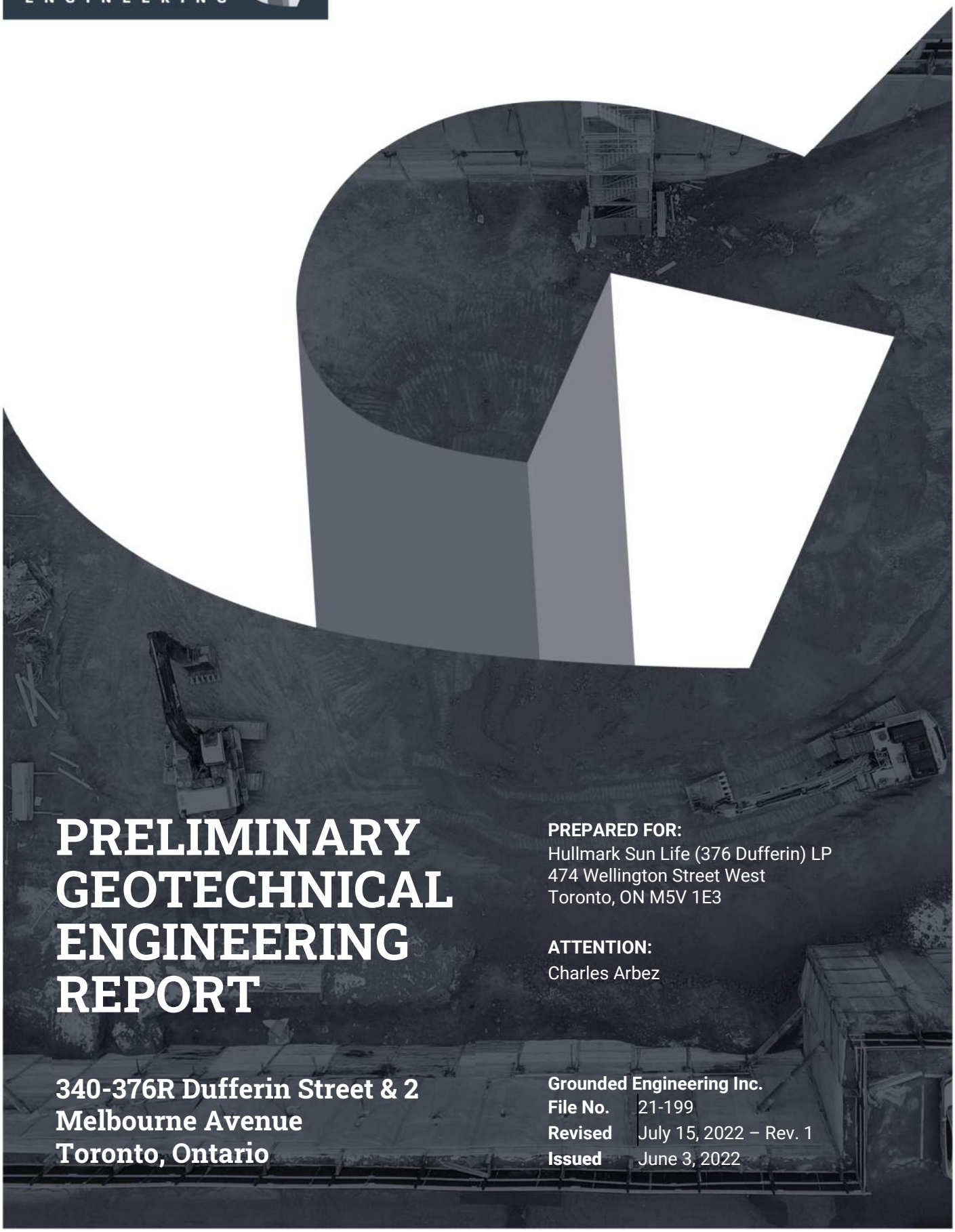


PRELIMINARY GEOTECHNICAL ENGINEERING REPORT

PREPARED FOR:
Hullmark Sun Life (376 Dufferin) LP
474 Wellington Street West
Toronto, ON M5V 1E3

ATTENTION:
Charles Arbez

340-376R Dufferin Street & 2 Melbourne Avenue Toronto, Ontario

Grounded Engineering Inc.
File No. 21-199
Revised July 15, 2022 – Rev. 1
Issued June 3, 2022

TABLE OF CONTENTS

FIGURES

APPENDICES

1 Introduction

Hullmark Sun Life (376 Dufferin) LP has retained Grounded Engineering Inc. ("Grounded") to provide preliminary geotechnical engineering design advice for their proposed development at 340-376R Dufferin Street & 2 Melbourne Avenue, in Toronto, Ontario.

The site is currently occupied by 1 to 2-storey office buildings (340-376R Dufferin Street & 2 Melbourne Avenue) and a centralized, at-grade courtyard. The building at 340 Dufferin Street has a partial basement level that extends beneath the northeast corner of the building footprint. The building at 360 Dufferin Street has 1 basement level that extends beneath the entire building footprint and transitions to the at-grade level of 376R Dufferin Street. The building at 350-358 Dufferin Street has a partial basement that extends beneath the full building footprint of 350 Dufferin Street and only the southwest portion of the building footprint at 358 Dufferin Street.

The proposed development of the site includes demolishing most of the existing structures and constructing two towers: North Tower and South Tower, as well as, buildings in the north west and south east corners of the site resting on a common P2 underground parking structure set at a lowest (P2) Finished Floor Elevation (FFE) of 84.73 ± m. The existing heritage building at 350 Dufferin Street will remain. A Privately Owned Public Space (POPS) is proposed for the south west portion of the Property along Melbourne Avenue.

Grounded has been provided with the following reports and drawings to assist in our geotechnical scope of work:

- Site survey, prepared by KRCMAR (April 25, 2019).
- Architectural Drawings, "340-376 Dufferin Street, Toronto, Ontario"; Project 2102, dated July 15, 2022, prepared by Sweeny & Co Architects.
- Preliminary Geotechnical Investigation, "350 – 360 Dufferin Street, Toronto, Ontario"; Project MRK-00230785-A0-003, dated February 25, 2016, prepared by EXP.
- Geotechnical Assessment, "376 Dufferin Street, Toronto, Ontario", File MRK-00230785-B0-004, dated Aug 8, 2016, prepared by EXP.

Grounded has been provided with factual borehole information from other consultants as listed above. Those borehole logs are provided in a report signed and sealed by professional engineers. As such, this borehole information (appended) is taken as factual for present purposes. Unless noted, borehole labels appended with "EXP-" refer to EXP's boreholes.

Grounded's subsurface investigation of the site to date includes eleven (11) boreholes (Boreholes 101 to 108, 110, 111, and 117) which were advanced from October 4th to 25th, 2021.

Based on the borehole findings, geotechnical engineering advice for the proposed development is provided for foundations, seismic site classification, earth pressure design, slab on grade design, and basement drainage. Construction considerations including excavation, groundwater control, and geostructural engineering design advice are also provided.

Grounded Engineering must conduct the on-site evaluation of founding subgrade as foundation and slab construction proceeds. This is a vital and essential part of the geotechnical engineering function and must not be grouped together with other "third-party inspection services". Grounded will not accept responsibility for foundation performance if Grounded is not retained to carry out all the foundation evaluations during construction.

This preliminary geotechnical engineering report is appropriate for due diligence and planning purposes only. Due to site access limitations during the time of our investigation in 2021, additional boreholes (particularly in the northern portion of the site), in situ testing, wells, and a detailed geotechnical engineering report will be required for detailed design. These additional boreholes must be advanced after the buildings in the northern portion of the site has been demolished.

2 Ground Conditions

The borehole results are detailed on the attached borehole logs. Our assessment of the relevant stratigraphic units is intended to highlight the strata as they relate to geotechnical engineering. The ground conditions reported here will vary between and beyond the borehole locations.

The stratigraphic boundary lines shown on the borehole logs are assessed from non-continuous samples supplemented by drilling observations. These stratigraphic boundary lines represent transitions between soil types and should be regarded as approximate and gradual. They are not exact points of stratigraphic change.

Elevations are measured relative to City of Toronto Benchmark No. CT1577. The horizontal coordinates are provided relative to the Universal Transverse Mercator (UTM) geographic coordinate system.

Asphalt and granular thicknesses reported here are observed in individual borehole locations through the top of the open borehole. Thicknesses may vary between and beyond the boreholes.

2.1 Soil Stratigraphy

The following soil stratigraphy summary is based on the borehole results and the geotechnical laboratory testing. Our findings are largely consistent with those reported by EXP. A cross-section showing stratigraphy and engineering units is appended and includes the relevant borehole and well information from EXP.

The depths at which the deposits were encountered vary because boreholes were drilled in the exterior courtyard, in the existing buildings at ground level, and in the existing buildings at basement level. Thus, elevations are used to identify the strata.

2.1.1 Surficial and Earth Fill

At exterior grade within the existing courtyard, Boreholes 104, 105, and 111 observed an asphalt pavement structure overlying 25 to 275 mm thick aggregate layer. While Borehole 117 encountered asphalt pavement overlying granular fill.

Inside the existing buildings at the ground floor, Borehole 101 encountered a concrete slab overlying granular fill while Borehole 102 encountered a concrete slab overlying 150 mm of aggregate. Borehole 106 encountered a concrete pavement overlying a 40 mm thick layer of aggregate, over lying a 40 mm thick asphalt layer, overlying a 90 mm thick layer of aggregate.

At interior grade (i.e. basement levels of the existing buildings), Boreholes 103, 107, 108, 110 encountered a concrete pavement structure overlying a 150 to 175 mm thick aggregate layer.

Underlying the surficial materials, boreholes observed a layer of earth fill that extends to Elev. 90.4 to 91.8 m. At Boreholes 103, 107, and 108, no layer of fill was observed. The earth fill varies in composition but generally consists of sand, silty sand, and clayey silt with trace gravel, cinders, asphalt, construction debris, and rootlets. The earth fill is typically dark brown to black, and moist. Due to inconsistent placement and the inherent heterogeneity of earth fill materials, the relative density of the earth fill varies but is on average compact.

Due to the variation and inconsistent placement of the earth fill material, the consistency/relative density of the earth fill varies but is on average stiff/compact.

2.1.2 Sand

Underlying the fill materials, all Grounded boreholes encounter an undisturbed native sands deposit with a matrix of broadly cohesionless sands (sand and silt to sand). These soils are grouped together as the "**Sand**". This unit was encountered at Elev. 90.1 to 91.8 m and extends down to Elev. 82.8 to 87.1 m. Boreholes 107, 108, 110, and 117 were terminated in this unit at target Elev. 84.6 to 85.5 m. Borehole 101 observed an embedded layer of gravel at Elev. 88.6 m extending to Elev. 87.7 m.

The sand is generally brown and moist; transitioning to grey and wet at lower elevations within the stratum.

Standard Penetration Test (SPT) results (N-Values) measured in the earth fill range from 3 to 35 blows per 300 mm of penetration ("bpf"), indicating a relative density ranging from very loose to dense (on average, loose). Borehole 111 recorded higher blow counts for the first spoon which is likely due to rock backfill.

SPT N-values measured in this unit range from 7 to 80 bpf (on average dense, but occasionally very dense or compact).

2.1.3 Silt Till

Underlying the sand, Boreholes 101, 104, 105, 106, and 111 observed an undisturbed native glacial till deposit with a matrix of broadly sandy silt, silty sand, sand and silt, and clayey silt (observed in BH103). These soils are grouped together as the "**Silt Till**". This unit was encountered at Elev. 82.8 to 87.1 m and extends down to Elev. 80.1 to 82.3 m. Boreholes 103 and 106 were terminated in this unit at their target Elev. 81.9 and 82.3 m, respectively.

The sand is generally grey and wet. SPT N-values measured in this unit range from 41 to 103 bpf (on average very dense, but occasionally dense).

2.1.4 Bedrock

Inferred bedrock was encountered in Boreholes EXP-BH2, EXP-BH3, underlying the silt till at Elev. 80.0 and 79.9 m, respectively. Grounded confirmed bedrock by rock cores recovered in Boreholes 101, 104, 105, and 111. Inferred bedrock was not encountered in any of the other Grounded Boreholes, as they reached termination depth prior to reaching bedrock.

Detailed core logs are included with the corresponding borehole logs. Photographs of the recovered rock core and a guide of rock core terminology are appended. The rock core terminology sheet defines many of the descriptive terms used below.

The bedrock beneath the site is the Georgian Bay Formation, which comprises thin to medium bedded grey shale and limestone of Ordovician age. The shale is interbedded with calcareous shale, limestone, dolostone, and calcareous sandstone (conventionally grouped together as "limestone") which are typically laterally discontinuous. Per the appended terminology, the Georgian Bay shale is typically classified as "weak" whereas the limestone interbedding is classified as "strong". The percentage of strong limestone beds in each run is reported on the rock core logs.

Joints occurring within the shale are closely to very closely spaced, and typically weathered with a veneer to coating of clay. Widely-spaced subvertical joints (closed, planar, clean) were not observed within the shale.

A summary of the engineering properties of the Georgian Bay Formation is presented in the Ontario Ministry of Transportation and Communications document RR229, *Evaluation of Shales for Construction Projects* (March 1983). The relevant parameters from that document are as follows:

Table 2.1 – Summary of MTO Georgian Bay Formation Parameters

	Uniaxial Compressive Strength (MPa)	Young's Modulus (GPa)	Dynamic Modulus (GPa)	Poisson's Ratio
Average	28	4	19	0.19
Range	8 to 41	0.5 to 12	6 to 38	0.1 to 0.25

Directly below the overburden soils, the uppermost portion of bedrock is typically weathered. The MTO (Ontario Ministry of Transportation and Communications document RR229, *Evaluation of Shales for Construction Projects)* provides a *typical weathering profile of a low durability shale* reproduced from Skempton, Davis, and Chandler, which characterizes weathered versus unweathered shale as follows:

Table 2.2 – Typical Weathering Profile of a Low Durability Shale

	Zone	Description	Notes
Fully Weathered	IVb	Soil-like matrix only	indistinguishable from glacial drift deposits, slightly clayey, may be fissured
Partially Weathered	IVa	Soil-like matrix with occasional pellets of shale less than 3 mm dia.	little or no trace of rock structure, although matrix may contain relic fissures
	III	Soil-like matrix with frequent angular shale particles up to 25 mm dia.	moisture content of matrix greater than the shale particles
	II	angular blocks of unweathered shale with virtually no matrix separated by weaker chemically weathered but intact shale	spheroidal chemical weathering of shale pieces emanating from relic joints and fissures, and bedding planes
Unweathered (Sound)	I	shale	regular fissuring

In glacial till overburden soils directly overlying bedrock, a zone of till with fragmented shale is often observed and interpreted as either the lowest portion of the till, or as partially weathered Zone III rock. This interpretation is subjective and depends on the investigator. There is occasionally a concentration of boulders in the soil just above the bedrock that can be mistakenly identified as bedrock where rock coring is not performed. Weathering Zones III and IV are frequently not present due to glacial scouring action, which often removes these zones from the bedrock surface.

The bedrock surface as indicated on the Borehole Logs from this investigation is intended to be consistently interpreted as the surface of Zone II. Based on examination of the rock cores from this site, the partially weathered rock (Zone II) is approximately 0.5 to 1.5 m thick at Boreholes 104, 105, and 111. Borehole 101 was terminated due to site access restraints before encountering sound bedrock. Weathered and sound bedrock elevations are summarized as follows:

Borehole	Ground Surface Elevation (m)	Partially Weathered (Zone II) Bedrock		Unweathered/Sound (Zone I) Bedrock	
		Depth (m)	Elevation (m)	Depth (m)	Elevation (m)
101	93.2	12.3	80.9	N/A*	N/A*
104	93.3	13.1	80.2	13.6	79.8
105	93.3	13.2	80.1	13.6	79.7
111	93.4	13.2	80.2	14.7	78.7

*Sound bedrock was not encountered

Rock Quality Designation (RQD) is an index measurement that refers to the total length of pieces of sound core in a core run that are at least 100 mm in length, expressed as a percentage of the total length of that core run. Only natural discontinuities are used in assessing RQD.

RQD underrepresents the competency of the Georgian Bay Formation and is not appropriate for horizontally bedded fissile shale. In this formation, the RQD is typically low due to the fissility of the shale as well as the closely spaced horizontal bedding planes. Our results are typical of this formation.

The jointing and crush zones in the rock are related to the state of stress in the deposit. Research in the Greater Toronto Area has revealed that the bedrock contains locked-in horizontal stresses that could be remnants of the foreshortening that occurred in the earth's crust during continental glaciation several thousand years ago. Documented experiments have indicated that the major principal stress is of the order of 2 MPa in the upper 1 to 2 m of the deposit where the rock is weathered and contains more fractures. Intact rock can have an internal major principal stress as high as 4 to 5 MPa. The major and minor principal stresses are horizontal and may be oriented in any direction. The empirical approach to vertical stress below the top of bedrock is to use a uniform pressure distribution below the top of bedrock elevation that is equal to the maximum earth pressure calculated for the lowest level of soil in the profile.

The Georgian Bay Formation has been known to issue gases when penetrated. There are instances where both methane and hydrogen sulphide gas emissions have been detected in excavations made in the Georgian Bay Formation. While there was no specific indication of gas emissions from the boreholes made in this investigation, the potential for gas emissions from this formation is recognized as a design issue to be addressed.

2.2 Groundwater

The depth to groundwater and caved soils was measured in each of the boreholes immediately following the drilling. On completion of drilling, some boreholes were filled with drill fluid (from mud rotary drilling) and measuring the unstabilized groundwater level after drilling was not practical. Monitoring wells were installed in each of the boreholes, and stabilized groundwater levels were measured in each of the monitoring wells one week after the completion of drilling

The groundwater observations are shown on the Borehole Logs and are summarized as follows:

Borehole No.	Borehole depth (m)	Upon completion of drilling		Strata Screened	Water Level in Well, latest (m)	
		Depth to cave (m)	Unstabilized water level (m)		Date	Depth/Elev.
101	12.9	open	filled with drill water	Sand	2022-01-07	5.1/88.1
102	2.7	open	dry	Fill	2022-01-07	dry
103-S	4.6	open	not measured	Sand	2022-01-07	2.8/87.6
103-D	8.5	open	2.4	Sand	2022-01-07	2.8/87.6
104	15.6	n/a	filled with drill water	Silt Till/Bedrock	2022-01-07	5.2/88.1
105	15.8	n/a	4.6	Bedrock	2022-01-07	5.9/87.2
106	11.0	open	filled with drill water	Sand/Silt Till	2022-01-07	4.6/88.7
107	5.2	3.4	not measured	Sand	2022-01-07	2.2/88.5
108	6.5	3.7	not measured	Sand	2022-01-07	3.6/87.8
110	6.7	n/a	not measured	Sand	2022-01-07	3.6/87.8
111	15.7	n/a	filled with drill water	Silt Till/Bedrock	2022-01-07	5.6/87.8
117	8.2	open	5.5	Sand	2022-01-07	5.3/88.0

Groundwater levels fluctuate with time depending on the amount of precipitation and surface runoff, and may be influenced by known or unknown dewatering activities at nearby sites.

For basement wall design purposes, the groundwater table is at Elev. 88.7± m. The sand deposit has a high permeability and will yield free-flowing water when penetrated. There is also infiltrated stormwater perched in the earth fill.

Grounded will prepare a hydrogeological report for this site (File No. 21-199).

2.2.1 Corrosivity and Sulphate Attack

Three (3) soil samples were submitted for corrosivity testing parameters (pH, Resistivity, Electrical Conductivity, Redox Potential, Sulphate, Sulphide and Chloride). The Certificate of Analyses is appended.

The soil samples were analysed for soluble sulphate concentration and compared to the Canadian Standard CAN3/CSA A23.1-M94 Table 3, *Additional Requirements for Concrete Subjected to Sulphate Attack*. The results are summarized as follows:

Parameter	BH 106 SS 3	BH 111 SS 6	BH 104 SS 5
Soluble Sulphate (SO_4) in soil sample	107 µg/g < 0.1 %	50 µg/g < 0.1 %	<20 µg/g < 0.1 %
Class of Exposure	**Negligible**	**Negligible**	**Negligible**

Corrosivity parameters are also used for assessing soil corrosivity applicable to cast iron alloys, according to the 10-point soil evaluation procedure described in the American Water Work Association (AWWA) C-105 standard. The results are summarized as follows:

Parameter	AWWA C-105 Standard – Assigned Points					
	BH 106 SS 3		BH 111 SS 6		BH 104 SS 5	
	Result	Points	Result	Points	Result	Points
Resistivity (ohm.cm)	2840	0	5020	0	4630	0
pH	7.85	0	7.85	0	7.82	0
Redox Potential (mV)	295	0	286	0	287	0
Sulfides (%)	0.000037	3.5	<0.00002	2	0.000032	3.5
Moisture (%)	18.50	1	16.00	1	7.25	1
Corrosion protection recommended?	No		No		No	
Resistivity less than 2000 ohm.cm?	No		No		No	

The analytical results only provide an indication of the potential for corrosion. All three samples scored less than 10 points and corrosion protective measures are therefore not recommended for cast iron alloys. A more recent study by the AWWA has suggested that soil with a resistivity of less than about 2000 ohm.cm should be considered aggressive. All three samples had resistivity measurements exceeding 2000 ohm.cm.

2.2.2 Leachate Analysis

In addition to the O.Reg. 153/04 analysis noted above, one (1) sample was submitted for analysis of O.Reg. 347 Schedule 4 parameters (TCLP analysis) for waste classification purposes. The analysis was conducted for the following parameters

- Benzo(a)pyrene
- Metals & Inorganics

- Volatile Organic Compounds (VOCs)
- Polychlorinated Biphenyls (PCBs)

The results of chemical analysis indicate that the soil is considered **non-hazardous** and should be handled as accordingly.

The laboratory Certificates of Analysis are enclosed.

2.2.3 Frost Heave Susceptibility of Soils

A soil's susceptibility to frost heave is related to the percentage of silt and very fine sand in the soil, as frost heave impacts fine-grained soils with low cohesion and high capillarity. The site soils are classified for susceptibility to frost heave according to their grain size distributions on this basis. Geotechnical laboratory results for this site are appended. Per the Second Edition of the Pavement Design and Rehabilitation Manual by the Ministry of Transportation in Ontario, the following table summarizes the relationship between grain size and frost heave susceptibility:

Table 2.3: Relationship Between Grain Size and Frost Susceptibility (MTO)

Grain Size Percentage between 5 and 75 µm	Susceptibility to Frost Heaving
0 to 40%	Low
40 to 55%	Moderate
55 to 100%	High

Per the grain size data measured in the site soils, frost heave susceptibility is summarized accordingly:

Table 2.4: Summary of Susceptibility to Frost Heave

Stratum	Grain Size Percentage between 5 and 75 µm	Susceptibility to Frost Heaving
Earth Fill	Est. 25 to 50%	Low to Moderate
Silt Till	Est. 35 to 45%	Low to Moderate
Sand	Est. 20 to 85%	Low to High

3 Preliminary Geotechnical Engineering Recommendations

Based on the factual data summarized above, preliminary geotechnical engineering recommendations are provided. This preliminary geotechnical engineering report is appropriate for due diligence and planning purposes only. Due to site access limitations during the time of our investigation in 2021, additional boreholes (particularly in the northern portion of the site), in situ testing, wells, and a detailed geotechnical engineering report will be required for detailed design. These additional boreholes must be advanced after the demolition of the north portion of the site is completed.

This report assumes that the design features relevant to the geotechnical analyses will be in accordance with applicable codes, standards, and guidelines of practice. If there are any changes to the site development features, or there is any additional information relevant to the interpretations made of the subsurface information with respect to the geotechnical analyses or other recommendations, then Grounded should be retained to review the implications of these changes with respect to the contents of this report.

3.1 Foundation Design Parameters

The proposed development of the site includes demolishing the existing structures and constructing a two towers: North Tower and South Tower, as well as, buildings in the north west and south east corners of the site resting on a common P2 underground parking structure set at a lowest (P2) Finished Floor Elevation (FFE) of 84.73 ± m. A Privately Owned Public Space (POPS) is proposed for the south west portion of the Property along Melbourne Avenue.

Geotechnical recommendations are provided for the following foundation options:

- Conventional Spread Footing
- Raft Foundation

Excavations for typical footings will be nominally 1± m below FFE, to as much as 3 m below FFE for the elevator core. Therefore,

- Foundation excavations will extend below the prevailing groundwater table (Elev. 88.7 ±m);
- Foundation excavations will penetrate wet sand and silt till unit, which are highly permeable and will yield free-flowing water when penetrated.

It will therefore be necessary provide impermeable shoring to facilitate excavation to the P2 level using a continuous interlocking caisson wall socketed into sound bedrock. Excavations will then penetrate through wet sands during excavations, which must be dewatered during excavation activities.

When exposed to ambient environmental temperatures in the Greater Toronto Area, the design earth cover for frost protection of foundations and grade beams is 1.2 m. The lowest levels of unheated underground parking structures two or more levels deep are, although unheated, still warmer than typical outdoor winter temperatures in the Greater Toronto Area. Interior foundations (or pile caps) with 900 mm of frost cover perform adequately, as do perimeter foundations with 600 mm of frost cover. Where foundations are next to ventilation shafts or are exposed to typical outdoor temperatures, 1.2 m of earth cover (or equivalent insulation) is required for frost protection.

The topsoil and earth fill soils are considered unsuitable for the support of the proposed building foundations.

3.1.1 Spread Footings

Foundations made for the proposed P2 level will bear on undisturbed very dense silt till. Conventional spread footings made to bear on this soil at Elev. 83.6± m may be designed using a maximum factored geotechnical resistance at ultimate limit state (ULS) of 1200 kPa. The net geotechnical reaction at serviceability limit state (SLS) is 800 kPa, for an estimated total settlement of 25 mm.

Spread footing foundations must be maximum 3500 mm wide and must be embedded a minimum of 1000 mm below FFE. These minimum requirements apply in conjunction with the above recommended geotechnical resistance regardless of loading considerations. The geotechnical reaction at SLS refers to a settlement which for practical purposes is linear and non-recoverable. Differential settlement is related to column spacing, column loads, and footing sizes.

Alternatively, spread footings made to bear on weathered bedrock (at the elevations provided in Section 2.1.4) may be designed using a maximum factored geotechnical resistance at ULS of 5 MPa. The net geotechnical reaction at SLS is 3 MPa, for an estimated total settlement of 25 mm.

If higher capacities are required, spread footings can be made to bear on sound bedrock at the elevations provided in Section 2.1.4. These footings can be designed using a maximum factored geotechnical resistance at ULS of 10 MPa. The net geotechnical reaction at SLS is 6 MPa, for an estimated total settlement of 25 mm.

3.1.2 Raft Foundation

The City of Toronto no longer allows long-term groundwater drainage into their sewer system, which implies that basement structures must be made fully watertight. The proposed building may therefore be supported by a raft foundation, with watertight foundation walls designed to withstand hydrostatic forces (lateral and uplift). A 20 x 40 m raft underlying the towers is considered in the bearing capacity discussion below. Raft slabs for a podium structure will be subjected to much less load, and will not govern design.

Assuming a P2 FFE of 84.73± m, a raft would be founded at around Elev. 82.6± m, on undisturbed very dense native silt till.

The preliminary raft design parameters are provided assuming a *uniform load* at the base of the raft. In reality, raft loads are non-uniform; they will be highest around the core and will decrease away from the core. Consequently, detailed raft design is an iterative process between the structural and geotechnical engineers. The preliminary parameters below are provided as the initial step in determining raft feasibility (a structural task).

Bulk excavation to underside of raft elevation (Elev. 82.6± m) will induce a reduction in effective stress of 165 kPa, which is the unload stress. Utilizing preliminary soil and bedrock stiffness parameters, analysis of a *uniformly* loaded raft foundation shows that a uniform total SLS bearing pressure of 165 kPa (which is recompression) applied at the base of the raft will generate less than 5 mm of settlement. For 25 mm of total settlement, the total uniform SLS bearing pressure

is 850 kPa. Each additional increase of 750 kPa (which is now virgin loading) generates an additional 25 mm of settlement. Thus, a total (gross) *uniform* geotechnical reaction at SLS of 1,600 kPa will generate 50 mm of settlement.

The modulus of subgrade reaction for design of a raft slab is a function of the size of the raft, the applied load, and whether loading is within the recompression range or the virgin range. On the basis of our preliminary stiffness parameters and the assumption of uniform raft loading, the preliminary modulus of subgrade reaction appropriate for 20x40 m raft design at this site is about 30,000 kPa/m.

These parameters are based on assumed Young's Moduli (virgin and unload-reload) for each of the load-bearing strata, and can likely be improved by in situ testing of the Young's Modulus within the critical portions of the zone of influence of the raft. Settlement parameters can likewise be improved by modelling the real non-uniform loading at the base of the raft.

Detailed raft design is an iterative process between the structural and geotechnical engineers. Once a draft structural design is completed by the structural engineer, the resulting non-uniform raft pressure distribution is provided to us (typically as a contour plot). Grounded will then use finite element modelling to determine the real settlement more accurately at each point under the raft. The detailed settlement distribution and MSRs under the raft are then sent back to the structural engineer, and the structural design is modified as necessary.

The maximum factored geotechnical resistance of the raft foundations at ULS is 4,000 kPa for design purposes.

Should raft slab design be considered beyond this conceptual level, recommendations and discussion pertaining to differential settlement between the podium and building must be provided by Grounded. This may involve detailed construction sequencing or the use of delay strips. Differential settlement is related to real non-uniform raft load distribution and must be assessed as part of the detailed design process.

During construction, the subgrade at founding elevation should be cut neat, inspected, and immediately protected by a mud slab (comprising lean concrete) to provide a working surface. The subsurface must not be proofrolled as this activity would further weaken these soils. The raft slab is then constructed on top of the mud slab. Prior to pouring the mud mat and foundation, the foundation subgrade must be cleaned of all deleterious materials such as softened, disturbed or caved materials, or standing water. If construction proceeds during freezing weather conditions, adequate temporary frost protection for the raft foundation base and concrete must be provided.

As the raft slab is to be fully waterproofed, the structure must be designed to resist uplift and lateral hydrostatic pressure on foundation walls. During construction, it will be necessary to consider the potential uplift pressure on the underside of a raft foundation due to hydrostatic

forces. Positive dewatering operations during construction must begin prior to excavation and must continue until such time as the structural dead load exceeds the potential uplift forces (with suitable partial factors (LRFD) included in this assessment). A design groundwater elevation of 88.7 m is to be used.

3.2 Earthquake Design Parameters

The Ontario Building Code (2012) stipulates the methodology for earthquake design analysis, as set out in Subsection 4.1.8.7. The determination of the type of analysis is predicated on the importance of the structure, the spectral response acceleration, and the site classification.

The parameters for determination of Site Classification for Seismic Site Response are set out in Table 4.1.8.4A of the Ontario Building Code (2012). The classification is based on the determination of the average shear wave velocity in the top 30 metres of the site stratigraphy, where shear wave velocity (v_s) measurements have been taken. Alternatively, the classification is estimated from the rational analysis of undrained shear strength (s_u) or penetration resistance (N-values) according to the OBC and National Building Code of Canada.

Below the nominal founding elevations for spread footings or grade beams bearing on silt till, the boreholes observe dense to very dense silt till. Based on this information, the site designation for seismic analysis is **Class C**, per Table 4.1.8.4.A of the Ontario Building Code (2012). Tables 4.1.8.4.B and 4.1.8.4.C. of the same code provide the applicable acceleration- and velocity-based site coefficients. Alternatively, if spread footings or rafts are made to bear uniformly on bedrock, the site is classified as **Class B.**

3.3 Earth Pressure Design Parameters

At this site, the design parameters for structures subject to unbalanced earth pressures such as basement walls and retaining walls are shown in the table below.

Stratigraphic Unit	γ	φ	K_a	K_o	K_p
Compact Granular Fill Granular 'B' (OPSS.MUNI 1010)	21	32	0.31	0.47	3.25
Existing Earth Fill	19	29	0.35	0.52	2.88
Sand	20	36	0.26	0.41	3.85
Silt Till	21	38	0.24	0.38	4.20
Sound Bedrock	26	28	N/A		

γ = soil bulk unit weight (kN/m^3)
φ = internal friction angle (degrees)
K_a = active earth pressure coefficient (Rankine, dimensionless)
K_o = at-rest earth pressure coefficient (Rankine, dimensionless)
K_p = passive earth pressure coefficient (Rankine, dimensionless)

These earth pressure parameters assume that grade is horizontal behind the retaining structure. If retained grade is inclined, these parameters do not apply and must be re-evaluated.

The following equation can be used to calculate the unbalanced earth pressure imposed on walls:

$$P = K[\gamma(h - h_w) + \gamma' h_w + q] + \gamma_w h_w$$

P	=	horizontal pressure (kPa) at depth h	γ	=	soil bulk unit weight (kN/m^3)
h	=	the depth at which P is calculated (m)	γ'	=	submerged soil unit weight (γ - 9.8 kN/m^3)
K	=	earth pressure coefficient	q	=	total surcharge load (kPa)
h_w	=	height of groundwater (m) above depth h			

If the wall backfill is drained such that hydrostatic pressures on the wall are effectively eliminated, this equation simplifies to:

$$P = K[\gamma h + q]$$

The possible effects of frost on retaining earth structures must be considered. In frost-susceptible soils, pressures induced by freezing pore water are basically irresistible. Insulation typically addresses this issue. Alternatively, non-frost-susceptible backfill may be specified.

Foundation resistance to sliding is proportional to the friction between the soil/rock subgrade and the base of the footing. The factored geotechnical resistance to friction ($\mathbf{R_f}$) at ULS provided in the following equation:

$$R_f = \Phi N \tan \varphi$$

R_f	=	frictional resistance (kN)
Φ	=	reduction factor per Canadian Foundation Engineering Manual (CFEM) Ed. 4 (0.8)
N	=	normal load at base of footing (kN)
φ	=	internal friction angle (see table above)

3.4 Slab on Grade Design Parameters

The slab-on-grade parameters provided here apply to a conventional slab on grade and drained basement approach only. If a fully waterproofed raft foundation approach is adopted (with no permanent drainage system), design parameters are provided in Section 3.1.2.

At the proposed lowest P2 elevation, the undisturbed native soils will provide adequate subgrade for the support of a conventional slab on grade. The modulus of subgrade reaction for slab-on-grade design supported by undisturbed native till is 50,000 kPa/m.

The slab on grade must be provided with a drainage layer and capillary moisture break, which is achieved by forming the slab on a minimum 300 mm thick layer of 19 mm clear stone HL8 coarse aggregate (OPSS.MUNI 1150) or HPB vibrated to a dense state.

The use of excavated bedrock spoil to restore subgrade elevations is to be specifically prohibited. This bedrock spoil cannot be adequately compacted to provide support for the slab on grade and is not to be reused below any settlement sensitive areas.

A permanent drainage system including subfloor drains is required (see Section 3.5).

Prior to placement of the capillary moisture break and construction of the slab, the cut subgrade be cut and inspected by Grounded for obvious exposed loose or disturbed areas, or for areas containing excessive deleterious materials or moisture. These areas shall be recompacted in place and retested, or else replaced with Granular B placed as engineered fill (in lifts 150 mm thick or less and compacted to a minimum of 98 percent SPMDD).

3.5 Long-Term Groundwater and Seepage Control

To limit seepage to the extent practicable, exterior grades adjacent to foundation walls should be sloped at a minimum 2 percent gradient away from the wall for 1.2 m minimum.

The proposed structures may consist of the following scenarios:

- Drained foundations, consisting of perimeter drainage and a sub-slab drainage system
- Waterproofed foundation walls and a sub-slab drainage system
- Fully waterproofed foundation walls and waterproofed foundations (leak-tight)

The requirement for a permanent basement drainage system depends on whether a fully watertight approach is adopted for this site. The City of Toronto may require this basement to be fully watertight, according to their new policy. Grounded's Hydrogeological Report (File No. 21-199) provides further discussion on this.

Based on previous experience in the area, a conventional drained approach is not recommended at this site because a drained cavity at the foundation walls will not eliminate hydrostatic pressure, as the flow rate would overcome the drainage board capacity. The full height of the basement walls should be waterproofed (no drainage) and designed to withstand horizontal hydrostatic pressure below Elev. 88.7± m. Perimeter drainage is to be specifically excluded.

Although the walls are to be waterproofed, subfloor drainage is required for all below-grade space. The provision of subfloor drainage is required to collect and remove the water that infiltrates under the floor. Subfloor drains (spaced 3 m on-centres) are to be laid directly on the flat subgrade. If subdrain elevation conflicts with top of footing elevation, footings should be lowered as necessary. Typical basement drainage details are appended.

The subfloor drainage system is a critical structural element since it keeps water pressure from acting on the floor slab. There will be hydrostatic pressure on the permanent wall structures. As such, the sumps ensure the performance of this system and must have a duplexed pump arrangement for 100% pumping redundancy and these pumps must be on emergency power. The size of the sump must be designed to accommodate the anticipated water seepage.

Alternatively, if a raft foundation is preferred, the structure can be fully waterproofed and designed to withstand hydrostatic pressures, with no permanent drainage system. The full height of the basement walls should be waterproofed (no drainage) and designed to withstand hydrostatic pressure (horizontal and uplift) using a static groundwater table at Elev. 88.7 ±m.

The permanent dewatering requirements are provided in Grounded's Hydrogeological Report (File No. 21-199).

If any water is to be discharged to the storm or sanitary sewers, the City of Toronto will require a Permit to Discharge in the short term, and a Discharge Agreement in the long-term.

4 Considerations for Construction

4.1 Excavations

Excavations must be carried out in accordance with the *Occupational Health and Safety Act – Regulation 213/91 – Construction Projects (Part III - Excavations, Section 222 through 242)*. These regulations designate four (4) broad classifications of soils to stipulate appropriate measures for excavation safety. For practical purposes:

- The earth fill is a Type 3 soil
- The wet sands are Type 4 soils, or Type 3 soils if dewatered
- The silt till is a Type 2 soil

In accordance with the regulation's requirements, the soil must be suitably sloped and/or braced where workers must enter a trench or excavation deeper than 1.2 m. Safe excavation slopes (of no more than 3 m in height) by soil type are stipulated as follows:

Soil Type	Base of Slope	Steepest Slope Inclination
1	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
2	within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
3	from bottom of trench	1 horizontal to 1 vertical
4	from bottom of trench	3 horizontal to 1 vertical

Minimum support system requirements for steeper excavations are stipulated in Sections 235 through 238 and 241 of the Act and Regulations and include provisions for timbering, shoring and moveable trench boxes. Any excavation slopes greater than 3 m in height should be checked by Grounded for global stability issues.

Bedrock is not considered a soil under the Act. Vertical excavations made in sound bedrock are generally self-supporting provided the rock bedding is horizontally oriented. If deemed necessary, rock bolts can be used to anchor a layer of protective mesh that will protect workers from loose rock spalling from the face of excavation. The rock face must be inspected by Grounded to determine that no other support system is required to prevent the spalling of loose rock, and to confirm that all loose spall material at risk of falling upon a worker is removed (Section 233 of the above noted regulations).

Larger obstructions (e.g. buried concrete debris, other obstructions) not directly observed in the boreholes are likely present in the earth fill. Similarly, larger inclusions (e.g. cobbles and boulders)

may be encountered in the native soils. The size and distribution of these obstructions cannot be predicted with boreholes, as the split spoon sampler is not large enough to capture particles of this size. Provision must be made in excavation contracts to allocate risks associated with the time spent and equipment utilized to remove or penetrate such obstructions when encountered.

Excavations may penetrate weathered and sound bedrock. Georgian Bay Formation bedrock is a rippable rock that can be removed with conventional excavation equipment once it has been broken by ripper tooth or hoe ram. Creating detailed excavation shapes for foundations etc. is normally accomplished by hoe ram. The removal of rock from a vertical face without over-excavation, which can happen inadvertently by dislodging additional rock, is largely dependent on machine operator skill. If excavation faces must be made neat (such as beside an existing footing), a line of excavation can be provided by line drilling the rock a series of closely-spaced vertical holes (100 mm diameter, spaced at 300 mm on centre) to provide a preferential vertical break path for the excavation face.

Georgian Bay Formation bedrock contains beds of harder limestone. When excavating this bedrock, it should be expected that these beds will be encountered. Hard layers of limestone interbedded within the shale are normally broken with hoe mounted hydraulic rams before excavation.

Limestone beds may also be found to straddle the founding elevation, in which case the entire thickness of the hard limestone layer must be removed to expose founding subgrade as it is not possible to remove part of one of these layers. This will in turn result in excess rock removal not intrinsic to the project requirements. The risk and responsibility for the excess rock removal under these circumstances, and the supply and placement of the extra concrete to restore the foundation grade, must be addressed in the contract documents for foundations, excavation, and shoring contractors.

4.2 Short-Term Groundwater Control

Considerations pertaining to groundwater discharge quantities and quality are discussed in Grounded's hydrogeological report for the site, under separate cover (File No: 21-199).

For design purposes, the stabilized groundwater table is at about Elev. 88.7± m. The water table is present in all the native soil units and the bedrock. The lowest (P2) FFE is at about Elev. 84.73 m. Therefore, bulk excavation will extend below the elevation of the prevailing groundwater table, terminating in cohesionless glacial till with high permeability. Conventional foundation excavations and grade beam excavations will, therefore, be made in a combination of high-permeability native tills and weathered bedrock that will produce free flowing water when penetrated.

A fully continuous interlocking concrete caisson wall is required as a temporary groundwater cutoff wall and as shoring for the excavation. A caisson wall must be designed as a groundwater cutoff wall with the toes of the wall (piles and fillers) socketed and consistently embedded into sound bedrock. A properly constructed full shoring cut-off wall approach is advantageous as it

will provide a fully-continuous temporary groundwater cut-off barrier (i.e. piles and fillers), which will enable the site to be dewatered during construction without inducing more horizontal flow into the excavation. Dewatering inside an excavation protected by a full cut-off barrier wall may be conducted using conventional sump arrangements or by other means and methods of the contractor. Once the inside of the cut-off wall excavation is dewatered, precipitation events will be the primary contributor of water entering the excavation is shored with a cut-off wall.

The City of Toronto will require Discharge Agreements in the short and long-terms, if any water is to be discharged to the storm or sanitary sewers.

4.3 Earth-Retention Shoring Systems

No excavation shall extend below the foundations of existing adjacent structures without adequate alternative support being provided.

Continuous interlocking caisson wall shoring must be used. Caisson wall shoring preserves the support capabilities and integrity of the soil beneath existing foundations of adjacent buildings, in a state akin to the at-rest condition.

4.3.1 Lateral Earth Pressure Distribution

Where multiple rows of lateral supports are used to support the shoring walls, research has shown that a distributed pressure diagram more realistically approximates the earth pressure on a shoring system of this type, when restrained by pre-tensioned anchors. A multi-level supported shoring system can be designed based on an earth pressure distribution with a maximum pressure defined by:

$$P = 0.65\,K[\gamma H + q] + \gamma_w h_w$$

P = maximum horizontal pressure (kPa)
K = earth pressure coefficient (see Section 3.3)
H = total depth of the excavation (m)
h_w = height of groundwater (m) above the base of excavation
γ = soil bulk unit weight (kN/m3)
q = total surcharge loading (kPa)

At this site, a design groundwater table at Elev. 88.7± m must be accounted for in the design. In cohesionless soils, the lateral earth pressure distribution is rectangular.

4.3.2 Soldier Pile Toe Embedment

Soldier pile toes will be made in very dense silt till unit. Soldier pile toes resist horizontal movement due to the passive earth pressure acting on the toe below the base of excavation.

The subgrade soils at this site are cohesionless, wet, and permeable. Augered holes for piles made into these soils will be prone to caving and blowback. Temporarily cased holes are required

to prevent borehole caving during installations in drilled holes. To prevent groundwater issues (groundwater inflow, caving and blowback into the drill holes, disturbance to placed concrete, etc.) during drilling and installation, construction methods such as utilizing temporary liners, pre-advancing liners deeper than the augured holes, mud/slurry/polymer drilling techniques, or other methods as deemed necessary by the shoring contractor are required.

If piles are embedded in sound bedrock, the maximum factored vertical geotechnical resistance at ULS for the design of a pile embedded in the sound bedrock is 10 MPa. The maximum factored lateral geotechnical resistance at ULS of the undisturbed rock is 1 MPa.

4.3.3 Lateral Bracing Elements

The shoring system at this site will require lateral bracing. If feasible, the shoring system should be supported by pre-stressed soil anchors (tiebacks) extending into the subgrade of the adjacent properties. To limit the movement of the shoring system as much as is practically possible, tiebacks are installed and stressed as excavation proceeds. The use of tiebacks through adjacent properties requires the consent (through encroachment agreements) of the adjacent property owners.

In the sand above Elev. 83± m and in the very dense till below Elev. 83± m, it is expected that post-grouted anchors can be made such that an anchor will safely carry up to 60 kN/m and 80 kN/m of adhered anchor length (at a nominal borehole diameter of 150 mm), respectively.

At least one prototype anchor per tieback level must be performance-tested to 200% of the design load to demonstrate the anchor capacity and validate design assumptions. Given the potential variability in soil conditions or installation quality, all production anchors must also be proof-tested to 133% of the design load.

The very dense till below the proposed FFE is suitable for the placement of raker foundations. If hard cohesive till (Borehole 103) is encountered, it should be subexcavated down to the underlying very dense cohesionless soils. Raker footings established on very dense till at an inclination of 45 degrees can be designed for a maximum factored geotechnical resistance at ULS of 600 kPa.

The partially weathered bedrock below the proposed FFE is suitable for the placement of raker foundations. Raker footings established on weathered bedrock at an inclination of 45 degrees can be designed using a maximum factored geotechnical resistance at ULS of 2,000 kPa.

4.4 Site Work

To better protect wet undisturbed subgrade, excavations exposing wet soils must be cut neat, inspected, and then immediately protected with a skim coat of concrete (i.e. a mud mat). Wet sands are susceptible to degradation and disturbance due to even mild site work, frost, weather, or a combination thereof.

The effects of work on site can greatly impact soil integrity. Care must be taken to prevent this damage. Site work carried out during periods of inclement weather may result in the subgrade becoming disturbed, unless a granular working mat is placed to preserve the subgrade soils in their undisturbed condition. Subgrade preparation activities should not be conducted in wet weather and the project must be scheduled accordingly.

If site work causes disturbance to the subgrade, removal of the disturbed soils and the use of granular fill material for site restoration or underfloor fill will be required at additional cost to the project.

It is construction activity itself that often imparts the most severe loading conditions on the subgrade. Special provisions such as end dumping and forward spreading of earth and aggregate fills, restricted construction lanes, and half-loads during placement of the granular base and other work may be required, especially if construction is carried out during unfavourable weather.

Adequate temporary frost protection for the founding subgrade must be provided if construction proceeds in freezing weather conditions. The subgrade at this site is susceptible to frost damage. Depending on the project context, consideration should be given to frost effects (heaving, softening, etc.) on exposed subgrade surfaces.

The exposed Georgian Bay Formation deteriorates with time. Exposed excavation faces have been found to flake and recede as much as 300 mm with 12 months exposure. This recession generally takes the form of coin size shale particles dropping from the face on a constant basis. The deteriorated rock loses internal integrity and bearing capability. If bedrock is to be exposed for prolonged periods of time, it is recommended that a skim coat of concrete be used to protect the surface of bedrock from slaking and other degradation resulting from weathering.

4.5 Engineering Review

By issuing this preliminary report, Grounded Engineering has assumed the role of Geotechnical Engineer of Record for this site. Grounded should be retained to review the structural engineering drawings prior to issue or construction to ensure that the recommendations in this report have been appropriately implemented.

All foundation installations must be reviewed in the field by Grounded, the Geotechnical Engineer of Record, as they are constructed. The on-site review of the condition of the founding subgrade as the foundations are constructed is as much a part of the geotechnical engineering design function as the design itself; it is also required by Section 4.2.2.2 of the Ontario Building Code. If Grounded is not retained to carry out foundation engineering field review during construction, then Grounded accepts no responsibility for the performance or non-performance of the foundations, even if they are constructed in general conformance with the engineering design advice contained in this report.

The long-term performance of a slab on grade is highly dependent upon the subgrade support and drainage conditions. Strict procedures must be maintained during construction to maintain

the integrity of the subgrade to the extent possible. The design advice in this report is based on an assessment of the subgrade support capabilities as indicated by the boreholes. These conditions may vary across the site depending on the final design grades and therefore, the preparation of the subgrade and the compaction of all fill should be monitored by Grounded at the time of construction to confirm material quality, thickness, and to ensure adequate compaction.

A visual pre-construction survey of adjacent lands and buildings is recommended to be completed prior to the start of any construction. This documents the baseline condition and can prevent unwarranted damage claims. Any shoring system, regardless of the execution and design, has the potential for movement. Small changes in stress or soil volume can cause cracking in adjacent buildings.

5 Limitations and Restrictions

Grounded should be retained to review the structural engineering drawings prior to issue or construction to ensure that the recommendations in this report have been appropriately implemented.

This preliminary geotechnical engineering report is appropriate for due diligence and planning purposes only. Due to site access limitations during the time of our investigation in 2021, additional boreholes (particularly in the northern portion of the site), in situ testing, wells, and a detailed geotechnical engineering report will be required for detailed design. These additional boreholes must be advanced after the buildings in the northern portion of the site has been demolished.

5.1 Investigation Procedures

The geotechnical engineering analysis and advice provided here are based *in part* on factual data obtained from investigations at this site conducted by EXP as described above, as well as the factual borehole information observed and recorded by Grounded. EXP's subsurface information is provided in a professional engineer's signed and sealed geotechnical report, and as such this borehole information is taken as factual for present purposes.

The investigation methodology and engineering analysis methods used to carry out this scope of work are consistent with conventional standard practice by Grounded as well as other geotechnical consultants, working under similar conditions and constraints (time, financial and physical).

Borehole drilling services were provided to Grounded by a specialist professional contractor. The drilling was observed and recorded by Grounded's field supervisor on a full-time basis. Drilling was conducted using conventional and limited access drilling rigs equipped with conventional drilling augers and mud-rotary. As drilling proceeded, groundwater observations were made in the

boreholes. Based on examination of recovered borehole samples, our field supervisor made a record of borehole and drilling observations. The field samples were secured in air-tight clean jars and bags and taken to the Grounded soil laboratory where they were each logged and reviewed by the geotechnical engineering team and the senior reviewer.

The Split-Barrel Method technique (ASTM D1586) was used to obtain the soils samples. The sampling was conducted at conventional intervals and not continuously. As such, stratigraphic interpolation between samples is required and stratigraphic boundary lines do not represent exact depths of geological change. They should be taken as gradual transition zones between soil or rock types.

A carefully conducted, fully comprehensive investigation and sampling scope of work carried out under the most stringent level of oversight may still fail to detect certain ground conditions. As such, users of this report must be aware of the risks inherent in using engineered field investigations to observe and record subsurface conditions. As a necessary requirement of working with discrete test locations, Grounded has assumed that the conditions between test locations are the same as the test locations themselves, for the purposes of providing geotechnical engineering advice.

It is not possible to design a field investigation with enough test locations that would provide complete subsurface information, nor is it possible to provide geotechnical engineering advice that completely identifies or quantifies every element that could affect construction, scheduling, or tendering. Contractors undertaking work based on this report (in whole or in part) must make their own determination of how they may be affected by the subsurface conditions, based on their own analysis of the factual information provided and based on their own means and methods. Contractors using this report must be aware of the risks implicit in using factual information at discrete test locations to infer subsurface conditions across the site and are directed to conduct their own investigations as needed.

5.2 Site and Scope Changes

Natural occurrences, the passage of time, local construction, and other human activity all have the potential to directly or indirectly alter the subsurface conditions at or near the project site. Contractual obligations related to groundwater or stormwater control, disturbed soils, frost protection, etc. must be considered with attention and care as they relate this potential site alteration.

This report provides preliminary geotechnical engineering advice intended for use by the owner and their retained design team for due diligence only. These preliminary interpretations, design parameters, advice, and discussion on construction considerations are not complete. A detailed site-specific geotechnical investigation must be conducted by Grounded during detailed design to confirm and update the preliminary recommendations provided here.

5.3 Report Use

The authorized users of this report are Hullmark Sun Life (376 Dufferin) LP and their design team, for whom this report has been prepared. Grounded Engineering Inc. maintains the copyright and ownership of this document. Reproduction of this report in any format or medium requires explicit prior authorization from Grounded Engineering Inc.

The City of Toronto may also make use of and rely upon this report, subject to the limitations as stated.

6 Closure

If the design team has any questions regarding the discussion and advice provided, please do not hesitate to have them contact our office. We trust that this report meets your requirements at present.

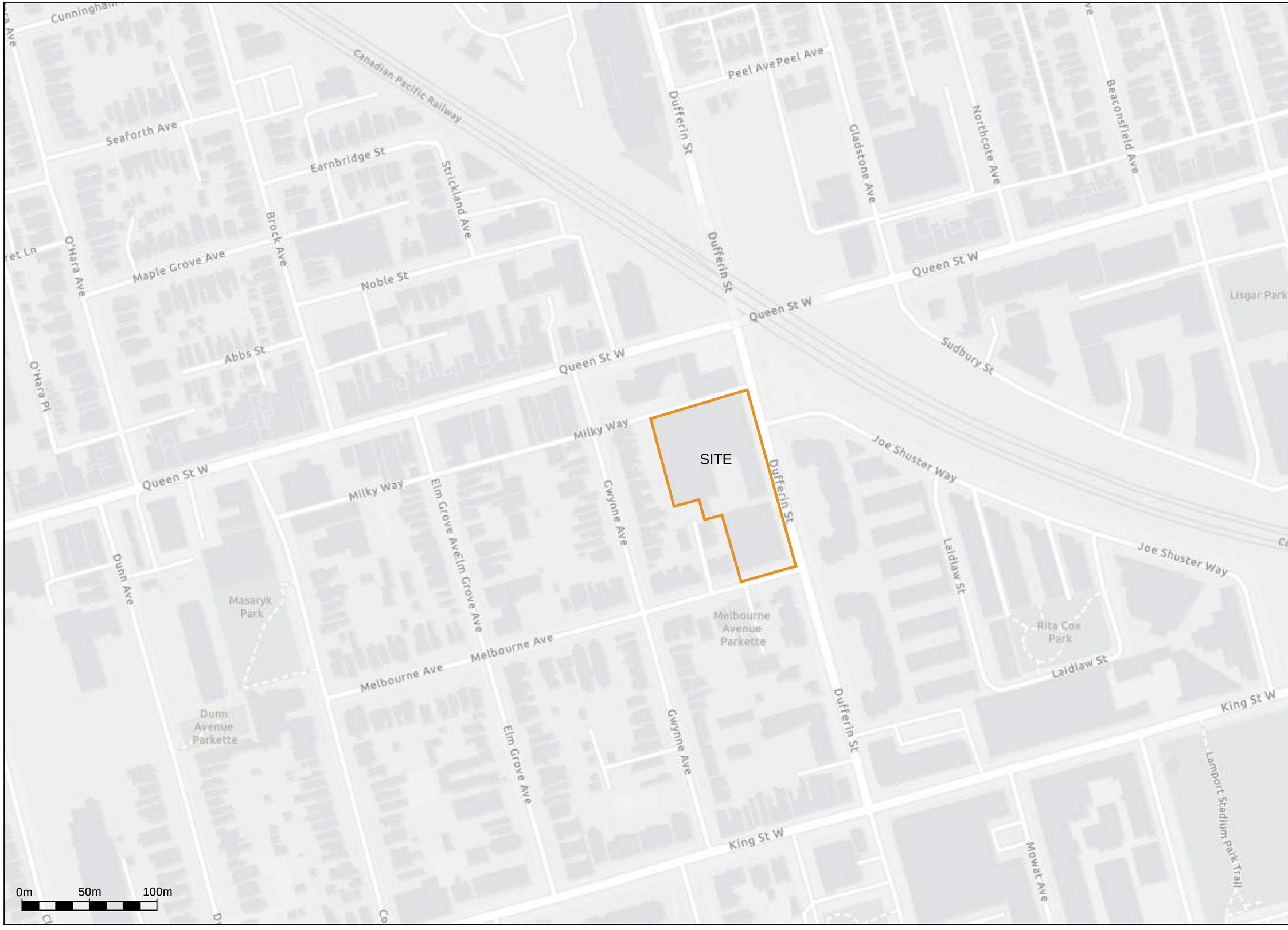
For and on behalf of our team,

GROUNDED ENGINEERING

Arman Gelimforoush, MASc, EIT
Project Manager

Jason Crowder, Ph.D., P.Eng
Principal

FIGURES



GROUNDED ENGINEERING
1 BANIGAN DRIVE, TORONTO, ONT., M4H 1G3
www.groundedeng.ca

LEGEND

APPROXIMATE PROPERTY BOUNDARY

Note

Reference

ArcGIS Online Map 2022

Project

340-376 DUFFERIN STREET, TORONTO, ONTARIO

Figure Title

SITE LOCATION PLAN

North

TRUE PROJECT

Date

JULY 2022

Scale

AS INDICATED

Job No

21-199

Figure No

FIGURE 1

GROUNDED ENGINEERING
1 BANIGAN DRIVE, TORONTO, ONT., M4H 1G3
www.groundedeng.ca

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING BUILDING STRUCTURE
- COMM — COMMUNICATION
- MH — MANHOLE
- CB — CATCH BASIN
- APPROXIMATE LOCATION OF GROUNDED BOREHOLES
- APPROXIMATE LOCATION OF EXISTING MONITORING WELLS (EXP 2016)
- APPROXIMATE LOCATION OF EXISTING BOREHOLES (EXP 2016)

Note

Reference

Survey Drawing job no. 15-285.
Certificate date: April 11, 2019.
Prepared by KRCMAR Surveyors Limited.
Received on April 25, 2019.

Project

340-376 DUFFERIN STREET,
TORONTO, ONTARIO

Figure Title

BOREHOLE LOCATION PLAN - EXISTING CONDITION

North

TRUE
PROJECT

Date

JULY 2022

Scale

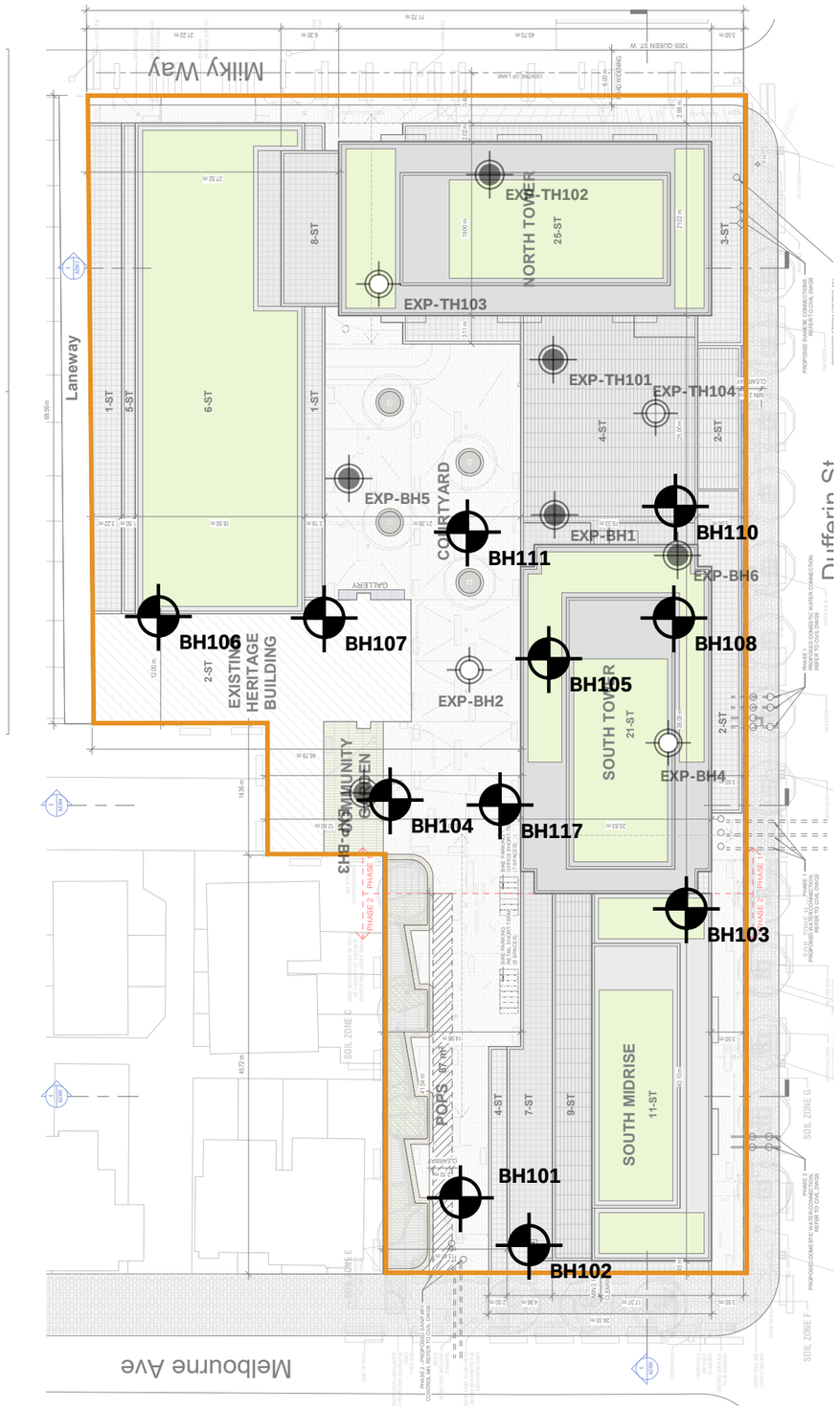
0m 10m 20m

Job No

21-199

Figure No

FIGURE 2



GROUNDED ENGINEERING

1 BANIGAN DRIVE, TORONTO, ONT., M4H 1G3
www.groundedeng.ca

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- (MH) MANHOLE
- CB CATCH BASIN
- APPROXIMATE LOCATION OF GROUNDED BOREHOLES
- APPROXIMATE LOCATION OF EXISTING MONITORING WELLS (EXP 2016)
- APPROXIMATE LOCATION OF EXISTING BOREHOLES (EXP 2016)

Note

Reference

Architectural drawing set prepared by Sweeny and Co Architects, Project No. 2102, Dated July 15, 2022.

Project

340-376 DUFFERIN STREET, TORONTO, ONTARIO

Figure Title

BOREHOLE LOCATION PLAN - PROPOSED CONDITION

North

TRUE PROJECT

Date

JULY 2022

Scale

Job No

21-199

Figure No

FIGURE 3

Average Ground Elev. 93.4 m

Design Groundwater Table Elev. 88.7 m

Proposed P2 FFE Elev. 84.6 m

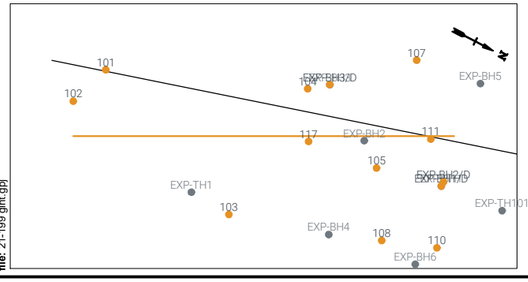
Elevation (m)

SOUTH

NORTH

Boreholes Equally Spaced

SITE MAP



file: 21-199 gint.gpj

LITHOLOGY GRAPHIC LEGEND

- Concrete
- Fill
- Silty Sand
- Gravel
- Silty Till
- Bedrock (cored)
- Aggregate
- Sand
- Clayey Silt Till
- Asphalt
- Sandy Silt Till
- Silty Sand Till
- Sand and Silt
- Silt and Sand Till
- Bedrock (inferred)

GROUNDED ENGINEERING

1 Banigan Drive, Toronto, Ont., M4H 1G3
www.groundedeng.ca

LEGEND

- FILL
- GRAVELS (gravel to gravelly sand)
- SILT TO SAND (not till)
- COHESIONLESS TILLS
- COHESIVE SOILS (clayey silt to clay, incl. tills)
- DISTURBED/REWORKED/ORGANIC

- water level, unstabilized
- water level, stabilized (latest)
- water level, stabilized (highest)

Project

340 - 376 DUFFERIN ST TORONTO

Figure Title

SUBSURFACE CROSS-SECTION

Date

JULY 2022

Scale

AS INDICATED

Job No

21-199

Figure No

FIGURE 4

APPENDIX A

BOREHOLE LOG TERMINOLOGY

GROUNDED ENGINEERING

SAMPLING/TESTING METHODS

SS: split spoon sample

AS: auger sample

GS: grab sample

FV: shear vane

DP: direct push

PMT: pressuremeter test

ST: shelby tube

CORE: soil coring

RUN: rock coring

SYMBOLS & ABBREVIATIONS

MC: moisture content

LL: liquid limit

PL: plastic limit

PI: plasticity index

γ: soil unit weight (bulk)

G_s: specific gravity

S_u: undrained shear strength

▽ unstabilized water level

▼ 1st water level measurement

▼ 2nd water level measurement most recent

▼ water level measurement

ENVIRONMENTAL SAMPLES

M&I: metals and inorganic parameters

PAH: polycyclic aromatic hydrocarbon

PCB: polychlorinated biphenyl

VOC: volatile organic compound

PHC: petroleum hydrocarbon

BTEX: benzene, toluene, ethylbenzene and xylene

PPM: parts per million

FIELD MOISTURE (based on tactile inspection)

DRY: no observable pore water

MOIST: inferred pore water, not observable (i.e. grey, cool, etc.)

WET: visible pore water

COHESIONLESS

Relative Density	N-Value
Very Loose	<4
Loose	4 - 10
Compact	10 - 30
Dense	30 - 50
Very Dense	>50

COHESIVE

Consistency	N-Value	Su (kPa)
Very Soft	<2	<12
Soft	2 - 4	12 - 25
Firm	4 - 8	25 - 50
Stiff	8 - 15	50 - 100
Very Stiff	15 - 30	100 - 200
Hard	>30	>200

COMPOSITION

Term	% by weight
trace silt	<10
some silt	10 - 20
silt***y***	20 - 35
sand ***and*** silt	>35

ASTM STANDARDS

ASTM D1586 Standard Penetration Test (SPT)
Driving a 51 mm O.D. split-barrel sampler ("split spoon") into soil with a 63.5 kg weight free falling 760 mm. The blows required to drive the split spoon 300 mm ("bpf") after an initial penetration of 150 mm is referred to as the N-Value.

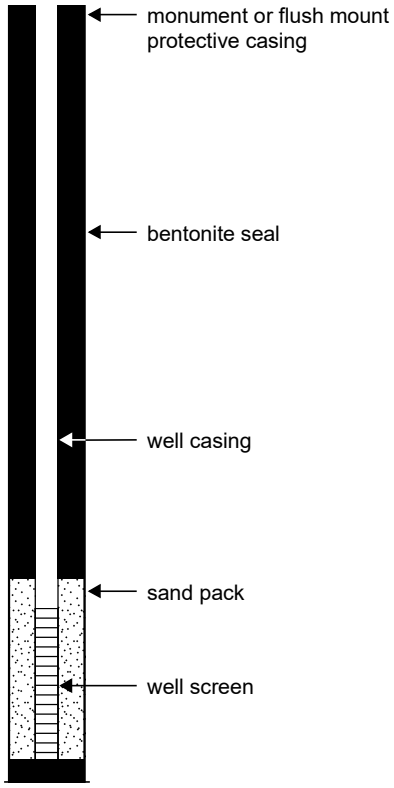
ASTM D3441 Cone Penetration Test (CPT)
Pushing an internal still rod with a outer hollow rod ("sleeve") tipped with a cone with an apex angle of 60° and a cross-sectional area of 1000 mm^2 into soil. The resistance is measured in the sleeve and at the tip to determine the skin friction and the tip resistance.

ASTM D2573 Field Vane Test (FVT)
Pushing a four blade vane into soil and rotating it from the surface to determine the torque required to shear a cylindrical surface with the vane. The torque is converted to the shear strength of the soil using a limit equilibrium analysis.

ASTM D1587 Shelby Tubes (ST)
Pushing a thin-walled metal tube into the in-situ soil at the bottom of a borehole, removing the tube and sealing the ends to prevent soil movement or changes in moisture content for the purposes of extracting a relatively undisturbed sample.

ASTM D4719 Pressuremeter Test (PMT)
Place an inflatable cylindrical probe into a pre-drilled hole and expanding it while measuring the change in volume and pressure in the probe. It is inflated under either equal pressure increments or equal volume increments. This provides the stress-strain response of the soil.

WELL LEGEND



ROCK CORE TERMINOLOGY (MTO SHALE)

TCR **Total Core Recovery** the total length of recovery (soil or rock) per run, as a percentage of the drilled length
SCR **Solid Core Recovery** the total length of sound full-diameter rock core pieces per run, as a percentage of the drilled length
RQD **Rock Quality Designation** the sum of all pieces of sound rock core in a run which are 10 cm or greater in length, as a percentage of the drilled length

Natural Fracture Frequency (typically per 0.3 m) The number of natural discontinuities (joints, faults, etc.) which are present per 0.3m. Ignores mechanical or drill-induced breaks, and closed discontinuities (e.g. bedding planes).

LOGGING DISCONTINUITIES

Discontinuity Type

BP bedding parting
CL cleavage
CS crushed seam
FZ fracture zone
MB mechanical break
IS infilled seam
JT Joint
SS shear surface
SZ shear zone
VN vein
VO void

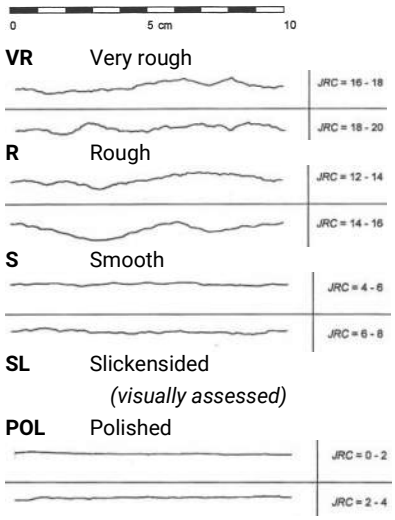
Coating

CN Clean
SN Stained
OX Oxidized
VN Veneer
CT Coating (>1 mm)

Dip Inclination

H	horizontal/flat	0 - 20°
D	dipping	20 - 50°
SV	sub-vertical	50 - 90°
V	vertical	90±°

Roughness (Barton et al.)



VR Very rough
R Rough
S Smooth
SL Slickensided *(visually assessed)*
POL Polished

Spacing in Discontinuity Sets (*ISRM 1981*)

VC	very close	< 60 mm
C	close	60 – 200 mm
M	mod. close	0.2 to 0.6 m
W	wide	0.6 to 2 m
VW	very wide	> 2 m

Aperture Size

T	closed / tight	< 0.5 mm
GA	gapped	0.5 to 10 mm
OP	open	> 10 mm

Planarity

PR	Planar
UN	Undulating
ST	Stepped
IR	Irregular
DIS	Discontinuous
CU	Curved

GENERAL

Degree of Weathering (*after MTO, RR229 Evaluation of Shales for Construction Projects*)

Zone	Degree	Description
Z1	unweathered	shale, regular jointing
Z2	partially weathered	angular blocks of unweathered shale, no matrix, with chemically weathered but intact shale
Z3		soil-like matrix with frequent angular shale fragments < 25mm diameter
Z4a		soil-like matrix with occasional shale fragments < 3mm diameter
Z4b	fully weathered	soil-like matrix only

Strength classification (*after Marinos and Hoek, 2001; ISRM 1981b*)

Grade		UCS (MPa)	Field Estimate (Description)
R6	extremely strong	> 250	can only be chipped by geological hammer
R5	very strong	100 - 250	requires many blows from geological hammer
R4	strong	50 - 100	requires more than one blow from geological hammer
R3	medium strong	25 - 50	can't be scraped, breaks under one blow from geological hammer
R2	weak	5 - 25	can be peeled / scraped with knife with difficulty
R1	very weak	1 - 5	easily scraped / peeled, crumbles under firm blow of geo. hammer
R0	extremely weak	< 1	indented by thumbnail

Bedding Thickness (*Q. J. Eng. Geology, Vol 3, 1970*)

Very thickly bedded	> 2 m
Thickly bedded	0.6 – 2m
Medium bedded	200 – 600mm
Thinly bedded	60 – 200mm
Very thinly bedded	20 – 60mm
Laminated	6 – 20mm
Thinly Laminated	< 6mm

GROUNDED ENGINEERING

Date Started : Oct 16, 2021
Position : E: 626748, N: 4833162 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 101

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : LA rig w/ full hammer

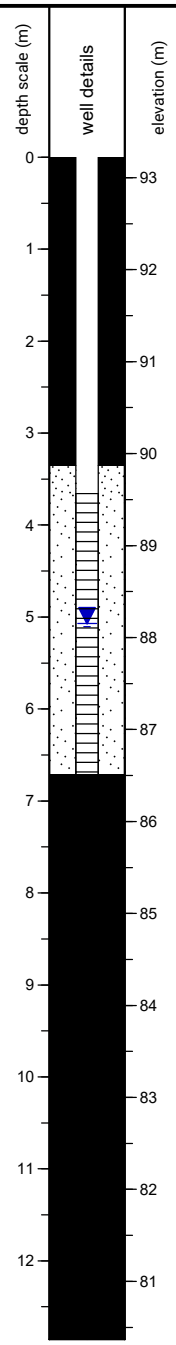
elev depth (m)	description	graphic log	number	type	SPT N-value
93.2	**TOP OF SLAB**				
	165mm **CONCRETE**		1A	SS	19
	FILL, silty sand, trace gravel, trace brick fragments, trace rock fragments, trace cinders, compact, black, moist		1B		
			2	SS	10
	...at 1.5 m, trace rootlets, brown		3	SS	18
90.9					
2.3	**SAND**, some silt, trace gravel, trace clay, very dense, brown, moist		4	SS	71
			5	SS	67
88.6					
4.6	**GRAVEL**, some sand, trace silt, trace rock fragments (inferred cobbles), loose, grey, wet		6	SS	7
87.7			7A	SS	53
5.5	**SILTY SAND**, trace gravel, trace clay, very dense, grey, moist to wet		7B		
87.1					
6.1	**SILT**, some sand, some gravel, trace to some clay, trace shale fragments, very dense, grey, wet (GLACIAL TILL)		8	SS	63
			9	SS	81
	...at 10.1 m, trace gravel, some sand/sand lenses, grey, moist		10	SS	73
			1	RUN	
			2	RUN	
80.9					
12.3	**GEORGIAN BAY FORMATION** (See rock core log for details)				
80.3					
12.9	**END OF BOREHOLE**				

hollow stem augers OD=215 mm

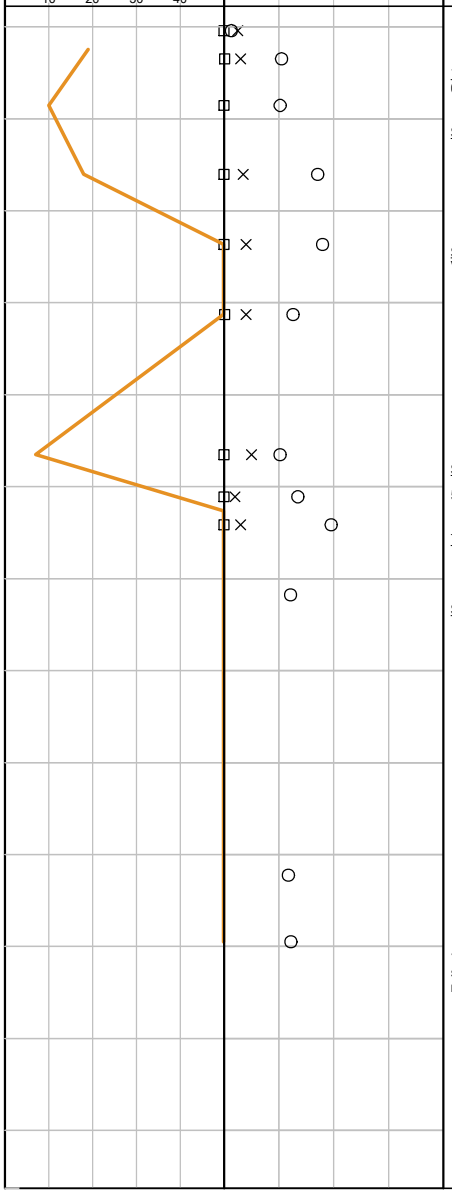
mud rotary med OD=125 mm

Rock coring (HQ) OD=96 mm

depth scale (m) / well details / elevation (m)



undrained shear strength (kPa) — unconfined, field vane, pocket penetrometer, Lab Vane; 40 80 120 160
SPT N-values (bpf) — dynamic cone; 10 20 30 40
headspace vapour (ppm) — hexane, isobutylene, methane; 100 200 300
moisture / plasticity — PL MC LL; 10 20 30



unstabilized water level

lab data and comments

grain size distribution (%) (MIT) — GR SA SI CL

1B: H-Ms, Metals, ORPs
0.5m: auger grinding

SS2: PAHs

1 80 17 2

SS4: BTEX, PAHs, PHCs, VOCs

SS6: PHCs
5.2m: auger grinding
1 55 41 3

7B: VOCs

SS8: BTEX, PHCs

10.2m: rock coring started split spoon extended to 10.7 m and over cored

Contained drill water upon completion of drilling. Unstabilized water level not measured. Borehole was open.

38 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	5.1	88.1
Nov 12, 2021	5.1	88.1
Nov 26, 2021	5.1	88.1
Dec 10, 2021	5.1	88.1
Dec 23, 2021	5.1	88.1
Jan 7, 2022	5.1	88.1

file: 21-199 gint.gpj

Tech : DI | **PM** : AG/SP | **Rev** : NN

GROUNDED ENGINEERING

Date Started : Oct 16, 2021
Position : E: 626748, N: 4833162 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 101

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

depth (m)	stratigraphy	Run elev depth (m)	recovery	elevation (m)	shale weathering zones	UCS (MPa) / estimated strength	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
	Rock coring started at 10.2m below grade	**83.0**								
	SILT, some sand, some gravel, trace to some clay, trace shale fragments, very dense, grey, wet (GLACIAL TILL)	10.2		83					**10.2 / 83.0 - 10.6 / 82.7m:** lost core	
11		R1	TCR = **73%** SCR = **0%** RQD = **0%**							
		81.9		82			**N/A**			82
		11.3								
12		R2	TCR = **100%** SCR = **38%** RQD = **10%**							
	GEORGIAN BAY FORMATION **Shale**, grey, thinly bedded, weak; joints are horizontal, gapped, planar;			81			**3**		**12.4 / 80.8m:** JT SV	81
							7		**12.7 / 80.5m:** JT SV	
	limestone, light grey, very thinly bedded to thinly bedded, medium strong	80.3								
	Overall shale: 84%, limestone: 16%	**12.9m**								
	END OF COREHOLE									

shale weathering zones: Z1 Z2 Z3 Z4
UCS (MPa): 5 25 50 100 250
estimated strength: R1 R2 R3 R4 R5 R6

file: 21-199 gint.gpj

Tech : DI | **PM** : AG/SP | **Rev** : NN

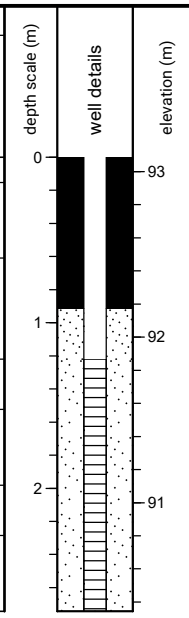
Date Started : Oct 16, 2021
Position : E: 626757, N: 4833159 (UTM 17T)
Elev. Datum : Geodetic

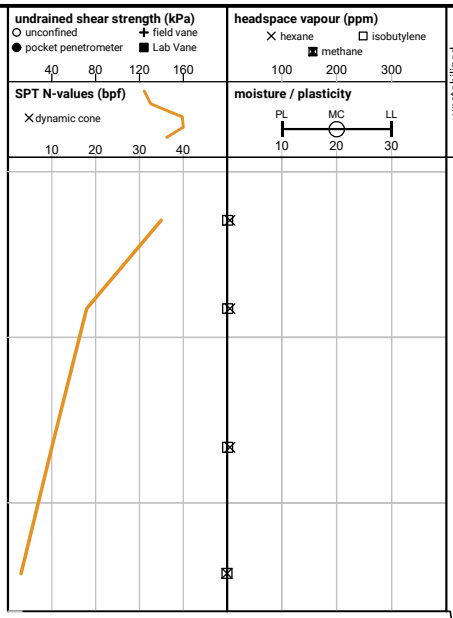
BOREHOLE LOG 102

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : *Mini Mole*

elev / depth (m)	description	graphic log	sample number	sample type	SPT N-value
93.1	**TOP OF SLAB**				
92.9	150mm **CONCRETE**				
0.2 / 92.8	150mm **AGGREGATE**				
0.3	**FILL**, sand, some silt, trace gravel, trace construction debris, trace cinders, trace rock fragments (inferred cobbles), trace brick fragments, compact to dense, brown, moist		1	SS	35
	...at 0.8 m, silt and clay packets		2	SS	18
	...at 1.5 m, trace rootlets		3	SS	10
	...at 2.3 m, very loose		4	SS	3
90.4 / 2.7	**END OF BOREHOLE**				





unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1: BTEX, PAHs, PHCs, VOCs

SS2: EC/SAR, H-Ms, Metals, ORPs, PAHs, pH

SS3: BTEX, PHCs, VOCs

2.7m: spoon bouncing, hit refusal

SS4: BTEX, PHCs, VOCs

Dry and open upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	dry	n/a
Nov 12, 2021	dry	n/a
Nov 26, 2021	dry	n/a
Dec 10, 2021	dry	n/a
Dec 23, 2021	dry	n/a
Jan 7, 2022	dry	n/a

file: 21-199 gint.gpj

Tech : KS | **PM** : AG/SP | **Rev** : NN

Date Started : Oct 12, 2021
Position : E: 626763, N: 4833199 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 103

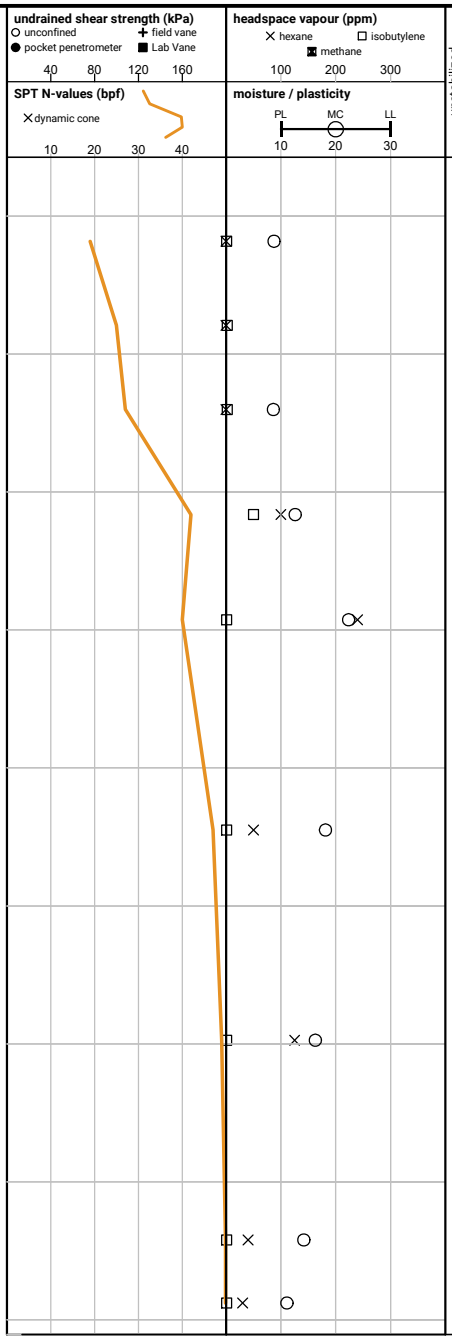
File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

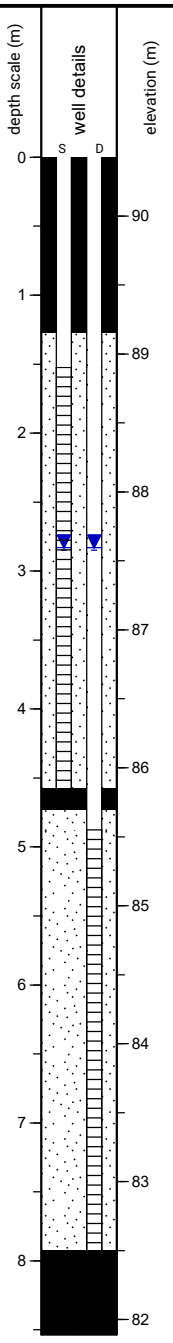
drill method : *LA rig w/ full hammer*

elev depth (m)	description	graphic log	number	type	SPT N-value
90.4	**TOP OF SLAB**				
	125mm **CONCRETE**				
90.1	175mm **AGGREGATE**				
0.3	**SAND**, some silt, compact, brown, moist		1	SS	19
			2	SS	25
			3	SS	27
	...at 2.3 m, silty sand, dense, grey		4	SS	42
	...at 3.0 m, sand and silt, trace clay, wet		5	SS	40
			6	SS	47
	...at 6.1 m, moist		7	SS	49
82.8					
7.6	**CLAYEY SILT**, some sand, trace gravel, trace shale fragments, trace rock fragments (cobbles inferred), hard, grey, moist (GLACIAL TILL)		8	SS	82
			9	SS	95
81.9					
8.5	**END OF BOREHOLE**				

hollow stem augers OD=215 mm

mud rotary med OD=125 mm





unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS2: H-Ms, Metals, ORPs, PAHs

SS3: BTEX, PAHs, PHCs, VOCs

SS4: BTEX, EC/SAR, H-Ms, Metals, ORPs, pH, PHCs, VOCs

0 59 38 3

SS5: BTEX, PHCs, VOCs

SS6: BTEX, PHCs, VOCs

7.0m: auger grinding **to 7.6m**

Contained drill water upon completion of drilling. Unstabilized water level not measured. Borehole was open.

38 mm dia. monitoring well installed. No. 10 screen

103-S GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	2.9	87.5
Nov 4, 2021	2.8	87.6
Nov 12, 2021	2.8	87.6
Nov 16, 2021	2.8	87.6
Nov 26, 2021	2.8	87.6
Dec 10, 2021	2.9	87.5
Dec 23, 2021	2.8	87.6
Jan 7, 2022	2.8	87.6

103-D GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	2.8	87.6
Nov 4, 2021	2.8	87.6
Nov 12, 2021	2.5	87.9
Nov 16, 2021	2.8	87.6
Nov 26, 2021	2.8	87.6
Dec 10, 2021	2.9	87.5
Dec 23, 2021	2.8	87.6
Jan 7, 2022	2.8	87.6

file: 21-199 gint.gpj

Tech : DI | **PM** : AG/SP | **Rev** : NN

GROUNDED ENGINEERING

Date Started : Oct 22, 2021
Position : E: 626732, N: 4833201 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 104

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
93.3	**GROUND SURFACE**				
92.9 / 0.4	75mm **ASPHALT** 275mm **AGGREGATE**		1	SS	6
	FILL, clayey silt, some sand, trace gravel, trace cinders, trace asphalt, trace concrete, firm, brown and black, moist ...at 1.0 m, grey ...at 1.6 m, black and grey		2	SS	5
91.2 / 2.1	**SILTY SAND**, dense to very dense, brown, moist		3A	SS	5
			3B		
			4	SS	51
			5	SS	48
	...at 4.6 m, wet		6	SS	41
			7	SS	35
85.7 / 7.6	**SANDY SILT**, trace gravel, trace clay, trace rock fragments (cobbles inferred), dense to very dense, grey, wet (GLACIAL TILL)		8	SS	46
			9	SS	50 / 125mm
	...at 10.7 m, clayey silt, some sand, trace gravel, trace shale fragments		10	SS	74
			1	RUN	
80.2 / 13.1	**GEORGIAN BAY FORMATION** (See rock core log for details) ...at 13.6 m, transition to sound bedrock		2	RUN	
			3	RUN	
77.7 / 15.6	**END OF BOREHOLE**				

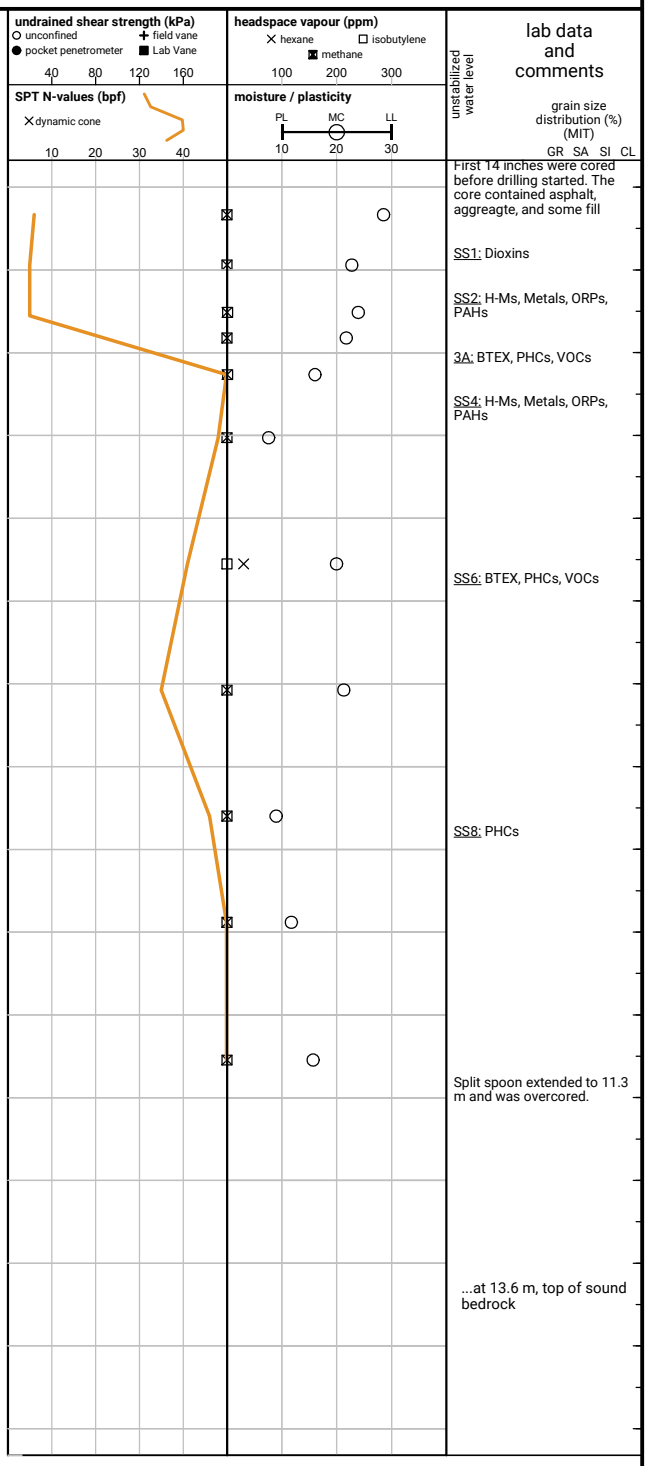
hollow stem augers (skinny) OD=110 mm

mud rotary small OD=100 mm

Rock coring (HQ) OD=96 mm

Borehole was filled with drill water upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen



lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

First 14 inches were cored before drilling started. The core contained asphalt, aggreagte, and some fill

SS1: Dioxins

SS2: H-Ms, Metals, ORPs, PAHs

3A: BTEX, PHCs, VOCs

SS4: H-Ms, Metals, ORPs, PAHs

SS6: BTEX, PHCs, VOCs

SS8: PHCs

Split spoon extended to 11.3 m and was overcored.

...at 13.6 m, top of sound bedrock

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 29, 2021	5.5	87.8
Nov 4, 2021	5.3	88.0
Nov 12, 2021	5.3	88.0
Nov 16, 2021	5.2	88.1
Nov 26, 2021	5.2	88.1
Dec 10, 2021	5.2	88.1
Dec 23, 2021	5.2	88.1
Jan 7, 2022	5.2	88.1

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Oct 22, 2021
Position : E: 626732, N: 4833201 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 104

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

depth (m)	stratigraphy	Run	elev depth (m)	recovery	elevation (m)	shale weathering zones	UCS (MPa) / estimated strength	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
	Rock coring started at 11.1m below grade		**82.2**								
	SANDY SILT, trace gravel, trace clay, trace rock fragments (cobbles inferred), dense to very dense, grey, wet (GLACIAL TILL)		11.1								
12		R1		TCR = **97%** SCR = **0%** RQD = **0%**	82			NA			82
			80.7		81						81
13			12.6							**13.1 / 80.3 - 13.1 / 80.2m:** SM clay	
	GEORGIAN BAY FORMATION **Shale**, grey, thinly bedded, weak; joints are horizontal, gapped, planar; **limestone**, light grey, very thinly bedded to thinly bedded, medium strong	R2		TCR = **100%** SCR = **63%** RQD = **37%**	80			7			80
	Overall shale: 60%, limestone: 40% **... at 13.6 m (Elev. 79.8 m), transition to sound rock**							3+Rz		**13.5 / 79.8 - 13.6 / 79.8m:** rubbalized zone (50 mm)	
14			79.2					3		**13.8 / 79.5 - 13.9 / 79.5m:** SM clay	
			14.1					4		**14.0 / 79.3 - 14.0 / 79.3m:** SM clay	
	Run 2 : 30% limestone 70% shale				79			3		**14.2 / 79.1 - 14.3 / 79.1m:** SM clay	79
15		R3		TCR = **100%** SCR = **98%** RQD = **83%**				2			
					78			4			78
	Run 3 : 35% limestone 65% shale		77.7					5			
			15.6m								
	END OF COREHOLE										

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Oct 18, 2021
Position : E: 626740, N: 4833222 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 105

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

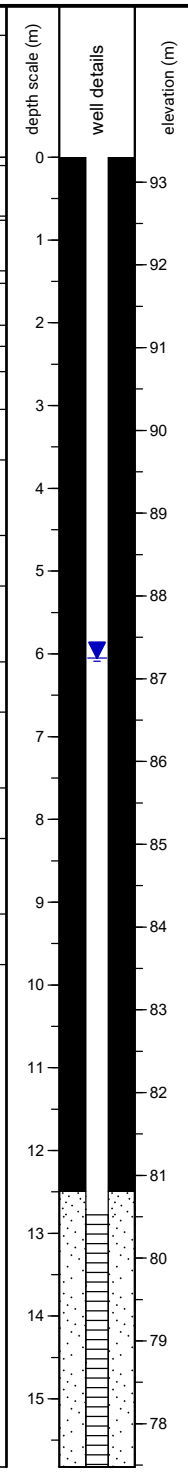
drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
93.3	**GROUND SURFACE**				
	75mm **ASPHALT**		1	SS	24
	25mm **AGGREGATE**				
	FILL, silty sand, trace gravel, trace cinders, trace brick fragments, trace rootlets,, loose to compact, black, moist		2	SS	4
91.5	...at 1.5 m, orangey brown, compact		3A	SS	17
1.8	...at 1.8 m, light brown		3B		
	SILTY SAND, with clayey sily packets, compact to dense, brown, moist		4	SS	24
	...at 3.0 m, very dense		5	SS	52
	...at 4.6 m, brown to grey (transitioning)		6	SS	45
	...at 6.1 m, wet		7	SS	39
	...at 7.6 m, grey		8	SS	36
84.2					
9.1	**SAND AND SILT**, some clay, trace gravel, very dense, grey, moist to wet (GLACIAL TILL)		9	SS	41
			1	RUN	
			2	RUN	
80.1					
13.2	**GEORGIAN BAY FORMATION** (See rock core log for details) ...at 13.6 m, transition to sound bedrock		3	RUN	
			4	RUN	
77.5					
15.8	**END OF BOREHOLE**				

hollow stem augers OD=215 mm

Rock coring (HQ) OD=96 mm

depth scale (m) / well details / elevation (m)



undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40 80 120 160
SPT N-values (bpf): dynamic cone; 10 20 30 40
headspace vapour (ppm): hexane, isobutylene, methane; 100 200 300
moisture / plasticity: PL MC LL; 10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT) GR SA SI CL

0.2m: SS1 was collected directly beside BH location due to suspected slab **to 0.8m**

SS1: EC/SAR, H-Ms, Metals, ORPs, PAHs, pH

SS2: EC/SAR, H-Ms, ORPs, pH

3A: BTEX, PHCs, VOCs

SS4: EC/SAR, H-Ms, Metals, ORPs, PAHs, pH

SS6: BTEX, PHCs, VOCs

SS7: BTEX, PHCs

SS8: BTEX, VOCs

3 45 39 13

10.7m: SS10, N=80/100mm, clayey silt, trace gravel, trace sand, trace shale fragments, grey, hard, moist **to 10.8m**

10.7m: spoon bouncing, rock coring started

...at 13.6 m, top of sound bedrock

Unstabilized water level measured at 4.6 m below ground surface upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	6.3	87.0
Oct 28, 2021	6.3	87.0
Nov 4, 2021	7.2	86.1
Nov 12, 2021	6.8	86.5
Nov 16, 2021	6.5	86.8
Nov 26, 2021	6.3	87.0
Dec 10, 2021	6.0	87.3
Dec 23, 2021	6.0	87.3
Jan 7, 2022	6.1	87.2

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : NN

GROUNDED ENGINEERING

Date Started : Oct 18, 2021
Position : E: 626740, N: 4833222 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 105

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

depth (m)	stratigraphy	Run elev / depth (m)	recovery	elevation (m)	shale weathering zones (Z1 Z2 Z3 Z4)	UCS (MPa) 5 25 50 100 250 / estimated strength (R1 R2 R3 R4 R5 R6)	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
	Rock coring started at 10.7m below grade	**82.6**								
11	**SAND AND SILT**, some clay, trace gravel, very dense, grey, moist to wet (GLACIAL TILL)	10.7 R1	TCR = **69**% SCR = **0**% RQD = **0**%							
		11.3 R2	TCR = **62**% SCR = **0**% RQD = **0**%	82						82
12							N/A			
		80.5		81					**12.2 / 81.1 - 12.5 / 80.8m:** lost core	81
		12.8							**12.8 / 80.5 - 12.9 / 80.4m:** SM clay	
13	**GEORGIAN BAY FORMATION** **Shale**, grey, thinly bedded, weak; joints are horizontal, gapped, planar; **limestone**, light grey, very thinly bedded to thinly bedded, medium strong *Overall shale: 75%, limestone: 25%* **... at 13.6 m (Elev. 79.7 m), transition to sound rock**	R3	TCR = **100**% SCR = **72**% RQD = **55**%	80			4+Rz			80
							4		**13.5 / 79.8 - 13.6 / 79.7m:** SM clay	
							0			
14		79.0					1			
		14.3		79			3			79
							2			
15	Run 3 : 32% limestone 68% shale	R4	TCR = **100**% SCR = **100**% RQD = **90**%				1			
				78			0			78
	Run 4 : 18% limestone 82% shale	77.5					1			
		15.8m								
	END OF COREHOLE									

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : NN

BOREHOLE LOG 106

Date Started : Oct 14, 2021
Position : E: 626699, N: 4833213 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : LA rig w/ full hammer

elev depth (m)	description	graphic log	number	type	SPT N-value
93.3	**TOP OF SLAB**				
93.1 / 0.2	165mm **CONCRETE**				
93.1 / 0.2	40mm **AGGREGATE**		1	SS	7
93.1 / 0.2	40mm **ASPHALT**				
93.0 / 0.3	90mm **CONCRETE**		2	SS	8
91.8 / 1.5	**FILL**, silty sand, trace gravel, trace cinders, trace brick fragments, trace plastic fragments, loose, dark brown, moist ...at 0.9 m, trace concrete fragments		3	SS	30
	SILTY SAND, dense to very dense, brown, wet		4	SS	52
			5	SS	50
			6	SS	53
	...at 6.1 m, sandy silt, grey, wet		7	SS	45
			8	SS	52
84.2 / 9.1	**SILTY SAND**, trace gravel, trace clay, very dense, grey, wet (GLACIAL TILL)		9	SS	77
			10	SS	95 / 225mm
82.3 / 11.0	...at 10.7 m, some clay, trace shale fragments		11	SS	103 / 225mm

hollow stem augers OD=215 mm

mud rotary med OD=125 mm

depth scale (m): 0 1 2 3 4 5 6 7 8 9 10 11

elevation (m): 93 92 91 90 89 88 87 86 85 84 83

well details

undrained shear strength (kPa): unconfined, field vane, pocket penetrometer, Lab Vane; 40 80 120 160

SPT N-values (bpf): dynamic cone; 10 20 30 40

headspace vapour (ppm): hexane, isobutylene, methane; 100 200 300

moisture / plasticity: PL MC LL; 10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT) GR SA SI CL

SS1: PAHs

SS2: EC/SAR, H-Ms, Metals, ORPs, pH

1.5m: auger grinding

SS3: BTEX, PHCs, VOCs

SS4: EC/SAR, H-Ms, Metals, ORPs, PAHs, pH

SS7: BTEX, PHCs, VOCs

8.5m: auger grinding

NP

9 52 34 5

9.8m: auger grinding

10.2m: auger grinding

10.7m: auger grinding, stopped at SS11 due to limited site access

END OF BOREHOLE

Contained drill water upon completion of drilling. Unstabilized water level not measured. Borehole was open.

38 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 28, 2021	4.6	88.7
Nov 12, 2021	4.6	88.7
Nov 26, 2021	4.6	88.7
Dec 10, 2021	4.6	88.7
Dec 23, 2021	4.5	88.8
Jan 7, 2022	4.6	88.7

file: 21-199 gint.gpj

Tech : DI | **PM** : AG/SP | **Rev** : NN

Date Started : Oct 6, 2021
Position : E: 626716, N: 4833219 (UTM 17T)
Elev. Datum : Geodetic

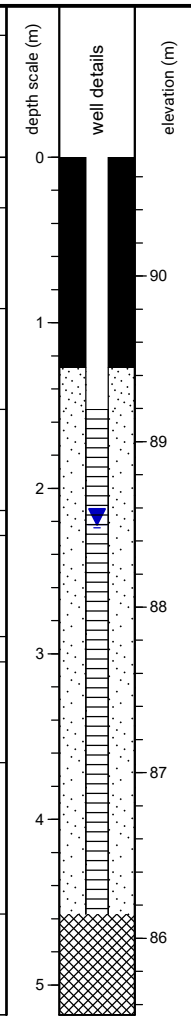
BOREHOLE LOG 107

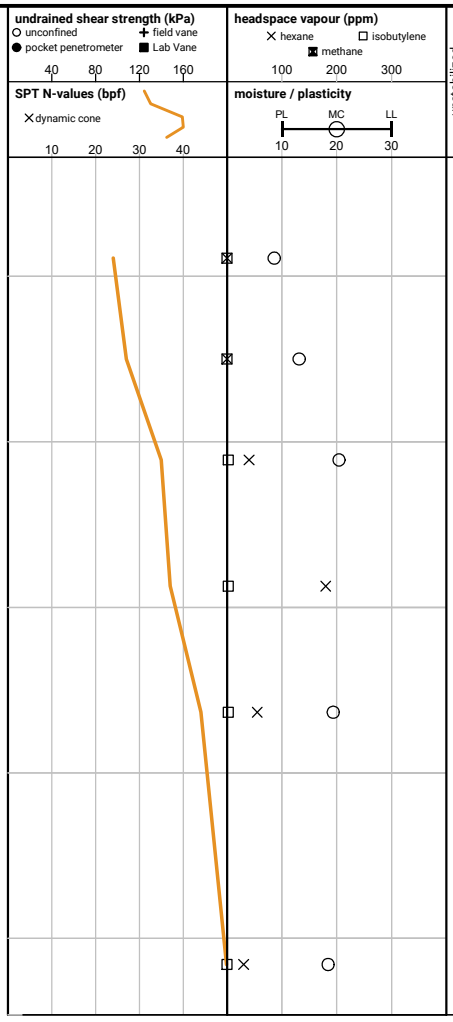
File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : *LA rig w/ full hammer*

elev depth (m)	description	graphic log	number	type	SPT N-value
90.7	**TOP OF SLAB**				
90.5	150mm **CONCRETE**				
0.2					
90.4	150mm **AGGREGATE**				
0.3	**SILTY SAND**, compact, brown, moist		1	SS	24
			2	SS	27
	...at 1.5 m, transitioning to grey, dense		3	SS	35
			4	SS	37
	...at 3.0 m, trace clay, wet		5	SS	44
			6	SS	52
85.5					
5.2	**END OF BOREHOLE**				

hollow stem augers (med)
OD=175 mm





unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1: H-Ms, Metals, ORPs, Dioxins

SS2: PAHs

SS3: PAHs

SS4: BTEX, H-Ms, Metals, ORPs, PHCs, VOCs

0 72 26 2

SS5: BTEX, PHCs, VOCs

4.6m: hole was terminated at target depth because auger got stuck

SS6: BTEX, PHCs

Water level and cave not measured upon completion of drilling.

38 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	2.3	88.4
Nov 4, 2021	2.2	88.5
Nov 12, 2021	2.2	88.5
Nov 16, 2021	2.3	88.4
Nov 26, 2021	2.2	88.5
Dec 10, 2021	2.2	88.5
Dec 23, 2021	2.2	88.5
Jan 7, 2022	2.2	88.5

file: 21-199 gint.gpj

Tech : OM | **PM** : AG/SP | **Rev** : NN

BOREHOLE LOG 108

Date Started : Oct 4, 2021
Position : E: 626753, N: 4833230 (UTM 17T)
Elev. Datum : Geodetic

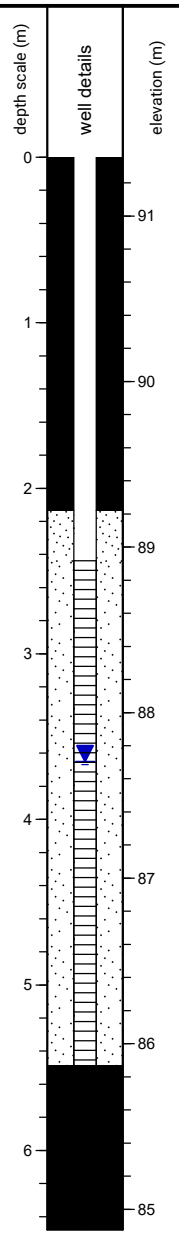
File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : *LA rig w/ full hammer*

elev depth (m)	description	graphic log	number	type	SPT N-value
91.4	**TOP OF SLAB**				
91.2	175mm **CONCRETE**				
0.2	125mm **AGGREGATE**				
91.1					
0.3	**SILTY SAND**, compact to dense, brown, moist		1	SS	12
	...at 0.9 m, dense		2	SS	34
	...at 1.5 m, grey, compact		3A	SS	19
	...at 1.8 m, brown		3B	SS	
	...at 2.3 m, transitioning to grey		4	SS	37
	...at 3.0 m, sandy silt, trace clay, wet		5	SS	35
			6	SS	40
			7	SS	80 / 225mm
84.9					
6.5					

hollow stem augers (med) OD=175 mm

depth scale (m) / well details / elevation (m)



undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
▣ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1: PAHs, PCBs

SS2: H-Ms, Metals, ORPs
1.2m: auger grinding observed

SS3A: BTEX, PHCs, VOCs

SS3B: PAHs

SS4: BTEX, H-Ms, Metals, ORPs, PHCs, VOCs

0 30 65 5

SS6: BTEX, PHCs, VOCs

END OF BOREHOLE

Water level and cave not measured upon completion of drilling.

38 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	3.5	87.9
Nov 4, 2021	3.6	87.8
Nov 12, 2021	3.7	87.7
Nov 16, 2021	3.6	87.8
Nov 26, 2021	3.6	87.8
Dec 10, 2021	3.6	87.8
Dec 23, 2021	3.6	87.8
Jan 7, 2022	3.7	87.7

file: 21-199 gint.gpj

Tech : OM | **PM** : AG/SP | **Rev** : NN

BOREHOLE LOG 110

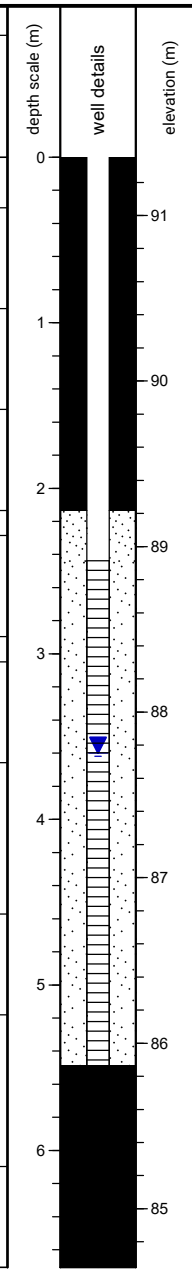
Date Started : Oct 5, 2021
Position : E: 626749, N: 4833241 (UTM 17T)
Elev. Datum : Geodetic

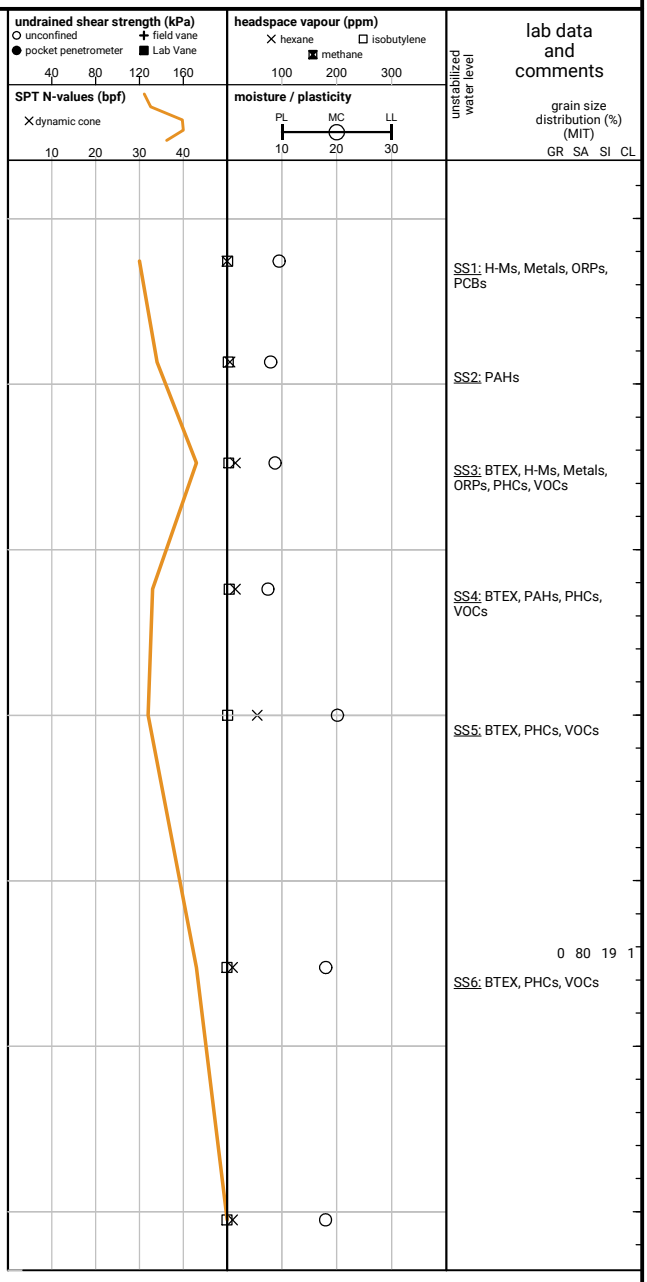
File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : *LA rig w/ full hammer*

elev / depth (m)	description	graphic log	number	type	SPT N-value
91.4	**TOP OF SLAB**				
91.2 / 0.2	150mm **CONCRETE**				
91.1 / 0.3	150mm **AGGREGATE**				
	FILL, clayey silt, some sand, trace gravel, with oxidation staining, hard, brownish grey, moist		1	SS	30
90.5 / 0.9	**SILTY SAND**, with clayey silt pockets, dense, grey, moist		2	SS	34
			3	SS	43
			4	SS	33
	...at 3.0 m, sandy silt		5	SS	32
			6	SS	43
	...at 4.6 m, sand, some silt, trace clay, wet		7	SS	50
84.7 / 6.7	**END OF BOREHOLE**				

hollow stem augers (med)
OD=175 mm





unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

SS1: H-Ms, Metals, ORPs, PCBs

SS2: PAHs

SS3: BTEX, H-Ms, Metals, ORPs, PHCs, VOCs

SS4: BTEX, PAHs, PHCs, VOCs

SS5: BTEX, PHCs, VOCs

0 80 19 1

SS6: BTEX, PHCs, VOCs

Water level and cave not measured upon completion of drilling.

38 mm dia. monitoring well installed.
No. 10 screen

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	3.5	87.9
Nov 4, 2021	3.6	87.8
Nov 12, 2021	3.6	87.8
Nov 16, 2021	3.7	87.7
Nov 26, 2021	3.6	87.8
Dec 10, 2021	3.6	87.8
Dec 23, 2021	3.6	87.8
Jan 7, 2022	3.6	87.8

file: 21-199 gint.gpj

Tech : OM | **PM** : AG/SP | **Rev** : NN

GROUNDED ENGINEERING

Date Started : Oct 18, 2021
Position : E: 626729, N: 4833229 (UTM 17T)
Elev. Datum : Geodetic

BOREHOLE LOG 111

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : CME 55

elev depth (m)	description	graphic log	number	type	SPT N-value
93.4	**GROUND SURFACE**				
	100mm **ASPHALT**		1	SS	99 / 200mm
	50mm **AGGREGATE**				
	FILL, sand, some cinders, some silt, trace gravel, trace brick fragments, trace wood fragments, inferred loose to compact, black, moist		2A	SS	8
			2B		
91.7			3A		
1.7	...at 0.8 m, clayey silt pockets, loose		3B	SS	16
	...at 1.2 m, sandy silt, trace clay, dark brown, compact				
	...at 1.5 m, orange and black staining		4	SS	41
	SAND AND SILT, compact, brown, moist				
	...at 2.3 m, dense to very dense, brown and grey		5	SS	55
	...at 4.6 m, silty sand		6	SS	43
	...at 6.1 m, sand and silt, trace clay, grey, very dense, wet		7	SS	49
			8	SS	52
84.3					
9.1	**SAND AND SILT**, some clay, trace gravel, very dense, grey, moist (GLACIAL TILL)		9	SS	57
	...at 10.7 m, clayey silt, trace gravel, trace sand, trace shale fragments		10	SS	90 / 150mm
			1	RUN	
			2	RUN	
80.2					
13.2	**GEORGIAN BAY FORMATION** (See rock core log for details)		3	RUN	
	...at 14.7 m, transition to sound bedrock		4	RUN	
77.7					
15.7	**END OF BOREHOLE**				

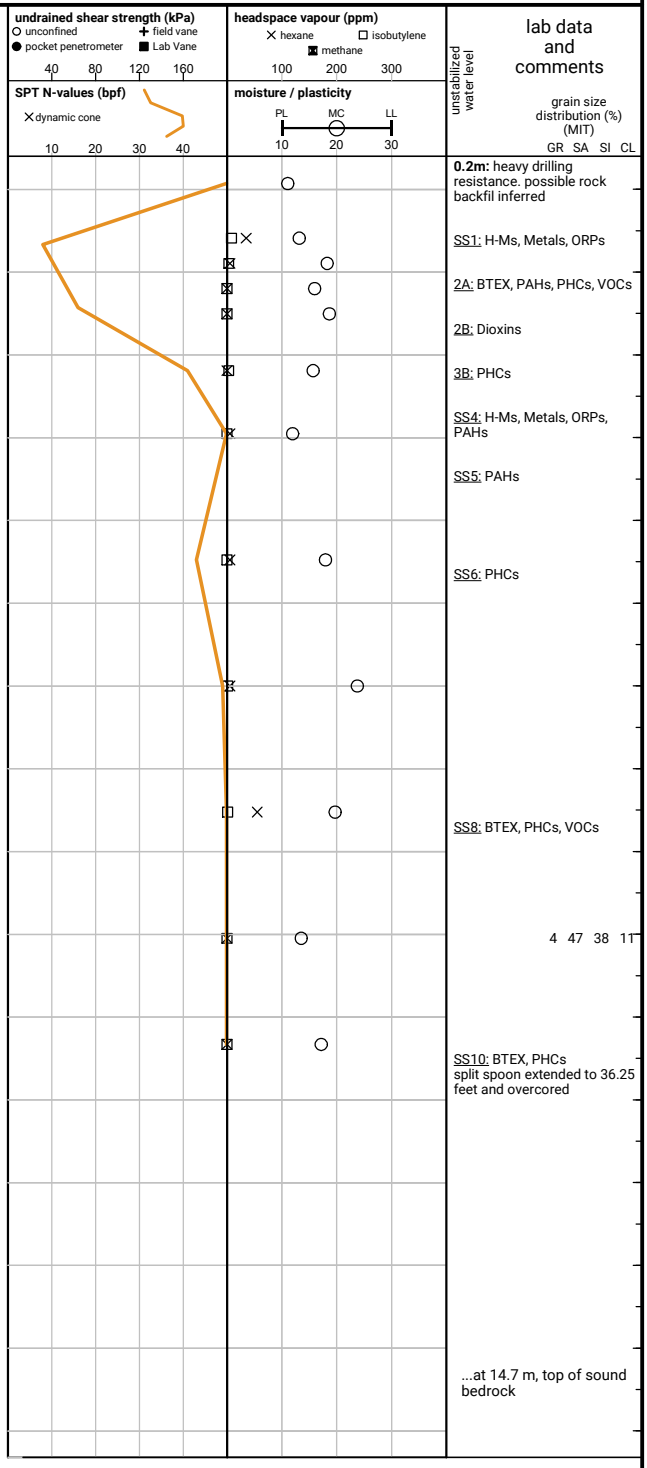
hollow stem augers (skinny) OD=110 mm

mud rotary small OD=100 mm

Rock coring (HQ) OD=96 mm

Borehole was filled with drill water upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen



unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

0.2m: heavy drilling resistance. possible rock backfil inferred

SS1: H-Ms, Metals, ORPs

2A: BTEX, PAHs, PHCs, VOCs

2B: Dioxins

3B: PHCs

SS4: H-Ms, Metals, ORPs, PAHs

SS5: PAHs

SS6: PHCs

SS8: BTEX, PHCs, VOCs

4 47 38 11

SS10: BTEX, PHCs
split spoon extended to 36.25 feet and overcored

...at 14.7 m, top of sound bedrock

GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 26, 2021	5.5	87.9
Oct 28, 2021	5.7	87.7
Nov 4, 2021	5.6	87.8
Nov 12, 2021	5.7	87.7
Nov 16, 2021	5.6	87.8
Nov 26, 2021	5.6	87.8
Dec 10, 2021	5.6	87.8
Dec 23, 2021	5.6	87.8
Jan 7, 2022	5.6	87.8

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : MD

GROUNDED ENGINEERING

Date Started : Oct 18, 2021
Position : E: 626729, N: 4833229 (UTM 17T)
Elev. Datum : Geodetic

ROCK CORE LOG 111

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

depth (m)	stratigraphy	Run / elev. depth (m)	recovery	elevation (m)	shale weathering zones (Z1 Z2 Z3 Z4)	UCS (MPa) 5 25 50 100 250 / estimated strength (R1 R2 R3 R4 R5 R6)	natural fracture frequency	laboratory testing	notes and comments	elevation (m)
	Rock coring started at 10.8m below grade	**82.6**								
11	**SAND AND SILT**, some clay, trace gravel, very dense, grey, moist (GLACIAL TILL)	10.8 R1	TCR = **100**% SCR = **0**% RQD = **0**%							
		11.1		82					**11.1 / 82.3 - 11.2 / 82.2m:** SM clay	82
12		R2	TCR = **100**% SCR = **0**% RQD = **0**%				N/A		**11.9 / 81.5 - 12.0 / 81.4m:** SM clay	
		80.7		81						81
13		12.7								
	GEORGIAN BAY FORMATION **Shale**, grey, thinly bedded, weak; joints are horizontal, gapped, planar; **limestone**, light grey, very thinly bedded to thinly bedded, medium strong *Overall shale: 74%, limestone: 26%*	R3	TCR = **100**% SCR = **53**% RQD = **28**%	80			Wz 5 6 4		**13.6 / 79.8 - 13.6 / 79.8m:** rubbalized zone (50 mm)	80
14		79.2								
		14.2		79			3 1		**14.3 / 79.1 - 14.3 / 79.1m:** SM clay **14.5 / 78.9 - 14.6 / 78.8m:** SM clay	79
	... at 14.7 m (Elev. 78.7 m), transition to sound rock Run 3 : 30% limestone 70% shale	R4	TCR = **100**% SCR = **90**% RQD = **53**%				2 3			
15	Run 4 : 22% limestone 78% shale	77.7		78			3			78
		15.7m								
	END OF COREHOLE									

file: 21-199 gint.gpj

Tech : LP | **PM** : AG/SP | **Rev** : MD

BOREHOLE LOG 117

Date Started : Oct 25, 2021
Position : E: 626742, N: 4833207 (UTM 17T)
Elev. Datum : Geodetic

File No. : 21-199 **Project** : 340 - 376 Dufferin St, Toronto **Client** : Hullmark Developments Limited

drill method : CME 55

hollow stem augers OD=215 mm

elev depth (m)	description	graphic log	number	type	SPT N-value
93.3	**GROUND SURFACE**				
	100mm **ASPHALT**				
	FILL, silty sand, trace gravel, trace clay, trace asphalt, trace brick fragments, loose to compact, black		1A	SS	16
			1B		
	...at 0.8 m, sandy silt, clayey, grey and orange		2	SS	5
			3	SS	9
91.0					
2.3	**SILTY SAND**, dense, brown, moist		4	SS	43
	...at 3.0 m, to grey		5	SS	41
			6	SS	36
	...at 6.1 m, grey, wet		7	SS	31
	...at 7.6 m, trace clay, trace gravel		8	SS	32
85.1					
8.2	**END OF BOREHOLE**				

depth scale (m) 0 1 2 3 4 5 6 7 8

well details

elevation (m) 93 92 91 90 89 88 87 86

undrained shear strength (kPa)
○ unconfined + field vane
● pocket penetrometer ■ Lab Vane
40 80 120 160

SPT N-values (bpf)
× dynamic cone
10 20 30 40

headspace vapour (ppm)
× hexane □ isobutylene
▣ methane
100 200 300

moisture / plasticity
PL MC LL
10 20 30

unstabilized water level

lab data and comments

grain size distribution (%) (MIT)
GR SA SI CL

1A: PAHs, Dioxins

1B: BTEX, PHCs

SS2: BTEX, H-Ms, Metals, ORPs, VOCs

SS4: H-Ms, Metals, ORPs

SS5: PAHs

SS7: BTEX, PHCs

SS8: BTEX, PHCs, VOCs

Unstabilized water level measured at 5.5 m below ground surface; open upon completion of drilling.

50 mm dia. monitoring well installed.
No. 10 screen

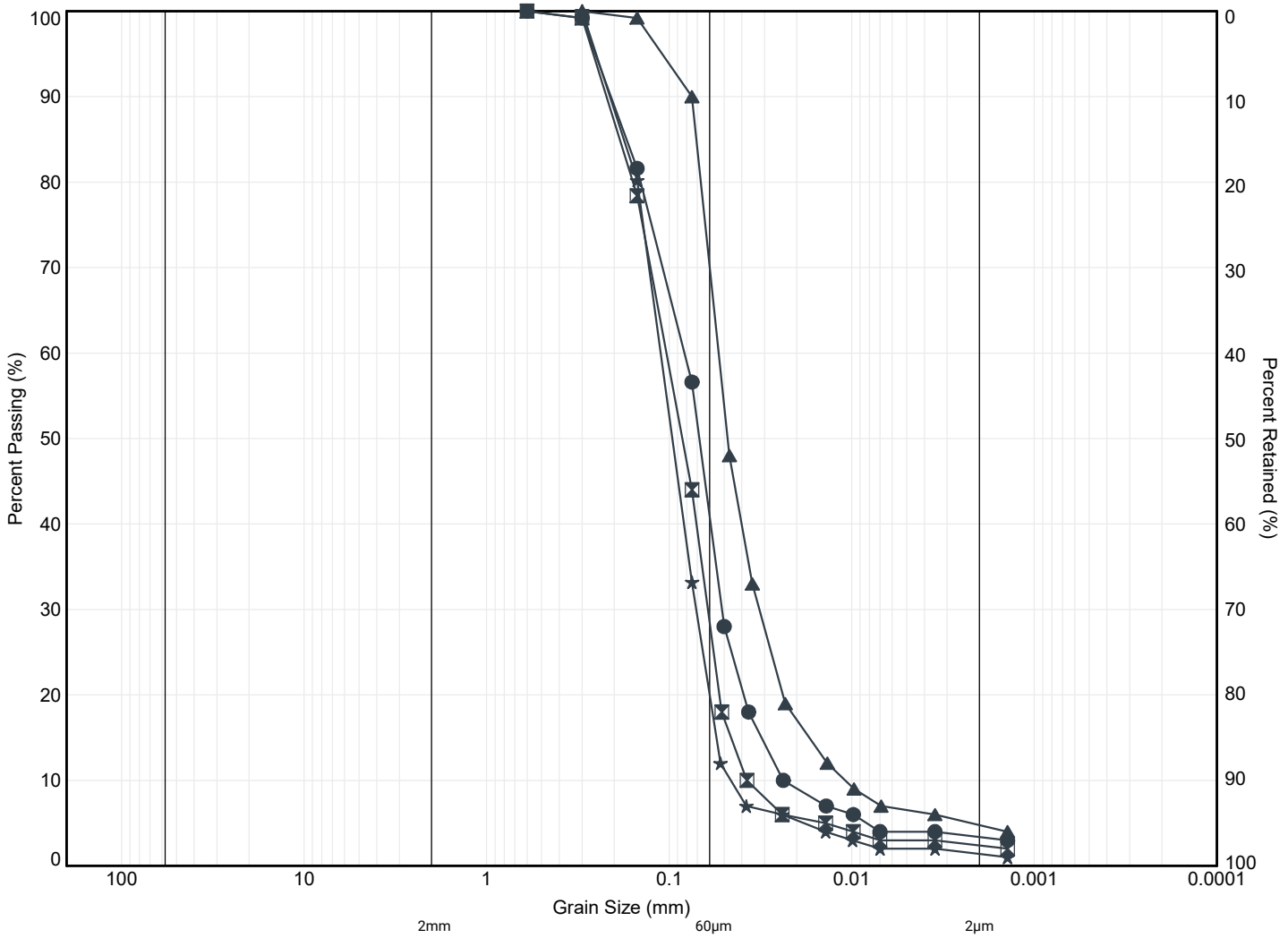
GROUNDWATER LEVELS

date	depth (m)	elevation (m)
Oct 29, 2021	5.3	88.0
Nov 4, 2021	5.3	88.0
Nov 12, 2021	5.3	88.0
Nov 16, 2021	5.0	88.3
Nov 26, 2021	5.3	88.0
Dec 10, 2021	5.3	88.0
Dec 23, 2021	5.2	88.1
Jan 7, 2022	5.3	88.0

file: 21-199 gint.gpj

Tech : DI | **PM** : AG/SP | **Rev** : MD

APPENDIX B



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

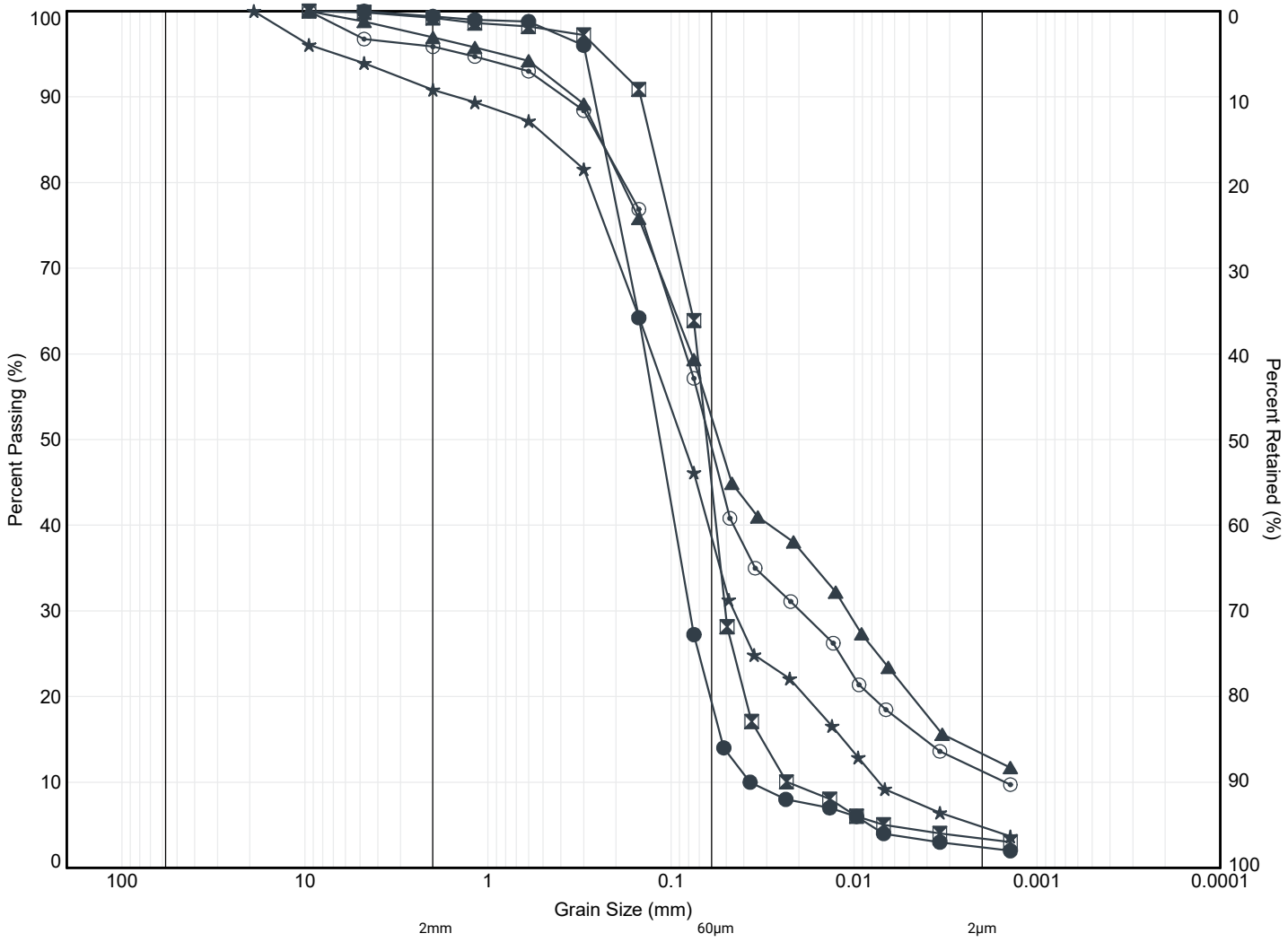
	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**103**	SS5	3.4	87.1	0	59	38	3
⊠	**107**	SS5	3.4	87.4	0	72	26	2
▲	**108**	SS5	3.4	88.0	0	30	65	5
★	**110**	SS6	4.9	86.5	0	80	19	1

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION SANDS**

File No.: **21-199**

file: 21-199.gint.gpj



MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

	Borehole	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
●	**101**	SS4	2.6	90.6	1	80	17	2
⊠	**101**	7B	5.6	87.6	1	55	41	3
▲	**105**	SS9	9.4	83.9	3	45	39	13
★	**106**	SS9	9.4	83.9	9	52	34	5
⊙	**111**	SS9	9.4	84.0	4	47	38	11

GROUNDED ENGINEERING

Title: **GRAIN SIZE DISTRIBUTION GLACIAL TILL**

File No.: **21-199**

file: 21-199 gint.gpj

APPENDIX C

Grounded Engineering Inc
ATTN: Shelby Plant
1 BANIGAN DRIVE
TORONTO ON M4H 1G3

Date Received: 28-OCT-21
Report Date: 10-NOV-21 14:14 (MT)
Version: FINAL

Client Phone: 647-264-7928

Certificate of Analysis

Lab Work Order #: L2656661

Project P.O. #:	NOT SUBMITTED
Job Reference:	21-199
C of C Numbers:	20-888176
Legal Site Desc:	340 DUFFERIN STREET

Amanda Overholster
Account Manager

ANALYTICAL REPORT

Summary of Guideline Exceedances

Guideline ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit

Federal & Provincial Waste Regulations (MAR, 2008) - Ontario Ministry of the Environment, General Waste Control Regulation No. 347/90

(No parameter exceedances)

ANALYTICAL REPORT

Sample Preparation - WASTE

			Lab ID	L2656661-1
			Sample Date	27-OCT-21
			Sample ID	TCLP
Analyte	**Unit**	**Guide Limits #1**	**#2**	
Initial pH	pH units	-	-	9.71
Final pH	pH units	-	-	6.17

Guide Limit #1: Ontario Ministry of the Environment, General Waste Control Regulation No. 347/90

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

TCLP Extractables - WASTE

				Lab ID	L2656661-1
				Sample Date	27-OCT-21
				Sample ID	TCLP
		Guide Limits			
Analyte	Unit	#1	#2		
Aroclor 1242	mg/L	-	-	<0.00020	
Aroclor 1248	mg/L	-	-	<0.00020	
Aroclor 1254	mg/L	-	-	<0.00020	
Aroclor 1260	mg/L	-	-	<0.00020	
Benzo(a)pyrene	mg/L	0.001	-	<0.0010	
3&4-Methylphenol	mg/L	-	-	<0.010	
Cresols (total)	mg/L	200	-	<0.015	
Cyanide, Weak Acid Diss	mg/L	20	-	<0.10	
2,4-Dichlorophenol	mg/L	90	-	<0.0050	
2,4-Dinitrotoluene	mg/L	0.13	-	<0.0040	
Fluoride (F)	mg/L	150.0	-	<10	
Hexachlorobenzene	mg/L	0.13	-	<0.0040	
Hexachlorobutadiene	mg/L	0.5	-	<0.0040	
Hexachloroethane	mg/L	3.0	-	<0.0040	
o-Cresol	mg/L	-	-	<0.0050	
Nitrate and Nitrite as N	mg/L	1000	-	<4.0	
Nitrate-N	mg/L	-	-	<2.0	
Nitrite-N	mg/L	-	-	<2.0	
Nitrobenzene	mg/L	2.0	-	<0.0040	
Total PCBs	mg/L	0.3	-	<0.00040	
Pentachlorophenol	mg/L	6	-	<0.0050	
Pyridine	mg/L	5.0	-	<2.0	
2,3,4,6-Tetrachlorophenol	mg/L	10.0	-	<0.0050	
2,4,5-Trichlorophenol	mg/L	400	-	<0.0050	
2,4,6-Trichlorophenol	mg/L	0.5	-	<0.0050	
Surrogate: 2,4,6-Tribromophenol	%	-	-	108.8	
Surrogate: Chrysene d12	%	-	-	102.3	
Surrogate: 2-Fluorobiphenyl	%	-	-	97.2	
Surrogate: Nitrobenzene d5	%	-	-	108.8	
Surrogate: p-Terphenyl d14	%	-	-	125.3	

Guide Limit #1: Ontario Ministry of the Environment, General Waste Control Regulation No. 347/90

ANALYTICAL REPORT

TCLP Extractables - WASTE

Guide Limit #1: Ontario Ministry of the Environment, General Waste Control Regulation No. 347/90

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

TCLP Metals - WASTE

			Lab ID	L2656661-1
			Sample Date	27-OCT-21
			Sample ID	TCLP
		Guide Limits		
Analyte	Unit	#1	#2	
Arsenic (As)	mg/L	2.5	-	<0.050
Barium (Ba)	mg/L	100	-	0.63
Boron (B)	mg/L	500	-	<2.5
Cadmium (Cd)	mg/L	0.5	-	<0.0050
Chromium (Cr)	mg/L	5.0	-	<0.050
Lead (Pb)	mg/L	5.0	-	<0.025
Mercury (Hg)	mg/L	0.1	-	<0.00010
Selenium (Se)	mg/L	1.0	-	<0.025
Silver (Ag)	mg/L	5.0	-	<0.0050
Uranium (U)	mg/L	10	-	<0.25

Guide Limit #1: Ontario Ministry of the Environment, General Waste Control Regulation No. 347/90

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

TCLP VOCs - WASTE

			Lab ID	L2656661-1
			Sample Date	27-OCT-21
			Sample ID	TCLP
		Guide Limits		
Analyte	Unit	#1	#2	
1,1-Dichloroethylene	mg/L	1.4	-	<0.025
1,2-Dichlorobenzene	mg/L	20.0	-	<0.025
1,2-Dichloroethane	mg/L	0.5	-	<0.025
1,4-Dichlorobenzene	mg/L	0.5	-	<0.025
Benzene	mg/L	0.5	-	<0.025
Carbon tetrachloride	mg/L	0.5	-	<0.025
Chlorobenzene	mg/L	8	-	<0.025
Chloroform	mg/L	10	-	<0.10
Dichloromethane	mg/L	5.0	-	<0.50
Methyl Ethyl Ketone	mg/L	200.0	-	<1.0
Tetrachloroethylene	mg/L	3	-	<0.025
Trichloroethylene	mg/L	5	-	<0.025
Vinyl chloride	mg/L	0.2	-	<0.050
Surrogate: 4-Bromofluorobenzene	%	-	-	97.6

Guide Limit #1: Ontario Ministry of the Environment, General Waste Control Regulation No. 347/90

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Volatile Organic Compounds - WASTE

			Lab ID	L2656661-1
			Sample Date	27-OCT-21
			Sample ID	TCLP
		Guide Limits		
Analyte	**Unit**	**#1**	**#2**	
Surrogate: 1,4-Difluorobenzene	%	-	-	99.1

Guide Limit #1: Ontario Ministry of the Environment, General Waste Control Regulation No. 347/90

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

ANALYTICAL REPORT

Polychlorinated Biphenyls - WASTE

			Lab ID	L2656661-1
			Sample Date	27-OCT-21
			Sample ID	TCLP
		Guide Limits		
Analyte	Unit	#1	#2	
Surrogate: Decachlorobiphenyl	%	-	-	90.8
Surrogate: Tetrachloro-m-xylene	%	-	-	91.1

Guide Limit #1: Ontario Ministry of the Environment, General Waste Control Regulation No. 347/90

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
BAP-ONT-TCLP-WT	Waste	Benzo(a)pyrene for O. Reg 347	SW 846 8270-GC-MS on TCLP Leachate
BNA-TCLP-WT	Waste	BNAs for O. Reg 347	SW846 8270

Samples are leached according to TCLP protocol and then the aqueous leachate is extracted and the resulting extracts are analyzed on GC/MSD

CN-TCLP-WT	Waste	Cyanide for O. Reg 347	APHA 4500CN I

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fiber filter. The extract is then analyzed using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

F-TCLP-WT	Waste	Fluoride (F) for O. Reg 347	EPA 300.1

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fiber filter. The extract is then analyzed using procedures adapted from EPA 300.1 and is analyzed by Ion Chromatography with conductivity and/or UV detection.

HG-TCLP-WT	Waste	Mercury (CVAA) for O.Reg 347	EPA 1631E

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using atomic absorption spectrophotometry (EPA 1631E).

LEACH-TCLP-WT	Waste	Leachate Procedure for Reg 347	EPA 1311

Inorganic and Semi-Volatile Organic contaminants are leached from waste samples in strict accordance with US EPA Method 1311, "Toxicity Characteristic Leaching Procedure" (TCLP). Test results are reported in leachate concentration units (normally mg/L).

MET-TCLP-WT	Waste	O.Reg 347 TCLP Leachable Metals	EPA 6020B

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020B).

N2N3-TCLP-WT	Waste	Nitrate/Nitrite-N for O. Reg 347	EPA 300.1

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fiber filter. The extract is then analyzed using procedures adapted from EPA 300.1 and is analyzed by Ion Chromatography with conductivity and/or UV detection.

PCB-TCLP-WT	Waste	PCBs for O. Reg 347	SW846 8270
PYR-TCLP-WT	Waste	Pyridine for O. Reg 347	SW846 8260D

Samples are leached according to TCLP protocol and then analyzed on GC/MSD

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
VOC-TCLP-WT	Waste	VOC for O. Reg 347	SW846 8260

A sample of waste is leached in a zero headspace extractor at 30–2 rpm for 18–2.0 hours with the appropriate leaching solution. After tumbling the leachate is analyzed directly by headspace technology, followed by GC/MS using internal standard quantitation.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody Numbers:

20-888176

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2656661 Report Date: 10-NOV-21

Client: Grounded Engineering Inc
1 BANIGAN DRIVE
TORONTO ON M4H 1G3
Contact: Shelby Plant

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BAP-ONT-TCLP-WT	**Waste**							
Batch R5636673								
WG3651711-4 DUP		**WG3651711-6**						
Benzo(a)pyrene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	50	05-NOV-21
WG3651711-2 LCS								
Benzo(a)pyrene			85.8		%		50-150	05-NOV-21
WG3651711-1 MB								
Benzo(a)pyrene			<0.0010		mg/L		0.001	05-NOV-21
Surrogate: Chrysene d12			98.4		%		50-150	05-NOV-21
WG3651711-3 MB								
Benzo(a)pyrene			<0.0010		mg/L		0.001	05-NOV-21
Surrogate: Chrysene d12			99.1		%		50-150	05-NOV-21
WG3651711-5 MS		**WG3651711-6**						
Benzo(a)pyrene			90.7		%		50-150	05-NOV-21
BNA-TCLP-WT	**Waste**							
Batch R5639896								
WG3654885-4 DUP		**WG3654885-3**						
2,3,4,6-Tetrachlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	10-NOV-21
2,4,5-Trichlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	10-NOV-21
2,4,6-Trichlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	10-NOV-21
2,4-Dichlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	10-NOV-21
2,4-Dinitrotoluene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	10-NOV-21
o-Cresol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	10-NOV-21
3&4-Methylphenol		0.044	0.043		mg/L	1.2	50	10-NOV-21
Hexachlorobenzene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	10-NOV-21
Hexachlorobutadiene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	10-NOV-21
Hexachloroethane		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	10-NOV-21
Nitrobenzene		<0.0040	<0.0040	RPD-NA	mg/L	N/A	50	10-NOV-21
Pentachlorophenol		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	10-NOV-21
WG3654885-2 LCS								
2,3,4,6-Tetrachlorophenol			102.8		%		60-140	10-NOV-21
2,4,5-Trichlorophenol			103.8		%		60-140	10-NOV-21
2,4,6-Trichlorophenol			101.7		%		60-140	10-NOV-21
2,4-Dichlorophenol			100.1		%		60-140	10-NOV-21
2,4-Dinitrotoluene			111.4		%		50-150	10-NOV-21
o-Cresol			87.4		%		60-140	10-NOV-21
3&4-Methylphenol			87.9		%		60-140	10-NOV-21

Quality Control Report

Client: Grounded Engineering Inc
1 BANIGAN DRIVE
TORONTO ON M4H 1G3
Contact: Shelby Plant

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BNA-TCLP-WT	**Waste**							
Batch R5639896								
WG3654885-2 LCS								
Hexachlorobenzene			82.9		%		60-140	10-NOV-21
Hexachlorobutadiene			56.9		%		40-130	10-NOV-21
Hexachloroethane			58.3		%		40-130	10-NOV-21
Nitrobenzene			83.7		%		60-140	10-NOV-21
Pentachlorophenol			133.0		%		50-160	10-NOV-21
WG3654885-1 MB								
2,3,4,6-Tetrachlorophenol			<0.0050		mg/L		0.005	10-NOV-21
2,4,5-Trichlorophenol			<0.0050		mg/L		0.005	10-NOV-21
2,4,6-Trichlorophenol			<0.0050		mg/L		0.005	10-NOV-21
2,4-Dichlorophenol			<0.0050		mg/L		0.005	10-NOV-21
2,4-Dinitrotoluene			<0.0040		mg/L		0.004	10-NOV-21
o-Cresol			<0.0050		mg/L		0.005	10-NOV-21
3&4-Methylphenol			<0.010		mg/L		0.01	10-NOV-21
Hexachlorobenzene			<0.0040		mg/L		0.004	10-NOV-21
Hexachlorobutadiene			<0.0040		mg/L		0.004	10-NOV-21
Hexachloroethane			<0.0040		mg/L		0.004	10-NOV-21
Nitrobenzene			<0.0040		mg/L		0.004	10-NOV-21
Pentachlorophenol			<0.0050		mg/L		0.005	10-NOV-21
Surrogate: Nitrobenzene d5			107.7		%		50-150	10-NOV-21
Surrogate: 2-Fluorobiphenyl			98.7		%		40-160	10-NOV-21
Surrogate: p-Terphenyl d14			120.6		%		60-140	10-NOV-21
Surrogate: 2,4,6-Tribromophenol			107.6		%		50-150	10-NOV-21
WG3654885-6 MB								
2,3,4,6-Tetrachlorophenol			<0.0050		mg/L		0.005	10-NOV-21
2,4,5-Trichlorophenol			<0.0050		mg/L		0.005	10-NOV-21
2,4,6-Trichlorophenol			<0.0050		mg/L		0.005	10-NOV-21
2,4-Dichlorophenol			<0.0050		mg/L		0.005	10-NOV-21
2,4-Dinitrotoluene			<0.0040		mg/L		0.004	10-NOV-21
o-Cresol			<0.0050		mg/L		0.005	10-NOV-21
3&4-Methylphenol			<0.010		mg/L		0.01	10-NOV-21
Hexachlorobenzene			<0.0040		mg/L		0.004	10-NOV-21
Hexachlorobutadiene			<0.0040		mg/L		0.004	10-NOV-21
Hexachloroethane			<0.0040		mg/L		0.004	10-NOV-21
Nitrobenzene			<0.0040		mg/L		0.004	10-NOV-21

Quality Control Report

Client: Grounded Engineering Inc
1 BANIGAN DRIVE
TORONTO ON M4H 1G3
Contact: Shelby Plant

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BNA-TCLP-WT	**Waste**							
Batch R5639896								
WG3654885-6 MB								
Pentachlorophenol			<0.0050		mg/L		0.005	10-NOV-21
Surrogate: Nitrobenzene d5			94.3		%		50-150	10-NOV-21
Surrogate: 2-Fluorobiphenyl			81.1		%		40-160	10-NOV-21
Surrogate: p-Terphenyl d14			102.7		%		60-140	10-NOV-21
Surrogate: 2,4,6-Tribromophenol			85.0		%		50-150	10-NOV-21
WG3654885-5 MS		**WG3654885-3**						
2,3,4,6-Tetrachlorophenol			86.2		%		50-150	10-NOV-21
2,4,5-Trichlorophenol			97.5		%		50-150	10-NOV-21
2,4,6-Trichlorophenol			94.8		%		50-150	10-NOV-21
2,4-Dichlorophenol			91.2		%		50-150	10-NOV-21
2,4-Dinitrotoluene			107.2		%		50-150	10-NOV-21
o-Cresol			78.3		%		50-150	10-NOV-21
3&4-Methylphenol			75.1		%		50-150	10-NOV-21
Hexachlorobenzene			64.3		%		40-150	10-NOV-21
Hexachlorobutadiene			58.6		%		40-150	10-NOV-21
Hexachloroethane			63.0		%		40-150	10-NOV-21
Nitrobenzene			84.0		%		50-150	10-NOV-21
Pentachlorophenol			128.7		%		50-150	10-NOV-21
CN-TCLP-WT	**Waste**							
Batch R5635675								
WG3651313-3 DUP		**L2655073-1**						
Cyanide, Weak Acid Diss		<0.10	<0.10	RPD-NA	mg/L	N/A	50	03-NOV-21
WG3651313-2 LCS								
Cyanide, Weak Acid Diss			102.1		%		70-130	03-NOV-21
WG3651313-1 MB								
Cyanide, Weak Acid Diss			<0.10		mg/L		0.1	03-NOV-21
WG3651313-4 MS		**L2655073-1**						
Cyanide, Weak Acid Diss			101.0		%		50-140	03-NOV-21
F-TCLP-WT	**Waste**							
Batch R5635745								
WG3651277-3 DUP		**L2655073-1**						
Fluoride (F)		<10	<10	RPD-NA	mg/L	N/A	30	03-NOV-21
WG3651277-2 LCS								
Fluoride (F)			99.9		%		70-130	03-NOV-21
WG3651277-1 MB								

Quality Control Report

Client: Grounded Engineering Inc
1 BANIGAN DRIVE
TORONTO ON M4H 1G3
Contact: Shelby Plant

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F-TCLP-WT	**Waste**							
Batch R5635745								
WG3651277-1 MB								
Fluoride (F)			<10		mg/L		10	03-NOV-21
WG3651277-4 MS		**L2655073-1**						
Fluoride (F)			101.3		%		50-150	03-NOV-21
HG-TCLP-WT	**Waste**							
Batch R5635129								
WG3651263-3 DUP		**L2657328-1**						
Mercury (Hg)		<0.00010	<0.00010	RPD-NA	mg/L	N/A	50	03-NOV-21
WG3651263-2 LCS								
Mercury (Hg)			101.0		%		70-130	03-NOV-21
WG3651263-1 MB								
Mercury (Hg)			<0.00010		mg/L		0.0001	03-NOV-21
WG3651263-4 MS		**L2657328-1**						
Mercury (Hg)			94.7		%		50-140	03-NOV-21
MET-TCLP-WT	**Waste**							
Batch R5635597								
WG3651216-4 DUP		**WG3651216-3**						
Silver (Ag)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	03-NOV-21
Arsenic (As)		<0.050	<0.050	RPD-NA	mg/L	N/A	50	03-NOV-21
Boron (B)		<2.5	<2.5	RPD-NA	mg/L	N/A	50	03-NOV-21
Barium (Ba)		<0.50	<0.50	RPD-NA	mg/L	N/A	50	03-NOV-21
Cadmium (Cd)		<0.0050	<0.0050	RPD-NA	mg/L	N/A	50	03-NOV-21
Chromium (Cr)		<0.050	<0.050	RPD-NA	mg/L	N/A	50	03-NOV-21
Lead (Pb)		<0.025	<0.025	RPD-NA	mg/L	N/A	50	03-NOV-21
Selenium (Se)		<0.025	<0.025	RPD-NA	mg/L	N/A	50	03-NOV-21
Uranium (U)		<0.25	<0.25	RPD-NA	mg/L	N/A	50	03-NOV-21
WG3651216-2 LCS								
Silver (Ag)			89.9		%		70-130	03-NOV-21
Arsenic (As)			97.8		%		70-130	03-NOV-21
Boron (B)			85.3		%		70-130	03-NOV-21
Barium (Ba)			95.6		%		70-130	03-NOV-21
Cadmium (Cd)			96.3		%		70-130	03-NOV-21
Chromium (Cr)			96.5		%		70-130	03-NOV-21
Lead (Pb)			95.3		%		70-130	03-NOV-21
Selenium (Se)			98.0		%		70-130	03-NOV-21
Uranium (U)			98.5		%		70-130	

Quality Control Report

Client: Grounded Engineering Inc
1 BANIGAN DRIVE
TORONTO ON M4H 1G3
Contact: Shelby Plant

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-TCLP-WT	**Waste**							
Batch R5635597								
WG3651216-2 LCS								
Uranium (U)			98.5		%		70-130	03-NOV-21
WG3651216-1 MB								
Silver (Ag)			<0.0050		mg/L		0.005	03-NOV-21
Arsenic (As)			<0.050		mg/L		0.05	03-NOV-21
Boron (B)			<2.5		mg/L		2.5	03-NOV-21
Barium (Ba)			<0.50		mg/L		0.5	03-NOV-21
Cadmium (Cd)			<0.0050		mg/L		0.005	03-NOV-21
Chromium (Cr)			<0.050		mg/L		0.05	03-NOV-21
Lead (Pb)			<0.025		mg/L		0.025	03-NOV-21
Selenium (Se)			<0.025		mg/L		0.025	03-NOV-21
Uranium (U)			<0.25		mg/L		0.25	03-NOV-21
WG3651216-5 MS		**WG3651216-3**						
Silver (Ag)			102.4		%		50-140	03-NOV-21
Arsenic (As)			100.5		%		50-140	03-NOV-21
Boron (B)			91.7		%		50-140	03-NOV-21
Barium (Ba)			105.8		%		50-140	03-NOV-21
Cadmium (Cd)			97.5		%		50-140	03-NOV-21
Chromium (Cr)			99.0		%		50-140	03-NOV-21
Lead (Pb)			98.2		%		50-140	03-NOV-21
Selenium (Se)			103.2		%		50-140	03-NOV-21
Uranium (U)			100.8		%		50-140	03-NOV-21
N2N3-TCLP-WT	**Waste**							
Batch R5635745								
WG3651277-3 DUP		**L2655073-1**						
Nitrate-N		<2.0	<2.0	RPD-NA	mg/L	N/A	25	03-NOV-21
Nitrite-N		<2.0	<2.0	RPD-NA	mg/L	N/A	25	03-NOV-21
WG3651277-2 LCS								
Nitrate-N			100.1		%		70-130	03-NOV-21
Nitrite-N			101.3		%		70-130	03-NOV-21
WG3651277-1 MB								
Nitrate-N			<2.0		mg/L		2	03-NOV-21
Nitrite-N			<2.0		mg/L		2	03-NOV-21
WG3651277-4 MS		**L2655073-1**						
Nitrate-N			102.0		%		50-150	03-NOV-21
Nitrite-N			103.5		%		50-150	03-NOV-21

Quality Control Report

Client: Grounded Engineering Inc
1 BANIGAN DRIVE
TORONTO ON M4H 1G3
Contact: Shelby Plant

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PCB-TCLP-WT	**Waste**							
Batch R5636116								
WG3651685-4 DUP		**WG3651685-6**						
Aroclor 1242		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	04-NOV-21
Aroclor 1248		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	04-NOV-21
Aroclor 1254		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	04-NOV-21
Aroclor 1260		<0.00020	<0.00020	RPD-NA	mg/L	N/A	50	04-NOV-21
WG3651685-2 LCS								
Aroclor 1242			108.7		%		65-130	04-NOV-21
Aroclor 1248			99.1		%		65-130	04-NOV-21
Aroclor 1254			96.9		%		65-130	04-NOV-21
Aroclor 1260			92.1		%		65-130	04-NOV-21
WG3651685-1 MB								
Aroclor 1242			<0.00020		mg/L		0.0002	04-NOV-21
Aroclor 1248			<0.00020		mg/L		0.0002	04-NOV-21
Aroclor 1254			<0.00020		mg/L		0.0002	04-NOV-21
Aroclor 1260			<0.00020		mg/L		0.0002	04-NOV-21
Surrogate: Decachlorobiphenyl			103.2		%		50-150	04-NOV-21
Surrogate: Tetrachloro-m-xylene			87.0		%		50-150	04-NOV-21
WG3651685-3 MB								
Aroclor 1242			<0.00020		mg/L		0.0002	04-NOV-21
Aroclor 1248			<0.00020		mg/L		0.0002	04-NOV-21
Aroclor 1254			<0.00020		mg/L		0.0002	04-NOV-21
Aroclor 1260			<0.00020		mg/L		0.0002	04-NOV-21
Surrogate: Decachlorobiphenyl			96.5		%		50-150	04-NOV-21
Surrogate: Tetrachloro-m-xylene			96.8		%		50-150	04-NOV-21
WG3651685-5 MS		**WG3651685-6**						
Aroclor 1242			111.8		%		50-150	04-NOV-21
Aroclor 1254			100.7		%		50-150	04-NOV-21
Aroclor 1260			94.8		%		50-150	04-NOV-21
PYR-TCLP-WT	**Waste**							
Batch R5638026								
WG3654056-4 DUP		**L2658881-1**						
Pyridine		<2.0	<2.0	RPD-NA	mg/L	N/A	30	08-NOV-21
WG3654056-2 LCS								
Pyridine			106.0		%		70-130	08-NOV-21
WG3654056-1 MB								
Pyridine			<2.0		mg/L		2	08-NOV-21

Quality Control Report

Client: Grounded Engineering Inc
1 BANIGAN DRIVE
TORONTO ON M4H 1G3
Contact: Shelby Plant

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PYR-TCLP-WT	**Waste**							
Batch R5638026								
WG3654056-5 MS		**L2658881-1**						
Pyridine			96.0		%		50-150	08-NOV-21
VOC-TCLP-WT	**Waste**							
Batch R5635778								
WG3651700-4 LCS								
1,1-Dichloroethylene			109.8		%		70-130	04-NOV-21
1,2-Dichlorobenzene			101.2		%		70-130	04-NOV-21
1,2-Dichloroethane			102.6		%		70-130	04-NOV-21
1,4-Dichlorobenzene			100.8		%		70-130	04-NOV-21
Benzene			99.1		%		70-130	04-NOV-21
Carbon tetrachloride			100.5		%		60-140	04-NOV-21
Chlorobenzene			99.8		%		70-130	04-NOV-21
Chloroform			100.6		%		70-130	04-NOV-21
Dichloromethane			105.2		%		70-130	04-NOV-21
Methyl Ethyl Ketone			105.9		%		50-150	04-NOV-21
Tetrachloroethylene			96.5		%		70-130	04-NOV-21
Trichloroethylene			98.8		%		70-130	04-NOV-21
Vinyl chloride			111.4		%		60-130	04-NOV-21
WG3651700-1 MB								
1,1-Dichloroethylene			<0.025		mg/L		0.025	04-NOV-21
1,2-Dichlorobenzene			<0.025		mg/L		0.025	04-NOV-21
1,2-Dichloroethane			<0.025		mg/L		0.025	04-NOV-21
1,4-Dichlorobenzene			<0.025		mg/L		0.025	04-NOV-21
Benzene			<0.025		mg/L		0.025	04-NOV-21
Carbon tetrachloride			<0.025		mg/L		0.025	04-NOV-21
Chlorobenzene			<0.025		mg/L		0.025	04-NOV-21
Chloroform			<0.10		mg/L		0.1	04-NOV-21
Dichloromethane			<0.50		mg/L		0.5	04-NOV-21
Methyl Ethyl Ketone			<1.0		mg/L		1	04-NOV-21
Tetrachloroethylene			<0.025		mg/L		0.025	04-NOV-21
Trichloroethylene			<0.025		mg/L		0.025	04-NOV-21
Vinyl chloride			<0.050		mg/L		0.05	04-NOV-21
Surrogate: 1,4-Difluorobenzene			99.4		%		70-130	04-NOV-21
Surrogate: 4-Bromofluorobenzene			97.3		%		70-130	04-NOV-21

Quality Control Report

Client: Grounded Engineering Inc
1 BANIGAN DRIVE
TORONTO ON M4H 1G3
Contact: Shelby Plant

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
VOC-TCLP-WT	**Waste**							
Batch R5635778								
WG3651700-3 MS		**WG3651700-2**						
1,1-Dichloroethylene			102.7		%		50-140	04-NOV-21
1,2-Dichlorobenzene			98.6		%		50-140	04-NOV-21
1,2-Dichloroethane			100.8		%		50-140	04-NOV-21
1,4-Dichlorobenzene			93.8		%		50-140	04-NOV-21
Benzene			95.7		%		50-140	04-NOV-21
Carbon tetrachloride			96.1		%		50-140	04-NOV-21
Chlorobenzene			95.7		%		50-140	04-NOV-21
Chloroform			98.1		%		50-140	04-NOV-21
Dichloromethane			102.2		%		50-140	04-NOV-21
Methyl Ethyl Ketone			104.7		%		50-140	04-NOV-21
Tetrachloroethylene			89.8		%		50-140	04-NOV-21
Trichloroethylene			93.6		%		50-140	04-NOV-21
Vinyl chloride			104.0		%		50-140	04-NOV-21

Quality Control Report

Workorder: L2656661 Report Date: 10-NOV-21

Client: Grounded Engineering Inc
1 BANIGAN DRIVE
TORONTO ON M4H 1G3
Contact: Shelby Plant

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Requ

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2656661-COFC

383176

of 1

Report To	Contact and company name below will appear on the final report
Company:	Crowfoot Engineering LTC
Contact:	Shelby Plant
Phone:	
	Company address below will appear on the final report
Street:	1 Bluniger Dr
City/Province:	Toronto ON
Postal Code:	M4H 1G3
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Reports / Recipients	
Select Report Format:	☐ PDF ☐ EXCEL ☑ EDD (DIGITAL)
Merge QC/QCI Reports with COA	☐ YES ☐ NO ☐ N/A
☑ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	Splant@crowfoot.com
Email 2	
Email 3	

Invoice Recipients	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	
Email 2	

Project Information	
ALS Account # / Quote #:	
Job #:	21-199
PO / AFE:	
LSD:	340 Dufferin Street
ALS Lab Work Order # (ALS use only):	L2656661

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	
ALS Contact:	Sampler: JR

- ☐ Routine [R] if received by 3pm M-F - no surcharges apply
- ☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum
- ☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum
- ☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum
- ☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum
- ☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Date and Time Required for all E&P TATs:

For all tests with rush TATs requested, please contact your AM to confirm availability.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	TCLP	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	TCLP	27/10/21	4:30pm	S	2	X			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

O. Reg 347/558 TCLP

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☑ ICE ☐ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☑ YES ☐ NO

Cooler Custody Seals Intact: ☑ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			5.3	4.7	

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (ALS use only)			FINAL SHIPMENT RECEPTION (ALS use only)		
Released by:	Date: 27/10/21	Time: 4:30pm	Received by:	Date:	Time:	Received by:	Date: 10/28/21	Time: 1100

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AHS 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Grounded Engineering Inc
ATTN: Arman Gelimforoush
1 Banigan Drive
Toronto On M4H1E9

Date Received: 29-OCT-21
Report Date: 09-NOV-21 15:15 (MT)
Version: FINAL

Client Phone: 647-264-7928

Certificate of Analysis

Lab Work Order #: L2657229

Project P.O. #: NOT SUBMITTED
Job Reference: 21-199-101
C of C Numbers:
Legal Site Desc: 340-376 DUFFERIN ST.

Amanda Overholster
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2657229-1 BH106- SS3 Sampled By: CLIENT on 26-OCT-21 @ 08:00 Matrix: SOIL							
Physical Tests							
Conductivity	0.352		0.0040	mS/cm		09-NOV-21	R5638308
% Moisture	18.5		0.25	%	01-NOV-21	02-NOV-21	R5633458
pH	7.85		0.10	pH units		04-NOV-21	R5635892
Redox Potential	295		-1000	mV		04-NOV-21	R5636256
Resistivity	2840		1.0	ohm*cm		09-NOV-21	
Leachable Anions & Nutrients							
Chloride	89.6		5.0	ug/g	04-NOV-21	05-NOV-21	R5637525
Anions and Nutrients							
Sulphate	107		20	ug/g	04-NOV-21	05-NOV-21	R5637525
Inorganic Parameters							
Acid Volatile Sulphides	0.37		0.20	mg/kg	09-NOV-21	09-NOV-21	R5638191
L2657229-2 BH111- SS6 Sampled By: CLIENT on 26-OCT-21 @ 08:00 Matrix: SOIL							
Physical Tests							
Conductivity	0.199		0.0040	mS/cm		09-NOV-21	R5638308
% Moisture	16.0		0.25	%	01-NOV-21	02-NOV-21	R5633458
pH	7.85		0.10	pH units		04-NOV-21	R5635892
Redox Potential	286		-1000	mV		04-NOV-21	R5636256
Resistivity	5020		1.0	ohm*cm		09-NOV-21	
Leachable Anions & Nutrients							
Chloride	65.7		5.0	ug/g	04-NOV-21	05-NOV-21	R5637525
Anions and Nutrients							
Sulphate	50		20	ug/g	04-NOV-21	05-NOV-21	R5637525
Inorganic Parameters							
Acid Volatile Sulphides	<0.20		0.20	mg/kg	09-NOV-21	09-NOV-21	R5638191
L2657229-3 BH104- SS5 Sampled By: CLIENT on 26-OCT-21 @ 08:00 Matrix: SOIL							
Physical Tests							
Conductivity	0.216		0.0040	mS/cm		09-NOV-21	R5638308
% Moisture	7.25		0.25	%	01-NOV-21	02-NOV-21	R5633458
pH	7.82		0.10	pH units		04-NOV-21	R5635892
Redox Potential	287		-1000	mV		04-NOV-21	R5636256
Resistivity	4630		1.0	ohm*cm		09-NOV-21	
Leachable Anions & Nutrients							
Chloride	87.8		5.0	ug/g	04-NOV-21	05-NOV-21	R5637525
Anions and Nutrients							
Sulphate	<20		20	ug/g	04-NOV-21	05-NOV-21	R5637525
Inorganic Parameters							
Acid Volatile Sulphides	0.32		0.20	mg/kg	09-NOV-21	09-NOV-21	R5638191

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CL-R511-WT	Soil	Chloride-O.Reg 153/04 (July 2011)	EPA 300.0

5 grams of dried soil is mixed with 10 grams of distilled water for a minimum of 30 minutes. The extract is filtered and analyzed by ion chromatography.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011 and as of November 30, 2020), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

EC-WT	Soil	Conductivity (EC)	MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MOISTURE-WT	Soil	% Moisture	CCME PHC in Soil - Tier 1 (mod)
PH-WT	Soil	pH	MOEE E3137A

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

REDOX-POTENTIAL-WT	Soil	Redox Potential	APHA 2580

This analysis is carried out in accordance with the procedure described in the "APHA" method 2580 "Oxidation-Reduction Potential" 2012. Samples are extracted at a fixed ratio with DI water. Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.

RESISTIVITY-CALC-WT	Soil	Resistivity Calculation	APHA 2510 B

"Soil Resistivity (calculated)" is determined as the inverse of the conductivity of a 2:1 water:soil leachate (dry weight). This method is intended as a rapid approximation for Soil Resistivity. Where high accuracy results are required, direct measurement of Soil Resistivity by the Wenner Four-Electrode Method (ASTM G57) is recommended.

SO4-WT	Soil	Sulphate	EPA 300.0

5 grams of soil is mixed with 50 mL of distilled water for a minimum of 30 minutes. The extract is filtered and analyzed by ion chromatography.

SULPHIDE-WT	Soil	Sulphide, Acid Volatile	APHA 4500S2J

This analysis is carried out in accordance with the method described in APHA 4500 S2-J. Hydrochloric acid is added to sediment samples within a purge and trap system. The evolved hydrogen sulphide (H2S) is carried into a basic solution by inert gas. The acid volatile sulfide is then determined colourimetrically.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2657229 Report Date: 09-NOV-21

Client: Grounded Engineering Inc
1 Banigan Drive
Toronto On M4H1E9
Contact: Arman Gelimforoush

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-R511-WT	**Soil**							
Batch R5637525								
WG3652381-3 CRM		**AN-CRM-WT**						
Chloride			88.7		%		70-130	05-NOV-21
WG3652381-4 DUP		**L2653656-7**						
Chloride		<5.0	<5.0	RPD-NA	ug/g	N/A	30	05-NOV-21
WG3652381-2 LCS								
Chloride			98.3		%		80-120	05-NOV-21
WG3652381-1 MB								
Chloride			<5.0		ug/g		5	05-NOV-21
EC-WT	**Soil**							
Batch R5638308								
WG3652527-4 DUP		**WG3652527-3**						
Conductivity		0.105	0.107		mS/cm	1.3	20	09-NOV-21
WG3652527-2 IRM		**WT SAR4**						
Conductivity			113.1		%		70-130	09-NOV-21
WG3655234-1 LCS								
Conductivity			94.4		%		90-110	09-NOV-21
WG3652527-1 MB								
Conductivity			<0.0040		mS/cm		0.004	09-NOV-21
MOISTURE-WT	**Soil**							
Batch R5633458								
WG3649472-3 DUP		**L2657229-2**						
% Moisture		16.0	15.6		%	2.4	20	02-NOV-21
WG3649472-2 LCS								
% Moisture			100.6		%		90-110	02-NOV-21
WG3649472-1 MB								
% Moisture			<0.25		%		0.25	02-NOV-21
PH-WT	**Soil**							
Batch R5635892								
WG3649758-1 DUP		**L2657049-6**						
pH		8.12	8.10	J	pH units	0.02	0.3	04-NOV-21
WG3652187-1 LCS								
pH			6.98		pH units		6.9-7.1	04-NOV-21
REDOX-POTENTIAL-WT	**Soil**							
Batch R5636256								
WG3652328-1 CRM		**WT-REDOX**						
Redox Potential			101.3		%		80-120	04-NOV-21
WG3649601-1 DUP		**L2653656-5**						

Quality Control Report

Client: Grounded Engineering Inc
1 Banigan Drive
Toronto On M4H1E9
Contact: Arman Gelimforoush

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
REDOX-POTENTIAL-WT	**Soil**							
Batch R5636256								
WG3649601-1 DUP		**L2653656-5**						
Redox Potential		333	287		mV	15	25	04-NOV-21
SO4-WT	**Soil**							
Batch R5637525								
WG3652381-3 CRM		**AN-CRM-WT**						
Sulphate			94.0		%		60-140	05-NOV-21
WG3652381-4 DUP		**L2653656-7**						
Sulphate		27	27		ug/g	1.8	25	05-NOV-21
WG3652381-2 LCS								
Sulphate			97.5		%		70-130	05-NOV-21
WG3652381-1 MB								
Sulphate			<20		ug/g		20	05-NOV-21
SULPHIDE-WT	**Soil**							
Batch R5638191								
WG3654940-3 DUP		**L2656842-1**						
Acid Volatile Sulphides		0.31	<0.20	RPD-NA	mg/kg	N/A	45	09-NOV-21
WG3654940-2 LCS								
Acid Volatile Sulphides			89.9		%		70-130	09-NOV-21
WG3654940-1 MB								
Acid Volatile Sulphides			<0.20		mg/kg		0.2	09-NOV-21

Quality Control Report

Workorder: L2657229 Report Date: 09-NOV-21

Client: Grounded Engineering Inc
1 Banigan Drive
Toronto On M4H1E9
Contact: Arman Gelimforoush

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain

~~L2657226 COFC~~

L2657229

COC Number: 20 - 946695

Page 1 of 1

www.alsglobal.com

Report To	Contact and company name below will appear on the final report
Company:	Grounded Engineering
Contact:	Arman Gelinforoush
Phone:	Agelinforoush@grounded eng.ca
	Company address below will appear on the final report
Street:	1 Borngrow Dr
City/Province:	East York, ON
Postal Code:	M4H 1G3
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☑ YES ☐ NO
Company:	
Contact:	

Reports / Recipients

Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)

Merge QC/QCI Reports with COA ☑ YES ☐ NO ☐ N/A

☑ Compare Results to Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax: Agelinforoush@grounded eng.ca

Email 2:

Email 3:

Invoice Recipients

Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax:

Email 2:

Turnaround Time (TAT) Requested

☑ Routine [R] if received by 3pm M-F - no surcharges apply

☐ 4 day [P4] if received by 3pm M-F - 20% rush surcharge minimum

☐ 3 day [P3] if received by 3pm M-F - 25% rush surcharge minimum

☐ 2 day [P2] if received by 3pm M-F - 50% rush surcharge minimum

☐ 1 day [E] if received by 3pm M-F - 100% rush surcharge minimum

☐ Same day [E2] if received by 10am M-S - 200% rush surcharge. Additional fees may apply to rush requests on weekends, statutory holidays and non-routine tests.

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm am/pm

For all tests with rush TATs requested, please contact your AM to confirm availability.

AFFIX ALS BARCODE LABEL HERE (ALS use only)

Project Information

ALS Account # / Quote #:

Job #: 21-199-101

PO / AFE:

LSD: 340-376 Different St

ALS Lab Work Order # (ALS use only): ~~L2657226~~ L2657229

Oil and Gas Required Fields (client use)

AFE/Cost Center: | PO#

Major/Minor Code: | Routing Code:

Requisitioner:

Location:

ALS Contact: | Sampler:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (ALS use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Corrosivity Suite	SAMPLES ON HOLD	EXTENDED STORAGE REQUIRED	SUSPECTED HAZARD (see notes)
	BH106-S53	26-10-21	8:00	Soil	1	X			
	BH111-S56	↓	↓	↓	1	X			
	BH104-S55				1	X			

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☐ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Notes / Specify Limits for result evaluation by selecting from drop-down below (Excel COC only)

SAMPLE RECEIPT DETAILS (ALS use only)

Cooling Method: ☐ NONE ☐ ICE ☑ ICE PACKS ☐ FROZEN ☐ COOLING INITIATED

Submission Comments identified on Sample Receipt Notification: ☐ YES ☐ NO

Cooler Custody Seals Intact: ☐ YES ☐ N/A Sample Custody Seals Intact: ☐ YES ☐ N/A

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
8.4				7.3			

SHIPMENT RELEASE (client use)

Released by: Arman Gelinforoush Date: Oct 26, 2021 Time: 8:30

INITIAL SHIPMENT RECEPTION (ALS use only)

Received by: ES Date: 04 29/21 Time: 14:00

FINAL SHIPMENT RECEPTION (ALS use only)

Received by: LM Date: 10/29/21 Time: 1600

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

AUG 2020 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

APPENDIX D

Borehole 101 – Runs 1 and 2

Depth: 10.2 to 12.9 m below grade (Elev. 83.0 to 80.3 m)

Borehole 104 – Runs 1 and 2

Depth: 11.1 to 14.1 m below grade (Elev. 82.2 to 79.2 m)

Borehole 104 – Run 3

Depth: 14.1 to 15.6 m below grade (Elev. 79.2 to 77.7 m)

Borehole 105 – Runs 1 and 2

Depth: 10.7 to 12.8 m below grade (Elev. 82.6 to 80.5 m)

Borehole 105 – Runs 3 and 4

Depth: 12.8 to 15.8 m below grade (Elev. 80.5 to 77.5 m)

Borehole 111 – Runs 1 and 2

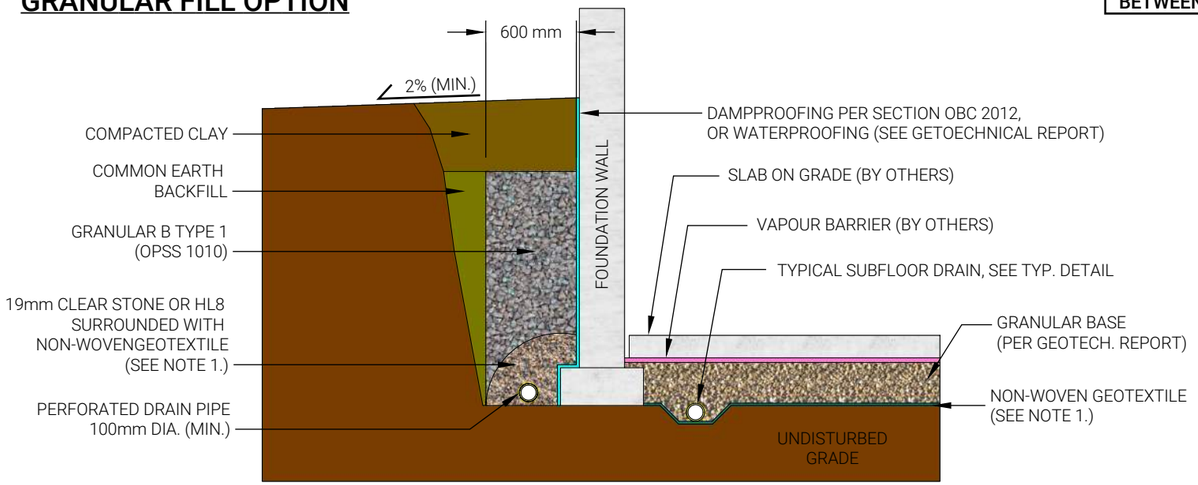
Depth: 10.8 to 12.7 m below grade (Elev. 82.6 to 80.7 m)

Borehole 111 – Runs 3 and 4

Depth: 12.7 m to 15.7 m below grade (Elev. 80.7 to 77.7 m)

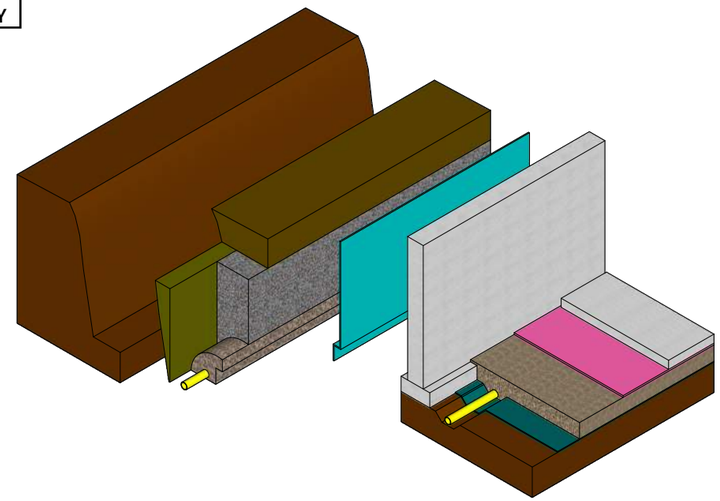
APPENDIX E

GRANULAR FILL OPTION



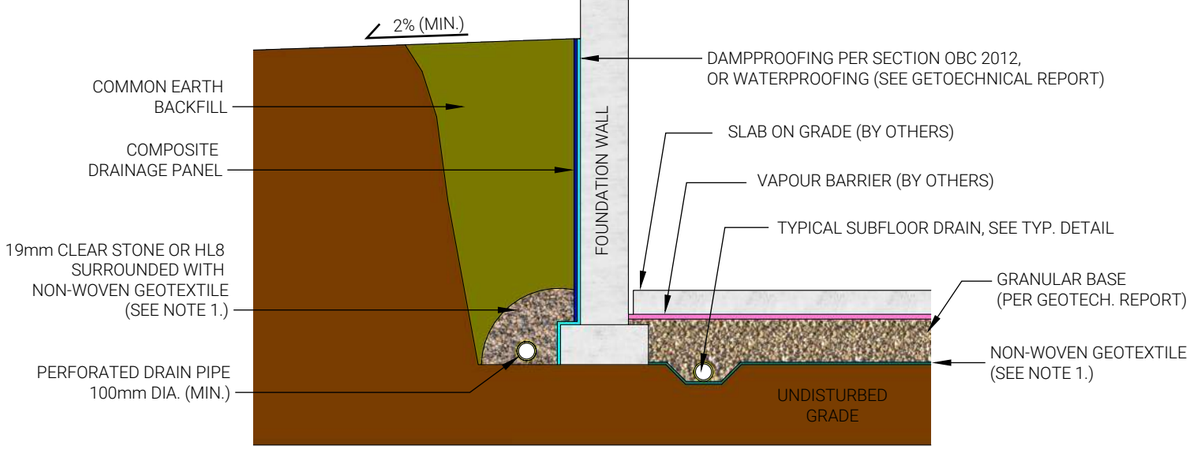
SECTIONAL VIEW

OBJECTS ARE COLOR-CODED BETWEEN TWO VIEWS FOR CLARITY

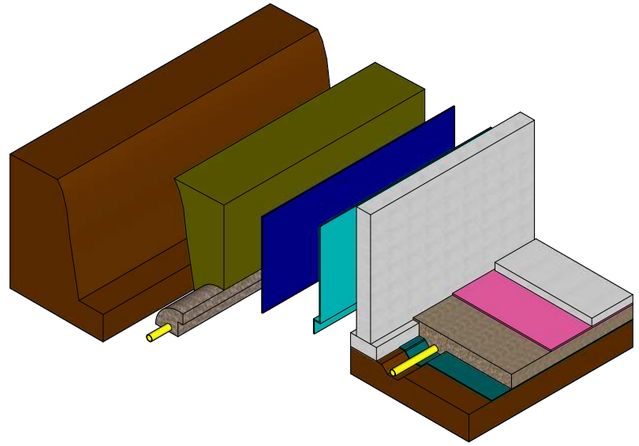


ISOMETRIC VIEW

GEO-COMPOSITE DRAINAGE PANEL OPTION



SECTIONAL VIEW



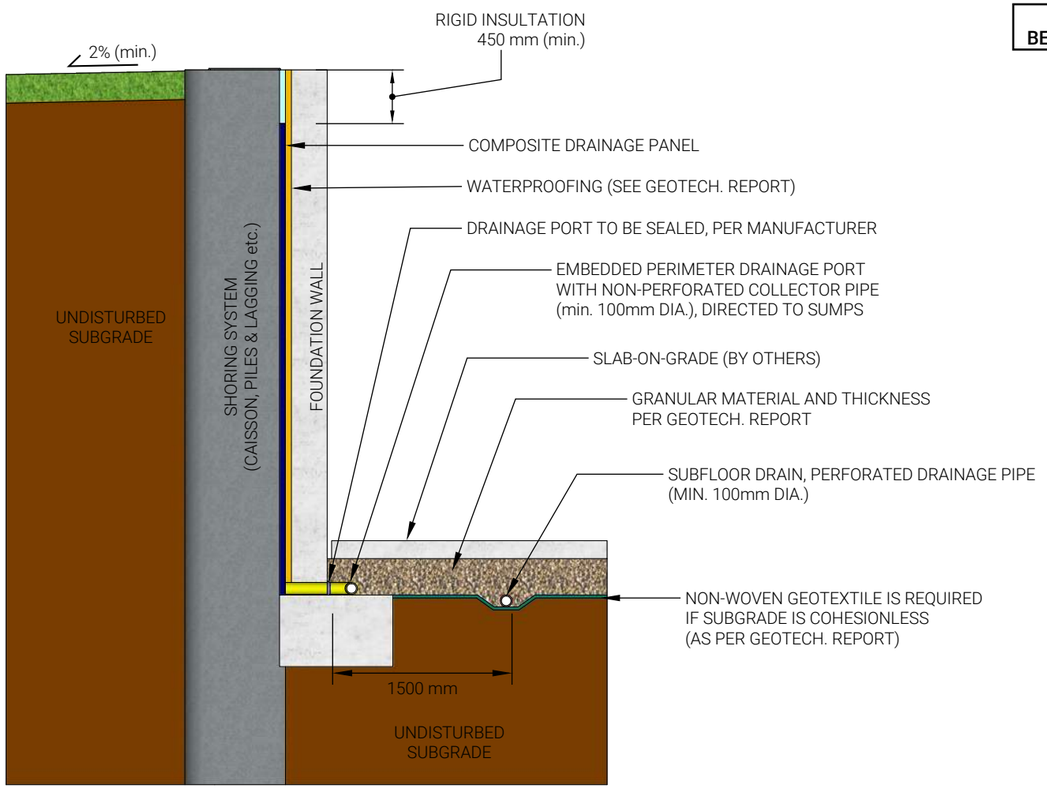
ISOMETRIC VIEW

NOTES
1. A NON-WOVEN GEOTEXTILE WITH AN APPARENT OPENING SIZE OF < 0.250mm AND A TEAR RESISTANCE OF > 200 N.

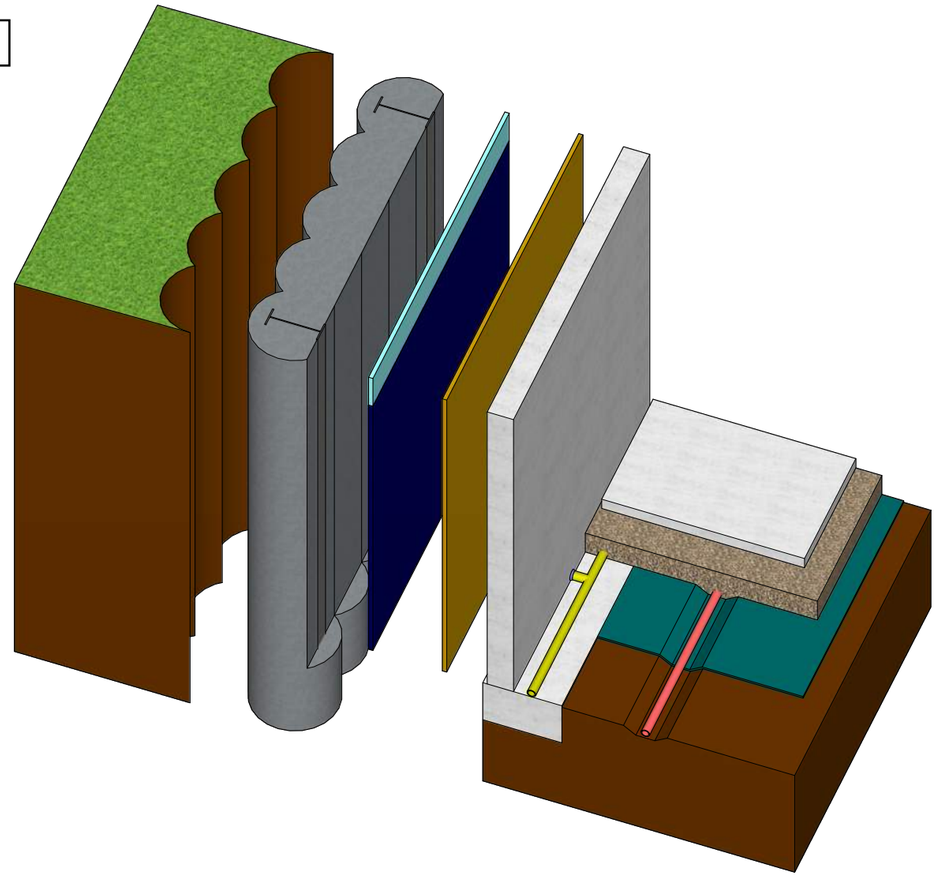
GROUNDED ENGINEERING

Title

BASEMENT DRAINAGE TYPICAL DETAIL



OBJECTS ARE COLOR-CODED BETWEEN TWO VIEWS FOR CLARITY



SECTIONAL VIEW

ISOMETRIC VIEW

SUBFLOOR DRAINAGE SYSTEM

1. THE SUBFLOOR DRAINS SHOULD BE SET IN PARALLEL ROWS, IN ONE DIRECTION, AND SPACED AS PER THE GEOTECHNICAL REPORT.
2. THE INVERT OF THE PIPES SHOULD BE A MINIMUM OF 300mm BELOW THE UNDERSIDE OF THE SLAB-ON-GRADE.
3. A CAPILLARY MOISTURE BARRIER (I.E. DRAINAGE LAYER) CONSISTING OF A MINIMUM 200 mm LAYER OF CLEAR STONE (OPSS MUNI 1004) COMPACTED TO A DENSE STATE (OR AS PER THE GEOTECHNICAL REPORT). WHERE VEHICULAR TRAFFIC IS REQUIRED, THE UPPER 50 mm OF THE CAPILLARY MOISTURE BARRIER MAY BE REPLACED WITH GRANULAR A (OPSS MUNI 1010) COMPACTED TO A MINIMUM 98% SPMDD.
4. A NON-WOVEN GEOTEXTILE MUST SEPARATE THE SUBGRADE FROM THE SUBFLOOR DRAINAGE LAYER IF THE SUBGRADE IS COHESIONLESS. THE NON-WOVEN GEOTEXTILE MAY CONSIST OF TERRAFIX 360R OR AN APPROVED EQUIVALENT.

PERIMETER DRAINAGE SYSTEM

1. FOR A DISTANCE OF 1.2m FROM THE BUILDING, THE GROUND SURFACE SHOULD HAVE A MINIMUM 2% GRADE.
2. PREFABRICATED COMPOSITE DRAINAGE PANEL (CONTINUOUS COVER, AS PER MANUFACTURER'S REQUIREMENTS) IS RECOMMENDED BETWEEN THE BASEMENT WALL AND RIGID SHORING WALL. THE DRAINAGE PANEL MAY CONSIST OF MIRADRAIN 6000 OR AN APPROVED EQUIVALENT.
3. PERIMETER DRAINAGE IS TO BE COLLECTED IN NON-PERFORATED PIPES AND CONVEYED DIRECTLY TO THE BUILDING SUMPS.
4. PERIMETER DRAINAGE PORTS SHOULD BE SPACED A MAXIMUM 3m ON-CENTRE. EACH PORT SHOULD HAVE A MINIMUM CROSS-SECTIONAL AREA OF 1500 mm2.

GENERAL NOTES

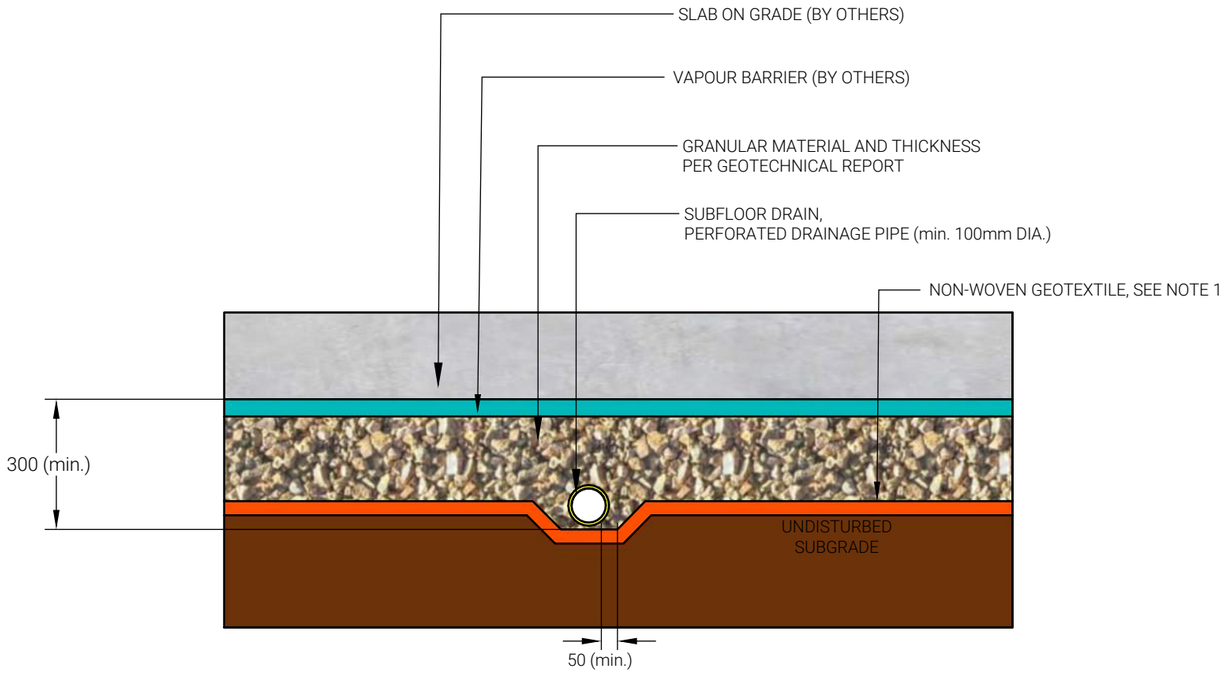
1. THERE SHOULD BE NO STRUCTURAL CONNECTION BETWEEN THE SLAB-ON-GRADE AND THE FOUNDATION WALL OR FOOTING.
2. THERE SHOULD BE NO CONNECTION BETWEEN THE SUBFLOOR AND PERIMETER DRAINAGE SYSTEMS.
3. THIS IS ONLY A TYPICAL BASEMENT DRAINAGE DETAIL. THE GEOTECHNICAL REPORT SHOULD BE CONSULTED FOR SITE SPECIFIC RECOMMENDATIONS.
4. THE FINAL BASEMENT DRAINAGE DESIGN SHOULD BE REVIEWED BY THE GEOTECHNICAL ENGINEER TO CONFIRM THE DESIGN IS ACCEPTABLE.

GROUNDED ENGINEERING

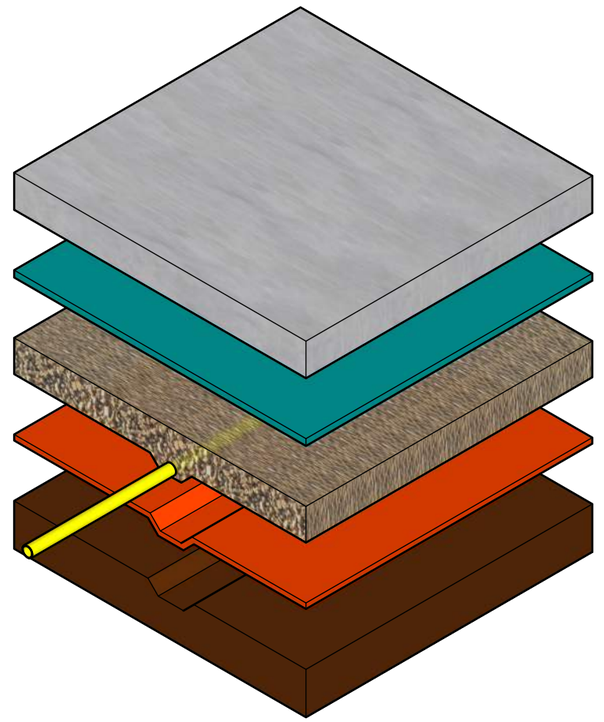
Title

BASEMENT DRAINAGE SHORING SYSTEM TYPICAL DETAILS

OBJECTS ARE COLOR-CODED BETWEEN TWO VIEWS FOR CLARITY



SECTIONAL VIEW



ISOMETRIC VIEW

NOTES

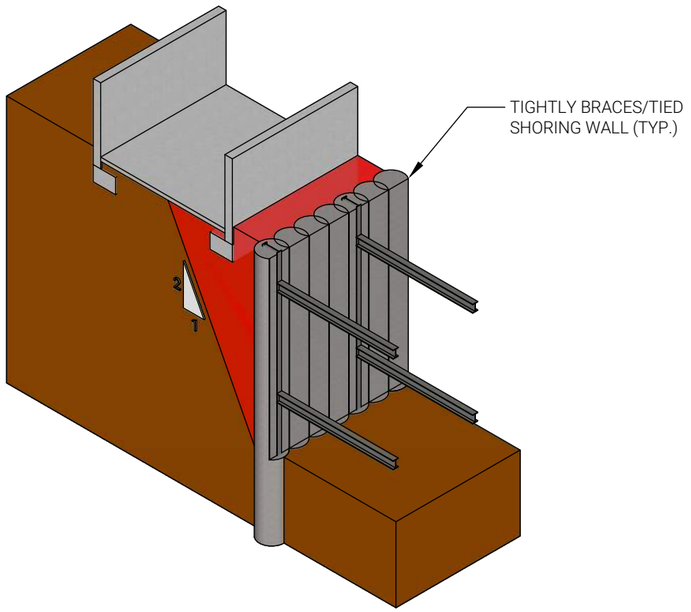
1. WHEN THE SUBGRADE CONSISTS OF COHESIONLESS SOIL, IT MUST BE SEPARATED FROM THE SUBFLOOR DRAINAGE LAYER USING A NON-WOVEN GEOTEXTILE (WITH AN APPARENT OPENING SIZE OF < 0.250mm AND A TEAR RESISTANCE OF > 200 N).

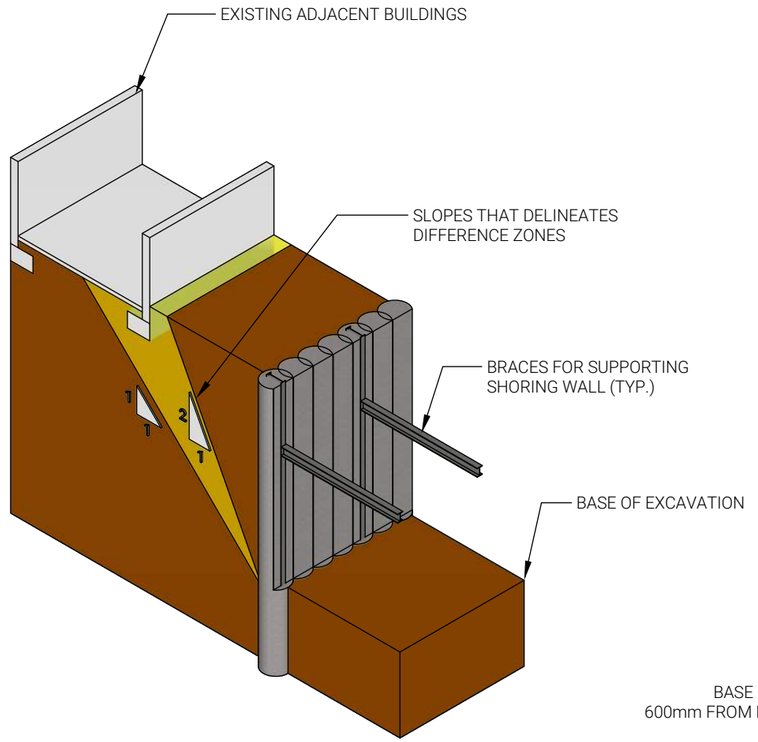
2. TYPICAL SCHEMATIC ONLY. MUST BE READ IN CONJUNCTION WITH GEOTECHNICAL REPORT.

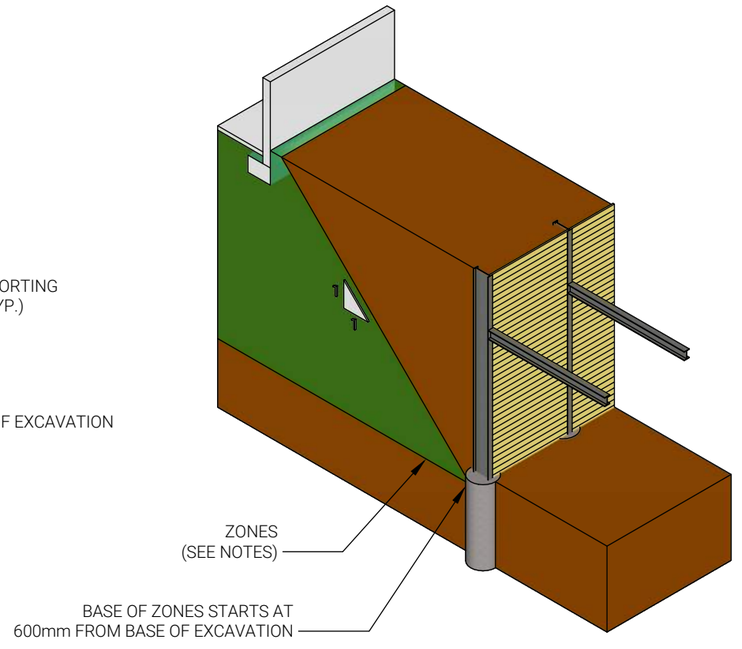
GROUNDED ENGINEERING

Title

BASEMENT SUBDRAIN TYPICAL DETAIL







ZONE A (RED)

FOUNDATIONS WITHIN THIS ZONE OFTEN REQUIRE UNDERPINNING OR SHORING SYSTEM. HORIZONTAL AND VERTICAL PRESSURES ON EXCAVATION WALL OF NON-UNDERPINNED FOUNDATION MUST BE CONSIDERED

ZONE B (YELLOW)

FOUNDATIONS WITHIN THIS ZONE OFTEN DO NOT REQUIRE UNDERPINNING BUT MAY REQUIRE SHORING SYSTEM. HORIZONTAL AND VERTICAL PRESSURES ON EXCAVATION WALL OF NON-UNDERPINNED FOUNDATION MUST BE CONSIDERED

ZONE C (GREEN)

FOUNDATIONS WITHIN THIS ZONE USUALLY DO NOT REQUIRE UNDERPINNING OR SHORING SYSTEM

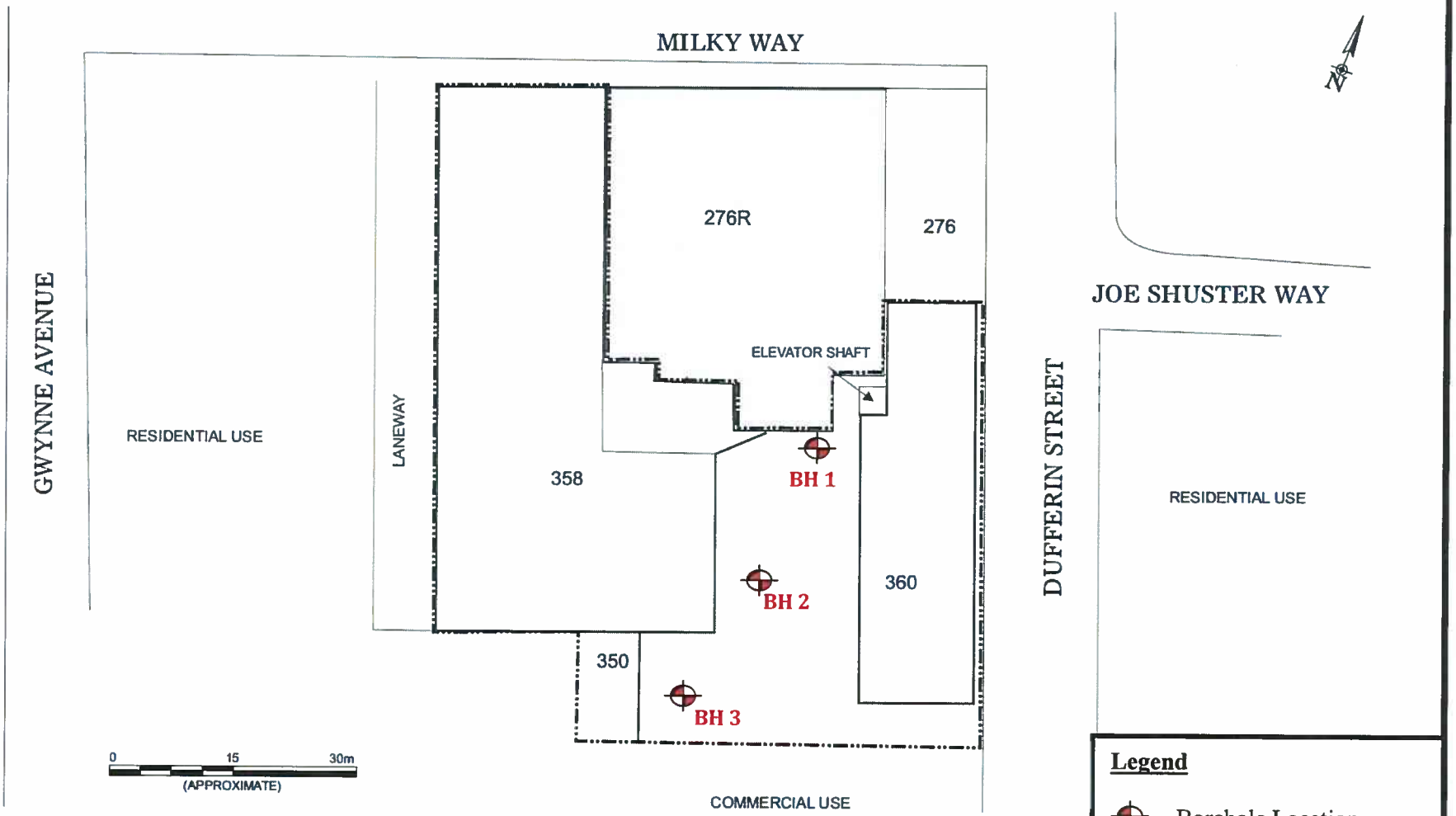
NOTES:
1. USER'S GUIDE - NBC 2005 STRUCTURAL COMMENTARIES (PART 4 OF DIVISION B) - COMMENTARY K.

GROUNDED ENGINEERING

Title

EXCAVATION ZONE OF INFLUENCE GUIDELINES

APPENDIX F



Legend

Borehole Location (Approximate)

exp Services Inc.
1595 Clark Boulevard
Brampton, Ontario
L6T 4V1
Telephone: (905) 793-9800
Fax: (905) 793-0641

SCALE: As shown		**BOREHOLE LOCATION PLAN** **Preliminary Geotechnical Investigation** 350-360 Dufferin Street Toronto, Ontario	
DATE: February 2016			
DWN.: AA	**CHKD.:KL**	**PROJECT NO.:** MRK-00230785-A0-003	**DRAWING NO.:** 1

Log of Borehole 1

Project No. MRK-00230785-A0 | Drawing No. 2

Project: Preliminary Geotechnical Investigation | Sheet No. 1 of 1

Location: 350 - 360 Dufferin Street, Toronto, Ontario

Date Drilled: February 1, 2016

Drill Type: Hollow Stem Auger

Datum: Geodetic

Auger Sample ☒ | Combustible Vapour Reading □

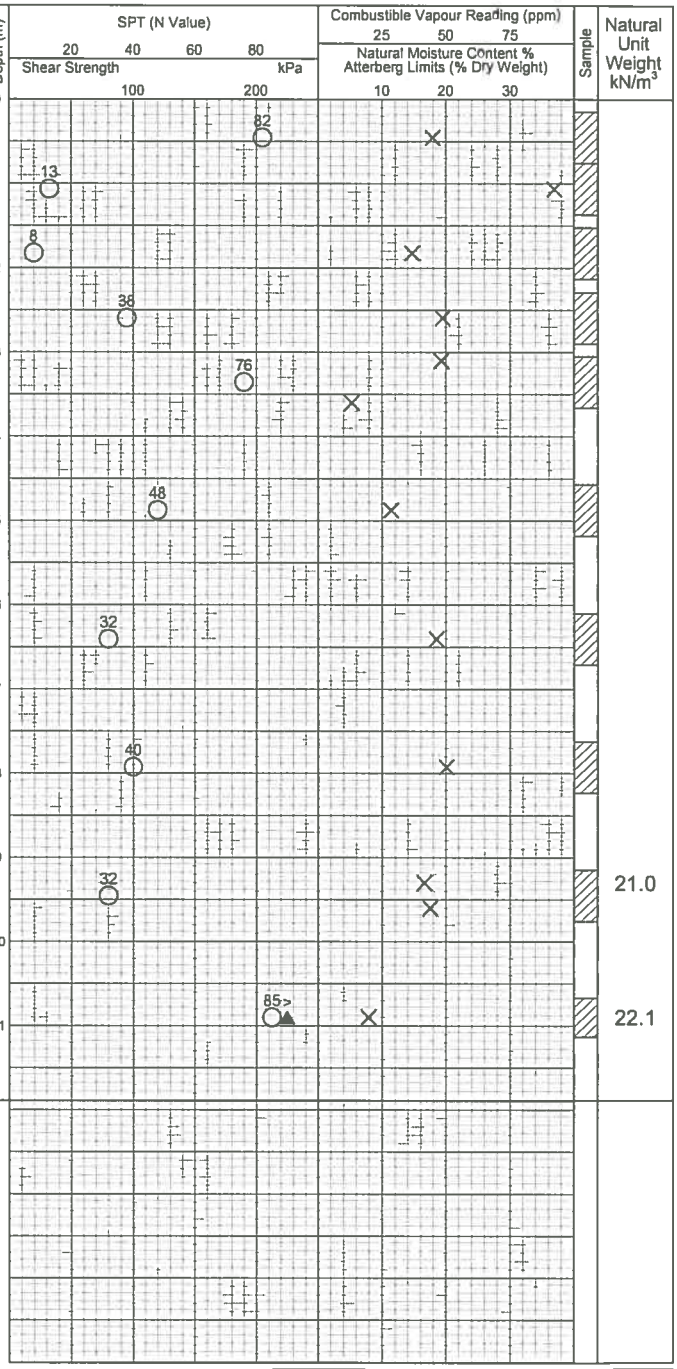
SPT (N) Value ○ ▨ | Natural Moisture ×

Dynamic Cone Test — | Plastic and Liquid Limit ⊢—○

Shelby Tube ■ | Undrained Triaxial at % Strain at Failure ⊕

Field Vane Test S | Penetrometer ▲

Groundwater	Soil/Rock Symbol	Soil Description	ELEV. m
		~50 mm **ASPHALT** over	93.48
		FILL - sand and gravel, trace cinders, occasional brick fragments, black, moist	92.9
		FILL - clayey silt, some sand, trace gravel, occasional wood fibre, black, moist **- slight hydrocarbon odour**	92.1
		FILL - silty sand, grey, moist **- hydrocarbon odour**	
		- hydrocarbon odour	90.3
		SAND - fine grained, trace silt seams and pockets, brown to grey, moist, dense to very dense	
		- becoming wet below ~5.5 m depth	
			85.0
		SILT TILL - some clay, trace gravel, trace sand pockets and silt seams, grey, moist, dense to very dense	
		Borehole Terminated on Auger Refusal End of Borehole	81.6



Notes:
1. Borehole advanced to completion at ~11.9 m depth by conventional soil sampling methods using a specialist drilling subcontractor. For borehole definitions, see notes prior to logs.
2. This drawing forms part of and must be read in conjunction with the subject report (Ref. No.: MRK-00230785-A0); borehole data requires interpretation assistance by exp professional staff before use by others.

exp. Brampton

Elapsed Time	Water Level (m)	Hole Open to (m)
On Completion	No Free Water	6.1
February 8, 2016	5.5	Well
February 10, 2016	5.5	Well

LAGWGL02EXP 230785A_BH_LOGS.GPJ NEW.GDT 2/18/16

Log of Borehole 2

Project No. MRK-00230785-A0

Drawing No. 3

Project: Preliminary Geotechnical Investigation

Sheet No. 1 of 1

Location: 350 - 360 Dufferin Street, Toronto, Ontario

Date Drilled: January 29, 2016

Drill Type: Hollow Stem Auger

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test ——
Shelby Tube ■
Field Vane Test S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit |—○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Groundwater	Soil/Rock Symbol	Soil Description	ELEV. m	Depth (m)
		~40 mm **ASPHALT** over ~210 mm **CONCRETE** over	93.21	0
		FILL - silty sand, some gravel, trace clay, black, moist	92.5	
		FILL - clayey silt, some sand, trace gravel, brown, moist	91.4	1
		SAND - fine grained, trace silt seams and pockets, oxidized zones, brown to grey, moist, compact to dense		2
				3
				4
				5
		- becoming wet below ~5.5 m depth		6
				7
			84.7	8
		SILT TILL - some clay, trace gravel, trace sand pockets and silt seams, grey, moist, dense to very dense		9
				10
				11
		- shale fragments at spoon tip		12
			80.0	13
		SHALE BEDROCK - interbedded with shaley limestone and limestone layers, highly weathered, grey	79.3	
		End of Borehole		

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

SPT values: 7, 14, 25, 32, 32, 36, 46, 44, 50/150 mm, 92, 54/150 mm, 60/50 mm, 60/50 mm

Sample

Natural Unit Weight kN/m³: 22.9, 23.5

LAGWGL02EXP 230785A_BH_LOGS.GPJ NEW.GDT 2/18/16

Notes:
1. Borehole advanced to completion at ~13.9 m depth by conventional soil sampling methods using a specialist drilling subcontractor. For borehole definitions, see notes prior to logs.
2. This drawing forms part of and must be read in conjunction with the subject report (Ref. No.: MRK-00230785-A0); borehole data requires interpretation assistance by exp professional staff before use by others.

exp.
Brampton

Elapsed Time	Water Level (m)	Hole Open to (m)
On Completion	No Free Water	5.8

Log of Borehole 3

Project No. MRK-00230785-A0

Drawing No. 4

Project: Preliminary Geotechnical Investigation

Sheet No. 1 of 1

Location: 350 - 360 Dufferin Street, Toronto, Ontario

Date Drilled: January 29, 2016

Drill Type: Hollow Stem Auger

Datum: Geodetic

Auger Sample ☒
SPT (N) Value ○ ▨
Dynamic Cone Test ——
Shelby Tube ■
Field Vane Test S

Combustible Vapour Reading □
Natural Moisture ×
Plastic and Liquid Limit |—○
Undrained Triaxial at % Strain at Failure ⊕
Penetrometer ▲

Soil Description	ELEV. m	Natural Unit Weight kN/m³
~60 mm **ASPHALT** over ~250 mm **CONCRETE** over **FILL** - clayey silt, some sand, trace gravel, trace organics, brown to black, moist	93.28	
	91.5	19.6
SAND - fine grained, occasional silt seams, oxidized zones, brown to grey, moist, compact to dense		19.7
- becoming fine to medium grained and wet below ~5.5 m depth		
	84.8	
SILT TILL - some clay, trace gravel, trace sand pockets and silt seams, grey, moist, very dense		23.5
- shale fragments at spoon tip		
	79.9	
SHALE BEDROCK - interbedded with shaley limestone and limestone layers, highly weathered, grey		
	78.8	
End of Borehole		

Depth (m): 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

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

SPT values: 9, 8, 14, 40, 36, 39, 27, 13, 88, 60/150 mm, 50/100 mm, 60/50 mm, 60/50 mm

Notes:
1. Borehole advanced to completion at ~14.5 m depth by conventional soil sampling methods using a specialist drilling subcontractor. For borehole definitions, see notes prior to logs.
2. This drawing forms part of and must be read in conjunction with the subject report (Ref. No.: MRK-00230785-A0); borehole data requires interpretation assistance by exp professional staff before use by others.

exp. Brampton

Elapsed Time	Water Level (m)	Hole Open to (m)
On Completion	No Free Water	6.6
February 8, 2016	5.2	Well
February 10, 2016	5.2	Well

LAGWGL02EXP 230785A_BH_LOGS.GPJ NEW.GDT 2/18/16