SOLA ENGINEERING

RE: GEOTECHNICAL INVESTIGATION
QEW + 427 DEVELOPMENT
1543, 1545, 1547, 1549, 1551 THE QUEENSWAY & 66 AND 76 FORDHOUSE BOULEVARD
ETOBICOKE, ONTARIO

FOR: 1370443 Ontario Limited
c/o
RSP LLP, Ontario
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Toronto, Ontario
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ATTENTION: Mr. Jeff Muir

REPORT NO.: 2023-18799R

DATE: December 2, 2024

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1.0 INTRODUCTION

Sola Engineering Inc. (Sola) was retained by Mr. Jeff Muir of Keystone Environmental on behalf of 1370443 Ontario Limited (The "Client") to carry out a geotechnical investigation for Proposed Mixed-Use and Residential Towers located at 1543, 1545, 1547, 1549, 1551 The Queensway & 66 and 76 Fordhouse Boulevard, Etobicoke, Ontario (the subject sites or sites). Authorization to proceed with the investigation was received on September 5, 2023, through the acceptance of Sola's Proposal No. 2023-3464 dated July 27, 2023.

As per the scope of services detailed in Sola's proposal, the purpose of this investigation is to collect information on the soil and groundwater conditions at the subject site and, based on the investigation data, to provide recommendations to assist with the design of the proposed residential towers.

This report presents the details of Sola's fieldwork and laboratory testing, outlines the soil and groundwater conditions at the site, and provides comments on the aforementioned items.

In this report, standard site investigation procedures have been adopted. The procedures including those developed by the Ontario Building Code, Canadian Foundation Engineering Manual, Ontario Ministry of Transportation and Toronto Transit Commission, are considered by far the most accepted methods by the geotechnical society for general engineering purposes. Soil Classification Systems used for developing this report have been in general conformance with those outlined in the above-mentioned procedures, with modifications where appropriate. Where in doubt, this office must be contacted for further interpretation or clarification.

This report has been prepared for the Client, and their nominated engineers and designers. Third-party use or reproduction, in part or in full, of this report, is prohibited without written authorization from Sola. This report is also subject to the Statement of Limitations which forms an integral part of this document.

2.0 SITE SETTING

2.1 SITE LOCATION, DESCRIPTION AND PROPOSED DEVELOPMENT

The site is located at 1543, 1545, 1547, 1549 and 1551 The Queensway & 66 and 76 Fordhouse Boulevard, Etobicoke, Ontario which are currently occupied by five commercial buildings of one to two storeys. The site is bounded to the East and West by commercial properties, the north by The Queensway, and the south by Fordhouse Blvd.

The subject site is being considered for redevelopment. It is understood that the Client is contemplating developing the site with four residential mixed-use buildings with heights ranging from 30 to 45 storeys with 2 underground parking levels.

2.2 PUBLISHED GEOLOGY

Based on a review of the existing geological publication for the site area, Ontario Geological Survey (OGS) Map P2204: "*Quaternary Geology, Toronto and Surrounding Area (Southern Ontario)*", the site surrounding areas are underlain by Glacial Ice Deposits, comprising Older Tills (Meadowcliffe), comprising silty clay to silt till. According to the OGS Map M2544: "*Bedrock Geology of Ontario – Southern Ontario*", the overburden is underlain by the bedrock of the Upper Ordovician Georgian Bay Formation; Blue Mountain Formation; Billings Formation; Collingwood Member; and Eastview Member, comprising Shale, Limestone, Dolostone, and Siltstone.

3.0 GROUND INVESTIGATION

3.1 FIELD INVESTIGATION

3.1.1 Soil Investigation

Prior to undertaking field drilling, Sola obtained clearances of existing public utility services for the site from all applicable agencies and companies. In addition, private utility locates were also carried out.

The geotechnical investigation was carried out on September 11 through 15 2023, and comprised the advancement of twelve (12) boreholes (BH1 through BH12). The boreholes were advanced through the existing ground surface to depths ranging from approximately 1.5 m to 12.9 m below the ground surface, using a truck-mounted drill rig equipped for split spoon sampling and standard penetration testing. Rock cores were obtained in four (4) boreholes. The approximate locations of the boreholes are shown in **Enclosure 1**.

All drilling equipment was supplied and operated by Terra Firma Environmental Services Ltd, Ontario, and the drilling works were completed under the full-time supervision of a qualified Sola Technician.

Standard Penetration Tests (SPTs) split spoon samples were collected in the drilled boreholes using a 50 mm outer diameter and 35 mm inner diameter split barrel sampler driven with a 63.5 kg automatic hammer dropping 760 mm. All soil samples were logged in the field.

Rock cores were obtained using NQ and HQ diamond core bits. All rock cores were visually examined in the field and secured in wooden core boxes.

All soil and rock cores samples were returned to Sola's laboratory in Vaughan for review and subsequent laboratory testing.

The logs of the boreholes completed are presented in **Enclosures 2 through 13**.

3.1.2 Groundwater Investigation

Groundwater level observations were made during the advancement of the boreholes and in the open boreholes upon completion of the drilling operations. In addition, piezometers were installed in boreholes BH1, BH3, BH4A, BH4B and BH5, and BH6 to enable, the monitoring of the groundwater levels over a prolonged period of time without interference from surface water. Details of groundwater observations for the boreholes are presented on the borehole logs in **Enclosures 2 through 13**. Further discussion on groundwater is provided in **Section 4.2** of this report.

3.2 GEOTECHNICAL LABORATORY TESTING

All soil samples were submitted to Sola's laboratory for natural moisture content determination. The results of the moisture content tests are presented on the borehole logs on **Enclosures 2 through 13**. In addition, one (1) representable soil sample was submitted for testing of particle size distribution and hydrometer. The results of the particle size distribution test are provided on **Enclosures 16**.

4.0 SUBSURFACE CONDITIONS

The detailed descriptions of the sub-soil conditions encountered at each borehole location are given in the Borehole Logs on **Enclosures 2 through 13**.

The borehole data collected by Sola only represents the subsurface conditions at the borehole locations. It should be pointed out that the material boundaries indicated on the Borehole Logs are approximate and based on visual observations and interpolation between successive samples. These boundaries typically represent a transition from one material type to another and should not be regarded as an exact plane of geological change. It should also be noted that the subsurface conditions may vary across the site.

A summary of the characteristics of each unit of subsoil encountered within the borehole depths is given in the following paragraphs.

4.1 SOIL CHARACTERISATION

4.1.1 Ground Cover

A layer of asphaltic concrete was encountered at boreholes BH1 through BH7 and BH9 through BH12. The thicknesses of the asphaltic concrete at these borehole locations were measured to be approximately 75 mm to 85 mm. A granular fill layer (i.e., pavement base/subbase) was encountered below the asphaltic concrete layer; with thicknesses at these borehole locations ranging from approximately 380 mm to 690.

At borehole BH8, a layer of granular fill was encountered at the surface. The thickness of the granular fill was measured to be approximately 85 mm.

4.1.2 Fill Materials

Fill materials were encountered below the asphaltic concrete and granular pavement at depths from approximately 0.5 m (BH5, BH6, BH7, BH8, BH10, BH11 and BH12) to 0.8 m (BH1 and BH3) and were found to extend to the depths of 1.5 m (BH2, BH3, BH4, BH6, BH7, BH8, BH11 and BH12) to 2.3 m (BH1 and BH5). Borehole BH10 was terminated in the fill material.

Fill materials generally consisted of sandy silt, clayey silt, and silty sand. The presence of cobbles and boulders was inferred in the fill in boreholes BH5, BH9, BH10 and BH12. Traces of organics were observed in BH3, BH4, BH5, and BH7. The fill was generally brown to grey in colour. In-situ resistance testing results were 6 (BH3) to 34 (BH2) blows per 300 mm of spoon penetration, indicating that the fill was not constructed under engineering control.

In the fill materials, the moisture contents of the samples recovered generally ranged from approximately 3.9% (BH5) to 18.5% (BH1), indicating a moist condition. In borehole BH7 moisture contents of 107.5% and 208.9% were measured, due to presence of organic material in the fill in this particular borehole.

4.1.3 Native Soil

Native soils consisting of silt, silt till and clayey silt till were encountered below the fill material in all boreholes except BH10 (this borehole was terminated within the fill at the depth of 2.0 m).

A layer of clayey silt till was encountered below the fill layer at a depth of 1.5 m (BH3) and 2.3 m (BH1) with a thickness of 0.7 m. Based on the recorded N values of 24 and 32 blows per 300 mm penetration, the consistency of this cohesive deposit is described as very stiff to hard.

Silt and silt till were encountered below the fill material and the clayey silt till in all boreholes except for BH1 and BH10 at depths ranging from approximately 1.5 m (BH2, BH4, BH6, BH7, BH8, BH11 and BH12) to 2.3 m (BH5) below the ground surface. The thickness of these layers ranged from approximately 0.7 m (BH1 and BH5) to 3.1 m (BH6). Boreholes BH9, BH11, and BH12 were terminated in these deposits. The presence of shale fragments and cobbles and boulders was noted in these deposits. It should be pointed out that present cobbles and boulders should always be anticipated in glacial till deposits, owing to their mode of deposition.

SPT "N" values for the cohesionless deposits were recorded from 18 (BH7) to in excess of 50 blows per 300 mm of spoon penetration, indicating that the soil had a compact to very dense condition.

In the native deposits, the measured moisture contents of the samples recovered ranged from approximately 12.0% (BH4) to 14.6% (BH1), indicating a moist condition.

4.1.4 Shale Bedrock

Shale bedrock was contact in all the boreholes except for shallow boreholes BH9 through BH12 which were terminated at the depth of 2.0 m below the ground surface. Shale bedrock was proven in four (4) boreholes. The bedrock surface was found at a depth of 2.3 m below the ground surface in BH 4, 3.0 m in BH1, BH2, BH3, BH5, BH7, BH8 and at 4.6 m in BH6.

The upper layers of the shale bedrock were completely weathered. They were soil-like and can be readily augered through. SPT "N" values in the upper completely weathered rock layer was measured to be in excess of 50 per 300 mm of spoon penetration.

Bedrock was of Georgian Bay formation. The rock quality designation (RQD) varied from 0 to 88%. It is observed that occasional thin limestone seams interbedded in the shale bedrock.

4.2 GROUNDWATER

The groundwater conditions encountered during drilling and cave-in depths were not measured due to the coring activity in BH2, BH3, BH5 and BH7 (introducing water for coring).

Groundwater monitoring wells were installed in the boreholes BH1, BH3, BH4, BH5 and BH6 upon the completion of drilling.

The groundwater conditions encountered, and cave-in depth observations were made during drilling and in the open boreholes upon completion of the drilling of each borehole and are presented on the borehole logs in **Enclosures 2 through 13** as well as in **Table 1**.

Table 1: Water Depth and Cave-in

Borehole Number	Upon Drilling Completion		Water Level Measurement Taken by Project Hydrogeologist on September 20, 2023
	Water Depth (mbgs)	Cave-in Depth (mbgs)	
BH1	2.5	Open	3.54
BH2	N/A	N/A	N/A
BH3	N/A	N/A	3.20
BH4A	11.0	Open	2.53
BH4B	N/A	N/A	N/A
BH5	N/A	N/A	3.40
BH6	8.2	8.2	7.20
BH7	N/A	N/A	N/A
BH8	Dry	Open	N/A
BH9	1.9	Open	N/A
BH10	1.9	Open	N/A
BH11	Dry	Open	N/A
BH12	Dry	Open	N/A

Note: mbgs = meters below the existing ground surface

It should be noted that water levels can vary in response to seasonal fluctuations and major weather events. In addition, a perched water condition can occur due to the accumulation of surface water in the more pervious fill overlying relatively less pervious deposits (if these occur), especially during seasonally wetter periods.

Long-term “stabilized” groundwater level measurements should refer to the project hydrogeology study.

5.0 DISCUSSION AND RECOMMENDATIONS

The investigation and comments should be considered ongoing as new information about the underground conditions will continue to become available, for example, when construction is underway and more specific information is available with respect to soil conditions. The interpretation and recommendations of this report must, therefore, be checked through field inspections carried out by Sola to validate the information for use during construction.

It is proposed to redevelop the site to incorporate multiple residential towers which will include three basement levels

Based on the ground conditions found at the site, our recommendations are presented in the following sections.

5.1 GEOTECHNICAL ISSUES

The following geotechnical issues are observed at this site:

- With two(2) underground parking level(s), the building foundation will likely be positioned within the shale bedrock. Conventional spread footings would be suitable for foundation design; and,
- Bedrock excavation is expected for the installation of foundations and some service lines. Excavation in shale bedrock in the upper sub-unit may be carried out using conventional construction equipment (power backhoe with rock teeth).

Based on the ground conditions found at the site, our recommendations are presented in the following sections.

5.2 FROST PROTECTION

All footings and structural elements exposed to seasonal freezing conditions must have at least 1.2 meters of permanent soil cover, or equivalent, for frost protection in the GTA areas.

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. Previous experience indicates that a shallower depth ranging from 0.8 to 0.9 m for interior column footings and 0.4 m for wall footings has been successful where two or more basement levels apply. The 0.8 m depth is believed to be close to the minimum structural requirement for interior column footings. Adjacent to air shafts and entrance and exit doors, a footing depth of 1.2 m below floor level is required or, alternatively, insulation protection must be provided.

If the foundation supporting strata is shale bedrock, the above-mentioned frost protection thickness may be halved.

5.3 CONVENTIONAL SPREAD OR STRIP FOUNDATIONS

At the time of preparation of this report, design loading requirements had not been made available. The Foundation arrangement has not been finalized. For geotechnical design purposes, it is assumed that the footings will be positioned below the frost penetration depth, as mentioned above.

The following discussions are provided to advance the design phase of the new development.

In boreholes BH2, BH3, BH4, BH6, BH7 and BH8, native soil from a depth of 1.5 m below the ground surface may be considered competent. In boreholes BH1 and BH5, competent soil was encountered at a depth of 2.3 m below the ground surface. Bedrock was contacted at a depth of 2.3 m to 4.6 m below ground surface and was proven by coring starting at depths of 6.0 to 6.1 m (BH2, BH3, BH5, and BH7).

For geotechnical design purposes, it is assumed that the footings for buildings with three (3) basement levels the proposed footings may be positioned at a depth of approximately 9 m to 10 m below the existing grade.

Based on the cores recovered and the RQD values foundation strata at depths between 7 and 10 m below the ground surface were found to be poor in borehole BH3 and fair to good quality shale bedrock in boreholes BH2, BH5, and BH7

With three (3) underground parking levels, the founding stratum is likely the lower sub-unit of the shale bedrock with improved quality in rock strength and condition. The proposed buildings can be supported by spread and strip footings founded on the lower sub-unit of shale. Three levels of basement (parking garage), spread footing foundations can be designed for serviceability limit state (SLS) of 800 kPa and for a factored geotechnical resistance (ULS) of 1200 kPa at depths of 7.0 to 9.0 m below the existing ground surface. These values can be increased to 1000 and 1500 respectively at greater depths (i.e., more than 9.0 m below the existing ground surface).

The exposed bedrock founding surface must be examined, evaluated, and approved by the geotechnical engineer, prior to placing the reinforcing steel and pouring the concrete for the foundations. Placing a skim coat of concrete may be necessary upon excavating and approval of the founding bedrock, as directed by the geotechnical engineer, to prevent the deterioration of the founding medium upon exposure to elements. The presence of occasional rubble zones in the bedrock is possible and may require sub excavation, if discovered and directed by the engineer. All the above recommendations should be revisited when more details are available.

Footings that are founded on bedrock, and settlements are negligible.

Where it is necessary to place footings on the soil at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical lines (10H:7V) drawn up from the base of the lower footing. The lower footing must be installed first to minimize the risk of undermining the upper footing. If on bedrock, the above may not apply.

Footings and any foundation wall should be reinforced as per the design to be provided by the Structural Engineer of the project.

The recommended bearing resistances and the corresponding founding elevations would need to be confirmed by geotechnical engineering staff at the site prior to pouring footing concrete.

It should be noted that the recommended bearing resistances have been calculated by Sola from the borehole information for the design stage only. Should higher bearing values be required, this office should be contacted to review this report.

5.4 EARTHQUAKE CONSIDERATIONS

Using the information provided by the site investigation, the general soil profile comprises *"Very Dense Soil and Soft Rock – Site Class C"* as defined by Table 4.1.8.4.A *"Site Classification for Seismic Site Response"* of the Ontario Building Code.

For residential building construction, cost savings may be achieved if the Site Classification can be upgraded through shear wave velocity testing. This testing can be carried out by a specialist geophysics firm.

5.5 BASEMENT FLOOR SLABS AND PERMANENT DRAINAGE CONSIDERATIONS

The basement slab for the proposed highrise buildings can be supported at grade on shale bedrock. After the bedrock surface preparation, the exposed subgrade should be inspected and approved.

It is considered by Sola that completed excavations for floor slabs should not be left open before pouring concrete for any period longer than 24 hours, particularly if the floor construction works are being completed during the winter months or wet weather periods. The base of any floor slab excavation that is to be left exposed for longer than 24 hours should be suitably covered and protected from water ponding, and/or protected to prevent degradation of the exposed founding stratum with the construction of a mud mat.

A granular layer consisting of at least 200 mm of Ontario Provincial Standard Specification (herein *"OPSS"*) Granular A should be installed under the floor slab as a bedding layer. The OPSS Granular A should be compacted to 100 % of its Standard Proctor Maximum Dry Density (herein *"SPMDD"*).

The design of the concrete slabs on native soils may be made on the basis of a value of modulus of subgrade reaction of 25 MPa/m on the surface of the granular moisture barrier. The design of the concrete slabs on shale bedrock may be made on the basis of a value of modulus of subgrade reaction (k) of 40 MPa/m on the surface of the granular moisture barrier.

The floor slab should be structurally independent of any load-bearing structural elements.

Should the lowest construction element extend below the site's permanent water table, proper permanent water control provisions, i.e., watertight structure considerations, positive pumping plus backup systems, waterproofing, etc., must be included in the basement design and construction. Further, depending on the results of the hydrogeological study, the Client may wish to consider the installation of waterproofing or an under-slab drainage system.

5.6 SITE PREPARATORY WORKS

The site preparation work may include stripping the ground cover and existing fill in order to develop the required construction or engineered fill subgrades. Depending on the final grading plan, stripping depths will likely vary locally and should be adjusted to remove all unsuitable material.

It is recommended that the Geotechnical Engineer monitor the stripping operations to ensure that unsuitable materials have been fully removed prior to construction works or the placement of engineered fill. Unacceptable areas identified are to be remediated as soon as practicable and, the procedures would be dependent upon the conditions encountered.

5.7 EXCAVATABILITY AND SITE EXCAVATIONS

If excavations for the buildings and utilities will be open cut, in order to enable entry into excavations during the construction process, all excavations must comply with the definitions prescribed by the "*Occupational Health and Safety Act*" (OHSA), Ontario Regulation 213/91 "*Construction Projects*".

The borehole data indicate that the fill and native soils can be classified as a Type 3 material above groundwater and Type 4 below groundwater as defined in the OHSA and Regulations for Construction Projects (Part III Excavations, Section 226). Weathered shale bedrock in the upper sub-unit should present as Type 1. In Sound rock, the excavation walls may remain nearly vertical (subject to periodical inspection), but would be subject to deterioration.

Excavations should be constructed in conformance with the regulations. It is noted that the above classifications have been estimated based on small, discontinuous samples from boreholes. The excavation conditions must be confirmed and/or modified on the basis of field inspections during the construction stage when large-scale observations can be made with ease.

As defined by the OHSA, excavation walls within the Type 3 soils will require battering back at slopes no steeper than 1H (horizontal):1V (vertical) and flatter for Type 4 material. For Type 1 or Type 2, the bottom 1.2 m high trench wall can be vertical. Within the fill materials, a flatter than 1:1 side slope may be required even above the water table.

Depending on the construction feasibility the excavation for a three level underground will likely be supported by temporary shoring systems. The shoring system should be designed by a professional engineer experienced in this type of work. This may require tie-back support and we will be pleased to further discuss these aspects and provide design parameters if required.

Based on the findings of the investigation, it is considered that excavation of the overburden native soils at the site can be carried out using a conventional backhoe excavator. The contractor should include provisions in their contract for removing construction rubble within the existing building footprints, where appropriate, as well as in the existing fill within the entire site. The presence of cobbles and boulders should always be anticipated in the glacial till deposit, owing to their mode of deposition, as well as in the fill.

Using the estimated parameters of the degree of weathering, rock strength, joints, bedding spacing, and diggability index rating developed by Scoble and Muftuoglu (2001), it is anticipated that the rock materials, their ease of digging and typical construction equipment should conform to the following **Table 2**:

Table 2: Excavatability of Soil

Stratigraphic Unit	Class	Ease of Digging	Typical Plant Fitted with Rock Teeth and Ripper which may be used Without Blasting
Weathered shale	III	Moderately	Hydraulic shovel, e.g., CAT 245
Unweathered shale	IV	Difficult	Hydraulic shovel, e.g., CAT 245
Limestone	V	Very Difficult	Hydraulic shovel, e.g., Hitachi EX 1200-5

It is assumed that the excavations for the building and utilities will be within a depth range from 3 to 10 m below the existing ground level. Groundwater is generally reported at a depth of approximately 2.53 to 3.54 m below ground level with a reading of 7.2 m depth recorded in borehole BH6. However, the water encountered was likely perched water condition. Georgian Bay Shale Formation is recognized to be very fractured and includes occasional thin layers of limestone interbeds. Therefore, seepage through fractures is likely. Seepage will likely be controlled by the use of conventional pumping from collection sumps and ditches. However, if there is a source of water nearby, greater amounts of seepage can occur.

It is important to note that the above discussion about the excavation is for information purposes only. Contractor bidding on the projects must make their own assessment based on the real site conditions.

It is assumed that the groundwater will be lowered to not less than 0.8 m below the required excavation depth to enable the construction to be carried out in the ‘dry’ condition. It is expected that the ‘perched water’ can be controlled by the conventional ‘sump and pump’ methodology.

The project hydrogeologist and dewatering specialist should be consulted for dewatering purposes.

5.8 CONSTRUCTION DEWATERING

The construction dewatering requirements should refer to the project hydrogeology study.

5.9 SOIL/SHALE REUSABILITY AND DISPOSAL

On-site excavated overburden soils, either fill or native, may consist of a significant proportion of silt particles. The silty soil is generally poor in its workability. The Contractor should plan appropriately with their construction methodology as well as equipment in the fill placement if silty soils are reused.

It is recommended, that the soil to be excavated should be tested for compliance with prevailing Ministry of Environment Conservation and Parks (MECP) regulations for off-site disposal, which is beyond scope of work of this study.

5.10 ENGINEERED FILL

On-site excavated environmentally clean (acceptable for site reuse) inorganic earth (native and/or fill) may selectively be reused as engineered fill material, provided that the moisture contents are strictly controlled. Reuse of excavated shale bedrock for site grading purposes may be considered. The application must be brought to this office for review of the feasibility and to establish the applicable specifications.

If imported inorganic mineral soils are used for engineered fill construction, they must meet the applicable environmental guidelines, and their moisture contents should be sufficiently close to their respective optimum water content values.

The soil should be placed in thin lifts and suitable compaction equipment should be employed, to achieve the specified degree of field density. However, vibrations due to compaction may need to be reduced or curtailed to prevent damage to the existing structures and public right of way.

Consideration may also be given to backfilling excavations with well-graded, compacted granular soil such as Granular B as it, if thoroughly compacted, would reduce the post-construction settlements to an acceptable level and may also expedite the compaction process.

Fill materials required for replacing locally softened soils or raising grades within the footprint of the structures and paved areas are to comprise suitably organic-free materials approved for use by the Geotechnical Engineer. Fill materials are to be placed in lifts of a maximum thickness of 300 mm and compacted, using appropriate compaction equipment, to at least 98 % of its SPMDD for floor slab construction to within 0.6 m below the underside of the slab and to 100% above this level. For engineered fill and for supporting foundations, the recommended degree of compaction is 100%.

Fills located under paved areas should be compacted to at least 95 % of the material's SPMDD below 1.0 m of the subgrade level, and then to at least 98 % of its SPMDD up to the required subgrade. Imported granular fill used in confined areas should be compacted using hand-held compaction equipment only.

It should be pointed out that the existing sandy silt to silty sand fill can be expected to be difficult to handle and contact and may need to be wasted or used in landscaping areas only. This should be taken into consideration in planning.

Sola recommends that any and all engineered subgrades beneath proposed structures, including pavements, be inspected and proof-rolled prior to construction.

5.11 EARTH PRESSURES

The recommendations in this subsection may be ignored if the construction can be carried out using open-cut techniques.

If the proposed buildings will take up a large portion of the property, it may be expected that shoring is required to facilitate the construction of the proposed buildings. It should be noted that, if shoring is required, a specialist shoring contractor should be consulted to establish the most appropriate design and seating depths for the construction shoring solution.

The shoring system may be designed in accordance with the Canadian Foundation Engineering Manual (CFEM), the 4th Edition. Though not a design code, the CFEM design manual provides a comprehensive guide for shoring and anchor design and is still considered the most widely used and accepted design approach in the Greater Toronto Area (herein "GTA").

Shoring subject to unbalanced earth pressures must be designed to resist a pressure distribution that can be calculated as follows:

$$p = K [\gamma (h-hw) + \gamma' hw + q] + \gamma whw$$

where:
- p = Lateral earth pressure in kPa acting at depth h
- K = parameters are provided below
- h = the depth below the ground surface (m)
- hw = the depth below the groundwater level (m)
- γ = the bulk unit weight of soil, (kN/m3) use 20.0
- γ' = the submerged unit weight of the exterior soil, (γ - 9.8 kN/m3)
- q = equivalent value of surcharge on the ground surface in kPa (min 12 kPa)

Where the backfill against the buried structure can be drained effectively to eliminate hydrostatic pressures on the wall, this equation can be simplified to:

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

The soil parameters estimated to be applicable for this design are as follows in **Table 3**:

Table 3: Soil Parameters for Shoring

Material	Effective Friction Angle ϕ' (deg)	Unit Weight γ (kN/m3)	Coeff. Of Active Earth Pressure, Ka	Coeff. Of Passive Earth Pressure, Kp	Coeff. Of At-rest Earth Pressure, Ko
OPSS Granular A or B	34	22	0.28	3.6	0.44
Fill	28	19	0.37	2.7	0.53
Native	31	20.5	0.32	3.2	0.48

For a global stability check:

ϕ = 30°
γ = 20 kN/m^3

Wall friction should be considered negligible.

The design groundwater table and the long-term groundwater level should be determined by the project hydrogeologist.

The surcharge needs should be determined by the Structural Engineer but should not be less than 12 kPa.

The design calculations should be submitted to Sola for geotechnical review.

The movement of the shoring system is considered inevitable. The magnitude of this movement can be controlled by sound construction practices, and it is anticipated that the horizontal movement will be in the range of 0.1 % H to 0.25 % H. Vertical movements increase the horizontal movements because of the reduced stress in the inclined anchors. For this reason, the shoring design must be carried out to minimize the vertical movement of the shoring system.

To ensure that movements of the shoring are within an acceptable range, monitoring must be undertaken throughout the site development process. Vertical and horizontal targets must be located and surveyed before excavation begins. Weekly readings during excavation should show that the movements will be within those predicted; if not, the monitoring results should enable directions to be given to improve the shoring.

5.12 PAVEMENT

Pavement structures adjoining the proposed construction areas should be protected from damage resulting from construction activities. All heavy vehicles should be appropriately planned and re-routed to avoid such damage.

The pavement should be neatly saw-cut along the construction boundary. Any pavement repair and reinstatement should match the existing (neighbouring) pavement courses.

5.12.1 Pavement Thickness Design

After stripping of unsuitable materials, i.e., organics, new pavement can be supported by the existing fill soils (re-compacted as required under Sola's supervision) and/or engineered fill.

It is anticipated that the final subgrade will comprise predominantly on-site improved fill (by proof-rolling and surface compaction). Accordingly, given the frost susceptibility and drainage characteristics of the final subgrade soils, the following pavement designs presented in **Table 4** are recommended based on the City of Toronto Pavement Structural Design Matrix. It is assumed that there will be only occasional delivery truck travels allowed for medium-duty areas. In the areas where haul routes are expected, a heavy-duty pavement design should be implemented.

Table 4: Recommended Pavement Design (New Construction)

PAVEMENT LAYER	LAYER THICKNESSES (MM)		COMPACTION REQUIREMENTS
	MEDIUM DUTY (PASSENGER CARS)	HEAVY DUTY (DRIVEWAYS, FIRE ROUTES, ETC.)	
Asphaltic Concrete Surface Course (SP 12.5B)	40	40	Minimum of 92.0% of Maximum Relative Density (MRD)
Asphaltic Concrete Binder Course (SP 19.0B)	60	80	Minimum of 91.0% of Maximum Relative Density (MRD)
Granular Base (Granular A)	150	150	100% SPMDD
Granular Sub-Base (Granular B-Type II)	200	250	

It is recommended that the thickness of granular sub-base courses given in **Table 4** be increased by 50 mm.

The recommended granular base and sub-base materials shall meet the City of Toronto Specification for Aggregates TS1010. The granular base and subbase should be compacted to at least 100% of their SPMDD.

The asphaltic concrete courses are to be hot-mixed and hot-laid in accordance with the current City of Toronto specifications, Forms TS310 and TS1101 (Ontario PGAC grades PG 58-28 equivalency) and compacted to a minimum of 92% of Maximum Relative Density (MRD) for the surface course and a minimum of 91% of MRD for the binder course.

The pavement design as presented above in **Table 4** is based on the assumption that construction will be undertaken under dry weather conditions and that the subgrade is stable and not heaving under construction equipment traffic. However, if the construction conditions are non-ideal, with the final subgrade being wet and/or unstable, additional imported subbase material may become necessary.

Prior to placing the granular subbase, the final subgrade should be proof rolled to identify soft spots, if any, and rectified as required in consultation with a Geotechnical Engineer.

The recommended pavement structure should be considered for preliminary design purposes only. The functional design life of ten (10) to twelve (12) years has been used to establish pavement recommendations. This represents the number of years to the first rehabilitation, assuming regular maintenance is carried out.

If required, a more refined pavement structure can be designed based on specific traffic data and design life requirements. Such further analysis will also involve specific laboratory tests to determine frost susceptibility and strength characteristics of the subgrade soils, as well as specific traffic loading data input from the Client.

Pavement Drainage: The ability of the soils to provide adequate subgrade support is reduced if allowed to become too wet. Therefore, in order to intercept infiltrating water and provide drainage of the subgrade and pavement material, it is recommended that 100 mm diameter sub-drains, wrapped in filter cloth, be provided along both sides of the driveways; in addition, similar sub-drains should be installed in four (4) directions from the catch basins and at strategic locations under the parking lot pavement. Furthermore, the subgrade should be graded to promote the flow of water toward the sub-drains. In the cases where the sub-drains connecting to the municipal sewer system are not preferred, the pavement profile should be adjusted to direct any runoff flow of water to an on-site stormwater management system, i.e., infiltration gallery.

5.12.2 Pavement Construction Considerations

For pavement construction, the subgrade must be compacted to not less than 98% SPMDD for at least the upper 300 mm unless an alternative is approved by Sola.

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure uniform subgrade moisture and density conditions are achieved.

Additional comments on the construction of pavement areas are as follows:

- The subgrade preparation should include stripping of any objectionable materials, e.g., loose fill with organics. The base should be properly shaped and thoroughly proof rolled using a loaded truck. Soft and/or unstable subgrade areas should be further sub-excavated and backfilled to the design subgrade level using an approved material, placed in thin lifts, and compacted to not less than 98% of its SPMDD;
- The locations and extent of sub-drainage required within the paved areas should be reviewed by this office in conjunction with the proposed grading. Assuming that satisfactory cross falls in the order of 3.0% have been provided, sub-drains extending from and between catch basins may be satisfactory. In the event that flatter cross falls are considered, a more extensive system of sub-drainage may be necessary and should be reviewed by Sola; and,
- The most severe loading conditions on the pavement areas and subgrade may occur during construction. Consequently, special provisions such as restricted access routes, half-loads during paving, etc., may be required, especially if construction is carried out during unfavourable weather.

It is recommended that Sola be retained to review the final pavement structure designs and drainage plans prior to construction to ensure that they are consistent with the recommendations in this report.

5.13 Service Installation Considerations (where applicable)

5.13.1 General

The native materials found in the boreholes generally consist of sufficiently competent soils in their undisturbed state and can be considered suitable for pipe support. In general, the site materials are suitable for pipeline support. Localized loose/soft subgrade conditions, if encountered during construction, should be sub-excavated to a depth of at least 300 mm or a firm base, if shallower, and backfilled with clean, compactable materials and stabilized as per the project specifications.

Where the invert falls within the existing fills, these may need to be removed and replaced with engineered fill as directed by the geotechnical engineer.

Prior to the placement of bedding, the exposed subgrade at the bottom of each servicing trench excavation should be inspected by a Geotechnical Engineer to identify any soft, loose, or disturbed base conditions. All disturbed soils resulting from construction activities should be removed and replaced as noted above.

Design and construction considerations for both flexible (PVC) and rigid (concrete) pipes are included in the following sections.

5.13.2 Excavations and Health and Safety Considerations

The same recommendations as given in **Section 5.7** will generally apply to the excavations for laying the underground services. The excavated soils should be placed not closer than the depth of the trenches from the trench edge.

5.13.3 Bedding

The native subgrade in an undisturbed state will provide adequate support for the proposed service pipes and will allow the use of normal Class B-type bedding. Where the invert falls within the existing fill materials, the fill should be removed from the surface of native soil and replaced with engineered fill. Alternatively, an increased thickness of bedding can be used as directed by the geotechnical engineer. The bedding should conform to the current Ontario Provincial Standard Specifications (OPSS 1010) and/or the City of Toronto standards for bedding stone gradation requirements. The pipes should be placed with a minimum bedding thickness in conformance with Ontario Provincial Standard Drawing OPSD 802.010 (for flexible pipes), though the bedding thickness will be subject to variation and ultimately be based on the proposed pipe diameter, bedding specifications used, etc.

For service trenches extending into bedrock, allowance must be made for possible horizontal expansion of the vertical or near vertical face of the bedrock, especially in excavation's deeper sections (i.e., more than 5.0 m below existing ground surface). Proper design must be made for this purpose; otherwise service pipes may be damaged in the long run as well, bedding on the bedrock surface must be in accordance with the proper specifications on bedrock. We will be pleased to discuss these aspects with you, if required.

On completion of the servicing pipe installation, a granular surround of the same bedding material should be placed around the pipe to cover it to at least 300 mm above the pipe obvert.

The backfill above the bedding and cover materials may consist of a clean, compactable fill that possesses similar properties to the existing subgrade soil. Based on the borehole data it is anticipated that the local soil material may be reused as trench backfill. Some moisture conditioning of the soil may be required to facilitate soil compaction. The silty sand and sandy silt fill, however, can be expected to be difficult to handle and compact (as these will dilate in the presence of water) and may be difficult to reuse, especially in the presence of the narrow confines of service trenches. If imported soil is used as a trench backfill, it must be ensured that the drainage properties of the subgrade are maintained and that there is no differential frost movement. Trench backfills should be compacted to at least 95% of the material's SPMDD, or the City of Toronto standards, whichever is more stringent.

5.13.4 Trench Backfill

Backfilling During Dry-Weather Conditions

The excavated fill and overburden soils, if environmentally suitable and approved by the Geotechnical personnel at the time of construction, are considered suitable for re-use as fill to backfill service trenches, provided that suitable compaction equipment can be used to compact the fill material. The use of heavy compactors in the narrow-confined service trenches may not be feasible. In confined areas, consideration may also be given to backfilling the areas with a well-graded, compacted granular soil such as Granular 'B' material. As such material, if thoroughly compacted, would reduce the post-construction settlements to an acceptable level and may also expedite the compaction process. However, proper tapering should be provided to prevent differential frost heave of the paved surface. As mentioned before, excavated bedrock should not be used, unless special precautions are taken which will unlikely be cost effective.

Each lift should be no greater than 300 mm thick and compacted using an appropriate heavy compaction machine to at least 95 % of the material's SPMDD to within 1 m of the top of the subgrade, and then to 98 % SPMDD up to the required grade.

Exposed, excavated soil stockpiles that are to be reused as fill on-site should be compacted at the surface or temporarily covered during wet weather to help maintain their original moisture content. Such stockpiles are prone to wet weather exposure and, as such, the increased moisture contents will make these materials too wet to achieve the required levels of compaction.

Conversely, if the excavated native soils are too dry to achieve the required levels of compaction, some moisture addition/conditioning by means of water hosing or misting should be expected.

We recommend the subgrade be observed and approved by a Geotechnical Engineer prior to the placement of the bedding material to confirm that the subgrade conditions are consistent with the recommendations given in this report. Where unsuitable subgrade conditions are observed, remedial procedures can be established in the field to avoid construction delays.

Backfilling During Winter Months

Should this project proceed during the winter months or when the ambient temperatures are below freezing, the following additional recommendations will apply in order to avoid any detrimental effects of frost.

In this situation, it is imperative that the excavation and backfilling operations follow simultaneously. This procedure is required to avoid time gaps between the two construction stages, as prolonged exposure to frost may lead to the inclusion of frozen material during backfilling. It is recommended that prior to resuming backfilling over the frozen surface, all frost should be removed to achieve a satisfactory bond between the current and previously laid fills. Also, this procedure would prevent leaving frozen layers of soil which could cause long-term settlements while undergoing slow thawing.

It is further recommended that any accumulation of water or ice in the small Sheepsfoot footprint overnight or on weekends should be prevented by adequately shaping up and back blading the compacted grades prior to leaving the site.

In order to ensure that no frozen material is being backfilled in the trenches, it is recommended that the backfilling and compaction operations should be supervised and closely monitored by Sola on a continuous basis.

For the construction of the road/driveway, the final subgrade should be prepared during 'dry weather' conditions so as to achieve a satisfactory end product.

5.14 CONSTRUCTION CONSIDERATIONS

Load-bearing soils are susceptible to disturbance from environmental factors (temperature, moisture change, etc.) and construction activity. Therefore, due care should be given to minimizing the trafficking of such areas during periods of excavation and the construction of the floor slab and footings to minimize the disturbance of the bearing soils.

Any excessive disturbances of the load-bearing and underlying soils affected during construction works could influence the long-term settlement of the structures and will therefore require further excavation and replacement of such impacted soils with suitable engineered fill. Bedrock surfaces may deteriorate with exposure to elements as discussed before.

During winter seasons, foundations and slab-on-grade construction should be carried out to avoid pouring concrete on frozen soil. Foundations must be adequately protected at all times from cold weather and freezing conditions.

A Geotechnical Engineer should evaluate all subgrade surfaces to confirm that the subgrade and founding conditions are consistent with the recommendations given by this report.

6.0 MATERIAL TESTING AND INSPECTION

It is recommended that Sola be appointed to carry out field inspection and materials testing during construction to ensure that the construction complies with the design recommendations.

7.0 DRAWING REVIEW

Once the final design drawings for this project are prepared, it is recommended that one (1) set of the drawings should be submitted to Sola for review and to make any amendments to our recommendations that may be required, prior to starting construction.

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

The comments given in this report are preliminary and intended only for the guidance of design engineers. Contractors bidding on or undertaking the works should make their own interpretations of the factual borehole results, so that they may draw their own conclusions on how the subsurface conditions may affect them.

The information in this report in no way reflects on the environmental aspects of soil conditions at the site and has not been addressed in this report, since this aspect was beyond the scope and terms of reference.

8.0 CLOSURE

This report is subject to the *Statement of Limitations* which forms an integral part of this document. The Statement of Limitations is not intended to reduce the level of responsibility accepted by Sola, but rather to ensure that all parties who have been given reliance for this report are aware of the responsibilities each assumes in so doing.

We trust that this report meets your needs. Should you have any queries, please contact the Sola office.

Sincerely,
SOLA ENGINEERING INC.

LICENSED PROFESSIONAL ENGINEER
Bill Feng
B. FENG
100050651
Dec. 2, 2024
PROVINCE OF ONTARIO

Clement Chan
EIT

Bill Feng P. Eng.
Chief Engineer

Y:\PROJECTS\11240-(3464)-1370443 Ontario Limited co RSM Canada-GEO-QWE and 427 Development-The Queensway and Fordhouse Blvd-Etobicoke-Sept\GEO\08 Draft Reports\2023-18799R-11240-S0667-GEO-FINAL.docx

Enclosures

STATEMENT OF LIMITATIONS

Standard of Care and Basis of this Report
Sola Engineering Inc. ("Sola Engineering") has prepared this report in a manner consistent with generally accepted engineering and/or environmental practices in the jurisdiction in which the specified services were provided. The information and conclusions set out in this report reflects Sola Engineering's best professional judgment in light of the information available to Sola Engineering at the time of preparation. Sola Engineering disclaims any and all warranties, express or implied, including without limitation any warranty of merchantability and/or fitness for a particular purpose, and makes no representations concerning the legal effect, interpretation or significance of this report or the information, conclusions or recommendations contained in it.

The conclusions and recommendations provided in this report have been prepared in relation to the specified site (the "Site") and the proposed project (the "Project"), as described by the Client to Sola Engineering. Given the nature of the work undertaken by Sola Engineering as part of this report, the Client acknowledges that ground conditions may vary over distances and may change over time. Should there arise any changes to the conditions of the Site or the Project (as to purpose or design), Sola Engineering is to be notified within a reasonable period of time, and in any event within 24 hours of the Client's learning of such changes, so as to give Sola Engineering an opportunity to review and revise this report in light of such changes. Sola Engineering accepts no liability or responsibility for any use of this report or reliance on this report following any changes to the conditions of the Site or the Project.

The scope of professional services provided by Sola Engineering for the Project are as set out in this report. Should such services be limited to those of a geotechnical nature, Sola Engineering shall not be held liable or responsible for any environmental services that may be required, nor shall this report be interpreted to reflect any environmental aspects of the Project. Alternatively, should such services be limited to those of an environmental nature, Sola Engineering shall not be held liable or responsible for any geotechnical services that may be required, nor shall this report be interpreted to reflect any geotechnical aspects of the Project.

This report is not intended to provide recommendations for possible future conditions or use of the Site or adjoining properties. Should the need arise for such recommendations Sola Engineering may need to conduct further investigations.

Use of this Report
This report is intended to be read and used in its entirety. No reliance may be made upon any individual portion or section of this report without reference to the entire report as a whole. In preparing this report, Sola Engineering has relied on information, instructions and communications given by the Client to Sola Engineering, the applicability, truth and accuracy of which is the sole responsibility of the Client.

This report with the information, sampling data, analysis, conclusions and recommendations contained in it (if any), has been prepared for and may only be used by the Client and only for the specific purpose as specified by the Client to Sola Engineering in connection with the Project. Without prior written consent from Sola Engineering, use of this report or any portion thereof by any person or entity other than the Client, or for any purpose other than as communicated by the Client to Sola Engineering, is strictly prohibited. Sola Engineering accepts no liability or responsibility for the unauthorized use of this report. This report and all documents that form part of it are the sole property of Sola Engineering. Sola Engineering relies on and retains any and all intellectual property rights it has in this report, including any copyright to which it is entitled. The Client shall not give, lend or sell this report, or any portion thereof, to any entity, person or association without the express prior written consent of Sola Engineering. This report and the information contained herein shall be treated as strictly confidential.

The contents of this report, inclusive of Sola Engineering's conclusions and recommendations in relation to the Project, are intended only for the guidance of the Client in carrying out the specified services for the Project, as described by the Client to Sola Engineering. Accordingly, Sola Engineering does not accept any liability or responsibility for any inaccuracy contained in this report arising as a result of or in any way connected with any exclusion, oversight or falsification of the information provided to Sola Engineering by the Client. This report, including the effect of the subsurface conditions as described in this report, is to be interpreted at the risk and discretion of the Client and any contractors or others bidding on or undertaking contractual work to be performed as part of the Project who may come into possession of or learn of this report or its contents. It is exigent that all contractors bidding or undertaking the work are to rely on their own interpretations of the data contained in this report in addition to their own investigations and conclusions. Sola Engineering shall not be held liable or responsible for any interpretation of or conclusions that may be drawn from the data or information contained in this report.

The information, recommendations and conclusions presented in this report are based on Sola Engineering's interpretation of conditions revealed through the limited investigation conducted within a defined scope of services. In no event will Sola Engineering be held responsible or liable to the Client or any other person or entity for any special, indirect, incidental, punitive or consequential loss or damage (including, loss of use, lost profits or expenses incurred) resulting from or in any way related to the independent interpretations, interpolations, conclusions or decisions of the Client or any other person or entity, based on the information contained in this report. The restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

Notwithstanding the exclusions of liability contained herein but without in any way limiting their effect or generality, if there is found to be any finding of liability or responsibility whatsoever on the part of Sola Engineering which in any way relates to or arises from this report, or the information, conclusions or recommendations contained in it, such liability and/or responsibility shall cease and forever be extinguished from and after the date which is two (2) years from the date of this report. In no event shall any liability or responsibility of Sola Engineering exceed the fees charged by Sola Engineering to the Client for the preparation of this report (excluding any arms' length disbursements or expenditures made or incurred by Sola Engineering as a result thereof and reimbursed by the Client).

Site Conditions
The material conditions, classifications, conclusions and recommendations contained in this report were based on the site conditions observed or tested by Sola Engineering or otherwise communicated to Sola Engineering by the Client. The description, identification and classification of soils, rocks, chemical contamination and other materials have been made based on limited investigations, sampling and testing of materials performed by Sola Engineering and its qualified representatives in reliance on the use of relevant or applicable equipment, all in accordance with commonly acceptable standards in the geotechnical and/or environmental disciplines. Accordingly, this report may include assumptions of conditions which are based on discrete sample locations and thus some conditions may not have been detected. The Client accepts all liability and risk for the use of this report and the information and data contained in it. Sola Engineering shall not be held liable or responsible for any conditions beyond the scope of tests conducted on samples of the subsurface and soil conditions of the subject property as set out in this report.

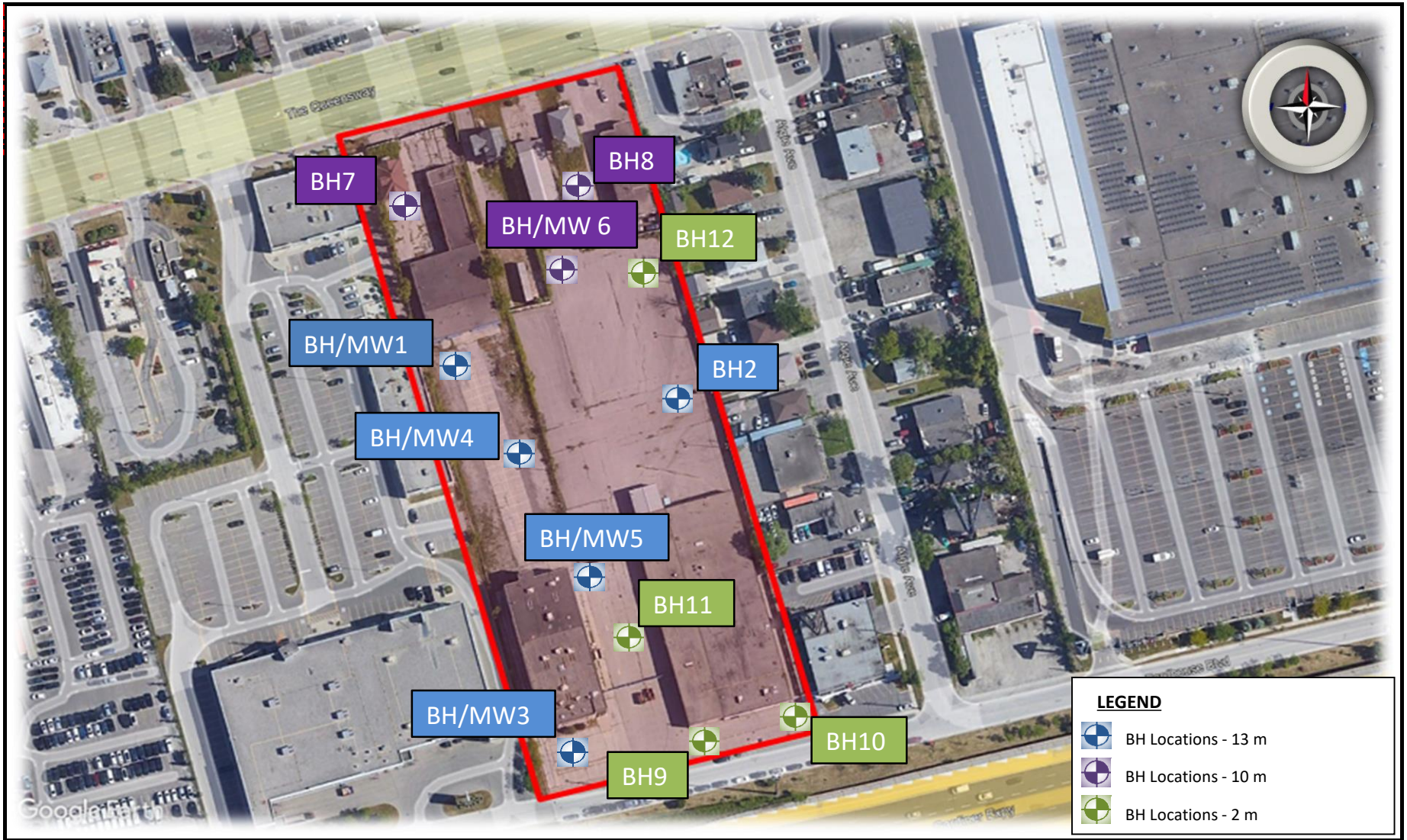
For clarity, the Client acknowledges and accepts that unique risks exist whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive sampling and testing program may fail to detect certain conditions. The environmental, geological, geotechnical, geochemical and hydrogeological conditions that Sola Engineering interprets to exist between sampling points may differ from those that actually exist. As a result, the Client acknowledges and accepts that because of the inherent uncertainties in subsurface evaluations, unanticipated underground conditions may occur or become known subsequent to Sola Engineering's investigation that could affect conclusions, recommendations, total Project cost and/or execution.

Indemnification of Risk
Though Sola Engineering adheres to the highest degree of integrity and employs due diligence in limiting the potential release of toxins and hazardous substances, the risk of accidental release of such substances is a possibility when providing geotechnical and environmental services.

In consideration of the provision of services by Sola Engineering, the Client agrees to defend, indemnify and hold Sola Engineering and its employees and agents harmless from and against any and all claims, liabilities, damages, causes of action, judgments, costs or expenses (including reasonable legal fees and disbursements), resulting from or arising by reason of the death or bodily injury to persons, damage to property, or other loss, whether related to an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project or otherwise, and whether or not resulting from Sola Engineering's negligent actions or omissions. This indemnification shall include and extend to any and all third party claims brought or threatened against Sola Engineering under any federal or provincial law or statute as a result of Sola Engineering conducting work on the Project. In addition to and notwithstanding the foregoing, the Client further agrees to unconditionally and irrevocably release Sola Engineering from, and not to bring any claims against Sola Engineering in connection with, any of the aforementioned claims or causes.

Subconsultants and Contractor Services
In conjunction with the services provided by Sola Engineering's own employees, external services provided by other persons or entities that are specializing in services other than those offered by Sola Engineering, such as drilling, excavation and laboratory testing, are often employed in order to carry out the defined scope of work. If such external services have been employed for this Project, the Client acknowledges that Sola Engineering is not in any way liable or responsible for any costs, claims or damages in relation to the services rendered by such other persons or entities or payment therefor, nor shall Sola Engineering be liable or responsible for damages for errors, omissions or negligence caused by such other persons or entities while providing such external services.

Work and Job Site Safety
Sola Engineering shall be responsible only for its activities and that of its employees on the Site. Sola Engineering shall not direct any of the fieldwork nor the work of any other person or entity on the Project. The presence of Sola Engineering staff on the Site does not relieve the Client or any contractor on the Site from their responsibilities pertaining to site safety. The Client at all times retains any and all responsibility for the safety of those individuals present on the Site and/or working on the Project, including Sola Engineering's employees.



SOLA ENGINEERING	Project No: 11240-S0667-GEO	**BH Location Plan**	The figure provided is for the intended purpose of presenting the approximate borehole locations. This figure should not be used for any other purposes including construction, architecture or for accuracy of dimensions and orientation of objects.	Enclosure No.: **1**
	Report Number: 2023-18799	**Proposed Residential Development The Queensway and Fordhouse Boulevard, Etobicoke, Ontario**		
	Date: September 18 , 2023	**1370443 Ontario Limited**		Not to Scale

SOLA ENGINEERING

ENCLOSURE No. 2

RECORD OF BOREHOLE No. BH1 1 OF 2 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.11 - 2023.09.12 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt										
0.1	ASPHALTIC CONCRETE - 75 mm thick										
	GRANULAR BASE/SUBBASE (sand and gravel) - 685 mm thick		1	SS	15				○		
0.8	FILL - clayey silt, trace gravel, brown, moist		2	SS	12				○		
			3	SS	17				○		
2.3	CLAYEY SILT TILL- brown, compact , moist		4	SS	32				○		
3.0	SHALE - completely weathered, gray		5	SS	99/ 23 cm				○		
			6	AS					○		
			7	AS					○		
			8	AS					○		
	- some clay		9	SS	50/ 8 cm				○		

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 2

RECORD OF BOREHOLE No. BH1 2 OF 2 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.11 - 2023.09.12 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SHALE - completely weathered, gray *(continued)*										
			10	SS	50/ 5 cm						
13.0	End of Borehole at the Targeted Depth; Borehole was Open and Water at 2.5 m Below Existing Ground Surface Upon Completion of Drilling Period.										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 3

RECORD OF BOREHOLE No. BH2 1 OF 1 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.13 - 2023.09.13 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt										
0.1	ASPHALTIC CONCRETE - 85 mm thick										
	GRANULAR BASE/SUBBASE (sand and gravel) - 530 mm thick		1A	SS	34				○		
0.6			1B								
0.8	FILL - clayey silt, trace gravel, brown, moist		2	SS	27				○		
	FILL - sandy silt, trace gravel, trace sand, oxidation, brown, moist										
1.5	SILT - containing shale fragments, brown, dense to very dense, moist		3	SS	41				○		
			4	SS	50/ 13 cm				○		
3.0	SHALE - completely weathered, gray		5	SS	89/ 23 cm				○		
			6	SS	50/ 10 cm				○		
			7	SS	50/ 5 cm				○		
6.1	Start of rock coring;										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ROCK CORE LOG

PROJECT NO.: 11240

PROJECT: QEW + 427 Development
LOCATION: The Queensway and Fordhpuse
ELEVATION: _____ DATUM: _____

CORING NO.: **BH2**

CONTRACTOR: _____ DRILL TYPE: _____
DATE STARTED: 13/09/2023 AT: _____ DATE FINISH: 13/09/2023 AT: _____
ORIENTATION: VERTICAL: ☐ INCLINED: ☐ BEARING: _____
COORDS. N: _____ E: _____ LOGGER: HH

DEPTH	ROCK TYPE	DESCRIPTION	CORE RUN AND RECOVERY	DISCONTINUITIES: RQD (PERCENT) 0 25 50 75 100	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DEFECT DESCRIPTION	WEATHERING: FR SW MW HW XW	REMARKS
7.2	SHALE	moderate to slightly weathered, grey, moderately weak in strength, intense to moderately fractured, TCR: 97% RQD: 85%	1.524/ 1.575 =97%					
8.4	SHALE	TCR: 100% RQD: 76%	1.473/ 1.473 =100%					
9.2	SHALE	moderate to slightly weathered, grey, moderately weak in strength, moderate to slightly fractured,						
10.8	SHALE	moderate to slightly weathered, grey, moderately weak in strength, moderately fractured, - 75 mm limestone layer at 10.8 m - 50 mm limestone layer at 11.2 m TCR: 100% RQD: 80%	1.524/ 1.524 =100%					
11.6		moderately weathered, grey, moderately weak in strength, intensely fractured, - 75 mm limestone layer at	1.524/ 1.524 =100%					

ROCK CORE LOG

PROJECT NO.: 11240

PROJECT: QEW + 427 Development
LOCATION: The Queensway and Fordhpuse
ELEVATION: _____ DATUM: _____

CORING NO.: **BH2**

CONTRACTOR: _____ DRILL TYPE: _____
DATE STARTED: 13/09/2023 AT: _____ DATE FINISH: 13/09/2023 AT: _____
ORIENTATION: VERTICAL: ☐ INCLINED: ☐ BEARING: _____
COORDS. N: _____ E: _____ LOGGER: HH

DEPTH	ROCK TYPE	DESCRIPTION	CORE RUN AND RECOVERY	DISCONTINUITIES: RQD (PERCENT) 0 25 50 75 100	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DEFECT DESCRIPTION	WEATHERING: FR SW MW HW XW	REMARKS
12	SHALE	11.4 m - 100 mm limestone layer at 12.1 m - 75 mm limestone layer at 12.4 m TCR: 100% RQD: 18%						
12.4								
12.8								
		End of Rock Core at the Targeted Depth of 12.9 m Below Ground Surface						
13.2								
13.6								
14								
14.4								
14.8								
15.2								
15.6								
16								
16.4								
16.8								

SOLA ENGINEERING

ENCLOSURE No. 4

RECORD OF BOREHOLE No. BH3 1 OF 1 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.12 - 2023.09.12 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt										
0.1	ASPHALTIC CONCRETE - 85 mm thick GRANULAR BASE/SUBBASE (sand and gravel) - 650 mm thick		1	SS	14				○		
0.8	FILL - silty sand, trace gravel, trace organic, brown, moist		2	SS	6						
1.5	CLAYEY SLIT TILL- trace gravel, grey to brown, oxidation, compact , moist		3	SS	24				○		
2.2	SILT TILL - containing shale fragments, grey, dense, moist		4	SS	49				○		
3.0	SHALE - completely weathered, gray		5	SS	50/ 5 cm				○		
			6	SS	50/ 8 cm				○		
6.0	Start of rock coring;										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ROCK CORE LOG

PROJECT NO.: 11240

PROJECT: QEW + 427 Development
LOCATION: The Queensway and Fordhpuse
ELEVATION: _____ DATUM: _____

CORING NO.: **BH3**

CONTRACTOR: _____ DRILL TYPE: _____
DATE STARTED: 12/09/2023 AT: _____ DATE FINISH: 12/09/2023 AT: _____
ORIENTATION: VERTICAL: ☐ INCLINED: ☐ BEARING: _____
COORDS. N: _____ E: _____ LOGGER: _____

DEPTH	ROCK TYPE	DESCRIPTION	CORE RUN AND RECOVERY	DISCONTINUITIES: RQD (PERCENT) 0 25 50 75 100	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DEFECT DESCRIPTION	WEATHERING: FR SW MW HW XW	REMARKS
6.4	SHALE	GEORGIAN BAY FORMATION - intensely weathered, grey, weak in strength, very intensely fractured TCR:60% RQD:0%	0.635/ 1.067 =60%					
6.8	SHALE	TCR:95% RQD:20%	1.473/ 1.549 =95%					
7.2	SHALE	-intense to moderately weathered, grey, moderately weak in strength, intnesly fractured						
7.6	SHALE							
8	SHALE							
8.4	SHALE	-moderately to slightly weathered, grey, moderately weak in strength, intensely fractured TCR=97% RQD=47%	1.473/ 1.524 =97%					
8.8	SHALE							
9.2	SHALE							
9.6	SHALE							
10	SHALE	TCR:98% RQD:27%	1.475/ 1.524 =97%					
10.4	SHALE							
10.8	SHALE							

ROCK CORE LOG

PROJECT NO.: 11240

PROJECT: QEW + 427 Development
LOCATION: The Queensway and Fordhpuse
ELEVATION: _____ DATUM: _____

CORING NO.: **BH3**

CONTRACTOR: _____ DRILL TYPE: _____
DATE STARTED: 12/09/2023 AT: _____ DATE FINISH: 12/09/2023 AT: _____
ORIENTATION: VERTICAL: ☐ INCLINED: ☐ BEARING: _____
COORDS. N: _____ E: _____ LOGGER: _____

DEPTH	ROCK TYPE	DESCRIPTION	CORE RUN AND RECOVERY	DISCONTINUITIES: RQD (PERCENT) 0 25 50 75 100	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DEFECT DESCRIPTION	WEATHERING: FR SW MW HW XW	REMARKS
11.2								
11.6		- 70 mm limestone layer at 11.8 m TCR:95% RQD:30%	1.45/ 1.524 =95%					
12	SHALE							
12.4								
12.8								
		End of Rock Core at the Targeted Depth of 12.9 m Below Ground Surface						
13.2								
13.6								
14								
14.4								
14.8								
15.2								
15.6								

SOLA ENGINEERING

ENCLOSURE No. 5

RECORD OF BOREHOLE No. BH4A 1 OF 2 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.11 - 2023.09.11 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt								
0.1	ASPHALTIC CONCRETE - 85 mm thick								
	GRANULAR BASE/SUBBASE (sand and gravel) - 530 mm thick		1A	SS	11				
0.6			1B						
0.8	FILL - clayey silt, trace gravel, trace sand, trace organic, brown, moist		2	SS	14				
	FILL - sandy silt, trace gravel, brown, moist								
1.5	SILT TILL - brown, dense, moist		3	SS	40				
2.3	SHALE - completely weathered, gray		4	SS	86/ 25 cm				
			5	SS	50/ 5 cm				
			6	AS					
			7	SS	50/ 8 cm				
			8	AS					
			9	SS	50/ 13 cm				

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

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

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%) (20 40 60)

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 5

RECORD OF BOREHOLE No. BH4A 2 OF 2 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.11 - 2023.09.11 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SHALE - completely weathered, gray *(continued)*		10	AS					○		
			11	SS	50/ 5 cm				○		
13.4	End of Borehole at the Targeted Depth; Borehole was Open and Water was at 11 m Below Existing Ground Surface Upon Completion of Drilling Period.										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 5

RECORD OF BOREHOLE No. BH4B 1 OF 1 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.11 - 2023.09.11 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (20 40 60 80 100): ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt Direct Augur to 3.8 m for monitoring well installation										
3.8											

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 6

RECORD OF BOREHOLE No. BH5 1 OF 1 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.13 - 2023.09.13 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (20 40 60 80 100): ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt										
0.1	ASPHALTIC CONCRETE - 85 mm thick										
	GRANULAR BASE/SUBBASE (sand and gravel) - 430 mm thick		1A	SS	23						
0.5			1B								
0.8	FILL - silty sand, some clay, trace gravel, trace organic, dark brown, moist		2	SS	12						
	FILL - clayey silt, trace gravel, trace sand, brown, moist										
	- occasionally inferred cobbles and boulders		3	SS	34						
2.3	SILT - containing shale fragments, grey, dense, moist		4	SS	43						
3.0	SHALE - completely weathered, gray		5	SS	50/ 8 cm						
			6	SS	50/ 5 cm						
6.1	Start of rock coring		7	SS	50/ 5 cm						

+ 3, × 3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ROCK CORE LOG

PROJECT NO.: 11240

PROJECT: QEW + 427 Development
LOCATION: The Queensway and Fordhpuse
ELEVATION: _____ DATUM: _____

CORING NO.: **BH5**

CONTRACTOR: _____ DRILL TYPE: _____
DATE STARTED: 14/09/2023 AT: _____ DATE FINISH: 14/09/2023 AT: _____
ORIENTATION: VERTICAL: ☐ INCLINED: ☐ BEARING: _____
COORDS. N: _____ E: _____ LOGGER: _____

DEPTH	ROCK TYPE	DESCRIPTION	CORE RUN AND RECOVERY	DISCONTINUITIES: RQD (PERCENT) 0 25 50 75 100	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DEFECT DESCRIPTION	WEATHERING: FR SW MW HW XW	REMARKS
7.2	SHALE	GEORGIAN BAY FORMATION moderate to slightly weathered, grey, moderately weak in strength, moderately fractured, TCR: 94% RQD: 88%	1.425/ 1.524 =94%					
7.6								
8								
8.4								
8.8	SHALE	moderate to slightly weathered, grey, moderately weak in strength, intensely fractured, - 90 mm limestone layer at 9.2 m TCR: 98% RQD: 68%	1.475/ 1.499 =98%					
9.2								
9.6								
10								
10.4	SHALE	moderately weathered, grey moderately weak in strength, moderately fractured, - 70 mm limestone layer at 9.9 m TCR: 98% RQD: 85%	1.525/ 1.549 =98%					
10.8								
11.2								
11.6	SHALE	TCR: 100% RQD: 78%	1.524/ 1.524 =100%					

ROCK CORE LOG

PROJECT NO.: 11240

PROJECT: QEW + 427 Development
LOCATION: The Queensway and Fordhpuse
ELEVATION: _____ DATUM: _____

CORING NO.: **BH5**

CONTRACTOR: _____ DRILL TYPE: _____
DATE STARTED: 14/09/2023 AT: _____ DATE FINISH: 14/09/2023 AT: _____
ORIENTATION: VERTICAL: ☐ INCLINED: ☐ BEARING: _____
COORDS. N: _____ E: _____ LOGGER: _____

DEPTH	ROCK TYPE	DESCRIPTION	CORE RUN AND RECOVERY	DISCONTINUITIES: RQD (PERCENT) 0 25 50 75 100	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DEFECT DESCRIPTION	WEATHERING: FR SW MW HW XW	REMARKS
12								
	SHALE	moderately weathered, grey moderately hard in strength, moderately to slightly fractured,					○	
12.4		- 50 mm limestone layer at 12.1 m						
		- 50 mm limestone layer at 12.3 m						
12.8		- 50 mm limestone layer at 12.5 m						
		End of Rock Core at the Targeted Depth of 13 m Below Ground Surface						
13.2								
13.6								
14								
14.4								
14.8								
15.2								
15.6								
16								
16.4								
16.8								

SOLA ENGINEERING

ENCLOSURE No. 7

RECORD OF BOREHOLE No. BH6 1 OF 1 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.15 - 2023.09.15 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (20 40 60 80 100): ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt										
0.1	ASPHALTIC CONCRETE - 85 mm thick		1A	SS	13				○		
0.5	GRANULAR BASE/SUBBASE (sand and gravel) - 380 mm thick		1B						○		
0.8	FILL - silty sand, trace gravel, dark brown, moist		2	SS	11				○		
	FILL - clayey silt, brown, moist										
1.5	SILT - occasionally inferred cobbles and boulders, brown, compact to very dense, moist		3	SS	24				○		
			4	SS	50/ 8 cm				○		
			5	SS	50/ 8 cm				○		
4.6	SHALE - completely weathered, gray		6	SS	50/ 5 cm				○		
			7	SS	50/ 5 cm				○		
			8	SS	50/ 5 cm				○		
			9	SS	50/ 5 cm				○		
9.2	End of Borehole at the Targeted Depth; Borehole Caved at 8.2 m and Water was at 8.2 m Below Existing Ground Surface Upon Completion of Drilling Period.										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 8

RECORD OF BOREHOLE No. BH7 1 OF 1 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.14 - 2023.09.14 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt										
0.1	ASPHALTIC CONCRETE - 85 mm thick										
	GRANULAR BASE/SUBBASE (sand and gravel) - 380 mm thick		1A	SS	13						
0.5			1B								
	FILL - silty sand, trace organic, dark brown, moist		2A	SS	12					127.5	
0.9	FILL - sandy silt, grey, moist		2B							208.9	
1.5	SILT - grey, compact to dense, moist		3	SS	18						
	- occasionally inferred cobbles and boulders		4	SS	47						
3.0	SHALE - completely weathered, gray		5	SS	50/ 14 cm						
			6	SS	50/ 10 cm						
			7	AS							
6.6	Start of rock coring;										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ROCK CORE LOG

PROJECT NO.: 11240

PROJECT: QEW + 427 Development
LOCATION: The Queensway and Fordhpuse
ELEVATION: _____ DATUM: _____

CORING NO.: **BH7**

CONTRACTOR: _____ DRILL TYPE: _____
DATE STARTED: 14/09/2023 AT: _____ DATE FINISH: 14/09/2023 AT: _____
ORIENTATION: VERTICAL: ☐ INCLINED: ☐ BEARING: _____
COORDS. N: _____ E: _____ LOGGER: _____

DEPTH	ROCK TYPE	DESCRIPTION	CORE RUN AND RECOVERY	DISCONTINUITIES: RQD (PERCENT) 0 25 50 75 100	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DEFECT DESCRIPTION	WEATHERING: FR SW MW HW XW	REMARKS
7.2	SHALE	intense to moderately weathered, grey, moderately weak in strength, intensely fractured, TCR: 100% RQD: 85%	1.524/ 1.524 =100%					
7.6								
8								
8.4								
8.8	SHALE	TCR: 95% RQD: 77%	1.448/ 1.524 =95%					
9.2								
9.6								
10		End of Rock Core at the Targeted Depth of 9.9 m Below Ground Surface						
10.4								
10.8								
11.2								
11.6								

SOLA ENGINEERING

ENCLOSURE No. 9

RECORD OF BOREHOLE No. BH8 1 OF 1 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.15 - 2023.09.15 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Gravel										
0.1	GRAVEL - 85 mm thick										
	GRANULAR BASE/SUBBASE (sand and gravel) - 380 mm thick		1A	SS	21				○		
0.5	FILL - sandy silt, trace clay, brown, moist		1B						○		
			2	SS	11				○		
1.5	SILT TILL - contaning shale fragments, brown, dense to very dense, moist		3	SS	36				○		
			4	SS	50/ 14 cm				○		
3.0	SHALE - completely weathered, gray, very dense, moist		5	SS	50/ 10 cm				○		
			6	SS	50/ 8 cm				○		
			7	SS	50/ 8 cm				○		
			8	SS	50/ 5 cm				○		
			9	SS	50/ 5 cm				○		
9.2	End of Borehole at the Targeted Depth; Borehole was Open and Dry Upon Completion of Drilling Period.										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 10

RECORD OF BOREHOLE No. BH9 1 OF 1 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.12 - 2023.09.12 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt										
0.1	ASPHALTIC CONCRETE - 75 mm thick										
	GRANULAR BASE/SUBBASE (sand and gravel) - 530 mm thick		1A	SS	18				○		
0.6			1B						○		
0.8	FILL - clay, trace gravel, trace sand, brown, moist		2	SS	15				○		
	FILL - sandy silt, trace gravel, trace clay, occasionally inferred cobbles and boulders, brown, moist										
			3A	SS	24				○		
1.8	SILT TILL, grey, compact, moist		3B						○		
2.0	End of Borehole at the Targeted Depth; Borehole was Open and Water was at 1.9 m Below Existing Ground Surface Upon Completion of Drilling Period.										

$+^{3}$, $\times^{3}$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 11

RECORD OF BOREHOLE No. BH10 1 OF 1 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.12 - 2023.09.12 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt										
0.1	ASPHALTIC CONCRETE - 75 mm thick										
	GRANULAR BASE/SUBBASE (sand and gravel) - 380 mm thick		1A / 1B	SS	7				○		
0.5											
0.8	FILL - silt, some clay, trace gravel, trace sand, brown, moist		2	SS	32				○		
	FILL - sandy silt, some gravel, occasionally inferred cobbles and boulders, brown, moist to very moist		3	SS	41				○		
2.0	End of Borehole at the Targeted Depth; Borehole was Open and Water was at 1.9 m Below Existing Ground Surface Upon Completion of Drilling Period.										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 12

RECORD OF BOREHOLE No. BH11 1 OF 1 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.12 - 2023.09.12 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt										
0.1	ASPHALTIC CONCRETE - 75 mm thick		1A	SS	18				○		
0.5	GRANULAR BASE/SUBBASE (sand and gravel) - 380 mm thick		1B						○		
0.8	FILL - silty sand, trace gravel, occasionally inferred cobbles and boulders, brown, moist		2	SS	18				○		
	FILL - sandy silt, some clay, brown, moist										
1.5	SILT - occasionally inferred cobbles and boulders, grey to brown, compact, moist		3	SS	26				○		
2.0	End of Borehole at the Targeted Depth; Borehole was Open and Dry Upon Completion of Drilling Period.										

$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

ENCLOSURE No. 13

RECORD OF BOREHOLE No. BH12 1 OF 1 METRIC

PROJECT NUMBER 11240 LOCATION The Queensway and Fordhouse Boulevard, Etobicoke, Onatrio ORIGINATED BY RT

NAME QEW + 427 Development CLIENT 1370443 Ontario Limited c/o RSM Canada METHOD Soild Stem Augers COMPILED BY RT

DATUM _____ DATE 2023.09.15 - 2023.09.15 NORTHING _____ EASTING _____ CHECKED BY HH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	Asphalt										
0.1	ASPHALTIC CONCRETE - 75 mm thick		1A	SS	19				○		
0.5	GRANULAR BASE/SUBBASE (sand and gravel) - 380 mm thick		1B						○		
0.8	FILL - silty sand, trace gravel, containing brick fragments, black, moist		2	SS	7				○		
	FILL - clayey silt, brown, moist										
1.5	SILT - occasionally inferred cobbles and boulders, brown, compact, moist		3	SS	31				○		
2.0	End of Borehole at the Targeted Depth; Borehole was Open and Dry Upon Completion of Drilling Period.										

$+^3$, $\times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

SOLA ENGINEERING

KEY TO SYMBOLS

Enclosure No.: 2

PROJECT NUMBER 11240

PROJECT NAME QEW + 427 Development

LOCATION 1543, 1545, 1547, 1549, 1551 THE QUEENSWAY & 66 AND 76 FORDHOU

CLIENT 1370443 Ontario Limited c/o RSM Canada

LITHOLOGIC SYMBOLS (Unified Soil Classification System)


ASPHALT: Asphalt


CL-SL-TL: clayey silt till


FILL: TTC Fill (made ground)


GRAVEL: TTC Gravel


GRVYSAND: Gravelly Sand


SHALE: TTC Shale


SL: silt


SL-TL: silt till

SAMPLER SYMBOLS


Auger Sample


Split Spoon Sample

WELL CONSTRUCTION SYMBOLS


Bentonite Seal: 1 pipe group, 1 pipe


Concrete: 1 pipe group, 1 pipe


Filter Pack: 1 pipe group, 1 pipe


Slotted Pipe: 1 pipe group, 1 pipe


Slough at bottom of hole

Notes:

Terms describing RELATIVE DENSITY, based on Standard Penetration Test "N"-Value for COURSE GRAINED soils (major portion retained on No. 200 seive):

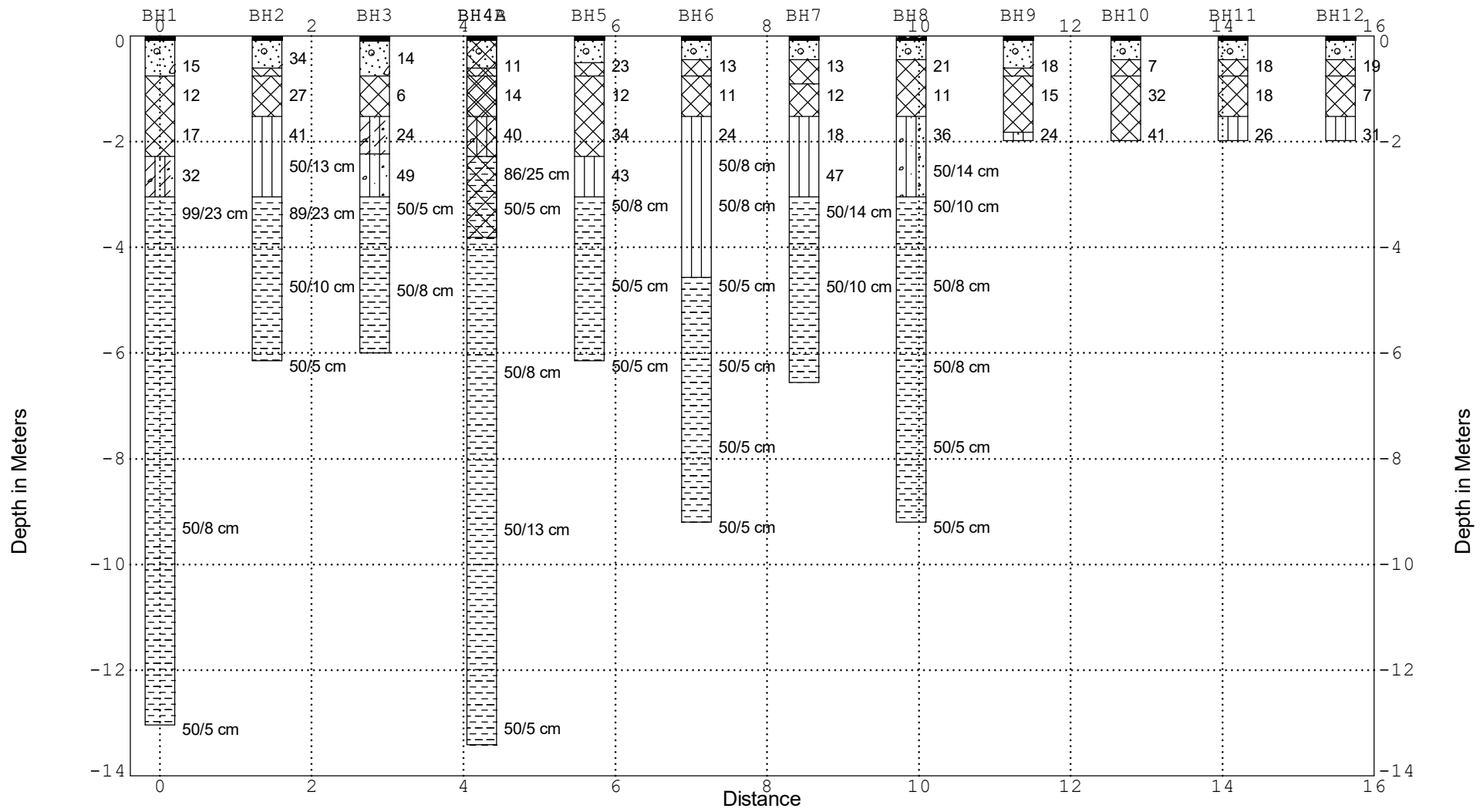
DESCRIPTIVE TERM ["N"-Value (blows/0.3m), Relative Density (%)]

- **Very Loose [less than 4, less than 15]**
- **Loose [4 to 10, 15 to 35]**
- **Compact or Medium [10 to 30, 35 to 65]**
- **Dense [30 to 50, 65 to 85]**
- **Very Dense [greater than 50, greater than 85]**

Terms describing CONSISTENCY, based on Standard Penetration Test "N"-Value for FINE GRAINED soils (major portion passing No. 200 sieve):

DESCRIPTIVE TERM [Unconfined Compressive Strength (kPa), "N"-Value (blows/0.3m)]

- **Very Soft [less than 25, less than 2]**
- **Soft [25 to 50, 2 to 4]**
- **Firm [50 to 100, 4 to 8]**
- **Stiff [100 to 200, 8 to 15]**
- **Very Stiff [200 to 400, 15 to 30]**
- **Hard [greater than 400, greater than 30]**



Plan View

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CONCEPTUAL SOIL PROFILE

Horizontal Scale:	Drawn By:	
Vertical Scale:	Approved By:	

QEW + 427 Development
1543, 1545, 1547, 1549, 1551 THE QUEENSWAY & 66 AND 76 FORDHOUSE BOULEVARD, Etobic

Project Number: 11240 | Enclosure No.: 3