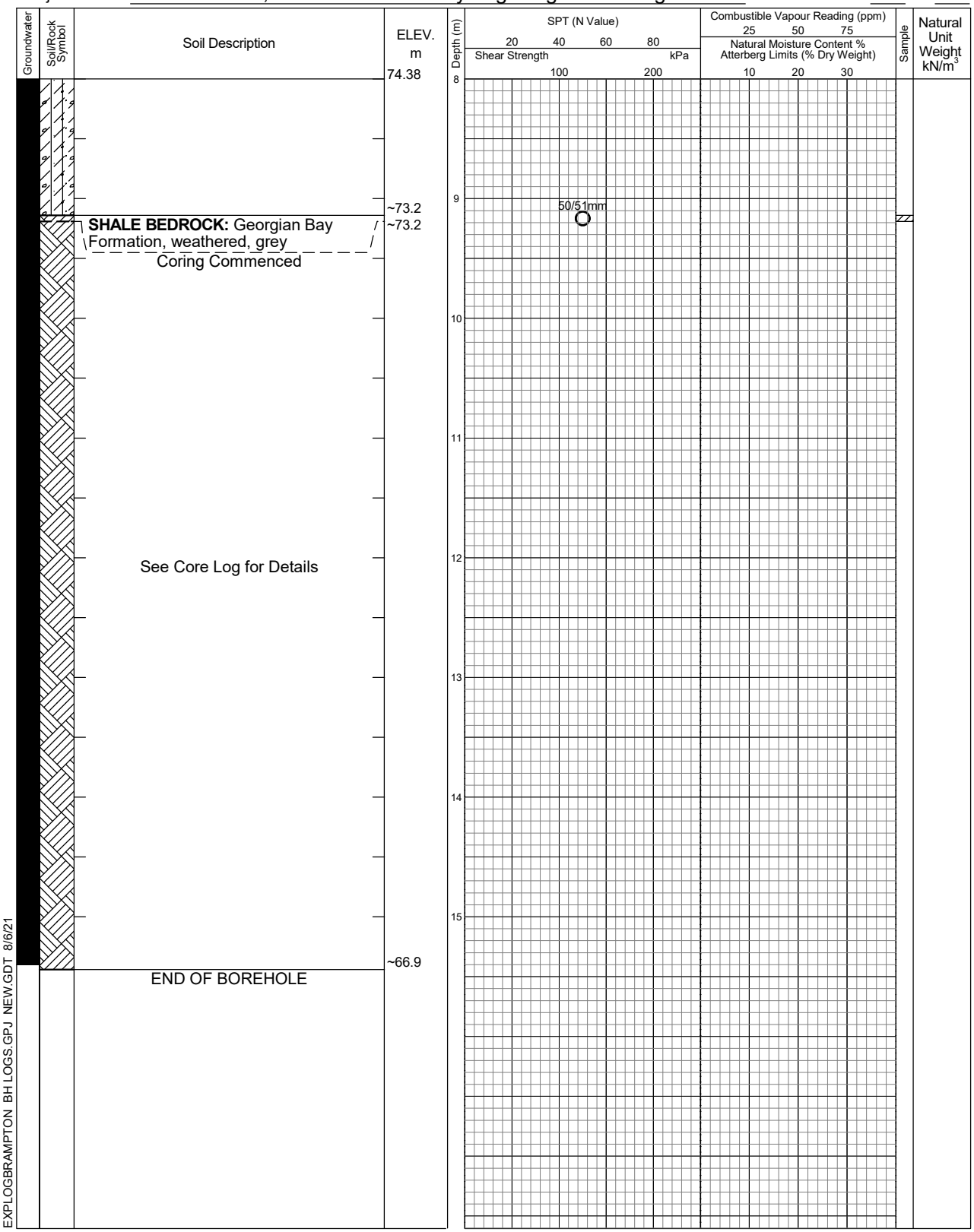
Date	Water Level (m)	Hole Open to (m)
On completion	N/A	15.4
July 12, 2021	4.76	
July 14, 2021	6.63	

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Log of Borehole 2

Project No. BRM-00239423-E0 Drawing No. 3

Project: Environmental, Geotechnical and Hydrogeological Investigation Sheet No. 2 of 2



EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Date	Water Level (m)	Hole Open to (m)
On completion	N/A	15.4
July 12, 2021	4.76	
July 14, 2021	6.63	

ROCK CORE LOG

BH 2

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	82.4	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	06/28/21	06/28/21	B. Hesse	3a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	1 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
73.5			See Borehole Log for Details															
	9																	
73.2			**GEORGIAN BAY FORMATION**															
73.1			Shale interbedded with limestone and siltstone.	1	B	F	VC	RU SU		<5				1	100	0	100	grey
73.1			Shale (90%): very fine to fine grained fissile, very thin to thick bedded, grey, low to very low strength, slightly-heavily weathered in upper portion, becoming unweathered with depth.						SO	40								
73.0			Limestone (5%): fine grained, very thin to thin bedded, grey, medium strength, slightly weathered to unweathered.															
73.0			Siltstone (4%): fine grained, very thin to thin bedded, grey, calcareous, medium strength, slightly weathered to unweathered.															
72.9			Clay-filled joints (1%): highly weathered, very low strength intervals at following depth:															
72.8			9.4 to 9.44 m (40 mm thick)															
72.8			Discontinuities: bedding joints are smooth planar to smooth undulating in the shale layers and rough undulating in the limestone/siltstone interbedds.															
72.6			Vertical joints are rough undulating to rough planar and occured mainly in the limestone/siltstone litholgies at following depth:															
72.5			10.13 to 10.20 m; 13.23 to 13.29 m															
72.5			Shale Rubble Zone was noted from 9.19 to 9.24 m (50 mm thick)															
72.4	10																	
72.4				1	B	F	VC	RU		<5				2	100	36	100	grey
72.4					C	V	C	SP		<5								
72.3								RU										
72.3																		
72.3																		
72.2																		
72.1																		
72.0																		
72.0																		
71.9																		
71.6																		
71.5																		
	11																	
				1	B	F	VC M	SU SP		<5				3	100	96	100	grey
	12																	

EXP_ROCKCORE ANN ST & HIGH ST E.GPJ CORE_LOG.GDT 7/30/21

exp.

ROCK CORE LOG

BH 2

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	82.4	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	06/28/21	06/28/21	B. Hesse	3a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	2 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	13			1	B	F	VC	SU		<5				4	100	86	100	grey
69.2					C	V	M	RU		<5								
69.1								RU										
	14																	
				1	B	F	C	SP		<5				5	100	95	100	grey
	15						M											
66.9			End of Borehole at 15.4 m															

EXP_ROCKCORE ANN ST & HIGH ST E.GPJ CORE_LOG.GDT 7/30/21

exp.

Log of Borehole 3

Project No. BRM-00239423-E0 | Drawing No. 4

Project: Environmental, Geotechnical and Hydrogeological Investigation | Sheet No. 1 of 2

Location: Ann St and High St E, Mississauga, ON

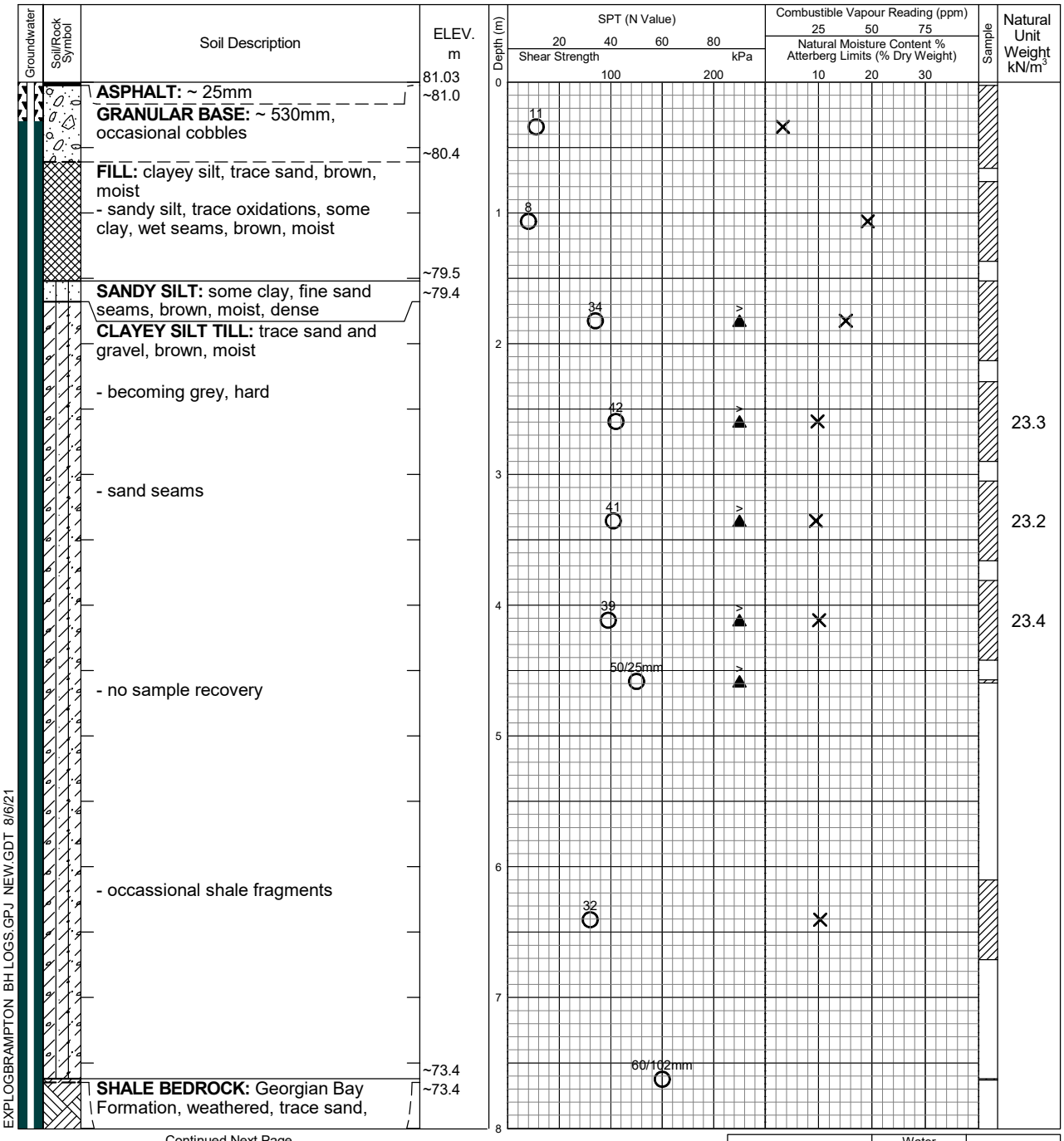
Date Drilled: June 29, 2021

Drill Type: Truck - CME 75

Datum: Geodetic

Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Field Vane Test (S)

Combustible Vapour Reading | Natural Moisture | Plastic and Liquid Limit | Undrained Triaxial at % Strain at Failure | Penetrometer



EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Continued Next Page

Date	Water Level (m)	Hole Open to (m)
July 12, 2021	9.83	15.69
July 14, 2021	9.75	

Log of Borehole 3

Project No. BRM-00239423-E0 Drawing No. 4

Project: Environmental, Geotechnical and Hydrogeological Investigation Sheet No. 2 of 2

Groundwater	Soil/Rock Symbol	Soil Description	ELEV. m	Depth (m)	SPT (N Value) 20 40 60 80 / Shear Strength kPa 100 200	Combustible Vapour Reading (ppm) 25 50 75 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 10 20 30	Sample	Natural Unit Weight kN/m³
		grey	73.03	8				
		Coring Commenced		9				
				10				
				11				
		See Core Log for Details		12				
				13				
				14				
			~65.6	15				
		END OF BOREHOLE						

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Date	Water Level (m)	Hole Open to (m)
July 12, 2021	9.83	15.69
July 14, 2021	9.75	

ROCK CORE LOG

BH 3

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	81.0	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	06/29/21	06/29/21	B. Hesse	4a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	1 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
73.7			See Borehole Log for Details															
73.4			**GEORGIAN BAY FORMATION**															
73.4				1	B	F	VC	SU	SO	20				1	100	88	100	grey
73.3			Shale interbedded with limestone and siltstone.				C	SP		<5								
	8		Shale (91%): very fine to fine grained fissile, very thin to thick bedded, grey, low to very low strength, slightly-heavily weathered in upper portion, becoming unweathered with depth.															
72.9																		
72.9			Limestone (1%): fine grained, very thin to thin bedded, grey, medium strength, slightly weathered to unweathered.															
72.6			Siltstone (8%): fine grained, very thin to thin bedded, grey, calcareous, medium strength, slightly weathered to unweathered.															
72.6				1	B	F	VC	RU		<5				2	100	48	100	grey
			Clay-filled joints (<1%): highly weathered, very low strength intervals at following depth:				C	SU										
72.3																		
72.3			7.67 to 7.69 m (20 mm thick)		C	V		SU		<5								
72.1																		
72.1	9		Discontinuities: bedding joints are smooth planar to smooth undulating in the shale layers and rough undulating in the limestone/siltstone interbedds.															
72.1																		
72.0			Vertical joints are rough undulating to rough planar and occured mainly in the limestone/siltstone litholgies at following depth:															
71.7					C	V		RU		<5								
71.7			8.78 to 8.86 m; 9.30 to 9.37 m; 9.72 to 9.78 m; 12.98 to 13.03 m															
71.3					C	V		RU		<5								
71.3																		
71.2																		
71.1																		
71.0	10																	
71.0				1	B	F	VC	SU		<5				3	100	55	100	grey
71.0							M	SP										
70.9																		
70.8																		
70.8																		
	11																	

ROCK CORE LOG

BH 3

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	81.0	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	06/29/21	06/29/21	B. Hesse	4a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	2 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
69.5																		
69.4				1	B	F	C M	SU RU		<5				4	100	93	100	grey
	12																	
68.7																		
68.6																		
68.1	13				C	V		RU		<5								
68.0				1	B	F	VC M	SU SP		<5				5	100	93	100	grey
	14																	
				1	B	F	C M	SU SP		<5				6	100	100	100	grey
	15																	
65.6			End of Borehole at 15.5 m															

EXP_ROCKCORE ANN ST & HIGH ST E.GPJ CORE_LOG.GDT 7/30/21

exp.

Log of Borehole 4

Project No. BRM-00239423-E0 | Drawing No. 5

Project: Environmental, Geotechnical and Hydrogeological Investigation | Sheet No. 1 of 2

Location: Ann St and High St E, Mississauga, ON

Date Drilled: June 30, 2021

Drill Type: Truck - CME 75

Datum: Geodetic

Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Field Vane Test (S)

Combustible Vapour Reading | Natural Moisture | Plastic and Liquid Limit | Undrained Triaxial at % Strain at Failure | Penetrometer

Soil Description	ELEV. m	Natural Unit Weight kN/m³
ASPHALT: ~ 40mm	81.48	
GRANULAR BASE: ~ 200mm	~81.4	
FILL: sandy silt, asphalt and debris, occasional cobbles, some gravel, brown, moist	~81.2	
- clayey silt, trace sand & gravel, occasional cobbles, brown, moist	~80.0	
CLAYEY SILT TILL: trace sand & gravel, some oxidations, brown, moist, very stiff		22.1
- hit boulder, becoming grey		
- hard		23.4
- occasional cobbles, very stiff		23.4
		22.9
- very moist		23.7
SHALE BEDROCK: Georgian Bay Formation, highly weathered, grey	~74.0	
Coring Commenced	~73.9	

SPT (N Value): 9, 18, 28, 50/102mm, 36, 26, 26, 15, 50/127mm

Shear Strength kPa (20 40 60 80 | 100 200)

Combustible Vapour Reading (ppm) (25 50 75)

Natural Moisture Content % Atterberg Limits (% Dry Weight) (10 20 30)

Depth (m): 0 1 2 3 4 5 6 7 8

Continued Next Page

Date	Water Level (m)	Hole Open to (m)

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Log of Borehole 4

Project No. BRM-00239423-E0 Drawing No. 5

Project: Environmental, Geotechnical and Hydrogeological Investigation Sheet No. 2 of 2

Groundwater	Soil/Rock Symbol	Soil Description	ELEV. m	Depth (m)	SPT (N Value) 20 40 60 80 / Shear Strength 100 200 kPa	Combustible Vapour Reading (ppm) 25 50 75 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 10 20 30	Sample	Natural Unit Weight kN/m³
		73.48		8				
				9				
				10				
				11				
		See Core Log for Details		12				
				13				
				14				
				15				
		~66.1						
		END OF BOREHOLE						

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Date	Water Level (m)	Hole Open to (m)

ROCK CORE LOG

BH 4

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	81.5	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	06/30/21	06/30/21	B. Hesse	5a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	1 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
74.3			See Borehole Log for Details															
73.9			**GEORGIAN BAY FORMATION**															
73.7			Shale interbedded with limestone and siltstone.		C	V		RU		<5				1	100	60	100	grey
			Shale (94%): very fine to fine grained fissile, very thin to thick bedded, grey, low to very low strength, slightly-heavily weathered in upper portion, becoming unweathered with depth.	1	B	F	VC C	RU SU		<5								
	8		Limestone (2%): fine grained, very thin to thin bedded, grey, medium strength, slightly weathered to unweathered.															
73.1					C	V		RU		<5								
73.1			Siltstone (4%): fine grained, very thin to thin bedded, grey, calcareous, medium strength, slightly weathered to unweathered.															
			Discontinuities: bedding joints are smooth planar to smooth undulating in the shale layers and rough undulating in the limestone/siltstone interbedds.	1	B	F	VC C	RU SU		<5				2	100	63	100	grey
72.7					C	V		RU		<5								
72.6			Vertical joints are rough undulating to rough planar and occured mainly in the limestone/siltstone litholgies at following depth:															
72.5	9				C	V		RU		<5								
72.5			7.72 to 7.75 m; 8.34 to 8.37 m; 8.82 to 8.87 m; 8.99 to 9.17 m; 9.83 to 9.88 m; 14.0 to 14.19 m															
72.3																		
72.3			Shale Rubble Zone was noted from 9.44 to 9.53 m (90 mm)															
72.0																		
72.0																		
71.9																		
71.8																		
71.8																		
71.7					C	V		RU		<5								
71.6																		
71.5	10																	
71.5				1	B	F	VC C	SU RU		<5				3	100	66	100	grey
71.0																		
70.9																		
70.9																		
70.8																		
	11																	

EXP_ROCKCORE ANN ST & HIGH ST E.GPJ CORE_LOG.GDT 7/30/21

exp.

ROCK CORE LOG

BH 4

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	81.5	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	06/30/21	06/30/21	B. Hesse	5a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	2 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
70.0																		
70.0				1	B	F	VC M	SU SP		<5				4	100	93	100	grey
	12																	
68.8																		
68.8																		
	13			1	B	F	VC M	SU RU		<5				5	100	95	100	grey
	14				C	V		SU		<5				6	100	97	100	grey
	15																	
66.1																		
66.1			End of Borehole at 15.4 m															

EXP_ROCKCORE ANN ST & HIGH ST E.GPJ CORE_LOG.GDT 7/30/21

exp.

Log of Borehole 5

Project No. BRM-00239423-E0 | Drawing No. 6

Project: Environmental, Geotechnical and Hydrogeological Investigation | Sheet No. 1 of 2

Location: Ann St and High St E, Mississauga, ON

Date Drilled: July 5, 2021

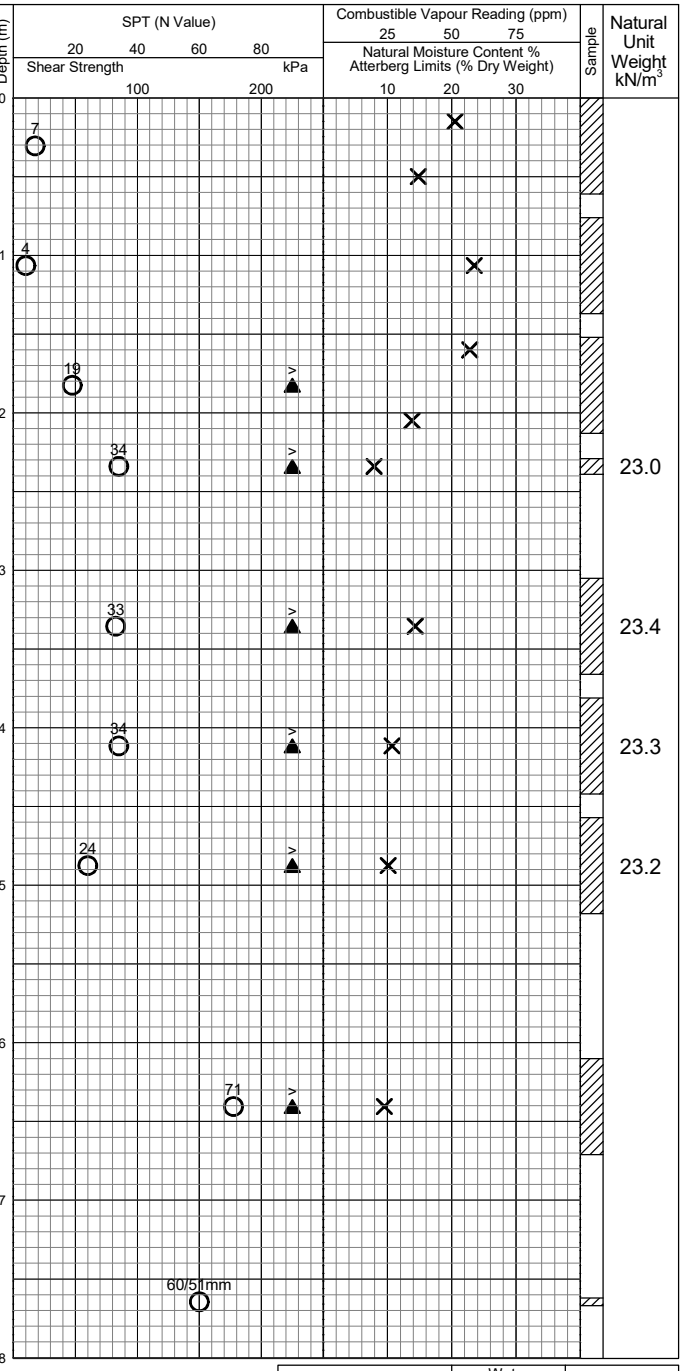
Drill Type: Truck - CME 75

Datum: Geodetic

Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Field Vane Test (S)

Combustible Vapour Reading | Natural Moisture | Plastic and Liquid Limit | Undrained Triaxial at % Strain at Failure | Penetrometer

Soil Description	ELEV. m
TOPSOIL: ~300mm	82.38
FILL: sandy silt, trace clay and gravel, trace rootlets, topsoil inclusions, brown, moist	~82.1
- no top soil, very moist to wet	~80.6
CLAYEY SILT TILL: trace sand & gravel, trace cobbles, grey, moist, very stiff	
- hard	
- very stiff	
- occasional shale fragments, hard	
SHALE BEDROCK: Georgian Bay Formation, trace clay, grey	~74.8 / ~74.7



Continued Next Page

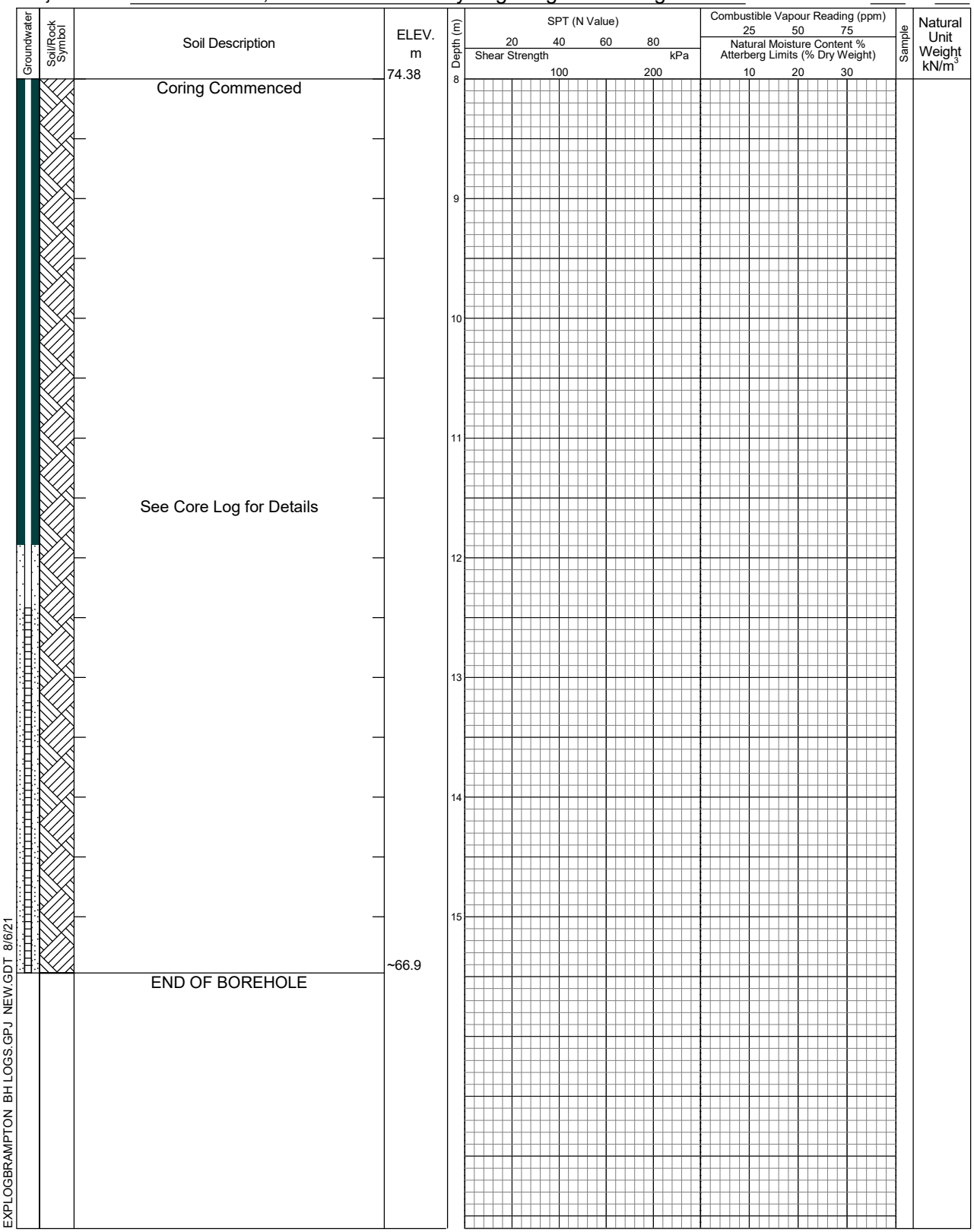
Date	Water Level (m)	Hole Open to (m)
On completion	N/A	15.47
July 12, 2021	7.96	
July 14, 2021	11.19	

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Log of Borehole 5

Project No. BRM-00239423-E0 Drawing No. 6

Project: Environmental, Geotechnical and Hydrogeological Investigation Sheet No. 2 of 2



Date	Water Level (m)	Hole Open to (m)
On completion	N/A	15.47
July 12, 2021	7.96	
July 14, 2021	11.19	

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

ROCK CORE LOG

BH 5

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	82.4	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	07/05/21	07/05/21	B. Hesse	6a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	1 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
75.1			See Borehole Log for Details															
74.7																		
74.7			**GEORGIAN BAY FORMATION**	1	B	F	VC	SU		<5				1	100	0	100	grey
74.6			Shale interbedded with limestone and siltstone.				C	RU										
74.6																		
74.4	8		Shale (90%): very fine to fine grained fissile, very thin to thick bedded, grey, low to very low strength, slightly-heavily weathered in upper portion, becoming unweathered with depth.		C	V		RU		<5								
74.4			Limestone (3%): fine grained, very thin to thin bedded, grey, medium strength, slightly weathered to unweathered.															
			Siltstone (6%): fine grained, very thin to thin bedded, grey, calcareous, medium strength, slightly weathered to unweathered.	1	B	F	VC	SU		<5				2	100	71	100	grey
							C	RU										
			Clay-filled joints (1%): highly weathered, very low strength intervals at following depth:															
73.5																		
73.5			9.3 to 9.37 m (70 mm thick)															
73.4	9																	
73.4			Discontinuities: bedding joints are smooth planar to smooth undulating in the shale layers and rough undulating in the limestone/siltstone interbedds.															
73.1									SO	70								
73.0			Vertical joints are rough undulating to rough planar and occured mainly in the limestone/siltstone litholgies at following depth:															
72.9																		
72.9					C	V		RU		<5								
72.8			7.99 to 8.02 m; 9.5 to 9.54 m; 9.81 to 9.87 m; 10.07 to 10.15 m; 10.19 to 10.22 m; 10.63 to 10.67 m; 13.83 to 13.84 m; 14.41 to 14.43 m															
72.8																		
72.7																		
72.6			Shale Rubble Zone was noted from 7.67 to 7.73 (60 mm); 9.62 to 9.66 (40 mm)		C	V		RU		<5								
72.5																		
72.4	10																	
72.3				1	C	V	VC	RU		<5				3	100	46	100	grey
72.2					B	F	C	SU		<5								
72.2					C	V		RU		<5								
72.2								RU										
72.1																		
72.0																		
71.8					C	V		RU		<5								
71.7																		
	11																	

ROCK CORE LOG

BH 5

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	82.4	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	07/05/21	07/05/21	B. Hesse	6a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	2 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
				1	B	F		SP		<5				4	100	100	100	grey
	12																	
69.6																		
69.5																		
	13			1	B	F		SU RU		<5				5	100	96	100	grey
68.6					C	V		RU		<5								
68.5																		
	14																	
68.0					C	V		RU		<5								
68.0				1	B	F		SU SP		<5				6	100	94	100	grey
	15																	
66.9			End of Borehole at 15.5 m															

exp.

Log of Borehole 6

Project No. BRM-00239423-E0 | Drawing No. 7

Project: Environmental, Geotechnical and Hydrogeological Investigation | Sheet No. 1 of 2

Location: Ann St and High St E, Mississauga, ON

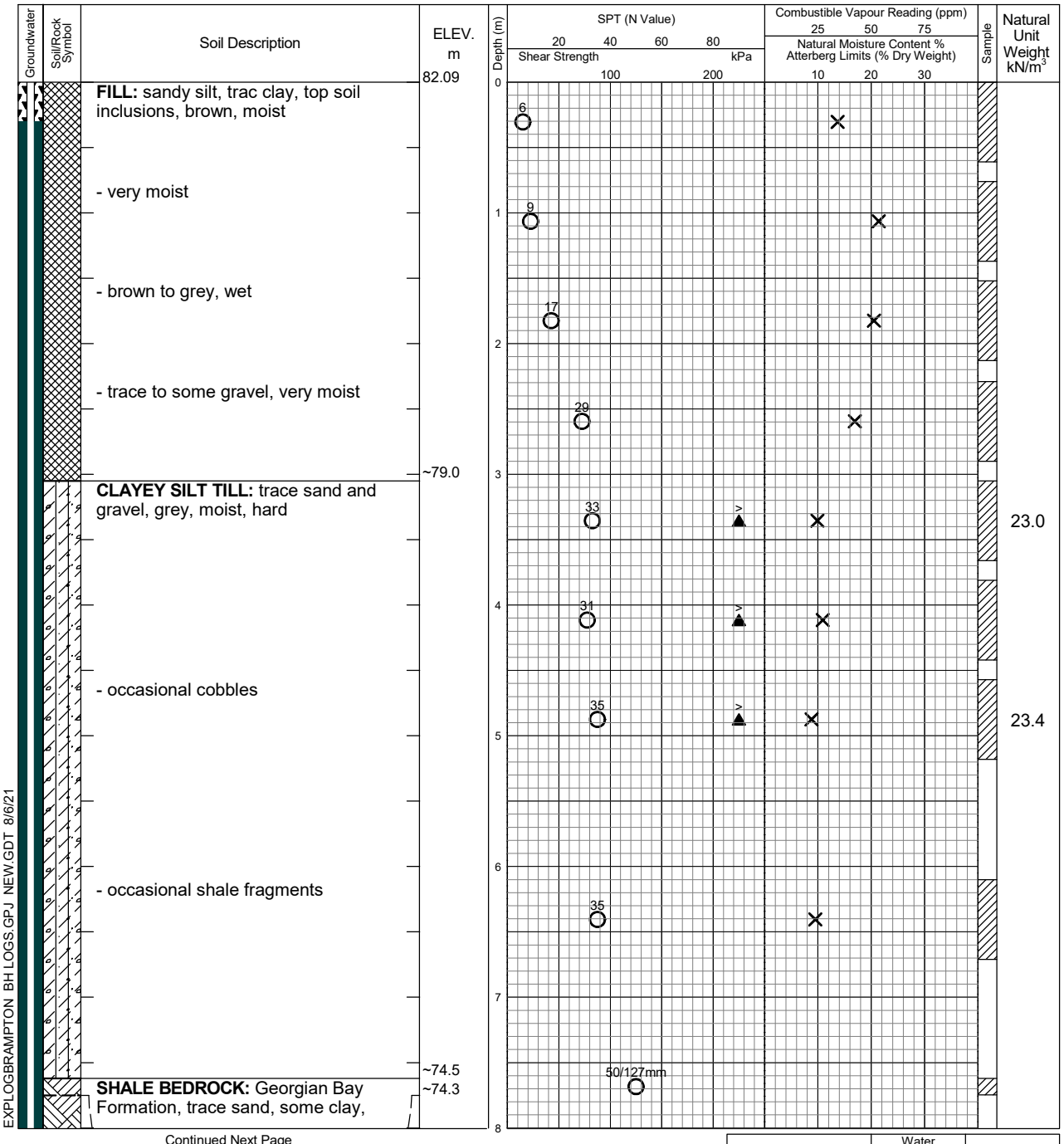
Date Drilled: July 6, 2021

Drill Type: Truck - CME 75

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer



EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Continued Next Page

Date	Water Level (m)	Hole Open to (m)
On completion	N/A	14.33
July 12, 2021	8.34	
July 14, 2021	8.44	

Log of Borehole 6

Project No. BRM-00239423-E0 Drawing No. 7

Project: Environmental, Geotechnical and Hydrogeological Investigation Sheet No. 2 of 2

Groundwater	Soil/Rock Symbol	Soil Description	ELEV. m	Depth (m)	SPT (N Value) 20 40 60 80 / Shear Strength kPa 100 200	Combustible Vapour Reading (ppm) 25 50 75 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 10 20 30	Sample	Natural Unit Weight kN/m³
		74.09		8				
		grey						
		Coring Commenced		9				
				10				
				11				
		See Core Log for Details		12				
				13				
				14				
				15				
			~66.6					
		END OF BOREHOLE						

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Date	Water Level (m)	Hole Open to (m)
On completion	N/A	14.33
July 12, 2021	8.34	
July 14, 2021	8.44	

ROCK CORE LOG

BH 6

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	82.1	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	07/06/21	07/06/21	B. Hesse	7a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	1 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
74.7			See Borehole Log for Details															
74.3			**GEORGIAN BAY FORMATION**															
74.3			Shale interbedded with limestone and siltstone.	1	B	F	VC	SU		<5				1	100	0	100	grey
74.2					C	V	C	SU		<5								
74.1	8		Shale (91%): very fine to fine grained fissile, very thin to thick bedded, grey, low to very low strength, slightly-heavily weathered in upper portion, becoming unweathered with depth.															
73.8			Limestone (5%): fine grained, very thin to thin bedded, grey, medium strength, slightly weathered to unweathered.															
73.7					C	V		RU		<5								
73.6			Siltstone (4%): fine grained, very thin to thin bedded, grey, calcareous, medium strength, slightly weathered to unweathered.															
73.5																		
73.5																		
73.4				1	B	F	VC	SU		<5				2	92	29	100	grey
73.3			Clay-filled joints (<1%): highly weathered, very low strength intervals at following depth:				C	RU										
73.2			9.01 to 9.03 m (20 mm)															
73.1	9								SO	<5								
73.1			Discontinuities: bedding joints are smooth planar to smooth undulating in the shale layers and rough undulating in the limestone/siltstone interbedds.															
73.0																		
73.0																		
72.8			Vertical joints are rough undulating to rough planar and occured mainly in the limestone/siltstone litholgies at following depth:															
72.6																		
72.6			7.84 to 7.93 m; 9.62 to 9.67 m; 9.78 to 9.89 m; 10.01 to 10.12 m															
72.5					C	V		RU		<5								
72.4			Shale Rubble Zone was noted from 7.75 to 7.84 m (90 mm thick); 7.93 to 8.04 m (70 mm thick); 8.48 to 8.56 m (80 mm); 8.67 to 8.76 m (100 mm thick); 13.44 to 13.52 (80 mm thick)															
72.4																		
72.3					C	V		RU		<5								
72.2																		
72.2	10																	
72.1			Core loss was observed during Run 5 between 13.52 to 14.01 m. Observations made during the drilling process (water loss, low ground resistance), well installation and quality of the recovered rock indicate the presents of a fault zone, likely filled with soft material (sand, clay or gauge). that got washed out during the coring process.		C	V		RU		<5								
72.1																		
72.1				1	B	F	VC	SU		<5				3	100	61	100	grey
72.0							C	RU										
71.9																		
71.9																		
71.8																		
71.7																		
71.7																		
71.6																		
71.4																		
71.3																		
71.1	11																	
70.7																		
70.7																		
70.6																		

exp.

ROCK CORE LOG

BH 6

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	82.1	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	07/06/21	07/06/21	B. Hesse	7a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	2 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
70.2				1	B	F	VC M	SU RU		<5				4	100	93	100	grey
70.0	12																	
69.9																		
69.8																		
69.8																		
69.6																		
69.6																		
69.3																		
69.3																		
69.2																		
69.2	13																	
69.1																		
69.0																		
69.0																		
68.9				1	B	F	VC C	SU RU		<5				5	67	25	50	grey
68.9																		
68.9																		
68.7																		
68.7																		
68.6																		
			Core Loss															
68.1	14																	
68.0																		
67.3				1	B	F	C M	SP		<5				6	100	92	100	grey
	15																	
66.6			End of Borehole at 15.5 m															

EXP_ROCKCORE ANN ST & HIGH ST E.GPJ CORE_LOG.GDT 7/30/21

exp.

Log of Borehole 7

Project No. BRM-00239423-E0 | Drawing No. 8

Project: Environmental, Geotechnical and Hydrogeological Investigation | Sheet No. 1 of 2

Location: Ann St and High St E, Mississauga, ON

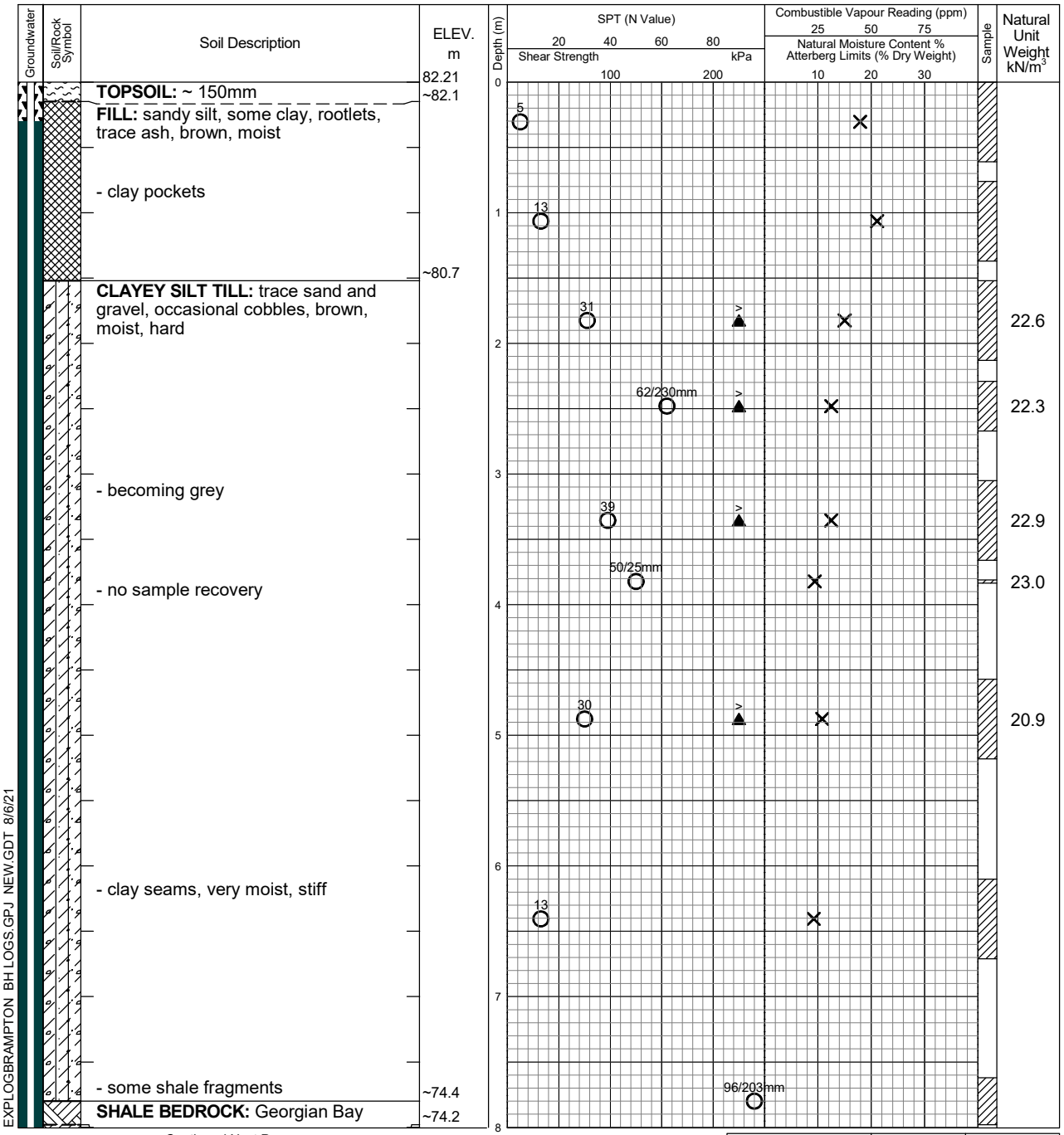
Date Drilled: July 7, 2021

Drill Type: Truck - CME 75

Datum: Geodetic

Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Field Vane Test (S)

Combustible Vapour Reading | Natural Moisture | Plastic and Liquid Limit | Undrained Triaxial at % Strain at Failure | Penetrometer



Continued Next Page

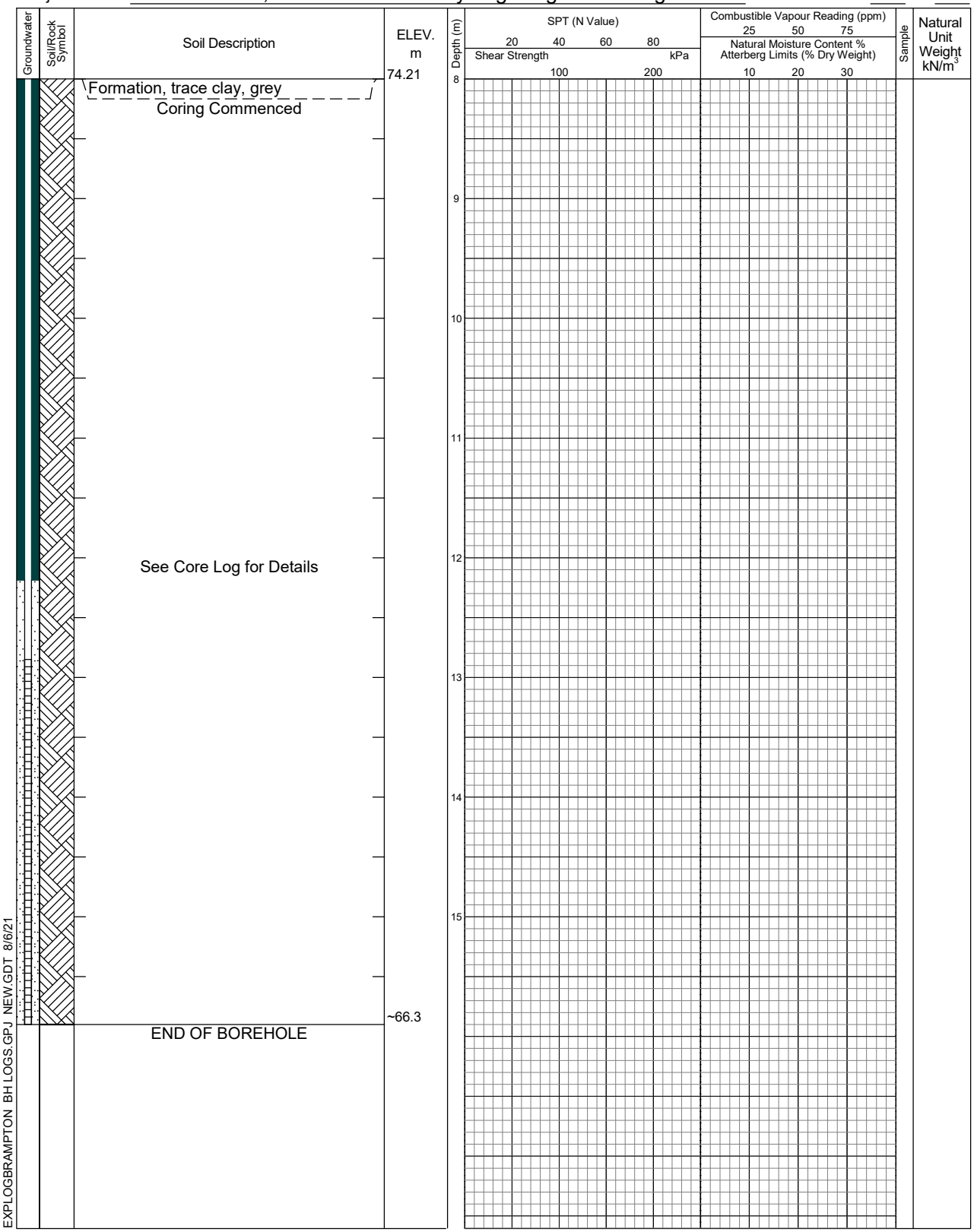
Date	Water Level (m)	Hole Open to (m)
On completion	N/A	15.9
July 12, 2021	8.71	
July 14, 2021	10.65	

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Log of Borehole 7

Project No. BRM-00239423-E0 Drawing No. 8

Project: Environmental, Geotechnical and Hydrogeological Investigation Sheet No. 2 of 2



EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Date	Water Level (m)	Hole Open to (m)
On completion	N/A	15.9
July 12, 2021	8.71	
July 14, 2021	10.65	

ROCK CORE LOG

BH 7

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	82.2	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	07/07/21	07/07/21	B. Hesse	8a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	1 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
74.5			See Borehole Log for Details															
74.2	8		**GEORGIAN BAY FORMATION**															
74.1			Shale interbedded with limestone and siltstone.	1	B	F	VC	SU	SO	<5 80				1	100	0	100	grey
74.1																		
73.9			Shale (90%): very fine to fine grained fissile, very thin to thick bedded, grey, low to very low strength, slightly-heavily weathered in upper portion, becoming unweathered with depth.															
73.9																		
73.8					C	V		RU		<5								
73.7			Limestone (2%): fine grained, very thin to thin bedded, grey, medium strength, slightly weathered to unweathered.															
			Siltstone (6%): fine grained, very thin to thin bedded, grey, calcareous, medium strength, slightly weathered to unweathered.															
	9			1	B	F	VC M	SU RU		<5				2	100	55	100	grey
			Clay-filled joints (2%): highly weathered, very low strength noted at following depth:															
			8.08 to 8.16 m (80 mm thick); 9.80 to 9.87 m (70 mm thick)															
72.7			Discontinuities: bedding joints are smooth planar to smooth undulating in the shale layers and rough undulating in the limestone/siltstone interbedds.															
72.7																		
72.5																		
72.4			Vertical joints are rough undulating to rough planar and occured mainly in the limestone/siltstone litholgies at following depth:															
72.3																		
72.3	10		8.43 to 8.49 m; 10.18 to 10.22 m; 10.65 to 10.67 m; 10.88 to 10.99 m; 11.39 to 11.45 m															
72.0					C	V		RU		<5								
72.0																		
				1	B	F	VC C	SU RU		<5				3	100	36	100	grey
71.6					C	V		RU		<5								
71.5																		
71.5																		
71.4																		
71.3					C	V		RU		<5								
71.2	11																	
70.9																		
70.9																		
70.8					C	V		RU		<5								
70.8																		

EXP_ROCKCORE ANN ST & HIGH ST E.GPJ CORE_LOG.GDT 7/30/21

exp.

ROCK CORE LOG

BH 7

PROJECT	ORIENTATION	ELEVATION (m)	DATUM	PROJECT NUMBER
Geotechnical Investigation	Vertical	82.2	Geodetic	BRM-00239423-E0
LOCATION	**DATE STARTED**	**COMPLETED**	**LOGGED BY**	**DRAWING NUMBER**
Ann St and High St E, Mississauga, ON	07/07/21	07/07/21	B. Hesse	8a
CLIENT	**DRILLER**	**DRILL TYPE**	**CORE BARREL**	**SHEET**
10 WEST GO GP Inc.	Davis	Truck - CME 75	HQ	2 of 2

ELEVATION (m)	DEPTH (m)	SYMBOL	GENERAL DESCRIPTION	JOINT CHARACTERISTICS: NO. OF SETS	JOINT TYPE	ORIENTATION	SPACING	ROUGHNESS	FILLING	APERTURE (mm)	WEATHERING	STRENGTH	FRACTURE FREQUENCY	RUN NUMBER	RECOVERY (%)	RQD	WATER RECOVERY (%)	WATER COLOUR
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	12			1	B	F		SP SU		<5				4	100	88	100	grey
	13			1	B	F		SP SU		<5				5	100	95	100	grey
	14																	
	15			1	B	F		SP SU		<5				6	100	96	100	grey
66.3	16		End of Borehole at 15.9 m															

exp.

Log of Borehole 8

Project No. BRM-00239423-E0 | Drawing No. 9

Project: Environmental, Geotechnical and Hydrogeological Investigation | Sheet No. 1 of 1

Location: Ann St and High St E, Mississauga, ON

Date Drilled: June 30, 2021

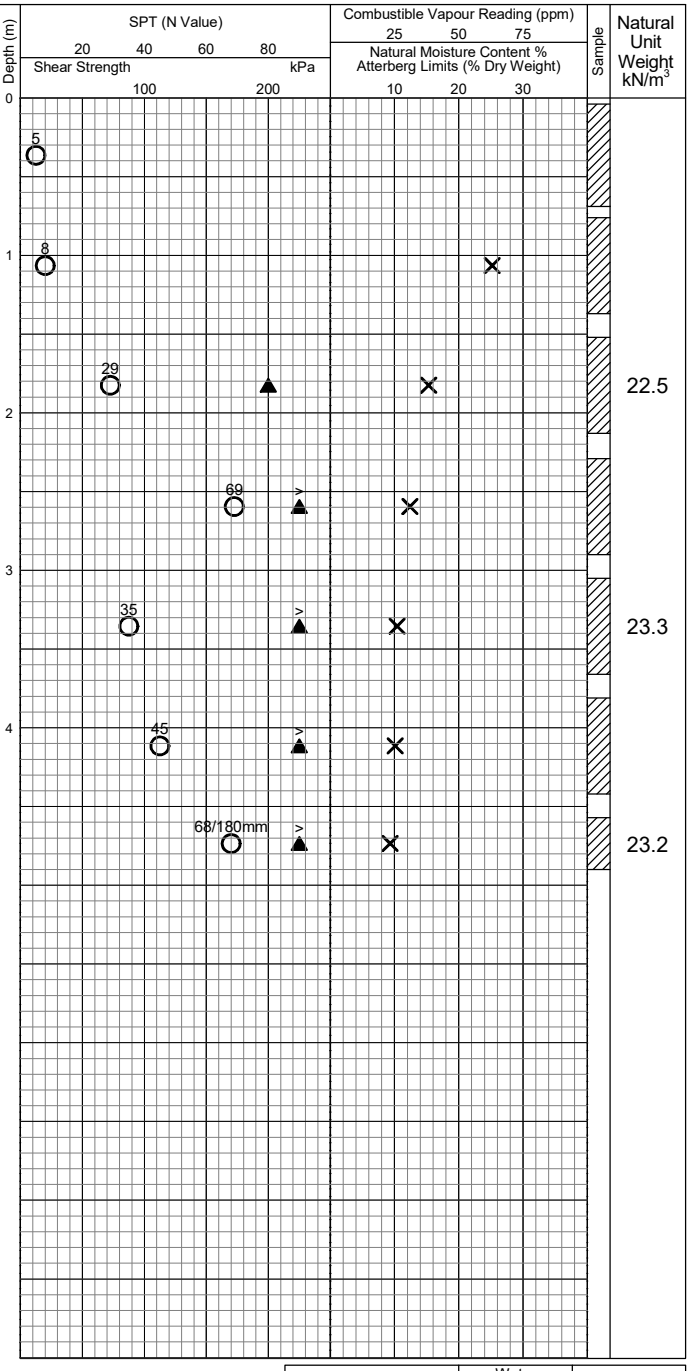
Drill Type: CME 55 Track Mount - Hollow Stem

Datum: Geodetic

Auger Sample | SPT (N) Value | Dynamic Cone Test | Shelby Tube | Field Vane Test (S)

Combustible Vapour Reading | Natural Moisture | Plastic and Liquid Limit | Undrained Triaxial at % Strain at Failure | Penetrometer

Soil Description	ELEV. m
ASPHALT: ~ 40mm	81.59
GRANULAR BASE: ~ 280mm	~81.6
FILL: sandy silt, trace clay, brown, moist	~81.3
- wet	
CLAYEY SILT TILL: trace sand and gravel, brown, moist, very stiff	~80.1
- stone fragments, hard	
- occasional cobbles	
END OF BOREHOLE	~76.7



Date	Water Level (m)	Hole Open to (m)
On completion	Dry	4.57

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Log of Borehole 9

Project No. BRM-00239423-E0 | Drawing No. 10

Project: Environmental, Geotechnical and Hydrogeological Investigation | Sheet No. 1 of 1

Location: Ann St and High St E, Mississauga, ON

Date Drilled: June 30, 2021

Drill Type: CME 55 Track Mount - Hollow Stem

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

Soil Description	ELEV. m	Depth (m)	Sample	Natural Unit Weight kN/m³
ASPHALT: ~ 40mm	81.41 ~81.4	0		
GRANULAR BASE: ~ 280mm	~81.1			
FILL: sandy silt, trace gravel, brown, moist	~80.5			
CLAYEY SILT TILL: trace sand & gravel, some oxidations, brown, moist, stiff		1		
- occasional cobbles, very stiff		2		21.9
- trace shale fragments and cobbles, some gravel, becoming grey, hard		3		23.8
- very stiff		4		23.4
		5		20.4
END OF BOREHOLE	~76.2			

SPT (N Value): 20 40 60 80 — Shear Strength: 100 200 kPa

Combustible Vapour Reading (ppm): 25 50 75 — Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SPT values: 6, 9, 27, 30, 42, 23, 26

Date	Water Level (m)	Hole Open to (m)
On completion	Dry	4.57

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

Log of Borehole 10

Project No. BRM-00239423-E0 | Drawing No. 11

Project: Environmental, Geotechnical and Hydrogeological Investigation | Sheet No. 1 of 1

Location: Ann St and High St E, Mississauga, ON

Date Drilled: July 7, 2021

Drill Type: CME 55 Track Mount - Hollow Stem

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Combustible Vapour Reading
Natural Moisture
Plastic and Liquid Limit
Undrained Triaxial at % Strain at Failure
Penetrometer

Soil Description	ELEV. m	Depth (m)	Sample	Natural Unit Weight kN/m³
TOPSOIL: ~ 180mm	81.21	0		
	~81.0			
FILL: sandy silt, topsoil inclusions, brown, moist				
- trace clay		1		
- trace rootlets, some oxidations, wet		2		
	~78.6			
CLAYEY SILT TILL: trace gravel and sand, sandy silt seams, brown, moist, very stiff		3		22.9
- hard				23.4
		4		
	~75.9	5		23.2
END OF BOREHOLE				

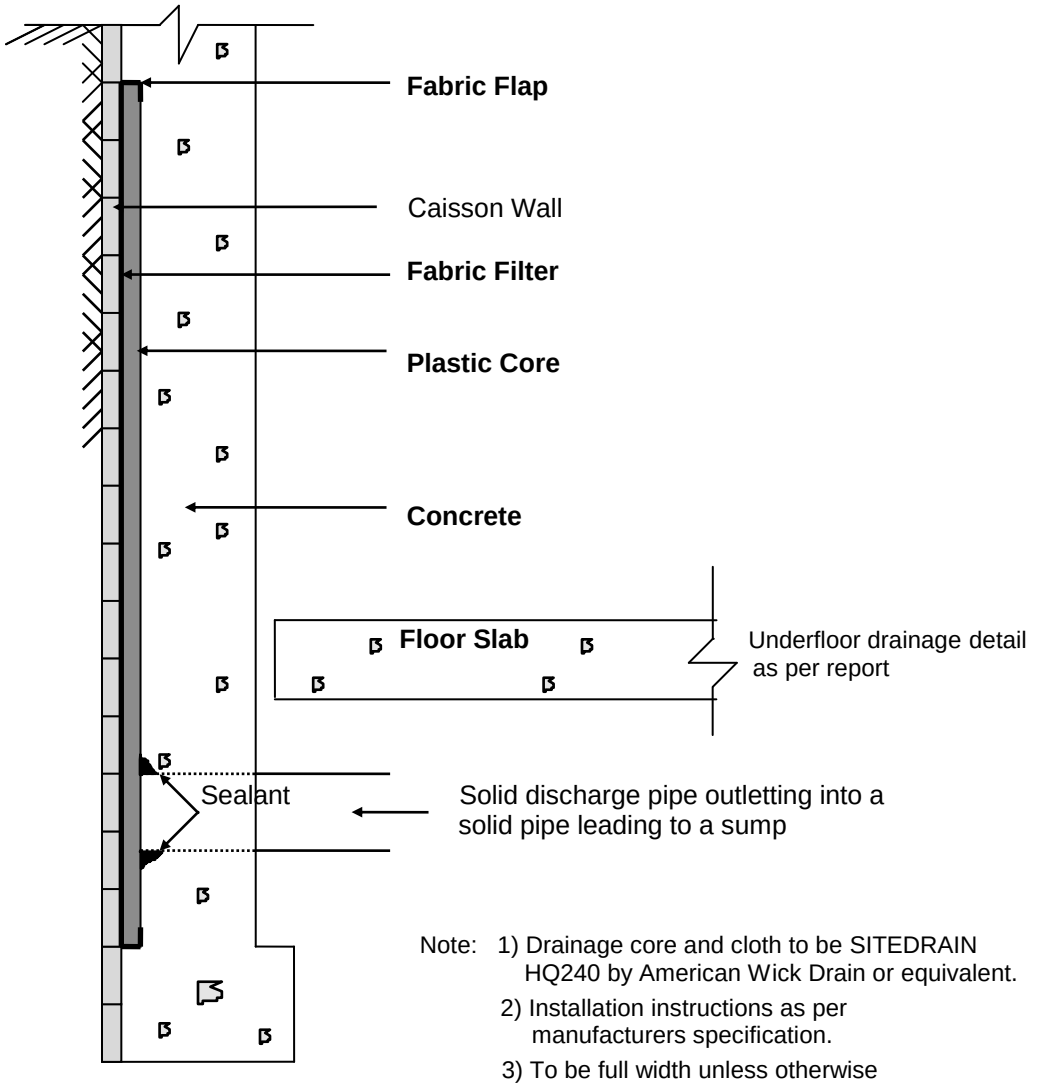
SPT (N Value): 20 40 60 80
Shear Strength: 100 200 kPa
Combustible Vapour Reading (ppm): 25 50 75
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

SPT values: 6, 6, 6, 25, 34, 43, 31

Date	Water Level (m)	Hole Open to (m)
On completion	Dry	4.57

EXPLOGBRAMPTON BH LOGS.GPJ NEW.GDT 8/6/21

BRM-00239423-E0
Drawing No.12



Note: 1) Drainage core and cloth to be SITEDRAIN HQ240 by American Wick Drain or equivalent.

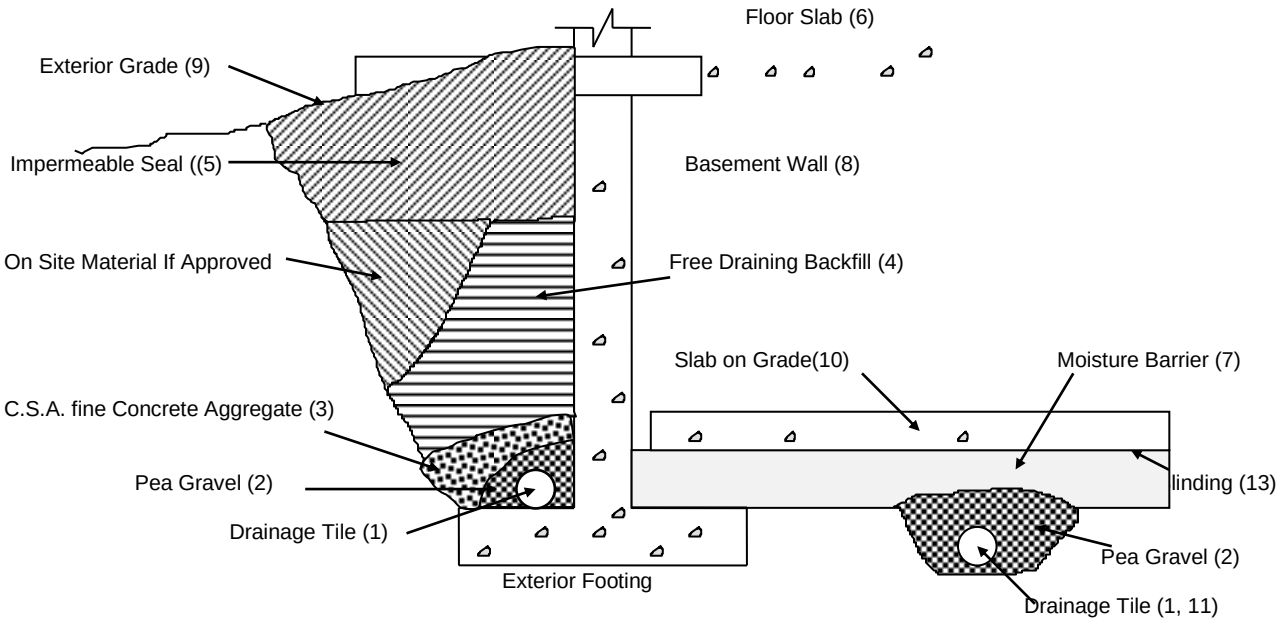
2) Installation instructions as per manufacturers specification.

3) To be full width unless otherwise recommended by the engineer.

4) Final detail must be approved before system is considered acceptable.

5) SITEDRAIN HQ240 should be kept a minimum of 1.2 m below exterior finished grade.

SUGGESTED EXTERIOR DRAINAGE AGAINST SHORING SYSTEM



Notes

1. Drainage tile to consist of 100 mm (4”) diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be a minimum of 150 mm (6”) below underside of floor slab.
2. Pea gravel - 150 mm (6”) top and side of drain. If drain is not on footing, place 100 mm (4 inches) of pea gravel below drain . 20 mm (3/4”) clear stone is an alternative provided it is surrounded by an approved porous plastic membrane (Terrafix 270R or equivalent).
3. C.S.A. fine concrete aggregate to act as filter material. Minimum 300 mm (12”) top and side of tile drain. This may be replaced by an approved porous plastic membrane as indicated in (2).
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.
5. Impermeable backfill seal - compacted clay, clayey silt or equivalent. If original soil is free-draining, seal may be omitted.
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.
8. Basement wall to be damp-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. Drainage tile placed in parallel rows 6 to 8 m (20 to 25’) centres one way. Place drain on 100 m (4”) pea gravel with 150 mm(6”) of pea gravel on top and sides. Provide filter material as noted in (3) if moisture barrier is not clear crushed stone.
12. Do not connect the underfloor drains to perimeter drains.
13. If the 20 mm (3/4”) stone requires surface blinding, use 6 mm (1/4”) clear stone chips.

DRAINAGE AND BACKFILL RECOMMENDATIONS

(not to scale)

Appendix A

Certificate of Analysis for pH and Sulphate

Your P.O. #: BRM-GEO
Your Project #: BRM-00239423-E0
Site Location: ANN & HIGH ST. E, MISSISSAUGA
Your C.O.C. #: na

Attention: Jason Byun

exp Services Inc
Brampton Branch
1595 Clark Blvd
Brampton, ON
CANADA L6T 4V1

Report Date: 2021/07/07
Report #: R6708742
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1I1756
Received: 2021/06/30, 18:43

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
pH CaCl2 EXTRACT	1	2021/07/07	2021/07/07	CAM SOP-00413	EPA 9045 D m
Sulphate (20:1 Extract)	1	2021/07/07	2021/07/07	CAM SOP-00464	EPA 375.4 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your P.O. #: BRM-GEO
Your Project #: BRM-00239423-E0
Site Location: ANN & HIGH ST. E, MISSISSAUGA
Your C.O.C. #: na

Attention: Jason Byun

exp Services Inc
Brampton Branch
1595 Clark Blvd
Brampton, ON
CANADA L6T 4V1

Report Date: 2021/07/07
Report #: R6708742
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1I1756
Received: 2021/06/30, 18:43

Encryption Key

Bureau Veritas
07 Jul 2021 16:50:12

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Patricia Legette, Project Manager
Email: Patricia.Legette@bureauveritas.com
Phone# (905)817-5799

==========

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BV Labs Job #: C1I1756
Report Date: 2021/07/07

exp Services Inc
Client Project #: BRM-00239423-E0
Site Location: ANN & HIGH ST. E, MISSISSAUGA
Your P.O. #: BRM-GEO
Sampler Initials: VM

RESULTS OF ANALYSES OF SOIL

BV Labs ID		PZF813		PZF813		
Sampling Date		2021/06/28		2021/06/28		
COC Number		na		na		
	UNITS	**BH 2/SS8**	**QC Batch**	**BH 2/SS8 Lab-Dup**	**RDL**	**QC Batch**
Inorganics						
Available (CaCl2) pH	pH	7.88	7448111			
Soluble (20:1) Sulphate (SO4)	ug/g	130	7448566	110	20	7448566

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: C1I1756
Report Date: 2021/07/07

exp Services Inc
Client Project #: BRM-00239423-E0
Site Location: ANN & HIGH ST. E, MISSISSAUGA
Your P.O. #: BRM-GEO
Sampler Initials: VM

TEST SUMMARY

BV Labs ID: PZF813
Sample ID: BH 2/SS8
Matrix: Soil

Collected: 2021/06/28
Shipped:
Received: 2021/06/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
pH CaCl2 EXTRACT	AT	7448111	2021/07/07	2021/07/07	Neil Dassanayake
Sulphate (20:1 Extract)	KONE/EC	7448566	2021/07/07	2021/07/07	Avneet Kour Sudan

BV Labs ID: PZF813 Dup
Sample ID: BH 2/SS8
Matrix: Soil

Collected: 2021/06/28
Shipped:
Received: 2021/06/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sulphate (20:1 Extract)	KONE/EC	7448566	2021/07/07	2021/07/07	Avneet Kour Sudan

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BV Labs Job #: C1I1756
Report Date: 2021/07/07

exp Services Inc
Client Project #: BRM-00239423-E0
Site Location: ANN & HIGH ST. E, MISSISSAUGA
Your P.O. #: BRM-GEO
Sampler Initials: VM

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	9.7°C

Results relate only to the items tested.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: C1I1756
Report Date: 2021/07/07

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: BRM-00239423-E0
Site Location: ANN & HIGH ST. E, MISSISSAUGA
Your P.O. #: BRM-GEO
Sampler Initials: VM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7448111	Available (CaCl2) pH	2021/07/07			100	97 - 103			0.18	N/A
7448566	Soluble (20:1) Sulphate (SO4)	2021/07/07	NC	70 - 130	101	70 - 130	<20	ug/g	12	35

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

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BV Labs Job #: C1I1756
Report Date: 2021/07/07

exp Services Inc
Client Project #: BRM-00239423-E0
Site Location: ANN & HIGH ST. E, MISSISSAUGA
Your P.O. #: BRM-GEO
Sampler Initials: VM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com