Report on
Geotechnical Investigation
Proposed High-rise Buildings
5 and 15 Tangreen Court, Toronto, Ontario

Prepared For:

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Table of Contents

1. INTRODUCTION

DS Consultants Ltd (DS) was retained by CAPREIT 2 Limited Partnership (the Client) to undertake a geotechnical investigation for the proposed high-rise buildings located at 5 and 15 Tangreen Court, Toronto, Ontario.

The site is currently occupied by two 18-storey residential buildings with two levels of underground parking. It is understood that the site will be re-developed with seven 25 to 55-storey towers with up to five levels of underground parking. The towers will be connected with 6 to 8-storey podium. Finished floor elevations of the underground parking are not available to us at the time of writing of this report.

In 2020, Englobe Corp. (Englobe) conducted a geotechnical investigation with 10 boreholes (BH1 to BH10) drilled to depths of 13 to 26 m at the subject site. The borehole logs of Englobe's investigation are included as Appendix A of this report.

Concurrently with the Geotechnical Investigation program, a Hydrogeological Study and a Phase Two ESA (Environmental Site Assessment) are carried out by DS, and the results will be addressed separately.

The purpose of this geotechnical investigation was to obtain the subsurface conditions at the borehole locations. From the findings at the borehole locations, this report provides 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
7. Pavement Design

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 CAPREIT 2 Limited Partnership and its architect and designers. Use of this report by third party without DS Consultants Ltd. consent is prohibited.

2. FIELD AND LABORATORY WORK

The field work for this investigation was carried out by DS between February 10 and 21, 2023. A total of five (5) boreholes (BH23-1 and BH23-5, see **Drawing 1** for borehole locations) were drilled to depths ranging from 24.9 to 37.2 m below existing ground surface. Boreholes were drilled with hollow stem continuous flight auger and mud rotary 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 DS laboratory for detailed examination by the project engineer and for laboratory testing. In addition to visual examination in the laboratory, all soil samples were tested for moisture contents and results are presented on the respective borehole logs. Selected eleven (11) soil samples (BH23-1/SS7, BH23-1/SS12, BH23-1/SS21, BH23-2/SS5, BH23-2/SS15, BH23-3/SS111, BH22-3/SS14, BH23-4/SS5, BH23-4/SS14, BH23-5/SS13 and BH23-5/SS20) were tested for grain size analyses and five (5) samples (BH23-1/SS7, BH23-1/SS21, BH23-2/SS15, BH23-5/SS13 and BH23-5/SS20) were tested for Atterberg Limits. Gradation curves for the grain size analyses are presented on **Drawing 7**. Atterberg Limits test results are presented on **Drawing 8**.

Monitoring wells were installed in all boreholes (BH23-1 to BH23-5) to allow for long-term groundwater level monitoring and hydrogeological/environmental testing.

The geodetic ground surface elevations at the locations of the boreholes/monitoring wells were established by DS using differential GPS system. It should be noted that the elevations at the as-drilled borehole/well locations were not provided by a professional surveyor and should be considered to be approximate. Contractors performing any work referenced to the borehole/well elevations should confirm the borehole elevations for their work.

3. SUBSURFACE CONDITIONS

The borehole location plan is shown on **Drawing 1**. General notes on sample description are provided on **Drawing 1A**. The subsurface conditions in the boreholes (BH23-1 to BH23-5) by DS are presented in the individual borehole logs presented on **Drawings 2 to 6**. Generalized Subsurface Profiles at Borehole Locations (BH23-1 to BH23-5) are shown on **Drawing 9**. The location plan and logs of the boreholes (BH1 to BH10) by Englobe are attached in **Appendix A**.

3.1 Soil Conditions

Topsoil:

A surficial topsoil layer with a thickness of approximately 200 mm was encountered at all boreholes by DS.

It should be noted that the thickness of the topsoil explored at the borehole locations may not be representative for the site and should not be relied on to calculate the amount of topsoil at the site. Shallow hand-dug test-pits should be carried out to further explore the topsoil conditions.

Fill Materials:

Fill materials consisting of silty clay and sandy silt with organics were encountered in all boreholes (BH23-1 to BH23-5). Fill material extended to depths ranging from approximately 1.8 to 2.6 m below existing grade. The consistency of the silty clay fill materials was firm to very stiff, as indicated from measured SPT 'N' values ranging from 5 to 17 blows per 300 mm penetration. The compactness of sandy silt fill materials was in a compact state, as indicated from measured SPT 'N' values ranging from 12 to 23 blows per 300 mm penetration.

Upper Sandy Silt Till Deposit:

Upper sandy silt till deposit was encountered below the fill materials in all boreholes and extended to depths ranging from 4.6 to 5.6 m below existing grade. The upper sandy silt till deposit was present in a compact to very dense compactness, with measured SPT 'N' values of 14 to 58 blows per 300 mm penetration.

Grain size analyses of two (2) sandy silt till samples (BH22-2/SS5 and BH22-4/SS5) were conducted and the results are presented on **Drawing 7.** The fractions of soil particles of sandy silt till are presented as follows:

Clay:	14 to 15%
Silt:	43 to 45%
Sand:	37 to 38%
Gravel:	2 to 6%

Upper Silty Clay to Clayey Silt (Till):

An upper silty clay to clayey silt (till) deposit was encountered below the upper sandy silt till deposit in all boreholes and extended to depths ranging from 9.1 to 16.8 m below existing ground surface. The silty clay to clayey silt (till) deposit was present in a firm to hard consistency, with measured SPT 'N' values ranging from 5 to over 50 blows per 300 mm penetration.

Grain size analysis of one (1) silty clay till sample (BH23-1/SS7) was conducted and the results are presented on **Drawing 7.** The fractions of soil particles of silty clay till are presented as follows:

Clay: 23%

Silt: 43 %

Sand: 32%

Gravel: 2%

Atterberg limits test of the same silty clay till sample (BH23-1/SS7) was also conducted. The results are shown on the borehole log and on **Drawing 8** and are summarized as follows:

Liquid limit (WL): 19.6%

Plastic limit (WP): 11%

Plasticity index (PI): 8.6

Lower Sandy Silt to Silty Sand (Till) Deposit:

Lower sandy silt to silty sand (till) deposit was encountered below the upper silty clay to clayey silt (till) deposit in all boreholes and extended to depths ranging from approximately 15.2 to 21.3 m below existing grade. The lower sandy silt to silty sand (till) deposit was present in a dense to very dense compactness, with measured SPT 'N' values of 30 to over 50 blows per 300 mm penetration. A silt layer was encountered at a depth of approximately 12.2 to 13.7 m in borehole BH23-3. The silt was present in a loose compactness, with measured SPT 'N' values of 6 blows per 300 mm penetration.

Grain size analyses of three (3) sandy silt to silty sand (till)/silt samples (BH23-1/SS12, BH23-3/SS11 and BH23-4/SS14) were conducted and the results are presented on **Drawing 7.** The fractions of soil particles of sandy silt to silty sand (till) are presented as follows:

Clay: 4 to 10%

Silt: 30 to 78%

Sand: 11 to 66%

Gravel: 0 to 4%

Lower Silty Clay to Clayey Silt (Till):

A lower silty clay to clayey silt (till) deposit was encountered below the lower sandy silt to silty sand (till) deposit in all boreholes and extended to depths ranging from 24.9 to 37.2 m below existing ground surface. The silty clay to clayey silt (till) deposit was present in a very stiff to hard, but generally in a hard consistency, with measured SPT 'N' values ranging from 22 to over 50 blows per 300 mm penetration.

Grain size analyses of five (5) silty clay to clayey silt (till) samples (BH23-1/SS21, BH23-2/SS15, BH23-3/SS14, BH23-5/SS13 and BH23-5/SS20) were conducted and the results are presented on **Drawing 7.** The fractions of soil particles of silty clay to clayey silt till are presented as follows:

Clay: 17 to 53%

Silt: 44 to 65%

Sand: 0 to 36%

Gravel: 0 to 4%

Atterberg limits tests of selected four (4) silty clay to clayey silt (till) samples (BH23-1/SS21, BH23-2/SS15, BH23-5/SS13 and BH23-5/SS20) were conducted. The results are shown on the borehole logs and on **Drawing 8** and are summarized as follows:

Liquid limit (WL): 16.1 to 33.6%

Plastic limit (WP): 10.2 to 16.5%

Plasticity index (PI): 5.3 to 17.1

3.2 Groundwater Conditions

Monitoring wells were installed in all boreholes (BH23-1 to BH23-5) for the long-term groundwater table monitoring and hydrogeological/environmental testing. On March 3, 2023, groundwater was measured in monitoring wells BH23-2 to BH23-5 at depths ranging from 12.7 to 17.1 m below existing grade, corresponding to Elev. 174.7 to 180.0 m. Groundwater was dry in monitoring well BH23-1. The groundwater levels observed in the monitoring wells are listed in **Table 1**:

Table 1: Groundwater Levels Observed in Monitoring Wells

Monitoring Well No.	Ground Surface Elevation (m)	Screened Interval (m)	Date of Observation	Groundwater Depth (m)	Elevation of Groundwater (m)
BH23-1	191.6	12.2-15.2	Mar. 3, 2023	Dry	-
BH23-2	191.8	18.3-21.3	Mar. 3, 2023	17.1	174.7
BH23-3	192.7	15.3-18.3	Mar. 3, 2023	12.7	180.0
BH23-4	191.9	15.2-18.2	Mar. 3, 2023	14.9	177.0
BH23-5	191.6	13.7-16.7	Mar. 3, 2023	15.8	175.8

Groundwater levels measured in the Englobe's monitoring wells on March 26 and April 27, 2020 were at 4.7 m to 17.8 m below the existing grade (Elev. 175.6 m to 188.4 m).

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

Further groundwater monitoring must be carried out to confirm the groundwater conditions. Refer to DS's hydrogeological report for more information regarding long-term groundwater levels at the site.

4. FOUNDATIONS

Based on the conceptual design information, the proposed development will consist of seven towers as the followings:

- Tower A: 55-storey + MPH
- Tower B: 40-storey + MPH
- Tower C: 25-storey + MPH
- Tower D: 25-storey + MPH
- Tower E: 55-storey + MPH
- Tower F: 45-storey + MPH
- Tower G: 35-storey + MPH

The levels of underground parking are not finalized; however, up to five (5) levels of underground parking are currently contemplated.

4.1 FOUNDATIONS FOR TOWERS A, B, E, F AND G

4.1.1 Conventional Footings and Raft Foundations

Based on the borehole information, the proposed Towers A, B, E, F and G can be supported by conventional footings and/or raft foundations founded on the undisturbed very dense/hard soils for bearing capacity values of 600 kPa at SLS (Serviceability Limit States) and 900 kPa at ULS (Ultimate Limit States) as listed in **Table 2**.

Table 2: Bearing Values and Founding Levels of Footings/Raft Foundations

Proposed Tower Locations	Borehole No.	Ground Surface Elevation At Borehole (m)	Bearing Capacity at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Depth below Existing Ground (m)	Founding Level at or below Elevation (m)
Tower A (55-storey)	*BH10-MW	193.1	600	900	8.0	185.1
	*BH9	192.7	600	900	9.5	183.2
Tower B (40-storey)	BH23-1	191.6	600	900	9.5	182.1
	*BH8-MW	192.9	600	900	11.0	181.9
Tower E (55-storey)	*BH1-MW	192.9	600	900	9.5	183.4
	BH23-2	191.8	600	900	9.5	182.3

Tower F (45-storey)	*BH2-MW	193.0	600	900	11.0	182.0
Tower G 35-storey	BH23-3	192.7	600	900	14.0	178.7
	*BH3-MW	193.5	600	900	14.0	179.5

*Boreholes drilled by Englobe in 2020

It should be noted that, based on City of Toronto's Foundation Drainage Policy ("FDP"; November 1, 2021), long-term Discharge of Foundation Drainage that contains any groundwater will not be permitted to the City's storm or combined sewer system. As such, the proposed building/structure may have to be designed as a 'bathtub' or a tanked structure, with a raft foundation at the base.

A modulus of subgrade reaction Rt=15 MPa/m can be used for the design of raft foundations.

4.1.2 Combined Raft-Pile Foundation System for Towers A, B, E, F and G

In the areas where the raft foundation pressure exceeds the recommend bearing capacity specified in **Table 2**, the raft foundation can be augmented with CFA (Continuous Flight Auger) piles to support the loads exceeding the recommended bearing capacity in **Table 2**.

As a preliminary input, a 600 mm diameter CFA pile with the pile toe elevation below Elev. 150.0 m can be designed for a bearing capacity value of 2000 kN/pile at SLS and 2700 kN/pile at ULS, provided it is confirmed by the pile load testing. Additional deep boreholes to a depth of at least 50 m below existing grade would be needed to confirm the above recommendations for CFA piles.

The test piles must be loaded to at least 1.67 times the ULS bearing resistance, i.e. to 4500 kN per pile. Depending on the load test results, deeper/longer piles may be required to achieve the design bearing resistances.

The bearing resistances of CFA piles will be highly dependent on the contractor's experience, the quality and procedure of the pile installation, and the skills of the installation operator(s). The CFA contractor must review the borehole information and evaluate bearing capacity of the piles based on their experience. The quality and the design bearing resistance of the piles must be ensured by the CFA contractor. A specialty contractor should be retained to design and install the CFA piles based on the performance specification and design bearing resistances.

Prior to the pile construction, the contractor should submit the details of the installation plan, load test program, installation procedure, automated monitoring system and control parameters, grout/concrete mix design, and reinforcement installation etc. for the review by the structural engineer and the geotechnical engineer. All pile installation must be inspected by this office.

In order to avoid group effect on the bearing capacity of the piles, the horizontal spacing of adjacent piles should be at least 3 times its diameter.

4.2 FOUNDATIONS FOR TOWERS C AND D

4.2.1 Conventional Strip and Spread Footings

It is understood that the proposed Tower C and Tower D will be 25-storey buildings. If there are any design changes, the following foundation recommendations should be further reviewed and amended as necessary.

Based on the borehole and design information, the proposed Towers C and D can be supported by conventional footings founded on the undisturbed very dense/hard soils for bearing capacity values of 800 kPa at SLS and 1200 kPa at ULS as listed in **Table 3**. Using the bearing capacity values listed in **Table 3**, the width of strip footings must be limited to 2.0 m, and the dimensions of spread footings must be limited to 3 m x 3 m.

Table 3: Bearing Values and Founding Levels of Conventional Footings

Proposed Tower Locations	Borehole No.	Ground Surface Elevation At Borehole (m)	Bearing Capacity at SLS (kPa)	Factored Geotechnical Resistance at ULS (kPa)	Minimum Depth below Existing Ground (m)	Founding Level at or below Elevation (m)
Tower C (25-storey)	BH23-4	191.9	800	1200	12.5	179.4
	*BH7	192.8	800	1200	14.0	178.8
Tower D (25-storey)	BH23-5	191.6	800	1200	13.5	178.1

*Boreholes drilled by Englobe in 2020

4.2.2 Raft Foundations

If the bearing capacities provided in **Table 3** for conventional footings are not sufficient for the design or the Towers have to be designed as tanked structures, raft foundations can be considered to support the proposed Towers C and D. The bearing capacity values of 600 kPa at SLS and 900 kPa at ULS are recommended for raft foundations founded on undisturbed very dense/hard soils at depths/elevations specified in **Table 3**.

A modulus of subgrade reaction Rt=15 MPa/m can be used for the design of raft foundations.

4.3 OTEHER COMMENTS ON FOUNDATIONS

Foundations designed to the specified bearing capacity values at SLS are expected to settle less than 40 mm total and 30 mm differential.

All foundations and pile caps exposed to seasonal freezing conditions must have at least 1.2 meters of soil cover for frost protection.

Positive dewatering will be required for the installation of foundations below groundwater table. The groundwater table must be lowered to at least 1.0 m below the deepest excavation base.

Prior to the placement of concrete, all foundation bases must be inspected by this office to confirm the design bearing values. The subgrade of foundation base should be covered with 50 mm thick lean concrete slab immediately after inspection and cleaning.

Where it is necessary to place footings on soil at different levels, the upper footing must be founded below an imaginary 10 horizontal to 7 vertical line (10H:7V) 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.

It should be noted that the recommended bearing capacities have been calculated by DS Consultants Ltd. 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 Ltd. to validate the information for use during the construction stage.

5. FLOOR SLAB AND PERMANENT DRAINAGE

Refer to DS's hydrogeological investigation for the feasibility of installation permanent underfloor drainage and perimeter drainage. If it is not feasible to install permanent underfloor and perimeter drainages based on the City of Toronto's Foundation Drainage Policy ("FDP"; November 1, 2021), tanked basement structures can be considered. The tanked basement structures must be designed to resist hydrostatic pressure, with a raft foundation at the base.

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

6. FROST PROTECTION

There are no regulations or guidelines governing the required earth cover for footings placed below the floor slabs of unheated underground parking structures. Certainly, it will not be greater than 1.2 m required in Southern Ontario for exterior footings. Experience, however, indicates that a shallower depth, ranging from 0.8 to 0.9 m for interior column footings and 0.4 m for wall footings has been proven adequate for structures with two (2) or more basement levels. The 0.8 m depth is believed to be close to the minimum structural requirement for interior column footings. Adjacent to air shafts and

entrance and exit doors, a footing depth of 1.2 m below floor level is required or, alternatively, insulation protection must be provided.

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 and water pressure acting at any depth on basement walls can be calculated as follows:

In soils above the groundwater table ($z < d_w$):

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

In soils below the groundwater table ($z \geq d_w$):

$$p = K \{\gamma d_w + \gamma_1 (z - d_w) + q\} + p_w$$

In which, $p_w = \gamma_w (z - d_w)$

where p = lateral earth and water pressure in kPa acting at a depth of z below ground surface

K = earth pressure coefficient, K = 0.40 for basement walls

γ = unit weight of soil above groundwater table, assuming γ = 21 kN/m^3

γ_1 = submerged unit weight of soil below groundwater table, assuming γ_1 = 11 kN/m^3

γ_w = unit weight of water, assuming γ_w = 9.8 kN/m^3

z = depth below ground surface to point of interest, in metres

d_w = depth of groundwater table below ground surface, in metres

q = value of surcharge in kPa

p_w = hydrostatic water pressure in kPa

When the basement wall is poured against the shoring caisson wall, the basement wall as well as the shoring caisson wall should be designed for hydrostatic pressure.

8. EXCAVATION AND GROUNDWATER CONTROL

The levels of underground parking are not finalized at the time of preparing this report. For P5 basement floor, it is assumed that the basement floor is approximately 15 m below ground surface. Excavations for the proposed structure with up to 5 levels of underground parking are expected to be 17 m deep. The excavation will be through the fill materials, the upper sandy silt till and silty clay to clayey silt (till) deposits, the lower sandy silt to silty sand (till) deposit and potentially into the lower clayey silt to silty clay (till) deposit.

Excavations can be carried out with heavy hydraulic backhoe. Positive dewatering would be required for any excavation below groundwater. The groundwater level should be lowered to at least 1.0 m below the excavation bases. DS has carried out a hydrogeological investigation at the subject site in conjunction with the geotechnical investigation which will comment on the type and extent of the groundwater control (both temporary and permanent drainage) required at this site.

A continuous cut-off caisson wall to be installed along the exterior basement walls can be considered to control the groundwater for both temporary dewatering during construction and permanent perimeter/underfloor drainages. The cut-off caisson wall should be installed to at least 1.5 m below the lower silty clay to clayey silt (till) deposit to cut off the seepage from the water bearing upper cohesionless soils. At borehole BH23-2 and BH23-4 locations, the caisson wall should be installed to Elev. 169.0 m. Even with a caisson wall, dewatering within the site will be required to assist the excavation. The feasibility of a cut-off caisson wall should be further reviewed when the design building locations and basement depth are finalized.

All 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 the sandy silt to silty sand (till)/silt can be classified as Type 3 Soil above the groundwater level and Type 4 Soil below the groundwater level. The stiff silty clay to clayey silt (till) deposits can be classified as Type 3 Soil above the groundwater level and as Type 4 Soil below the groundwater level. The very stiff to hard silty clay to clayey silt (till) deposits can be classified as Type 2 Soil above the groundwater level and as Type 3 Soil below the groundwater level.

It should be noted that the glacial till soils may contain boulders. Large obstructions in the fill material are anticipated. Provisions must be made in the excavation contract for the removal of boulders in the till and large obstructions in the fill material.

The select inorganic native soils can be re-used as general construction backfill, provided its moisture content is within two percent of its optimum moisture content. Loose lifts of soil, which are to be compacted, should not exceed 200 mm.

Imported granular fill, which can be compacted with handheld 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 be compacted at the surface or be covered with tarpaulins to minimize moisture uptake.

9. 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 tightly braced caisson wall may be required to support adjacent structures and utilities. Unsupported open cut excavation may be utilized at areas where

sufficient space exists. The requirement for caisson wall to support adjacent structures is given on **Drawing 10**.

The shoring system must be designed in accordance with the 4th Edition of the Canadian Foundation Engineering Manual. The surcharge loading from adjacent structures must be considered. The soil parameters estimated to be applicable for this design are as follows:

1) Earth Pressure Coefficient for shoring:

   (a) where movement must be minimal K=0.45

   (b) where minor movement (.002H) can be tolerated K=0.30

   (c) passive earth pressure for soldier piles (unfactored) K_p=3.0 for very stiff to hard soils

2) For stability check

   $\phi = 30°$

   C = 0

   $\gamma = 21$ kN/m^3

   surcharge is to be determined by shoring contractor.

A bond stress of 100 kPa can be used for post-grouted anchors in hard or dense to very dense soil. However, these suggested bond values are preliminary since the contractor's installation methods and grouting procedures will determine the actual soil to concrete bond value. Hence, the contractor must decide on a capacity and confirm its availability by field load testing. 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 sandy/silty soils 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 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.

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.

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% of shoring height.

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.

10. 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 buildings with up to 5 levels of underground parking using the recommended foundation system can be classified as “Class C” for seismic site response.

11. PAVEMENT

The recommended pavement structures provided in **Table 4** 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.

Table 4: Recommended Pavement Structure Thickness

Pavement Layer	Compaction Requirements	Light Duty Parking (Cars)	Heavy Duty Parking/Driveway (Delivery Trucks)
Asphaltic Concrete	92.0 to 96.5% Maximum Relative Density (MRD)	40 mm HL 3 or SP 12.5 40 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 19mm Crusher Run Limestone)	100% SPMDD*	150 mm	150 mm

OPSS Granular B (or 50mm Crusher Run Limestone)	100% SPMDD	250 mm	350 mm

The subgrade must be compacted to 98% SPMDD for at least the upper 500 mm unless accepted by DS Consultants Ltd.

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. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas. Subdrains should be installed to intercept excess subsurface moisture and prevent subgrade softening. This is particularly important in heavy-duty pavement areas.

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

1) As part of the subgrade preparation, proposed parking areas and access roadways should be stripped of topsoil and other obvious objectionable material. Fill required to raise the grades to design elevations should conform to backfill requirements outlined in previous sections of this report. The subgrade should be properly shaped, crowned then proof-rolled in the full-time presence of a representative of this office. Soft or spongy subgrade areas should be sub-excavated and properly replaced with suitable approved backfill compacted to 98% 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. Assuming that satisfactory crossfalls in the order of two percent have been provided, subdrains extending from and between catch basins may be satisfactory. In the event that shallower crossfalls are considered, a more extensive system of sub-drainage may be necessary and should be reviewed by DS Consultants Ltd.

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 Consultants Ltd. 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. GENERAL COMMENTS AND LIMITATIONS OF REPORT

DS Consultants Ltd. (DS) 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, DS will assume no responsibility for interpretation of the recommendations in the report. 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.

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to DS at the time of preparation. Unless otherwise agreed in writing by DS, 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 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. DS 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.

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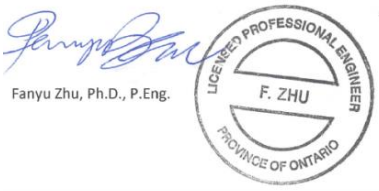


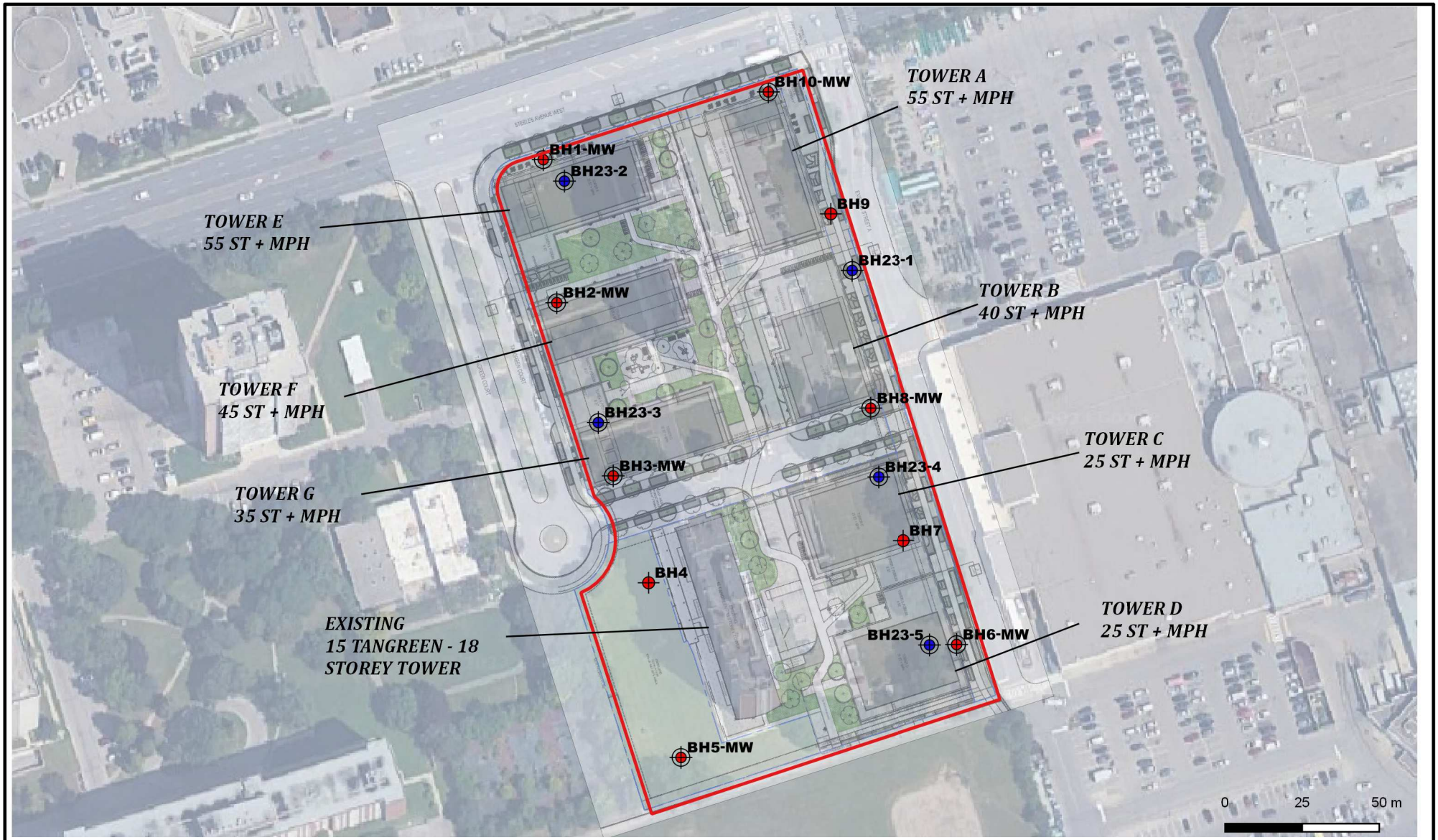
Derek Wang, P.Eng.
Senior Geotechnical Engineer

Fanyu Zhu, Ph.D., P.Eng.
Principal Engineer

Alka Sangar, M.Eng., P.Eng.
Principal Engineer

Drawings

J:\-GIS\2023 PROJECTS\23-011-100 - 5 and 15 Tangreen Court, Toronto, ON\1-QGIS\GEO\Figure 1 - Borehole Location Plan.qgs Mar-14 14:22



Legend

- Property Boundary
- Monitoring Well - DS
- Borehole - Englobe
- Monitoring Well - Englobe

DS CONSULTANTS LTD.
6221 Highway 7, UNIT 16
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Telephone: (905) 264-9393
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Project: GEOTECHNICAL INVESTIGATION
5 and 15 Tangreen Court, Toronto, ON

Title: **BOREHOLE LOCATION PLAN**

N

Client: CARPREIT 2 LIMITED PARTNERSHIP

Size:	Approved By:	Drawn By:	Date:
8.5 x 11	D.W.	P.P	March 2023
Rev: 0	Scale: As Shown	Project No.: 23-011-100	Figure No.: 1

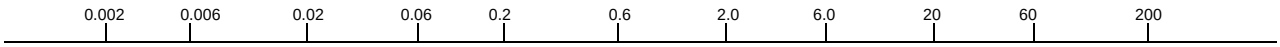
Image/Map Source: *Google Satellite Image*

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.

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Geotechnical ◆ Environmental ◆ Materials ◆ Hydrogeology

LOG OF BOREHOLE BH23-1

PROJECT: Geotechnical Investigation
CLIENT: CARPEIT 2 Limited Partnership
PROJECT LOCATION: 5 and 15 Tangreen Court, Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4850447.11 E 626731.91

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-15-2023

REF. NO.: 23-011-100
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
191.6 / 0.0	**TOPSOIL:** 200mm				
191.4 / 0.2	**FILL:** silty clay, trace rootlets, trace organics, trace gravel, brown, moist, firm to stiff	1	SS	11	191
		2	SS	8	
		3	SS	5	190
189.0 / 2.6	**SANDY SILT TILL:** trace to some clay, trace gravel, oxidized fissures, brown, moist, compact	4	SS	7	189
		5	SS	23	188
187.0 / 4.6	**SILTY CLAY TILL:** sandy, trace gravel, brown, moist, very stiff to hard	6	SS	29	187
	grey below 6.1m	7	SS	22	186
		8	SS	18	185
	trace to some gravel at 9.1m	9	SS	50/ 50mm	184
	brown silty sand pockets at 10.7m	10	SS	50/ 130mm	183
		11	SS	50/ 130mm	182
177.9 / 13.7	**SILTY SAND:** trace clay, greyish brown, wet, very dense	12	SS	50/ 130mm	181
		13	SS	50/ 130mm	180
174.8 / 16.8	**SANDY SILT TILL:** clayey, trace gravel, grey, moist, very dense	14	SS	50/ 75mm	179
173.3 / 18.3	**SANDY SILT:** trace to some clay, trace gravel, grey, wet, very dense	15	SS	63	178
171.8					177
					176
					175
					174
					173
					172

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
Switched to Mud Rotary at 3.1m				
	2	32	43	23
	0	66	30	4

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-2021-DRAFT 23-011-100 GEO COPY.GPJ DS.GDT 23-3-7

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LOG OF BOREHOLE BH23-1

PROJECT: Geotechnical Investigation
CLIENT: CARPEIT 2 Limited Partnership
PROJECT LOCATION: 5 and 15 Tangreen Court, Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4850447.11 E 626731.91

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-15-2023

REF. NO.: 23-011-100
ENCL NO.: 2

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
19.8	**SILTY CLAY TILL:** some sand, trace gravel, sand seams, grey, moist, hard(Continued)		16	SS	50/130mm		171
170.3							
21.3	**SILTY CLAY:** sandy, trace gravel, grey, moist, hard		17	SS	50/130mm		170
			18	SS	50/130mm		169
167.2							168
24.4	**CLAYEY SILT TO SILTY CLAY:** interbedded with silty sand, grey, moist, hard		19	SS	50/100mm		167
							166
							165
			20	SS	50/100mm		164
							163
							162
			21	SS	50/100mm		161
							160
							159
	grey silt partings, very stiff to hard below 33.5m		22	SS	29		158
							157
							156
154.5			23	SS	50/75mm		155
37.1	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Mar. 3, 2023 dry						

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
0	0	65	35

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

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LOG OF BOREHOLE BH23-2

PROJECT: Geotechnical Investigation
CLIENT: CARPEIT 2 Limited Partnership
PROJECT LOCATION: 5 and 15 Tangreen Court, Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4850476.09 E 626638.53

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-13-2023

REF. NO.: 23-011-100
ENCL NO.: 3

ELEV / DEPTH (m)	DESCRIPTION	NUMBER	TYPE	BLOWS "N" 0.3 m	REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
191.8 / 0.0	**TOPSOIL:** 200mm				
191.6 / 0.2	**FILL:** silty clay, trace organics, dark brown to brown, moist, firm to stiff	1	SS	7	
		2	SS	12	
		3	SS	8	
189.4 / 2.4	**SANDY SILT TILL:** some clay, trace gravel, brown, moist, compact to dense	4	SS	20	Switched to Mud Rotary at 3.1m
		5	SS	30	6 37 43 14
187.0 / 4.8	**CLAYEY SILT TO SILTY CLAY TILL:** some sand to sandy, trace gravel, brown, moist, stiff to hard	6	SS	35	
	grey below 6.1m	7	SS	10	
		8	SS	16	
182.7 / 9.1	**SANDY SILT TILL:** trace to some clay, trace gravel, grey, moist, dense to very dense	9	SS	50/130mm	
		10	SS	74	
		11	SS	50/120mm	
	clayey at 13.7m	12	SS	49	
		13	SS	40	
		14	SS	44	W. L. 174.7 m Mar 03, 2023
173.5 / 18.3	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard	15	SS	34	3 36 44 17
172.0 / 20.0					

SHEAR STRENGTH (kPa): ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE
DYNAMIC CONE PENETRATION RESISTANCE PLOT
PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%)
POCKET PEN. (Cu) (kPa)
NATURAL UNIT WT (kN/m³)

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

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LOG OF BOREHOLE BH23-2

PROJECT: Geotechnical Investigation
CLIENT: CARPEIT 2 Limited Partnership
PROJECT LOCATION: 5 and 15 Tangreen Court, Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4850476.09 E 626638.53

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-13-2023

REF. NO.: 23-011-100
ENCL NO.: 3

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS 0.3 m "N"	GROUND WATER CONDITIONS	ELEVATION
19.8	**SILTY SAND:** trace to some clay, trace gravel, grey, wet, very dense(Continued)		16	SS	67		
170.5							171
21.3	**SILTY CLAY TO CLAYEY SILT:** trace sand, grey, moist, hard		17	SS	50/ 130mm		170
	grey silt partings at 22.9m		18	SS	50/ 120mm		169
	very moist at 24.4m		19	SS	50/ 120mm		168
			20	SS	50/ 130mm		167
			21	SS	50/ 150mm		166
			22	SS	50/ 130mm		165
	sand seams at 36.6m		23	SS	50		164
154.6							163
37.2	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Mar. 3, 2023 17.11						162
							161
							160
							159
							158
							157
							156
							155

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

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

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LOG OF BOREHOLE BH23-3

PROJECT: Geotechnical Investigation
CLIENT: CARPEIT 2 Limited Partnership
PROJECT LOCATION: 5 and 15 Tangreen Court, Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4850397.74 E 626649.53

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-10-2023

REF. NO.: 23-011-100
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
192.7												
192.5 0.2	**TOPSOIL:** 200mm											
	FILL: silty clay, sandy, trace organics, brown, moist, firm to stiff		1	SS	7		192					
			2	SS	12							
190.9												
1.8	**SANDY SILT TILL:** trace clay, trace gravel, brown, moist, compact to very dense		3	SS	19		191					
			4	SS	15		190					
			5	SS	21		189					Switched to Mud Rotary at 3.1m
			6	SS	50		188					
	grey below 6.1m		7	SS	15		187					
185.1							186					
7.6	**SILTY CLAY TO CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, stiff to very stiff		8	SS	15		185					
			9	SS	17		184					
			10	SS	10		183					
180.5							182					
12.2	**SILT:** some clay, some sand, trace gravel, grey, wet, loose		11	SS	6	▽	181					1 11 78 10
179.0						W. L. 180.0 m Mar 03, 2023	180					
13.7	**SILTY SAND:** trace clay, grey, moist to wet, very dense		12	SS	50/ 150mm		179					
			13	SS	50/ 130mm		178					
175.9							177					
16.8	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard		14	SS	50/ 130mm		176					4 35 44 17
			15	SS	50/ 150mm		175					
							174					
							173					

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 BH23-3

PROJECT: Geotechnical Investigation
CLIENT: CARPEIT 2 Limited Partnership
PROJECT LOCATION: 5 and 15 Tangreen Court, Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4850397.74 E 626649.53

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-10-2023

REF. NO.: 23-011-100
ENCL NO.: 4

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES 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
171.4	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard(Continued)		16	SS	57		172		○			
21.3	**CLAYEY SILT:** trace sand, silt seams, grey, moist, hard		17	SS	50/130mm		171		○			
			18	SS	51		170		○			
							169					
167.8			19	SS	50/130mm		168		○			
24.9	**END OF BOREHOLE:** Notes: 1) 50mm dia. monitoring well installed upon completion. 2) Water Level Readings: Date: Water Level(mbgl): Mar. 3, 2023 12.69											

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

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

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LOG OF BOREHOLE BH23-4

PROJECT: Geotechnical Investigation
CLIENT: CARPEIT 2 Limited Partnership
PROJECT LOCATION: 5 and 15 Tangreen Court, Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4850380.08 E 626740.55

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-16-2023

REF. NO.: 23-011-100
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
191.9					
191.8	**TOPSOIL:** 200mm				
0.2	**FILL:** silty clay, some organics, trace gravel, dark brown to brown, moist, stiff to very stiff	1	SS	9	
1		2	SS	17	191
190.4					
1.5	**FILL:** sandy silt, trace gravel, brown, moist, compact	3	SS	12	
2					190
189.4					
2.5	**SANDY SILT TILL:** some clay, trace gravel, brown, moist, compact to very dense	4	SS	23	
3		5	SS	58	189
4					188
5		6	SS	44	187
185.8					
6.1	**SILTY CLAY TILL:** some sand, trace gravel, grey, moist, firm to stiff	7	SS	10	186
7					185
8		8	SS	8	184
9					183
9		9	SS	7	
10					182
181.2					
10.7	**CLAYEY SILT:** trace sand, grey, moist, very stiff	10	SS	17	181
11					
179.7					
12.2	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard	11	SS	50/100mm	
12					180
13		12	SS	50/130mm	179
14					178
15					
175.1		13	SS	50/50mm	177
16.8	**SILTY SAND TILL:** some clay, trace gravel, grey, moist, very dense	14	SS	50/100mm	176
17					175
18		15	SS	50/100mm	174
19					173
20					

W. L. 177.0 m
Mar 03, 2023

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
Switched to Mud Rotary at 3.1m				
	2	38	45	15
	4	49	37	10

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-2021-DRAFT 23-011-100 GEO COPY.GPJ DS.GDT 23-3-7

LOG OF BOREHOLE BH23-4

PROJECT: Geotechnical Investigation
CLIENT: CARPEIT 2 Limited Partnership
PROJECT LOCATION: 5 and 15 Tangreen Court, Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4850380.08 E 626740.55

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-16-2023

REF. NO.: 23-011-100
ENCL NO.: 5

(m) ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: 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
21 170.6	**SILTY SAND TILL:** some clay, trace gravel, grey, moist, very dense(Continued)		16	SS	50/ 130mm		171					
21.3	**SILTY CLAY:** trace sand, grey, moist, hard		17	SS	61							
22 169.0							170					
22.9	**SILTY CLAY TILL:** sandy, trace gravel, grey, moist, hard		18	SS	50/ 130mm		169					
24							168					
			19	SS	50/ 130mm							
25							167					
26 165.9							166					
26.0	**END OF BOREHOLE:**		20	SS	50/ 130mm							

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

Date:	Water level(mbgl):
Mar. 3, 2023	14.9

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

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LOG OF BOREHOLE BH23-5

PROJECT: Geotechnical Investigation
CLIENT: CARPEIT 2 Limited Partnership
PROJECT LOCATION: 5 and 15 Tangreen Court, Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4850325.55 E 626757.23

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-17-2023

REF. NO.: 23-011-100
ENCL NO.: 6

(m) ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS 0.3 m "N"	ELEVATION
191.6					
191.4	**TOPSOIL:** 200mm				
0.2	**FILL:** silty clay, trace organics, dark brown to brown, moist, stiff	1	SS	8	191
1		2	SS	9	
2		3	SS	10	190
189.2					
2.4	**SANDY SILT TILL:** some clay, trace gravel, brown, moist, compact to dense trace oxidation at 3.1m	4	SS	14	189
3		5	SS	17	
4					188
5		6	SS	35	187
6					186
185.4					
6.2	**SILTY CLAY TILL:** sandy, trace gravel, grey, moist, firm to very stiff	7	SS	15	185
7					
8		8	SS	13	184
9					183
9		SS	10	182	
10					
11		10	SS	5	181
12					180
179.4					
12.2	**SILTY SAND:** trace clay, grey, wet, dense to very dense	11	SS	30	179
13					
14		12	SS	50/ 130mm	178
15					177
176.4					
15.2	**CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, hard	13	SS	54	176
16					
17		14	SS	50/ 150mm	175
18					174
19		15	SS	50/ 150mm	173
20					172

W. L. 175.8 m
Mar 03, 2023

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	31	48	19

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-2021-DRAFT 23-011-100 GEO COPY.GPJ DS.GDT 23-3-7

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LOG OF BOREHOLE BH23-5

PROJECT: Geotechnical Investigation
CLIENT: CARPEIT 2 Limited Partnership
PROJECT LOCATION: 5 and 15 Tangreen Court, Toronto, ON
DATUM: Geodetic
BH LOCATION: See Drawing 1 N 4850325.55 E 626757.23

DRILLING DATA
Method: Hollow Stem Auger/Mud Rotary
Diameter: 200mm
Date: Feb-17-2023

REF. NO.: 23-011-100
ENCL NO.: 6

(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
	CLAYEY SILT TILL: sandy, trace gravel, grey, moist, hard(Continued)		16	SS	50/ 130mm		171					
21												
			17	SS	50/ 100mm		170					
22												
							169					
23			18	SS	50/ 130mm							
							168					
24												
167.2												
24.4	**SILTY CLAY:** trace sand, silt seams, grey, moist, hard		19	SS	50/ 130mm		167					
25												
							166					
26												
165.2			20	SS	74							0 2 45 53
26.4	**END OF BOREHOLE:**											

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

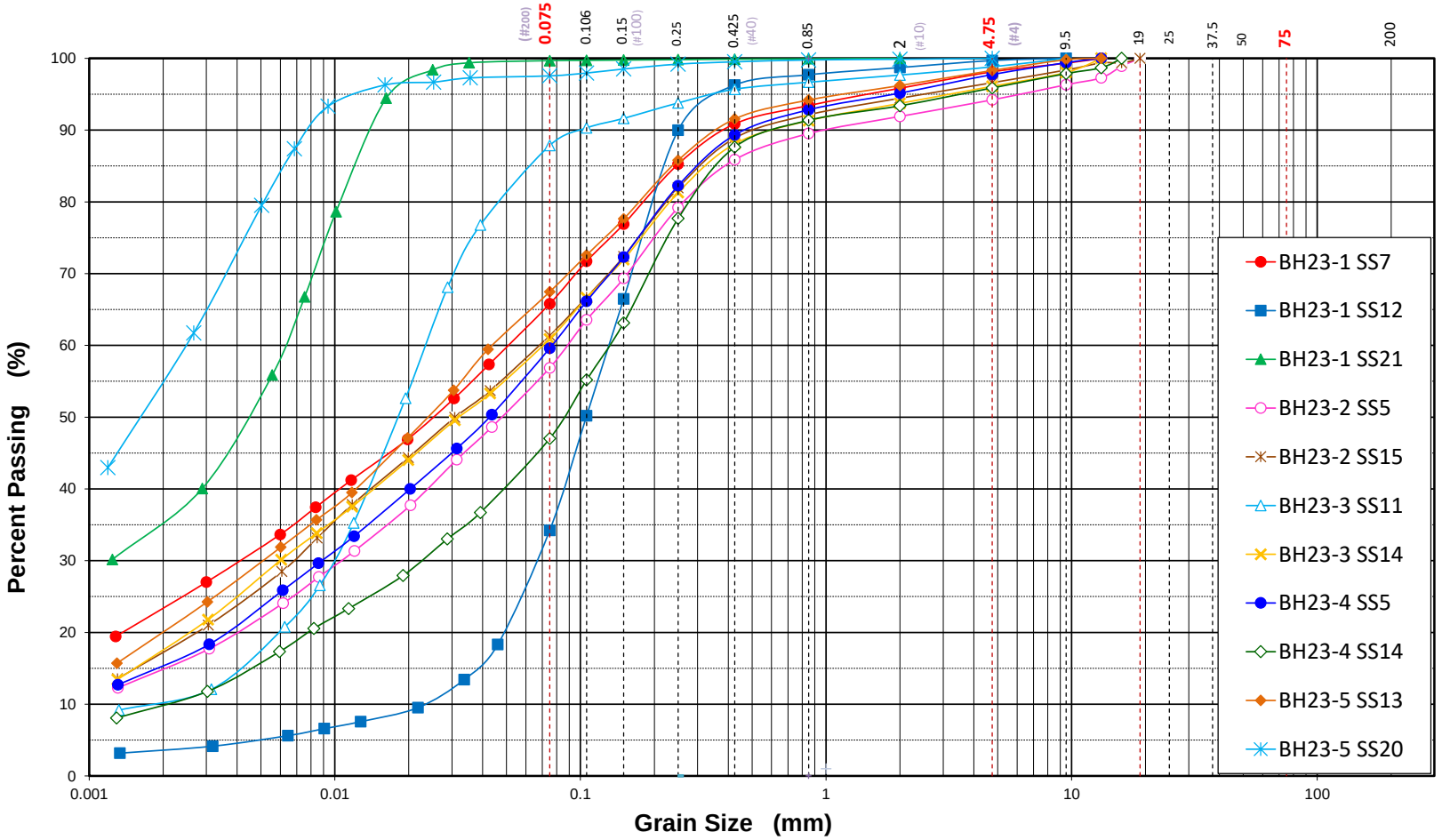
Date:	Water Level(mbgl):
Mar. 3, 2023	15.84

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

DS SOIL LOG-2021-DRAFT 23-011-100 GEO COPY.GPJ DS.GDT 23-3-7

Particle Size Distribution (ASTM-D421/D422)

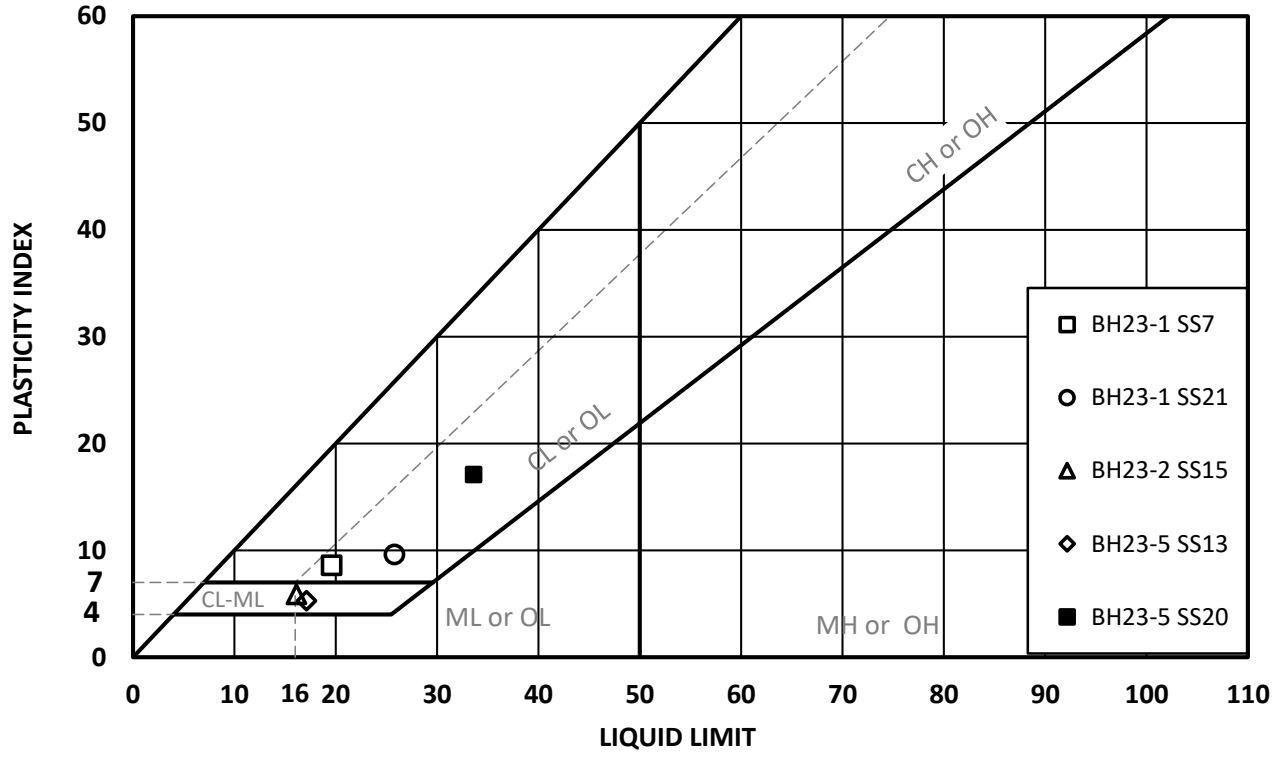


Silt and Clay		Sand			Gravel		Cobble +
Clay	Silt	Fine	Medium	Coarse	Fine	Coarse	

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

Project	**Geotechnical Investigation**	Project No	**23-011-100**
Location	**5 and 15 Tangreen Court, Toronto, ON**	Date	**Feb-23-2023**
Client	**CAPREIT 2 Limited Partnership**	Figure No	**7**

Atterberg Test (ASTM D-4318)



Code	Sample ID	Sample No.		Moisture Contant (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	USCS Symbol
1	□	BH23-1	SS7	11	19.6	11	8.6	CL
2	○	BH23-1	SS21	16	25.8	16.2	9.6	CL
3	△	BH23-2	SS15	11	16.1	10.2	5.9	CL-ML
4	◇	BH23-5	SS13	11	17.1	11.8	5.3	CL-ML
5	■	BH23-5	SS20	24	33.6	16.5	17.1	CL

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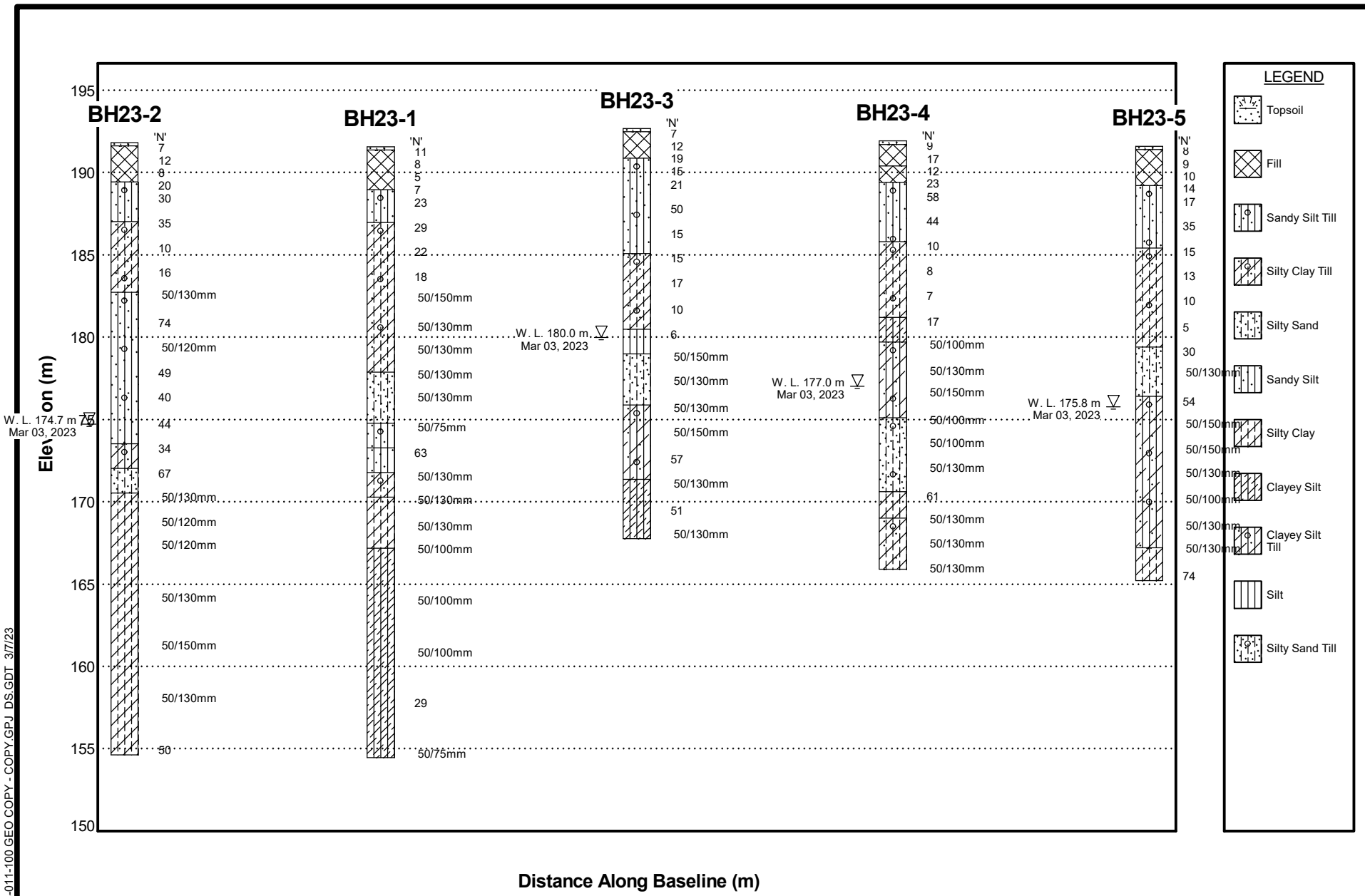
Project	**Geotechnical Investigation**	Project No	**23-011-100**
Location	**5 and 15 Tangreen Court, Toronto, ON**	Date	**Feb-23-2023**
Client	**CAPREIT 2 Limited Partnership**	Figure No	**8**



Distance Along Baseline (m)

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Generalized Sub-surface Profile (NTS)

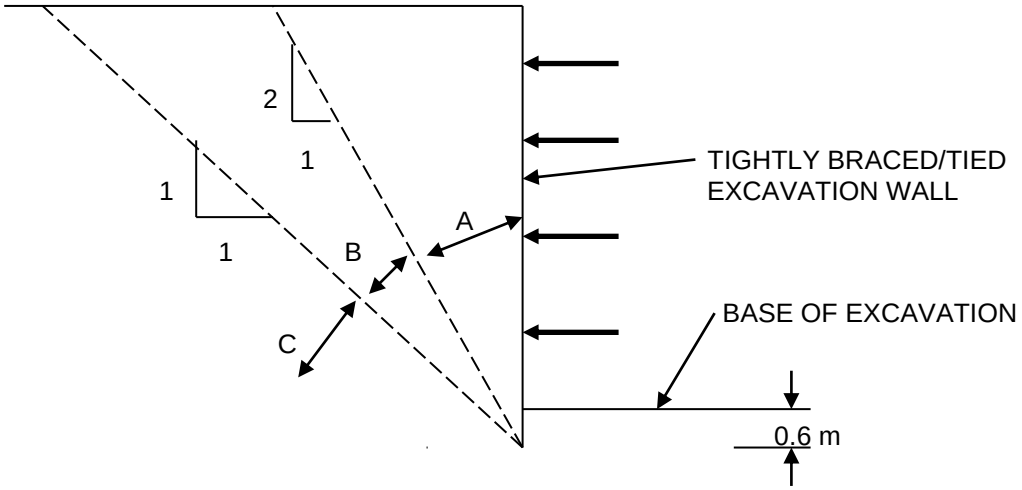
DRAWING NO.	9
JOB NO.	23-011-100
DATE	March 7, 2023

DS FENCE (M) 23-011-100 GEO COPY - COPY.GPJ DS.GDT 3/7/23

Project: 23-011-100 **Drawing 10**

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

Englobe Borehole Logs and Locations

Legend:

BOREHOLE LOCATION

Notes:

Seal

Client

Englobe Corp.
1821, Albion Road, Unit 7
Toronto (Ontario) M9W 5W8
Telephone : 416.213.1060
Fax : 416.213.1070

Project

GEOTECHNICAL INVESTIGATION

5 & 15 TANGREEN COURT, TORONTO

BOREHOLE LOCATION PLAN

Discipline: GEOTECHNICAL		Prepared by: H. Akbari	Verified by: H. Akbari
Scale: No Scale		Drawned by: M. Soufan	Approved by: H. Akbari
Date: 2020/04/06		Figure n°: 02 of 02	
Page setup: 02	Paper format: ANSI full bleed B (17.00 x 11.00 Inches)	Register n°:	

Resp.	Projet	OTP	Projet/ Disc	Phase/ Type	Réf. élec. / No.Dessin	Rév.
124	P-0021056	0-01	GE	R	02	0

LOG OF No. BH1

Englobe

Project No. P-0021056 DRAWING No. 1

Project: 5 &15 Tangreen Court Sheet No. 1 of 2

Location: 5 and 15 Tangreen Crt, North York, ON

N 4,850,478 E 626,634

Date Drilled: 2020-3-4

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		150 mm thick; TOPSOIL	192.9 192.8	0
		Brown, moist, SANDY CLAYEY SILT, trace to some organics, FILL		1
			190.6	2
		Brown, moist, stiff to hard, SANDY SILT, trace gravel, trace to some clay, TILL		3
		become grey		4
			185.3	5
		Grey, moist to wet, very dense, SANDY CLAYEY SILT, trace gravel, oxidation staining; TILL		6
				7
				8
				9
				10

Standard Penetration Test N Value
Shear Strength kPa: 20 40 60 80 | 50 100 150 200
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SPT (N) values: 7, 17, 7, 22, 24, 34, 25, 40, 40, 50/100 mm

SAMPLES

Natural Unit Weight kN/m³

Logged By: AM

Checked By: TY

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	16.3	none
2020-04-27	16.4	

LOG OF No. BH1

Englobe

Project No. P-0021056 DRAWING No. 1

Project: 5 &15 Tangreen Court Sheet No. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		Grey, moist to wet, very dense, SANDY SILT, trace gravel, oxidation staining; TILL *(continued)*		10
				11
			180.7	12
		Grey, moist, hard, SANDY SILTY CLAY, some gravel; TILL		13
				14
				15
				16
				17
				18
		Gr: 20.9%, Sa: 31.2 %, Si: 23.9%, Cl: 23.9%		19
			172.9	20
		End of Borehole		

Notes:

1) Borehole advanced using continuous flight solid stem augering equipment on March 4, 2020 by Groundwrok Drilling.
2) One (1) 50mm dia. monitoring well was installed in the borehole, upon completion of drilling, and was screened from 15.2 m to 18.3m

Terminated at 20.0 m

Standard Penetration Test N Value
20 40 60 80
Shear Strength kPa
50 100 150 200

Natural Moisture Content % Atterberg Limits (% Dry Weight)
10 20 30

80/250 mm
52
48
83/230 mm
80/250 mm
48
50/75 mm

SAMPLES

Natural Unit Weight kN/m³

Checked By: TY

Logged By: AM

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	16.3	none
2020-04-27	16.4	

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH2

Englobe

Project No. P-0021056 DRAWING No. 2

Project: 5 &15 Tangreen Court Sheet No. 1 of 2

Location: 5 and 15 Tangreen Crt, North York, ON

N 4,850,435 E 626,639

Date Drilled: 2020-3-6

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample ⊠
Auger Sample □
SPT (N) Value ●
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test S

Natural Moisture Content ×
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		150 mm thick; TOPSOIL	193.0 192.8	0
		Brown, moist, SANDY SILT, some clay, trace to some organics, FILL		
			191.4	1
		Grey, moist, compact to dense, SANDY SILT, trace gravel, some clay, TILL		2
				3
				4
				5
			186.9	6
		Grey, moist, stiff to hard, SANDY CLAYEY SILT, trace gravel, TILL		7
				8
				9
				10

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SPT values: 12, 12, 18, 28, 27, 38, 15, 25, 18

SAMPLES

Natural Unit Weight kN/m³

Checked By: TY

Logged By: AM

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	11.5	none
2020-04-27	11.5	

LOG OF No. BH2

Englobe

Project No. P-0021056 DRAWING No. 2

Project: 5 &15 Tangreen Court Sheet No. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		Grey, moist, stiff to hard, SANDY CLAYEY SILT, trace gravel, TILL *(continued)*		10
				11
		Gr:3.9%, Sa: 19.3%, Si: 52.0%, Cl: 24.8%		12
				13
			179.2	
		Grey,moist, very dense, SANDY SILT, trace gravel; TILL		14
				15
			177.6	
		End of Borehole		

Notes:

1) Borehole advanced using continuous flight solid stem augering equipment on March 6, 2020 by Groundwrok Drilling.
2) One (1) 50mm dia. monitoring well was installed in the borehole, upon completion of drilling, and was screened from 12.2 m to 15.2m

Terminated at 15.4 m

Standard Penetration Test N Value

Shear Strength kPa: 20 40 60 80 | 50 100 150 200

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30

66/100 mm

96/280 mm

50/100 mm

50/125 mm

SAMPLES

Natural Unit Weight kN/m³

Checked By: TY

Logged By: AM

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	11.5	none
2020-04-27	11.5	

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH3

Englobe

Project No. P-0021056

DRAWING No. 3

Project: 5 &15 Tangreen Court

Sheet No. 1 of 3

Location: 5 and 15 Tangreen Crt, North York, ON

N 4,850,380 E 626,655

Date Drilled: 2020-3-9

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test

Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
			193.5	0
		150 mm thick; TOPSOIL	193.3	
		Brown, moist to wet, SANDY SILT, some clay, trace to some organics, FILL		
			192.0	
		Brown, moist to wet, compact to dense, SANDY SILT, trace gravel, trace to some clay, TILL		
			188.9	
		Grey, moist, very stiff to hard, SANDY CLAYEY SILT, trace gravel, TILL		

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30
SAMPLES
Natural Unit Weight kN/m³

SPT (N) values: 8, 18, 30, 26, 32, 45, 70, 18, 31, 30

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	16.1	none
2020-04-27	16.4	

Checked By: TY

Logged By: AM

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH3

Englobe

Project No. P-0021056 DRAWING No. 3

Project: 5 &15 Tangreen Court Sheet No. 2 of 3

SOIL DESCRIPTION	ELEV. m
Grey, moist, very stiff to hard, SANDY CLAYEY SILT, trace gravel, TILL *(continued)*	182.8
Grey, moist, stiff to very stiff, SILTY CLAY, trace gravel, some sand, TILL Gr: 0.9%, Sa: 16.0%, Si: 21.7%, Cl: 61.4%	179.8
Grey, moist, very dense, SANDY SILT, trace gravel, TILL	173.4
End of Borehole	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

DEPTH: 10 11 12 13 14 15 16 17 18 19 20

15

14

50/75 mm

50/75 mm

50/100 mm

50/125 mm

50/100 mm

SAMPLES

Natural Unit Weight kN/m³

Notes:

1) Borehole advanced using continuous flight solid stem augering equipment to the 4.6m depth
2) Switched to casing with mudrotary washing drilling method from 4.6m depth to the bottom of the hole on March 9, 2020

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	16.1	none
2020-04-27	16.4	

Checked By: TY

Logged By: AM

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH3

Englobe

Project No. P-0021056 DRAWING No. 3

Project: 5 &15 Tangreen Court Sheet No. 3 of 3

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa (20 40 60 80 / 50 100 150 200)	Natural Moisture Content % Atterberg Limits (% Dry Weight) (10 20 30)	SAMPLES	Natural Unit Weight kN/m^3
		by Groundwork Drilling. 3) One (1) 50mm dia. monitoring well was installed in the borehole, upon completion of drilling, and was screened from 17.1 m to 20.1m 4) Borehole ended at 20.1 due to the washboring refusal Terminated at 20.1 m						

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	16.1	none
2020-04-27	16.4	

Logged By: AM

Checked By: TY

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH4

Englobe

Project No. P-0021056 DRAWING No. 4

Project: 5 &15 Tangreen Court Sheet No. 1 of 2

Location: 5 and 15 Tangreen Crt, North York, ON

N 4,850,340 E 626,662

Date Drilled: 2020-3-10

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample ⊠
Auger Sample □
SPT (N) Value ●
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test S

Natural Moisture Content ×
Atterberg Limits |—○—|
Undrained Triaxial at % Strain at Failure 0 / 5 / 10 / 15
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
			193.1	0
		150 mm thick; TOPSOIL	193.0	
		Brown, moist, SANDY SILT, some clay, some to trace organics, FILL	192.4	
		Brown, moist, compact to very dense, SANDY SILT, trace gravel, trace to some clay, TILL		1
				2
				3
				4
			188.6	
		Grey, moist, very stiff, SANDY CLAYEY SILT, trace gravel, TILL		5
				6
			185.5	
		Grey, moist to wet, stiff to very stiff, SILTY CLAY, trace gravel, some sand, TILL		7
				8
				9
				10

Standard Penetration Test N Value
20 40 60 80
Shear Strength kPa
50 100 150 200

Natural Moisture Content % Atterberg Limits (% Dry Weight)
10 20 30

SAMPLES

Natural Unit Weight kN/m³

8
13
26
29
57
46
22
28
20
16

Checked By: TY

Logged By: AM

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)

LOG OF No. BH4

Englobe

Project No. P-0021056 DRAWING No. 4

Project: 5 &15 Tangreen Court Sheet No. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		Grey, moist to wet, stiff to very stiff, SILTY CLAY, trace gravel, some sand, TILL *(continued)*		10
		Gr: 5.3%, Sa: 29.6%, Si: 29.8, Cl:35.3%		11
				12
				13
			179.4	
		Grey, moist, very dense, SANDY SILT, trace gravel, TILL		14
				15
			177.8	
		End of Borehole		

Notes:

1) Borehole advanced using continuous flight solid stem augering equipment completed on March 10, 2020 by Groundwork Drilling.
3) Borehole ended at 15.4m and caved at 14.0m

Terminated at 15.3 m

Standard Penetration Test N Value
20 40 60 80
Shear Strength kPa
50 100 150 200

Natural Moisture Content % Atterberg Limits (% Dry Weight)
10 20 30

SAMPLES

Natural Unit Weight kN/m³

12

19

50/125 mm

50/100 mm

Time	Water Level (m)	Depth to Cave (m)

Logged By: AM

Checked By: TY

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH5

Englobe

Project No. P-0021056 DRAWING No. 5

Project: 5 &15 Tangreen Court Sheet No. 1 of 3

Location: 5 and 15 Tangreen Crt, North York, ON

N 4,850,288 E 626,677

Date Drilled: 2020-3-11

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample ☒
Auger Sample □
SPT (N) Value ●
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test ✤S
Natural Moisture Content ×
Atterberg Limits |—○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		150 mm thick; TOPSOIL	193.1 192.9	0
		Brown, wet, SANDY SILT, some clay, trace to some organics, FILL	192.3	
		Brown, moist, compact to dense, SANDY SILT, trace gravel, trace to some clay, TILL		1
				2
				3
				4
			188.5	5
		Grey, moist, very stiff to hard, SANDY CLAYEY SILT, trace gravel, TILL		6
				7
				8
				9
				10

Standard Penetration Test N Value
Shear Strength kPa: 20 40 60 80 / 50 100 150 200
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SPT (N) values: 10, 17, 27, 29, 38, 46, 53, 31, 33, 27

SAMPLES

Natural Unit Weight kN/m³

Checked By: TY

Logged By: AM

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	4.7	none
2020-04-27	5.1	

LOG OF No. BH5

Englobe

Project No. P-0021056 DRAWING No. 5

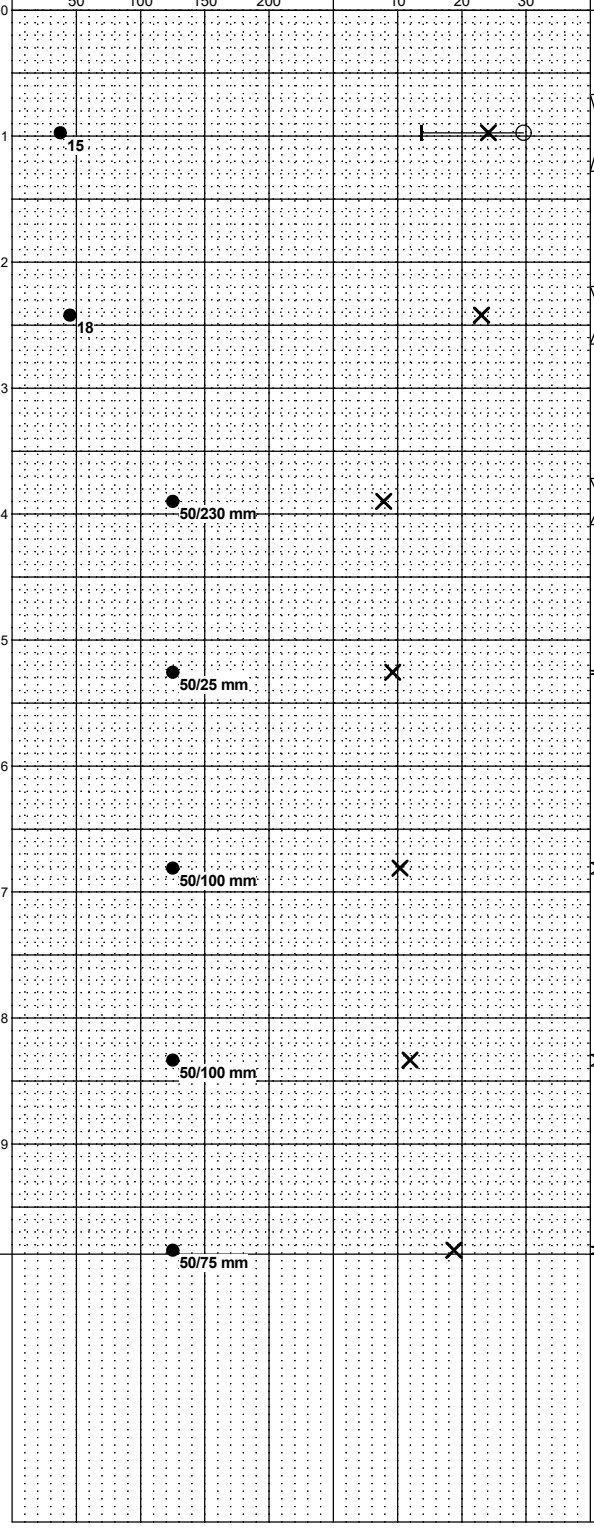
Project: 5 &15 Tangreen Court Sheet No. 2 of 3

SOIL DESCRIPTION	ELEV. m
Grey, moist, very stiff to hard, SANDY CLAYEY SILT, trace gravel, TILL *(continued)*	182.4
Grey, moist to very moist, very stiff, SILTY CLAY, trace gravel, some sand, TILL Gr: 1.5%, Sa: 17.2%, Si: 25.4%, Cl: 55.9%	179.4
Grey, moist, very dense, SANDY SILT, trace gravel, TILL	173.2
End of Borehole	

Notes:

1) Borehole advanced using continuous flight solid stem augering equipment to the 12.2m depth
2) Switched to the casing with mudrotary washing drilling method from 12.2m to the bottom of the hole on March 9, 2020 by Groundwork Drilling.

Standard Penetration Test N Value
Shear Strength kPa
Natural Moisture Content % Atterberg Limits (% Dry Weight)



SAMPLES

Natural Unit Weight kN/m³

Logged By: AM

Checked By: TY

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	4.7	none
2020-04-27	5.1	

LOG OF No. BH5

Englobe

Project No. P-0021056 DRAWING No. 5

Project: 5 &15 Tangreen Court Sheet No. 3 of 3

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa (20 40 60 80 / 50 100 150 200)	Natural Moisture Content % Atterberg Limits (% Dry Weight) (10 20 30)	SAMPLES	Natural Unit Weight kN/m^3
		3) One (1) 50mm dia. monitoring well was installed in the borehole, upon completion of drilling, and was screened from 9.1 m to 12.1m Terminated at 19.9 m						

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	4.7	none
2020-04-27	5.1	

Logged By: AM

Checked By: TY

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH6

Englobe

Project No. P-0021056 DRAWING No. 6

Project: 5 &15 Tangreen Court Sheet No. 1 of 2

Location: 5 and 15 Tangreen Crt, North York, ON

N 4,850,323 E 626,766

Date Drilled: 2020-3-13

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample ⊠
Auger Sample □
SPT (N) Value ●
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test S

Natural Moisture Content ×
Atterberg Limits |—○—|
Undrained Triaxial at % Strain at Failure 0 / 5 / 10 / 15
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Natural Moisture Content % / Atterberg Limits (% Dry Weight) (10 20 30)	SAMPLES	Natural Unit Weight kN/m³
		150 mm thick; TOPSOIL	192.5	0				
		150 mm thick; TOPSOIL	192.4					
		Brown, moist, SANDY SILT, some clay, trace to some organics, FILL			14	×		
				1	14	×		
			191.0					
		Brown, moist, compact to very dense, SANDY SILT, trace gravel, trace to some clay, TILL		2	8	×		
					16	×		
				3	39	×		
				4	51	×		
					44	×		
				5				
				6	39	×		
				7				
			184.9					
		Grey, moist, stiff to very stiff, SILTY CLAY, trace gravel, some sand, TILL		8	20	×		
				9				
					15	×		
				10				

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

Checked By: TY

Logged By: AM

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	8.7	none
2020-04-27	9.1	

LOG OF No. BH6

Englobe

Project No. P-0021056 DRAWING No. 6

Project: 5 &15 Tangreen Court Sheet No. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		Grey, moist, stiff to very stiff, SILTY CLAY, trace gravel, some sand, TILL *(continued)*		10	20 40 60 80 / 50 100 150 200	10 20 30		
		Gr: 3.3%, Sa:15.7%, Si:21.0%, Cl:60.0%		11	12			2.0
				12	19			
		End of Borehole	179.7					

Notes:

1) Borehole advanced using continuous flight solid stem augering equipment on March 13, 2020 by Groundwork Drilling.
2) One (1) 50mm dia. monitoring well was installed in the borehole, upon completion of drilling, and was screened from 9.1 m to 12.2m

Terminated at 12.8 m

Time	Water Level (m)	Depth to Cave (m)
2020-03-26	8.7	none
2020-04-27	9.1	

Logged By: AM *Checked By: TY*

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH7

Englobe

Project No. P-0021056 DRAWING No. 7

Project: 5 &15 Tangreen Court Sheet No. 1 of 2

Location: 5 and 15 Tangreen Crt, North York, ON

N 4,850,356 E 626,752

Date Drilled: 2020-3-16

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample ⊠
Auger Sample □
SPT (N) Value ●
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test S

Natural Moisture Content ×
Atterberg Limits |—○—|
Undrained Triaxial at % Strain at Failure 0 / 15 ⊕ 5 / 10
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		150 mm thick; TOPSOIL	192.8 192.6	0
		Brown, moist to wet, SANDY SILT, some clay, trace to some organics, FILL		1
			190.5	2
		Brown, moist, compact to very dense, SANDY SILT, trace gravel, TILL		3
				4
				5
			186.7	6
		Grey, moist, soft to very stiff, SANDY CLAYEY SILT, trace gravel, TILL		7
				8
				9
				10

Standard Penetration Test N Value
Shear Strength kPa: 20 40 60 80 / 50 100 150 200
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SAMPLES

Natural Unit Weight kN/m³

10 8 11 11 43 61 58 19 7 7

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)

Checked By: TY

Logged By: AM

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH7

Englobe

Project No. P-0021056 DRAWING No. 7

Project: 5 &15 Tangreen Court Sheet No. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		Grey, moist, soft to very stiff, SANDY CLAYEY SILT, trace gravel, TILL *(continued)*		10	20 40 60 80 / 50 100 150 200	10 20 30		
				11	8	×		
			180.6	12				
		Grey, moist to wet, hard, SANDY CLAYEY SILT, trace gravel, TILL Gr: 5.7%, Sa:39.4%, Si: 36.6%, Cl:18.3%		12	42	×		2.3
				13				
		Auger grinding		13	50/75 mm	×		
				14				
				15	50/25 mm			
				16				
				17	50/50 mm	×		
				18				
				18	50/50 mm	×		
				19				
			172.9	19	50/50 mm	×		
		End of Borehole Notes: 1) Borehole advanced using continuous flight solid stem augering equipment to the 4.6 m depth and 2) Switched to the casing with mudrotary washing drilling method from 4.6m to the bottom of the hole on March 16, 2020 by Groundwork Drilling.						

Terminated at 19.9 m

Time	Water Level (m)	Depth to Cave (m)

Checked By: TY

Logged By: AM

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH8

Englobe

Project No. P-0021056 DRAWING No. 8

Project: 5 &15 Tangreen Court Sheet No. 1 of 3

Location: 5 and 15 Tangreen Crt, North York, ON

N 4,850,400 E 626,740

Date Drilled: 2020-3-17

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample ⊠
Auger Sample □
SPT (N) Value ●
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test S

Natural Moisture Content ×
Atterberg Limits |—○—|
Undrained Triaxial at % Strain at Failure 0 / 15 ⊕ 5 / 10
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
			192.9	0
		150 mm thick; TOPSOIL	192.8	
		Brown, moist, SANDY SILT, some clay, trace to some organics, FILL	192.2	
		Brown, moist, compact to very dense, SANDY SILT, trace gravel, TILL		1
				2
				3
			188.4	4
		Grey, moist, stiff to hard, SANDY CLAYEY SILT, trace gravel, TILL		5
				6
				7
			183.8	8
		Grey, moist, hard, SANDY SILTY CLAY trace gravel, TILL		9
				10

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

SPT (N) values: 10, 11, 22, 14, 52, 33, 40, 11, 22, 40

SAMPLES

Natural Unit Weight kN/m³

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)
2020-04-27	Dry	none

Checked By: TY

Logged By: AM

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH8

Englobe

Project No. P-0021056 DRAWING No. 8

Project: 5 &15 Tangreen Court Sheet No. 2 of 3

SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
Grey, moist, hard, SANDY SILTY CLAY trace gravel, TILL *(continued)*		10	50/75 mm			
		11				
Gr: 5.2%, Sa:33.9%, Si:33.0%, Cl:27.9%		12	50/120 mm			2.1
		13				
Auger grinding		14	50/100 mm			
		15				
Encountred gravel and rock fragments		16	50/75 mm			
		17	50/50 mm			
		18	50/75 mm			
		19				
	173.0		50/125 mm			
End of Borehole						

Notes:
1) Borehole advanced using continuous flight solid stem augering equipment to the 6.0m depth and
2) Switched to the casing with mudrotary washing drilling method from 6.0m to the bottom of the hole on March 9, 2020 by Groundwork Drilling.
3) One (1) 50mm dia. monitoring well was

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)
2020-04-27	Dry	none

Checked By: TY

Logged By: AM

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH8

Englobe

Project No. P-0021056 DRAWING No. 8

Project: 5 &15 Tangreen Court Sheet No. 3 of 3

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		installed in the borehole, upon completion of drilling, and was screened from 16.8m to 19.8m - Terminated at 19.9 m			20 40 60 80 50 100 150 200	10 20 30		

Time	Water Level (m)	Depth to Cave (m)
2020-04-27	Dry	none

Logged By: AM *Checked By: TY*

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH9

Englobe

Project No. P-0021056 DRAWING No. 9

Project: 5 &15 Tangreen Court Sheet No. 1 of 2

Location: 5 and 15 Tangreen Crt, North York, ON

N 4,850,462 E 626,725

Date Drilled: 2020-3-17

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample ⊠
Auger Sample □
SPT (N) Value ●
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test S

Natural Moisture Content ×
Atterberg Limits |—○—|
Undrained Triaxial at % Strain at Failure 0 / 5 / 10 / 15
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value / Shear Strength kPa	Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Weight kN/m³
		150 mm thick; TOPSOIL	192.7	0	11			
			192.6					
		Brown, moist, SANDY SILT, some clay, some to trace organics, FILL		1	7			
			191.2					
		Brown, moist, loose to very dense, CLAYEY SILTY SAND, some gravel, TILL		2	6			
					11			
				3	12			
				4	7			
				5	7			
				6	27			
				7				
				8	28			
				9				
		Become very dense Gr: 10.4%, Sa: 40.5%, Si: 30.7%, Cl: 18.4%			90/250 mm			1.9
				10				

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)

Checked By: TY

Logged By: AM

LOG OF No. BH9

Englobe

Project No. P-0021056 DRAWING No. 9

Project: 5 &15 Tangreen Court Sheet No. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		Brown, moist, loose to very dense, CLAYEY SILTY SAND, some gravel, TILL *(continued)*		10
			182.1	
		Grey, moist, very dense, CLAYEY SILTY SAND, trace gravel, TILL		11
				12
				13
				14
			178.4	
		End of Borehole		

Notes:

1) Borehole advanced using continuous flight solid stem augering equipment on March 17, 2020 by Groundwork Drilling.
2) Borehole ended at 14.3 due to the Augering Refusal
3) Open and wet upon completion
Terminated at 14.3 m

Standard Penetration Test N Value
20 40 60 80
Shear Strength kPa
50 100 150 200

50/75 mm
50/100 mm
50/150 mm

Natural Moisture Content % Atterberg Limits (% Dry Weight)
10 20 30

SAMPLES

Natural Unit Weight kN/m³

Time	Water Level (m)	Depth to Cave (m)

Checked By: TY

Logged By: AM

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

LOG OF No. BH10

Englobe

Project No. P-0021056 DRAWING No. 10

Project: 5 &15 Tangreen Court Sheet No. 1 of 3

Location: 5 and 15 Tangreen Crt, North York, ON

N 4,850,503 E 626,708

Date Drilled: 2020-3-20

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample ⊠
Auger Sample □
SPT (N) Value ●
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test S

Natural Moisture Content ×
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		150 mm thick; TOPSOIL	193.1 192.9	0
		Brown, moist, SANDY SILT, some clay, some to trace organics, FILL		1
			190.8	2
		Brown, moist, compact to dense, SANDY SILT, trace gravel, TILL		3
			187.0	4
		Grey, moist, very stiff to hard, SANDY CLAYEY SILT, trace gravel, TILL		5
				6
				7
				8
				9
				10

Standard Penetration Test N Value
20 40 60 80
Shear Strength kPa
50 100 150 200

Natural Moisture Content % Atterberg Limits (% Dry Weight)
10 20 30

SAMPLES

Natural Unit Weight kN/m³

3 7 8 17 34 38 30 21 65 57

Continued Next Page

Checked By: TY

Logged By: AM

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

Time	Water Level (m)	Depth to Cave (m)
2020-04-27	17.5	none

LOG OF No. BH10

Englobe

Project No. P-0021056 DRAWING No. 10

Project: 5 &15 Tangreen Court Sheet No. 2 of 3

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH
		Grey, moist, very stiff to hard, SANDY CLAYEY SILT, trace gravel, TILL *(continued)*		10
				11
				12
			180.9	
		Grey, wet, very dense, SILTY SAND, trace to some gravel, TILL		13
		Gravel and rock fragments		14
		Auger grinding		15
				16
			176.3	
		Brown, moist to wet, hard, SILTY CLAY, trace sand, TILL		17
				18
				19
				20
				21
		Gr: 0.2%, Sa: 5.5%, Si: 20.3%, Cl: 74.0%		22

Standard Penetration Test N Value

Shear Strength kPa (20, 40, 60, 80 / 50, 100, 150, 200)

Natural Moisture Content % Atterberg Limits (% Dry Weight) (10, 20, 30)

SAMPLES

Natural Unit Weight kN/m³

50/125 mm

50/75 mm

50/75 mm

50/75 mm

50/125 mm

50/50 mm

50/100 mm

50/100 mm

1.8

Checked By: TY

Logged By: AM

LOG A GWWL02_ENGLOBE P-0021056-TANGREEN-BH-LOGS-2020-04-09.GPJ LOG A GWGL02.GDT 20-5-7

Continued Next Page

Time	Water Level (m)	Depth to Cave (m)
2020-04-27	17.5	none

LOG OF No. BH10

Englobe

Project No. P-0021056 DRAWING No. 10

Project: 5 &15 Tangreen Court Sheet No. 3 of 3

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Natural Moisture Content % / Atterberg Limits (% Dry Weight) (10 20 30)	SAMPLES	Natural Unit Weight kN/m³
		Brown, moist to wet, hard, SILTY CLAY, trace sand, TILL *(continued)*		22				
				23	50/100 mm	×		
				24	50/100 mm	×		
				25				
			167.1		50/100 mm	×		
		End of Borehole						

Notes:

1) Borehole advanced using continuous flight solid stem augering equipment to the 6.0 m depth
2)Switched to the casing with mudrotary washing drilling method from 6.0m to the 21.3 m depth
3) from 21.3m to to the bottom with Tricone Drilling bit ;
4) BH10 completed on March 20, 2020 by Groundwork Drilling
5) One (1) 50mm dia. monitoring well was installed in the borehole, upon completion of drilling, and was screened from 22.5 m to 25.6 m

Terminated at 26.0 m

Checked By: TY

Logged By: AM

Time	Water Level (m)	Depth to Cave (m)
2020-04-27	17.5	none