Geotechnical Investigation 5800 Yonge Street Toronto, Ontario

Prepared For:

Life Construction

DS Project No: 18-733-100 **Date**: February 07, 2019



DS CONSULTANTS LTD.

6221 Highway 7, Unit 16 Vaughan, Ontario, L4H 0K8 Telephone: (905) 264-9393 <u>www.dsconsultants.ca</u>

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APPENDIX A

LOG SHEETS OF BOREHOLES BH17-2, BH17-5 AND BH17-6 DRILLED BY WSP IN AUGUST 2017

1. INTRODUCTION

DS Consultants Limited (DSCL) was retained by Life Construction to undertake a geotechnical investigation for the proposed high-rise building located at 5800 Yonge Street in The City of Toronto, Ontario.

A phase 2 Environmental Site Assessment at the subject site was carried out by WSP in August 2017 and a total of six boreholes BH17-1 to BH17-6 were drilled to depths ranging from 6.7m to 27.4m. Boreholes BH17-2, BH17-5 and BH17-6 were drilled to deeper depths ranging from 16.9m to 27.4m. The borehole logs of the deep boreholes are attached in **Appendix A** of this report.

It is understood that the existing onsite building will be demolished, and future use of the property will be residential/commercial with four (4) and five (5) levels of underground parking. The finish floor level of P4 and P5 is not available to us at the time of writing this report.

DS is also carrying out hydrogeological and environmental investigations at the subject site and the reports will be documented under separate covers. This report deals with the geotechnical aspects of the site.

The purpose of this geotechnical investigation was to determine the subsurface conditions at the ten (10) borehole locations and from the findings at the boreholes make geotechnical recommendations for the following:

- 1. Foundations
- 2. Floor slabs and permanent drainage
- 3. Excavations and groundwater control
- 4. Temporary shoring
- 5. Earth pressures
- 6. Earthquake considerations

This report is provided on the basis of the terms of reference presented above and on the assumption that the design will be in accordance with applicable codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, or if any questions arise concerning the geotechnical aspects of the codes and standards, this office should be contacted to review the design. It may then be necessary to carry out additional borings and reporting before the recommendations can cater to the changed design.

The site investigation and recommendations follow generally accepted practice for geotechnical consultants in Ontario. The format and contents are guided by client specific needs and economics and do not conform to generalized standards for services. Laboratory testing for most part follows ASTM or CSA Standards or modifications of these standards that have become standard practice.

This report has been prepared for Life Construction, its architect and designers. Use of this report by third party without DS consent is prohibited.

2. FIELD AND LABORATORY WORK

A total of ten boreholes (BH18-1 to BH18-10 see **Drawing 1** for borehole locations) were drilled at the subject site to depths ranging from 6.5m to 21.6m below ground surface. Boreholes BH18-1, BH18-2, BH18-5 and BH18-6 were drilled for the geotechnical investigation to depths ranging from 21.4m to 21.6m and other shallow boreholes were drilled for environmental investigation. These boreholes were drilled with solid and hollow stem continuous flight auger equipment by a drilling sub-contractor under the direction and supervision of DS personnel. Samples were retrieved at regular intervals with a 50 mm O.D. split-barrel sampler driven with a hammer weighing 624 N and dropping 760 mm in accordance with the Standard Penetration Test (SPT) method. The samples were logged in the field and returned to the DS laboratory for detailed examination by the project engineer and for laboratory testing.

As well as visual examination in the laboratory, all soil samples from geotechnical boreholes were tested for moisture contents. Grain size analyses of four (4) selected soil samples were conducted and the results are presented on individual logs and on **Drawing 12**.

Water level observations were made during and upon completion of drilling. Eight (8) deep and shallow monitoring wells of 50mm dia. were installed in Boreholes BH18-1 through BH18-7 and BH18-10 for the long-term groundwater measurements.

Surveying at the borehole locations was undertaken by DS personnel and the elevations at the borehole locations were referenced to geodetic benchmark.

3. SITE AND SUBSURFACE CONDITIONS

The borehole location plans are shown on **Drawing 1**. General notes on sample description are provided on **Drawing 1A**. The subsurface conditions in the boreholes are presented in the individual borehole logs presented on **Drawings 2 to 11**.

3.1 Soil Conditions

PAVEMENT STRUCTURE: Boreholes BH18-1 through BH18-4 and BH18-7 were drilled on paved surface and encountered a pavement structure consisting of 100mm to 125mm of asphaltic concrete overlying 200 to 360mm of granular base.

75 to 450mm thick topsoil was encountered in Boreholes BH18-5, BH18-6, BH18-8 to BH18-10

FILL: Fill material was found in all boreholes extending to depths ranging from 0.9 to 3.1m below ground surface. The fill consisted of silty sand, sand and gravel and clayey silt and was in a firm to stiff consistency, with measured SPT 'N' values ranging from 4 to 10 blows per 300 mm penetration. Traces of organics and topsoil were also observed in fill material.

<u>COHESIVE DEPOSITS (CLAYEY SILT TILL/SILTY CLAY/CLAYEY SILT)</u>: Cohesive deposits of clayey silt till and silty clay to clayey silt were encountered in all boreholes and extended to depths ranging from 5.7m to 9.4m below ground surface. Another layer of clayey silt was found in BH18-5 at a depth of 17.9m and extended to a depth of 19.5m below ground surface. Boreholes BH18-4 and BH18-7 were

terminated in these deposits. Cohesive deposits were found to have very stiff to hard consistency with, measured SPT 'N' values ranging from 16 to more than 50 blows per 300 mm of penetration.

Grain size analyses of one silty clay samples (BH18-1/SS7) was conducted and the result is are presented on **Drawings 12**, with the following fractions:

Clay: 65% Silt: 33% Sand: 2%

<u>COHESIONLESS DEPOSITS (SAND, SILT, SAND AND GRAVEL, SANDY SILT TO SILTY SAND</u>): Below the cohesive deposits in Boreholes BH18-1, BH18-2, BH18-5, BH18-6 and BH18-10, cohesionless deposits of sand, silt, sand and gravel and sandy silt to silty sand were encountered and extended to the maximum explored depths in most of the boreholes. Boreholes BH18-1, BH18-5, BH18-6 and BH18-10 were terminated in cohesionless deposits. Cohesionless deposits were generally found in a very dense state with occasional dense layers with, measured SPT 'N' values ranging from 41 to more than 50 blows per 300 mm of penetration. Sand and gravel in Boreholes BH18-5 and BH18-6 were found wet at depths 16.7m and 13.4m, respectively.

Grain size analyses of three (3) silt and silt seams samples (BH18-1/SS12, BH18-2/SS11 and BH18-5/SS12) were conducted and the results are presented on **Drawings 12**, with the following fractions:

Clay:	3 to 11%
Silt:	79 to 95%
Sand:	2 to 10%

SANDY SILT TILL: These deposits were encountered at various depths in Boreholes BH18-2, BH18-3, BH18-6, BH18-8 and BH18-9. These deposits were found generally in a very dense state, with occasional dense layers with, measured SPT 'N' values ranging from 36 to more than 50 blows per 300 mm of penetration.

3.2 Groundwater Conditions

Eight (8) shallow and deep monitoring wells of 50mm dia. were installed in Boreholes BH18-1 through BH18-7 and BH18-10 for the long-term groundwater measurements. The groundwater level measured on February 04, 2019 in shallow wells found in the range of 1.3 to 3.4m, corresponding to Elev. 187.6m to 189.4m below ground surface. The deep wells were found dry.

Table 1 summarizes the depth and elevation of water level readings in monitoring wells.

Monitoring Well No.	Ground Surface Elevation (m)	Screen Depth (m)	Date of Observation	Ground water Depth/Elevation (m)
BH18-1 (Shallow Well)	190.4	3.1 - 6.1	February 04, 2019	2.2/188.2
BH18-2 (Deep Well)	190.4	15.2 – 18.2	February 04, 2019	Dry
BH18-3 (Shallow Well)	190.8	3.1 - 6.1	February 04, 2019	1.7/189.0
BH18-4 (Shallow Well)	190.8	3.1 - 6.1	February 04, 2019	1.3/189.4
BH18-5 (Shallow Well)	191.1	3.1 - 6.1	February 04, 2019	2.3/188.7
BH18-6 (Deep Well)	190.8	18.2 - 21.2	February 04, 2019	inaccessible
BH18-7 (Shallow Well)	191.1	3.1 - 6.1	February 04, 2019	3.4/187.6
BH18-10 (Shallow Well)	190.4	3.1 - 6.1	February 04, 2019	1.3/189.0

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.

4. FOUNDATIONS

It is understood that the proposed high-rise building will be a residential/commercial with four (4) and five (5) levels of underground parking. The finish floor level of P4 and P5 is not available to us at the time of writing this report.

The P4 and P5 levels are anticipated to be at about 12m and 15m below grade, respectively. The footings are expected to be about 1 to 2m below the P4 and P5 basement floor.

Based on the information from boreholes, the proposed building with four and five levels of basement can be supported by conventional spread and strip footings / mat foundations for a bearing capacity of 800 kPa at SLS (Serviceability Limit States), and for a factored geotechnical resistance of 1200 kPa at ULS (Ultimate Limit States) at the anticipated founding levels.

Foundations designed to the specified bearing capacity at the Serviceability Limit States (SLS) are expected to settle less than 25mm total and 19mm differential.

Where it is necessary to place foundations at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing. In the vicinity of the existing buried utilities, all footings must be lowered to undisturbed native soils, or alternatively the services must be structurally bridged.

It should be noted that the recommended bearing capacities have been calculated by DS Consultants Limited from the borehole information for the preliminary design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by DS Consultants Limited to validate the information for use during the construction stage.

5. FLOOR SLAB AND PERMANENT DRAINAGE

The basement floor can be supported on grade provided the surficially loose/softened soils are removed and the base thoroughly proof rolled. Any backfill required to raise the grade can consists of inorganic soil, placed in shallow lifts and compacted to 98 percent of Standard Proctor Maximum Dry Density (SPMDD).

A moisture barrier consisting of at least 200mm of 19mm clear crushed stone should be installed under the floor slab.

A perimeter and underfloor drainage system will be required around the exterior basement walls. Typical drainage and backfill recommendations are illustrated on **Drawings 13 and 14.**

6. FROST PROTECTION

All footings exposed to seasonal freezing conditions must have at least 1.2 metres of soil cover for frost protection.

There is no official rule governing the required founding depth for footings below unheated basement floors. Certainly, it will not be greater than the 1.2 m required in Southern Ontario for exterior footings. Un-monitored experience indicates that a shallower depth ranging from 0.82 to 0.9 m for interior column footings and 0.4 m for wall footings has been successful where 2 or more basement levels apply. The 0.82 m depth is believed to be close to the minimum structural requirement for interior column footings. Adjacent to air shafts and entrance and exit doors, a footing depth of 1.2 m below floor level is required or, alternatively, insulation protection must be provided.

It is also emphasized that underfloor drainage and/or an adequate free draining gravel base is required to minimize the risk of floor dampness. Floor dampness could lead to temporary icing and the risk of accidents.

7. EARTH AND WATER PRESSURES

The lateral earth pressures acting on foundation walls may be calculated from the following expression:

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

where, p = Lateral earth pressure in kPa acting at depth h

K = Earth pressure coefficient, assumed to be 0.40 for vertical walls

and horizontal backfill for permanent construction

- γ = Unit weight of backfill, a value of 21 kN/m³ may be assumed
- h = Depth to point of interest in metres
- q = Equivalent value of surcharge on the ground surface in kPa

The above expression assumes that the perimeter drainage system prevents the build-up of any hydrostatic pressure behind the wall.

8. EXCAVATION AND GROUNDWATER CONTROL

Excavations can be carried out with heavy hydraulic backhoe. No major problems with groundwater are anticipated for the installation of foundations. It is expected that any seepage from fill material and native sand and gravel deposits can be removed by pumping from sumps.

DS is carrying out a hydrogeological study at the subject site and more comments regarding the type and extent of groundwater control required will be addressed in the hydrogeology report.

It should be noted that the till is a non-sorted sediment and therefore may contain boulders. Provisions must be made in the excavation contract for the removal of possible boulders in the till or obstructions in the fill material.

All temporary excavations must be carried out in accordance with the most recent Occupational Health and Safety Act (OHSA). In accordance with OHSA, the fill material and cohesionless sandy soils can be classified as Type 3 Soil above groundwater. The hard clayey deposits can be classified as Type 1 Soils above groundwater.

The select inorganic fill and native soils free from topsoil and organics can be used as general construction backfill where it can be compacted with sheep's foot type compactors. Loose lifts of soil, which are to be compacted, should not exceed 200 mm.

Imported Granular 'B' fill is recommended in areas where free draining material is required, i.e. backfill behind foundation walls and in footing trenches.

Imported granular fill, which can be compacted with hand held equipment, should be used in confined areas.

It should be noted that the excavated soils are subject to moisture content increase during wet weather which would make these materials too wet for adequate compaction. Stockpiles should therefore be compacted at the surface or be covered with tarpaulins to help minimize moisture uptake.

9. EARTHQUAKE CONSIDERATIONS

Based on the existing borehole information and according to Table 4.1.8.4.A of OBC 2012, the subject site for the proposed building with four to five levels of basement can be classified as "Class C" for seismic site response.

10. TEMPORARY SHORING

It is understood that the proposed excavations may be supported by a temporary shoring system consisting of timber lagging and soldier piles. A caisson wall may be required to support adjacent structures. The requirement for caisson walls is given on **Drawing 15**.

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

- 1) Earth Pressure Coefficients
 - (a) where movement must be minimal K= 0.45
 - (b) where minor movement (.002H) can be tolerated K= 0.25
 - (c) passive earth pressure for soldier piles (unfactored) Kp=4 for very dense soils
 - 2) For stability check

φ= 32°

c= 0

 $\gamma = 21 \text{ kN/m}^3$

Surcharge is to be determined by shoring contractor.

3) For earth anchors

An allowable bond value of 50 kPa is suggested; this value depends on anchor installation methods and grouting procedures. Gravity poured concrete can result in low bond values while pressure grouted anchors will give higher values and produce a more satisfactory anchor.

The top anchor must not be placed lower than 3.0 metres below the top of level ground surface. Anchors will require casing when penetrating through wet sand and silt layers. The bond value of 50 KPa is suggested but this value is arbitrary since the contractor's installation procedures will determine the actual soil to concrete bond value. Hence, the contractor must decide on a capacity and confirm its availability. All anchors must be tested as indicated in the Foundation Manual, 4th edition.

The soldier piles should be installed in pre-augered holes taken below the deepest excavation. The holes should be filled with concrete below the excavation level and half bag mix above the base of the excavation. The concrete strength must be specified by the shoring designer. Temporary liners will be required to help prevent the sand deposits from caving during the installation period. Positive measures may be required to prevent the loss of soil through the spaces between the lagging boards. This could probably be achieved by placing well-graded sand and gravel behind the lagging boards or by installing a geotextile filter cloth.

Soil anchors will be required to support the shoring. The anchors must be of a length that meets the Canadian Foundation Manual recommendations. It is important to note that the minimum length

lies beyond the 45 - $\phi/2$ + .15H line drawn from the base of the soldier pile and the overall stability of the system must be checked at each anchor level.

Adhesion on the buried caisson shaft or behind the shoring system must be neglected when designing this shoring system.

Movement of the shoring system is inevitable. Vertical movements will result from the vertical load on the soldier piles resulting from the inclined tiebacks and inward horizontal movement results from earth and water pressures. The magnitude of this movement can be controlled by sound construction practices, and it is anticipated that the horizontal movement will be in the range of 0.1 to 0.25%H.

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

11. ROADS

There will be two public roads as a part of the project scope and are classified as minor collector roads.

The investigation has shown that the predominant subgrade soil, after stripping the topsoil and any other organic and otherwise unsuitable subsoil, will generally consist of clayey silt till, silty clay to clayey silt.

Based on the above and assuming that traffic usage will be residential minor local or local, the following minimum pavement thickness is recommended:

40 mm HL3 Asphaltic Concrete 50 mm HL8 Asphaltic Concrete 150 mm Granular 'A' 300 mm Granular 'B'

For bus routes and collector roads, the following minimum pavement thickness is recommended:

40 mm HL3 Asphaltic Concrete

70 mm HL8 Asphaltic Concrete

150 mm Granular 'A'

450mm Granular 'B'

The site subgrade and weather conditions (i.e. if wet) at the time of construction may necessitate the placement of thicker granular sub-base layer in order to facilitate the construction. The need for filter fabric/geo-grid can be evaluated during construction stage. Furthermore, heavy construction

12. PAVEMENTS

The recommended pavement structures provided in **Table 2** are based upon an estimate of the subgrade soil properties determined from visual examination and textural classification of the soil samples. The values may need to be adjusted based on the city standards. Consequently, the recommended pavement structures should be considered for preliminary design purposes only. A functional design life of eight to ten years has been used to establish the pavement recommendations. This represents the number of years to the first rehabilitation, assuming regular maintenance is carried out. If required, a more refined pavement structure design can be performed based on specific traffic data and design life requirements and will involve specific laboratory tests to determine frost susceptibility and strength characteristics of the subgrade soils, as well as specific data input from the client.

The long term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure uniform subgrade moisture and density conditions are achieved. In addition, the need for adequate drainage cannot be over-emphasized. The finished pavement surface and underlying subgrade should be free of depressions and should be sloped (preferably at a minimum grade of two percent) to provide effective surface drainage toward catch basins.

Pavement Layer	Compaction Requirements	Light Duty Parking (Cars)	Heavy Duty Parking (Trucks & Fire Route)
Asphaltic Concrete	92.0 to 96.5% Maximum Relative Density (MRD)	40 mm HL 3 or SP 12.5 50 mm HL 8 or SP 19.0	40 mm HL 3 or SP 12.5 80 mm HL 8 or SP 19.0
OPSS Granular A Base (or 20mm Crusher Run Limestone)	100% SPMDD*	150 mm	150 mm
OPSS Granular B (or 50mm Crusher Run Limestone)	100% SPMDD	200 mm	300 mm

Table 2: Recommended Pavement Structure Thickness

* Denotes Standard Proctor Maximum Dry Density, ASTM-D698. The subgrade must be compacted to 98% SPMDD for at least the upper 300 mm unless accepted by DS.

Additional comments on the construction of parking areas and access roadways are as follows:

(1) As part of the subgrade preparation, proposed parking areas should be stripped of the obvious objectionable material. The subgrade should be properly shaped, crowned then proof-rolled in the full time presence of a representative of this office. The primary purposes of proof rolling are to identify the Soft or spongy areas, check the subgrade compaction, to carry out the intent of the design, and to provide uniform support for the pavement structure. Soft subgrade areas that are located should be corrected so that the subgrade density can be maintained throughout

the construction. Soft Subgrade areas should be sub-excavated and properly replaced with suitable approved backfill compacted to 98% SPMDD. In the areas of the site where loose fill material was encountered, the loose fill within 0.6 m from the subgrade surface must be removed and the base thoroughly proof rolled. Backfill to raise the grade to the subgrade surface level can consist of inorganic soil, placed in shallow lifts and compacted to 98 percent of Standard Proctor Maximum Dry density (SPMDD).

- (2) The locations and extent of sub-drainage required within the paved areas should be reviewed by this office in conjunction with the proposed lot grading. Satisfactory crossfalls in the order of two percent should be provided. Subdrains extending from and between catch basins should be installed to intercept excess subsurface moisture and prevent subgrade softening. In the event that shallower crossfalls are considered, a more extensive system of sub-drainage may be necessary and should be reviewed by DS.
- (3) The most severe loading conditions on light-duty pavement areas and the subgrade may occur during construction. Consequently, special provisions such as restricted access lanes, half-loads during paving, etc., may be required, especially if construction is carried out during unfavourable weather.
- (4) It is recommended that DS be retained to review the final pavement structure designs and drainage plans prior to construction to ensure that they are consistent with the recommendations of this report.

12.1 PAVEMENTS OVER UNDERGROUND PARKING GARAGE

In order to provide surface drainage over the garage roof, granular material must be used to obtain slope for drainage. The following pavement structures are recommended for light and heavy duty areas:

Light Duty Areas:	60mm HL8/SP 19.0							
	50mm HL3/SP 12.5							
	150mm Granular A (min. 100mm variable thickness to provide 2% slope for drainage)							
	Protection board to prevent piercing of waterproofing membrane							
	Structural Concrete Slab							
Heavy Duty Areas:	40mm HL3HS							
	80mm HDBC							
	300mm Crusher Run Limestone							
	Protection board							
	Structural Concrete Slab							
If this method is used	a hi-level drainage system is required							

If this method is used, a bi-level drainage system is required.

If the underlying concrete slab (parking garage roof) has been sloped to provide adequate surface drainage, the placement of granular drainage layer is not required and asphalt concrete can be placed directly on top of the protection board.

13. GENERAL COMMENTS AND LIMITATIONS OF REPORT

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

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to DSCL at the time of preparation. Unless otherwise agreed in writing by DSCL, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

The conclusions and recommendations given in this report are based on information determined at the test hole locations. The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. DSCL accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time. We trust that the information contained in this report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

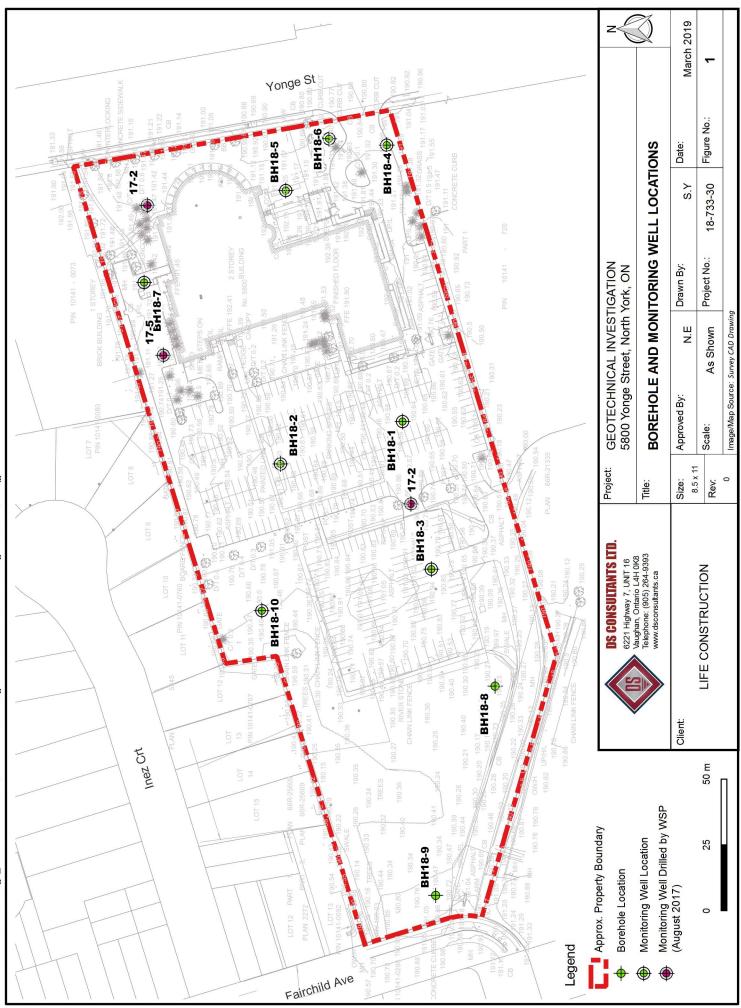
aer DS CONSULTANTS LIMITED

Naeem Ehsan, M.Eng., P.Eng.

Alka Sangar, M.Eng., P.Eng.



Drawings



J:\-GIS\18-733-30 5800 Yonge_Life Construction\1-QGIS\Geotechnical\Figure 1 - Borehole and Monitoring Well Locations.qgs

Drawing 1A: Notes On Sample Descriptions

 All sample descriptions included in this report generally follow the Unified Soil Classification. Laboratory grain size analyses provided by DSCL also follow the same system. Different classification systems may be used by others, such as the system by the International Society for Soil Mechanics and Foundation Engineering (ISSMFE). Please note that, with the exception of those samples where a grain size analysis and/or Atterberg Limits testing have been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

CLAY		SILT			SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		
0.00	02 0	0.006	0.02 0	.06 ().2	0.6	2.0	6.0	20 60	20	00
			E	QUIVALE	NT GRAIN	DIAMETER	IN MILLI	METRES			
LAY (PLAS				FINE		MEDIUM	CRS.	FINE	COARSE		
LAT (PLAS	10,10										

UNIFIED SOIL CLASSIFICATION

- 2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.
- 3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

LOG OF BOREHOLE BH18-1

1 OF 2

CLIENT: Life Construction

PROJECT LOCATION: Toronto, ON

DATUM: Geodetic

BH LOCATION: See Drawing 1

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 203mm Date: Jan-07-2019 REF. NO.: 18-733-10 ENCL NO.: 2

ſ		SOIL PROFILE		s	AMPL	ES			DYNA	MIC CC	NE PE PLOT		ATION			NAT	URAI			Т	REMA	ARKS
ľ	(m)		⊢				GROUND WATER				0 6		_	00	PLASTI LIMIT	C NATI MOIS	TURE	LIQUID LIMIT	ËN.	IT WT	AN	1D
	(m)		STRATA PLOT			BLOWS 0.3 m	AN A	Z		AR STI	L 1		-	ī	WP		w	W_{L}	OCKET PEN. (Cu) (kPa)	NATURAL UNIT V (kN/m ³)	GRAIN	
	ELEV DEPTH	DESCRIPTION	TAF	NUMBER		0.3		ELEVATION		NCONF		+	FIELD V & Sensiti	ANE vitv			0		OCK	TURA (KN	DISTRIE (%	
			TRA	UME	ТҮРЕ	ľ,	N N			UICK TI		. ×	LAB V	ANE			ONTEN			Ă		
	190.5	ASPHALT: 100 mm		z	Ĺ	÷	U C			20 4	0 6	0 8	80 1	00	1	0 2	20 3	0			GR SA	SI CL
	19 8.4	GRANULAR BASE: 200mm	хX	1	SS	34		19	E							0						
	19 0.8 189.7 10.8	FILL: silty sand, trace gravel, some	\bigotimes					10	Έ													
	U.0	organics, wet, grey, dense	\bigotimes	2	SS	13		-Bent	F								0					
		FILL: clayey silt, trace sand, some organics, grey, moist, stiff	\bigotimes	3	SS	13		-Dent	7 7								0					
	<u>2</u> 188.4		\boxtimes		00	10			F								Ŭ					
	2.1	CLAYEY SILT TILL: some sand to sandy, trace gravel, trace		4	SS	37	Ξž	W. L.	188.3	m						<u> </u>						
		cobble/boulders, brown, moist, very		–	00	51		Feb (4, 201	9												
		stiff to hard	jø,	5	SS	38	ŀΗ		Ē							0						
			Ρŀ	۴,		00		18	7													
	4						日		Ē													
	186.1	SILTY CLAY: trace sand, grey,	KI'I				に目	Filter	Pack_ ed Pipe													
	5	moist, very stiff to hard	1	6	SS	57	门	Slott	ed Pipe							0						
							同		Ē													
			1X				ľ	18	5													
	6		Ĥ				詞		Ē													
			K	7	SS	27		8 18	<u>ا</u>								0				2	33 65
	7		1					8	Ē													
	183.2	CANDI tropp pilt tropp play brown	Ľ.Ľ					8	Ę.													
	7.3	SAND: trace silt, trace clay, brown, moist, very dense		8	SS	50/		18:	۶ <u>–</u>						0							
	8)	00mŋ		8	Ē													
								8 18	<u>2</u> [
	9			1				8	Ē													
				9	SS	50/		8 10	,E						0							
						00mŋ		18	Ē													
	180.2							8	Ē													
	10.3	SILT: trace sand, trace clay,						8 18	₽ <u></u>													
	11	brown, moist, very dense		10/		50/		8	Ē						0							
						00mr		17	E													
	178.7							`` ``	Ë													
	≌ 11.8	SAND AND GRAVEL: trace to some clay, occassional	0	11	ss /	50/		8	Ē						0							
		cobble/boulder, brown to grey,	· o·	11/	_ 33 /	75mm		17	3													
2-	13	moist, very dense	•					8	F													
19-2	177.0		0					17	7Ē													
Б	13.5	SILT: trace sand, trace clay, brown, moist, very dense		12	ss /	50/		Slou	gh E						0						3	94 3
SS.G		2.0,				25mr		8	Ē													
2	_							8 17	Ē													
Ð	15							8	Ē													
REE				13/	SS	50/		17	5Ē						0							
ST	16					\25mr		8	Ē													
NGE								8	.E													
2		arey below 16.7m		14	66	50/		₿ ¹⁷	ŧ						0							
5800	17	grey below 16.7m		14	<u>ss</u>	50/ 00mr		8	Ē													
g	-							17:	3Ē	-												
33-1(18							8	Ē													
8-7				15	ss /	50/		8 17	,E							•						
Ŋ						25mr		17:	Ē													
L	19							8	Ē													
DS SOIL LOG 18-733-100 5800 YONGE STREET.GPJ DS.GDT	_							17	1 <u>F</u>	+			+		-		+					
SD	20	Continued Next Page					KXXX	8	Ē.							0						
		Continued Next Pade						ц л	2	Numbor			-20/									

GROUNDWATER ELEVATIONS Measurement $\stackrel{1st}{\underline{\nabla}} \stackrel{2nd}{\underline{\Psi}} \stackrel{3rd}{\underline{\Psi}} \stackrel{4th}{\underline{\Psi}}$

+ ³, × ³: Numbers refer to Sensitivity NOTES

O ^{8=3%} Strain at Failure

LOG OF BOREHOLE BH18-1

PROJECT: Geotechnical Investigation- 5800 Yonge Street

CLIENT: Life Construction

PROJECT LOCATION: Toronto, ON

DATUM: Geodetic

Method: Hollow Stem Auger

Diameter: 203mm Date: Jan-07-2019 REF. NO.: 18-733-10 ENCL NO.: 2

BH LOCATION: See Drawing 1

ſ		SOIL PROFILE		s	SAMPL	ES			DYNA RESIS	MIC CC	DNE PE E PLOT		ATION			NAT	URAI			F	REMARKS
	(m)		⊢				GROUND WATER CONDITIONS							00	PLASTI LIMIT	C NAT MOIS CON	TURE	LIQUID LIMIT	ż.	NATURAL UNIT WT (kN/m ³)	AND
			STRATA PLOT			BLOWS 0.3 m	d W C	z			RENG	L TH (kf	Pa)	I	W _P		N	WL	POCKET PEN. (Cu) (kPa)	N(m ³)	GRAIN SIZE DISTRIBUTION
	ELEV DEPTH	DESCRIPTION	ATA	NUMBER		BLO 0.3	N E	ELEVATION	οU	NCONF	INED	+	FIÉLD V. & Sensiti	ANE vity	\A/A				DOCI DOCI	ATUR (K	(%)
			TR/	MUM	ТҮРЕ	ż	NON NON	LE/			RIAXIAI 0 6			ANE 00			ONTEN 20 3	1 (%) 30		Ž	
		SILT: trace sand, trace clay,		∠ \16/	⊢ ∖ss/	50/		ш	-					1	- '			1			GR SA SI CL
	-	brown, moist, very				100mn		170	-												
	₂₁ 169.5	dense(Continued)							-												
	21.0	SANDY SILT: trace clay, grey, moist, very dense		17	SS	50/		100								•					
ł	- <u>168.9</u> 21.6	END OF BOREHOLE		<u> </u>	55	25mn	h	169	_												
	-	Notes:																			
		 50 mm dia. monitoring well installed upon completion. 																			
		2) Water Level Readings Date Water Depth (mbgs)																			
		Feb. 04, 2019 2.2																			
2-7																					
19-2-7																					
GDT																					
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ЯUS																					
ŇŐ																					
200																					
58																					
100																					
DS SOIL LOG 18-733-100 5800 YONGE STREET.GPJ DS.GDT																					
18																					
ĕ																					
20L																					
SS (



O ^{8=3%} Strain at Failure

SOIL PROFILE

LOG OF BOREHOLE BH18-2

SAMPLES

PROJECT: Geotechnical Investigation- 5800 Yonge Street

CLIENT: Life Construction

PROJECT LOCATION: Toronto, ON

DATUM: Geodetic

BH LOCATION: See Drawing 1

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 203 mm

Date: Jan-04-2019

REF. NO.: 18-733-10 ENCL NO.: 3

DYNAMIC CONE PENETRATION RESISTANCE PLOT PLASTIC NATURAL MOISTURE LIMIT CONTENT REMARKS GROUND WATER CONDITIONS LIQUID LIMIT POCKET PEN. (Cu) (kPa) NATURAL UNIT M (kN/m³) AND 40 60 100 20 80 (m) STRATA PLOT GRAIN SIZE BLOWS 0.3 m Wp w WL ELEVATION SHEAR STRENGTH (kPa) ELEV DEPTH + FIELD VANE & Sensitivity DISTRIBUTION -0 -1 DESCRIPTION NUMBER O UNCONFINED (%) WATER CONTENT (%) TYPE QUICK TRIAXIAL × LAB VANE ż 40 60 80 100 10 20 30 20 190.4 GR SA SI CL ASPHALT: 125 mm 198.9 1 SS 12 n 190 GRANULAR BASE: 200mm -19<u>0</u>.3 189.6 FILL: silty trace silt, brown, wet, 0.8 compact 2 SS 9 0 FILL: clayey silt, trace sand, brown, 189 moist, stiff 188.6 2 1.8 3 SS 31 0 CLAYEY SILT TILL: some sand to sandy, trace gravel, trace cobble/boulders, brown, moist, very 50/ 188 4 SS 25mr stiff to hard 50/ 5 SS 187 25mr 186.0 186 SILTY CLAY: trace sand, grey, 4.4 moist, hard 6 SS 74 0 185 7 SS 38 184 183.1 -Bentonite SILTY SAND: trace clay, brown, 7.3 0 8 | SS | 50/ moist, very dense 25mr 182 o 9 SS 50/ 181 00mn 180 10 SS 50/ o 75mm 179 12 2 95 3 0 11 SS 50/ silt seams below 12.3m 178 75mm 13 ο 50/ 19-2-7 12 SS 25m 177 DS.GDT 0 50/ 13 SS 14 25m 176 50/ 14 SS GPJ 175.5 25m SILT: trace sand, trace clay, 14.9 5800 YONGE STREET 0 brown, moist, very dense 50/ 15 SS 175

Continued Next Page GROUNDWATER ELEVATIONS Measurement $\overset{1st}{\checkmark} \overset{2nd}{\checkmark} \overset{3rd}{\checkmark} \overset{4th}{\checkmark}$

18-733-100

LOG 19 SOIL

SD

+ ³,×³: Numbers refer GRAPH NOTES

Filter Pack Slotted Pipe

173

172

171 Bentonite

25mr

00mr

25mr

16 SS / 50/

17 SS 50/

O ^{8=3%} Strain at Failure to Sensitivity

0

LOG OF BOREHOLE BH18-2

2 OF 2

PROJECT: Geotechnical Inves	stigation- 5800 Yonge Street
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CLIENT: Life Construction

PROJECT LOCATION: Toronto, ON

DATUM: Geodetic

BH LOCATION: See Drawing 1

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 203 mm Date: Jan-04-2019 REF. NO.: 18-733-10 ENCL NO.: 3

	SOIL PROFILE		5	SAMPL	.ES	~		DYNAI RESIS	MIC CC	NE PE PLOT		ATION			_ NAT	URAL			F	REMARKS
(m) <u>ELEV</u> DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	ТҮРЕ	"N" <u>BLOWS</u> 0.3 m	GROUND WATER CONDITIONS		2 SHEA O UN ● QU	0 4 R ST F NCONF JICK TI	0 6 RENG INED RIAXIAI	0 8 TH (kF + L ×	0 10	ANE vity ANE	WA	TER CO		LIQUID LIMIT WL IT (%) 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	
2169.4 21.0	grey below 19.8m SILT: trace sand, trace clay, brown, moist, very dense(Continued)	о 	z \ <u>18</u> /		₽ 50/ 75mm	1	ш 170	E		0 0								-		GR SA SI CL
<u>168.0</u> 21.5				33	- 30/															

DS	CONSULTANTS LTD.	g of	BOR	EHC	DLE I	BH18	3-3									1 OF 1				
PROJ	ECT: Geotechnical Investigation- 5800 `	reet				DRILI	ING D	ATA												
CLIEN	IT: Life Construction							Metho	d: Sol	id Ster	n Aug	ers								
PROJ	ECT LOCATION: Toronto, ON							Diam	eter: 1	50 mm	- ו					RE	F. NC).: 18	8-733	3-10
	IM: Geodetic							Date:	Jan-0	8-201	9						ICL NO			_
	DCATION: See Drawing 1							Duto.	oun c	0 201								01		
DITEC	SOIL PROFILE			SAMPL	FS			DYNA		NE PE	NETRA	ATION								
	SOLETINOTILE		Ľ			Ë				E PLOT	\sim			PLASTI LIMIT	10013	TURE	LIQUID LIMIT		TW.	REMARKS AND
(m)		-0			<u>ဖ</u> ု_	GROUND WATER CONDITIONS	7	2		06	í	80 10	00	W _P	CON V		WL	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	GRAIN SIZE
ELEV DEPTH	DESCRIPTION	APL	к		BLOWS 0.3 m	₽ QF	0 E		AR STH		ì	FIÉLD VA	ANE	 	(, 		Cu) (F	(kN/r	DISTRIBUTION
DEFIN		STRATA PLOT	NUMBER	ТҮРЕ			EVATION					& Sensitiv LAB VA		WA	FER CC	NTEN	T (%)	80	INATI	(%)
190.8		ST	Ŋ	₽	ŗ	<u>п</u> П П С	EL	2	0 4	06	8 0	80 10	00	1	0 2	0 3	0			GR SA SI CL
190.0	ASPHALT: 100 mm	ō.	1	SS	35			-						0						
198.4 198.5	GRANULAR BASE: 360 mm	\boxtimes					190	-												
0.8	trace silt, brown, moist, dense	\bigotimes	2	SS	16		-Bento	-									0			
E	FILL: clayey silt, trace sand, trace	\bigotimes					Dento	F												
-2	to some organics, brown, moist, firm to very stiff	\bigotimes	3	SS	6		W. L. [.]											Î		
188.4	-	\bigotimes	<u> </u>				Feb 04	l, 2019)											
2.4	CLAYEY SILT TILL: trace sand, trace gravel, occassional		4	SS	31		188	-								0				
-3	cobble/boulders, brown, moist, very	ŗ.					100													
E	stiff to hard	jø,	5	SS	26			-							0					
4		HH	1			[: 目: ·	187	-												
E		14					Filter	-												
Ē		Ŀ	6	SS	16		-Slotte 186	d Pipe												
-5		[]]	Ť		10	に目に														
185.1		[]]	1					Ē												
₆ 5.7	SANDY SILT TILL: trace clay,	. •	1			[:目:	185	-												
184.3	trace gravel, occassional cobble/boulders, grey, moist, very		7	SS	79		1	Ē							0					
6.5	dense																			
	END OF BOREHOLE Notes:																			
	1) 50 mm dia. monitoring well																			
	installed upon completion. 2) Water Level Readings																			
	Date Water Depth (mbgs)																			
	Feb. 04, 2019 1.7																			
i l																				
2																				
2																				
5																				
			1																	
2			1																	
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			1																	

DS SOIL LOG 18-733-100 5800 YONGE STREET.GPJ DS.GDT 19-2-7

ELEV DEPTH

LOG OF BOREHOLE BH18-4

PRO	JECT: Geotechnical Investigation- 5800	Yong	je Str	reet				DRILL	ING D	DATA								
CLIE	NT: Life Construction							Metho	d: Sol	id Ster	n Aug	ers						
PRO	JECT LOCATION: Toronto, ON							Diam	eter: 1	50 mm	ı			RE	EF. NO	.: 18	3-733	3-10
DATU	JM: Geodetic							Date:	Jan-0	08-2019	9			E١	NCL NO	D.: 5		
BH LO	OCATION: See Drawing 1		-															
	SOIL PROFILE		s	SAMPL	.ES	~				DNE PE E PLOT		TION	PLASTI	URAL	LIQUID		τŅ	REMARKS
(m) ELEV DEPTH 190.9	DESCRIPTION	STRATA PLOT	NUMBER	ТҮРЕ	"N" <u>BLOWS</u> 0.3 m	GROUND WATEF CONDITIONS	ELEVATION	SHEA O UN O QI	NR STI NCONF	RENG RENG INED RIAXIAL	TH (kF + - ×	Pa) FIELD V & Sensiti LAB V	LIMIT WP I		LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT W (KN/m ³)	AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CI
19 0 .0		ō.	1	SS	14			Ē					0					

190.9 ASPHALT: 100 mm 1988 GRANULAR BASE: 360 mm 198.4 198.1 FILL: sand and gravel, trace clay, 190 0.8 2 SS 21 0 trace silt, brown, moist, compact Bentonite FILL: clayey silt, trace sand, brown, W. L. 189.6 m Feb 04, 2019_ -189.3 moist, very stiff CLAYEY SILT TILL: trace sand, 3 SS 15 0 1.6 -2 trace gravel, occassional cobble/boulders, brown, moist, very 4 SS 19 о ٠. stiff to hard 188 5 SS 35 0 187 Filter Pack -Slotted Pipe grey below 4.6m 6 SS 39 186 185 6J 7 SS 38 0 184.4 END OF BOREHOLE 6.5 Notes: 1) 50 mm dia. monitoring well installed upon completion. 2) Water Level Readings Date Water Depth (mbgs) Feb. 04, 2019 1.3

CL

DS CONSULTANTS LTD. LOG OF BOREHOLE BH18-5 1 OF 2 PROJECT: Geotechnical Investigation- 5800 Yonge Street DRILLING DATA CLIENT: Life Construction Method: Hollow Stem Auger PROJECT LOCATION: Toronto, ON Diameter: 203 mm REF. NO.: 18-733-10 DATUM: Geodetic Date: Jan-09-2019 ENCL NO.: 6 BH LOCATION: See Drawing 1 DYNAMIC CONE PENETRATION RESISTANCE PLOT SAMPLES SOIL PROFILE PLASTIC NATURAL MOISTURE LIMIT CONTENT REMARKS GROUND WATER CONDITIONS LIQUID LIMIT POCKET PEN. (Cu) (kPa) AND 40 60 100 NATURAL UNIT ((kN/m³) 20 80 (m) STRATA PLOT GRAIN SIZE BLOWS 0.3 m Wp w W ELEVATION SHEAR STRENGTH (kPa) ELEV DEPTH + FIELD VANE & Sensitivity DISTRIBUTION -0 -DESCRIPTION NUMBER O UNCONFINED (%) WATER CONTENT (%) TYPE × LAB VANE QUICK TRIAXIAL ż 40 60 80 100 10 20 30 20 191.1 GR SA SI CL TOPSOIL: 300 mm 19 190.0 1 SS 16 0 0.3 FILL: clayey silt, trace sand, trace topsoil, some organics, brown to 2 7 SS grey, moist, firm to very stiff 0 190 Bentonite 3 SS 16 189 4 SS 10 W. L. 188.8 m 0 eb 04, 2019 <u>188.0</u> 188 CLAYEY SILT TILL: some sand to 50/ 5 SS 31 b sandy, trace gravel, trace 50m cobble/boulders, brown, moist, hard 187 Filter Pack 50/ Slotted Pipe 6 SS grey below 4.6m 0 50m 186 185 7 SS 42 ο Bentonite 184 8 SS 53 0 183 182 50/ 181.7 9 SS ο SAND: trace silt, trace clay, brown, 25mr 9.4 moist, very dense 181 10 SS / 50/ 75mr 180 179.3 SILTY SAND TO SANDY SILT: 12 11.8 179 trace clay, brown, moist, very dense 0 11 SS 50/ 25m 13 19-2-7 178 DS.GDT silt seams below 13.6m о 10 79 11 12 SS 50/ 14 25m 177 Slough GPJ 176.2 SAND AND GRAVEL: trace silt, 14.9 ċ. 176 5800 YONGE STREET 0 trace clay, brown, moist, very dense 13 SS 50/ 25mr 175 14 SS 50/ wet at 16.7m 174 25mr 18-733-100 173.2 CLAYEY SILT: trace sand, brown, 17.9 173 15 SS 50/ moist, hard 0 00mr LOG F19 172 SOIL 171.6 19.5 SO 0 Continued Next Page + ³,×³: Numbers refer GRAPH

GROUNDWATER ELEVATIONS Measurement $\overset{1 \text{st}}{\underbrace{\nabla}} \overset{2 \text{nd}}{\underbrace{\nabla}} \overset{3 \text{rd}}{\underbrace{\nabla}} \overset{4 \text{th}}{\underbrace{\nabla}}$ NOTES to Sensitivity

O ^{8=3%} Strain at Failure

SOIL PROFILE

LOG OF BOREHOLE BH18-5

PROJECT: Geotechnical Investigation- 5800 Yonge Street

SAMPLES

CLIENT: Life Construction

PROJECT LOCATION: Toronto, ON

DATUM: Geodetic

(m)

BH LOCATION: See Drawing 1

Method: Hollow Stem Auger

DYNAMIC CONE PENETRATION RESISTANCE PLOT

Diameter: 203 mm Date: Jan-09-2019

> 20 40 60 80 100

REF. NO.: 18-733-10 ENCL NO.: 6

LIQUID LIMIT

PLASTIC NATURAL MOISTURE CONTENT

GROUND WATER CONDITIONS POCKET PEN. (Cu) (kPa) NATURAL UNIT M (kN/m³) STRATA PLOT BLOWS 0.3 m w WL SHEAR STRENGTH (kPa) O UNCONFINED + FIELD VANE & Sensitivity WP ELEVATION ELEV DEPTH DISTRIBUTION -0--1 NUMBER DESCRIPTION (%) WATER CONTENT (%) TYPE QUICK TRIAXIAL × LAB VANE z 20 40 60 80 100 10 20 30 GR SA SI CL 50/ SANDY SILT TO SILTY SAND: 16 SS 17 trace clay, grey, moist, very 25m dense(Continued) 170 169.7 33 21.4 END OF BOREHOLE 17 50 25mr Notes: 1) 50 mm dia. monitoring well installed upon completion. 2) Water Level Readings Date Water Depth (mbgs) Feb. 04, 2019 2.3 SOIL LOG 18-733-100 5800 YONGE STREET.GPJ DS.GDT 19-2-7

2 OF 2

REMARKS

AND

GRAIN SIZE

SD

LOG OF BOREHOLE BH18-6

DRILLING DATA

PROJECT: Geotechnical Investigation- 5800 Yonge Street

CLIENT: Life Construction

PROJECT LOCATION: Toronto, ON

DATUM: Geodetic

Image: Second		CATION: See Drawing 1 SOIL PROFILE		s	SAMPL	ES								TION				10.				05111516
1000 1000 100 <th< td=""><td></td><td></td><td></td><td></td><td> uvn L</td><td></td><td>ËR</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>PLASTI</td><td></td><td>URAL</td><td></td><td>z</td><td>T WT</td><td>REMARKS AND</td></th<>					uvn L		ËR									PLASTI		URAL		z	T WT	REMARKS AND
100.0 100 <th< td=""><td>(m)</td><td></td><td>10</td><td></td><td></td><td><u></u></td><td>VAT</td><td>SN</td><td>z</td><td></td><td></td><td>I I</td><td></td><td>L</td><td>100</td><td></td><td></td><td></td><td></td><td>T PEI kPa)</td><td>") (ⁿ</td><td>GRAIN SIZE</td></th<>	(m)		10			<u></u>	VAT	SN	z			I I		L	100					T PEI kPa)	") (ⁿ	GRAIN SIZE
1000 1000 100 <th< td=""><td>ELEV</td><td>DESCRIPTION</td><td>API</td><td>К</td><td></td><td>0 2 2</td><td>ģ</td><td><u>I</u>O</td><td>0 F</td><td></td><td></td><td></td><td>IH (k⊦ ⊥</td><td>'a) FIELD \</td><td>/ANE</td><td> i—</td><td></td><td>o</td><td>—-ī</td><td>Cu) (</td><td>(kN/i</td><td>DISTRIBUTIO</td></th<>	ELEV	DESCRIPTION	API	К		0 2 2	ģ	<u>I</u> O	0 F				IH (k⊦ ⊥	'a) FIELD \	/ANE	i—		o	—-ī	Cu) ((kN/i	DISTRIBUTIO
1000 15 2 P P D Ci 20 40 80 80 100 10 20 30 0 R A S 5 0.0 trained and grows, mixed, more and, finde tages trained and grows, mixed, more and the grows, mixed	DEPTH		AT.	MBE	щ		l S	g	N. A				т . Х	& Sensi LAB V	tivity /ANE	WA	TER CO	ONTEN	T (%)	βΞ	NATI	(%)
100 TOPSOL: 430 mm 4 5 1 5 0 100 FUL: sand and gravel, time stift 2 3 6 0	190.9		STF	N	μ	ż	GR	8	E							1	0 2	20 3	30			GR SA SI C
0.5 FLL: clayey silt. trace and, trace transmit is a set of transmit		TOPSOIL: 450 mm	<u>×1 1/</u>		22	6	ŀT	1		E								0				
1983 Tield Pittlis and growt, trace sit, trace s		FILL: clavev silt, trace sand, trace			- 55	0	1		'	-								ľ				
1983 111 convertices 3 SS 6 111 convertices 3 SS 6 112 convertices 3 SS 6 113 convertices 3 SS 6 113 convertices 1 180 0 113 convertices 1 180 0 114 convertices 1 180 0 115 convertices 1 180 0 116 convertices 1 180 0 116 convertices 1 180 0 1 116 convertices 1 1 1 1 1 1 1 116 convertices 1 1 1 1 1 1 1 1 </td <td><u>-1</u></td> <td>topsoil, brown, moist, firm to stiff</td> <td>\boxtimes</td> <td></td> <td>~~~</td> <td>4</td> <td></td> <td></td> <td>190</td> <td>-</td> <td></td>	<u>-1</u>	topsoil, brown, moist, firm to stiff	\boxtimes		~~~	4			190	-												
1.7.7 Bites Full conversion and brown, rest way solid to as and, brown, rest way solid to band 4 SS 27 4 188 4 5 <td></td> <td></td> <td>\bigotimes</td> <td>2</td> <td>55</td> <td>4</td> <td>1</td> <td></td> <td>' </td> <td>Ē.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0</td> <td></td> <td></td> <td></td> <td></td>			\bigotimes	2	55	4	1		'	Ē.								0				
102.5 FILL days sitt frame samt to the second			XX	3	22	6	11		1 400	Ē												
Base Classes C	E I		\bigotimes		- 55	0	1		189	-								ľ				
1422-0 Label buildes, trace gravel, trac	188.5	-moist, firm	X		~~~	07	11		'	Ē												
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3.5 SMUE trace slit, trace slit, trace to some (pbble/bouldes, brown, moist, where gravel, trace slit, trase slit, trace slit, trase slit, trace slit, t			•	5	66	11	11		'	Ē												
SAND trace sill, trace clay, brown, molst, help be change and trace sill, trace		¬\$tiff		5	33	41	1		'	-						`	ľ					
4.4 AMD Sill TILL: trace to some typele/bouldes, brown, moist, dense gravet, trace gravet, trace gravet, trace sand to the typele/bouldes, brown, moist, trace sand to the typele/bouldes, grave, wet sand seams, moist, dense gravet, trace sand, grave, moist, dense gravet, trace sand, gravet, moist, very stiff to are different seams of the typele/bouldes, gravet, wet sand seams, moist, dense gravet, trace sand, gravet, moist, very dense gravet, trace sand, gravet, trace sand, gravet, gravet, trace sand, gravet, gravet, moist, very dense gravet, gravet, gravet, moist, very dense gravet, grav	E ₄	SAND: trace silt, trace clay, brown,//	11				1		187	-												
Image times grawt, trace grawt, tr	4.2		ŀ¦¦{ſ∙				1		<i>.</i>	Ē.												
1 cpoble/bouldes, brown, moist, werg samt and to the construction of the constru	Ē		:[.	6	66	26	11		100	Ē												
180 QLAYEY SILT TILL: some sand to public boulders, prown, moist, and take the spectrum of the spectru	-5	cpbble/boulders, brown, moist,			33	30	11		1 186	-						1						
1850	ŧ I		. °	1			1		'	Ē												
5.9 cbbble/builders, brown, molst, height day, trace grew, trace is some dbbble/builders, grey, wet sand searns, molst, dense slit_TV CLAY: trace sand, grey, molst, very dense 7 Ss 60 182.1 3 8.8 SAND: trace sitt, trace clay, brown, molst, very dense 9 SS 60/ 10.3 9 SS 60/ 11.5 9 SS 60/ 11.5 9 SS 60/ 11.5 9 9 SS 60/ 11.6 180 0 0 1 181 0 0 1 181 180 0 0 1 181 180 0 0 1 181 180 0 0 1 181 180 0 0 1 181 180 0 0 1 180 0 0 1 180 0 0 1 180 0 0 1 177 177 177 177 0 0 1 177 177 177 177 177 0 0 1									185	Ē												
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1 Continued Nord Ravez: 10 <td>Ē</td> <td></td> <td>XX</td> <td><u> </u></td> <td>- 55</td> <td>00</td> <td></td> <td></td> <td>·</td> <td>Ē</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Γ</td> <td></td> <td></td> <td></td> <td></td>	Ē		XX	<u> </u>	- 55	00			·	Ē								Γ				
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GROUNDWATE ELEVATIONS GRAPH + 3, × 3: Numbers refer O \$\$=3% Strain at Failure	GROUN	0				-	GRA	PH	+ 3,	×3:	Numbe	rs refer	С	8 =3%	⁶ Strain	at Failu	ire					

Measurement $\underbrace{\stackrel{1st}{\underline{\nabla}}} \underbrace{\stackrel{2nd}{\underline{\Psi}}} \underbrace{\stackrel{3rd}{\underline{\Psi}}} \underbrace{\stackrel{4th}{\underline{\Psi}}}$

REF. NO.: 18-733-10 ENCL NO.: 7

Method: Hollow Stem Auger Diameter: 203 mm Date: Jan-08-2019

PROJECT: Geotechnical Investigation- 5800 Yonge Street

LOG OF BOREHOLE BH18-6

DRILLING DATA

Method: Hollow Stem Auger

Diameter: 203 mm

Date: Jan-08-2019

REF. NO.: 18-733-10 ENCL NO.: 7

DATUM: Geodetic BH LOCATION: See Drawing

PROJECT LOCATION: Toronto, ON

CLIENT: Life Construction

	SOIL PROFILE		S	SAMPL	ES	r r		DYNA RESIS	MIC CO TANCE	NE PE PLOT		ATION		C NAT	URAL			5	REMARKS
(m) <u>ELEV</u> DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	ТүрЕ	"N" <u>BLOWS</u>	GROUND WATER CONDITIONS	ELEVATION	2 SHEA 0 UI • QI	NR STI	0 6 RENG	0 8 TH (kF + _ ×	30 10 Pa) FIELD V & Sensiti LAB V	ANE vity ANE 00	TER CO	STURE ITENT w OMTEN 20 3	LIQUID LIMIT WL T (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT M (KN/m ³)	AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
21 21 169.5			16/		50/ 1 <u>50mr</u>	$I \rightarrow I$	170	-									_		
21.4	END OF BOREHOLE Notes: 1) 50 mm dia. monitoring well installed upon completion. 2) Water Level Readings Date Water Depth (mbgs)																		

PROJECT: Geotechnical Investigation- 5800 Yonge Street

LOG OF BOREHOLE BH18-7

DRILLING DATA
Method: Solid Stem Augers

CLIENT: Life Construction PROJECT LOCATION: Toronto, ON

DATUM: Geodetic

BH LOCATION: See Drawing 1

bd:	Solid	Stem	Aι
<i>.</i>	Cond	0.0111	,

Diameter: 150 mm

Date: Jan-08-2019

REF. NO.: 18-733-10 ENCL NO.: 8

ľ		SOIL PROFILE		s	SAMPL	ES			DYNA RESIS	MIC CO TANCE	DNE PE E PLOT		TION		 - NAT	JRAL			⊢	REMARKS
-	(m) <u>ELEV</u> DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	Ë	BLOWS 0.3 m	GROUND WATER CONDITIONS	ELEVATION	2 SHEA O UI	0 4 R STI	IO 6 RENG ⁻ INED RIAXIAI	0 8 TH (kF +	0 10 Pa) FIELD VA & Sensitiv	ANE vity	١	URAL ITURE TENT N DONTEN	LIQUID LIMIT WL T (%)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	AND GRAIN SIZE DISTRIBUTION (%)
	191.1		STF		түре	ż	GR(CO		- «		0 6	- ^	0 10				30		2	GR SA SI CL
	19 6 8	ASPHALT: 100 mm GRANULAR BASE: 200 mm	×X	1	SS	9		191	Ē						0					
	19 0 8 190 3 1 0.8 189.7	trace clay, brown, moist, compact		2	SS	39		-Bento	E nite						0					
	1.4	FILL: sandy silt, trace clay, brown, moist, dense CLAYEY SILT TILL: trace sand,		3	SS	66									o					
	_	trace gravel, occassional cobble/boulders, brown, moist, hard		4	SS	50/ (25mŋ		189	-						o					
	3	grey below 3.1m		5	SS	50/ (25mr)		188 W. L.	E .						,					
	186.6							Feb 0	4, 2019 F Pack) 										
	4.5	CLAYEY SILT: trace sand, grey, moist, hard		6	SS	80		-Slotte	d Pipe ¢							0				
	184.6 6.5	END OF BOREHOLE		7	SS	51	·· ; ; ; ·	185	-							0				
DS SOIL LOG 18-733-100 5800 YONGE STREET.GPJ DS.GDT 19-2-7		Notes: 1) 50 mm dia. monitoring well installed upon completion. 2) Water Level Readings Date Water Depth (mbgs) Feb. 04, 2019 3.4 Feb. 04, 2019 3.4																		

PROJECT: Geotechnical Investigation- 5800 Yonge Street

LOG OF BOREHOLE BH18-8

DRILLING	DATA
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Method: Solid Stem Augers

Diameter: 150 mm

Date: Jan-08-2019

REF. NO.: 18-733-10 ENCL NO.: 9

DATUM: Geodetic
BH LOCATION: See Drawing 1

CLIENT: Life Construction PROJECT LOCATION: Toronto, ON

DIL	JCATION. See Drawing T																			
	SOIL PROFILE		5	SAMPL	ES			DYNA	MIC CC	DNE PE E PLOT	NETRA	ATION			ΝΑΤΙ	IDAI				REMARKS
						GROUND WATER CONDITIONS							~~	PLASTI LIMIT	C MOIS	URAL	LIQUID LIMIT	z	NATURAL UNIT WT (kN/m ³)	AND
(m)		5			S	IS IS	-		1	06		-	00	WP		TENT W	WL	r PEI	ۍ ۳	GRAIN SIZE
ELEV	DESCRIPTION	STRATA PLOT	6		BLOWS 0.3 m	2 Q	ELEVATION		AR STI		TH (kł	Pa)						POCKET PEN. (Cu) (kPa)	kk ∛	DISTRIBUTION
DEPTH	DESCRIPTION	\ 4T⊳	NUMBER		BLO 0.0	ND	/AT		NCONF		+	FIELD V & Sensiti	ivity	W/ A 7	ER CO		T (%)	ĞС)	10 TU	(%)
		L R	B	ТҮРЕ	ż	ON ON	ГШ						ANE 00						Ż	
190.1		S S	-			00	ш 190		20 4	0 6			100	· ·	0 2		30			GR SA SI CI
19 0 :0	TOPSOIL: 75mm	\mathbb{X}	1	SS	8		190	-								0				
189.2	FILL: clayey silt mixed with topsoil, trace sand, brown, moist, stiff	\bigotimes						F												
0.9		KX :	2	SS	28	1	189	-								0				
						1	109	Ē												
Ē	CLAYEY SILT TILL: trace sand,	19.1	3	SS	30	1		-							0					
- <u>2</u>	trace gravel, occassional cobble/boulders, brown, moist, very	ΠD	<u> </u>			1	188	Ē												
	stiff to hard			00		-	100	Ē												
Ē		Hŀl	4	SS	44	-		F							0					
-3		ΠIJ					187	-												
		[14]	5	SS	30		107	-							0	•				
E		Kit				1		F												
<u>-4</u>		НŔ					186	-												
E		rk					100	E												
Ē	grey below 4.6m	Иł	6	SS	21	-		F												
5	groy bolow hom	ΗĦ	0	33	21	-	185													
-		1P.	1				105	-												
184.2		KI.	1					-												
5.9	SANDY SILT TILL: trace to some	H.	·				184	-												
	clay, trace gravel, occassional		7	SS	50/		104	-						0						
Ē	cobble/boulders, grey, moist, very	l i i i			(50mr	n		Ē												
7	dense	•					183	-												
							100	Ē												
-182.4 7.7	END OF BOREHOLE	111	8	33 /	50/			F						-				_	_	
1.1	Notes:		\square	<u> </u>	00mr	A														
	1) Borehole dry and open upon																			
	completion.																			
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PROJECT: Geotechnical Investigation- 5800 Yonge Street

LOG OF BOREHOLE BH18-9

DRILLING DATA

Method: Solid Stem Augers

Diameter: 150 mm

Date: Jan-08-2019

REF. NO.: 18-733-10 ENCL NO.: 10

DATUM: Geodetic BH LOCATION: See Drawing 1

PROJECT LOCATION: Toronto, ON

CLIENT: Life Construction

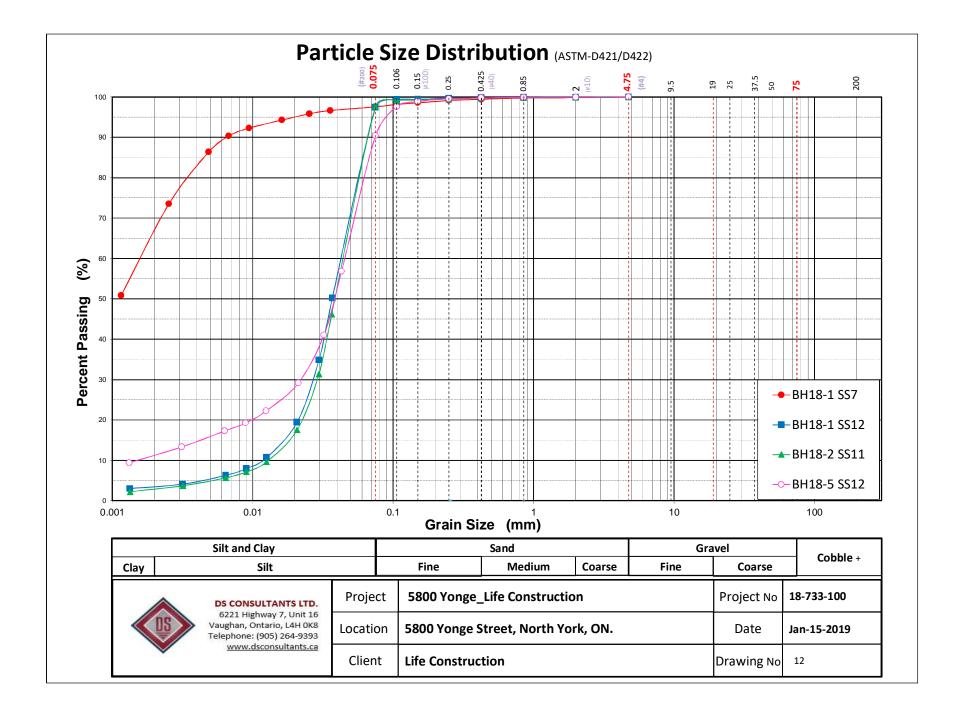
DHL	JCATION. See Drawing T					_														
	SOIL PROFILE		5	SAMPL	ES			DYNA	MIC CC	DNE PE E PLOT		ATION			NAT					DEMADIZE
						Ë							20	PLASTI LIMIT	MOIS	TURE	LIQUID LIMIT	z	NATURAL UNIT WT (kN/m ³)	REMARKS AND
(m)		_0T			S _	VAT VS	z			0 6			00	W _P		TENT N	WL	POCKET PEN. (Cu) (kPa)	NN (۲	GRAIN SIZE
ELEV	DESCRIPTION	API	Ř		BLOWS 0.3 m	<u>d</u>	Ē		AR STE NCONF		IH (k⊦	7a) FIELD V. & Sensiti	ANE	<u>-</u>		o	ī	SQKE (U	(kN/	DISTRIBUTION
DEPTH		STRATA PLOT	NUMBER	Ц		GROUND WATER CONDITIONS	ELEVATION			RIAXIAI	L X	& Sensiti LAB V	vity ANE	WAT	ER CO	ONTEN	T (%)	۲ <u>۳</u>	NATI	(%)
190.5		STF	ΝΩ	ТҮРЕ	ż	C G R	Ë			0 6		0 1		1	0 2	20 3	30		 	GR SA SI CL
19 0.4	TOPSOIL: 75mm	İXX	1	SS	7			E								0				
Ē	FILL: clayey silt mixed with topsoil,	\boxtimes				1	190	-										-		
- 189.3	trace sand, brown, moist, stiff	\bigotimes	2	SS	14			E.								•				
= 109.3	CLAYEY SILT TILL: trace sand,	17	1-				1 400													
Ē	trace gravel, occassional	KK	3	SS	22	1	189	Ē							с	þ				
-2	cobble/boulders, brown, moist, very stiff to hard	ł.H.				1		-												
		H!	4	SS	40		188	Ē							c	,				
- 3		ľIJ	<u> </u>					-												
Ē			5	SS	25	1		Ē							c					
Ē			Ľ	00	20		187	-							,	,				
4			1					Ē												
Ē								-												
Ē	grey below 4.6m	11	6	SS	16	1	186	Ē							0					
- 4	5.07 20.011 1.011	F.M.	Ľ	- 55	10	1		Ē							0					
Ē		W.					185													
6		KK						-												
- <u>6</u>	wet sand seams at 6.1m		7	SS	22	1		Ē							0					
-		KŀĮ	–	- 33	22	-	184								<u> </u>			-		
-7		[]Îł						E.												
183.2 7.3	SANDY SILT TILL: trace to some	H.																		
E	clay, trace gravel, occassional		8	SS	70		183	E						0						
- <u>₁82.5</u> 8.0	cebble/beulders, grey, moist, very			00	10			-											┝──	
	dense																			
	Notes:																			
	1) Borehole dry and open upon																			
	completion.																			
																		1		
																		1		
																		1		
														1						

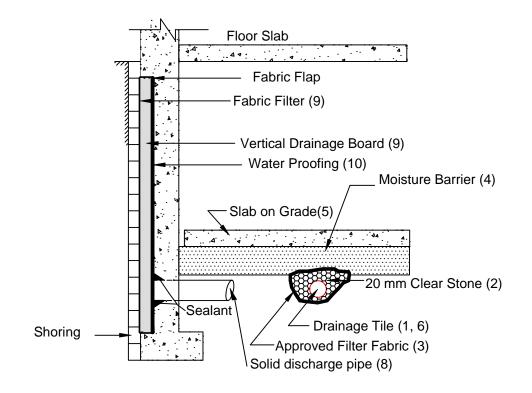
I OG OF BORFHOLF BH18-10

	1	OF	1
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05	CONSOLIANTS LID.				LOG	JOF	DUR	ЕПО			-10									1 OF 1
PROJ	ECT: Geotechnical Investigation- 5800	Yong	je Sti	eet				DRIL	LING D	ATA										
CLIEN	IT: Life Construction							Metho	od: Sol	id Ster	n Aug	ers								
PROJ	ECT LOCATION: Toronto, ON							Diam	eter: 1	50 mm	ı					RE	F. NC	D.: 18	3-733	3-10
DATU	IM: Geodetic							Date:	Jan-1	0-201	9					EN	ICL N	0.: 1	1	
BH LC	DCATION: See Drawing 1																	-		
	SOIL PROFILE		S	SAMPL	ES	<u>م</u>		RESIS	MIC CC	E PLOT		ATION		PLASTI	NAT	URAL	LIQUID		WT	REMARKS
(m)		5				GROUND WATER CONDITIONS		2	20 4	0 6	0 8	30 10	00	LIMIT	CON	TENT	LIMIT	POCKET PEN. (Cu) (kPa)	NIT (
ELEV	DECODIDITION	STRATA PLOT	~		BLOWS 0.3 m	ŇO	ELEVATION		AR STI		TH (kf	Pa)		W _P		N 0	WL	(kP	NATURAL UNIT V (kN/m ³)	GRAIN SIZE DISTRIBUTION
DEPTH	DESCRIPTION	ATA	NUMBER		BLC 0.3		L E A		NCONF			FIELD V. & Sensiti		\A/A		DNTEN	T (%)	0 Q Q	ATUR (F	(%)
100.4		STR	NUN	ТҮРЕ	ż	SRC NON				RIAXIAI 0 6		LAB V/ 30 10	ANE DO				i (70) i0		z	GR SA SI CL
190.4 19 0 .0	TOPSOIL: 300mm	<u>1, 1, 7</u>	1	SS	- 6		ш	-		-		1			Ť.					GR SA SI CL
0.3	FILL: clayey silt mixed with topsoil,	$\overline{\mathbb{X}}$	<u> </u>	00			190	-												
189.5	trace sand, brown, moist, stiff	X		SS	24			E.												
0.9	CLAYEY SILT TILL: trace sand, trace gravel, occassional		2	33	24	$\overline{\nabla}$	-Bento													
Ē	cobble/boulders, brown, moist, very		3	SS	36		W. L. ⁻ Feb 04											1		
-2	stiff to hard	jø,	Ļ				1 60 0-	F, 201.												
Ē.		PH	4	SS	33		188	-												
E,			-	00	00			Ē												
- <u>-</u> - <u>-</u> - 187.1		Į.	5	SS	50/			Ē												
E 3.3	SAND: trace silt, trace clay, grey, wet, very dense		Ľ	00	125mr		187	E												
4	wel, very dense					l∶⊟∶		Ē												
186.0		[:					Filter	Pack												
E 4.4	SILTY CLAY: trace sand, grey, moist, hard	11	6	SS	50/		-Slotte	d Pipe ⊦												
-5	grey below 4.6m	KX.			1 <u>00m</u> r	▓∃∷		Ē												
E I		Ŵ	1				185													
- <u>6</u>		K]			[]:目:		-												
E		12	7	SS	62		184													
Ē		K				1														
- <u>7</u> - 183.1		Ŵ						Ē												
182:7	SANDY SILT: trace clay, grey,						183													
7.7	75mm thick sand layer at 7.5m		<u> </u>	33	50/ 50m															
	END OF BOREHOLE				00111															
	Notes:																			
	 Groundwater was at 3.3m during drilling. 																			
	2) Water Level Readings																			
	Date Water Depth (mbgs) Feb. 04, 2019 1.3																			
																		1		

DS SOIL LOG 18-733-100 5800 YONGE STREET.GPJ DS.GDT 19-2-7





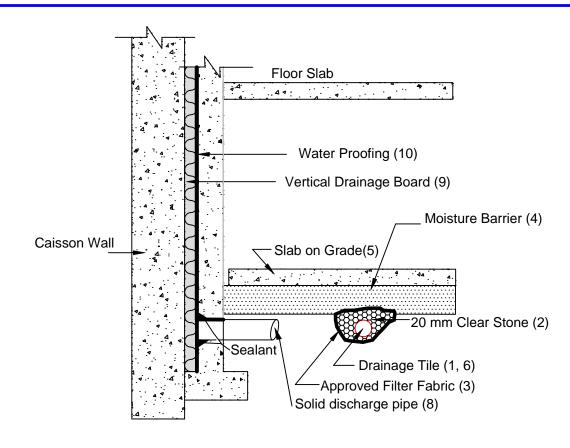
EXTERIOR FOOTING

Notes

- 1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet, spaced between columns.
- 2. 20 mm (3/4") clear stone 150 mm (6") top and side of drain. If drain is not on footing, place100 mm (4 inches) of stone below drain .
- 3. Wrap the clear stone with an approved filter membrane (Terrafix 270R or equivalent).
- 4. Moisture barrier to be at least 200 mm (8") of compacted clear 20 mm (3/4") stone or equivalent free draining material. A vapour barrier may be required for specialty floors.
- 5. Slab on grade should not be structurally connected to the wall or footing.
- 6. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
- 7. Do not connect the underfloor drains to perimeter drains.
- 8. Solid discharge pipe located at the middle of each bay between the solider piles, approximate spacing 2.5 m, outletting into a solid pipe leading to a sump.
- 9. Vertical drainage board with filter cloth should be kept a minium of 1.2 m below exterior finished grade.
- 10. The basement walls should be water proofed using bentonite or equivalent water-proofing system.
- 11. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

DRAINAGE RECOMMENDATIONS Shored Basement wall with Underfloor Drainage System

(not to scale)

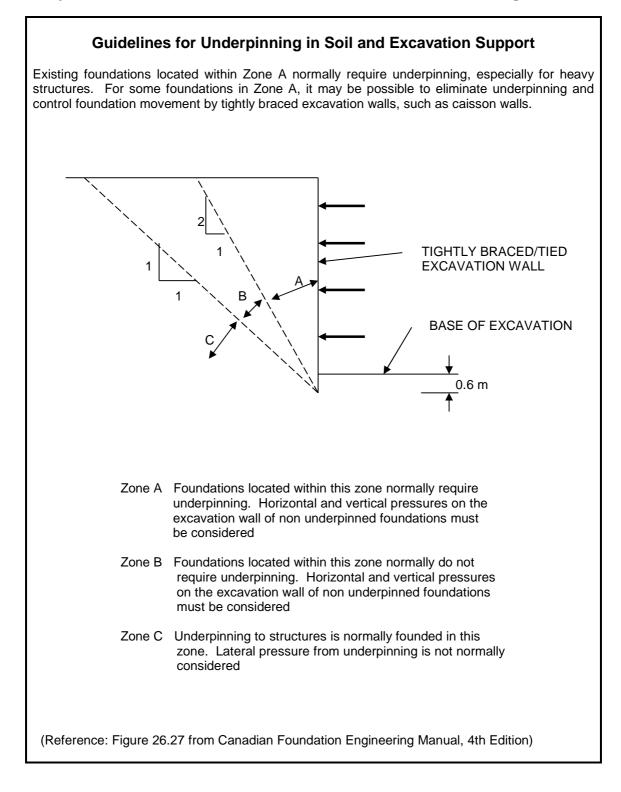


EXTERIOR FOOTING

Notes

- 1. Drainage tile to consist of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet, spaced between columns.
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- 5. Slab on grade should not be structurally connected to the wall or footing.
- 6. Underfloor drain invert to be at least 300 mm (12") below underside of floor slab. Drainage tile placed in parallel rows 6 to 8 m (20 to 25') centers one way. Place drain on 100 mm (4") clear stone with 150 mm (6") of clear stone on top and sides. Enclose stone with filter fabric as noted in (3).
- 7. Do not connect the underfloor drains to perimeter drains.
- 8. Solid discharge pipe located at the middle of each bay between the solider piles, approximate spacing 2.5 m, outletting into a solid pipe leading to a sump.
- 9. Vertical drainage board mira-drain 6000 or eqivalent with filter cloth should be continous from bottom to 1.2 m below exterior finished grade.
- 10. The basement walls must be water proofed using bentonite or equivalent water-proofing system.
- 11. Review the geotechnical report for specific details. Final detail must be approved before system is considered acceptable.

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



Appendix A

Log Sheets of Boreholes BH17-2, BH17-5 and BH17-6 drilled by WSP in August 2017

										vv		L DRIL Pro	ject N	1um	ber ^{0 Yon}	: 171-0 ge Street, Tor onmental Site	9879-02
DRILLING DE Date (Start): Date (End): Drilling Compar Drilling Equipm Drilling Method: Borehole Diam Drilling Fluid:	ny: ient: :	7/3 8/2 Tri- CM Hol	IE 55 Iow Ste 3 mm	, Group em Auger	SURVEY DETAILS Easting: 627234.457 m Northing: 4849124.68 m Surface Elevation: 190.695 masl Top of Well Elevation: masl	ODOUR L - Light M - Medium S - Strong VISUAL D - Disperss Product S - Saturate Product	ed with d with		DC - Dia SS - Spli MA - Ma TR - Tro ST - She DT - Dua MC - Ma	nual Auge wel Iby Tube al Tube	rrer er	Inorg. I PHC F BTEX F VOC V PAH F PCB F D/F I Phenol F		npounds rdrocarbon uene, Ethy nic Compo omatic Hyd ed Bipheny ans npounds	ns (F1-F4 vlbenzen ounds drocarbo	ie, Xylene	V Zn
				LITHO	LOGY / GEOLOGY	OBSER		ONS		s	SAMPL	ES	1	M	ONITO	RING WELL	
(m) DEPTH ELEVATION (masl)	N	STRATIGRAPHY		D	ESCRIPTION	PID CGD (ppm)		NSUAL	MA MA MA	% RECOVERY	N (Blow/15cm)	CHEMICAL ANALYSIS	DUPLICATE	DIAGRAM		DESCRIPTION	REMARKS
0.5 = 0.7	K	\bigotimes	\otimes		nm asphalt over; anular base over;				SS1	17%	3				~	CONCRETE	0
1.0 - 189.					ome sand, dark brown, moist				SS2	54%	7	Metals & Inorg. PCB	-				1
1.5	ł				T : Trace sand, trace gravel, rey mottling, moist	0.8			SS3	83%	21						1
2.5	ł			-					SS4	92%	26						:
3.0										92.76							:
3.5									SS5	100%	22						
4.0 4.5 4.5																	
5.0 - 186.	.12			SILT : Some grey mottling	sand, trace clay, brown with	0.8			SS6	92%	52						
5.5				grey mouning													
6.0			grey at 6.1 mbgs	0.4			SS7	63%	27								
6.5						337	03 %	21				4	BENTONITE				
7.5 7.6																	
8.0					: Trace clay, brown, and pockets, moist	<u>0.3</u> /			SS8	67%	50/5"						
8.5 - 9.0 -																	
9.5									SS9	100%	60/5"						
10.0-																	1
10.5						0.4			0040	67%	60/3"						1
11.0						<u>0.4</u>			5510	01%							1
12.0				- Trace aravel	greyish brown at 12.2 mbgs												1
12.5						<u> </u>			SS11	58%	60/3"						1
13.0																SAND	1
14.0						0.1			<u>SS</u> 12	111%	125/11					SAND	1
14.5																	1
15.0-															-	SCREEN Length: 3.05 m	1
15.5									SS13	67% 1	115/11	*				Diam.: 50 mm Slot: #10	1
16.5																	1
17.0									SS14	83%	60/5"	PHC VOC	1			SAND	1
17.5																	1

DRILLING DETAILS SURVEY DETAILS Date (Start): 7/31/2017 Easting: 627234.45 Dating Company: 8/2/2017 Northing: 4849124.6 Drilling Campany: Tri-Phase Group Surface Elevation: 190.695 m Drilling Hethod: Hollow Stem Auger Top of Well Elevation: masl Drilling Fluid: N/A Virting Kenter Masl	3 m M - Mediur asl S - Strong VISUAL D - Disper Produc S - Satural Produc	sed with ct ted with		SAMPLE DC - Diam SS - Split MA - Man	iond Co Spoon		CHEMICAL AN Metals)
	OBSER			TR - Trow ST - Shelt DT - Dual MC - Mac NR - No R	el by Tube Tube ro Core		Inorg. PHC BTEX VOC PAH PCB D/F Phenol	Inorganic Com Petroleum Hyo Benzene, Tolu Volatile Organ Polycyclic Aron Polychlorinater Dioxins & Fura Phenolic Com Grain-size Ana	apounds drocarbons (F ⁻ iene, Ethylben ic Compounds matic Hydroca d Biphenyl ins pounds	zene, Xylene	V Zn
LITHOLOGY / GEOLOGY			IS		s	AMPLI	ES		MONI	TORING WELL	
(m) <u>DEPTH</u> ELEVATION (masl) ELEVATION (masl) ELEVATION ELEVATION (masl) ELEVATION ELEVAT	PID CGD (ppm)	L M S		SAMPLE TYPE & No.	% RECOVERY	N (Blow/15cm)	CHEMICAL ANALYSIS	DUPLICATE	DIAGRAM	DESCRIPTION	REMARKS
 SANDY SILT : Trace clay, brown, occasional sand pockets, moist(cont from previous page) 	'd <u>0.1</u>	/		SS15	58%	60/5",					18.5 19.0 19.5
		-		SS16	56%	125/8"					20.0 20.5 21.0
21.5 169.36 SANDY SILT TILL : Trace gravel, gre 22.0 22.5 moist	y, <u>0.1</u>	-		SS17	56%	104/9"				- BENTONITE	21.5 22.0 22.5
23.0 - 23.5 - 24.0 - 24.		-		SS18	56%	97/9"					23.0 23.5 24.0
24.5 - 25.0 - 25.5 - 25.	<u></u>	-		SS19	58%	55/5"					24.5 25.0 25.5
26.0 26.5 27.0 27.4 27.43											26.0 26.5 27.0
27.5 = 163.26		-		SS20	44%	98/10"			WATER MA Depth : 16.9 Elev. : m Date : 8/18/2	11 m	27.5 28.0 28.5
29.0 - 29.5 - 30.0 -											29.0 29.5 30.0
28.0 28.5 29.0 29.5 30.0 30.5 31.0 31.5											30.5 31.0 31.5
											32.0 - 32.5 -
33.0 33.5 34.0 											33.0 33.5 34.0
32.0 32.5 33.0 33.5 33.5 34.0 35.0 35.0											34.5 35.0 35.5

	5		N	10NI ⁻	ГО	R	ING	W	EL		ject N	5800 Y	CORD er: 171-09 Yonge Street, Too Invironmental Site	9879-02 ronto, Ontario
DRILLING DETAI Date (Start): Date (End): Drilling Company: Drilling Equipment: Drilling Method: Borehole Diameter: Drilling Fluid:	8/4/2017 8/4/2017 Tri-Phase CME 55 Hollow Ste 203 mm N/A	·	SURVEY DETAILS Easting: 627289.044 m Northing: 4849217.738 m Surface Elevation: 191.049 masl Top of Well Elevation: masl	ODOUR L - Light M - Medium S - Strong VISUAL D - Disperse Product S - Saturate Product	ed with		SAMPLI DC - Diar SS - Split MA - Mar TR - Trow ST - Shel DT - Dual MC - Mac NR - No F	mond Cor Spoon nual Auge vel by Tube I Tube cro Core	rer er	Inorg. In PHC P BTEX B VOC V PAH P PCB P D/F D Phenol P	b As Ba Be l organic Con etroleum Hy enzene, Tolu olatile Orgar	npounds drocarbons (F uene, Ethylber nic Compound matic Hydroca d Biphenyl ans upounds	nzene, Xylene s	V Zn
(m) <u>DEPTH</u> <i>ELEVATION</i> (masl)	STRATIGRAPHY		.OGY / GEOLOGY ESCRIPTION	OBSERV	ODOUR ODOUR		SAMPLE TYPE & No.	% RECOVERY	(Blow/15cm) TdM	CHEMICAL ANALYSIS	DUPLICATE	DIAGRAM	NOLLAINO WELL	REMARKS
191.05 0.5 1.0 1.5 1.5	st	~100 mm gra	m asphalt over; inular base over; ome sand, dark brown, some ist	<u>0.3</u>	LMS	S D S	v SS1 SS2	33% 54%	2 5 14	Metals & Inorg. PAH				0.5 1.0 1.5
2.5 3.0 3.5			r : Trace sand, trace gravel, rey mottling, moist	 			SS3 SS4 SS5	75% 96% 75%	30 64 54					2.0 2.5 3.0 3.5
4.0 4.5 5.0 5.5				0.5			SS6	92%	35					4.(4.) 5.(5.3
7.0 7.5		CLAYEY SIL	F : Trace sand, trace gravel,				SS7	100%	33				- BENTONITE	6.(6.) 7.(7.)
8.0 9.0 9.14 9.5 10.0		SANDY SILT	: Light brown, moist	<u> 0.4 </u>										8.(8.(9.(9.1
10.0 10.5 11.0 11.5 12.0 11.0 12.0 11.0 11.0 11.0 12.0 11.0 11.0 11.0 11.0 10.0				\ <u>0.6</u> /			SS10	100%	50/2"					10.5 11.0 11.5 12.0
12.5 13.0 13.5 14.0				<u> 1.1 </u> / <u> 0.3 </u> /			SS11 SS12		<u>50/3"</u>				- SAND	12.5 13.0 13.5 14.0
14.5 15.0 15.5 16.0				\ <u>0.2</u> _/			SS13	83% เ	50/4",				➡- SCREEN Length: 3.05 m Diam.: 50 mm Slot: #10	14.5 15.0 15.5 16.0
16.5 17.0 17.5				<u> </u>			SS14	233%	50/5"	PHC VOC		WATER M/ Depth : 17.2 Elev. : m Date : 8/18/	2 m	16.5 17.0 17.5

11	5		IONITO	DR	ING	WE	ΞL		ject N	5800 Y	CORD er: 171-09 fonge Street, Toi ivironmental Site	9879-02 ronto, Ontario
DRILLING DETAIL Date (Start): Date (End): Drilling Company: Drilling Equipment: Drilling Method: Borehole Diameter: Drilling Fluid:	S 8/8/2017 8/8/2017 Tri-Phase CME 55 Hollow Ste 203 mm N/A	Top of Well Elevation: masl	Product S - Saturated with Product	L - Light M - Medium S - Strong VISUAL D - Dispersed with Product S - Saturated with Product			er -	Inorg. In PHC F BTEX E VOC V PAH F PCB F D/F D D/F D GSA C	Sb As Ba Be norganic Con Petroleum Hy Benzene, Tolu /olatile Orgar	drocarbons (F uene, Ethylber nic Compound matic Hydroca d Biphenyl ans upounds alysis	I V Zn	
(m) <u>DEPTH</u> <i>ELEVATION</i> (masl)	STRATIGRAPHY	LITHOLOGY / GEOLOGY DESCRIPTION	PID CGD (ppm)		SAMPLE TYPE & No.		N (Blow/15cm)	SI CHEMICAL ANALYSIS	DUPLICATE	DIAGRAM		REMARKS
191.05 0.5		FILL : ~50mm topsoil over;			SS1	50%	12				- CONCRETE	0.5
1.0		Silty sand, trace clay, dark brown, organics and rootlets, moist			SS2	58%	24	Metals & Inorg. PCB PAH				1.0
1.5		SANDY SILT : Trace gravel, brown, moist						PAH				1.5
2.0 2.29 2.5 188.76		-			SS3	83%	30	=			2.0	
3.0		CLAYEY SILT : Trace to some sand, brown, moist			SS4	83%	64					3.0
3.5					SS5	83%	54					3.9
4.0												4.
4.5					SS6	100%	35					4. 5.
5.0-					- 330	100 %	35					5.
6.0												6.
5.5					SS7	100%	33					6.
7.0 -											BENTONITE	7.
7.5												7.
8.0 - 8.5 -					SS8	100% 7	/ 1/9"					8.
9.0												9.
9.5			1.6		SS9	100% 5	50/3"					9.
.0.0												10.
10.5 = 10.67 10.67 180.38		SANDY SILT : Light brown, moist			0010	83% 5	50/2"					10.
1.0		SANDI SILI . LIGHLUIUWH, MUISL			SS10	83% 5	2012					11.
2.0												12.
2.5					SS11	83%	50/3",					12
2.5												13.
											- SAND	13.
4.0			<u></u> /		SS12	117% 5	50/4"				•	14. 14.
4.5												15.
5.5 -					SS13	117%	50/4"			目	SCREEN Length: 3.05 m Diam.: 50 mm Slot: #10	15.
6.0												16.
6.5								вис				16.
7.0 - 7.23			<u>1.5</u>		SS14	117% 5	50/5"	PHC VOC		WATER MA Depth : 16.1 Elev. : m		17.0
7.5										Date : 8/18/	/2017	17.

Prepared by: Josh Deline Reviewed by: Michael Wilson