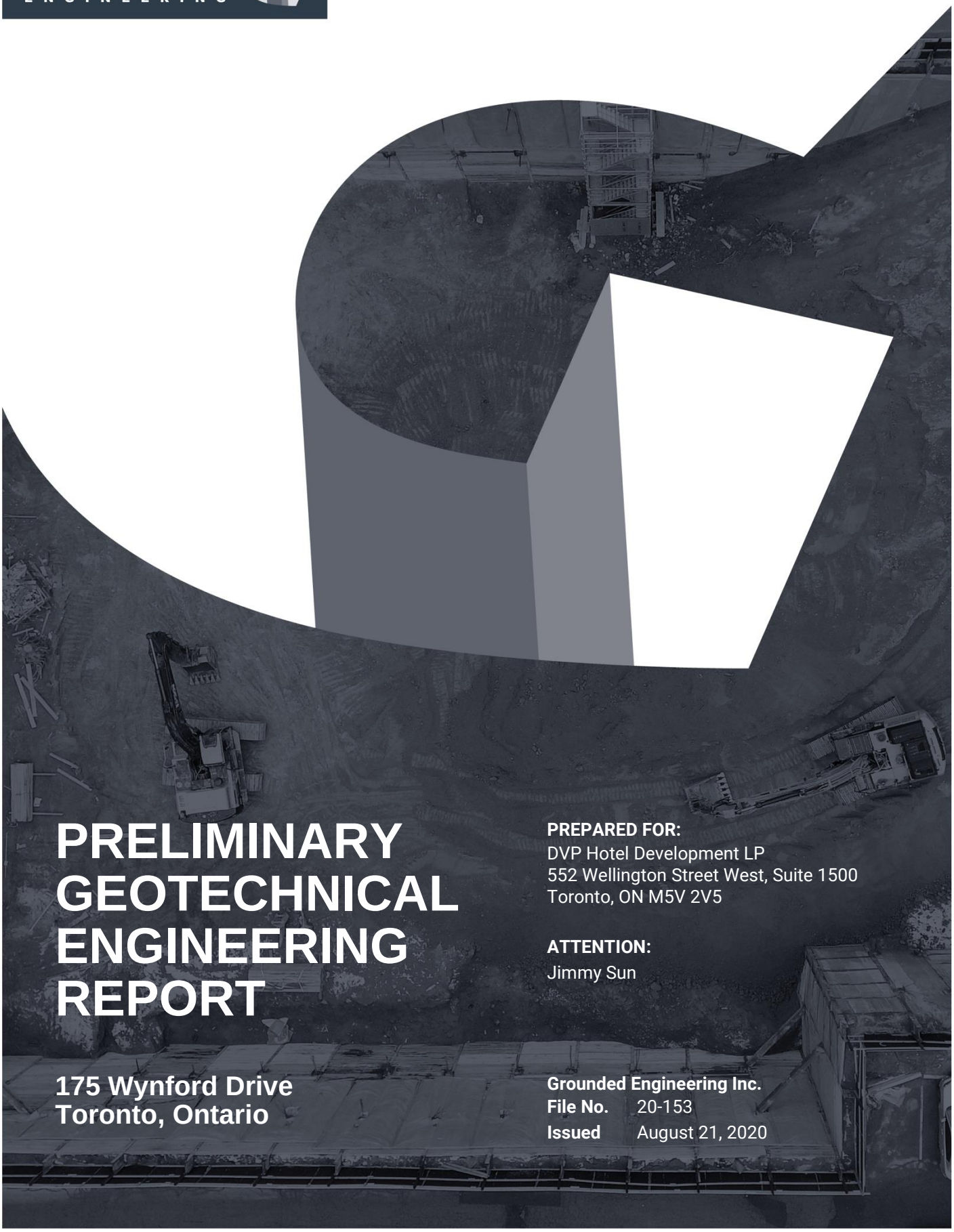

PRELIMINARY GEOTECHNICAL ENGINEERING REPORT

PREPARED FOR:
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ATTENTION:
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Grounded Engineering Inc.
File No. 20-153
Issued August 21, 2020

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1 Introduction

DVP Hotel Development LP has retained Grounded Engineering Inc. ("Grounded") to provide preliminary geotechnical engineering design advice for their proposed development at 175 Wynford Drive, in Toronto, Ontario.

The proposed project includes demolishing the existing structures and constructing four towers that are 45 to 54 storeys in height with an 8-storey podium. The development will have a common six levels (P6) of underground parking set at a Finished Floor Elevation (FFE) of 104± m. As the site backs onto an existing slope, the TRCA requires a slope stability and erosion risk assessment report for the purpose of determining the Long-term Stable Slope Crest (LTSSC).

Previous subsurface investigations have been conducted at the property. Grounded has been provided with the previous reports:

- Golder Associates, "Slope Assessment 1250 Eglinton Avenue East, Toronto, Ontario", Project No. 1526137, dated July 28, 2015.
- R.J. Burnside & Associates Limited, "175, 181, 185 Wynford Drive, Toronto Ontario, Hydrogeological Assessment in Support of Zoning By-Law Amendment", Reference No. 300037774.0000, dated November 2015.
- R.J. Burnside & Associates Limited, "Don Valley Hotel Hydrogeologic Assessment, Water Level Monitoring Summary", Project No. 300037774.0000, date November 7, 2016.
- McClymont & Rak Engineers Inc., "Geohydrology Study Proposed Mixed Use Development 175 Wynford Drive, Toronto, Ontario", Reference No. MG 5276, dated February 2018.
- McClymont & Rak Engineers Inc., "Slope Stability Assessment Proposed Mixed Use Development 175 Wynford Drive, Toronto, Ontario", Reference No. MG5276, dated April 2020.

Grounded has been provided with factual borehole information from other consultants as listed above. Those borehole logs are provided in professional engineer's signed and sealed reports. As such, this borehole information (appended) is taken as factual for present purposes.

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 shoring 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. Additional boreholes, wells, and a detailed geotechnical engineering report will be required for detailed design.

2 Ground Conditions

The borehole results are detailed on the attached borehole logs. A summary of the boreholes advanced on site and included in our assessment is outlined in the table below. Our assessment 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.

Pressuremeter Testing (PMT) was noted on the McClymont and Rak Borehole 1 log but was not included in any of the reports provided to Grounded.

Table 2.1 – Summary of Boreholes

Borehole ID	Engineer	Surface Elevation (m)	Depth of Borehole (m)	Bottom Elevation (m)
1	McClymont and Rak	131.9	45.0	86.9
2	McClymont and Rak	129.6	41.5	88.1
101	McClymont and Rak	132.3	12.7	119.7
102	McClymont and Rak	132.6	12.7	120.0
201	McClymont and Rak	132.3	12.7	119.7
202	McClymont and Rak	130.1	12.7	117.5
MW1d-15	R.J. Burnside & Associates	127.5±*	16.2	111.3±
MW1s-15	R.J. Burnside & Associates	127.5±*	12.0	111.3±
MW2-15	R.J. Burnside & Associates	131.9±*	14.3	117.6±
MW3-15	R.J. Burnside & Associates	130.0±*	12.8	117.2±

*Approximated from the survey

2.1 Soil Stratigraphy

The following soil stratigraphy summary is based on the borehole results and the geotechnical laboratory testing. Cross sections are appended and depict the main stratigraphic units in relation to the slope configuration.

In general, the boreholes encountered surficial earth fill overlying a variable glacial till with sand and silt seams.

2.1.1 Surficial and Earth Fill

Boreholes 1 and 2 encountered a pavement structure consisting of 75 to 100 mm of asphalt overlying 300 to 350 mm of granular. Borehole MW1s-15 encountered 130 mm of topsoil at ground surface.

Borehole 1, 101, 102, 201, 202 encountered earth fill extending to 0.8 to 3.0 m below existing grade (Elev. 129.3 to 131.3 m). The earth fill comprises sandy silt to clayey silt with trace gravel and organics. Borehole 201 encountered a petroleum odour. The earth fill is brown to grey and moist to wet. Earth fill is typically variable and is described as having a compact relative density.

All boreholes except Borehole 101 and 202 encountered an upper cohesionless layer of gravelly sand to sandy silt below the earth fill or pavement structure or at ground surface. This cohesionless layer extends to 0.6 to 4.5 m below existing grade (Elev. 130.4 to 125.7 ±m). This cohesionless layer is brown, black, grey, and typically moist. Standard Penetration Test (SPT) results (N-Values) in upper cohesionless layer range from 5 to 38 blows per 300 mm of penetration ('bpf'). The upper cohesionless layer is on average compact.

2.1.2 Glacial Till

Underlying the upper cohesionless layers the boreholes encountered a variable silt glacial till consisting of sandy silt with trace clay and gravel to clayey silt with trace sand and gravel. The glacial till was encountered at 0.6 to 3.6 m below existing grade (Elev. 130.4 to 125.7 ±m) and either extends past the vertical extent of the borehole or to 40.5 to 45.0 depth below existing grade (Elev. 86.9 to 89.1 m). The glacial till has interbedded layers of sand and silt that are moist to wet. SPT N-Values in the glacial till range from 11 to greater than 100 bpf. In general, the glacial till is compact (cohesionless) or very stiff (cohesive) above Elev. 108± m and becomes dense to very dense (cohesionless) to hard (cohesive) below Elev. 108± m.

2.1.3 Bedrock

Bedrock was inferred through SPT sampling in Boreholes 1 and 2. The bedrock was encountered at a depth of 40.5 to 45.0 m below grade (Elev. 86.9 to 89.1 m) and extending past the vertical extent of the investigation (Elev. 86.9 m). The bedrock is a grey shale that is described as moist.

2.2 Groundwater

The depth to groundwater and caved soils was measured in each of the boreholes immediately following the drilling. All boreholes were instrumented with groundwater monitoring wells.

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

Table 2.2 – Summary of Groundwater Observations

Borehole No.	Depth of well (m)	Strata Screened	Water Level in Well, Depth/Elev. (m)			
			Highest Level	Date	Most Recent Level	Date
1	86.9	Glacial Till	2.8 / 129.1	Oct. 10, 2018*	Couldn't be opened	
2	88.1	Glacial Till	2.1 / 127.5	Jul. 23, 2018*	Couldn't be found	
101	119.7	Glacial Till	7.9 / 124.4	Oct. 10, 2018*	Couldn't be opened	
102	120.0	Glacial Till	10.1 / 122.5	Oct. 10, 2018*	Couldn't be opened	
201	119.7	Glacial Till	10.7 / 121.6	Oct. 10, 2018*	Couldn't be opened	
202	117.5	Glacial Till	9.3 / 120.8	Oct. 10, 2018*	Couldn't be found	
MW1d-15	111.3±	Glacial Till	n.r. / 117.7	Jan. 2016**	14.4 / 113.1	Jul. 28, 2020
MW1s-15	111.3±	Glacial Till	n.r. / 113.7	Oct. 22, 2015***	10.5 / 117.0	Jul. 28, 2020
MW2-15	117.6±	Glacial Till and sand seams	n.r. / 123.3	Nov. 2015**	3.5 / 128.4	Jul. 28, 2020
MW3-15	117.2±	Glacial Till and sand seams	n.r. / 121.4	Apr. 2016**	2.8 / 127.2	Jul. 28, 2020

*McClymont & Rak Engineers Inc., "Slope Stability Assessment Proposed Mixed Use Development 175 Wynford Drive, Toronto, Ontario", Reference No. MG5276, dated April 2020
**R.J. Burnside & Associates Limited, "Don Valley Hotel Hydrogeologic Assessment, Water Level Monitoring Summary", Project No. 300037774.0000, date November 7, 2016.
***McClymont & Rak Engineers Inc., "Geohydrology Study Proposed Mixed Use Development 175 Wynford Drive, Toronto, Ontario", Reference No. MG 5276, dated February 2018.
n.r. = Not recorded

The highest groundwater table recorded on site is at 129± m in a variable glacial till with a high enough fine content that free flow of water is not expected. The boreholes encountered cohesionless sand seams within the glacial till that will produce free flowing water.

3 Preliminary Geotechnical Engineering Recommendations

Based on the factual data summarized above, we are providing the following geotechnical engineering design recommendations. Contractors must review the factual data while bidding or scoping services for this project and must provide their own opinion as to means, methods, and schedule.

Based on the factual data summarized above, preliminary geotechnical engineering recommendations are provided. These preliminary recommendations are for due diligence purposes only. They must be supplemented and confirmed by additional boreholes, wells, and a detailed geotechnical engineering report at the detailed design stage.

3.1 Preliminary Foundation Design Parameters

The proposed project includes demolishing the existing structures and constructing four towers that are 45 to 54 storeys in height with an 8-storey podium. The development will have a common six levels (P6) of underground parking set at a Finished Floor Elevation (FFE) of 104± m.

3.1.1 Spread Footings

Foundations made for the proposed P6 level will bear on undisturbed very dense glacial till or hard cohesive silt below Elev. 104± m. Pressuremeter testing has been conducted below the foundation level. The capacities provided must be confirmed and may be improved with the receipt of the pressuremeter testing results and additional boreholes and pressuremeter testing at detailed design. If Grounded were to be provided with these results, the bearing capacity below may potential be increased.

Conventional spread footings made to bear on this soil may be designed using a preliminary maximum factored geotechnical resistance at ULS of 900 kPa. The preliminary net geotechnical reaction at SLS is 600 kPa, for an estimated total settlement of 25 mm.

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.

Foundations will be made approximately 25 ±m below the highest recorded water table. The glacial till, while generally is a low permeability soil, has seams of wet sand that will produce free flowing water. Therefore, it is necessary to dewater the subgrade to at least 1.2 m below the lowest excavation, prior to excavation to preserve the in-situ integrity of the native soils. If the till is not depressurized prior to excavation, the native soils may become disturbed by basal heave or the ingress of groundwater and the above bearing capacity will not be valid.

Footings stepped from one elevation to another should be offset at a slope not steeper than 7 vertical to 10 horizontal.

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 founding subgrade must be cleaned of all unacceptable materials and approved by Grounded prior to pouring concrete for the footings. Such unacceptable materials may include disturbed or caved soils, ponded water, or similar as indicated by Grounded during founding subgrade inspection. During the winter, adequate temporary frost protection for the footing bases and concrete must be provided if construction proceeds during freezing weather conditions.

3.1.2 Alternative Foundation Options

The above spread footing capacities may not be enough for the proposed tower column loads. Additional subsurface investigation is required at detailed design to confirm, and likely improve, the spread footing bearing capacity. If at detailed design the spread footing capacity is not adequate, alternative foundation options are available.

Recommendations for higher capacity foundations made as end bearing caissons will be available at detailed design. The bedrock with constitute an adequate subgrade for end-bearing caissons. Bedrock was encountered at Elev. 86.9 to 89.1 m, approximately 15 to 17 m below the proposed FFE. A raft may also be explored at detailed design.

3.2 Preliminary Earthquake Design Parameters

The Ontario Building Code 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. 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 proposed FFE at Elev. 104± metres, the boreholes observe dense to very dense or hard soils. 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.

3.3 Preliminary 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 1010)	21	32	0.31	0.47	3.26
Existing Earth Fill	19	28	0.36	0.53	2.77
Glacial Till	21	32	0.31	0.47	3.26

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:

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

Where walls are made directly against shoring, prefabricated composite drainage panel covering the blind side of the wall is used to provide drainage. Water from the composite drainage panel is collected and discharged through the basement wall in solid ports directly to the sumps. This is discussed in Section 3.5.

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 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 CFEM Ed. 4 (0.8)
N	=	normal load at base of footing (kN)
φ	=	internal friction angle (see table above)

3.4 Preliminary Slab on Grade Design Parameters

At the proposed lowest P6 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 soils is 40,000 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 (OPSS 1004) vibrated to a dense state.

Wherever the slab-on-grade is made on sand, the drainage layer must be separated from the subgrade using a non-woven geotextile (with an apparent opening size of less than 0.250 mm and a tear resistance of more than 200 N) with a minimum 600 mm overlap. The clear stone drainage layer is then placed over the geotextile.

Wherever the slab-on-grade is made on native silt, bulk excavation is subexcavated a min. 150 mm and replaced by Granular A (OPSS 1010) compacted to 98% of SPMDD. A non-woven geotextile (with an apparent opening size of less than 0.250 mm and a tear resistance of more than 200 N) is to be placed on the surface of the compacted Granular A. The clear stone drainage layer is then placed over the geotextile.

Without this filtering layer, fines from the underlying sand subgrade will enter the drainage layer potentially resulting in loss of ground, loss of slab support, and clogging of the subfloor drainage system.

Given the nature of the soils at this site, recompaction or proof rolling of the undisturbed subgrade will weaken the subgrade materials. These activities should be specifically prohibited when preparing the subgrade. The subgrade should be cut neat and inspected by Grounded prior to placement of the capillary moisture break and construction of the slab. Disturbed or otherwise unacceptable material (as determined by Grounded) must be subexcavated and replaced with Granular B (OPSS 1010) compacted to a minimum of 98% SPMDD.

3.5 Preliminary 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.

For a conventional drained basement approach, perimeter and subfloor drainage are required for the underground structure. Subfloor drainage collects and removes the seepage that infiltrates under the floor. Perimeter drainage collects and removes seepage that infiltrates at the foundation walls.

Subfloor drainage pipes are to be spaced at an average 3 m (measured on-centres). If subdrain elevation conflicts with top of footing elevation, footings should be lowered as necessary.

The walls of the substructure are to be fully drained to eliminate hydrostatic pressure. Where drained basement walls are made directly against shoring, prefabricated composite drainage panel covering the blind side of the wall is used to provide drainage. Seepage from the composite drainage panel is collected and discharged through the basement wall in solid ports directly to the sumps. A layer of waterproofing placed between the drain core product and the basement wall should be considered to protect interior finishes from moisture.

Typical basement drainage details are appended.

The perimeter and subfloor drainage systems are critical structural elements since they eliminate hydrostatic pressure from acting on the basement walls and floor slab. The sumps that ensure the performance of these systems must have a duplexed pump arrangement providing 100% redundancy, and they must be on emergency power. The sumps should be sized by the mechanical engineer to adequately accommodate the estimated volume of water seepage.

4 Considerations for Construction

4.1 Excavations

Excavations must be carried out in accordance with the *Occupational Health and Safety Act and Regulations for Construction Projects, November 1993 (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 glacial till is a Type 2 soil
- The wet sands are Type 4 soils, or Type 3 soils if dewatered

In accordance with the regulation's requirements, the soil must be suitably sloped and/or braced where workmen must enter a trench or excavation deeper than 1.2 m. Safe excavation slopes 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.

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.

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.

For design purposes, the stabilized groundwater table is at about Elev.129± m. The water table is present in native soil. The lowest (P6) FFE is at about Elev. 104 m.

Therefore,

- Bulk excavation will extend approximately 25 ±m below the highest recorded water table elevation; and
- The glacial till, while generally considered a low permeability soil, has seams of wet sands and silts that will produce some free flowing water.

Positive dewatering to lower the groundwater table by at least 1.2 m below the lowest excavation elevation will be required to facilitate construction as well as to maintain the integrity of the subgrade for foundation and slab-on-grade support. The water level must be kept at least 1.2 m below the lowest excavation elevation during construction. Failure to dewater prior to excavation will result in unrecoverable disturbance of the subgrade, which will render advice provided for undisturbed subgrade conditions inapplicable. Dewatering will take some time to accomplish prior to the start of excavation.

Cohesionless wet zones were encountered in several of the boreholes. If these cohesionless zones are penetrated, some seepage from these wet zones should be anticipated. However, these zones are likely of limited extent and are not horizontally continuous layers. Seepage from these zones may be allowed to drain into the excavation and then controlled by a conventional sump pump arrangement. Nevertheless, delays in excavation will occur as the seepage is controlled and these delays should be anticipated in the construction schedule.

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. It should be noted that securing a permit to take water on a permanent basis may not be supported by regulatory agencies.

Should the excavation be supported using permeable soldier pile and lagging shoring, positive dewatering will be required on a continuous ongoing basis during construction.

A fully continuous interlocking caisson wall can limit the flow of water into the excavation, if better groundwater control during construction is required.

4.3 Earth-Retention Shoring Systems

The site is immediately bounded by a ravine to the north, an existing residential building (assumed to have multiple underground levels) and Eglinton Avenue East to the south, and Wynford Drive to the east and an on-ramp to the Don Valley Parkway to the west of site. No excavation shall extend below the foundations of existing adjacent structures without adequate alternative support being provided.

Underpinning guidelines are appended.

4.3.1 Lateral Earth Pressure Distribution

If the shoring is supported with a single level of earth anchor or bracing, a triangular earth pressure distribution like that used for the basement wall design is appropriate.

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:

$\boldsymbol{P = 0.8\,K[\gamma H + q] + \gamma_w h_w}$ (in cohesive soils)
$\boldsymbol{P = 0.65\,K[\gamma H + q] + \gamma_w h_w}$ (in cohesionless soils)

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)

Where shoring walls are drained to effectively eliminate hydrostatic pressure on the shoring system (e.g. pile and lagging walls), $\boldsymbol{h_w}$ is equal to zero. For the design of impermeable shoring, a design groundwater table at Elev. 129 m must be accounted for.

In cohesive soils, the lateral earth pressure distribution is trapezoidal, uniformly increasing from zero to the maximum pressure defined in the equation above over the top and bottom quarter (H/4) of the shoring. In cohesionless soils, the lateral earth pressure distribution is rectangular.

4.3.2 Soldier Pile Toe Embedment

Soldier pile toes will be made in dense to very dense or hard native soils. 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. There are zones within the subgrade that cohesionless, wet, and permeable. Augered holes for piles made into these soils may be prone to caving and blowback. Temporarily cased holes may be 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, mud/slurry drilling techniques, or other methods as deemed necessary by the shoring contractor are required.

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.

Above Elev. 108 m in the compact/stiff soils, it is expected that post-grouted anchors can be made such that an anchor will safely carry up to 50 kN/m of adhered anchor length (at a nominal borehole diameter of 150 mm). In the dense to very dense or hard till below Elev. 108± m, it is expected that post-grouted anchors can be made such that an anchor will safely carry up to 80 kN/m of adhered anchor length (at a nominal borehole diameter of 150 mm).

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 dense to very dense or hard till below the proposed FFE is suitable for the placement of raker foundations. Raker footings established on these competent native soils at an inclination of 45 degrees can be designed for a maximum factored geotechnical resistance at ULS of 400 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.

4.5 Engineering Review

By issuing this 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.

The proposed structure will be founded on conventional spread footings. 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 ensure that uniform moisture and density conditions are achieved in 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 report provides specifications which are to be used as technical specifications only. These technical specifications do not cover contract issues (quantities, insurance, other tender specifications, etc.) and as such must not be regarded as final tender specifications. The technical specifications provided in this report may form part of a complete set of tender documents prepared by others.

This preliminary geotechnical engineering feasibility study is intended for due diligence purposes only. At detailed design, site-specific boreholes, groundwater monitoring wells, and updated detailed geotechnical engineering advice are required. Once completed, the future detailed geotechnical engineering report by Grounded Engineering would then supersede this preliminary report.

5.1 Investigation Procedures

The geotechnical engineering analysis and advice provided here are based on factual data obtained from investigations at this site conducted by other consultants as described above. This previous consultant 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.

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.

The geotechnical engineering advice provided in this report is based on the factual observations made from the site investigations as reported. It is intended for use by the owner and their retained design team. If there are changes to the features of the development or to the scope, the interpreted subsurface information, geotechnical engineering design parameters, advice, and discussion on construction considerations may not be relevant or complete for the project. Grounded should be retained to review the implications of such changes with respect to the contents of this report.

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 DVP Hotel Development 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.

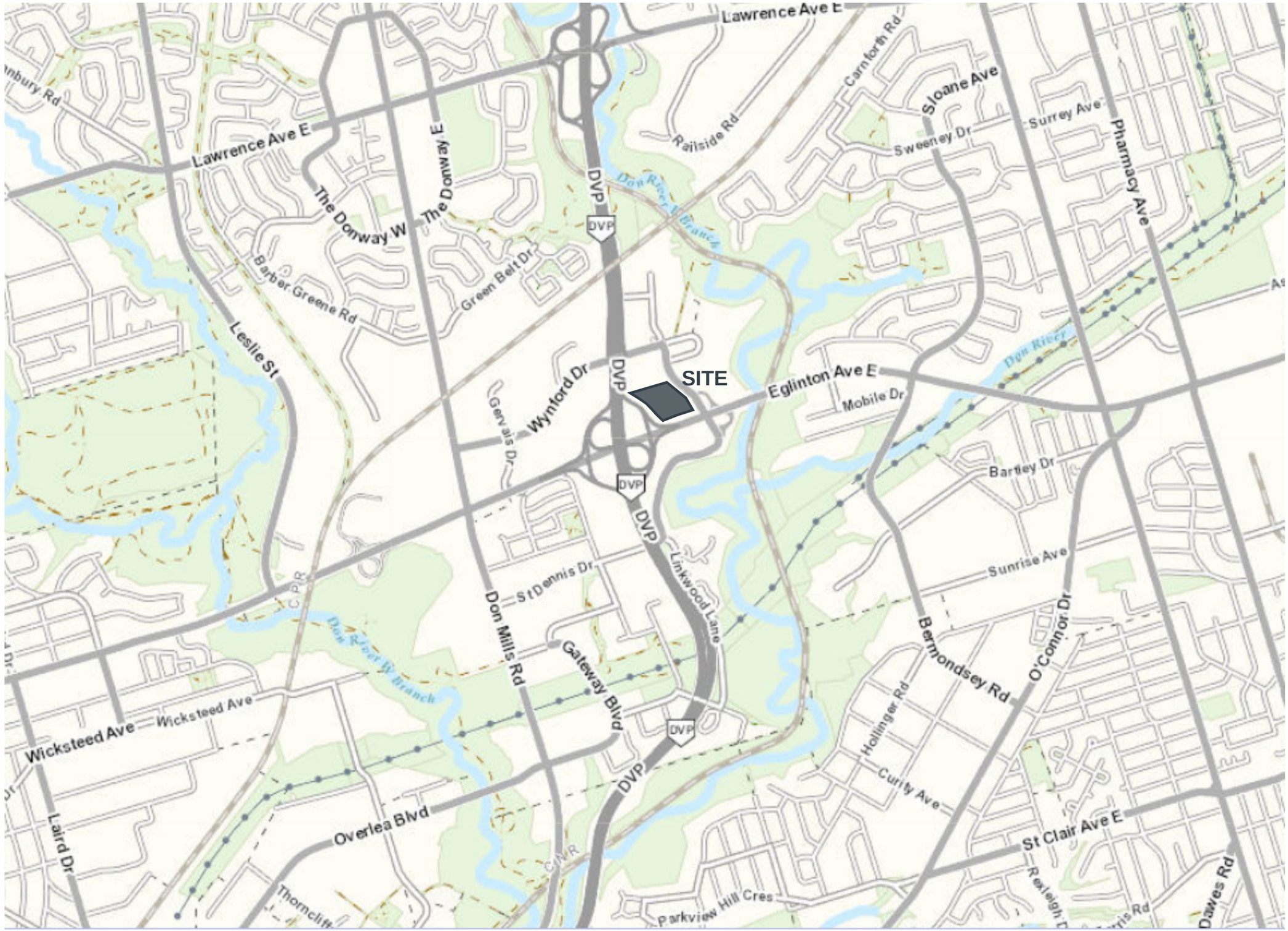
For and on behalf of our team,

GROUNDED ENGINEERING

Jory Hunter, B.Sc.(Eng.), EIT
Geotechnical and Environmental Group

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

FIGURES



GROUNDED ENGINEERING

12 Banigan Drive, Toronto, Ont., M4H 1E9
www.groundedeng.ca

LEGEND

SITE

Note

Reference
Toronto Maps v2, 2020.

Project

175 WYNFORD DRIVE

175 WYNFORD DRIVE
TORONTO, ONTARIO, M3C 1J3

Figure Title

SITE LOCATION PLAN

North

TRUE
PROJECT

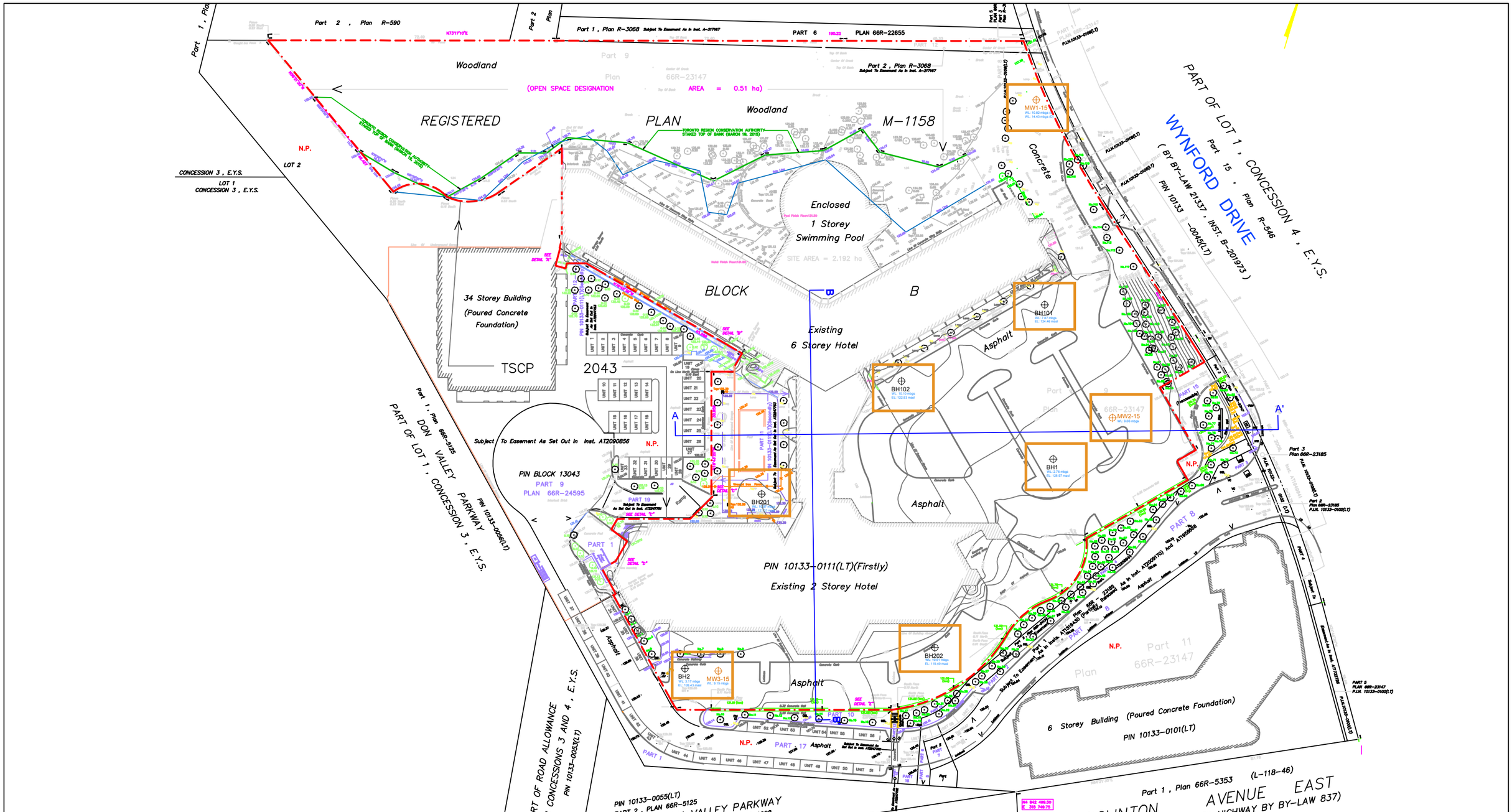
Date
AUGUST 2020

Scale
AS INDICATED

Job No
20-153

Figure No
FIGURE 1

APPENDIX A



LEGEND:

- PROPERTY BOUNDARY
- MONITORING WELL INSTALLED BY MCR, 2018

PROJECT NORTH
TRUE NORTH

0 1 2 5 10
SCALE (m)

Drawing Notes: Image drafted from property survey, Toronto Maps, Google Maps, and site inspections. Not for construction purposes.

McCLYMONT&RAK ENGINEERS, INC.
GEO-ENVIRONMENTAL CONSULTANTS

175 WYNFORD DRIVE, TORONTO, ONTARIO

BOREHOLE LOCATION PLAN

Project No.	Date	Drawing No.
MGE5276	MAY 2019	1

APPENDIX B

RECORD OF BOREHOLE 1

PROJECT : MGE5276
LOCATION : 175 Wynford Drive, Toronto, Ontario
STARTED : January 3, 2018
COMPLETED : January 11, 2018

MC CLYMONT & RAK ENGINEERS, INC.

SHEET 1 OF 2
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ORGANIC VAPOUR READINGS (ppm)	SHEAR STRENGTH: Cu, KPa (nat V - rem V - Q - U -)	WATER CONTENT, PERCENT (wp w wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		131.90								
		100 mm ASPHALT / 350 mm GRANULAR FILL		131.80 0.10								Flush Mount Cover
		FILL: sandy silt, trace of clay, gravel and organics, brown, moist, compact.		131.45 0.45	1	AS						
				131.00 0.90	2	SS	18					
2		SAND: medium to fine, trace of gravel, brown, moist, compact.		130.38 1.52	3	SS	22					
		SANDY SILT TILL: trace of clay and gravel, brown, moist, compact. -wet sand seam at 1,8 m depth. -some clay at 2.3 m depth. -wet coarse sand seam at 2.6 m depth.			4	SS	29					Bentonite
				128.55 3.35	5	SS	18					
4		CLAYEY SILT TILL: trace of sand and gravel, grey, moist, very stiff.										
		PMT1 at elevation 125.96 m asl.										9.14 m Long 50 mm ID PVC Riser
6					6	SS	22					
												124.30
8		**PMT2** at elevation 122.93 m asl.										Silica Sand
				122.45 9.45								122.76
10		SILTY CLAY: trace of sand, grey, moist to wet, very stiff			7	SS	23					
												3.05 m Long 50 mm ID Well Screen
12	POWER BORING / ROTARY MUD DRILLING											119.71
				119.25 12.65	8	SS	25					Well installed in separate borehole drilled next to BH!
14		SANDY SILT TILL: some clay, trace of gravel, grey, moist to wet, compact.										
		PMT3 at elevation 115.34 m asl.										
16				114.83 17.07	9	SS	20					
		CLAYEY SILT TILL: trace of sand and gravel, grey, moist to wet, very stiff.										
18												
20		**PMT4** at elevation 112.11 m asl.										
				111.63 20.27	10	SS	30					
		SILTY SAND: trace of gravel, brown, moist, dense.										
22												
		PMT5 at elevation 109.17 m asl.										
				108.74 23.16	11	SS	>100					
24		SANDY SILT TILL: trace of clay, gravel and shale fragments, brown, moist, very dense.										

GROUNDWATER ELEVATIONS

SHALLOW/SINGLE INSTALLATION
WATER LEVEL: 6.94 m bgs

DEEP/DUAL INSTALLATION
WATER LEVEL:

LOGGED : PL
CHECKED : LM

MCR BOREHOLE LOG 5276.GPJ 2/16/18

RECORD OF BOREHOLE 1

PROJECT : MGE5276
LOCATION : 175 Wynford Drive, Toronto, Ontario
STARTED : January 3, 2018
COMPLETED : January 11, 2018

MC CLYMONT & RAK ENGINEERS, INC.

SHEET 2 OF 2
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ORGANIC VAPOUR READINGS (ppm) ⊗ 100 200 300 400 / % LEL - (hexane) □ 20 40 60 80	SHEAR STRENGTH: Cu, KPa nat V - ✤ rem V - ● Q - ✖ U - ▲ 20 40 60 80 / WATER CONTENT, PERCENT wp w wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		131.90							
26	POWER BORING / ROTARY MUD DRILLING	**PMT6** at elevation 106.12 m asl. -seams with some clay at 26.2 m depth.			12	SS	>100	10 ⊗			
28		**PMT7** at elevation 102.61 m asl.									
30		CLAYEY SILT TILL: trace of sand and gravel, brown, moist, hard.		102.18 29.72	13	SS	62	0 ⊗			
32		**PMT8** at elevation 99.90 m asl.			14	SS	43	0 ⊗			
34		**PMT9** at elevation 96.57 m asl.									
36		SILT: some clay, trace of fine sand, grey, moist, hard.		96.09 35.81	15	SS	45	0 ⊗			
38		**PMT10** at elevation 93.52 m asl.									
40		SAND: medium to fine, brown, moist to wet, very dense		93.04 38.86	16	SS	>100	0 ⊗			
42		**PMT11** at elevation 90.47 m asl. CLAYEY SILT TILL: trace of sand and gravel, grey, moist, hard.		89.99 41.91	17	SS	53	0 ⊗			
44		**PMT12** at elevation 87.42 m asl.									
46		SHALE: grey, moist. End of Borehole		86.94 44.96 86.50 45.00	18	SS	>100				
48		Note: 1) Water level was not measured on completion of drilling due to use of mud. 2) Combustible vapour reading was 10 ppm at 1.8 m depth in open borehole. 3) Soil samples were screened using a RKI Eagle gas meter with methane response mode off. 4) Water level was measured at 6.94 m bgs on February 16, 2018.									

GROUNDWATER ELEVATIONS

▽ SHALLOW/SINGLE INSTALLATION
WATER LEVEL: 6.94 m bgs

▼ DEEP/DUAL INSTALLATION
WATER LEVEL:

LOGGED : PL
CHECKED : LM

MCR BOREHOLE LOG 5276.GPJ 2/16/18

RECORD OF BOREHOLE 2

PROJECT : MGE5276
LOCATION : 175 Wynford Drive, Toronto, Ontario
STARTED : February 6, 2018
COMPLETED : February 9, 2018

MC CLYMONT & RAK ENGINEERS, INC.

SHEET 1 OF 2
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	ORGANIC VAPOUR READINGS (ppm) ⊗ 100 200 300 400 / % LEL - (hexane) □ 20 40 60 80	SHEAR STRENGTH: Cu, KPa nat V - ✤ rem V - ● Q - ✖ U - ▲ 20 40 60 80 / WATER CONTENT, PERCENT wp w wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		129.60							
		75 mm ASPHALT / 300 mm GRANULAR FILL		129.38							
		SANDY SILT: trace of clay and gravel, sand seams, brown, moist, loose.		129.22 0.38	1	SS		0			Flush Mount Cover
					2	SS	7	5			Bentonite
		CLAYEY SILT TILL: some sand, trace of gravel, brown, moist, very stiff.		128.08 1.52	3	SS	15	0			3.05 m Long 50 mm ID PVC Riser
2		-grey below 2.45 m depth.			4	SS	17	0			127.15 Silica Sand
					5	SS	21	0			126.55 ▽
4		SANDY SILT TILL: trace of clay and gravel, grey, moist, compact. -fine sand seam, wet in the upper 300 mm.		125.03 4.57	6	SS	25	0			3.05 m Long 50 mm ID Well Screen
6					7	SS	21	0			123.50 Well installed in separate borehole drilled next to BH2
8					8	SS	26	0			
		SILT: some sand, grey, moist to wet, very dense.		120.46 9.14	9	SS	65	0			
10	POWER BORING / ROTARY MUD DRILLING	SAND: medium to fine, grey, moist to wet, very dense.		118.93 10.67	10	SS	74	0			
12		SILT: some sand, trace of clay, grey, moist to wet, very dense to dense..		117.41 12.19	11	SS	54	0			
					12	SS	40	0			
14		CLAYEY SILT: trace of sand, grey, moist, hard to very stiff.		114.36 15.24	13	SS	38	0			
		-occasional clayey seams below 16.75 m depth.			14	SS	42	0			
16					15	SS	25	0			
18											
		SANDY SILT TILL: some clay, trace of gravel, grey, moist, very dense.		108.26 21.34	16	SS	>100	0			
20											
22											

GROUNDWATER ELEVATIONS

▽ SHALLOW/SINGLE INSTALLATION
WATER LEVEL: 3.12 m bgs

▼ DEEP/DUAL INSTALLATION
WATER LEVEL:

LOGGED : PL
CHECKED : LM

MCR BOREHOLE LOG 5276.GPJ 2/16/18

RECORD OF BOREHOLE 2

PROJECT : MGE5276
LOCATION : 175 Wynford Drive, Toronto, Ontario
STARTED : February 6, 2018
COMPLETED : February 9, 2018

MC CLYMONT & RAK ENGINEERS, INC.

SHEET 2 OF 2
DATUM Geodetic

DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	ORGANIC VAPOUR READINGS (ppm) ⊗ 100 200 300 400 / % LEL - (hexane) □ 20 40 60 80	SHEAR STRENGTH: Cu, KPa nat V - ✤ rem V - ● Q - ✖ U - ▲ 20 40 60 80 / WATER CONTENT, PERCENT wp w wl 10 20 30 40	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		129.60							
24	POWER BORING / ROTARY MUD DRILLING										
		SILT: some clay, trace of sand, grey, moist. hard.		105.22 / 24.38	17	SS	51	0			
26											
					18	SS	52	0			
28											
30											
					19	SS	43	0			
32											
					20	SS	39	0			
34											
36											
		CLAYEY SILT: grey, moist, hard.		93.02 / 36.58	21	SS	40	0			
38											
		-some sand below 39.6 m depth. -200 mm wet sand seam, coarse to medium, trace of decay wood at 39.9 m depth.			22	SS	91				
40				89.06 / 40.54							
		SHALE: grey, moist.			23	SS	>100				
				88.07 / 41.53	24	SS	>100				
42		End of Borehole									
		Note: 1) Water level was not measured on completion of drilling due to use of mud. 2) Combustible vapour reading was 10 ppm at 1.8 m depth in open borehole. 3) Soil samples were screened using a RKI Eagle gas meter with methane response mode off. 4) Water level was measured at 3.12 m bgs on February 16, 2018.									
44											

GROUNDWATER ELEVATIONS

▽ SHALLOW/SINGLE INSTALLATION
WATER LEVEL: 3.12 m bgs

▼ DEEP/DUAL INSTALLATION
WATER LEVEL:

LOGGED : PL
CHECKED : LM

MCR BOREHOLE LOG 5276.GPJ 2/16/18

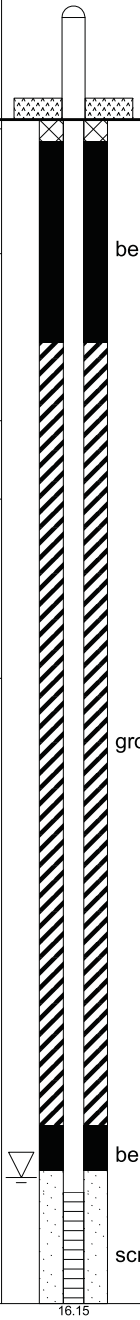
LOG OF DRILLING OPERATIONS

MW1d-15

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Guelph, Ontario N1H 1C4
telephone (519) 823-4995 fax (519) 836-5477

Client: **Allied Don Valley Hotel Inc.**	Project Name: **Don Valley Hotel HydroG Study**	Logged by: **D. Durham**
Project No.: **300037774**	Location: **175 Wynford Drive**	Ground (m amsl):
Drilling Co.: **Lantech Drilling Services Inc.**	Date Started: **10/14/2015**	Static Water Level Depth (m): **14.43**
Drilling Method: **Hollow Stem Auger**	Date Completed: **10/14/2015**	Sand Pack Depth (m) :

Depth Scale (ft)	Depth Scale (m)	Stratigraphic Description	Strat. Plot	Depth (m)	Num.	Type	Int.	N.Val.
		Dark Brown TOPSOIL.		0.13		SS		28
	1.0	SILTY SAND, light to med brown, trace to some gravel, trace clay, stiff, dry, minor plasticity.				SS		31
5.0	2.0	SILT AND CLAY, med grey with some mottling near 1.83m, varying sand and gravel content, some to trace gravel, sandy to some sand, soft to firm, moist, some plasticity.		1.83		SS		29
						SS		13
10.0	3.0					SS		6
	4.0	SILTY SAND, med grey, trace gravel, clayey near 5.18m, soft, moist, generally not plastic except for clayey zone near 5.18m.		4.11		SS		13
15.0	5.0					SS		20
		CLAYEY SILT, med grey, trace fine gravel, soft to firm, moist, some plasticity.		5.18				
20.0	6.0					SS		21
	7.0							
25.0	8.0	SANDY SILT, med grey, some clay, trace gravel, firm, moist, some plasticity. Sand is fine to very fine grained.		7.62		SS		25
		Minor sand zones at: 11.0 - 11.3 m, 13.7 - 14.0 m, and 15.2 - 15.5 m.						
30.0	9.0					SS		22
	10.0							
35.0	11.0					SS		16
	12.0							
40.0	13.0					SS		29
45.0	14.0					SS		100+
	15.0							
50.0						SS		61
	16.0			16.15				



Prepared By: **D. Durham** Checked By: Date Prepared: **10/23/2015**

This borehole log was prepared for hydrogeological and/or environmental purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by R. J. Burnside & Associates Limited personnel before use by others.

LEGEND
- Water found @ time of drilling
- Static Water Level - 10/22/2015

MONITORING WELL DATA
- Pipe: **51 mm dia. PVC**
- Screen: **51 mm dia. PVC #10 slot**

SAMPLE TYPE
- AC Auger Cutting
- CS Continuous
- RC Rock Core
- SS Split Spoon
- AR Air Rotary
- WC Wash Cuttings

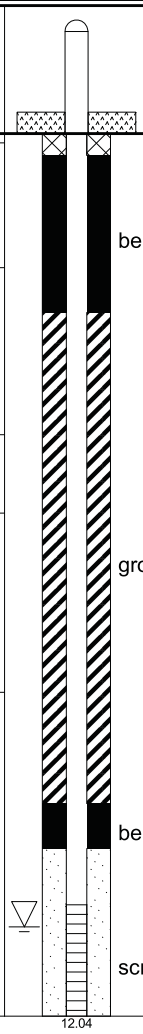
LOG OF DRILLING OPERATIONS

MW1s-15

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Guelph, Ontario N1H 1C4
telephone (519) 823-4995 fax (519) 836-5477

Client: **Allied Don Valley Hotel Inc.**	Project Name: **Don Valley Hotel HydroG Study**	Logged by: **D. Durham**
Project No.: **300037774**	Location: **175 Wynford Drive**	Ground (m amsl):
Drilling Co.: **Lantech Drilling Services Inc.**	Date Started: **10/13/2015**	Static Water Level Depth (m): **10.82**
Drilling Method: **Hollow Stem Auger**	Date Completed: **10/13/2015**	Sand Pack Depth (m) :

Depth Scale (ft)	Depth Scale (m)	Stratigraphic Description	Strat. Plot	Depth (m)	SAMPLE Num.	SAMPLE Type	SAMPLE Int.	Depth Scale (ft)	Depth Scale (m)
		Dark Brown TOPSOIL.		0.13					
5.0	1.0	SILTY SAND, light to med brown, trace to some gravel, trace clay, stiff, dry, minor plasticity.						5.0	1.0
	2.0	SILT AND CLAY, med grey with some mottling near 1.83m, varying sand and gravel content, some to trace gravel, sandy to some sand, soft to firm, moist, some plasticity.		1.83					2.0
10.0	3.0							10.0	3.0
	4.0	SILTY SAND, med grey, trace gravel, clayey near 5.18m, soft, moist, generally not plastic except for clayey zone near 5.18m.		4.11					4.0
15.0	5.0			5.18				15.0	5.0
	6.0	CLAYEY SILT, med grey, trace fine gravel, soft to firm, moist, some plasticity.						20.0	6.0
20.0	7.0								7.0
25.0	8.0	SANDY SILT, med grey, some clay, trace gravel, firm, moist, some plasticity. Sand is fine to very fine grained.		7.62				25.0	8.0
30.0	9.0	Minor sand zone at: 11.0 - 11.3 m.						30.0	9.0
	10.0								10.0
35.0	11.0							35.0	11.0
	12.0			12.04					12.0



Prepared By: **D. Durham** Checked By: Date Prepared: **10/23/2015**

This borehole log was prepared for hydrogeological and/or environmental purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by R. J. Burnside & Associates Limited personnel before use by others.

LEGEND
- Water found @ time of drilling
- Static Water Level - 10/22/2015

MONITORING WELL DATA
- Pipe: **51 mm dia. PVC**
- Screen: **51 mm dia. PVC #10 slot**

SAMPLE TYPE
- AC Auger Cutting
- CS Continuous
- RC Rock Core
- SS Split Spoon
- AR Air Rotary
- WC Wash Cuttings

LOG OF DRILLING OPERATIONS

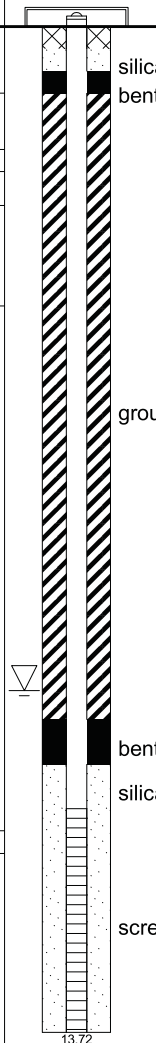
MW2-15

BURNSIDE

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Guelph, Ontario N1H 1C4
telephone (519) 823-4995 fax (519) 836-5477

Client: **Allied Don Valley Hotel Inc.**	Project Name: **Don Valley Hotel HydroG Study**	Logged by: **D. Durham**
Project No.: **300037774**	Location: **175 Wynford Drive**	Ground (m amsl):
Drilling Co.: **Lantech Drilling Services Inc.**	Date Started: **10/14/2015**	Static Water Level Depth (m): **9.06**
Drilling Method: **Hollow Stem Auger**	Date Completed: **10/15/2015**	Sand Pack Depth (m) :

Depth Scale (ft)	Depth Scale (m)	Stratigraphic Description	Strat. Plot	Depth (m)	Num.	Type	Int.	N.Val.
		FILL. Brown/grey gravel and sand, compact, moist.				SS		27
	1.0	GRAVELLY SAND, speckled brn/blk/grey, loose to compact, moist to wet, non-plastic.		0.91		SS		23
5.0	2.0	SAND, brown, medium, compact, wet, non-plastic, uniform.		1.68 1.98		SS		26
		SILT and FINE SAND, brown with rust coloured mottling, trace small stones, moist, stiff, competent. Till like.		2.44		SS		38
10.0	3.0	SANDY SILT, medium grey, fine sand, trace clay and gravel, firm, moist, some plasticity.		3.81		SS		15
	4.0	CLAYEY SANDY SILT, medium grey, some clay to clayey, trace gravel, stiff, moist, some plasticity.				SS		17
15.0	5.0					SS		13
20.0	6.0					SS		11
25.0	7.0					SS		17
30.0	8.0					SS		18
35.0	9.0					SS		21
40.0	10.0	SAND, medium grey, fine, some silt, some to trace clay, trace gravel, firm, wet, some plasticity.		10.97 11.28		SS		22
45.0	11.0	SILT and FINE SAND, medium grey, some to trace clay, trace gravel, firm, wet, some plasticity.		14.33		SS		21



Prepared By: **D. Durham** Checked By: Date Prepared: **10/23/2015**

This borehole log was prepared for hydrogeological and/or environmental purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by R. J. Burnside & Associates Limited personnel before use by others.

LEGEND
- Water found @ time of drilling
- Static Water Level - 10/22/2015

MONITORING WELL DATA
- Pipe: **51 mm dia. PVC**
- Screen: **51 mm dia. PVC #10 slot**

SAMPLE TYPE
- AC Auger Cutting
- CS Continuous
- RC Rock Core
- SS Split Spoon
- AR Air Rotary
- WC Wash Cuttings

LOG OF DRILLING OPERATIONS

MW3-15

R.J. Burnside & Associates Limited
292 Speedvale Avenue West, Guelph, Ontario N1H 1C4
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Client: **Allied Don Valley Hotel Inc.**	Project Name: **Don Valley Hotel HydroG Study**	Logged by: **D. Durham**
Project No.: **300037774**	Location: **175 Wynford Drive**	Ground (m amsl):
Drilling Co.: **Lantech Drilling Services Inc.**	Date Started: **10/15/2015**	Static Water Level Depth (m): **9.15**
Drilling Method: **Hollow Stem Auger**	Date Completed: **10/15/2015**	Sand Pack Depth (m) :

Depth Scale (ft)	Depth Scale (m)	Stratigraphic Description	Strat. Plot	Depth (m)		SAMPLE Num.	Type	Int.	N.Val.	Depth Scale (ft)	Depth Scale (m)
		FILL, grey.		0.18	silica sand pack		SS		13		
	1.0	SAND, fine, brown with mottles, some silt, soft to firm, moist to wet, non-plastic.		0.61	bentonite seal		SS		18		1.0
5.0	2.0	CLAYEY SILT, grey with some mottling, trace gravel and fine sand, firm, moist, some plasticity.		2.13			SS		14	5.0	2.0
		SANDY CLAYEY SILT, medium grey, trace gravel, firm, moist, some plasticity.					SS		19		
10.0	3.0						SS		16	10.0	3.0
	4.0	SANDY SILT, medium grey, trace gravel and clay, stiff to very stiff, dry to moist, non-plastic.		3.81			SS		50		4.0
15.0				4.57	grout					15.0	
	5.0	SAND, fine to medium, grey, trace silt, loose to compact, saturated, non-plastic.		4.88			SS		26		5.0
		SANDY CLAYEY SILT, medium grey, trace gravel, firm, moist, some plasticity.									
20.0	6.0						SS		22	20.0	6.0
	7.0										7.0
25.0							SS		30	25.0	
	8.0				bentonite seal						8.0
	9.0				silica sand pack						9.0
30.0		SILT, medium grey, trace fine sand, stiff, moist, non-plastic.		9.14			SS		88+	30.0	
	10.0										10.0
35.0				10.67	screen		SS		86+	35.0	
	11.0	SAND, grey speckled, medium, some silt, dense, saturated, non-plastic.		10.97							11.0
	12.0	SANDY SILT, medium grey, stiff, moist, non-plastic.									12.0
40.0					12.19		SS		70+	40.0	
				12.80							

Prepared By: **D. Durham** Checked By: Date Prepared: **10/23/2015**

This borehole log was prepared for hydrogeological and/or environmental purposes and does not necessarily contain information suitable for a geotechnical assessment of the subsurface conditions. Borehole data requires interpretation by R. J. Burnside & Associates Limited personnel before use by others.

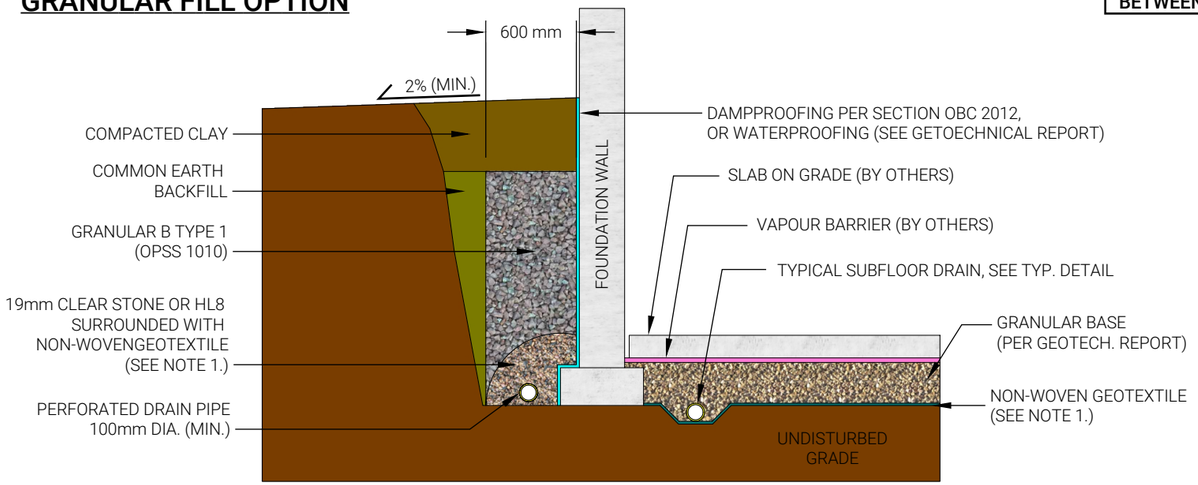
LEGEND
- Water found @ time of drilling
- Static Water Level - 10/22/2015

MONITORING WELL DATA
- Pipe: **51 mm dia. PVC**
- Screen: **51 mm dia. PVC #10 slot**

SAMPLE TYPE
- AC Auger Cutting
- CS Continuous
- RC Rock Core
- SS Split Spoon
- AR Air Rotary
- WC Wash Cuttings

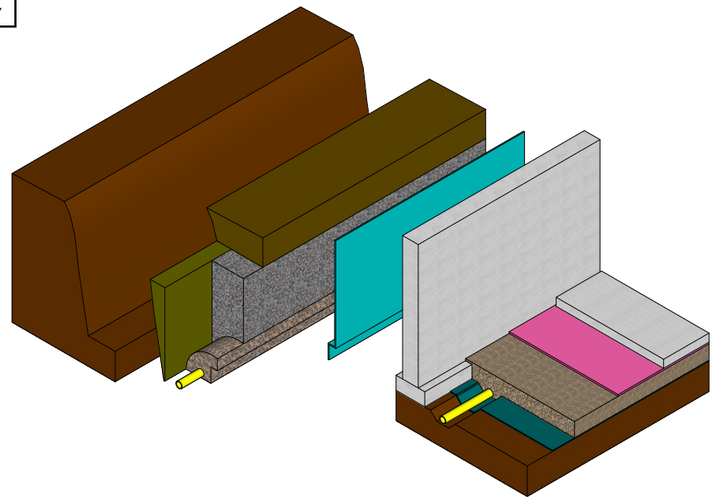
APPENDIX C

GRANULAR FILL OPTION



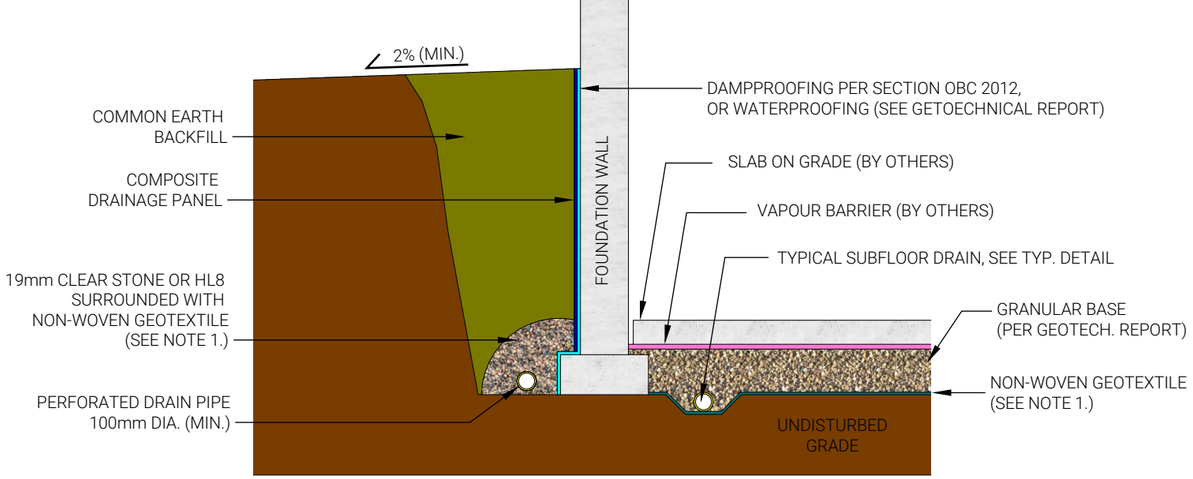
SECTIONAL VIEW

OBJECTS ARE COLOR-CODED BETWEEN TWO VIEWS FOR CLARITY

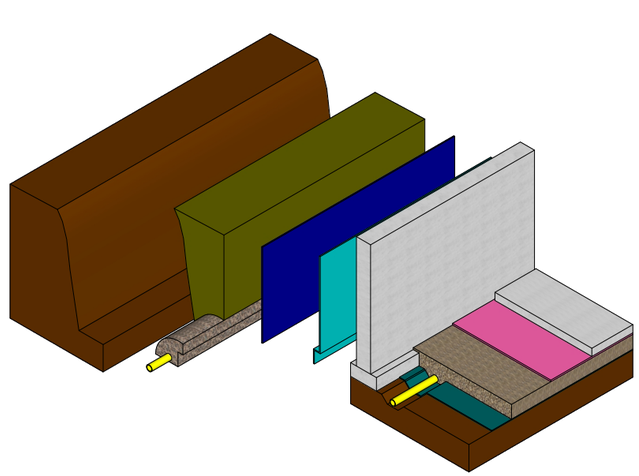


ISOMETRIC VIEW

GEO-COMOSITE DRAINAGE PANEL OPTION



SECTIONAL VIEW



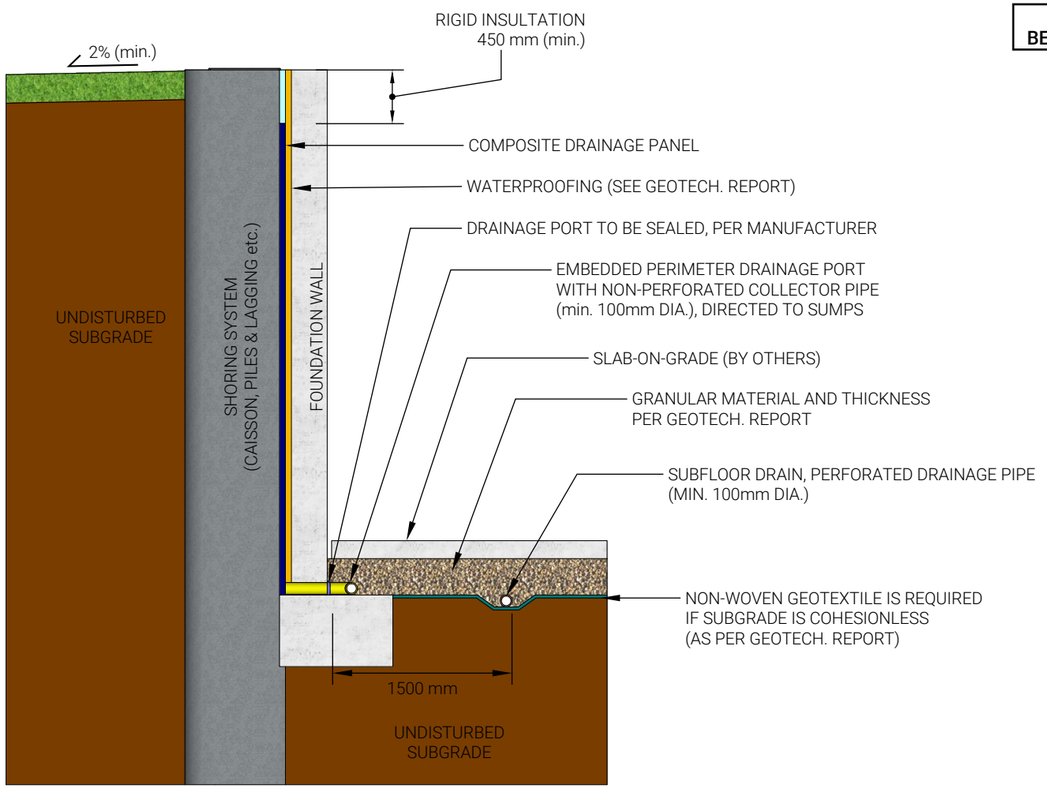
ISOMETRIC VIEW

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

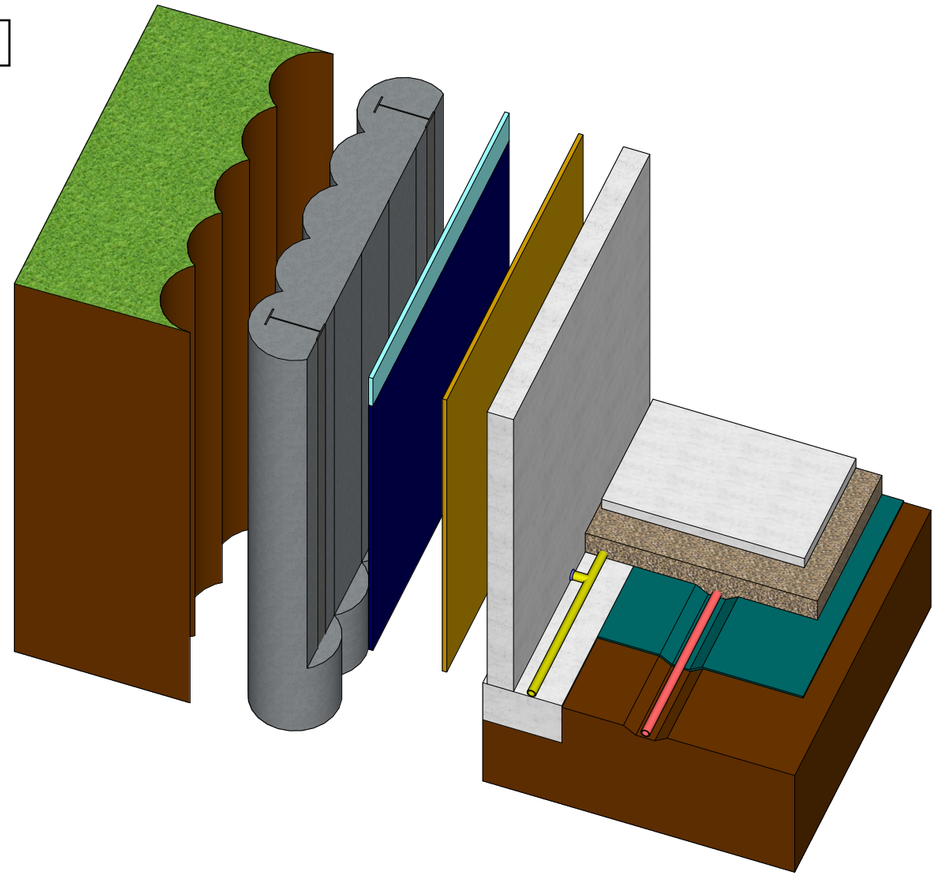
GROUNDED ENGINEERING

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

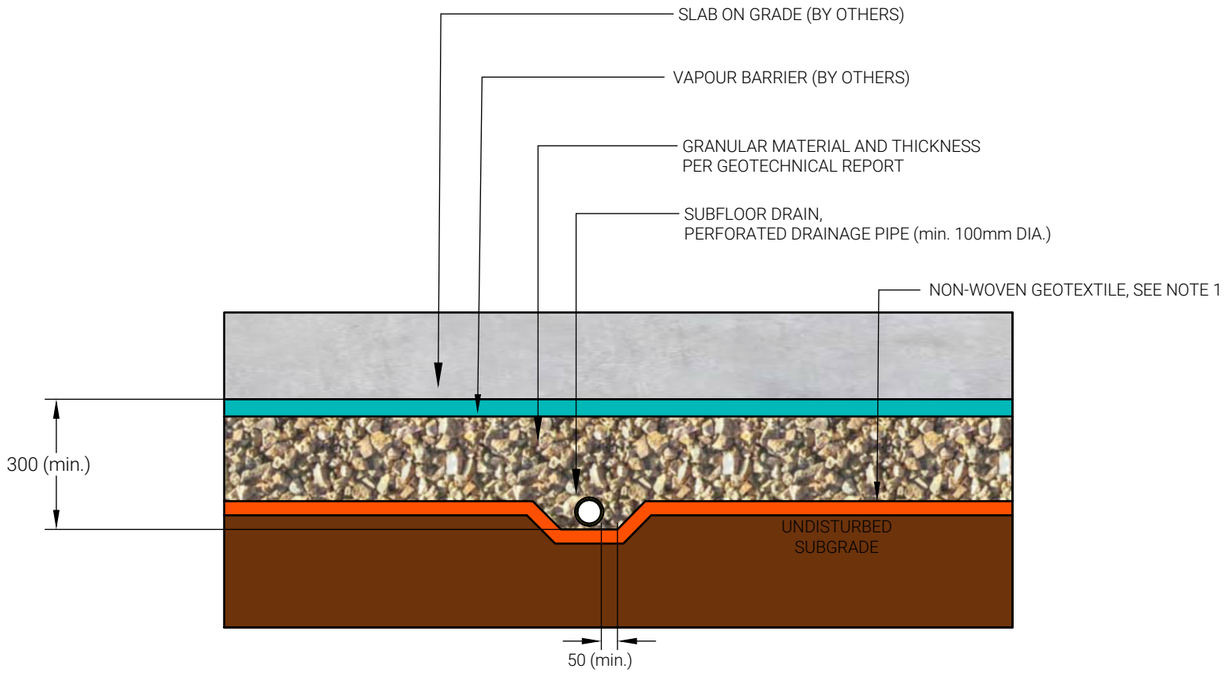
1. THERE SHOULD BE NO STRUCTURAL CONNECTION BETWEEN THE SLAB-ON-GRADE AND THE FOUNDATION WALL OR FOOTING.
2. THERE SHOULD BE NO CONNECTION BETWEEN THE SUBFLOOR AND PERIMETER DRAINAGE SYSTEMS.
3. THIS IS ONLY A TYPICAL BASEMENT DRAINAGE DETAIL. THE GEOTECHNICAL REPORT SHOULD BE CONSULTED FOR SITE SPECIFIC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

GROUNDED ENGINEERING

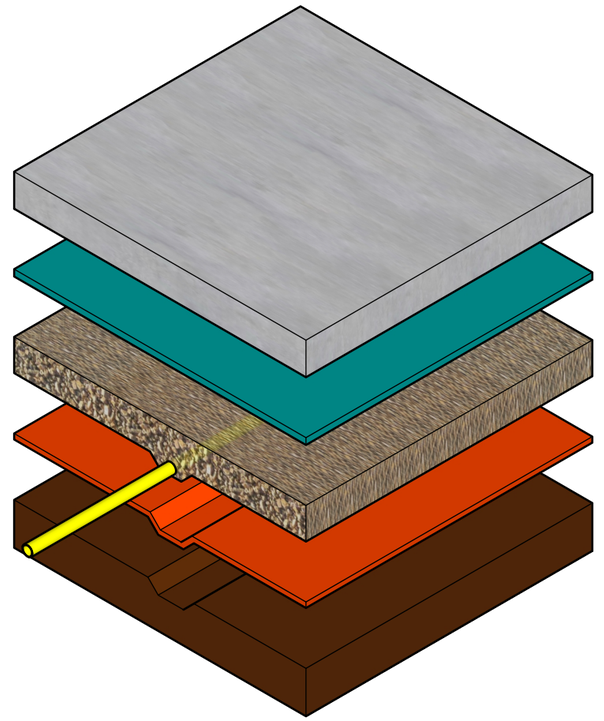
Title

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).

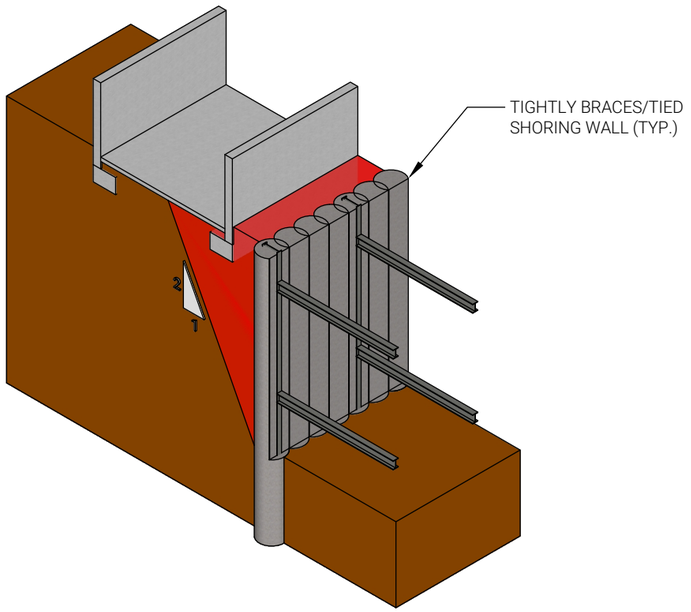
2. TYPICAL SCHEMATIC ONLY. MUST BE READ IN CONJUNCTION WITH GEOTECHNICAL REPORT.

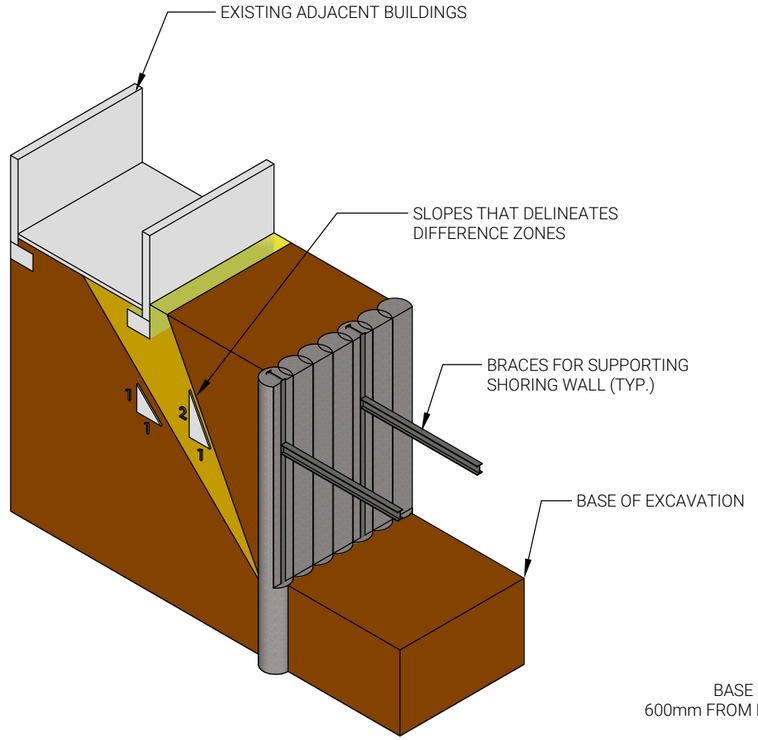
GROUNDED ENGINEERING

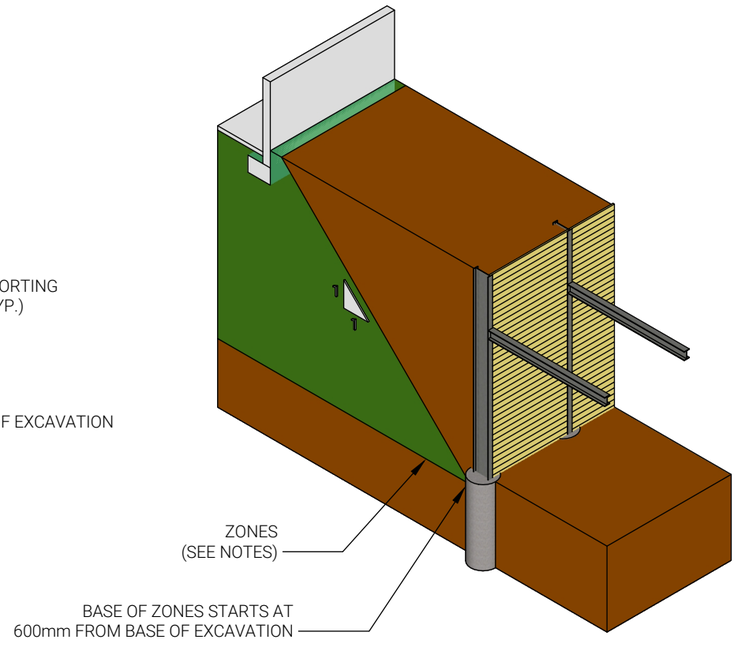
Title

BASEMENT SUBDRAIN TYPICAL DETAIL

APPENDIX D







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