Geotechnical Investigation
5800 Yonge Street
Toronto, Ontario

Prepared For:
Life Construction

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

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DRAWINGS

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.

COHESIVE DEPOSITS (CLAYEY SILT TILL/SILTY CLAY/CLAYEY SILT): 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%

COHESIONLESS DEPOSITS (SAND, SILT, SAND AND GRAVEL, SANDY SILT TO SILTY SAND): 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.

Table 1: Summary of Groundwater Level Measurements

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/m^3 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

$\phi = 32^{\circ}$

c= 0

$\gamma = 21\ kN/m^3$

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 - ϕ/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.

Table 2: Recommended Pavement Structure Thickness

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

* 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. 100 mm 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 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.

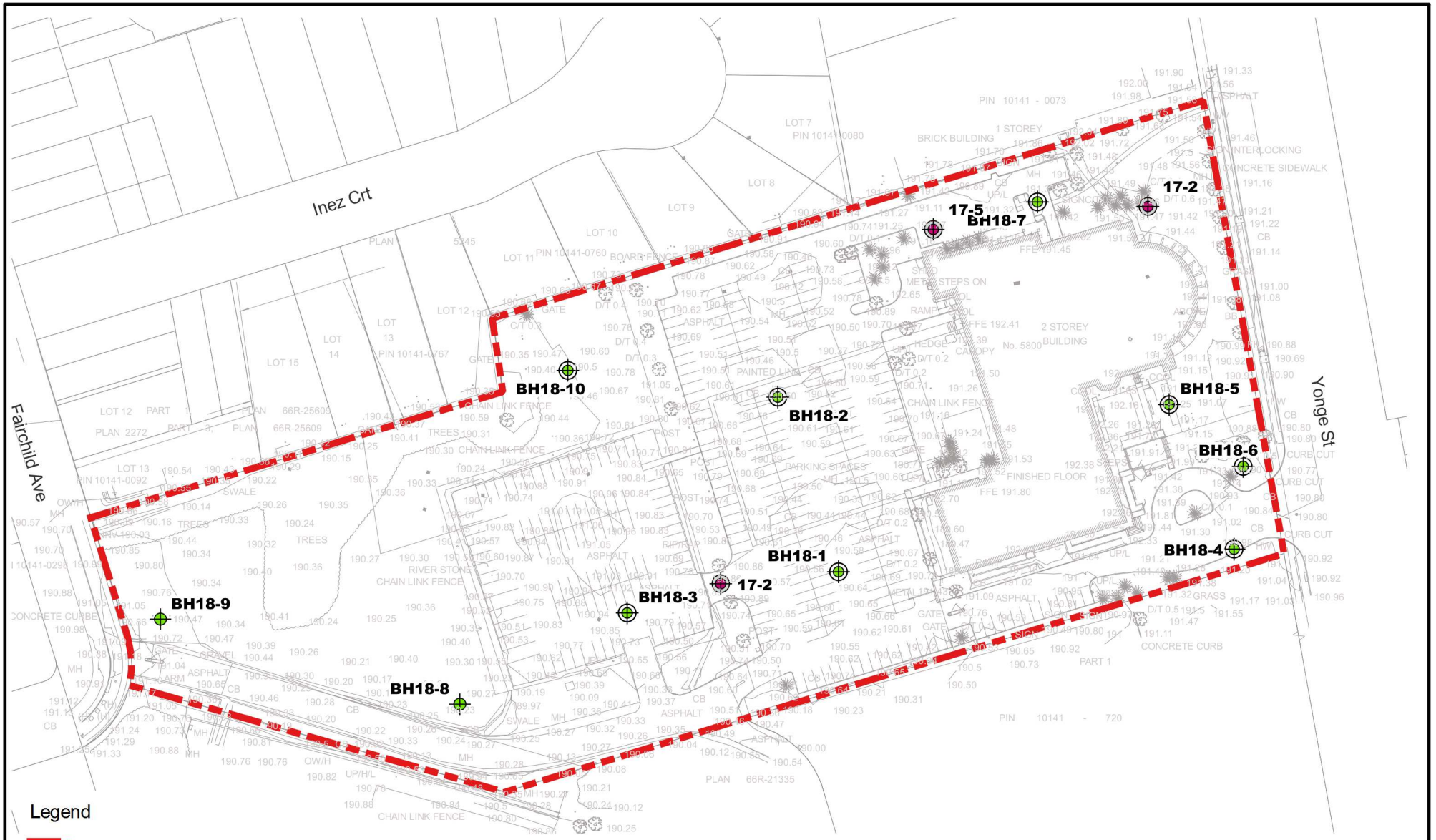
DS CONSULTANTS LIMITED

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



Legend

- Approx. Property Boundary
- Borehole Location
- Monitoring Well Location
- Monitoring Well Drilled by WSP (August 2017)

0 25 50 m

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Project: GEOTECHNICAL INVESTIGATION
5800 Yonge Street, North York, ON

Title: **BOREHOLE AND MONITORING WELL LOCATIONS**

N

Client: LIFE CONSTRUCTION

Size:	Approved By:	Drawn By:	Date:
8.5 x 11	N.E	S.Y	March 2019
Rev: 0	Scale: As Shown	Project No.: 18-733-30	Figure No.: 1

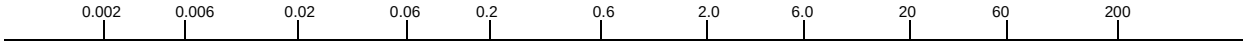
Image/Map Source: *Survey CAD Drawing*

Drawing 1A: Notes On Sample Descriptions

1. 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.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

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

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: 203mm
Date: Jan-07-2019

REF. NO.: 18-733-10
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
190.5						
190.4	**ASPHALT:** 100 mm					
190.2	**GRANULAR BASE:** 200mm	1	SS	34		190
189.7	**FILL:** silty sand, trace gravel, some organics, wet, grey, dense					
0.8		2	SS	13		
	FILL: clayey silt, trace sand, some organics, grey, moist, stiff				Bentonite	
188.4		3	SS	13		
2.1	**CLAYEY SILT TILL:** some sand to sandy, trace gravel, trace cobble/boulders, brown, moist, very stiff to hard	4	SS	37	W. L. 188.3 m Feb 04, 2019	
		5	SS	38		187
186.1					Filter Pack Slotted Pipe	
4.4	**SILTY CLAY:** trace sand, grey, moist, very stiff to hard	6	SS	57		
		7	SS	27		184
183.2						
7.3	**SAND:** trace silt, trace clay, brown, moist, very dense	8	SS	50/ 100mm		183
		9	SS	50/ 100mm		181
180.2						
10.3	**SILT:** trace sand, trace clay, brown, moist, very dense	10	SS	50/ 100mm		180
178.7						
11.8	**SAND AND GRAVEL:** trace to some clay, occassional cobble/boulder, brown to grey, moist, very dense	11	SS	50/ 75mm		178
177.0						
13.5	**SILT:** trace sand, trace clay, brown, moist, very dense	12	SS	50/ 125mm	Slough	177
		13	SS	50/ 125mm		175
	grey below 16.7m	14	SS	50/ 100mm		174
		15	SS	50/ 125mm		172
						171

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

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

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
2	33	65	
3	94	3	

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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

LOG OF BOREHOLE BH18-1

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: 203mm
Date: Jan-07-2019

REF. NO.: 18-733-10
ENCL NO.: 2

SOIL PROFILE (m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 10 20 30	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SILT: trace sand, trace clay, brown, moist, very dense(Continued)		16	SS	50/ 100mm		170				
21 169.5											
21.0 168.9	**SANDY SILT:** trace clay, grey, moist, very dense		17	SS	50/ 25mm		169				
21.6	**END OF BOREHOLE**										

Notes:
1) 50 mm dia. monitoring well installed upon completion.
2) Water Level Readings

Date	Water Depth (mbgs)
Feb. 04, 2019	2.2

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

LOG OF BOREHOLE BH18-2

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

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m
190.4 / 0.0	**ASPHALT:** 125 mm	1	SS	12
190.1 / 0.3	**GRANULAR BASE:** 200mm			
189.6 / 0.8	**FILL:** silty trace silt, brown, wet, compact	2	SS	9
	FILL: clayey silt, trace sand, brown, moist, stiff	3	SS	31
188.6 / 1.8	**CLAYEY SILT TILL:** some sand to sandy, trace gravel, trace cobble/boulders, brown, moist, very stiff to hard	4	SS	50/ 125mm
		5	SS	50/ 125mm
186.0 / 4.4	**SILTY CLAY:** trace sand, grey, moist, hard	6	SS	74
		7	SS	38
183.1 / 7.3	**SILTY SAND:** trace clay, brown, moist, very dense	8	SS	50/ 125mm
		9	SS	50/ 100mm
		10	SS	50/ 75mm
	silt seams below 12.3m	11	SS	50/ 75mm
		12	SS	50/ 125mm
		13	SS	50/ 125mm
		14	SS	50/ 125mm
175.5 / 14.9	**SILT:** trace sand, trace clay, brown, moist, very dense	15	SS	50/ 125mm
		16	SS	50/ 100mm
		17	SS	50/ 125mm

GROUND WATER CONDITIONS: Bentonite; Filter Pack; Slotted Pipe; Bentonite

ELEVATION: 190, 189, 188, 187, 186, 185, 184, 182, 181, 180, 179, 178, 177, 176, 175, 173, 172, 171

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

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

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)

GR	SA	SI	CL
2	95	3	

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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

LOG OF BOREHOLE BH18-2

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

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa): ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE & Sensitivity, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	grey below 19.8m		18	SS	50/ 75mm		170				
169.4	**SILT:** trace sand, trace clay, brown, moist, very dense(Continued)										
21.0											
168.9	**SANDY SILT TILL:** trace to some clay, trace gravel, trace cobble/boulders, grey, moist, very dense		19	SS	50/ 125mm						
21.5	**END OF BOREHOLE**										

Notes:
1) 50 mm dia. monitoring well installed upon completion.
2) Water Level Readings

Date	Water Depth (mbgs)
Feb. 04, 2019	Dry

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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

LOG OF BOREHOLE BH18-3

PROJECT: Geotechnical Investigation- 5800 Yonge Street
CLIENT: Life Construction
PROJECT LOCATION: Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150 mm
Date: Jan-08-2019

REF. NO.: 18-733-10
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS / 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
190.8												
190.7 0.0	**ASPHALT:** 100 mm		1	SS	35							
190.4 0.4	**GRANULAR BASE:** 360 mm											
190.0 0.8	**FILL:** sand and gravel, trace clay, trace silt, brown, moist, dense		2	SS	16		190					
	FILL: clayey silt, trace sand, trace to some organics, brown, moist, firm to very stiff		3	SS	6		Bentonite					
188.4							W. L. 189.1 m Feb 04, 2019					
2.4	**CLAYEY SILT TILL:** trace sand, trace gravel, occassional cobble/boulders, brown, moist, very stiff to hard		4	SS	31		188					
			5	SS	26		187					
							Filter Pack					
							Slotted Pipe					
			6	SS	16		186					
185.1												
5.7	**SANDY SILT TILL:** trace clay, trace gravel, occassional cobble/boulders, grey, moist, very dense		7	SS	79		185					
184.3 6.5	**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

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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

LOG OF BOREHOLE BH18-4

PROJECT: Geotechnical Investigation- 5800 Yonge Street
CLIENT: Life Construction
PROJECT LOCATION: Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150 mm
Date: Jan-08-2019

REF. NO.: 18-733-10
ENCL NO.: 5

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	ELEVATION
190.9					
190.8 / 0.1	**ASPHALT:** 100 mm	1	SS	14	
190.4 / 0.5	**GRANULAR BASE:** 360 mm				
190.1 / 0.8	**FILL:** sand and gravel, trace clay, trace silt, brown, moist, compact	2	SS	21	190
189.3 / 1.6	**FILL:** clayey silt, trace sand, brown, moist, very stiff	3	SS	15	
	CLAYEY SILT TILL: trace sand, trace gravel, occassional cobble/boulders, brown, moist, very stiff to hard	4	SS	19	
		5	SS	35	188
	grey below 4.6m	6	SS	39	187 / 186 / 185
184.4 / 6.5	**END OF BOREHOLE**	7	SS	38	

Notes:
1) 50 mm dia. monitoring well installed upon completion.
2) Water Level Readings

Date	Water Depth (mbgs)
Feb. 04, 2019	1.3

GROUND WATER CONDITIONS: Bentonite; W. L. 189.6 m Feb 04, 2019; Filter Pack; Slotted Pipe

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)
REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

LOG OF BOREHOLE BH18-5

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-09-2019

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

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
191.1 / 0.0	**TOPSOIL:** 300 mm						191
0.3	**FILL:** clayey silt, trace sand, trace topsoil, some organics, brown to grey, moist, firm to very stiff		1	SS	16		
			2	SS	7		190
			3	SS	16		189
188.0			4	SS	10	W. L. 188.8 m Feb 04, 2019	
3.1	**CLAYEY SILT TILL:** some sand to sandy, trace gravel, trace cobble/boulders, brown, moist, hard		5	SS	50/ 50mm		188
	grey below 4.6m		6	SS	50/ 50mm	Filter Pack Slotted Pipe	187
			7	SS	42	Bentonite	186
181.7			8	SS	53		185
9.4	**SAND:** trace silt, trace clay, brown, moist, very dense		9	SS	50/ 25mm		184
			10	SS	50/ 75mm		183
179.3							182
11.8	**SILTY SAND TO SANDY SILT:** trace clay, brown, moist, very dense		11	SS	50/ 125mm		181
	silt seams below 13.6m		12	SS	50/ 125mm		180
176.2							179
14.9	**SAND AND GRAVEL:** trace silt, trace clay, brown, moist, very dense		13	SS	50/ 125mm	Slough	178
	wet at 16.7m		14	SS	50/ 125mm		177
173.2							176
17.9	**CLAYEY SILT:** trace sand, brown, moist, hard		15	SS	50/ 100mm		175
171.6							174
19.5							173
							172

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL
10 79 11

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+3, ×3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

LOG OF BOREHOLE BH18-5

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-09-2019

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

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa): ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE & Sensitivity, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
21 / 169.7	**SANDY SILT TO SILTY SAND:** trace clay, grey, moist, very dense(Continued)		16	SS	50/ 125mm		171 / 170					
21.4	**END OF BOREHOLE**		17	SS	50/ 125mm							

Notes:
1) 50 mm dia. monitoring well installed upon completion.
2) Water Level Readings

Date	Water Depth (mbgs)
Feb. 04, 2019	2.3

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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

LOG OF BOREHOLE BH18-6

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-08-2019

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

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS
190.9 / 0.0	**TOPSOIL:** 450 mm				
190.4 / 0.5	**FILL:** clayey silt, trace sand, trace topsoil, brown, moist, firm to stiff	1	SS	6	
189.5		2	SS	4	
189.2 / 1.7	**FILL:** sand and gravel, trace silt, brown, wet, loose	3	SS	6	
188.5 / 2.4	**FILL:** clayey silt, trace sand, brown, moist, firm	4	SS	27	
188.1 / 2.8	**CLAYEY SILT TILL:** some sand to sandy, trace gravel, trace cobble/boulders, brown, moist, very stiff	5	SS	41	
187.4 / 3.5	**SAND:** trace silt, trace clay, brown, wet, dense				
186.7 / 4.2	**SANDY SILT TILL:** trace to some clay, trace gravel, trace cobble/boulders, brown, moist, dense	6	SS	36	
185.0 / 5.9	**CLAYEY SILT TILL:** some sand to sandy, trace gravel, trace cobble/boulders, brown, moist, hard	7	SS	60	
	SANDY SILT TILL: trace to some clay, trace gravel, trace cobble/boulders, grey, wet sand seams, moist, dense				
182.1	**SILTY CLAY:** trace sand, grey, moist, very stiff to hard	8	SS	18	
180.6 / 8.8	**SAND:** trace silt, trace clay, brown, moist, very dense	9	SS	50/100mm	
180.4 / 10.3	**SILTY SAND TO SANDY SILT:** trace clay, brown, moist, very dense	10	SS	50/150mm	
		11	SS	50/50mm	
177.5 / 13.4	**SAND AND GRAVEL:** trace silt, trace clsy, brown, wet, very dense	12	SS	50/150mm	
176.0 / 14.9	**SILTY SAND TO SANDY SILT:** trace clay, grey, moist, very dense	13	SS	50/150mm	
		14	SS	50/125mm	
		15	SS	50/150mm	

ELEVATION: 190, 189, 188, 187, 186, 185, 184, 183, 181, 180, 179, 178, 177, 176, 175, 174, 173, 172

Bentonite

Filter Pack
Slotted Pipe

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

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

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%): 10 20 30

POCKET PEN. (Cu) (kPa)

NATURAL UNIT WT (kN/m³)

REMARKS AND GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ε=3% Strain at Failure

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

LOG OF BOREHOLE BH18-6

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-08-2019

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

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS "N" 0.3 m	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
21 169.5	**SILTY SAND TO SANDY SILT:** trace clay, grey, moist, very dense(Continued)		16	SS	50/ 150mm		170					
21.4	**END OF BOREHOLE**		17	SS								

Notes:
1) 50 mm dia. monitoring well installed upon completion.
2) Water Level Readings
Date Water Depth (mbgs)

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES
+ 3, × 3: Numbers refer to Sensitivity
○ ε=3% Strain at Failure

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

LOG OF BOREHOLE BH18-7

PROJECT: Geotechnical Investigation- 5800 Yonge Street
CLIENT: Life Construction
PROJECT LOCATION: Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150 mm
Date: Jan-08-2019

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

ELEV / DEPTH (m)	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS / 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
191.1 / 0.0	**ASPHALT:** 100 mm		1	SS	9		191			
190.9 / 0.2	**GRANULAR BASE:** 200 mm									
190.3 / 0.8	**FILL:** sand and gravel, trace silt, trace clay, brown, moist, compact		2	SS	39					
189.7 / 1.4	**FILL:** sandy silt, trace clay, brown, moist, dense		3	SS	66		Bentonite			
	CLAYEY SILT TILL: trace sand, trace gravel, occassional cobble/boulders, brown, moist, hard		4	SS	50/ 125mm		189			
	grey below 3.1m		5	SS	50/ 125mm	W. L. 187.7 m Feb 04, 2019	188			
186.6 / 4.5	**CLAYEY SILT:** trace sand, grey, moist, hard		6	SS	80	Filter Pack Slotted Pipe	186			
184.6 / 6.5	**END OF BOREHOLE**		7	SS	51		185			

Notes:
1) 50 mm dia. monitoring well installed upon completion.
2) Water Level Readings

Date	Water Depth (mbgs)
Feb. 04, 2019	3.4

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

GROUNDWATER ELEVATIONS
Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

LOG OF BOREHOLE BH18-8

PROJECT: Geotechnical Investigation- 5800 Yonge Street
CLIENT: Life Construction
PROJECT LOCATION: Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150 mm
Date: Jan-08-2019

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

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS / 0.3 m "N"	ELEVATION
190.1 / 0.0	**TOPSOIL:** 75mm	1	SS	8	190
189.9 / 0.2	**FILL:** clayey silt mixed with topsoil, trace sand, brown, moist, stiff				
189.2 / 0.9	**CLAYEY SILT TILL:** trace sand, trace gravel, occassional cobble/boulders, brown, moist, very stiff to hard	2	SS	28	189
		3	SS	30	188
		4	SS	44	
		5	SS	30	187
	grey below 4.6m	6	SS	21	186
184.2 / 5.9	**SANDY SILT TILL:** trace to some clay, trace gravel, occassional cobble/boulders, grey, moist, very dense	7	SS	50/ 150mm	185
					184
182.4 / 7.7	**END OF BOREHOLE**	8	SS	50/ 100mm	183

Notes:
1) Borehole dry and open upon completion.

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)
PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)
REMARKS AND GRAIN SIZE DISTRIBUTION (%) — GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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

LOG OF BOREHOLE BH18-9

PROJECT: Geotechnical Investigation- 5800 Yonge Street
CLIENT: Life Construction
PROJECT LOCATION: Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150 mm
Date: Jan-08-2019

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

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
190.5					
190.4 / 0.1	**TOPSOIL:** 75mm	1	SS	7	190
	FILL: clayey silt mixed with topsoil, trace sand, brown, moist, stiff				
189.3 / 1.2	**CLAYEY SILT TILL:** trace sand, trace gravel, occassional cobble/boulders, brown, moist, very stiff to hard	2	SS	14	189
		3	SS	22	
		4	SS	40	188
		5	SS	25	187
	grey below 4.6m	6	SS	16	186
	wet sand seams at 6.1m	7	SS	22	185
183.2					184
182.5 / 7.3	**SANDY SILT TILL:** trace to some clay, trace gravel, occassional cobble/boulders, grey, moist, very dense	8	SS	70	183
8.0	**END OF BOREHOLE**				

Notes:
1) Borehole dry and open upon completion.

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)
SHEAR STRENGTH (kPa) (20 40 60 80 100)
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%) (10 20 30)

GROUND WATER CONDITIONS | STRATA PLOT | POCKET PEN. (Cu) (kPa) | NATURAL UNIT WT (kN/m³) | REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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

LOG OF BOREHOLE BH18-10

PROJECT: Geotechnical Investigation- 5800 Yonge Street
CLIENT: Life Construction
PROJECT LOCATION: Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1

DRILLING DATA
Method: Solid Stem Augers
Diameter: 150 mm
Date: Jan-10-2019

REF. NO.: 18-733-10
ENCL NO.: 11

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
190.4												
190.0 0.0	**TOPSOIL:** 300mm		1	SS	6		190					
189.5 0.3	**FILL:** clayey silt mixed with topsoil, trace sand, brown, moist, stiff											
0.9	**CLAYEY SILT TILL:** trace sand, trace gravel, occassional cobble/boulders, brown, moist, very stiff to hard		2	SS	24							
			3	SS	36		Bentonite W. L. 189.1 m Feb 04, 2019					
			4	SS	33		188					
187.1 3.3	**SAND:** trace silt, trace clay, grey, wet, very dense		5	SS	50/ 125mm		187					
186.0 4.4	**SILTY CLAY:** trace sand, grey, moist, hard grey below 4.6m		6	SS	50/ 100mm		Filter Pack Slotted Pipe 185					
			7	SS	62		184					
183.1 7.3	**SANDY SILT:** trace clay, grey, moist, very dense						183					
182.7 7.7	75mm thick sand layer at 7.5m		8	SS	50/ 150mm							
	END OF BOREHOLE											

Notes:
1) Groundwater was at 3.3m during drilling.
2) Water Level Readings

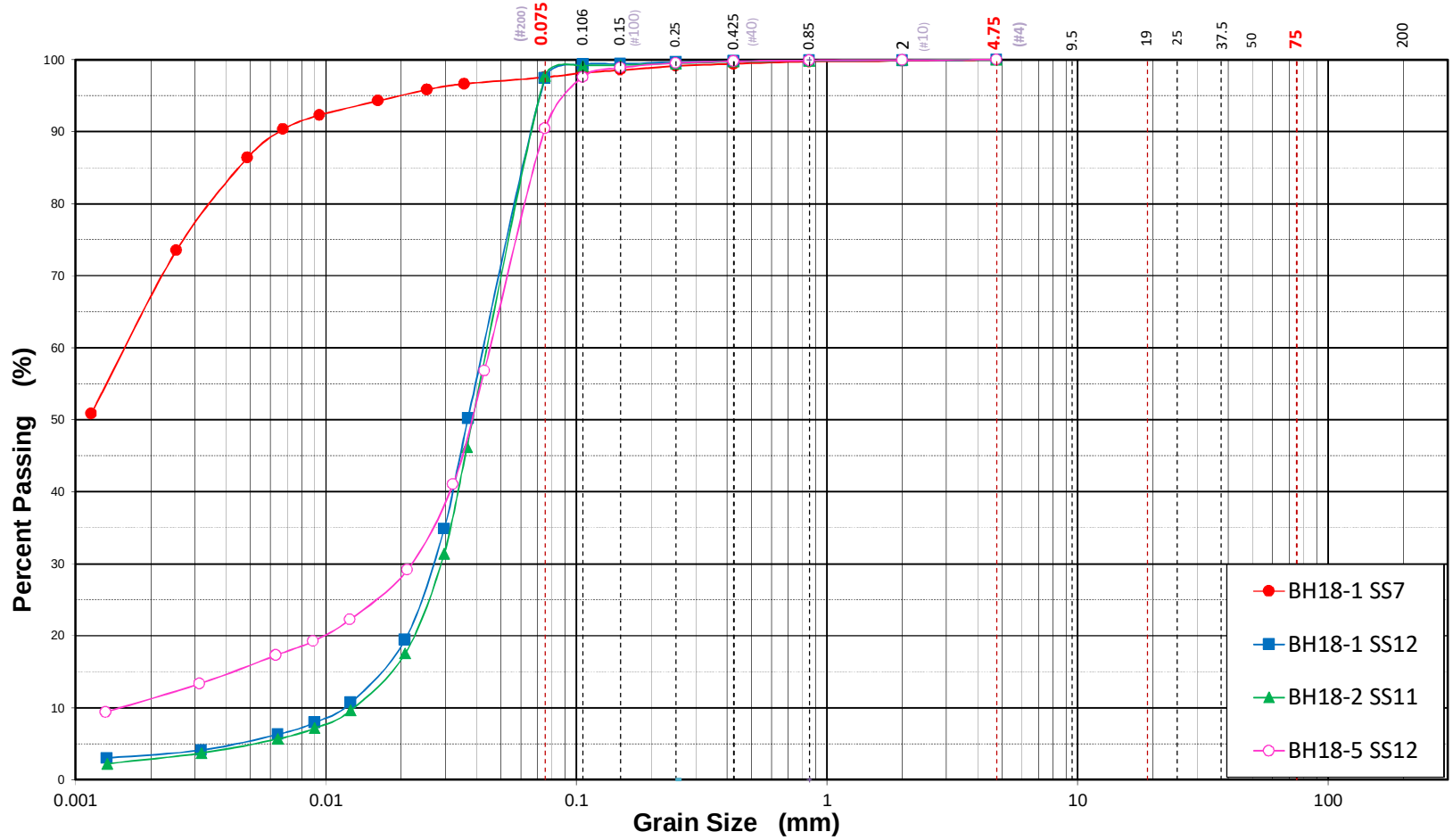
Date	Water Depth (mbgs)
Feb. 04, 2019	1.3

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: +3, ×3: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

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

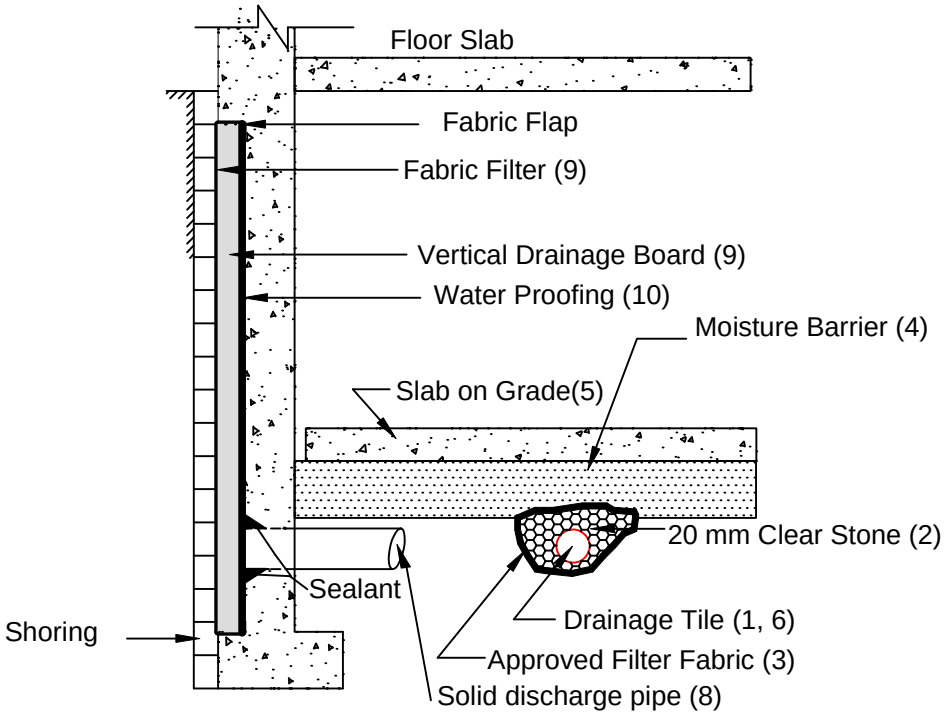
Particle Size Distribution (ASTM-D421/D422)



Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	

DS CONSULTANTS LTD.
6221 Highway 7, Unit 16
Vaughan, Ontario, L4H 0K8
Telephone: (905) 264-9393
www.dsconsultants.ca

Project	**5800 Yonge_Life Construction**	Project No	**18-733-100**
Location	**5800 Yonge Street, North York, ON.**	Date	**Jan-15-2019**
Client	**Life Construction**	Drawing No	12

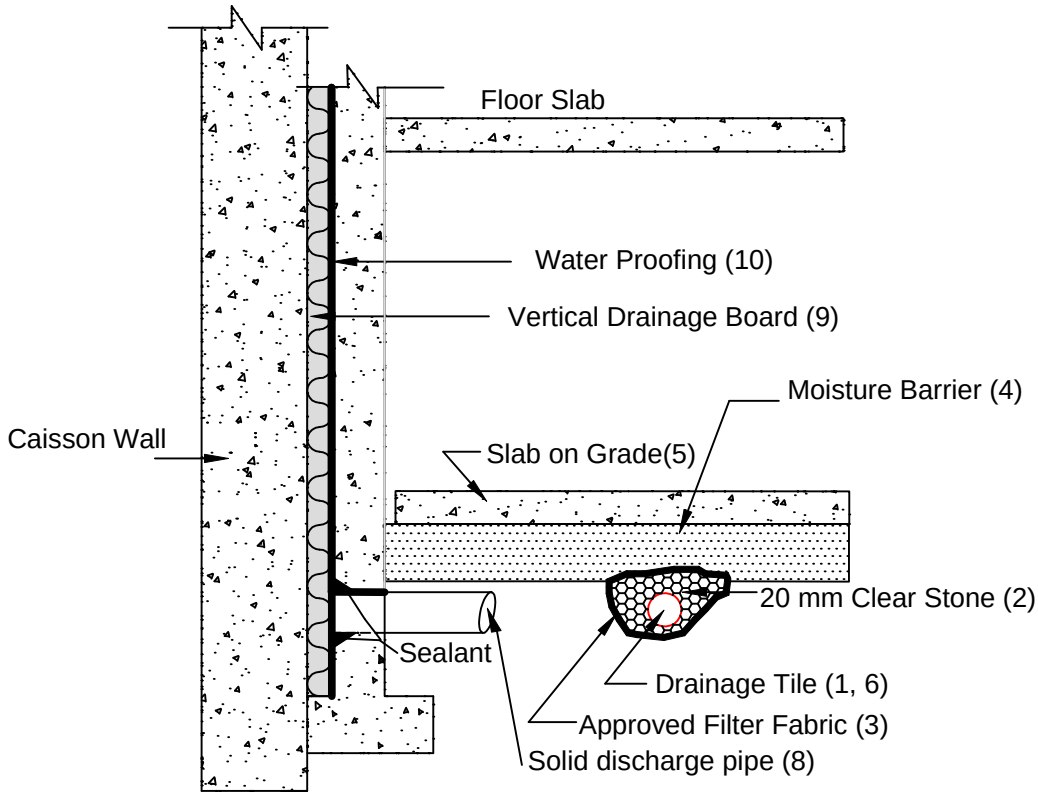


EXTERIOR FOOTING

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.
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 .
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5. Slab on grade should not be structurally connected to the wall or footing.
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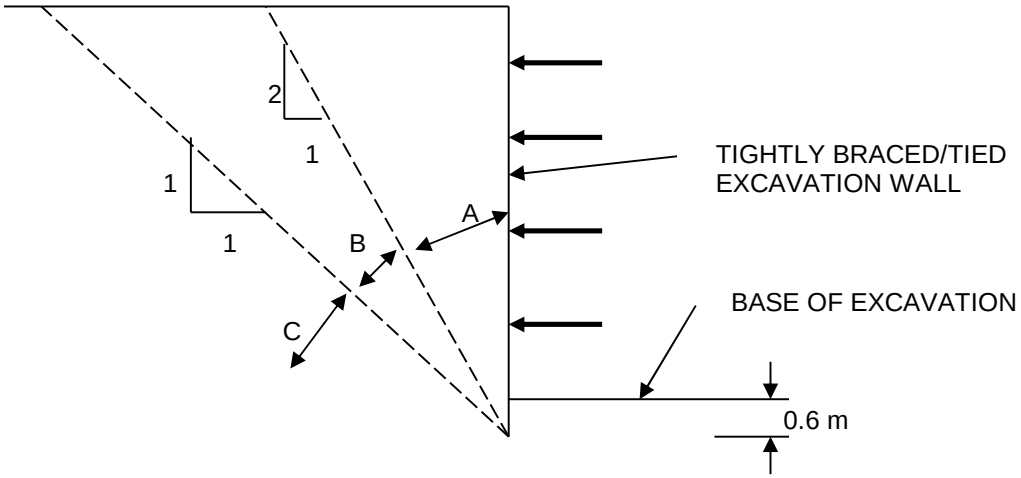
7. Do not connect the underfloor drains to perimeter drains.
8. Solid discharge pipe located at the middle of each bay between the solider piles, approximate spacing 2.5 m, outletting into a solid pipe leading to a sump.
9. Vertical drainage board mira-drain 6000 or eqivalent with filter cloth should 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)

Project: 18-733-100 **Drawing 15**

Guidelines for Underpinning in Soil and Excavation Support

Existing foundations located within Zone A normally require underpinning, especially for heavy structures. For some foundations in Zone A, it may be possible to eliminate underpinning and control foundation movement by tightly braced excavation walls, such as caisson walls.



Zone A Foundations located within this zone normally require underpinning. Horizontal and vertical pressures on the excavation wall of non underpinned foundations must be considered

Zone B Foundations located within this zone normally do not require underpinning. Horizontal and vertical pressures on the excavation wall of non underpinned foundations must be considered

Zone C Underpinning to structures is normally founded in this zone. Lateral pressure from underpinning is not normally considered

(Reference: Figure 26.27 from Canadian Foundation Engineering Manual, 4th Edition)

Appendix A

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

MONITORING WELL DRILLING RECORD : **17-2**

Project Number: **171-09879-02**

5800 Yonge Street, Toronto, Ontario
Phase Two Environmental Site Assessment
Toronto Hydro

DRILLING DETAILS

Date (Start):	7/31/2017
Date (End):	8/2/2017
Drilling Company:	Tri-Phase Group
Drilling Equipment:	CME 55
Drilling Method:	Hollow Stem Auger
Borehole Diameter:	203 mm
Drilling Fluid:	N/A

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 - Dispersed with Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
DT - Dual Tube
MC - Macro Core
NR - No Recovery

CHEMICAL ANALYSIS

Metals	Sb As Ba Be B Cd Cr Co Cu Pb Mo Ni Se Ag Tl U V Zn
Inorg.	Inorganic Compounds
PHC	Petroleum Hydrocarbons (F1-F4)
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
VOC	Volatile Organic Compounds
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
D/F	Dioxins & Furans
Phenol	Phenolic Compounds
GSA	Grain-size Analysis

(m) DEPTH / *ELEVATION* (masl)	STRATIGRAPHY	DESCRIPTION	PID / *CGD* (ppm)	ODOUR (L M S)	VISUAL (D S)	SAMPLE TYPE & No.	% RECOVERY	N (Blow/15cm)	CHEMICAL ANALYSIS	DUPLICATE	DIAGRAM	DESCRIPTION	REMARKS
190.70 0.0												CONCRETE	
0.5		**FILL** : ~100mm asphalt over; ~100 mm granular base over;	0.5			SS1	17%	3					
0.76 *189.93*		Clayey silt, some sand, dark brown, moist											
1.0			0.4			SS2	54%	7	Metals & Inorg. PCB				
1.5		**CLAYEY SILT** : Trace sand, trace gravel, brown with grey mottling, moist											
2.0			0.8			SS3	83%	21					
2.5													
3.0			0.4			SS4	92%	26					
3.5			0.4			SS5	100%	22					
4.0													
4.5													
4.57 *186.12*													
5.0		**SILT** : Some sand, trace clay, brown with grey mottling	0.8			SS6	92%	52					
5.5													
6.0		←- *Changing to grey at 6.1 mbgs*											
6.5			0.4			SS7	63%	27					
7.0												BENTONITE	
7.5													
7.62 *183.08*													
8.0		**SANDY SILT** : Trace clay, brown, occasional sand pockets, moist	0.3			SS8	67%	50/5"					
8.5													
9.0													
9.5			0.4			SS9	100%	60/5"					
10.0													
10.5													
11.0			0.4			SS10	67%	60/3"					
11.5													
12.0		←*Trace gravel, greyish brown at 12.2 mbgs*											
12.5			0.7			SS11	58%	60/3"					
13.0													
13.5												SAND	
14.0			0.1			SS12	111%	125/11"					
14.5													
15.0												SCREEN Length: 3.05 m Diam.: 50 mm Slot: #10	
15.5			0.3			SS13	67%	115/11"					
16.0													
16.5													
17.0			0.5			SS14	83%	60/5"	PHC VOC			SAND	
17.5													

Project : TEMPLATE_MASTER - IMPERIAL.GPJ Report : WSP_EN_WELL-ENVIRONMENTAL 8/31/2017

Prepared by: Josh Deline
Reviewed by: Michael Wilson

MONITORING WELL DRILLING RECORD : **17-2**

Project Number: **171-09879-02**

5800 Yonge Street, Toronto, Ontario
Phase Two Environmental Site Assessment
Toronto Hydro

DRILLING DETAILS

Date (Start):	7/31/2017
Date (End):	8/2/2017
Drilling Company:	Tri-Phase Group
Drilling Equipment:	CME 55
Drilling Method:	Hollow Stem Auger
Borehole Diameter:	203 mm
Drilling Fluid:	N/A

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 - Dispersed with Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
DT - Dual Tube
MC - Macro Core
NR - No Recovery

CHEMICAL ANALYSIS

Metals	Sb As Ba Be B Cd Cr Co Cu Pb Mo Ni Se Ag Tl U V Zn
Inorg.	Inorganic Compounds
PHC	Petroleum Hydrocarbons (F1-F4)
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
VOC	Volatile Organic Compounds
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
D/F	Dioxins & Furans
Phenol	Phenolic Compounds
GSA	Grain-size Analysis

(m) DEPTH / *ELEVATION* (masl)	LITHOLOGY / GEOLOGY: STRATIGRAPHY	LITHOLOGY / GEOLOGY: DESCRIPTION	OBSERVATIONS: PID *CGD* (ppm)	OBSERVATIONS: ODOUR (L M S)	OBSERVATIONS: VISUAL (D S)	SAMPLES: SAMPLE TYPE & No.	SAMPLES: % RECOVERY	SAMPLES: N (Blow/15cm)	SAMPLES: CHEMICAL ANALYSIS	SAMPLES: DUPLICATE	MONITORING WELL: DIAGRAM	MONITORING WELL: DESCRIPTION	REMARKS
18.5		**SANDY SILT** : Trace clay, brown, occasional sand pockets, moist *(cont'd from previous page)*	0.1			SS15	58%	60/5"					
19.0													
19.5													
20.0			0.1			SS16	56%	125/8"					
20.5													
21.0													
21.34 / *169.36*													
21.5		**SANDY SILT TILL** : Trace gravel, grey, moist	0.1			SS17	56%	104/9"					
22.0												BENTONITE	
22.5													
23.0			0.1			SS18	56%	97/9"					
23.5													
24.0													
24.5			0.1			SS19	58%	55/5"					
25.0													
25.5													
26.0													
26.5													
27.0													
27.43 / *163.26*													
27.5			0.1			SS20	44%	98/10"					
28.0												WATER MARKER Depth : 16.91 m Elev. : m Date : 8/18/2017	
28.5													
29.0													
29.5													
30.0													
30.5													
31.0													
31.5													
32.0													
32.5													
33.0													
33.5													
34.0													
34.5													
35.0													
35.5													

Project : TEMPLATE_MASTER - IMPERIAL.GPJ Report : WSP_EN_WELL-ENVIRONMENTAL 8/31/2017

Prepared by: Josh Deline
Reviewed by: Michael Wilson

MONITORING WELL DRILLING RECORD : **17-5**

Project Number: **171-09879-02**

5800 Yonge Street, Toronto, Ontario
Phase Two Environmental Site Assessment
Toronto Hydro

DRILLING DETAILS

Date (Start):	8/4/2017
Date (End):	8/4/2017
Drilling Company:	Tri-Phase Group
Drilling Equipment:	CME 55
Drilling Method:	Hollow Stem Auger
Borehole Diameter:	203 mm
Drilling Fluid:	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 - Dispersed with Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
DT - Dual Tube
MC - Macro Core
NR - No Recovery

CHEMICAL ANALYSIS

Metals	Sb As Ba Be B Cd Cr Co Cu Pb Mo Ni Se Ag Tl U V Zn
Inorg.	Inorganic Compounds
PHC	Petroleum Hydrocarbons (F1-F4)
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
VOC	Volatile Organic Compounds
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
D/F	Dioxins & Furans
Phenol	Phenolic Compounds
GSA	Grain-size Analysis

(m) DEPTH / *ELEVATION* (masl)	STRATIGRAPHY	DESCRIPTION	PID / *CGD* (ppm)	ODOUR L M S	VISUAL D S	SAMPLE TYPE & No.	% RECOVERY	N (Blow/15cm)	CHEMICAL ANALYSIS	DUPLICATE	REMARKS
191.05 0.0		**FILL** : ~100mm asphalt over; ~100 mm granular base over; Clayey silt, some sand, dark brown, some organics, moist	0.3			SS1	33%	5			
0.5											0.5
1.0			0.3			SS2	54%	14	Metals & Inorg. PAH		1.0
1.52											
189.53 1.5		**CLAYEY SILT** : Trace sand, trace gravel, brown with grey mottling, moist	0.3			SS3	75%	30			1.5
2.0											2.0
2.5			0.2			SS4	96%	64			2.5
3.0											3.0
3.5			0.7			SS5	75%	54			3.5
4.0											4.0
4.57											
186.48 4.5		**SANDY SILT** : Grey with brown layering, moist	0.5			SS6	92%	35			4.5
5.0											5.0
5.5											5.5
6.10											
184.95 6.0		**CLAYEY SILT** : Trace sand, trace gravel, grey, moist	0.4			SS7	100%	33			6.0
6.5											6.5
7.0											7.0
7.5											7.5
8.0			0.4			SS8	111%	71/9"			8.0
8.5											8.5
9.14											
181.91 9.0		**SANDY SILT** : Light brown, moist	0.6			SS9	67%	50/3"			9.0
9.5											9.5
10.0											10.0
10.5											10.5
11.0			0.6			SS10	100%	50/2"			11.0
11.5											11.5
12.0											12.0
12.5			1.1			SS11	92%	50/3"			12.5
13.0											13.0
13.5											13.5
14.0			0.3			SS12	83%	50/4"			14.0
14.5											14.5
15.0											15.0
15.5			0.2			SS13	83%	50/4"			15.5
16.0											16.0
16.5											16.5
16.92 *174.29* 17.0			0.3			SS14	233%	50/5"	PHC VOC		17.0
17.5											17.5

MONITORING WELL

DIAGRAM / DESCRIPTION

- CONCRETE
- BENTONITE
- SAND
- SCREEN Length: 3.05 m Diam.: 50 mm Slot: #10

WATER MARKER
Depth : 17.2 m
Elev. : m
Date : 8/18/2017

Project : TEMPLATE_MASTER - IMPERIAL.GPJ Report : WSP_EN_WELL-ENVIRONMENTAL 8/31/2017

Prepared by: Josh Deline
Reviewed by: Michael Wilson

MONITORING WELL DRILLING RECORD : **17-6**

Project Number: **171-09879-02**

5800 Yonge Street, Toronto, Ontario
Phase Two Environmental Site Assessment
Toronto Hydro

DRILLING DETAILS

Date (Start):	8/8/2017
Date (End):	8/8/2017
Drilling Company:	Tri-Phase Group
Drilling Equipment:	CME 55
Drilling Method:	Hollow Stem Auger
Borehole Diameter:	203 mm
Drilling Fluid:	N/A

SURVEY DETAILS

Easting:	627355.488 m
Northing:	4849224.64 m
Surface Elevation:	191.049 masl
Top of Well Elevation:	masl

ODOUR
L - Light
M - Medium
S - Strong

VISUAL
D - Dispersed with Product
S - Saturated with Product

SAMPLE TYPE
DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
DT - Dual Tube
MC - Macro Core
NR - No Recovery

CHEMICAL ANALYSIS

Metals	Sb As Ba Be B Cd Cr Co Cu Pb Mo Ni Se Ag Tl U V Zn
Inorg.	Inorganic Compounds
PHC	Petroleum Hydrocarbons (F1-F4)
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
VOC	Volatile Organic Compounds
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
D/F	Dioxins & Furans
Phenol	Phenolic Compounds
GSA	Grain-size Analysis

(m) DEPTH / *ELEVATION* (masl)	LITHOLOGY / GEOLOGY: STRATIGRAPHY	DESCRIPTION	OBSERVATIONS: PID *CGD* (ppm)	ODOUR (L M S)	VISUAL (D S)	SAMPLES: SAMPLE TYPE & No.	% RECOVERY	N (Blow/15cm)	CHEMICAL ANALYSIS	DUPLICATE	MONITORING WELL: DIAGRAM	DESCRIPTION	REMARKS
191.05 0.0		**FILL** : ~50mm topsoil over; Silty sand, trace clay, dark brown, organics and rootlets, moist	1.8			SS1	50%	12				CONCRETE	
1.52			1.2			SS2	58%	24	Metals & Inorg. PCB PAH				
189.53 2.29		**SANDY SILT** : Trace gravel, brown, moist	1.7			SS3	83%	30					
188.76		**CLAYEY SILT** : Trace to some sand, brown, moist	2			SS4	83%	64					
			2.5			SS5	83%	54					
			1.3			SS6	100%	35					
			2.6			SS7	100%	33				BENTONITE	
			1.7			SS8	100%	71/9"					
			1.6			SS9	100%	50/3"					
10.67 *180.38*		**SANDY SILT** : Light brown, moist	2.4			SS10	83%	50/2"					
			3			SS11	83%	50/3"					
			1.5			SS12	117%	50/4"				SAND	
			1			SS13	117%	50/4"				SCREEN Length: 3.05 m Diam.: 50 mm Slot: #10	
16.92 *174.29*			1.5			SS14	117%	50/5"	PHC VOC		WATER MARKER Depth : 16.19 m Elev. : m Date : 8/18/2017		

Project : TEMPLATE_MASTER - IMPERIAL.GPJ Report : WSP_EN_WELL-ENVIRONMENTAL 8/31/2017

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