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**A REPORT TO**
**MAYFIELD MCLAUGHLIN DEVELOPMENTS INC.**

# A GEOTECHNICAL INVESTIGATION FOR PROPOSED RESIDENTIAL DEVELOPMENT

**MAYFIELD WEST PHASE 2**
**PART OF LOT 18, CONCESSION 2**
**NORTH SIDE OF MAYFIELD ROAD, BETWEEN MCLAUGHLIN ROAD AND CHINGUACOUSY ROAD**

**TOWN OF CALEDON**

**REFERENCE NO. 1708-S057**

**APRIL 2018**

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## 1.0 INTRODUCTION

In accordance with written authorization dated August 9, 2017, from Mr. Jonathan Hunt of Cedar City Developments on behalf of Mayfield McLaughlin Developments Inc., a geotechnical investigation was carried out at a parcel of land located on the north side of Mayfield Road, between McLaughlin Road and Chinguacousy Road, in the City of Brampton, for a proposed Residential Development.

The purpose of the investigation was to reveal the subsurface conditions and determine the engineering properties of the disclosed soils for the design and construction of the proposed project.

The geotechnical findings and resulting recommendations are presented in this Report.

It should be noted that a Report on Geotechnical Investigation was previously completed by WSP Canada Inc. (WSP) for Mayfield Station Landowners Group Inc. for the proposed sanitary trunk sewer within the Mayfield West Phase 2 property (WSP Project No. 161-01403-00, dated July 11 2017). A 'Consent to Rely on Report' letter was provided by WSP, dated July 25, 2017, allowing Soil Engineers Ltd. third party reliance on the WSP report. Some of the relevant boreholes from the WSP report have been incorporated in preparation of this report.

## 2.0 SITE AND PROJECT DESCRIPTION

The Town of Caledon is situated on Peel-Markham till plain where the drift dominates the soil stratigraphy. In places, lacustrine sand, silt, clay and drift which has been reworked by the water action of Peel Ponding (glacial lake) have modified the drift stratigraphy.

The investigated property is bounded by Mayfield Road to the south, McLaughlin Road to the east and Chinguacousy Road to the west, with additional farm fields located north of the property. At the time of the investigation, the site consisted of farm lands, of which the crops were harvested prior to the field work. The southeast portion of the property is open and partially weed-covered; storage containers were found within this portion of the property. The ground surface at the site is generally relatively flat, but on a gentle incline with the higher ground located at the north end.

It is understood that the proposed project will consist of a residential development which will include two school blocks, two parks, a commercial block and two stormwater management ponds. The development will be provided with municipal services and roadways meeting current standards.

Further investigation will be required for the commercial and school blocks once their designs are available.

## 3.0 **FIELD WORK**

The field work, consisting of 56 boreholes to depths of 6.2 to 12.2 m, was performed during the period from November 23 to December 8, 2017, at the locations shown on the Borehole and Test Pit Location Plan, Drawing No. 1. Initially, 58 boreholes were to be conducted at the site; however, upon review of the existing Borehole Logs and Borehole Location Plan prepared for WSP's investigation, and upon observation of the existing WSP wells at the site, Boreholes 3 and 18 were cancelled as WSP boreholes and wells at BH 16-5, BH 16-6 and BH 16-8 are able to be utilized for the current investigation at these locations. Furthermore, 50 test pits were conducted on December 5 and 6, 2017, to verify the thickness of the topsoil.

The holes were advanced at intervals to the sampling depths by a track-mounted, continuous-flight power-auger machine equipped for soil sampling. Standard Penetration Tests, using the procedures described on the enclosed "List of Abbreviations and Terms", were performed at the sampling depths. The test results are recorded as the Standard Penetration Resistance (or 'N' values) of the subsoil. The relative density of the granular strata and the consistency of the cohesive strata are inferred from the 'N' values. Split-spoon samples were recovered for soil classification and laboratory testing.

A 50-mm diameter groundwater monitoring well was installed at each of the 15 selected borehole locations, with a shallower nested well installed at 1 of the 15 locations. The wells were installed in order to facilitate a hydrogeological assessment at the site. The well details are provided in the respective Borehole Logs.

The field work was supervised and the findings were recorded by a Geotechnical Technician.

The elevation at each of the borehole locations was interpreted from the spot elevations and contours shown on the provided topographic plan.

## 4.0 SUBSURFACE CONDITIONS

Detailed descriptions of the encountered subsurface conditions at the boreholes are presented on the Borehole Logs, comprising Figures 1 to 58, inclusive. The revealed stratigraphy is plotted on the Subsurface Profile, Drawing Nos. 2 to 7, inclusive, and the engineering properties of the disclosed soils are discussed herein. In addition, some of the boreholes from the WSP investigation were conducted within the boundaries of the current investigation, of which the borehole information of select boreholes has been incorporated into this report; the Borehole Logs of the select boreholes and Borehole Location Plan are included in the Appendix.

The current investigation has disclosed that beneath a veneer of topsoil at all except one location, the site is primarily underlain by a stratum of silty clay till, with strata of silty clay, silty sand till, sandy silt till, silty fine sand, sandy silt, silt and/or gravelly sand encountered at various locations and depths. The soils bed onto shale bedrock at moderate depths in the south and east portions of the site.

### 4.1 **Topsoil** (All Boreholes, except Borehole 49)

The revealed topsoil layer at the site is approximately 8 to 30 cm thick. In addition, 50 test pits were conducted at the site on December 5 and 6, 2017, to determine the topsoil thickness at various locations. The locations of the test pits are shown on Drawing No. 1, and the topsoil thickness at each test pit location has been summarized in Table 1.

**Table 1** - Topsoil Thickness

| Test Pit No. | Topsoil Thickness (cm) | Test Pit No. | Topsoil Thickness (cm) |
|---|---|---|---|
| 1 | 28 | 26 | 30 |
| 2 | 25 | 27 | 33 |
| 3 | 30 | 28 | 20 |
| 4 | 33 | 29 | 28 |
| 5 | 23 | 30 | 20 |
| 6 | 30 | 31 | 20 |
| 7 | 23 | 32 | 28 |
| 8 | 38 | 33 | 20 |
| 9 | 30 | 34 | 28 |
| 10 | 30 | 35 | 20 |
| 11 | 33 | 36 | 28 |
| 12 | 28 | 37 | 25 |
| 13 | 30 | 38 | 15 |
| 14 | 28 | 39 | 25 |
| 15 | 28 | 40 | 28 |
| 16 | 25 | 41 | 20 |
| 17 | 23 | 42 | 20 |
| 18 | 33 | 43 | 20 |
| 19 | 23 | 44 | 18 |
| 20 | 25 | 45 | 23 |
| 21 | 25 | 46 | 18 |
| 22 | 28 | 47 | 20 |
| 23 | 28 | 48 | 15 |
| 24 | 38 | 49 | 18 |
| 25 | 25 | 50 | 20 |

The topsoil is dark brown in colour, indicating that it contains appreciable amounts of roots and humus. These materials are compressible under loads; therefore, the topsoil is considered to be void of engineering value. Due to its humus content, the topsoil will generate an offensive odour and may produce volatile gases under anaerobic conditions. Therefore, the topsoil must not be buried below any structures or deeper than 1.2 m below the exterior finished grade so it will not have an adverse impact on the environmental well-being of the developed area.

Topsoil thicker than that found in the boreholes and at the test pit locations may occur in places. In order to prevent overstripping, diligent control of the stripping operation will be required.

Since the topsoil is void of engineering value, it can only be used for general landscape contouring purposes. Its suitability for planting and sodding purposes can be further assessed by fertility testing.

4.2 **Silty Clay Till** (All Boreholes, except Borehole 27) and **Silty Clay** (Boreholes 2, 13, 24, 27 and 33)

The silty clay till was the dominant soil encountered at the site, and was generally found from just beneath the surficial topsoil and at various depths through the site. The silty clay till consists of a random mixture of soils; the particle sizes range from clay to gravel, with the clay fraction exerting the dominant influence on its soil properties. The till is embedded with occasional wet sand and silt seams and layers, cobbles and boulders. The structure of the till is heterogeneous, indicating that it is a glacial deposit. The silty clay was generally found in the mid to lower zone of the revealed soil stratigraphy, generally beneath the silty clay till, but was also encountered beneath the topsoil at one location. The silty clay contains a trace to

some sand, with occasional gravel in places. The laminated structure shows that the silty clay is a lacustrine deposit.

The clay till and clay within the top 0.5± to 1.5± m below the prevailing ground surface, in places, has been permeated with fissures showing they have been fractured by the weathering process.

The obtained 'N' values for the silty clay till range from 4 blows per 30 cm of penetration to 50 per 5 cm, with a median of 21 per 30 cm, showing the consistency of the till is soft to hard, being generally very stiff. The obtained 'N' values for the silty clay range from 7 to 20, with a median of 14 per 30 cm, showing the consistency of the clay is firm to very stiff, being generally stiff. The soft to firm soils are generally encountered in the weathered zone.

The Atterberg Limits of 1 representative silty clay till sample and the water content of all of the silty clay till and silty clay samples were determined. The results are plotted on the Borehole Logs and summarized below:

| | **Silty Clay Till** | **Silty Clay** |
|---|---|---|
| Liquid Limit | 35% | - |
| Plastic Limit | 19% | - |
| Natural Water Content | 7% to 28%<br>(median 14%) | 17% to 27%<br>(median 20%) |

Sample examinations and the above results show that the clay till and clay are cohesive materials with low to medium plasticity. The natural water content of the silty clay till ranges from below its plastic limits to between its plastic and liquid limits, being generally below it plastic limit, confirming the generally very stiff consistency of the clay till as disclosed by the 'N' values.

In addition, thin layers of silty fine sand, sandy silt, silt or silty sand till were encountered within the clay samples in places. The natural water content of these sand and silt samples ranged from 9% to 17%, indicating they are in a moist to wet condition.

A grain size analysis was performed on 1 representative sample of the silty clay till; the result is plotted on Figure 59.

Based on the above findings, the deduced engineering properties pertaining to the project are given below:

- High frost susceptibility and low water erodibility.
- The silty clay till has low soil-adfreezing potential, while the silty clay has high soil-adfreezing potential.
- Low permeability, with an estimated coefficient of permeability of $10^{-7}$ cm/sec, and runoff coefficients of:

| **Slope** | |
|---|---|
| 0% - 2% | 0.15 |
| 2% - 6% | 0.20 |
| 6% + | 0.28 |

- Cohesive soils, their shear strength is derived from consistency and augmented by internal friction of the silt. Their shear strength is moisture dependent and, to a lesser degree, directly dependent on the soil density.
- They will generally be stable in a relatively steep cut. However, prolonged exposure will allow infiltrating precipitation to saturate the weathered zone and the sand and silt seams and layers; this may lead to localized sloughing.
- Very poor pavement-supportive materials, with an estimated California Bearing Ratio (CBR) value of 3% or less.

- Moderately high corrosivity to buried metal, with an estimated electrical resistivity of 2500 to 3000 ohm·cm.

4.3 **Silty Sand Till** (Boreholes 1, 2, 4, 10, 12, 17, 24, 25, 27, 30, 31, 33, 34D, 42, 43, 46, 47, 49, 52 and 57) and **Sandy Silt Till** (Boreholes 4, 5, 8, 16, 26, 27, 30, 32, 33, 36, 37, 39, 40, 50, 53 and 54)

The silty sand till and/or sandy silt till were encountered at varying depths throughout the site. The tills consist of a random mixture of soils; the particle sizes range from clay to gravel, with either the sand or silt fraction exerting the dominant influence on their soil properties. The tills are heterogeneous and amorphous, in places, with occasional wet sand and silt seams and layers, cobbles and boulders, showing they are glacial deposits.

The tills within the top 0.8± to 1.5± m below the prevailing ground surface, in places, have been permeated with fissures showing they have been fractured by the weathering process.

The obtained 'N' values for the silty sand till range from 7 per 30 cm to 50 per 5 cm, with a median of 25 per 30 cm, indicating that its relative density is loose to very dense, being generally compact. The obtained 'N' values for sandy silt till range from 7 per 30 cm to 50 per 8 cm, with a median of 54 per 30 cm, indicating that its relative density is very loose to very dense, being generally very dense. The loose tills were encountered in the weathered zone.

The natural water content of the samples was determined and the results are plotted on the Borehole Logs; the values for the silty sand till range from 6% to 18%, with a median of 11%, and the values for the sandy silt till range from 6% to 21%, with a

median of 8%. This indicates that the tills are in a damp to very moist, generally moist condition.

Grain size analyses were performed on 2 representative samples of the silty sand till and 5 representative samples of the sandy silt till; the results are plotted on Figures 60 and 61.

Based on the above findings, the deduced engineering properties pertaining to the project are given below:

- High frost susceptibility and moderately low water erodibility.
- Relatively low to low permeability, with an estimated coefficient of permeability of $10^{-5}$ to $10^{-6}$ cm/sec, and runoff coefficients of:

| **Slope** | |
|---|---|
| 0% - 2% | 0.11 to 0.15 |
| 2% - 6% | 0.12 to 0.20 |
| 6% + | 0.23 to 0.28 |

- Frictional soils, their shear strength is primarily derived from internal friction and is augmented by cementation. Therefore, their strength is primarily soil density dependent.
- In steep cuts, they will be stable; however, under prolonged exposure, localized sheet collapse will occur, particularly in the weathered zone and where the wet sand and silt layers are prevalent.
- Fair pavement-supportive materials, with an estimated CBR value of 8% to 10%.
- Moderate to moderately low corrosivity to buried metal, with an estimated electrical resistivity of 4500 to 5000 ohm·cm.

4.4 **Silty Fine Sand** (Boreholes 33 and 43) and **Sandy Silt** (Boreholes 16, 33 and 44)

The silty fine sand and sandy silt were generally found in the upper to mid zone of the revealed soil stratigraphy. The deposits contain traces of clay and gravel, in places. The sorted structure indicates that the silty fine sand and sandy silt are glaciolacustrine deposits. The silty fine sand at Borehole 33 has been loosened by the weathering process.

The obtained 'N' values for the silty fine sand are 6 and 32 per 30 cm, indicating that its relative density is loose to dense. The obtained 'N' values for sandy silt range from 24 to 27, with a median of 26 per 30 cm, indicating that its relative density is compact. The loose soil is restricted to the surficial weathered zone.

The natural water content of the samples was determined and the results are plotted on the Borehole Logs; the values for the silty fine sand are 14% and 16%, and the values for the sandy silt range from 11% to 19%, with a median of 17%. This indicates that the silty fine sand and sandy silt are in a very moist to wet condition.

Grain size analyses were performed on 1 representative sample of the silty fine sand and 2 representative samples of the sandy silt; the results are plotted on Figure 62.

Based on the above findings, the deduced engineering properties pertaining to the project are given below:

- High frost susceptibility and high soil-adfreezing potential.
- High water erodibility; they are susceptible to migration through small openings under low to moderate seepage pressure.
- Soils of high capillarity and water retention capacity.

- Pervious to relatively pervious, with an estimated coefficient of permeability of $10^{-3}$ to $10^{-4}$ cm/sec, and runoff coefficients of:

| **Slope** | |
|---|---|
| 0% - 2% | 0.04 to 0.07 |
| 2% - 6% | 0.09 to 0.12 |
| 6% + | 0.13 to 0.18 |

- Frictional soils, their shear strength is primarily derived from internal friction and is soil density dependent. Due to their dilatancy, the strength of the wet sand and silt is susceptible to impact disturbance; i.e., the disturbance will induce a build-up of pore pressure within the soil mantle, resulting in soil dilation and a reduction of shear strength.
- In excavation, the wet sand and silt will slough in steep cuts, run slowly with water seepage, and boil under a piezometric head of 0.4 m.
- Poor pavement-supportive materials, with an estimated CBR value of 5%.
- Moderately low corrosivity to buried metal, with an estimated electrical resistivity of 5000 to 6000 ohm·cm.

4.5 **Silt** (Boreholes 4, 14, 19, 27, 28, 36, 38, 41, 44 and 45)

The silt was generally encountered in the mid to lower zone of the revealed soil stratigraphy, but found below the surficial topsoil at Borehole 27; the silt at Borehole 27 has been loosened by the weathering process. The silt contains traces to some clay and sand. The sorted structure indicates that it is a glaciolacustrine deposit.

The obtained ‘N’ values range from 7 per 30 cm to 50 per 5 cm, with a median of 22 per 30 cm, indicating that the relative density of the silt is loose to very dense, being generally compact.

The natural water content of the samples was determined and the results are plotted on the Borehole Logs; the values range from 12% to 23%, with a median of 17%, indicating that the silt is in a very moist to wet, generally wet condition. The wet silt samples displayed dilatancy when shaken by hand.

A grain size analysis was performed on 1 representative sample of the silt; the result is plotted on Figure 63.

Based on the above findings, the deduced engineering properties pertaining to the project are given below:

- High frost susceptibility and high soil-adfreezing potential.
- High water erodibility; it is susceptible to migration through small openings under seepage pressure.
- A soil of high capillarity and water retention capacity.
- Relatively low permeability, with an estimated coefficient of permeability of $10^{-5}$ cm/sec, and runoff coefficients of:

| **Slope** | |
|---|---|
| 0% - 2% | 0.11 |
| 2% - 6% | 0.16 |
| 6% + | 0.23 |

- A frictional soil, its shear strength is derived from internal friction; therefore, its shear strength is density dependent. Due to its dilatancy, the strength of the wet silt is susceptible to impact disturbance; i.e., the disturbance will induce a build-up of pore pressure within the soil mantle, resulting in soil dilation and a reduction of shear strength.
- In excavation, the silt will slough and run slowly with seepage bleeding from the cut face. It will boil under a piezometric head of 0.4 m.

- A poor pavement-supportive material, with an estimated CBR value of 5%.
- Moderate corrosivity to buried metal, with an estimated electrical resistivity of 4500 ohm·cm.

4.6 **Gravelly Sand** (Borehole 26)

A thin layer of gravelly sand was encountered between the silty clay till and sandy silt till at Borehole 26 within the lower zone of the revealed soil stratigraphy. The gravelly sand particles are subangular in shape. The sorted structure shows that the sand is a glaciolacustrine deposit.

The natural water content of the sample was determined and the result is plotted on the Borehole Log; the value is 9%, indicating that the gravelly sand is in a very moist condition.

Based on the above findings, the deduced engineering properties pertaining to the project are given below:

- Low frost susceptibility and high water erodibility.
- Susceptible to migration through small openings under seepage pressure.
- Pervious, with an estimated coefficient of permeability of $10^{-2}$ cm/sec, and runoff coefficients of:

| **Slope** | |
|---|---|
| 0% - 2% | 0.04 |
| 2% - 6% | 0.09 |
| 6% + | 0.13 |

- A frictional soil, its shear strength is derived from internal friction and is soil density dependent.

- In steep cuts, the sand will slough; it will run with seepage and boil under a piezometric head of 0.4 m.
- A good pavement-supportive material, with an estimated CBR value of 30%.
- Low corrosivity to buried metal, with an estimated electrical resistivity of 7000 ohm·cm.

4.7 **Shale Bedrock** (Boreholes 25, 26, 31, 32, 38, 46, 47, 48, 49, 56, 57, 58)

Shale bedrock was encountered in the boreholes in the south and east portions of the site at depths ranging from 3.4± to 9.1± m below the prevailing ground surface; the shallower bedrock was generally encountered with the southeast portion of the site.

The shale is red in colour, indicating that it is of Queenston Formation. It is thinly to thickly bedded and consists predominantly of mudstone with occasional hard limestone and dolomite bands. The shale is susceptible to disintegration and swelling upon exposure to air and water, with subsequent reversion to a clay soil, but the laminated limy and sandy layers would remain as rock slabs.

The bedrock within the investigated depth can be penetrated by power-augering with some difficulty in grinding through the hard layers found at lower depths. The water content values of the samples obtained from the sampler range from 3% to 31%, with a median of 9%. The high water content of 31% occurred in a slurry sample of the shale bedrock. The obtained 'N' values from the shale bedrock range from 60 per 30 cm to 50 per 3 cm, with a median of 50 per 8 cm. The upper layer of the shale within depths ranging from 1.0± to 3.0± m from the surface of the bedrock is generally in a weathered condition, becoming sound with depth.

The shale has low permeability, and occasional pockets of groundwater may be trapped in its fissures. This water is often under moderate subterranean artesian pressure. Upon release through excavation, the water is likely to drain readily with a limited yield.

The weathered rock can be excavated with considerable effort by a heavy-duty backhoe equipped with a rock-ripper; however, excavation will become progressively more difficult with depth into the sound shale. Efficient removal of the sound shale may require the aid of pneumatic hammering and/or rock blasting.

The excavated spoil may contain large amounts of hard limy and sandy rock slabs, rendering it virtually impossible to obtain uniform compaction. Therefore, unless the spoil is sorted, it is considered unsuitable for engineering applications. Limy shale fragments larger than 15 cm should be pulverized by mechanical means.

In sound shale excavation, slight lateral displacement of the excavation walls is often experienced. This is due to the release of residual stress stored in the bedrock mantle and the swelling characteristics of the rock.

4.8 **Soils from WSP's Report on Geotechnical Investigation** (Boreholes 16-1, 16-2, 16-3, 16-4, 16-5, 16-6, 16-8, 16-24, 16-25, 16-26 and 16-36)

The subsurface soils from the noted boreholes were utilized in this report preparation as they were conducted within the areas of the current investigation, as well as boreholes that were utilized to replace proposed Boreholes 3 and 18 of the current investigation.

The subsurface soil information from WSP's borehole investigation shows that beneath a layer of fill, consisting of silty clay extending to a depth of 1.1± to 1.8± m below the prevailing ground surface, the site is underlain primarily by stiff to hard silty clay till, with layers of firm to very stiff silty clay, very stiff to hard clayey silt till, compact to very dense silty sand till, dense to very dense sandy silt till, very stiff to hard clayey silt and compact to very dense silt. In addition, the till at Boreholes 16-5 and 16-36 has been described with the term 'shale complex' with the understanding that broken bedrock/shale fragments were encountered within the till. Furthermore, shale bedrock of Queenston Formation was encountered at Borehole 16-36.

The fill encountered at the boreholes is likely similar to the weathered soils encountered during the current investigation.

## 4.9 Soil Compatibility with Concrete

In order to assess the potential for concrete attack by the occurring soils, ten (10) soil samples were selected for testing to determine pH values and suphalte concentration. The results are summarized in Table 2.

**Table 2** - pH and Sulphates

| Borehole/Sample No. | Depth (m) | Soil Description | pH Value | Sulphates (ppm) |
|---|---|---|---|---|
| 6/6 | 4.8 | Silty Clay Till | 7.8 | 20 |
| 11/6 | 4.8 | Silty Clay Till | 7.9 | 20 |
| 16/5 | 3.3 | Sandy Silt | 7.9 | 20 |
| 22/5 | 3.3 | Silty Clay Till | 7.8 | 20 |
| 28/4 | 2.5 | Silt | 7.9 | 20 |

**Table 2** - pH and Sulphates (cont'd)

| Borehole/Sample No. | Depth (m) | Soil Description | pH Value | Sulphates (ppm) |
|---|---|---|---|---|
| 35/6 | 4.8 | Silty Clay Till | 8.0 | 20 |
| 43/5 | 3.3 | Silty Fine Sand | 8.1 | 20 |
| 47/6 | 4.8 | Silty Sand Till | 7.9 | 150 |
| 53/8 | 7.9 | Sandy Silt Till | 8.1 | 150 |
| 56/6 | 4.8 | Silty Clay Till | 7.8 | 20 |

The above results reveal that the tested samples have neutral pH values and a sulphate concentration of 20 ppm and 150 ppm, which is less than 0.1% for a water-soluble sulphate in soil samples. Thus, it is inferred that the soils have a negligible potential of sulphate attack on a normal concrete type (Type GU cement).

## 4.10 Compaction Characteristics of the Revealed Soils

The obtainable degree of compaction is primarily dependent on the soil moisture and, to a lesser extent, on the type of compactor used and the effort applied. As a general guide, the typical water content values of the revealed soils from the current investigation for Standard Proctor compaction are presented in Table 3.

**Table 3** - Estimated Water Content for Compaction

| Soil Type | Determined Natural Water Content (%) | Water Content (%) for Standard Proctor Compaction | |
|---|---|---|---|
| | | 100% (optimum) | Range for 95% or + |
| Silty Clay Till | 7 to 28 (median 14) | 14 to 18 | 10 to 23 |
| Silty Clay | 17 to 27 (median 20) | 16 to 19 | 12 to 24 |

**Table 3** - Estimated Water Content for Compaction (cont'd)

| Soil Type | Determined Natural Water Content (%) | Water Content (%) for Standard Proctor Compaction | |
|---|---|---|---|
| | | 100% (optimum) | Range for 95% or + |
| Silty Sand Till | 6 to 18 (median 11) | 10 to 11 | 6 to 16 |
| Sandy Silt Till | 6 to 21 (median 8) | 12 | 8 to 16 |
| Silty Fine Sand | 14 and 16 | 11 | 6 to 16 |
| Sandy Silt | 11 to 19 (median 17) | 12 | 8 to 16 |
| Silt | 12 to 23 (median 17) | 13 | 8 to 17 |
| Gravelly Sand | 9 | 8 | 4 to 13 |
| Broken Shale | 3 to 31 (median 9) | 16 | 12 to 21 |

The above values show that the majority of the in situ soils are suitable for a 95% or + Standard Proctor compaction. However, portions of the in situ soils, except the gravelly sand, are too wet and will require aeration or mixing with drier soils prior to structural compaction. Aeration of these materials can be achieved by spreading them thinly on the ground in the dry, warm weather. Furthermore, a portion of the silty clay till and the majority of the excavated shale are too dry and will require the addition of water prior to structural compaction.

The tills and clay should be compacted using a heavy-weight, kneading-type roller. The sands and silts can be compacted by a smooth roller with or without vibration, depending on the moisture content of the soils being compacted. The lifts for compaction should be limited to 20 cm, or to a suitable thickness as assessed by test strips performed by the equipment which will be used at the time of construction.

When compacting the very stiff to hard silty clay till and silty clay, and the cemented, dense to very dense silty sand till and sandy silt till on the dry side of the optimum, the compactive energy will frequently bridge over the chunks in the soils and be transmitted laterally into the soil mantle. Therefore, the lifts must be limited to 20 cm or less (before compaction). It is difficult to monitor the lifts of backfill placed in deep trenches; therefore, it is preferable that the compaction of backfill at depths over 1.0 m below the subgrade be carried out on the wet side of the optimum. This would allow a wider latitude of lift thickness.

One should be aware that with considerable effort, a 90%± Standard Proctor compaction of the wet sands and silts is achievable. Further densification is prevented by the pore pressure induced by the compactive effort; however, large random voids will have been expelled and, with time, the pore pressure will dissipate and the percentage of compaction will increase. There are many cases on record where after a few months of rest, the density of the compacted mantle had increased to over 95% of its maximum Standard Proctor dry density.

If the compaction of the soils is carried out with the water content within the range for 95% Standard Proctor dry density but on the wet side of the optimum, the surface of the compacted soil mantle will roll under the dynamic compactive load. This is unsuitable for road construction since each component of the pavement structure is to be placed under dynamic conditions which will induce the rolling action of the subgrade surface and cause structural failure of the new pavement. The slab-on-grade, foundations or bedding of the underground services will be placed on a subgrade which will not be subjected to impact loads. Therefore, the structurally compacted soil mantle with the water content on the wet side or dry side of the optimum will provide adequate subgrade strength for the project construction.

The presence of boulders and large shale fragments will prevent transmission of the compactive energy into the underlying material to be compacted. If an appreciable amount of boulders and shale fragments over 15 cm in size is mixed with the material, it must either be sorted or must not be used for structural backfill and/or construction of engineered fill.

As noted, the shale is susceptible to disintegration and will revert to a clay soil. The shale spoil which has been exposed to weathering may be selected for use as structural fill. To achieve this, the shale must be excavated by a rock-ripper to break up the limy shale and sandstone slabs and piled thinly on the ground for optimum exposure to weathering. If shale spoil is to be used immediately for structural fill, it should be pulverized to sizes of 15 cm or less and must be compacted with lifts of 15 cm or less and consistently wetted. It should be compacted to achieve at least 95% of its maximum Standard Proctor dry density. The structurally compacted shale debris fill must be left for a period of at least 1 winter to allow the shale to swell prior to the construction of the foundations. In order to reduce the time required for the shale to swell, the shale to be reused must be pulverized and mixed with the silty clay under the supervision of a geotechnical firm.

It should be noted that if the shale spoil is to be left on the ground surface for a period of 1 or 2 winters for weathering, its swelling characteristic will result in a significant increase in soil volume, even in a compacted state. This phenomenon must be considered in the cut and fill calculations.

## 5.0 GROUNDWATER CONDITIONS

The boreholes were checked for the presence of groundwater and the occurrence of cave-in upon their completion. The data are plotted on the Borehole Logs and summarized in Table 4.

**Table 4 -** Groundwater/Cave-in Levels

| BH No. | Borehole Depth (m) | Soil Colour Changes Brown to Grey/ Reddish-Grey/Red Depth (m) | Measured Groundwater/ Cave-in* Level | | | |
|---|---|---|---|---|---|---|
| | | | On Completion | | In Well on February 1, 2018 | |
| | | | Depth (m) | El. (m) | Depth (m) | El. (m) |
| 1 | 6.6 | 4.6 | Dry | - | N/A | - |
| 2 | 6.6 | 4.6 | Dry | - | N/A | - |
| 3 | CANCELLED | | | | | |
| 4 | 9.4 | 3.0 | 4.6/4.6* | 255.0/255.0* | N/A | - |
| 5 | 6.6 | 3.0 | Dry | - | 3.9 | 256.7 |
| 6 | 6.6 | 3.3 | Dry | - | N/A | - |
| 7 | 6.6 | 4.6 | Dry | - | N/A | - |
| 8 | 6.6 | 3.0 | Dry | - | N/A | - |
| 9 | 6.6 | 3.0 | Dry | - | N/A | - |
| 10 | 6.6 | 2.4 | Dry | - | 2.9 | 255.2 |
| 11 | 6.6 | 3.0 | Dry | - | N/A | - |
| 12 | 6.6 | 4.6 | Dry | - | 2.5 | 255.5 |
| 13 | 6.6 | 3.0 | Dry | - | N/A | - |
| 14 | 6.6 | 3.0 | Dry | - | N/A | - |
| 15 | 6.6 | 3.1 | Dry | - | N/A | - |
| 16 | 6.6 | 4.6 | 5.2* | 252.4* | 3.8 | 253.8 |

**Table 4** - Groundwater/Cave-in Levels (cont'd 1)

| BH No. | Borehole Depth (m) | Soil Colour Changes Brown to Grey/ Reddish-Grey/Red Depth (m) | Measured Groundwater/ Cave-in* Level | | | |
|---|---|---|---|---|---|---|
| | | | On Completion | | In Well on February 1, 2018 | |
| | | | Depth (m) | El. (m) | Depth (m) | El. (m) |
| 17 | 6.6 | 2.5 | 5.8* | 250.7* | N/A | - |
| 18 | CANCELLED | | | | | |
| 19 | 6.6 | 3.0 | Dry | - | N/A | - |
| 20 | 6.6 | 3.3 | 5.8 | 252.1 | N/A | - |
| 21 | 6.6 | 3.3 | 5.9 | 250.9 | 3.1 | 253.7 |
| 22 | 6.6 | 3.0 | 5.8 | 251.1 | N/A | - |
| 23 | 6.6 | 2.7 | Dry | - | N/A | - |
| 24 | 6.6 | 3.0 | Dry | - | N/A | - |
| 25 | 9.2 | 2.5 | Dry | - | N/A | - |
| 26 | 9.3 | 2.5 | 9.0 | 246.8 | 2.1 | 253.7 |
| 27 | 9.3 | 4.6 | Dry | - | N/A | - |
| 28 | 6.6 | 2.4 | Dry | - | N/A | - |
| 29 | 6.6 | 3.3 | Dry | - | N/A | - |
| 30 | 6.6 | 3.4 | Dry | - | N/A | - |
| 31 | 12.2 | 3.2 | Dry | - | 4.4 | 251.4 |
| 32 | 7.8 | 3.0 | Dry | - | N/A | - |
| 33 | 8.1 | 3.4 | 7.3 | 248.6 | N/A | - |
| 34D | 6.2 | 4.6 | Dry | - | 0.8 | 258.7 |
| 34S | Nested Well to 4.0 m depth | | | | 0.8 | 258.7 |
| 35 | 6.4 | 3.2 | Dry | - | 2.9 | 257.6 |
| 36 | 6.2 | 3.0 | Dry | - | N/A | - |
| 37 | 6.2 | 3.2 | Dry | - | N/A | - |

**Table 4** - Groundwater/Cave-in Levels (cont'd 2)

| BH No. | Borehole Depth (m) | Soil Colour Changes Brown to Grey/ Reddish-Grey/Red Depth (m) | Measured Groundwater/ Cave-in* Level | | | |
|---|---|---|---|---|---|---|
| | | | On Completion | | In Well on February 1, 2018 | |
| | | | Depth (m) | El. (m) | Depth (m) | El. (m) |
| 38 | 7.7 | 3.2 | 7.3 | 252.7 | 1.4 | 258.6 |
| 39 | 6.6 | 3.0 | Dry | - | N/A | - |
| 40 | 6.4 | 3.3 | Dry | - | N/A | - |
| 41 | 6.6 | 4.6 | Dry | - | N/A | - |
| 42 | 6.4 | 4.6 | Dry | - | N/A | - |
| 43 | 6.4 | 4.6 | 3.0/3.4* | 256.0/255.6* | N/A | - |
| 44 | 6.6 | 3.3 | Dry | - | 0.8 | 257.6 |
| 45 | 6.6 | 4.6 | Dry | - | N/A | - |
| 46 | 6.3 | 3.0 | Dry | - | 1.6 | 256.8 |
| 47 | 6.2 | 3.0 | 5.8 | 253.0 | N/A | - |
| 48 | 9.1 | 3.0 | 8.8 | 250.1 | 2.5 | 256.4 |
| 49 | 6.1 | 3.4 | 5.8 | 252.9 | N/A | - |
| 50 | 6.2 | 4.6 | Dry | - | N/A | - |
| 51 | 6.6 | 4.6 | Dry | - | N/A | - |
| 52 | 6.2 | 4.6 | Dry | - | N/A | - |
| 53 | 8.1 | 4.6 | Dry | - | N/A | - |
| 54 | 8.1 | 4.6 | Dry | - | 1.5 | 256.2 |
| 55 | 6.4 | 4.6 | Dry | - | N/A | - |
| 56 | 9.1 | 3.0 | 5.2 | 251.5 | N/A | - |
| 57 | 9.1 | 3.4 | 4.3 | 253.1 | N/A | - |
| 58 | 9.1 | 3.2 | 3.7 | 253.3 | 0.9 | 256.1 |

* Cave-in level (In wet sand and silt layers, the level generally represents the groundwater at the time of investigation.)

As shown above, groundwater was encountered at depths ranging from 3.0± to 9.0± m below the prevailing ground surface in 14 out of 58 boreholes. In addition, 4 out of 58 boreholes caved at depths of 3.4± to 5.8± m below the prevailing ground surface. Most of the boreholes remained dry upon their completion. The groundwater level will fluctuate with the seasons.

In addition, 50-mm diameter groundwater monitoring wells were installed at 15 boreholes, with a shallower nested well at one location, to facilitate a hydrogeological assessment. The stabilized water levels were measured in the wells on February 1, 2018, and have been presented in Table 4. The measured water levels in the wells were at depths ranging from 0.8± to 4.4± m below the prevailing ground surface.

The soil colour changes from brown to grey, reddish-grey or red at depths of 2.4± to 4.6± m below the prevailing ground surface. The brown colour indicates that the soils have oxidized.

The groundwater yield, if any, from the silty clay till and silty clay is expected to be small and limited in quantity, due to the low permeability of the soils, and the yield from the silty sand till and sandy silt till may be slight to some, while the yield from the sands and silts will be moderate to appreciable, and likely persistent, depending on their extent and continuity. Groundwater under subterranean artesian pressure may occur in places within the shale bedrock, which is generally considered to be a poor aquifer. Therefore, the yield of groundwater from the bedrock, if encountered, will be appreciable initially; however, if allowed to drain freely, it will often dissipate or be depleted with time.

## 6.0 DISCUSSION AND RECOMMENDATIONS

The investigation has disclosed that beneath a veneer of topsoil at all except one location, the site is primarily underlain by a stratum of soft to hard, generally very stiff silty clay till, with strata of firm to very stiff, generally stiff silty clay; loose to very dense, generally compact silty sand till; loose to very dense, generally very dense sandy silt till; loose to dense silty fine sand; compact sandy silt; loose to very dense, generally compact silt; and/or gravelly sand encountered at various locations and depths. The soils within a depth of 0.8± to 1.5± m below the prevailing ground surface have been weathered. The soils bed onto shale bedrock at moderate depths in the south and east portions of the site at depths ranging from 3.4± to 9.1± m below the prevailing ground surface; the upper layer of the shale bedrock within a depth of 1.0± to 3.0± m from the surface of the bedrock is generally in a weathered condition.

Groundwater levels were measured in 14 of the 58 boreholes at depths of 3.0 to 9.0 m below the prevailing ground surface on completion of the boreholes and 4 of the 58 boreholes caved at depths of 3.4± to 5.8± m below the prevailing ground surface; the rest of the boreholes remained dry upon their completion. The stabilized groundwater level was measured on February 1, 2018 at depths of 0.8± to 4.4± m in the groundwater monitoring wells installed at 15 borehole locations during the current investigation. The groundwater level will fluctuate with the seasons.

The groundwater yield, if any, from the silty clay till and silty clay is expected to be small and limited in quantity, and the yield from the silty sand till and sandy silt till may be slight to some, while the yield from the sands and silts will be moderate to appreciable, and likely persistent, depending on their extent and continuity. In the shale bedrock, the yield may be appreciable initially in localized places due to

possible occurrence of groundwater pockets under subterranean artesian pressure; however, if allowed to drain freely, it will often dissipate or be depleted with time.

The geotechnical findings which warrant special consideration are presented below:

1. The topsoil is unsuitable for engineering applications and must be removed. For the environmental as well as the geotechnical well-being of the future development, it should not be buried below any structures or deeper than 1.2 m below the exterior finished grade. Fertility testing can be carried out to assess the suitability of the topsoil as landscaping material.
2. The badly weathered soils are not suitable to support any structural loads. The weathered soils must be subexcavated, sorted free of any topsoil inclusions or deleterious material and aerated before being used as structural backfill or for the construction of engineered fill at the site.
3. The sound natural soils below the topsoil and weathered soil are suitable for normal spread and strip footing construction. The footing subgrade must be inspected by a geotechnical engineer, or a geotechnical technician under the supervision of a geotechnical engineer, to ensure that its condition is compatible with the design of the foundation.
4. Extended footings and/or cut and fill may be required for the site grading. It is generally more economical to place engineered fill for normal footing, sewer and road construction.
5. Some of the in situ soils have high soil-adfreezing potential. Special measures must be implemented in the project construction to minimize the risk of damage to the foundations caused by frost action.
6. For slab-on-grade construction, the slab should be constructed on a granular base, 20 cm thick, consisting of 20-mm Crusher-Run Limestone, or equivalent, compacted to its maximum Standard Proctor dry density.

7. A Class ‘B’ bedding, consisting of compacted 20-mm Crusher-Run Limestone, is recommended for the construction of the underground services. Where water-bearing sands or silts are present, the pipe joints should be leak-proof, or wrapped with an appropriate waterproof membrane. Where extensive dewatering is required, a Class ‘A’ bedding should be considered.
8. Where underground services or building foundations are to be placed into the shale bedrock, the trench sides should be slightly sloped rather than vertical due to the residual stress relief and the swelling characteristics of the shale. The side slopes should be lined with a cushioning layer such as compressible Styrofoam.
9. Excavation should be carried out in accordance with Ontario Regulation 213/91.
10. In general, open-cut excavation can be carried out in the weathered shale by using a backhoe equipped with a rock-ripper; however, where deep excavation is required, pneumatic hammering with chisel points and/or rock blasting may be necessary for efficient rock removal.

The recommendations appropriate for the project described in Section 2.0 are presented herein. One must be aware that the subsurface conditions may vary between boreholes. Should subsurface variances become apparent during construction, a geotechnical engineer must be consulted to determine whether the following recommendations require revision.

## 6.1 **Foundations**

For the proposed development, it is recommended that the normal spread and strip footings be placed below the topsoil and weathered soil onto the sound natural soils, engineered fill and/or shale bedrock. As a general guide, the recommended soil

pressures for use in the design, together with the corresponding suitable founding levels, are presented in Table 5.

**Table 5** - Founding Levels

| Borehole No. | Recommended Maximum Allowable Soil Pressure (SLS)/ Factored Ultimate Soil Bearing Pressure (ULS) and Suitable Founding Level | |
|---|---|---|
| | 150 kPa (SLS) 250 kPa (ULS) | |
| | Depth (m) | Elevation (m) |
| 1 | 1.0 or + | 259.4 or - |
| 2 | 1.0 or + | 258.5 or - |
| 4 | 1.0 or +[A] | 258.6 or - |
| 5 | 1.0 or + | 259.6 or - |
| 6 | 1.0 or + | 258.3 or - |
| 7 | 1.0 or + | 258.3 or - |
| 8 | 1.0 or + | 257.4 or - |
| 9 | 1.0 or + | 256.9 or - |
| 10 | 1.5 or + | 256.6 or - |
| 11 | 1.8 or + | 256.9 or - |
| 12 | 0.8 or + | 257.2 or - |
| 13 | 1.0 or + | 257.5 or - |
| 14 | 1.0 or + | 256.0 or - |
| 15 | 0.6 or + | 257.2 or - |
| 16 | 1.0 or + | 256.6 or - |
| 17 | 1.0 or + | 255.5 or - |
| 19 | 1.0 or + | 256.2 or - |
| 20 | 1.0 or + | 256.9 or - |
| 21 | 1.0 or + | 255.8 or - |

**Table 5** - Founding Levels (cont'd 1)

| Borehole No. | Recommended Maximum Allowable Soil Pressure (SLS)/ Factored Ultimate Soil Bearing Pressure (ULS) and Suitable Founding Level | |
|---|---|---|
| | 150 kPa (SLS) 250 kPa (ULS) | |
| | Depth (m) | Elevation (m) |
| 22 | 1.0 or + | 255.9 or - |
| 23 | 1.0 or + | 255.7 or - |
| 24 | 1.0 or + | 255.8 or - |
| 25 | 1.0 or + | 255.1 or - |
| 26 | 1.8 or + | 254.0 or - |
| 27 | 2.0 or + | 254.6 or - |
| 28 | 1.0 or + | 254.9 or - |
| 29 | 1.0 or + | 255.2 or - |
| 30 | 0.6 or + | 255.9 or - |
| 31 | 1.5 or + | 254.3 or - |
| 32 | 1.8 or + | 253.8 or - |
| 33 | 1.8 or + | 254.1 or - |
| 34D | 1.0 or + | 258.5 or - |
| 35 | 1.0 or + | 259.5 or - |
| 36 | 1.0 or + | 257.8 or - |
| 37 | 1.0 or + | 259.0 or - |
| 38 | 1.5 or + | 258.5 or - |
| 39 | 1.0 or + | 259.2 or - |
| 40 | 1.0 or + | 257.9 or - |
| 41 | 1.0 or + | 258.0 or - |
| 42 | 1.0 or + | 258.1 or - |

**Table 5** - Founding Levels (cont'd 2)

| Borehole No. | Recommended Maximum Allowable Soil Pressure (SLS)/ Factored Ultimate Soil Bearing Pressure (ULS) and Suitable Founding Level | |
|---|---|---|
| | 150 kPa (SLS) 250 kPa (ULS) | |
| | Depth (m) | Elevation (m) |
| 43 | 1.0 or + | 258.0 or - |
| 44 | 1.2 or + | 257.2 or - |
| 45 | 1.0 or + | 257.5 or - |
| 46 | 1.5 or + | 256.9 or - |
| 47 | 1.0 or + | 257.8 or - |
| 48 | 1.0 or + | 257.9 or - |
| 49 | 1.0 or + | 257.7 or - |
| 50 | 1.0 or + | 256.7 or - |
| 51 | 1.0 or + | 257.2 or - |
| 52 | 1.2 or + | 256.6 or - |
| 53 | 1.0 or + | 256.7 or - |
| 54 | 1.0 or + | 256.7 or - |
| 55 | 1.0 or + | 256.5 or - |
| 56 | 1.8 or + | 254.9 or - |
| 57 | 1.5 or + | 255.9 or - |
| 58 | 1.0 or + | 256.0 or - |
| 16-1 | 1.3 or +[B] | 258.0 or - |
| 16-2 | 1.8 or + | 254.6 or - |
| 16-3 | 1.2 or + | 254.7 or - |
| 16-4 | 1.2 or + | 254.9 or - |
| 16-5 | 1.8 or + | 254.6 or - |

**Table 5** - Founding Levels (cont'd 3)

| Borehole No. | Recommended Maximum Allowable Soil Pressure (SLS)/ Factored Ultimate Soil Bearing Pressure (ULS) and Suitable Founding Level | |
|---|---|---|
| | 150 kPa (SLS) 250 kPa (ULS) | |
| | Depth (m) | Elevation (m) |
| 16-6 | 1.3 or +[C] | 256.2 or - |
| 16-8 | 1.9 or +[C] | 257.4 or - |
| 16-24 | 1.8 or + | 256.1 or - |
| 16-25 | 1.9 or + | 256.4 or - |
| 16-26 | 1.5 or + | 257.2 or - |
| 16-36 | 1.8 or + | 257.4 or - |

Due to the decrease in 'N' values with depth, the Maximum Allowable Soil Pressure (SLS) of 150 kPa must be reduced to:

[A] 75 kPa (SLS) from a depth of 3.3 to 6.1 m from the prevailing ground surface.
[B] 100 kPa (SLS) from a depth of 5.2 to 7.6 m from the prevailing ground surface.
[C] 100 kPa (SLS) from a depth of 3.7 to 6.1 m from the prevailing ground surface.

In areas where foundations are to be extended, it may be more cost effective to subexcavate to a size 30% larger than the designed footing width and fill with lean concrete up to the normal footing elevation immediately after the suitable founding soil is exposed.

The weathered soil can be subexcavated and replaced with engineered fill. Furthermore, where fill is required to raise the grade, or if extended footings and/or cut and fill is required for the site grading, engineered fill suitable for normal footing construction can be considered. A Maximum Allowable Soil Pressure (SLS) of 150 kPa and a Factored Ultimate Soil Bearing Pressure (ULS) of 250 kPa is recommended for footings founded on engineered fill. The fill must be certified by the geotechnical consultant that supervised and inspected the fill placement. Details of engineered fill are provided in Section 6.2 of this report.

The recommended bearing pressures (SLS) for normal footings incorporate a safety factor of 3. The total and differential settlements of the footings are estimated to be 25 mm and 15 mm, respectively.

The foundation subgrade must be inspected by a geotechnical engineer, or a geotechnical technician under the supervision of a geotechnical engineer, to assess its suitability for bearing the designed foundations.

Footings exposed to weathering, and in unheated areas, should have at least 1.2 m of earth cover for protection against frost action.

If excavation into the shale is to be carried out close to the foundation walls, the sides of excavation into sound shale should be shielded by compressible Styrofoam (or equivalent). This will provide a cushioning layer against movement of the shale that may damage the basement walls.

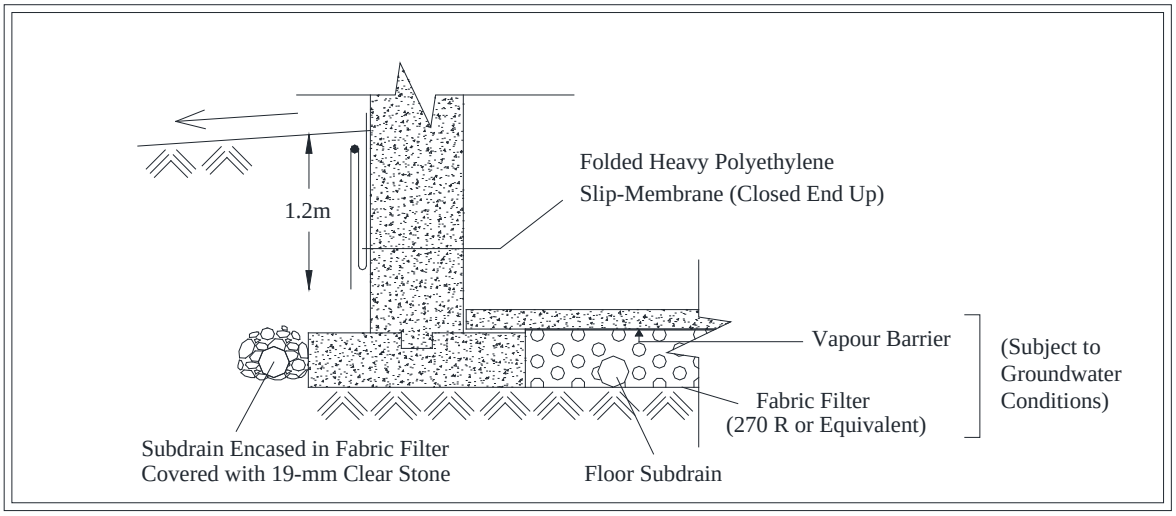
Perimeter subdrains and dampproofing of the foundation walls will be required. All the subdrains should be encased in a fabric filter to protect them against blockage by silting.

It should be noted that if groundwater seepage is encountered during the footing excavations, or where the subgrade of the normal foundations is found to be wet, the subgrade should be protected by a concrete mud-slab immediately after exposure. This will prevent construction disturbance and costly rectification.

Some of the in situ soils have high soil-adfreezing potential. Where these material are used to backfill against foundations, the foundation walls must be constructed of concrete and either backfilled with non-frost-susceptible pit-run granular, or should

be properly shielded with a polyethylene slip-membrane extending below the frost depth to alleviate the risk of frost damage. If the proposed structures have a basement and groundwater seepage is detected at the time of foundation excavation, under-floor subdrains may be installed and they must be connected to sump-wells, or to the drains which have a positive outlet. Also, a vapour barrier should be installed to prevent upfiltration of soil moisture that may wet the floor. The recommended measures are schematically presented in Diagram 1.

**Diagram 1** - Frost Protection Measures (Foundation)




The necessity to implement the above measures should be assessed at the time of construction.

The foundations should meet the requirements specified in the latest Ontario Building Code, and the structure should be designed to resist an earthquake force using Site Classification ‘D’ (stiff soil).

## 6.2 **Engineered Fill**

The weathered soil can be upgraded to or replaced with engineered fill, and where earth fill is required to raise the site or extended footings are required, it is generally more economical to place engineered fill for normal footing, underground services and pavement construction. The engineering requirements for a certifiable fill for pavement construction, municipal services, slab-on-grade, and footings designed with a Maximum Allowable Soil Pressure (SLS) of 150 kPa and a Factored Ultimate Soil Bearing Pressure (ULS) of 250 kPa are presented below:

1. All the existing topsoil and organics must be removed, and the subgrade must be inspected and proof-rolled prior to any fill placement. The badly weathered soil must be subexcavated, sorted free of topsoil inclusions and deleterious materials, if any, aerated and properly compacted.
2. Inorganic soils must be used, and they must be uniformly compacted in lifts of 20 cm thick to 98% or + of their maximum Standard Proctor dry density, up to the proposed finished grade and/or slab-on-grade subgrade. The soil moisture must be properly controlled on the wet side of the optimum. If the foundations are to be built soon after the fill placement, the densification process for the engineered fill must be increased to 100% of the maximum Standard Proctor compaction.
3. If imported fill is to be used, it should be inorganic soils, free of deleterious or any material with environmental issue (contamination). Any potential imported earth fill from off site must be reviewed for geotechnical and environmental quality by the appropriate personnel as authorized by the developer or agency, before it is hauled to the site.
4. If the engineered fill is to be left over the winter months, adequate earth cover, or equivalent, must be provided for protection against frost action.

5. The engineered fill must extend over the entire graded area; the engineered fill envelope and finished elevations must be clearly and accurately defined in the field, and they must be precisely documented by qualified surveyors. Foundations partially on engineered fill must be reinforced by two 15-mm steel reinforcing bars in the footings and upper section of the foundation and basement walls, or be designed by a structural engineer, to properly distribute the stress induced by the abrupt differential settlement (estimated to be 15± mm) between the natural soils and engineered fill.
6. The engineered fill must not be placed during the period from late November to early April, when freezing ambient temperatures occur either persistently or intermittently. This is to ensure that the fill is free of frozen soils, ice and snow.
7. Where the ground is wet due to subsurface water seepage, an appropriate subdrain scheme must be implemented prior to the fill placement, particularly if it is to be carried out on sloping ground or a bank.
8. Where fill is to be placed on a bank steeper than 1 vertical:3 horizontal, the face of the bank must flattened to 3+ so that it is suitable for safe operation of the compactor and the required compaction can be obtained.
9. The fill operation must be inspected on a full-time basis by a technician under the direction of a geotechnical engineer.
10. The footing and underground services subgrade must be inspected by the geotechnical consulting firm that inspected the engineered fill placement. This is to ensure that the foundations are placed within the engineered fill envelope, and the integrity of the fill has not been compromised by interim construction, environmental degradation and/or disturbance by the footing excavation.
11. Any excavation carried out in certified engineered fill must be reported to the geotechnical consultant who inspected the fill placement in order to document the locations of the excavation and/or to inspect reinstatement of the excavated

areas to engineered fill status. If construction on the engineered fill does not commence within a period of 2 years from the date of certification, the condition of the engineered fill must be assessed for re-certification.

12. Despite stringent control in the placement of the engineered fill, variations in soil type and density may occur in the engineered fill. Therefore, the strip footings and the upper section of the foundation walls constructed on the engineered fill may require continuous reinforcement with steel bars, depending on the uniformity of the soils in the engineered fill and the thickness of the engineered fill underlying the foundations. Should the footings and/or walls require reinforcement, the required number and size of reinforcing bars must be assessed by considering the uniformity as well as the thickness of the engineered fill beneath the foundations. In sewer construction, the engineered fill is considered to have the same structural proficiency as a natural inorganic soil.

If the shale spoil is intended for use as structural fill, it must be piled thinly on the ground for optimum exposure to weathering. Any remaining hard limy or sandy slabs must be pulverized to sizes less than 15 cm or must not be used for structural backfill and/or construction of engineered fill. It should be noted that if the shale spoil is to be left on the ground surface for weathering, it will swell and result in a significant increase in soil volume. This phenomenon must be considered in the cut and fill calculations.

## 6.3 **Slab-On-Grade**

The subgrade for the slab-on-grade must consist of sound natural soils, shale bedrock or properly compacted inorganic fill. In preparation of the subgrade, it must be inspected and assessed by proof-rolling. The topsoil must be removed; the badly weathered soil or any soft or loose soils should be subexcavated, sorted free of any

deleterious material, aerated and uniformly compacted to 98% or + of its maximum Standard Proctor dry density. If the deleterious materials cannot be sorted, the soils should be replaced by properly compacted, organic-free earth fill.

Any new material for raising the grade should consist of organic-free soil compacted to at least 98% of its maximum Standard Proctor dry density.

If the subgrade has been loosened due to construction traffic, it must be proof-rolled before placement of the granular base.

The slab should be constructed on a granular base, 20 cm thick, consisting of 20-mm Crusher-Run Limestone, or equivalent, compacted to its maximum Standard Proctor dry density.

A Modulus of Subgrade Reaction of 25 MPa/m can be used for the design of the floor slab.

The slab-on-grade in open areas should be designed to tolerate frost heave, and the grading around the slab-on-grade and building structures must be such that it directs runoff away from the structures.

## 6.4 **Underground Services**

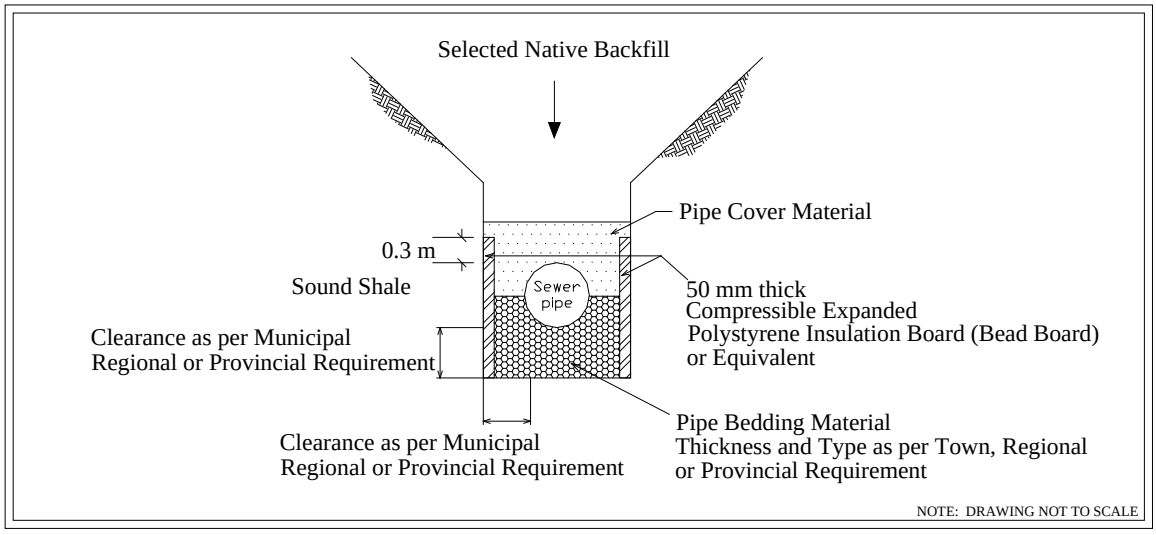
The subgrade for the underground services should consist of sound natural soils or properly compacted organic-free earth fill. Where topsoil, organic earth fill or badly weathered soil is encountered, it should be subexcavated and replaced with bedding material compacted to at least 95% or + of its Standard Proctor compaction.

A Class ‘B’ bedding is recommended for the underground services construction. The bedding material should consist of compacted 20-mm Crusher-Run Limestone, or equivalent. In the areas where extensive dewatering is required, a Class ‘A’ bedding will be required.

Where wet or water-bearing sands or silts occur, the pipe joints should be leak-proof, or the joints should be wrapped with a waterproof membrane, to prevent subgrade upfiltration through the joints.

Where underground services are to be placed in sound shale, the trench sides should be sloped rather than vertical, due to the residual stress relief and the swelling characteristics of the shale. The side slopes should be no steeper than 2 vertical: 1 horizontal. The rock face can be lined with a cushioning layer such as Styrofoam, to reduce the residual stress exerted on the buried structure, and then backfilled with sand up to 0.3 m above the crown of the pipe and flooded. The recommended scheme is illustrated in Diagram 2.

**Diagram 2** - Sewer Installation in Sound Shale



In order to prevent pipe floatation when the sewer trench is deluged with water, a soil cover at least equal in thickness to the diameter of the pipe should be in place at all times after completion of the pipe installation.

Openings to subdrains and catch basins should be shielded with a fabric filter to prevent blockage by silting.

Since the silty clay till and silty clay have moderately high corrosivities to buried metal, all metal fittings for the underground services should be protected against soil corrosion. In determining the mode of protection, an electrical resistivity of 2500 ohm·cm should be used. This, however, should be confirmed by testing the soil along the water main alignment at the time of services construction.

## 6.5 **Backfilling in Trenches and Excavated Areas**

The on-site inorganic soils are generally suitable for use as trench backfill. However, the soils should be sorted free of any topsoil inclusions and other deleterious materials prior to the backfilling. The soils should be sorted free of any large pieces (over 15 cm in size) of limestone bands and shale fragments, or the large pieces must be broken into sizes suitable for structural compaction.

The excavated shale can be pulverized to sizes less than 15 cm and thoroughly mixed with the overburden soils. The trench can then be backfilled by levelling the debris using a bulldozer with lifts no more than 20 cm (loose) in thickness. Compaction should be carried out by a vibratory sheepsfoot roller, with water constantly sprayed on each lift.

The backfill in trenches and excavated areas should be compacted to at least 95% of its maximum Standard Proctor dry density. In the zone within 1.0 m below the pavement subgrade, the materials should be compacted with the water content 2% to 3% drier than the optimum, and the compaction should be increased to at least 98% of the respective maximum Standard Proctor dry density. This is to provide the required stiffness for pavement construction. In the lower zone, the compaction should be carried out on the wet side of the optimum; this allows a wider latitude of lift thickness. Backfill below any floor slab which is sensitive to settlement must be compacted to at least 98% of its maximum Standard Proctor dry density.

In normal underground services construction practice, the problem areas of settlement largely occur adjacent to manholes, catch basins, services crossings, foundation walls and columns. The lumpy clays and broken shale are generally difficult to compact in these close quarters, and it is recommended that a sand backfill should be used. Imported sand backfill should also be used in areas which are inaccessible to a heavy compactor. Unless compaction of the backfill is carefully performed, the interface of the native soils and the sand backfill will have to be flooded for a period of several days.

The narrow trenches for services crossings should be cut at 1 vertical:
2 or + horizontal so that the backfill can be effectively compacted. Otherwise, soil arching will prevent the achievement of proper compaction. The lift of each backfill layer should either be limited to a thickness of 20 cm, or the thickness should be determined by test strips.

One must be aware of the possible consequences during trench backfilling and exercise caution as described below:

- When construction is carried out in freezing winter weather, allowance should be made for these following conditions. Despite stringent backfill monitoring, frozen soil layers may inadvertently be mixed with the structural trench backfill. Should the in situ soils have a water content on the dry side of the optimum, it would be impossible to wet the soils due to the freezing condition, rendering difficulties in obtaining uniform and proper compaction. Furthermore, the freezing condition will prevent flooding of the backfill when it is required, such as in a narrow vertical trench section, or when the trench box is removed, or when backfill consists of shale mixture. The above will invariably cause backfill settlement that may become evident within 1 to several years, depending on the depth of the trench which has been backfilled.
- In areas where the construction is carried out during the winter months, prolonged exposure of the trench walls will result in frost heave within the soil mantle of the walls. This may result in some settlement as the frost recedes, and repair costs will be incurred prior to final surfacing of the new pavement and the slab-on-grade construction.
- To backfill a deep trench, one must be aware that future settlement is to be expected, unless the side of the cut is flattened to at least 1 vertical: 1.5+ horizontal, and the lifts of the fill and its moisture content are stringently controlled; i.e., lifts should be no more than 20 cm (or less if the backfilling conditions dictate) and uniformly compacted to achieve at least 95% of the maximum Standard Proctor dry density, with the moisture content on the wet side of the optimum.
- It is often difficult to achieve uniform compaction of the backfill in the lower vertical section of a trench which is an open cut or is stabilized by a trench box, particularly in the sector close to the trench walls or the sides of the box. These sectors must be backfilled with sand. In a trench stabilized by a trench box, the void left after the removal of the box will be filled by the backfill. It

is necessary to backfill this sector with sand, and the compacted backfill must be flooded for 1 day, prior to the placement of the backfill above this sector; i.e., in the upper sloped trench section. This measure is necessary in order to prevent consolidation of inadvertent voids and loose backfill which will compromise the compaction of the backfill in the upper section. In areas where groundwater movement is expected in the sand fill mantle, anti-seepage collars should be provided.

## 6.6 Garages, Driveways, Sidewalks, Interlocking Stone Pavement and Landscaping

Due to the high frost susceptibility of some of the underlying soils, heaving of the pavement is expected to occur during the cold weather.

The driveways leading to the garages must be backfilled with non-frost susceptible granular material, with a frost taper at a slope of 1 vertical:1 horizontal.

The garage floor slab and interior garage foundation walls must be insulated with 50-mm Styrofoam, or equivalent.

Interlocking stone pavement, sidewalks and landscaping structures in areas which are sensitive to frost-induced ground movement must be constructed on a free-draining, non-frost-susceptible granular material such as Granular ‘B’. The material must extend to 0.3 to 1.2 m below the sidewalk, slab or pavement surface, depending on the degree of tolerance for settlement, and be provided with positive drainage, such as weeper subdrains connected to manholes or catch basins. Alternatively, the landscaping structures, sidewalks and interlocking stone pavement should be properly insulated with 50-mm Styrofoam, or equivalent.

## 6.7 **Pavement Design**

The recommended pavement design is presented in Table 6.

**Table 6** - Pavement Design

| Course | Thickness (mm) | | OPS Specifications |
|---|---|---|---|
| | Local Roads | Collector Roads | |
| Asphalt Surface | 40 | 40 | HL-3 |
| Asphalt Binder | 65 | 90 | HL-8 |
| Granular Base | 150 | 150 | Granular 'A' or equivalent |
| Granular Sub-base | 300 | 450 | Granular 'B' or equivalent |

In preparation of the subgrade, the topsoil should be removed, and the subgrade surface must be proof-rolled. The weathered soil and any soft/loose subgrade must be subexcavated, sorted free of any deleterious materials, aerated and properly compacted. If the deleterious materials cannot be sorted, the soils should be replaced by properly compacted, organic-free earth fill or granular materials. Earth fill used to raise the grade for pavement construction should consist of organic-free soil uniformly compacted to 95% or + of its maximum Standard Proctor dry density.

All the granular bases should be compacted to 100% of their maximum Standard Proctor dry density.

In the zone within 1.0 m below the road subgrade, the backfill should be compacted to at least 98% of its maximum Standard Proctor dry density, with the water content 2% to 3% drier than the optimum. In the lower zone, a 95% or + Standard Proctor compaction is considered adequate.

The road subgrade will suffer a strength regression if water is allowed to saturate the mantle. The following measures should, therefore, be incorporated into the construction procedures and pavement design:

- If the road construction does not immediately follow the trench backfilling, the subgrade should be properly crowned and smooth-rolled to allow interim precipitation to be properly drained.
- Areas adjacent to the road should be properly graded to prevent ponding of large amounts of water during the interim construction period.
- Curb subdrains will be required. The subdrains should consist of filter-sleeved weepers to prevent blockage by silting.
- If the road is to be constructed during wet seasons and extensively soft subgrade occurs, the granular sub-base should be thickened in order to compensate for the inadequate strength of the subgrade. This can be assessed during construction.

## 6.8 **Stormwater Management Ponds** (Boreholes 25, 26, 27, 56, 57 and 58)

The stormwater management (SWM) ponds are located in the south portion of the site, with SWM Pond 1 located in the west half of the site at the south boundary and SWM Pond 2 located at the southeast corner of the site.

### *SWM Pond 1 (Boreholes 25, 26 and 27)*

According to the SWM Pond 1 detail, Drawing No. 601, dated May, 2016, prepared by Urbantech Consulting, the side slopes on the dividing berm of SWM Pond 1 range from 2.8± to 6.2± m in height; this includes the slopes on the dividing berm between the wet cell and forebay. The proposed elevations for the bottom of the wet

cell and the forebay are El. 250.50 m and El. 251.00 m, respectively, with the top elevation to the edge of the access road, lot lines and/or sediment drying area ranging from approximately El. 255.50 to 256.70 m. The designed permanent pool/normal water level will be at El. 253.50 m.

Based on the borehole findings, the area of the SWM Pond 1 consists of silty clay till, silty sand till and/or sandy silt till with localized layers of gravelly sand, silt or silty clay at various locations and depths. At Boreholes 25 and 26, the tills overlay shale bedrock at depths of 9.1± m and 8.0± m below the prevailing ground surface, respectively, or El. 247.0± m and El. 247.8± m. Groundwater was encountered at a depth of 2.1± m below the prevailing ground surface (El. 253.7 m) in the well at Borehole 26 on February 1, 2018.

***SWM Pond 2 (Boreholes 56, 57 and 58)***

According to the SWM Pond 2 detail, Drawing No. 602, dated May, 2016, prepared by Urbantech Consulting, the side slopes of SWM Pond 2 range from 2.3± to 8.4± m in height; this includes the slopes on the dividing berm between the wet cell and the forebay. The proposed elevations for the bottom of the wet cell and forebay are El. 250.40 m and El. 251.40 m, respectively, with the top elevation to the edge of the roadways, trail and/or sediment drying area ranging from approximately El. 255.75 to 259.64 m. The designed permanent pool/normal water level will be at El. 253.40 m.

Based on the borehole findings, the area of SWM Pond 2 consists of silty clay till and/or silty sand till, overlying shale bedrock at depths of 3.4± to 4.9± m below the prevailing ground surface, or El. 251.8± to 253.9± m. Groundwater was encountered at a depth of 0.9± m below the prevailing ground surface (El. 256.1 m) in the well at Borehole 58 on February 1, 2018.

The silty clay till and silty clay have an estimated coefficient of permeability of $10^{-7}$ cm/sec with an estimated percolation time of 80+ min/cm, while the shale bedrock is considered to be relatively impermeable. As such, the seepage of groundwater into the ponds will likely be equal to or less than the amount of water lost through evaporation where these soils are encountered. The impact on the storage volume of the ponds will be minimal. The in situ silty sand till, sandy silt till and silt have an estimated coefficient of permeability of $10^{-5}$ to $10^{-6}$ cm/sec with an estimated percolation time of 30 to 60 min/cm, while the gravelly sand has an estimated coefficient of permeability of $10^{-2}$ cm/sec with an estimated percolation time of 5 min/cm.

The in situ silty clay till, silty clay and shale bedrock are suitable for the pond construction. Where necessary, a clay liner, at least 1.0 m thick, compacted to at least 98% of its maximum Standard Proctor dry density, should be installed on the sides or bottom of the ponds where permeable sand or silt layers, or cracks within the shale bedrock are encountered within the pond envelope and should extend to 1.0 m (minimum) above the permanent pool level. The extent of the clay liner and its implementation can be assessed at the time of the pond construction. The in situ clay material is suitable for use as a clay liner material, if required.

The side slopes of the SWM ponds are proposed with gradients of 1 vertical: 4 and 7 horizontal both below and above the designed permanent pool elevation; this is considered to be geotechnically acceptable. The side slopes should be surface compacted. All the proposed slopes must be vegetated and/or sodded to prevent erosion.

One should be aware that minor maintenance may be required after rapid drawdown as the water recedes from a high level to a lower level.

For construction of the ponds and earth berm around the ponds, the topsoil must be removed and the subgrade must be proof-rolled. The weathered soils should be subexcavated, inspected, sorted free of any deleterious materials, aerated and properly compacted. Inorganic clay material compacted to at least 98% of its maximum Standard Proctor dry density in 20 cm lifts, must be used. The in situ silty clay is suitable for berm construction.

The footings for all control structures for the SWM ponds and associated outfall will be placed onto the sound natural soils, engineered fill or shale bedrock. The Maximum Allowable Soil Pressure (SLS) and Factored Ultimate Soil Bearing Pressure (ULS), along with the suitable founding levels for the design footings are presented in Section 6.1, Table 5.

The footings must be placed below the frost depth of 1.2 m, or below the scouring depth, whichever is deeper. The footing subgrade must be inspected by a geotechnical engineer prior to concrete pouring to ensure its conformity to the design.

## 6.9 **Soil Parameters**

The recommended soil parameters for the project design are given in Table 7.

**Table 7** - Soil Parameters

**Unit Weight and Bulk Factor**

| | Unit Weight ($kN/m^3$) | | Estimated Bulk Factor | |
|---|---|---|---|---|
| | **Bulk** | **Submerged** | **Loose** | **Compacted** |
| Silty Clay Till | 22.0 | 12.5 | 1.33 | 1.05 |
| Silty Clay | 20.5 | 11.5 | 1.30 | 1.00 |
| Silty Sand Till/Sandy Silt Till | 22.5 | 12.5 | 1.33 | 1.03 |
| Silty Fine Sand/Sandy Silt | 20.5 | 10.5 | 1.20 | 1.00 |
| Silt | 21.0 | 10.5 | 1.20 | 1.00 |
| Gravelly Sand | 20.0 | 10.8 | 1.25 | 0.98 |
| Broken Shale | 24.0 | 14.0 | 1.50 | 1.15 |

**Lateral Earth Pressure Coefficients**

| | **Active $K_a$** | **At Rest $K_0$** | **Passive $K_p$** |
|---|---|---|---|
| Silty Clay Till | 0.33 | 0.50 | 3.00 |
| Silty Clay | 0.40 | 0.56 | 2.50 |
| Silty Sand Till, Sandy Silt Till, Sands and Silts | 0.32 | 0.48 | 3.12 |
| Broken Shale | 0.25 | 0.35 | 4.00 |

**Coefficients of Friction**

| | |
|---|---|
| Between Concrete and Granular Base | 0.60 |
| Between Concrete and Sound Natural Soils | 0.40 |

**Maximum Allowable Soil Pressure (SLS) For Thrust Block Design (kPa)**

| | |
|---|---|
| Engineered Fill | 75 |
| Sound Natural Soils | 100 |

## 6.10 Excavation

Excavation should be carried out in accordance with Ontario Regulation 213/91.

Excavations in excess of 1.2 m should be sloped at 1 vertical:1 horizontal for stability. Where weathered soil or seepage is encountered, the sides of excavations may need to be flattened to 1 vertical:1.5 or + horizontal for stability.

For excavation purposes, the types of soils are classified in Table 8.

**Table 8** - Classification of Soils for Excavation

| Material | Type |
|---|---|
| Sound Shale Bedrock | 1 |
| Sound Natural Soils and weathered Shale Bedrock | 2 |
| Weathered Soil, and dewatered Sands and Silts | 3 |
| Saturated Sands and Silts | 4 |

Excavation into the weathered shale, or the tills containing boulders or large shale fragments, may require extra effort and the use of a heavy-duty backhoe. Boulders and shale fragments larger than 15 cm in size are not suitable for structural backfill and/or construction of engineered fill.

The groundwater yield, if any, from the silty clay till and silty clay is expected to be small and limited in quantity, due to the low permeability of the soils, and the yield from the silty sand till and sandy silt till may be slight to some, while the yield from the sands and silts will be moderate to appreciable, and likely persistent, depending on their extent and continuity.

In shale bedrock, a cut steeper than 1 vertical:1 horizontal may be allowed, provided that the bedding plane of the rock is horizontal and loose rocks protruding from the excavation are removed for safety. The weathered shale or the hard clay till containing shale fragments will require extra effort for excavation using heavy-duty mechanical equipment, and a rock-ripper will be required to facilitate the excavation. This method can generally be employed to excavate the weathered shale to a depth of 3.0± m below the bedrock surface. Excavation into the sound shale may require the aid of pneumatic hammering and/or rock blasting.

Where excavation is to be carried out in the wet or water-bearing sands or silts, the possibility of flowing sides and bottom boiling dictates that the ground be predrained by pumping from closely spaced sump-wells or, if necessary, the use of a well-point dewatering system. This should be assessed by test pumping prior to the project construction when the intended bottom of excavation is determined. In order to provide a stable subgrade for the services or foundation construction, the groundwater should be depressed at least 1.0 m below the subgrade level.

Alternatively, sheeting structures can be installed around the excavation. The sheeting structure should be driven to a depth below the bottom of the excavation at least equal to the height of water above the bed of excavation. The sheeting structure must be properly designed to sustain the earth pressure, hydrostatic pressure and applicable surcharge loads.

Prospective contractors must be asked to assess the in situ subsurface conditions for soil cuts by digging test pits to at least 0.5 m below the intended bottom of excavation. These test pits should be allowed to remain open for a period of at least 4 hours to assess the trenching conditions.

## 7.0 LIMITATIONS OF REPORT

This report was prepared by Soil Engineers Ltd. for the account of Mayfield McLaughlin Developments Inc. and for review by its designated consultants and government agencies. Use of the report is subject to the conditions and limitations of the contractual agreement. The material in it reflects the judgement of Mumta Mistry, B.A.Sc., and Bernard Lee, P.Eng., in light of the information available to it at the time of preparation. Any use which a Third Party makes of this report, or any reliance on decisions to be made based on it, are the responsibility of such Third Parties. Soil Engineers Ltd. accepts no responsibility for damages, if any, suffered by any Third Party as a result of decisions made or actions based on this report.

**SOIL ENGINEERS LTD.**

Mumta Mistry, B.A.Sc.

Bernard Lee, P.Eng.
MM/BL:dd

# LIST OF ABBREVIATIONS AND DESCRIPTION OF TERMS

The abbreviations and terms commonly employed on the borehole logs and figures, and in the text of the report, are as follows:

## SAMPLE TYPES

AS Auger sample
CS Chunk sample
DO Drive open (split spoon)
DS Denison type sample
FS Foil sample
RC Rock core (with size and percentage recovery)
ST Slotted tube
TO Thin-walled, open
TP Thin-walled, piston
WS Wash sample

## PENETRATION RESISTANCE

Dynamic Cone Penetration Resistance:

A continuous profile showing the number of blows for each foot of penetration of a 2-inch diameter, 90° point cone driven by a 140-pound hammer falling 30 inches.

Plotted as '—●—'

Standard Penetration Resistance or 'N' Value:

The number of blows of a 140-pound hammer falling 30 inches required to advance a 2-inch O.D. drive open sampler one foot into undisturbed soil.

Plotted as '○'

WH Sampler advanced by static weight
PH Sampler advanced by hydraulic pressure
PM Sampler advanced by manual pressure
NP No penetration

## SOIL DESCRIPTION

Cohesionless Soils:

| 'N' (blows/ft) | Relative Density |
|---|---|
| 0 to 4 | very loose |
| 4 to 10 | loose |
| 10 to 30 | compact |
| 30 to 50 | dense |
| over 50 | very dense |

Cohesive Soils:

| Undrained Shear Strength (ksf) | 'N' (blows/ft) | Consistency |
|---|---|---|
| less than 0.25 | 0 to 2 | very soft |
| 0.25 to 0.50 | 2 to 4 | soft |
| 0.50 to 1.0 | 4 to 8 | firm |
| 1.0 to 2.0 | 8 to 16 | stiff |
| 2.0 to 4.0 | 16 to 32 | very stiff |
| over 4.0 | over 32 | hard |

Method of Determination of Undrained Shear Strength of Cohesive Soils:

x 0.0 Field vane test in borehole; the number denotes the sensitivity to remoulding

△ Laboratory vane test

□ Compression test in laboratory

For a saturated cohesive soil, the undrained shear strength is taken as one half of the undrained compressive strength

## METRIC CONVERSION FACTORS

1 ft = 0.3048 metres
1lb = 0.454 kg
1 inch = 25.4 mm
1ksf = 47.88 kPa

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 1

**FIGURE NO.:** 1

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 30, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 260.4 | Ground Surface | | | | | | | |
| 0.0 | **15 cm TOPSOIL** | | | | 0 | | | |
| | Brown, stiff, weathered **SILTY CLAY TILL** sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders — clay layers | 1 | DO | 9 | | | 15 | |
| 259.6 / 0.8 | | 2 | DO | 26 | 1 | | 12 | |
| | Brown, compact **SILTY SAND TILL** traces of clay and gravel occ. wet sand and silt seams and layers, cobbles and boulders | 3 | DO | 30 | 2 | | 12 | |
| 258.9 / 1.5 | Very stiff **SILTY CLAY TILL** a trace of sand to sandy a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders | 4 | DO | 30 | | | 9 | |
| | | 5 | DO | 30 | 3 | | 12 | |
| | — — brown / grey | 6 | DO | 17 | 4 5 | | 17 | |
| | | 7 | DO | 20 | 6 | | 12 | |
| 253.8 / 6.6 | **END OF BOREHOLE** | | | | 7 8 9 10 11 | | | Dry on completion |

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 2

**FIGURE NO.:** 2

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 30, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 259.5 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Brown, firm, weathered | 1 | DO | 7 | | | 10 | |
| | **SILTY CLAY TILL** | | | | | | | |
| 258.7 | some sand to sandy | | | | | | | |
| 0.8 | a trace of gravel | 2 | DO | 17 | 1 | | 12 | |
| | occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| | Brown, compact | | | | | | | |
| 257.7 | **SILTY SAND TILL** | 3 | DO | 28 | | | 12 | |
| 1.8 | traces of clay and gravel | | | | 2 | | | |
| | occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| | Very stiff to hard | 4 | DO | 24 | | | 11 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace of sand to sandy | 5 | DO | 33 | 3 | | 11 | |
| | a trace of gravel | | | | | | | |
| | occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| | brown / grey | | | | 4 | | | |
| | | 6 | DO | 26 | | | 15 | |
| | | | | | 5 | | | |
| 253.4 | | | | | | | | |
| 6.1 | Grey, very stiff | | | | 6 | | | |
| | **SILTY CLAY** | 7 | DO | 19 | | | 17 | |
| 252.9 | | | | | | | | |
| 6.6 | a trace to some sand | | | | | | | |
| | occ. gravel | | | | 7 | | | |
| | **END OF BOREHOLE** | | | | | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

WATER LEVEL: Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 3

**FIGURE NO.:** 3

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:**

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:**

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES: Number | SAMPLES: Type | SAMPLES: N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 259.0 | Ground Surface | | | | | | | |
| 0.0 | **CANCELLED BOREHOLE** | | | | 0 1 2 3 4 5 6 | | | |
| 252.4 / 6.6 | **END OF BOREHOLE** | | | | 7 8 9 10 11 | | | |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 4

**FIGURE NO.:** 4

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 29, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 259.6 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Firm to very stiff | 1 | DO | 11 | | | 17 | |
| | **SILTY CLAY TILL** — weathered | | | | | | | |
| | — silt seams | 2 | DO | 24 | 1 | | 15 | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders — silt seams | 3 | DO | 24 | | | 16 | |
| | | | | | 2 | | | |
| | | 4 | DO | 32 | | | 15 | |
| | — brown grey | | | | 3 | | | |
| | | 5 | DO | 15 | | | 15 | |
| | | | | | 4 | | | |
| | — silty fine sand | 6A<br>6B | DO | 6 | | | 17<br>22 | |
| | | | | | 5 | | | |
| 253.3 | | | | | 6 | | | |
| 6.3 | Grey, compact<br>**SANDY SILT TILL**<br>traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 7 | DO | 18 | | | 15 | |
| 252.0 | | | | | 7 | | | |
| 7.6 | Grey, very dense | 8 | DO | 50/5 | | | 12 | |
| | **SILT**<br>a trace of clay<br>a trace to some sand | | | | 8 | | | |
| 250.5 | | | | | 9 | | | |
| 9.1 | Grey, very dense | 9 | DO | 50/10 | | | 7 | |
| 250.2 | **SILTY SAND TILL** | | | | | | | |
| 9.4 | traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 10 | | | |
| | **END OF BOREHOLE** | | | | 11 | | | |

W.L. @ El. 255.0 m on completion
Cave-in @ El. 255.0 m on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 5

**FIGURE NO.:** 5

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 29, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 260.6 | Ground Surface | | | | | | | |
| 0.0 | **25 cm TOPSOIL** | | | | 0 | | | |
| | Brown, stiff, weathered **SILTY CLAY TILL** traces of sand and gravel occ. wet sand and silt seams and layers, cobbles and boulders | 1 | DO | 10 | | | 13 | |
| 259.8 / 0.8 | Brown, compact to dense **SANDY SILT TILL** traces to some clay and gravel occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 33 | 1 | | 9 | |
| | | 3 | DO | 23 | 2 | | 12 | |
| 258.1 / 2.5 | Stiff to very stiff **SILTY CLAY TILL** brown/grey a trace of sand to sandy a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders | 4 | DO | 27 | | | 13 | |
| | | 5 | DO | 21 | 3 | | 15 | |
| | | 6 | DO | 21 | 4 5 | | 12 | |
| 254.0 | | 7 | DO | 16 | 6 | | 15 | |
| 6.6 | **END OF BOREHOLE** Installed 50 mm Ø PVC monitoring well to 6.1 m (3.0 m screen) Sand backfill from 2.4 to 6.1 m Bentonite holeplug from 0.3 to 2.4 m Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 7 8 9 10 11 | | | Dry on completion W.L. @ El. 256.7 m on February 1, 2018 |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 6

**FIGURE NO.:** 6

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 1, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 259.3 | Ground Surface | | | | | | | |
| 0.0 | **18 cm TOPSOIL** | | | | 0 | | | |
| | Stiff to very stiff — sand seams | 1 | DO | 9 | | | 15 | |
| | **SILTY CLAY TILL** — weathered | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 31 | 1 | | 14 | |
| | | 3 | DO | 24 | 2 | | 14 | |
| | | 4 | DO | 28 | | | 15 | |
| | — brown<br>grey | 5 | DO | 19 | 3 | | 19 | |
| | | 6 | DO | 16 | 4 | | 13 | |
| | — grey<br>reddish-grey | 7 | DO | 18 | 5 | | 12 | |
| 252.7 | | | | | 6 | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 7

**FIGURE NO.:** 7

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 1, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 259.3 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Firm to very stiff organic inclusions/ weathered **SILTY CLAY TILL** | 1 | DO | 7 | | | 17 | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 31 | 1 | | 11 | |
| | | 3 | DO | 25 | 2 | | 13 | |
| | | 4 | DO | 32 | | | 13 | |
| | | 5 | DO | 28 | 3 | | 12 | |
| | brown grey/sandy silt | 6A<br>6B | DO | 11 | 4<br>5 | | 17<br>20 | Dry on completion |
| | grey reddish-grey | 7 | DO | 21 | 6 | | 10 | |
| 252.7<br>6.6 | **END OF BOREHOLE** | | | | 7<br>8<br>9<br>10<br>11 | | | |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 8

**FIGURE NO.:** 8

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 30, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.4 | Ground Surface | | | | | | | |
| 0.0 | **8 cm TOPSOIL/ROOTS** | | | | 0 | | | |
| | Brown, loose to compact **SANDY SILT TILL** a trace to some clay a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders — topsoil inclusions/ weathered | 1 | DO | 7 | | | 21 | |
| | | 2 | DO | 27 | 1 | | 10 | |
| 256.9 | | | | | | | | |
| 1.5 | Very stiff to hard **SILTY CLAY TILL** a trace to some sand a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders — brown grey sand seams | 3 | DO | 24 | 2 | | 12 | |
| | | 4 | DO | 37 | | | 15 | |
| | | 5 | DO | 21 | 3 | | 15 | |
| | | 6 | DO | 19 | 4 | | 16 | |
| | | 7 | DO | 28 | 5 | | 19 | |
| 251.8 | | | | | 6 | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | Dry on completion |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 9

**FIGURE NO.:** 9

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 30, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.9 | Ground Surface | | | | | | | |
| 0.0 | **23 cm TOPSOIL** | | | | 0 | | | |
| | Firm to very stiff — topsoil inclusions/ weathered | 1 | DO | 7 | | | 19 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 26 | 1 | | 16 | |
| | | 3 | DO | 27 | 2 | | 14 | |
| | | 4 | DO | 31 | | | 17 | |
| | brown grey sand seams | 5 | DO | 16 | 3 | | 14 | |
| | | 6 | DO | 21 | 4 5 | | 13 | |
| 251.3 | | 7 | DO | 24 | 6 | | 9 | Dry on completion |
| 6.6 | **END OF BOREHOLE** | | | | 7 8 9 10 11 | | | |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 10

**FIGURE NO.:** 10

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 30, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.1 | Ground Surface | | | | | | | |
| 0.0 | **28 cm TOPSOIL** | | | | 0 | | | |
| | Brown, loose to compact | 1 | DO | 8 | | | 16 | |
| | **SILTY SAND TILL** — topsoil inclusions | 2 | DO | 15 | 1 | | 15 | |
| | traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders — weathered | 3 | DO | 21 | | | 11 | |
| 255.8 | | | | | 2 | | | |
| 2.3 | Stiff to very stiff — brown grey | 4 | DO | 20 | | | 16 | |
| | **SILTY CLAY TILL** | | | | 3 | | | |
| | a trace to some sand<br>a trace of gravel — silt/clay layers<br>occ. wet sand and silt seams and layers, cobbles and boulders | 5 | DO | 18 | | | 13 | |
| | | 6 | DO | 16 | 4 | | 17 | |
| | — grey reddish-grey | 7 | DO | 24 | 5 | | 10 | |
| 251.5 | | | | | 6 | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | Installed 50 mm Ø PVC monitoring well to 6.1 m (3.0 m screen)<br>Sand backfill from 2.4 to 6.1 m<br>Bentonite holeplug from 0.3 to 2.4 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion
W.L. @ El. 255.2 m on February 1, 2018

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 11

**FIGURE NO.:** 11

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 30, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.7 | Ground Surface | | | | | | | |
| 0.0 | **18 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard | 1 | DO | 8 | | | 16 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace of sand to sandy — coarse sand | 2 | DO | 5 | 1 | | 15 | |
| | a trace of gravel | | | | | | | |
| | occ. wet sand and silt seams and — weathered layers, cobbles and boulders | 3 | DO | 32 | | | 14 | |
| | | | | | 2 | | | |
| | | 4 | DO | 34 | | | 15 | |
| | — brown | | | | 3 | | | |
| | grey | 5 | DO | 17 | | | 16 | |
| | | | | | 4 | | | |
| | | 6 | DO | 16 | | | 10 | |
| | | | | | 5 | | | |
| | — grey reddish-grey | | | | 6 | | | |
| 252.1 | silt/sand layers | 7 | DO | 20 | | | 11 | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 12

**FIGURE NO.:** 12

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 5, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) / Shear Strength (kN/m²) / Penetration Resistance (blows/30 cm) | Atterberg Limits PL LL / Moisture Content (%) | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.0 | Ground Surface | | | | | | | |
| 0.0 | **23 cm TOPSOIL** | | | | 0 | | | |
| | Brown, stiff to hard — organic inclusions/ weathered | 1 | DO | 15 | | | 11 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 33 | 1 | | 10 | |
| | | 3 | DO | 25 | 2 | | 12 | |
| | | 4 | DO | 25 | | | 12 | |
| 255.0 | | | | | 3 | | | |
| 3.0 | Brown, dense | 5 | DO | 42 | | | 11 | |
| | **SILTY SAND TILL**<br>a trace of clay, some gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 4 | | | |
| 253.4 | | | | | | | | |
| 4.6 | Stiff to hard | 6 | DO | 16 | 5 | | 22 | |
| | **SILTY CLAY TILL**<br>traces of sand and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders — grey / reddish-grey silt layers | 7 | DO | 43 | 6 | | 15 | |
| 251.4 | | | | | | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | Installed 50 mm Ø PVC monitoring well to 6.1 m (3.0 m screen)<br>Sand backfill from 2.4 to 6.1 m<br>Bentonite holeplug from 0.3 to 2.4 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion
W.L. @ El. 255.5 m on February 1, 2018

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 13

**FIGURE NO.:** 13

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 1, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.5 | Ground Surface | | | | | | | |
| 0.0 | **28 cm TOPSOIL** | | | | 0 | | | |
| | Firm to very stiff | 1 | DO | 6 | | | 17 | |
| | **SILTY CLAY TILL** — weathered | | | | | | | |
| | | 2 | DO | 28 | 1 | | 15 | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| | | 3 | DO | 32 | | | 15 | |
| | | | | | 2 | | | |
| | | 4 | DO | 25 | | | 15 | |
| | — brown grey | | | | 3 | | | |
| | | 5 | DO | 16 | | | 16 | |
| | | | | | 4 | | | |
| | | 6 | DO | 11 | | | 19 | |
| | | | | | 5 | | | |
| | | | | | 6 | | | |
| 252.2 6.3 | | 7 | DO | 14 | | | 27 | |
| 251.9 6.6 | Grey, stiff<br>**SILTY CLAY**<br>a trace of sand | | | | 7 | | | |
| | **END OF BOREHOLE** | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 14

**FIGURE NO.:** 14

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 1, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.0 | Ground Surface | | | | | | | |
| 0.0 | **23 cm TOPSOIL** | | | | 0 | | | |
| | Firm to very stiff — organic inclusions/ weathered | 1 | DO | 7 | | | 17 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 25 | 1 | | 14 | |
| | | 3 | DO | 23 | 2 | | 16 | |
| | | 4 | DO | 30 | | | 14 | |
| | — brown grey | 5 | DO | 14 | 3 | | 16 | |
| | — grey reddish-grey | 6 | DO | 17 | 5 | | 10 | |
| | — sand pockets | | | | 6 | | | |
| 250.8 | Grey, compact | 7A | DO | 22 | | | 16 | |
| 6.2 | **SILT** — clay seams | 7B | | | | | 21 | |
| 250.4 | a trace to some clay<br>a trace of sand | | | | | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 15

**FIGURE NO.:** 15

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 1, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.8 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** (topsoil inclusions/ weathered) | | | | 0 | | | |
| | Stiff to very stiff | 1 | DO | 20 | | | 20 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 26 | 1 | | 12 | |
| | | 3 | DO | 21 | 2 | | 15 | |
| | | 4 | DO | 27 | | | 18 | |
| | (brown grey) | 5 | DO | 19 | 3 | | 17 | |
| | | 6 | AS | 12 | 4 | | 12 | |
| | | 7 | DO | 19 | 5 | | 13 | |
| 251.2 | | | | | 6 | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 16

**FIGURE NO.:** 16

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 5, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) / Shear Strength (kN/m²) / Penetration Resistance (blows/30 cm) | Atterberg Limits PL LL / Moisture Content (%) | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.6 | Ground Surface | | | | | | | |
| 0.0 | **28 cm TOPSOIL** | | | | | | | |
| | Brown, stiff to hard — weathered | 1 | DO | 11 | 0 | | 19 | |
| | **SILTY CLAY TILL** | 2 | DO | 27 | 1 | | 14 | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 3 | DO | 29 | 2 | | 16 | |
| | | 4 | DO | 39 | | | 14 | |
| 254.6 | | | | | 3 | | | |
| 3.0 | Brown, compact | 5 | DO | 27 | | | 17 | |
| | **SANDY SILT** | | | | | | | |
| | traces of clay and gravel | | | | 4 | | | |
| 253.0 | | | | | | | | |
| 4.6 | Stiff — silt seams | 6 | DO | 16 | | | 12 | |
| | **SILTY CLAY TILL** — grey<br>a trace of sand to sandy — reddish-grey<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 5 | | | |
| 251.5 | | | | | | | | |
| 6.1 | Reddish-grey, very dense | 7 | DO | 67 | 6 | | 8 | |
| 251.0 | **SANDY SILT TILL** | | | | | | | |
| 6.6 | traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 7 | | | |
| | **END OF BOREHOLE** | | | | | | | |
| | Installed 50 mm Ø PVC monitoring well to 6.1 m (3.0 m screen)<br>Sand backfill from 2.4 to 6.1 m<br>Bentonite holeplug from 0.3 to 2.4 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Cave-in @ El. 252.4 m on completion
W.L. @ El. 253.8 m on February 1, 2018

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 17

**FIGURE NO.:** 17

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 5, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 256.5 | Ground Surface | | | | | | | |
| 0.0 | **25 cm TOPSOIL** | | | | 0 | | | |
| | Firm to very stiff<br>organic inclusions/ weathered<br>**SILTY CLAY TILL**<br>a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 1 | DO | 8 | | | 16 | |
| | | 2 | DO | 18 | 1 | | 10 | |
| | | 3 | DO | 25 | 2 | | 15 | |
| | brown grey | 4 | DO | 19 | | | 14 | |
| | silt layers | 5 | DO | 18 | 3 | | 18 | |
| | grey reddish-grey/ clay layers | 6 | DO | 18 | 4<br>5 | | 10 | |
| 250.4 | | | | | 6 | | | |
| 6.1 | Reddish-grey, dense<br>**SILTY SAND TILL**<br>traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 7 | DO | 40 | | | 9 | |
| 249.9 | | | | | 7 | | | |
| 6.6 | **END OF BOREHOLE** | | | | 8<br>9<br>10<br>11 | | | |

Cave-in @ El. 250.7 m on completion

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 18

**FIGURE NO.:** 18

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:**

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:**

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES: Number | SAMPLES: Type | SAMPLES: N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.2 | Ground Surface | | | | | | | |
| 0.0 | **CANCELLED BOREHOLE** | | | | 0 1 2 3 4 5 6 | | | |
| 250.6 / 6.6 | **END OF BOREHOLE** | | | | 7 8 9 10 11 | | | |

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 19

**FIGURE NO.:** 19

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 5, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.2 | Ground Surface | | | | | | | |
| 0.0 | **30 cm TOPSOIL** | | | | 0 | | | |
| | Firm to very stiff — sand layers | 1 | DO | 8 | | | 15 | |
| | **SILTY CLAY TILL** — weathered | 2 | DO | 20 | 1 | | 14 | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 3 | DO | 25 | | | 14 | |
| | | 4 | DO | 29 | 2 | | 16 | |
| | — brown grey | 5 | DO | 16 | 3 | | 10 | |
| | | | | | 4 | | | |
| | | 6 | DO | 18 | 5 | | 14 | |
| | — grey reddish-grey | | | | 6 | | | |
| 251.0 | | 7 | DO | 45 | | | 12 | |
| 6.2 | Grey, dense | | | | | | | |
| 250.6 | **SILT** | | | | | | | |
| 6.6 | traces of clay and sand | | | | | | | |
| | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 20

**FIGURE NO.:** 20

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 5, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.9 | Ground Surface | | | | | | | |
| 0.0 | **25 cm TOPSOIL** | | | | 0 | | | |
| | Stiff to hard | 1 | DO | 12 | | | 15 | |
| | **SILTY CLAY TILL** — weathered | 2 | DO | 33 | 1 | | 11 | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and<br>layers, cobbles and boulders — sand layers | 3 | DO | 30 | 2 | | 13 | |
| | | 4 | DO | 17 | | | 14 | |
| | — brown grey/ silt layers | 5 | DO | 25 | 3 | | 15 | |
| | | 6 | DO | 14 | 4 | | 15 | |
| | — grey reddish-grey | 7 | DO | 24 | 5 | | 12 | |
| 251.3 | | | | | 6 | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

W.L. @ El. 252.1 m on completion ▽

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 21

**FIGURE NO.:** 21

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 6, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 256.8 | Ground Surface | | | | | | | |
| 0.0 | **18 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard<br>organic inclusions/ weathered<br>**SILTY CLAY TILL**<br>a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 1 | DO | 8 | | | 19 | |
| | | 2 | DO | 21 | 1 | | 13 | |
| | | 3 | DO | 28 | 2 | | 15 | |
| | sand seams | 4 | DO | 35 | | | 14 | |
| | brown grey | 5 | DO | 19 | 3 | | 14 | |
| | grey reddish-grey | 6 | DO | 16 | 5 | | 10 | |
| 250.2 | | 7 | DO | 18 | 6 | | 10 | |
| 6.6 | **END OF BOREHOLE**<br>Installed 50 mm Ø PVC monitoring well to 6.1 m (3.0 m screen)<br>Sand backfill from 2.4 to 6.1 m<br>Bentonite holeplug from 0.3 to 2.4 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 7<br>8<br>9<br>10<br>11 | | | W.L. @ El. 250.9 m on completion<br>W.L. @ El. 253.7 m on February 1, 2018 |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 22

**FIGURE NO.:** 22

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 6, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 256.9 | Ground Surface | | | | | | | |
| 0.0 | **25 cm TOPSOIL** | | | | 0 | | | |
| | Stiff to very stiff — weathered | 1 | DO | 11 | | | 16 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 24 | 1 | | 14 | |
| | | 3 | DO | 25 | | | 13 | |
| | | 4 | DO | 26 | 2 | | 15 | |
| | — brown / grey | 5 | DO | 20 | 3 | | 17 | |
| | | 6 | DO | 14 | 4 | | 21 | |
| | — grey / reddish-grey sand layers | 7 | DO | 26 | 5 | | 12 | |
| 250.3 | | | | | 6 | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

W.L. @ El. 251.1 m on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 23

**FIGURE NO.:** 23

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 6, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 256.7 | Ground Surface | | | | | | | |
| 0.0 | **28 cm TOPSOIL** | | | | 0 | | | |
| | Stiff to very stiff — topsoil inclusions/ weathered | 1 | DO | 9 | | | 18 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 23 | 1 | | 14 | |
| | | 3 | DO | 32 | 2 | | 14 | |
| | | 4 | DO | 21 | | | 20 | |
| | — brown / grey | 5 | DO | 15 | 3 | | 14 | |
| | — grey / reddish-grey | 6 | DO | 18 | 5 | | 12 | |
| 250.1 | | 7 | DO | 25 | 6 | | 19 | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 24

**FIGURE NO.:** 24

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 6, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 256.8 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Brown, loose, weathered **SILTY SAND TILL** traces of clay and gravel occ. wet sand and silt seams and layers, cobbles and boulders | 1 | DO | 8 | | | 15 | |
| 256.0 / 0.8 | Stiff to very stiff | 2 | DO | 23 | 1 | | 13 | |
| | **SILTY CLAY TILL** a trace of sand to sandy a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders | 3 | DO | 22 | 2 | | 12 | |
| | | 4 | DO | 29 | | | 11 | |
| | brown / grey | 5 | DO | 18 | 3 | | 10 | |
| | grey / reddish-grey | 6 | DO | 16 | 4 5 | | 11 | Dry on completion |
| 250.7 / 6.1 | Grey, very stiff **SILTY CLAY** a trace of sand occ. gravel | 7 | DO | 20 | 6 | | 20 | |
| 250.2 / 6.6 | **END OF BOREHOLE** | | | | 7 8 9 10 11 | | | |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 25

**FIGURE NO.:** 25

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 8, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 256.1 | Ground Surface | | | | | | | |
| 0.0 | **23 cm TOPSOIL** | | | | 0 | | | |
| | Brown, loose to compact<br>**SILTY SAND TILL**<br>a trace to some clay — weathered<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 1 | DO | 7 | | | 14 | |
| | | 2 | DO | 20 | 1 | | 8 | |
| 254.6 | | | | | | | | |
| 1.5 | Stiff to very stiff<br>**SILTY CLAY TILL**<br>a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders — brown / grey | 3 | DO | 20 | 2 | | 18 | |
| | | 4 | DO | 26 | | | 15 | |
| | | 5 | DO | 15 | 3 | | 11 | |
| | — grey / reddish-grey | 6 | DO | 21 | 4 | | 10 | |
| 250.0 | | | | | 5 | | | |
| 6.1 | Grey, very dense<br>**SILTY SAND TILL**<br>traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 7 | DO | 50/15 | 6 | | 6 | |
| 248.5 | | | | | 7 | | | |
| 7.6 | Red, hard<br>**SILTY CLAY TILL**<br>a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles, boulders and shale fragments | 8 | DO | 50/10 | | | 7 | |
| 247.0 | | | | | 8 | | | |
| 246.9 | Red, weathered | 9 | DO | 50/10 | | | 10 | |
| 9.2 | **SHALE BEDROCK**<br>with limestone layers<br>**END OF BOREHOLE** | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 26

**FIGURE NO.:** 26

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 8, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 255.8 | Ground Surface | | | | | | | |
| 0.0 | **15 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard | 1 | DO | 5 | | | 24 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace to some sand | 2 | DO | 11 | 1 | | 16 | |
| | a trace of gravel | | | | | | | |
| | occ. wet sand and silt seams and layers, cobbles and boulders; weathered | 3 | DO | 21 | | | 14 | |
| | brown / grey | 4 | DO | 22 | 2 | | 12 | |
| | grey / reddish-grey | 5 | DO | 14 | 3 | | 14 | |
| | | 6 | DO | 50/5 | 4 | | 11 | |
| 249.7 | | | | | 5 | | | |
| 6.1 | Grey, dense | | | | | | | |
| 249.4 | **GRAVELLY SAND** | 7A | DO | 45 | 6 | | 9 | |
| 6.4 | some silt | 7B | | | | | 8 | |
| | Dense to very dense | | | | | | | |
| | **SANDY SILT TILL** | | | | 7 | | | |
| | a trace of clay | | | | | | | |
| | a trace to some gravel | | | | | | | |
| | occ. wet sand and silt seams and layers, cobbles and boulders; grey / red | 8 | DO | 71 | | | 9 | |
| 247.8 | | | | | 8 | | | |
| 8.0 | Red, weathered | | | | | | | |
| | **SHALE BEDROCK** | | | | | | | |
| | with limestone layers | | | | 9 | | 8 | |
| 246.5 | | 9 | DO | 50/13 | | | | |
| 9.3 | **END OF BOREHOLE** | | | | 10 | | | |
| | Installed 50 mm Ø PVC monitoring well to 9.1 m (3.0 m screen)<br>Sand backfill from 5.5 to 9.1 m<br>Bentonite holeplug from 0.3 to 5.5 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 11 | | | W.L. @ El. 253.7 m on February 1, 2018<br>W.L. @ El. 246.8 m on completion |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 27

**FIGURE NO.:** 27

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 8, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 256.6 | Ground Surface | | | | | | | |
| 0.0 | **28 cm TOPSOIL** | | | | 0 | | | |
| | Brown, loose, weathered — topsoil inclusions | 1 | DO | 7 | | | 22 | |
| | **SILT** — sand layers | 2 | DO | 8 | 1 | | 20 | |
| | traces to some clay and sand | | | | | | | |
| 255.1 | | | | | | | | |
| 1.5 | Brown, compact | 3 | DO | 12 | 2 | | 17 | |
| | **SILTY SAND TILL** | | | | | | | |
| | a trace to some clay<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 4 | DO | 23 | | | 14 | |
| | | 5 | DO | 25 | 3 | | 11 | |
| 252.0 | | | | | 4 | | | |
| 4.6 | Grey, stiff | 6 | DO | 14 | 5 | | 23 | |
| | **SILTY CLAY**<br>a trace of sand<br>occ. gravel | | | | | | | |
| 250.5 | | | | | 6 | | | |
| 6.1 | Dense to very dense | 7 | DO | 48 | | | 8 | |
| | **SANDY SILT TILL**<br>traces to some clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 7 | | | |
| | — reddish-grey red | 8 | DO | 75 | 8 | | 6 | |
| 247.3 | | 9 | DO | 50/15 | 9 | | 6 | |
| 9.3 | **END OF BOREHOLE** | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 28

**FIGURE NO.:** 28

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 6, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 255.9 | Ground Surface | | | | | | | |
| 0.0 | **25 cm TOPSOIL** | | | | 0 | | | |
| | Brown, stiff to very stiff — organic inclusions/ weathered | 1 | DO | 10 | | | 16 | |
| | **SILTY CLAY TILL** — sand layers | 2 | DO | 20 | 1 | | 12 | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 3 | DO | 19 | | | 15 | |
| 254.0 | | | | | 2 | | | |
| 1.9 | Compact | | | | | | | |
| | **SILT** — brown grey | 4 | DO | 20 | | | 21 | |
| | a trace to some clay<br>a trace of sand | 5 | DO | 19 | 3 | | 21 | |
| | | | | | 4 | | | |
| | — clay layers | 6 | DO | 20 | | | 18 | |
| 249.8 | | | | | 5 | | | |
| 6.1 | Grey, stiff | | | | 6 | | | |
| | **SILTY CLAY TILL**<br>traces of sand and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 7 | AS | 15 | | | 13 | |
| 249.3 | | | | | | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

WATER LEVEL: Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 29

**FIGURE NO.:** 29

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 6, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 256.2 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Stiff to very stiff<br>organic inclusions/ weathered<br>**SILTY CLAY TILL** | 1 | DO | 9 | | | 19 | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 31 | 1 | | 11 | |
| | | 3 | DO | 28 | 2 | | 10 | |
| | | 4 | DO | 25 | | | 15 | |
| | brown grey | 5 | DO | 16 | 3 | | 13 | |
| | | 6 | DO | 21 | 4 | | 11 | |
| | grey reddish-grey | 7 | DO | 26 | 5 | | 8 | |
| 249.6 | | | | | 6 | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 30

**FIGURE NO.:** 30

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 7, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 256.5 | Ground Surface | | | | | | | |
| 0.0 | **28 cm TOPSOIL** | | | | 0 | | | |
| | Brown, compact **SILTY SAND TILL** traces of clay and gravel occ. wet sand and silt seams and layers, cobbles and boulders | 1 | DO | 14 | | | 12 | |
| | | 2 | DO | 20 | 1 | | 12 | |
| 255.0 | | | | | | | | |
| 1.5 | Brown, stiff **SILTY CLAY TILL** some sand to sandy a trace of gravel | 3 | DO | 16 | | | 11 | |
| 254.2 | | | | | 2 | | | |
| 2.3 | occ. wet sand and silt seams and layers, cobbles and boulders | 4 | DO | 16 | | | 14 | |
| | Brown, compact **SANDY SILT TILL** a trace to some clay a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders | 5A | DO | 26 | 3 | | 12 | |
| 253.2 | | 5B | | | | | 11 | |
| 3.3 | Stiff to very stiff **SILTY CLAY TILL** a trace to some sand a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders | 6 | DO | 16 | 4 | | | |
| | | | | | 5 | | 16 | |
| | | | | | 6 | | | |
| | | 7 | DO | 25 | | | 12 | |
| 249.9 | | | | | 7 | | | |
| 6.6 | **END OF BOREHOLE** | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

brown / grey

grey / reddish-grey / cobble

Dry on completion

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 31

**FIGURE NO.:** 31

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 7, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 255.8 | Ground Surface | | | | | | | |
| 0.0 | **25 cm TOPSOIL** | | | | 0 | | | |
| | Brown, firm, weathered **SILTY CLAY TILL** a trace to some sand a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders with organic inclusions | 1 | DO | 5 | | | 16 | |
| 255.0 / 0.8 | | 2 | DO | 12 | 1 | | 18 | |
| 254.3 / 1.5 | Brown, compact **SILTY SAND TILL** traces of clay and gravel occ. wet sand and silt seams and layers, cobbles and boulders Very stiff to hard | 3 | DO | 17 | 2 | | 15 | |
| | | 4 | DO | 29 | | | 12 | |
| | **SILTY CLAY TILL** brown / grey a trace of sand to sandy a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders | 5 | DO | 22 | 3 | | 17 | |
| | | 6 | DO | 20 | 4 | | 11 | |
| | | 7 | DO | 24 | 5 | | 18 | |
| | grey / reddish-grey/ silt layers / red | 8A / 8B | DO | 54 | 6 | | 11 / 7 | |
| 246.7 / 9.1 | Red | 9 | DO | 50/13 | 7 | | 7 | |
| | **SHALE BEDROCK** with limestone layers | | | | 8 | | | |
| | weathered | 10 | AS | - | 9 | | 10 | |
| 244.8 | *(Continued on next page)* | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion
W.L. @ El. 251.4 m on February 1, 2018

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 31

**FIGURE NO.:** 31

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 7, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | SAMPLES Type | SAMPLES N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 11.0 | *(Continued)*<br>Red<br><br>**SHALE BEDROCK** | | | | 11 | | | |
| 243.6 | with limestone layers | 11 | AS | - | 12 | | 11 | |
| 12.2 | **END OF BOREHOLE**<br><br>Installed 50 mm Ø PVC monitoring well to 12.2 m (3.0 m screen)<br>Sand backfill from 8.5 to 12.2 m<br>Bentonite holeplug from 0.3 to 8.5 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21<br>22 | | | |

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 32

**FIGURE NO.:** 32

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 7, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 255.6 | Ground Surface | | | | | | | |
| 0.0 | **28 cm TOPSOIL** | | | | 0 | | | |
| | Firm to very stiff — topsoil inclusions | 1 | DO | 8 | | | 28 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace of sand to sandy | 2 | DO | 7 | 1 | | 18 | |
| | a trace of gravel | | | | | | | |
| | occ. wet sand and silt seams and — weathered | | | | | | | |
| | layers, cobbles and boulders | 3 | DO | 17 | 2 | | 17 | |
| | | 4 | DO | 19 | | | 13 | |
| | — brown | | | | 3 | | | |
| | — grey | 5A | DO | 16 | | | 17 | |
| | — silt | 5B | | | | | 15 | |
| | | 6 | DO | 15 | 4 | | 14 | |
| 249.5 | | | | | 5 | | | |
| 6.1 | Very dense | | | | 6 | | | |
| | **SANDY SILT TILL** — reddish-grey | 7A | DO | 68 | | | 9 | |
| 249.1 | a trace to some clay — red | 7B | | | | | 6 | |
| 6.5 | a trace of gravel | | | | 7 | | | |
| | occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| | Red, weathered | | | | | | | |
| | **SHALE BEDROCK** | | | | | | | |
| 247.8 | with limestone layers | 8 | DO | 50/15 | | | 7 | |
| 7.8 | **END OF BOREHOLE** | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 33

**FIGURE NO.:** 33

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** December 7, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 255.9 | Ground Surface | | | | | | | |
| 0.0 | **25 cm TOPSOIL** | | | | 0 | | | |
| | Brown, firm, weathered — sand seams — **SILTY CLAY** a trace of sand | 1 | DO | 7 | | | 20 | |
| 255.1 / 0.8 | Brown, loose, weathered — clay layers — **SILTY FINE SAND** a trace of clay | 2 | DO | 6 | 1 | | 16 | |
| 254.4 / 1.5 | Brown, compact **SANDY SILT** a trace of clay occ. gravel | 3 | DO | 26 | 2 | | 19 | |
| | | 4 | DO | 26 | | | 17 | |
| 252.9 / 3.0 | Dense **SILTY SAND TILL** — brown grey a trace to some clay a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders | 5A 5B | DO | 41 | 3 | | 11 8 | |
| 251.3 / 4.6 | Grey, very stiff **SILTY CLAY TILL** sandy, a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders | 6 | DO | 27 | 4 5 | | 10 | |
| 249.8 / 6.1 | Dense to very dense **SANDY SILT TILL** traces to some clay and gravel occ. wet sand and silt seams and layers, cobbles and boulders — reddish-grey red — transitioning to shale | 7 | DO | 38 | 6 7 | | 8 | |
| 247.8 / 8.1 | **END OF BOREHOLE** | 8 | DO | 54 | 8 9 10 11 | | 8 | W.L. @ El. 248.6 m on completion ▽ |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 34D

**FIGURE NO.:** 34A

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 29, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 259.5 | Ground Surface | | | | | | | |
| 0.0 | **23 cm TOPSOIL** | | | | 0 | | | |
| | Brown, firm to hard | 1 | DO | 7 | | | 21 | |
| | **SILTY CLAY TILL** — weathered | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 18 | 1 | | 16 | |
| | | 3 | DO | 23 | 2 | | 15 | |
| | | 4 | DO | 34 | | | 13 | |
| 256.1 | | 5A | DO | 50 | 3 | | 15 | |
| 3.4 | Brown, dense | 5B | | | | | 10 | |
| | **SILTY SAND TILL**<br>a trace of clay<br>a trace to some gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 4 | | | |
| 254.9 | | | | | | | | |
| 4.6 | Very stiff — reddish-grey / grey | 6 | DO | 19 | 5 | | 10 | |
| | **SILTY CLAY TILL**<br>a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| 253.4 | | | | | 6 | | 8 | |
| 253.3 | Grey, very dense | 7 | DO | 50/8 | | | | |
| 6.2 | **SILTY SAND TILL**<br>traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 7 | | | |
| | **END OF BOREHOLE** | | | | | | | |
| | Installed 50 mm Ø PVC monitoring well to 6.1 m (1.5 m screen)<br>Sand backfill from 4.0 to 6.1 m<br>Bentonite holeplug from 0.3 to 4.0 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion
W.L. @ El. 258.7 m on February 1, 2018

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 34S

**FIGURE NO.:** 34B

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 29, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES: Number | SAMPLES: Type | SAMPLES: N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 259.5<br>0.0 | Ground Surface | | | | 0 | | | |
| | **NESTED GROUNDWATER MONITORING WELL** | | | | 1 | | | |
| | | | | | 2 | | | |
| | | | | | 3 | | | |
| 255.5<br>4.0 | **END OF BOREHOLE**<br><br>Installed 50 mm Ø PVC nested monitoring well to 4.0 m (1.5 m screen)<br>Sand backfill from 1.8 to 4.0 m<br>Bentonite holeplug from 0.3 to 1.8 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 4 | | | Dry on completion<br>W.L. @ El. 258.7 m on February 1, 2018 |
| | | | | | 5 | | | |
| | | | | | 6 | | | |
| | | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 35

**FIGURE NO.:** 35

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 27, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 260.5 | Ground Surface | | | | | | | |
| 0.0 | **15 cm TOPSOIL** | | | | 0 | | | |
| | Stiff to hard clayey | 1 | DO | 12 | | | 18 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | traces to some sand and gravel occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 38 | 1 | | 15 | |
| | | 3 | DO | 30 | | | 15 | |
| | | | | | 2 | | | |
| | | 4 | DO | 26 | | | 13 | |
| | brown / grey | 5 | DO | 25 | 3 | | 12 | |
| | | | | | 4 | | | |
| | | 6 | DO | 17 | | | 12 | |
| | | | | | 5 | | | |
| | grey / reddish-grey | 7 | DO | 50/13 | 6 | | 10 | |
| 254.1 | | | | | | | | |
| 6.4 | **END OF BOREHOLE** | | | | 7 | | | |
| | Installed 50 mm Ø PVC monitoring well to 6.1 m (3.0 m screen)<br>Sand backfill from 2.4 to 6.1 m<br>Bentonite holeplug from 0.3 to 2.4 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion
W.L. @ El. 257.6 m on February 1, 2018

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 36

**FIGURE NO.:** 36

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 27, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength ($kN/m^2$) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.8 | Ground Surface | | | | | | | |
| 0.0 | **15 cm TOPSOIL** | | | | 0 | | | |
| | Stiff to very stiff | 1 | DO | 10 | | | 14 | |
| | **SILTY CLAY TILL** — weathered | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 18 | 1 | | 14 | |
| | | 3 | DO | 20 | 2 | | 11 | |
| | | 4 | DO | 30 | | | 12 | |
| | — brown reddish-grey | | | | 3 | | | |
| 255.6 | | | | | | | | |
| 3.2 | Grey, compact | 5 | DO | 20 | | | 12 | |
| | **SILT**<br>a trace of clay<br>a trace to some sand | | | | 4 | | | |
| 254.2 | | | | | | | | |
| 4.6 | Very dense | 6 | DO | 50/8 | 5 | | 7 | |
| | **SANDY SILT TILL**<br>traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| 252.6 | — grey red | 7 | DO | 50/8 | 6 | | 7 | |
| 6.2 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 37

**FIGURE NO.:** 37

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 27, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 260.0 | Ground Surface | | | | | | | |
| 0.0 | **23 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard | 1 | DO | 8 | | | 15 | |
| | **SILTY CLAY TILL** — weathered | | | | | | | |
| | | 2 | DO | 28 | 1 | | 12 | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| | | 3 | DO | 24 | 2 | | 13 | |
| | | 4 | DO | 25 | | | 14 | |
| | — brown / red | 5 | DO | 36 | 3 | | 14 | |
| | | | | | 4 | | | |
| | — red / grey | 6 | DO | 27 | | | 10 | |
| | | | | | 5 | | | |
| 253.9 | | | | | 6 | | 6 | |
| 253.8 | Grey, very dense | 7 | DO | 50/13 | | | | |
| 6.2 | **SANDY SILT TILL**<br>traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 7 | | | |
| | **END OF BOREHOLE** | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 38

**FIGURE NO.:** 38

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 27, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 260.0 | Ground Surface | | | | | | | |
| 0.0 | **25 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard | 1 | DO | 6 | | | 21 | |
| | **SILTY CLAY TILL** — weathered | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders — sand layers | 2 | DO | 12 | 1 | | 13 | |
| | | 3 | DO | 22 | 2 | | 13 | |
| | | 4 | DO | 29 | | | 13 | |
| | — brown red | 5 | DO | 49 | 3 | | 10 | |
| 255.4 | | | | | 4 | | | |
| 4.6 | Grey, very dense — clay seams/ cobble | 6 | DO | 76/25 | 5 | | 13 | |
| | **SILT**<br>a trace of clay<br>a trace to some sand<br>occ. gravel | | | | | | | |
| 253.9 | | | | | 6 | | | |
| 6.1 | Red, hard<br>**SILTY CLAY TILL**<br>a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 7 | DO | 50/13 | | | 8 | |
| 252.4 | | | | | 7 | | | |
| 252.3 | Red, weathered | 8 | DO | 50/13 | | | 8 | |
| 7.7 | **SHALE BEDROCK**<br>with limestone layers<br>**END OF BOREHOLE** | | | | 8 | | | |
| | Installed 50 mm Ø PVC monitoring well to 7.6 m (3.0 m screen)<br>Sand backfill from 4.0 to 7.6 m<br>Bentonite holeplug from 0.3 to 4.0 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

W.L. @ El. 258.6 m on February 1, 2018

W.L. @ El. 252.7 m on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 39

**FIGURE NO.:** 39

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 27, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 260.2 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard | 1 | DO | 7 | | | 12 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | weathered | 2 | DO | 20 | 1 | | 12 | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 3 | DO | 21 | 2 | | 13 | |
| | | 4 | DO | 32 | | | 10 | |
| | brown grey | 5 | DO | 23 | 3 | | 10 | |
| | | | | | 4 | | | |
| | silt seams | 6 | DO | 41 | 5 | | 11 | |
| 254.1 | | | | | 6 | | | |
| 6.1 | Reddish-grey, compact<br>**SANDY SILT TILL** | 7 | DO | 29 | | | 8 | |
| 253.6 | traces of clay and gravel | | | | | | | |
| 6.6 | occ. wet sand and silt seams and layers, cobbles and boulders<br>**END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 40

**FIGURE NO.:** 40

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 28, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength ($kN/m^2$) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.9 | Ground Surface | | | | | | | |
| 0.0 | **23 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard — topsoil/organic inclusions/ weathered | 1 | DO | 8 | | | 19 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 24 | 1 | | 13 | |
| | | 3 | DO | 16 | 2 | | 13 | |
| | | 4 | DO | 30 | | | 13 | |
| | — brown red | 5 | DO | 37 | 3 | | 16 | |
| | — red grey | 6 | DO | 40 | 4 | | 11 | |
| 252.8 | | | | | 5 | | | |
| 6.1 | Red, very dense | 7 | DO | 50/10 | 6 | | 7 | |
| 252.5 | **SANDY SILT TILL** | | | | | | | |
| 6.4 | traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 7 | | | |
| | **END OF BOREHOLE** | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 41

**FIGURE NO.:** 41

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 28, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 259.0 | Ground Surface | | | | | | | |
| 0.0 | **23 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard<br>organic inclusions/ weathered<br>**SILTY CLAY TILL**<br>a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 1 | DO | 7 | | | 15 | |
| | | 2 | DO | 30 | 1 | | 12 | |
| | | 3 | DO | 23 | 2 | | 14 | |
| | | 4 | DO | 34 | | | 12 | |
| | | 5 | DO | 32 | 3 | | 12 | |
| | brown<br>reddish-grey<br>grey | 6 | DO | 24 | 4<br>5 | | 14 | Dry on completion |
| 252.8<br>6.2 | Grey, compact<br>**SILT**<br>traces of clay and sand | 7 | DO | 27 | 6 | | 17 | |
| 252.4<br>6.6 | **END OF BOREHOLE** | | | | 7<br>8<br>9<br>10<br>11 | | | |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 42

**FIGURE NO.:** 42

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 28, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 259.1 | Ground Surface | | | | | | | |
| 0.0 | **25 cm TOPSOIL** | | | | 0 | | | |
| | Stiff to very stiff topsoil inclusions/ weathered **SILTY CLAY TILL** a trace of sand to sandy a trace of gravel occ. wet sand and silt seams and layers, cobbles and boulders | 1 | DO | 11 | | | 24 | |
| | | 2 | DO | 23 | 1 | | 13 | |
| | | 3 | DO | 25 | 2 | | 14 | |
| | | 4 | DO | 30 | | | 12 | |
| | | 5 | DO | 21 | 3 | | 15 | |
| | brown reddish-grey grey/ silt layers | 6 | DO | 20 | 4 5 | | 24 | Dry on completion |
| 253.0 | | | | | 6 | | | |
| 6.1 | Grey, very dense **SILTY SAND TILL** a trace of clay, some gravel to gravelly occ. wet sand and silt seams and layers, cobbles and boulders | 7 | DO | 50/10 | | | 8 | |
| 252.7 | | | | | 7 | | | |
| 6.4 | **END OF BOREHOLE** | | | | 8 9 10 11 | | | |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 43

**FIGURE NO.:** 43

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 29, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 259.0 | Ground Surface | | | | | | | |
| 0.0 | **23 cm TOPSOIL** | | | | 0 | | | |
| | Brown, stiff to very stiff | 1 | DO | 12 | | | 21 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 19 | 1 | | 15 | |
| | | 3 | DO | 22 | | | 14 | |
| 256.7 | | | | | 2 | | | |
| 2.3 | Brown, dense silt/sand layers<br>**SILTY SAND TILL**<br>traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 4 | DO | 38 | | | 12 | |
| 256.0 | | | | | 3 | | | |
| 3.0 | Brown, dense | 5 | DO | 32 | | | 14 | |
| | **SILTY FINE SAND**<br>a trace of clay | | | | 4 | | | |
| 254.4 | | | | | | | | |
| 4.6 | Grey, very stiff to hard | 6 | DO | 19 | | | 14 | |
| | **SILTY CLAY TILL**<br>traces of sand and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 5 | | | |
| | silt layers | 7 | DO | 50/13 | 6 | | 16 | |
| 252.6 | | | | | | | | |
| 6.4 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

W.L. @ El. 256.0 m on completion
Cave-in @ El. 255.6 m on completion

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 44

**FIGURE NO.:** 44

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 28, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.4 | Ground Surface | | | | | | | |
| 0.0 | **23 cm TOPSOIL** | | | | 0 | | | |
| | Stiff to very stiff | 1 | DO | 9 | | | 21 | |
| | **SILTY CLAY TILL** — weathered | | | | | | | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 13 | 1 | | 14 | |
| | | 3 | DO | 25 | 2 | | 13 | |
| | | 4 | DO | 29 | | | 14 | |
| | — brown grey | 5 | DO | 27 | 3 | | 14 | |
| | — grey reddish-grey | 6A | DO | 24 | 4 | | 11 | |
| 253.5 | | 6B | | | | | 11 | |
| 4.9 | Grey, compact<br>**SANDY SILT**<br>a trace of clay<br>occ. gravel | | | | 5 | | | |
| 252.3 | | | | | | | | |
| 6.1 | Grey, dense<br>**SILT** — clay layers<br>traces of clay and sand | 7 | DO | 36 | 6 | | 17 | |
| 251.8 | | | | | | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | Installed 50 mm Ø PVC monitoring well to 6.1 m (3.0 m screen)<br>Sand backfill from 2.4 to 6.1 m<br>Bentonite holeplug from 0.3 to 2.4 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion
W.L. @ El. 257.6 m on February 1, 2018

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 45

**FIGURE NO.:** 45

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 24, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.5 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Firm to very stiff | 1 | DO | 6 | | | 15 | |
| | **SILTY CLAY TILL** — weathered | | | | | | | |
| | a trace to some sand | 2 | DO | 28 | 1 | | 13 | |
| | a trace of gravel | | | | | | | |
| | occ. wet sand and silt seams and layers, cobbles and boulders | 3 | DO | 24 | | | 12 | |
| | | | | | 2 | | | |
| | | 4 | DO | 31 | | | 13 | |
| | | | | | 3 | | | |
| | | 5 | DO | 28 | | | 13 | |
| | | | | | 4 | | | |
| | — brown grey | 6 | DO | 22 | | | 13 | |
| | | | | | 5 | | | |
| 252.4 | | | | | | | | |
| 6.1 | Grey, compact — clay layers | 7 | DO | 29 | 6 | | 23 | |
| 251.9 | **SILT** | | | | | | | |
| 6.6 | traces of clay and sand | | | | | | | |
| | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 46

**FIGURE NO.:** 46

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 28, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.4 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard | 1 | DO | 6 | | | | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders — organic inclusions/ weathered silty sand till | 2 | DO | 21 | 1 | | | |
| | | 3A | DO | 18 | | | | |
| | | 3B | | | 2 | | | |
| | | 4 | DO | 33 | | | | |
| | — brown reddish-grey/ sandy silt layer | 5 | DO | 60/18 | 3 | | | |
| 253.8 | | | | | 4 | | | |
| 4.6 | Reddish-grey, very dense | 6 | DO | 50/5 | | | | |
| | **SILTY SAND TILL** | | | | 5 | | | |
| | traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| 252.3 | | | | | 6 | | | |
| 252.1 | Red, weathered | 7 | DO | 50/5 | | | | |
| 6.3 | **SHALE BEDROCK**<br>with clay and limestone layers | | | | 7 | | | |
| | **END OF BOREHOLE** | | | | | | | |
| | Installed 50 mm Ø PVC monitoring well to 6.1 m (3.0 m screen)<br>Sand backfill from 2.4 to 6.1 m<br>Bentonite holeplug from 0.3 to 2.4 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion
W.L. @ El. 256.8 m on February 1, 2018

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 47

**FIGURE NO.:** 47

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 23, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.8 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard organic inclusions/ weathered | 1 | DO | 7 | | | 19 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace of sand to sandy | 2 | DO | 26 | 1 | | 13 | |
| | a trace of gravel | | | | | | | |
| | occ. wet sand and silt seams and layers, cobbles and boulders | 3 | DO | 30 | | | 14 | |
| | | | | | 2 | | | |
| | | 4 | DO | 33 | | | 14 | |
| | brown | | | | 3 | | | |
| | grey | 5 | DO | 19 | | | 13 | |
| | red | | | | | | | |
| 254.2 | | | | | 4 | | | |
| 4.6 | Red, very dense | | | | | | | |
| 253.9 | **SILTY SAND TILL** | 6 | DO | 59 | | | 9 | |
| 4.9 | traces of clay and gravel | | | | 5 | | | |
| | occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| | Red, weathered | | | | | | | |
| | **SHALE BEDROCK** | | | | | | | |
| | with limestone layers | | | | 6 | | 6 | |
| 252.6 | | 7 | DO | 50/8 | | | | |
| 6.2 | **END OF BOREHOLE** | | | | | | | |
| | | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

W.L. @ El. 253.0 m on completion ▽

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 48

**FIGURE NO.:** 48

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 27, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.9 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard clayey topsoil inclusions/ weathered | 1 | DO | 6 | | | 13 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 16 | 1 | | 10 | |
| | | 3 | DO | 18 | 2 | | 13 | |
| | | 4 | DO | 26 | | | 13 | |
| | brown grey clay layers | 5 | DO | 20 | 3 | | 19 | |
| 254.3 | | | | | 4 | | | |
| 4.6 | Red | 6 | DO | 50/3 | | | 12 | |
| | **SHALE BEDROCK** | | | | 5 | | | |
| | with limestone layers | | | | 6 | | | |
| | | | | | 7 | | | |
| | | | | | 8 | | | |
| 249.8 | | | | | 9 | | | |
| 9.1 | **END OF BOREHOLE** | | | | | | | |
| | Installed 50 mm Ø PVC monitoring well to 9.1 m (3.0 m screen)<br>Sand backfill from 5.5 to 9.1 m<br>Bentonite holeplug from 0.3 to 5.5 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 10 | | | |
| | | | | | 11 | | | |

W.L. @ El. 256.4 m on February 1, 2018

W.L. @ El. 250.1 m on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 49

**FIGURE NO.:** 49

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 23, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.7 | Ground Surface | | | | | | | |
| 0.0 | Brown, soft, weathered | | | | 0 | | | |
| | **SILTY CLAY TILL** | 1 | DO | 4 | | | 15 | |
| | some sand to sandy | | | | | | | |
| 257.9 | a trace of gravel | | | | | | | |
| 0.8 | occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 21 | 1 | | 13 | |
| | Brown, compact | | | | | | | |
| 257.2 | **SILTY SAND TILL** | | | | | | | |
| 1.5 | a trace to some clay | | | | | | | |
| | a trace of gravel | 3 | DO | 28 | | | 16 | |
| | occ. wet sand and silt seams and layers, cobbles and boulders | | | | 2 | | | |
| | Very stiff to hard | | | | | | | |
| | **SILTY CLAY TILL** | 4 | DO | 32 | | | 15 | |
| | a trace to some sand | | | | | | | |
| | a trace of gravel — brown / grey | 5 | DO | 28 | 3 | | 11 | |
| | occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| | | | | | 4 | | | |
| 254.0 | red sandy silt | 6A | DO | 60 | | | 9 | |
| 4.7 | Red, weathered | 6B | | | | | 8 | |
| | **SHALE BEDROCK** | | | | 5 | | | |
| | with limestone layers | | | | | | | |
| 252.6 | | 7 | DO | 50/3 | 6 | | 7 | |
| 6.1 | **END OF BOREHOLE** | | | | | | | |
| | | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

W.L. @ El. 252.9 m on completion

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 50

**FIGURE NO.:** 50

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 28, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.7 | Ground Surface | | | | | | | |
| 0.0 | **15 cm TOPSOIL** | | | | 0 | | | |
| | Brown, stiff to hard | 1 | DO | 10 | | | 18 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 18 | 1 | | 13 | |
| | | 3 | DO | 20 | 2 | | 14 | |
| | | 4 | DO | 36 | | | 15 | |
| | | 5 | DO | 21 | 3 | | 13 | |
| 253.1 | | | | | 4 | | | Dry on completion |
| 4.6 | Grey, compact to very dense | 6 | DO | 18 | 5 | | 10 | |
| | **SANDY SILT TILL** | | | | | | | |
| | traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| 251.5 | | 7 | DO | 50/8 | 6 | | 6 | |
| 6.2 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 51

**FIGURE NO.:** 51

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 28, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 258.2 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard | 1 | DO | 8 | | | 20 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | weathered | 2 | DO | 17 | 1 | | 16 | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | | |
| | | 3 | DO | 25 | 2 | | 13 | |
| | | 4 | DO | 33 | | | 14 | |
| | | 5 | DO | 32 | 3 | | 12 | |
| | brown<br>grey | 6 | DO | 21 | 4 | | 14 | Dry on completion |
| | grey<br>reddish-grey | 7 | DO | 26 | 5 | | 13 | |
| 251.6 | | | | | 6 | | | |
| 6.6 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 52

**FIGURE NO.:** 52

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 24, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.8 | Ground Surface | | | | | | | |
| 0.0 | **23 cm TOPSOIL** | | | | 0 | | | |
| | Firm to very stiff | 1 | DO | 6 | | | 20 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | weathered | 2 | DO | 13 | 1 | | 14 | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 3 | DO | 21 | 2 | | 15 | |
| | | 4 | DO | 30 | | | 12 | |
| | | 5 | DO | 29 | 3 | | 14 | |
| | brown grey | 6 | DO | 17 | 4 | | 21 | |
| 251.7 | | | | | 5 | | | |
| 251.6 | Reddish-grey, very dense | 7 | DO | 50/8 | 6 | | 7 | |
| 6.2 | **SILTY SAND TILL**<br>traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 7 | | | |
| | **END OF BOREHOLE** | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 53

**FIGURE NO.:** 53

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 24, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.7 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard<br>organic inclusions/ weathered<br>**SILTY CLAY TILL** | 1 | DO | 8 | | | 19 | |
| | traces to some sand and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 19 | 1 | | 18 | |
| | silt seams | 3 | DO | 27 | 2 | | 15 | |
| | | 4 | DO | 37 | | | 12 | |
| | | 5 | DO | 48 | 3 | | 12 | |
| | brown<br>grey | 6 | DO | 19 | 4 | | 15 | |
| | grey<br>reddish-grey | 7 | DO | 18 | 5 | | 14 | |
| 250.1<br>7.6 | Reddish-grey, dense<br>**SANDY SILT TILL**<br>traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 8 | DO | 42 | 6 | | 9 | |
| 249.6<br>8.1 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

WATER LEVEL: Dry on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 54

**FIGURE NO.:** 54

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 24, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.7 | Ground Surface | | | | | | | |
| 0.0 | **20 cm TOPSOIL** | | | | 0 | | | |
| | Stiff to hard<br>organic inclusions/ weathered<br>**SILTY CLAY TILL**<br>a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 1 | DO | 11 | | | 13 | |
| | | 2 | DO | 17 | 1 | | 13 | |
| | | 3 | DO | 20 | 2 | | 13 | |
| | | 4 | DO | 35 | | | 10 | |
| | sand layers | 5 | DO | 49 | 3 | | 10 | |
| | brown<br>grey<br>reddish-grey | 6 | DO | 19 | 4 | | 11 | |
| 251.5 | sand layers | 7A<br>7B | DO | 50/15 | 5 | | 9<br>7 | |
| 6.2 | Reddish-grey, very dense<br>**SANDY SILT TILL**<br>traces of clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | 6 | | | |
| | | 8 | DO | 65 | 7 | | 7 | |
| 249.6 | | | | | 8 | | | |
| 8.1 | **END OF BOREHOLE**<br>Installed 50 mm Ø PVC monitoring well to 7.6 m (3.0 m screen)<br>Sand backfill from 4.0 to 7.6 m<br>Bentonite holeplug from 0.3 to 4.0 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 9<br>10<br>11 | | | |

Dry on completion
W.L. @ El. 256.2 m on February 1, 2018

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 55

**FIGURE NO.:** 55

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 24, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.5 | Ground Surface | | | | | | | |
| 0.0 | **28 cm TOPSOIL** | | | | 0 | | | |
| | Firm to hard | 1 | DO | 8 | | | 20 | |
| | topsoil/organic inclusions/ weathered | | | | | | | |
| | **SILTY CLAY TILL** | 2 | DO | 25 | 1 | | 13 | |
| | a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | | | | | | 12 | |
| | | 3 | DO | 25 | 2 | | | |
| | | 4 | DO | 39 | | | 12 | |
| | | 5 | DO | 44 | 3 | | 12 | |
| | brown / grey / reddish-grey/ silt layers | | | | 4 | | | |
| | | 6 | DO | 22 | 5 | | 10 | |
| | | 7 | DO | 71/18 | 6 | | 10 | |
| 251.1 | | | | | | | | |
| 6.4 | **END OF BOREHOLE** | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | Dry on completion |

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 56

**FIGURE NO.:** 56

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 23, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 256.7 | Ground Surface | | | | | | | |
| 0.0 | **28 cm TOPSOIL** clayey<br>Firm to hard<br>**SILTY CLAY TILL**<br>a trace of sand to sandy<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 1 | DO | 8 | 0 | | 27 | |
| | topsoil/organic inclusions/ weathered | 2 | DO | 10 | 1 | | 22 | |
| | | 3 | DO | 26 | 2 | | 13 | |
| | | 4 | DO | 66/18 | | | 11 | |
| | brown | | | | 3 | | | |
| | grey/silt layers<br>reddish-grey | 5 | DO | 23 | | | 12 | |
| | reddish-grey<br>red | 6 | DO | 63/23 | 4 | | 9 | |
| 251.8<br>4.9 | Red<br>**SHALE BEDROCK**<br>with limestone layers | | | | 5 | | | |
| | weathered | 7 | DO | 50/3 | 6 | | 31 | |
| | | | | | 7 | | | |
| | | | | | 8 | | | |
| 247.6<br>9.1 | **END OF BOREHOLE** | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

W.L. @ El. 251.5 m on completion

**Soil Engineers Ltd.**

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 57

**FIGURE NO.:** 57

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 23, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.4 | Ground Surface | | | | | | | |
| 0.0 | **18 cm TOPSOIL** | | | | 0 | | | |
| | Brown, firm to very stiff | 1 | DO | 8 | | | 18 | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders — topsoil/organic inclusions/ weathered | 2 | DO | 15 | 1 | | 23 | |
| | | 3 | DO | 20 | 2 | | 19 | |
| | | 4 | DO | 25 | | | 14 | |
| | — silt | 5A | DO | 41 | 3 | | 14 | |
| 254.0 | | | | | | | 8 | |
| 253.9 | Red, dense | 5B | | | | | | |
| 3.5 | **SILTY SAND TILL**<br>some clay and gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders<br>Red | | | | 4 | | | |
| | | 6 | DO | 50/5 | | | 9 | |
| | **SHALE BEDROCK** | | | | 5 | | | |
| | with limestone layers | | | | | | | |
| | — weathered | 7 | AS | - | 6 | | 11 | |
| | | | | | 7 | | | |
| | | 8 | AS | - | | | 9 | |
| | | | | | 8 | | | |
| 248.3 | | | | | 9 | | | |
| 9.1 | **END OF BOREHOLE** | | | | | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |

W.L. @ El. 253.1 m on completion

**JOB NO.:** 1708-S057

# LOG OF BOREHOLE NO.: 58

**FIGURE NO.:** 58

**PROJECT DESCRIPTION:** Proposed Residential Development

**METHOD OF BORING:** Flight-Auger (Solid Stem)

**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**DRILLING DATE:** November 23, 2017

| El. (m) / Depth (m) | SOIL DESCRIPTION | SAMPLES Number | Type | N-Value | Depth Scale (m) | Dynamic Cone (blows/30 cm) 10 30 50 70 90 / Shear Strength (kN/m²) 50 100 150 200 / Penetration Resistance (blows/30 cm) 10 30 50 70 90 | Atterberg Limits PL LL / Moisture Content (%) 10 20 30 40 | WATER LEVEL |
|---|---|---|---|---|---|---|---|---|
| 257.0 | Ground Surface | | | | | | | |
| 0.0 | **18 cm TOPSOIL** | | | | 0 | | | |
| | Stiff to hard — weathered | 1 | DO | 9 | | | | |
| | **SILTY CLAY TILL** | | | | | | | |
| | a trace to some sand<br>a trace of gravel<br>occ. wet sand and silt seams and layers, cobbles and boulders | 2 | DO | 14 | 1 | | | |
| | | 3 | DO | 29 | 2 | | | |
| | | 4 | DO | 19 | | | | |
| | brown — red | 5A<br>5B | DO | 56/25 | 3 | | | |
| 253.6 | | | | | | | | |
| 3.4 | Red | | | | | | | |
| | **SHALE BEDROCK** | | | | 4 | | | |
| | with limestone layers | | | | | | | |
| | weathered | 6 | DO | 50/3 | 5 | | | |
| | | | | | 6 | | | |
| | | | | | 7 | | | |
| | | | | | 8 | | | |
| 247.9 | | | | | 9 | | | |
| 9.1 | **END OF BOREHOLE** | | | | | | | |
| | Installed 50 mm Ø PVC monitoring well to 9.1 m (3.0 m screen)<br>Sand backfill from 5.5 to 9.1 m<br>Bentonite holeplug from 0.3 to 5.5 m<br>Provided with an aboveground steel monument casing with top and bottom caps and a lock | | | | 10 | | | |
| | | | | | 11 | | | |

W.L. @ El. 253.3 m on completion

W.L. @ El. 256.1 m on February 1, 2018

**Soil Engineers Ltd.**

# Soil Engineers Ltd.

## GRAIN SIZE DISTRIBUTION

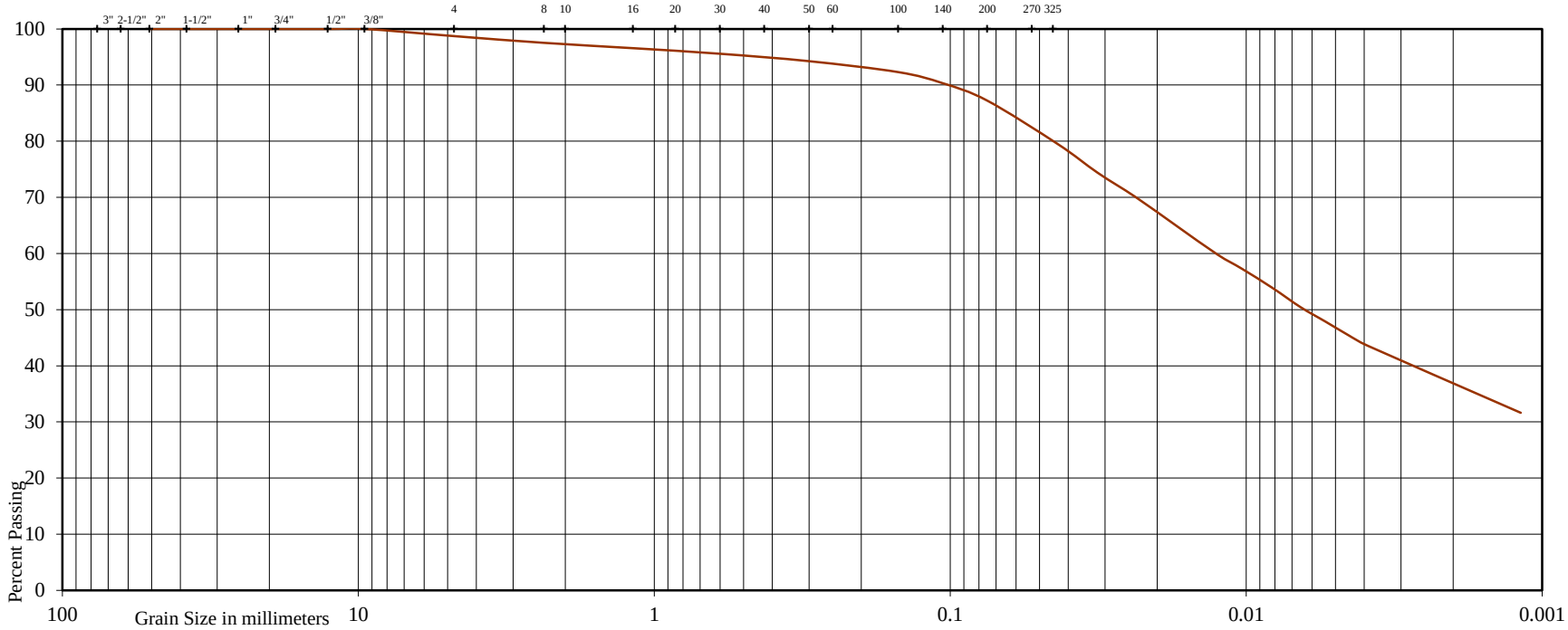
Reference No: 1708-S057

U.S. BUREAU OF SOILS CLASSIFICATION

| GRAVEL | | SAND | | | | SILT | CLAY |
|---|---|---|---|---|---|---|---|
| COARSE | FINE | COARSE | MEDIUM | FINE | V. FINE | | |

UNIFIED SOIL CLASSIFICATION

| GRAVEL | | SAND | | | SILT & CLAY |
|---|---|---|---|---|---|
| COARSE | FINE | COARSE | MEDIUM | FINE | |




Project: Proposed Residential Development

Location: Mayfield West Phase 2, Part of Lot 18, Concession 2

North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road, Town of Caledon

Borehole No: 22

Sample No: 5

Depth (m): 3.3

Elevation (m): 253.6

Liquid Limit (%) = 35

Plastic Limit (%) = 19

Plasticity Index (%) = 16

Moisture Content (%) = 17

Estimated Permeability (cm./sec.) = $10^{-7}$

Classification of Sample [& Group Symbol]: SILTY CLAY TILL, some sand, a trace of gravel

Figure: 59

Soil Engineers Ltd.

# GRAIN SIZE DISTRIBUTION

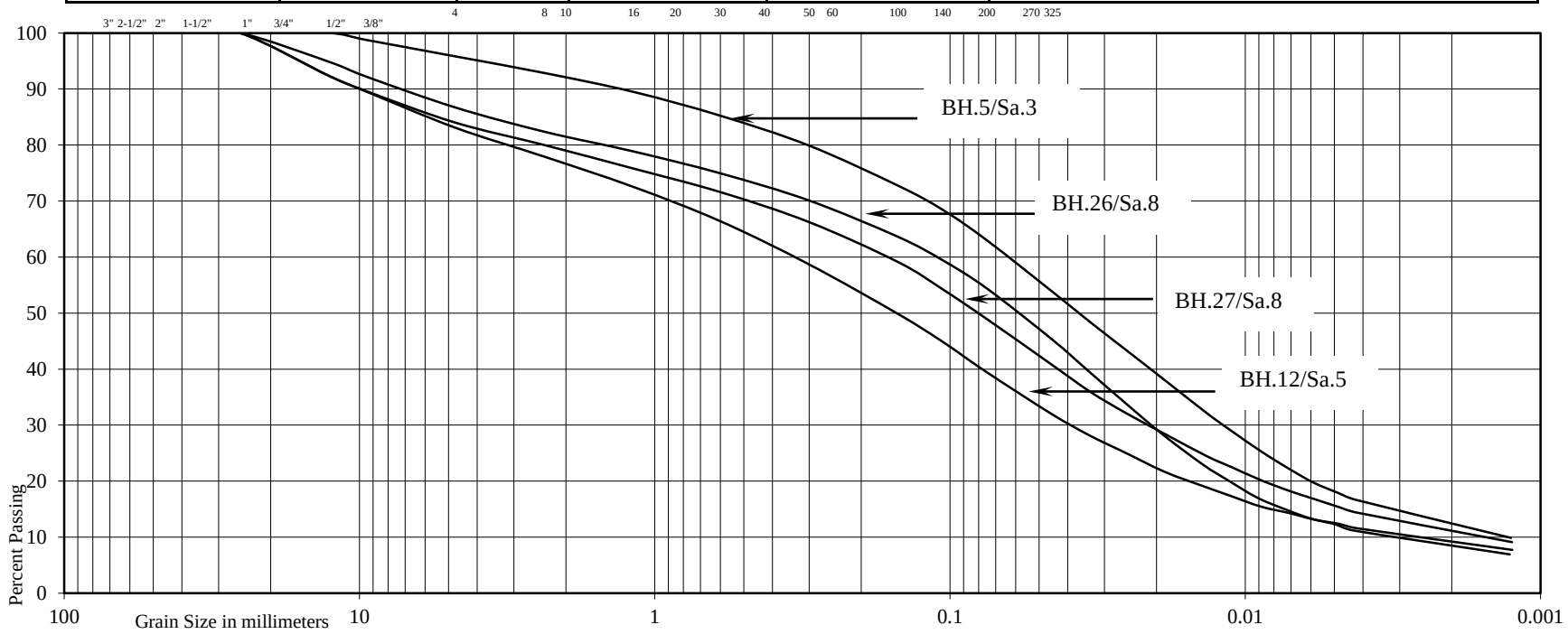
Reference No: 1708-S057

U.S. BUREAU OF SOILS CLASSIFICATION

| GRAVEL | | SAND | | | | SILT | CLAY |
|---|---|---|---|---|---|---|---|
| COARSE | FINE | COARSE | MEDIUM | FINE | V. FINE | | |

UNIFIED SOIL CLASSIFICATION

| GRAVEL | | SAND | | | SILT & CLAY |
|---|---|---|---|---|---|
| COARSE | FINE | COARSE | MEDIUM | FINE | |




Project: Proposed Residential Development

Location: Mayfield West Phase 2, Part of Lot 18, Concession 2

North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road, Town of Caledon

| Borehole No: | 5 | 12 | 26 | 27 |
|---|---|---|---|---|
| Sample No: | 3 | 5 | 8 | 8 |
| Depth (m): | 1.8 | 3.3 | 7.9 | 7.9 |
| Elevation (m): | 258.8 | 254.7 | 247.9 | 248.7 |

| BH./Sa. | 5/3 | 12/5 | 26/8 | 27/8 |
|---|---|---|---|---|
| Liquid Limit (%) = | - | - | - | - |
| Plastic Limit (%) = | - | - | - | - |
| Plasticity Index (%) = | - | - | - | - |
| Moisture Content (%) = | 12 | 11 | 9 | 6 |
| Estimated Permeability (cm./sec.) = | $10^{-6}$ | $10^{-5}$ | $10^{-5}$ | $10^{-6}$ |

Classification of Sample [& Group Symbol]: BH.5/Sa.3, BH.26/Sa.8 and BH.27/Sa.8 - SANDY SILT TILL, traces to some clay and gravel

BH.12/Sa.5 - SILTY SAND TILL, some gravel, a trace of clay

Figure: 60

Soil Engineers Ltd.

# GRAIN SIZE DISTRIBUTION

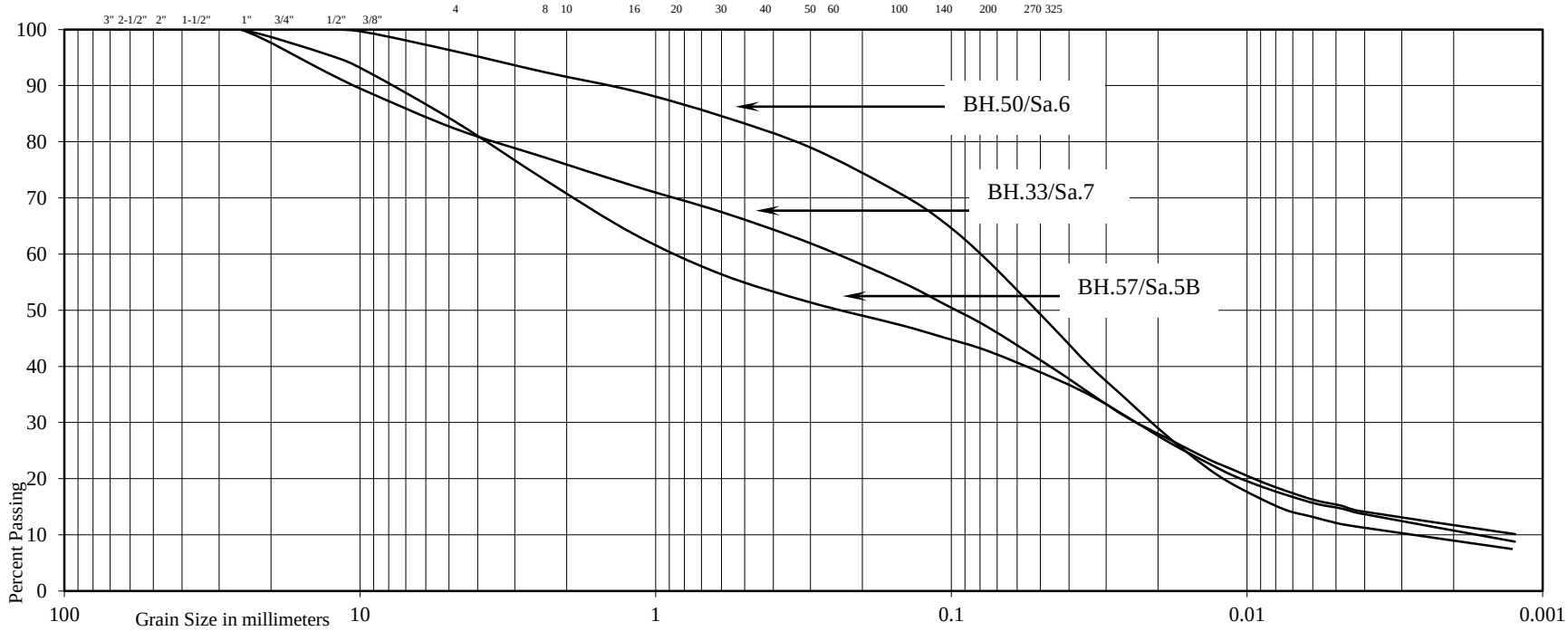
Reference No: 1708-S057

U.S. BUREAU OF SOILS CLASSIFICATION

| GRAVEL | | SAND | | | | SILT | CLAY |
|---|---|---|---|---|---|---|---|
| COARSE | FINE | COARSE | MEDIUM | FINE | V. FINE | | |

UNIFIED SOIL CLASSIFICATION

| GRAVEL | | SAND | | | SILT & CLAY |
|---|---|---|---|---|---|
| COARSE | FINE | COARSE | MEDIUM | FINE | |




Project: Proposed Residential Development

Location: Mayfield West Phase 2, Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road, Town of Caledon

| Borehole No: | 33 | 50 | 57 |
|---|---|---|---|
| Sample No: | 7 | 6 | 5B |
| Depth (m): | 6.3 | 4.8 | 3.4 |
| Elevation (m): | 249.6 | 252.9 | 254.0 |

| BH./Sa. | 33/7 | 50/6 | 57/5B |
|---|---|---|---|
| Liquid Limit (%) = | - | - | - |
| Plastic Limit (%) = | - | - | - |
| Plasticity Index (%) = | - | - | - |
| Moisture Content (%) = | 8 | 10 | 8 |
| Estimated Permeability (cm./sec.) = | $10^{-6}$ | $10^{-5}$ | $10^{-6}$ |

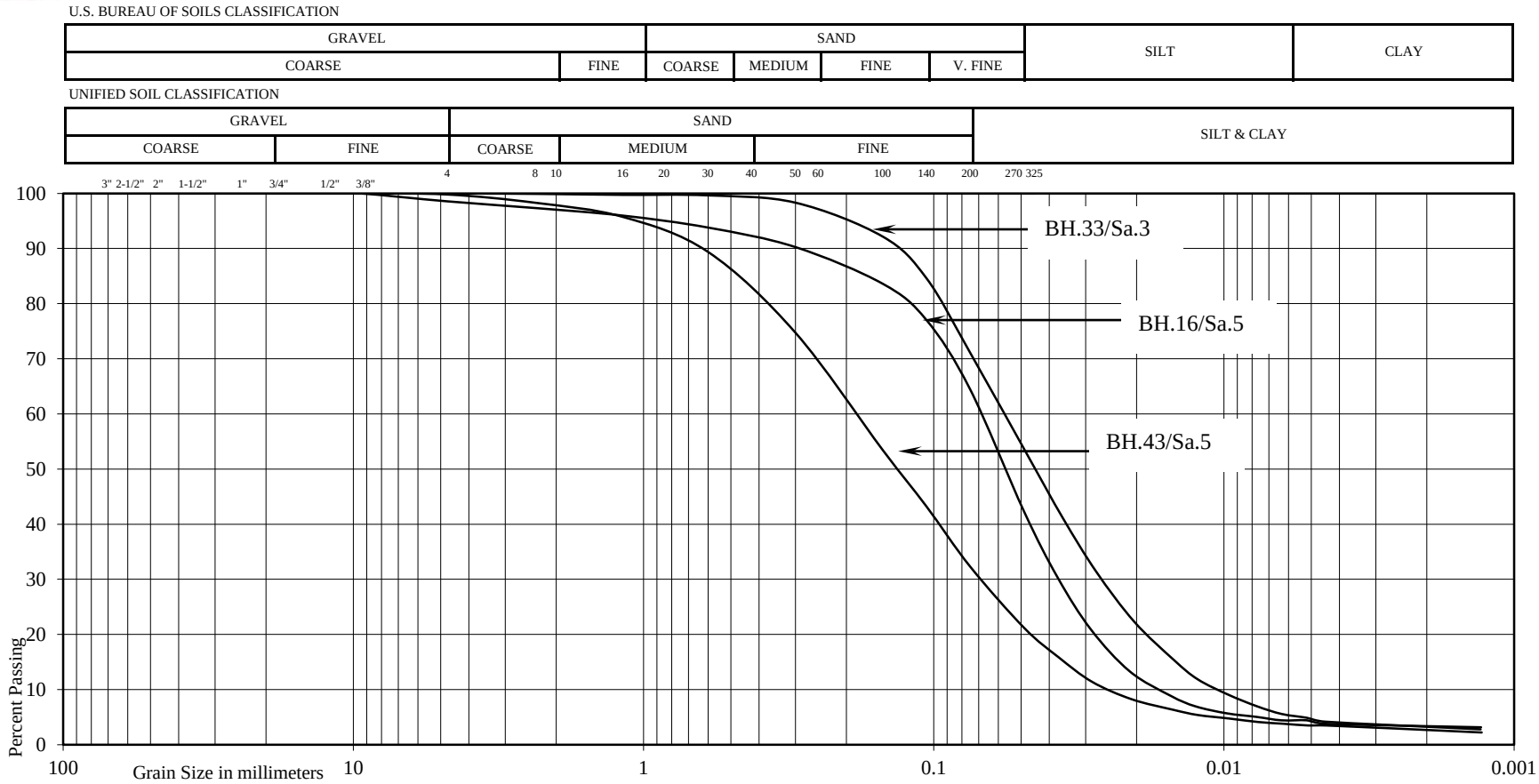
Classification of Sample [& Group Symbol]: BH.33/Sa.7 and BH.50/Sa.6 - SANDY SILT TILL, traces to some clay and gravel
BH.57/Sa.5B - SILTY SAND TILL, some clay and gravel

Figure: 61

Soil Engineers Ltd.

# GRAIN SIZE DISTRIBUTION

Reference No: 1708-S057




Project: Proposed Residential Development

Location: Mayfield West Phase 2, Part of Lot 18, Concession 2

North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road, Town of Caledon

| Borehole No: | 16 | 33 | 43 |
|---|---|---|---|
| Sample No: | 5 | 3 | 5 |
| Depth (m): | 3.3 | 1.8 | 3.3 |
| Elevation (m): | 254.3 | 254.1 | 255.7 |

| BH./Sa. | 16/5 | 33/3 | 43/5 |
|---|---|---|---|
| Liquid Limit (%) = | - | - | - |
| Plastic Limit (%) = | - | - | - |
| Plasticity Index (%) = | - | - | - |
| Moisture Content (%) = | 17 | 19 | 14 |
| Estimated Permeability (cm./sec.) = | $10^{-4}$ | $10^{-4}$ | $10^{-3}$ |

Classification of Sample [& Group Symbol]: BH.16/Sa.5 and BH.33/Sa.3 - SANDY SILT, traces of clay and gravel

BH.43/Sa.5 - SILTY FINE SAND, a trace of clay

Figure: 62

**Soil Engineers Ltd.**

# GRAIN SIZE DISTRIBUTION

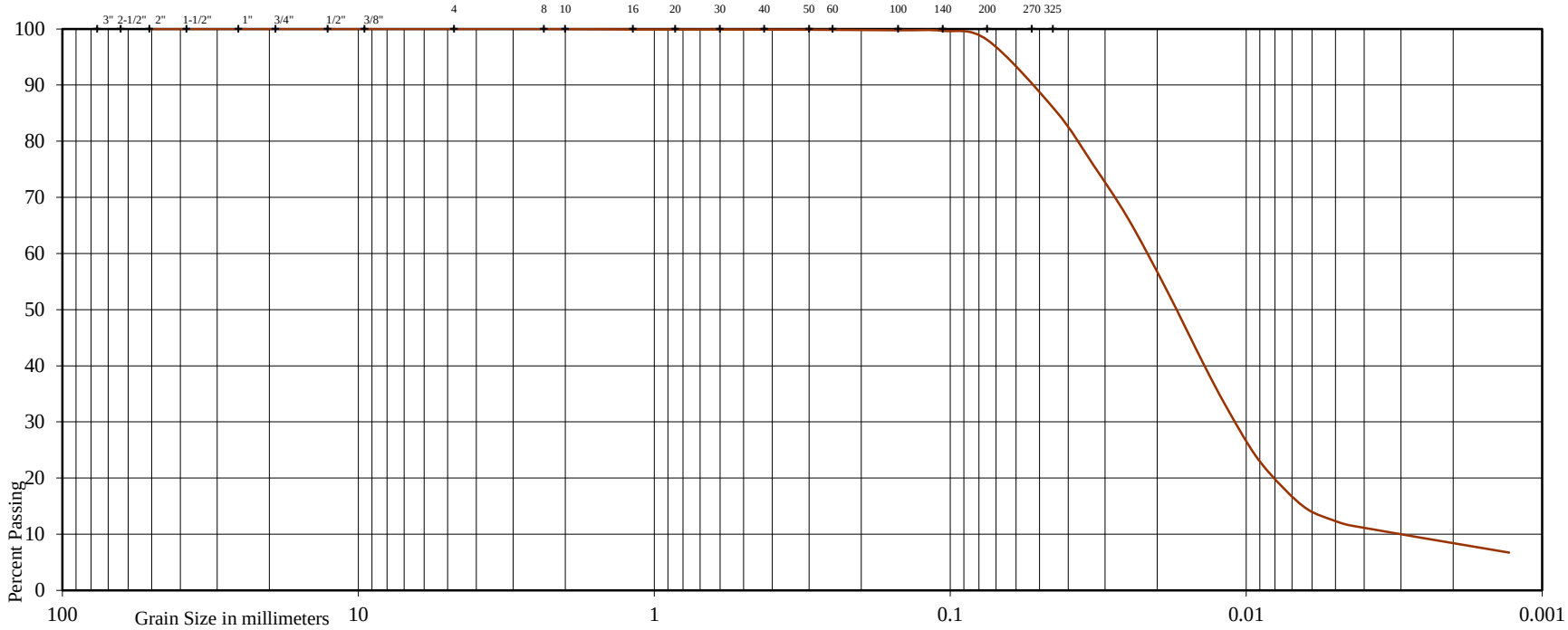
Reference No: 1708-S057

U.S. BUREAU OF SOILS CLASSIFICATION

| GRAVEL | | SAND | | | | SILT | CLAY |
|---|---|---|---|---|---|---|---|
| COARSE | FINE | COARSE | MEDIUM | FINE | V. FINE | | |

UNIFIED SOIL CLASSIFICATION

| GRAVEL | | SAND | | | SILT & CLAY |
|---|---|---|---|---|---|
| COARSE | FINE | COARSE | MEDIUM | FINE | |




Project: Proposed Residential Development

Location: Mayfield West Phase 2, Part of Lot 18, Concession 2

North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road, Town of Caledon

Borehole No: 28

Sample No: 5

Depth (m): 3.3

Elevation (m): 252.6

Liquid Limit (%) = -

Plastic Limit (%) = -

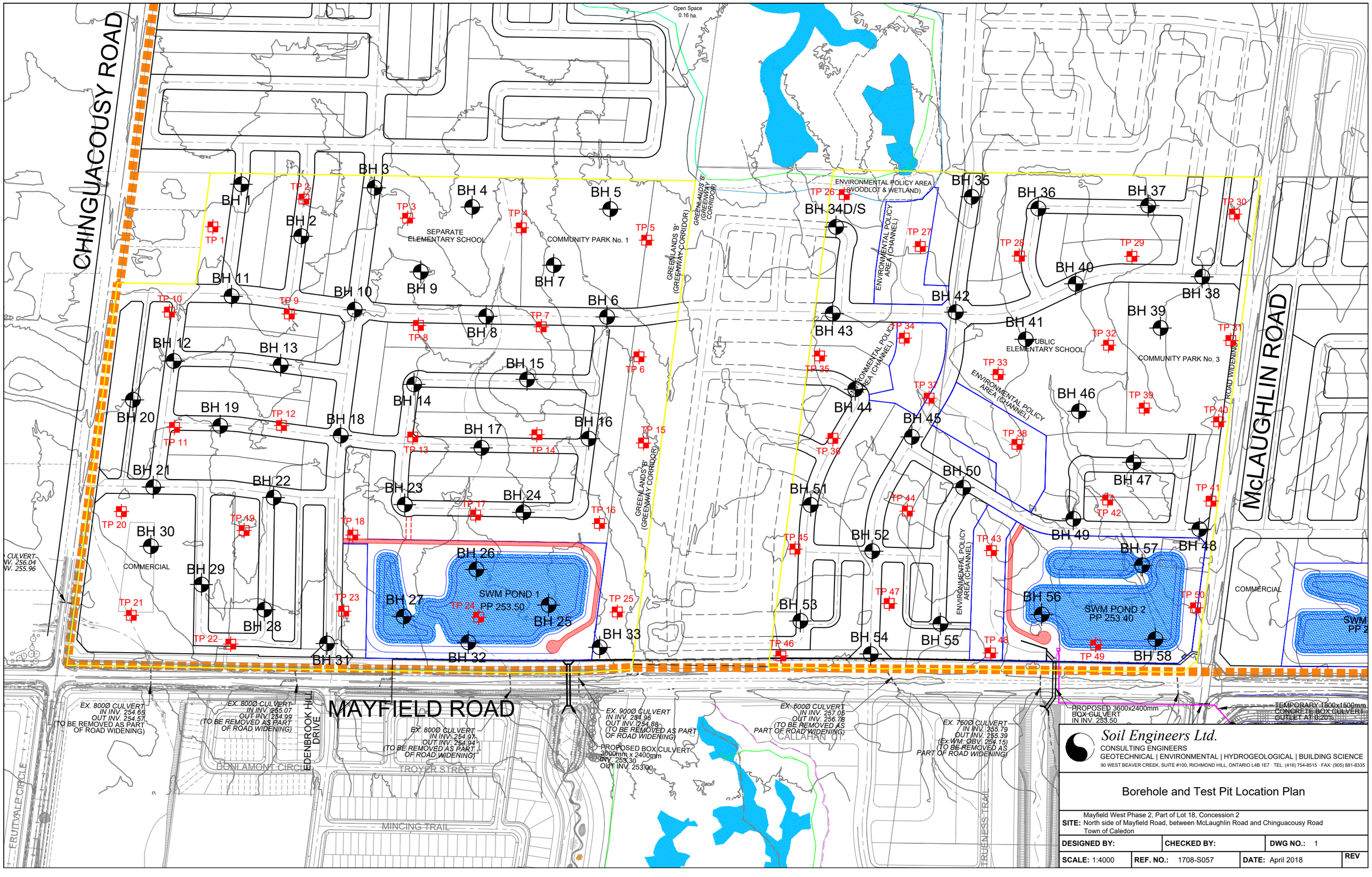
Plasticity Index (%) = -

Moisture Content (%) = 21

Estimated Permeability (cm./sec.) = $10^{-5}$

Classification of Sample [& Group Symbol]: SILT, traces of clay and sand

Figure: 63

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# Borehole and Test Pit Location Plan

**SITE:** Mayfield West Phase 2, Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

| DESIGNED BY: | CHECKED BY: | DWG NO.: 1 | |
|---|---|---|---|
| SCALE: 1:4000 | REF. NO.: 1708-S057 | DATE: April 2018 | REV |

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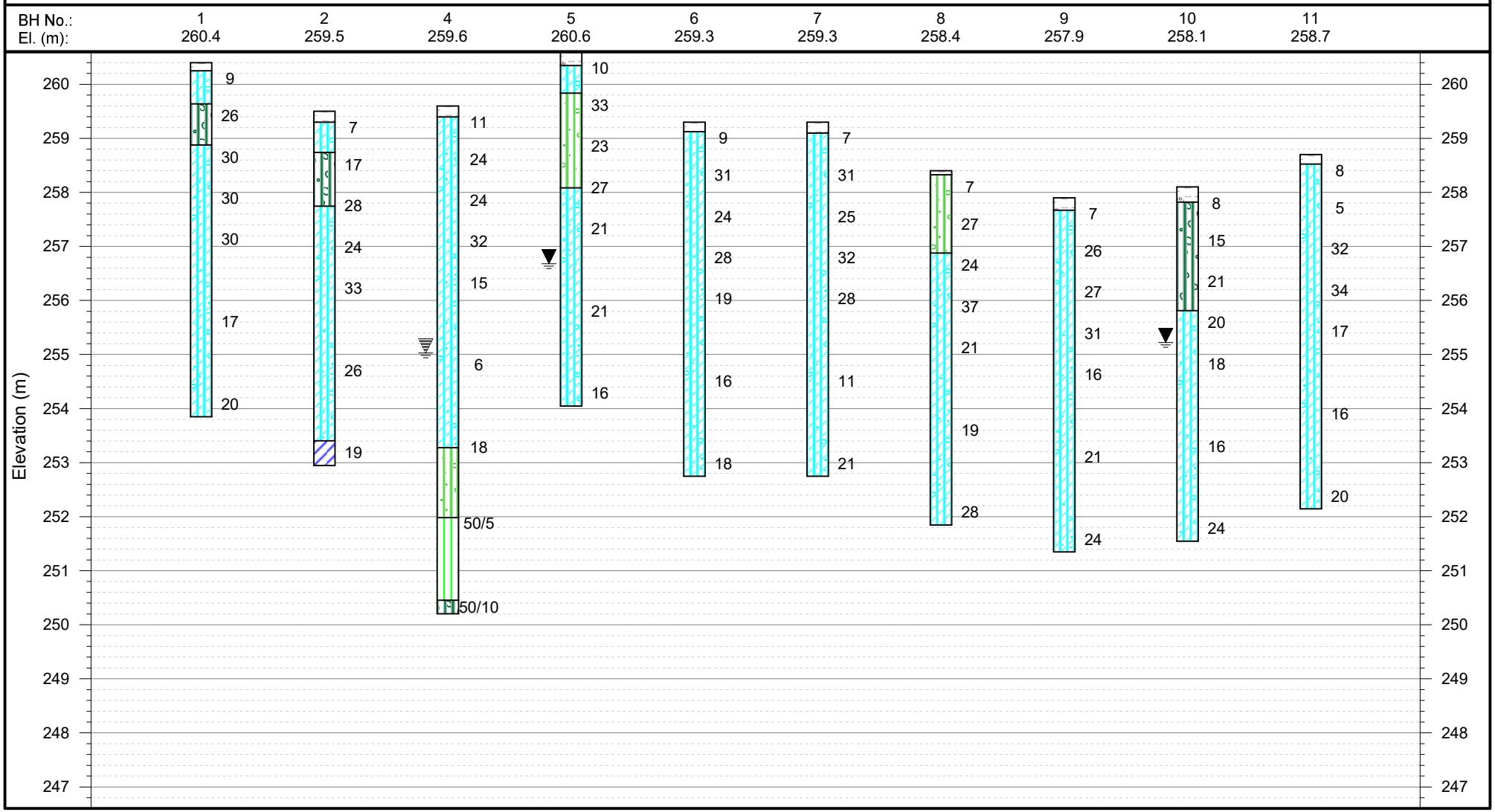
# SUBSURFACE PROFILE
**DRAWING NO. 2**
**SCALE: AS SHOWN**

**JOB NO.:** 1708-S057
**REPORT DATE:** April 2018
**PROJECT DESCRIPTION:** Proposed Residential Development
**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**LEGEND**

TOPSOIL | SANDY SILT TILL | SILTY CLAY | SILTY CLAY TILL
SILTY SAND TILL | SILT

WATER LEVEL (END OF DRILLING) | CAVE-IN | WATER LEVEL (STABILIZED)



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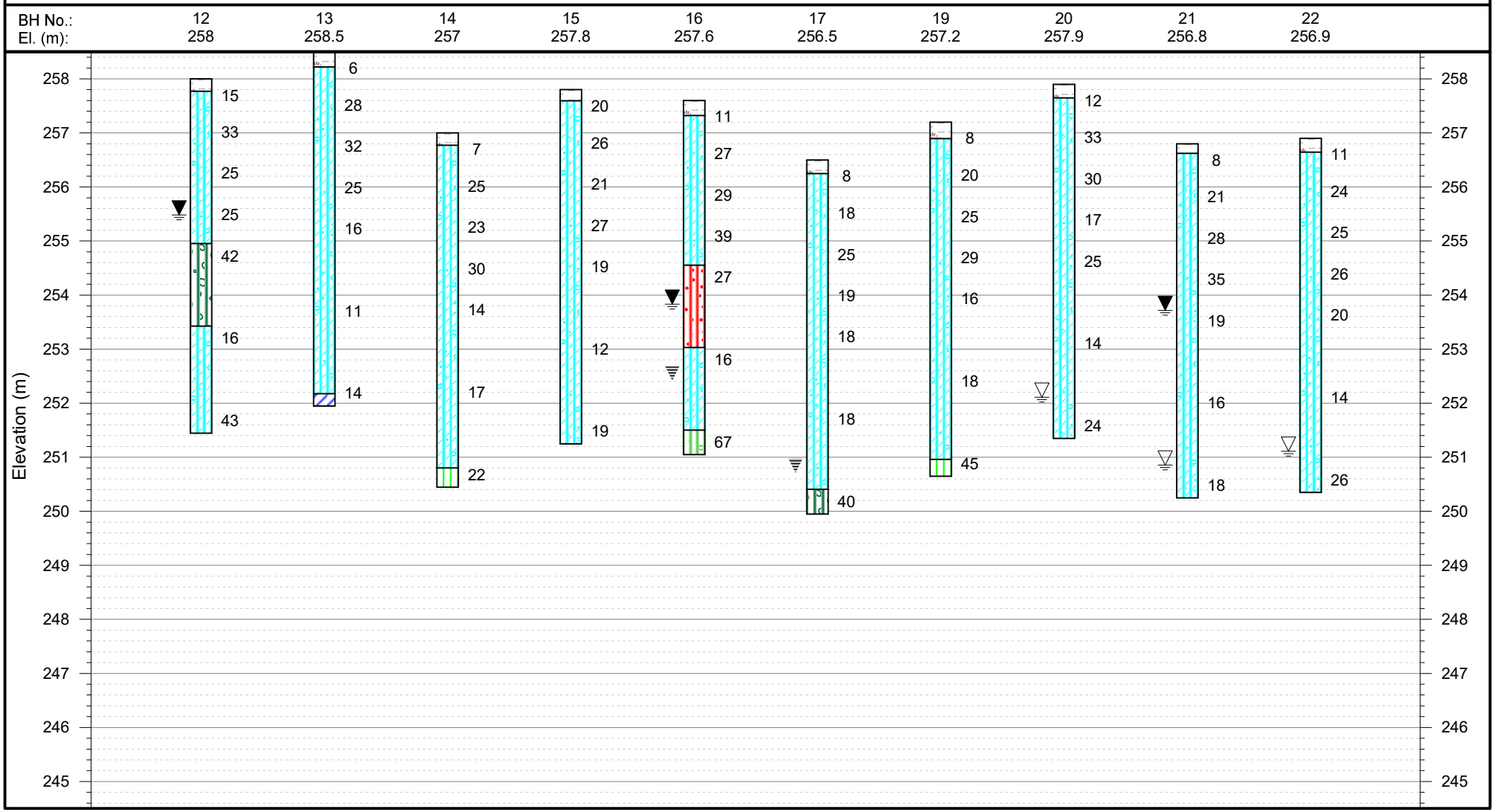
**SUBSURFACE PROFILE**
**DRAWING NO. 3**
**SCALE: AS SHOWN**

**JOB NO.:** 1708-S057
**REPORT DATE:** April 2018
**PROJECT DESCRIPTION:** Proposed Residential Development
**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**LEGEND**

TOPSOIL | SANDY SILT | SILT | SILTY CLAY TILL
SILTY SAND TILL | SANDY SILT TILL | SILTY CLAY

WATER LEVEL (END OF DRILLING) | CAVE-IN | WATER LEVEL (STABILIZED)



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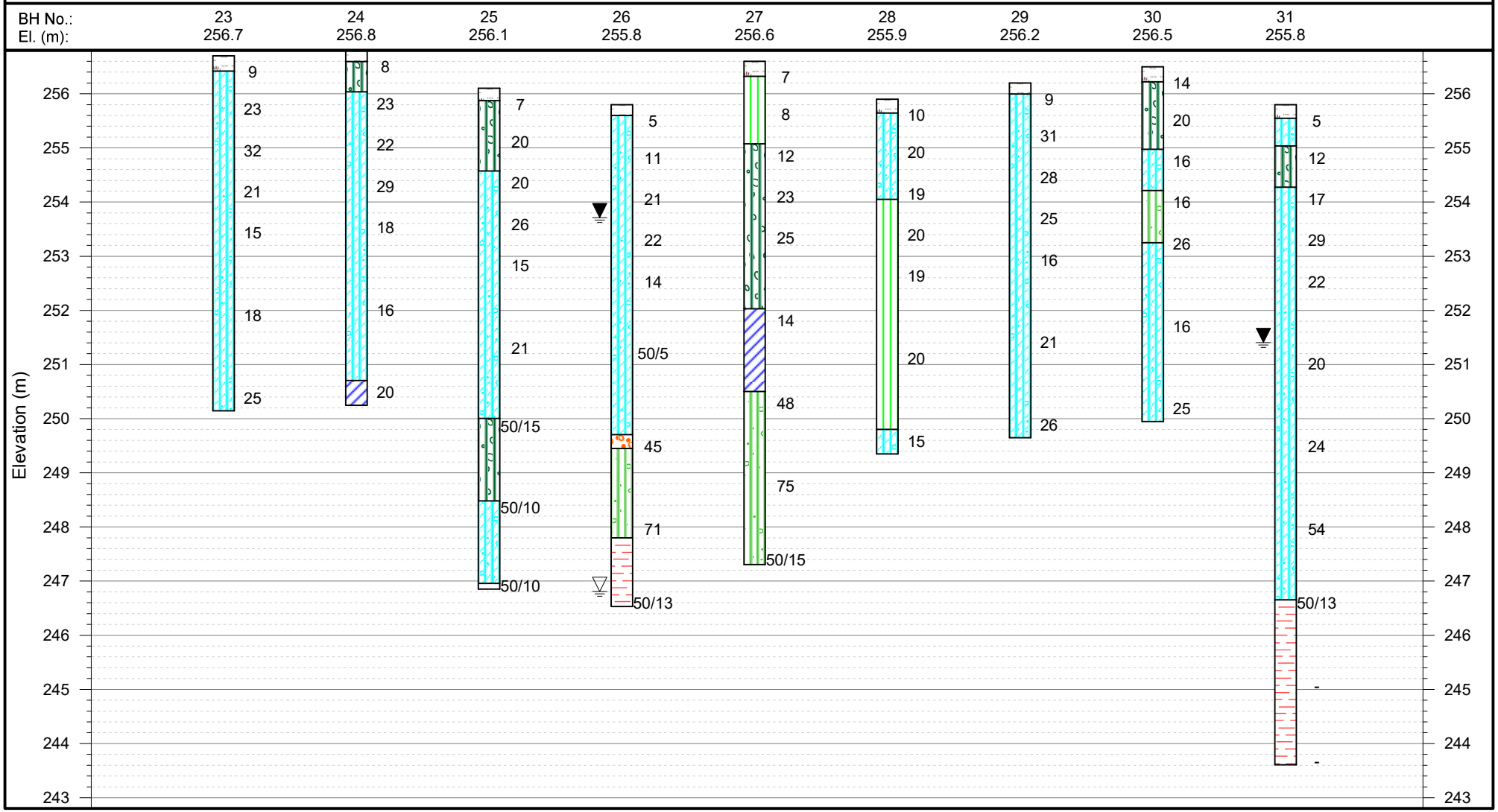
**SUBSURFACE PROFILE**
**DRAWING NO. 4**
**SCALE: AS SHOWN**

**JOB NO.:** 1708-S057
**REPORT DATE:** April 2018
**PROJECT DESCRIPTION:** Proposed Residential Development
**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**LEGEND**

TOPSOIL | SANDY SILT TILL | SILTY CLAY | SHALE
SILTY SAND TILL | SILT | SILTY CLAY TILL | GRAVELLY SAND

WATER LEVEL (END OF DRILLING) ▽ WATER LEVEL (STABILIZED) ▼



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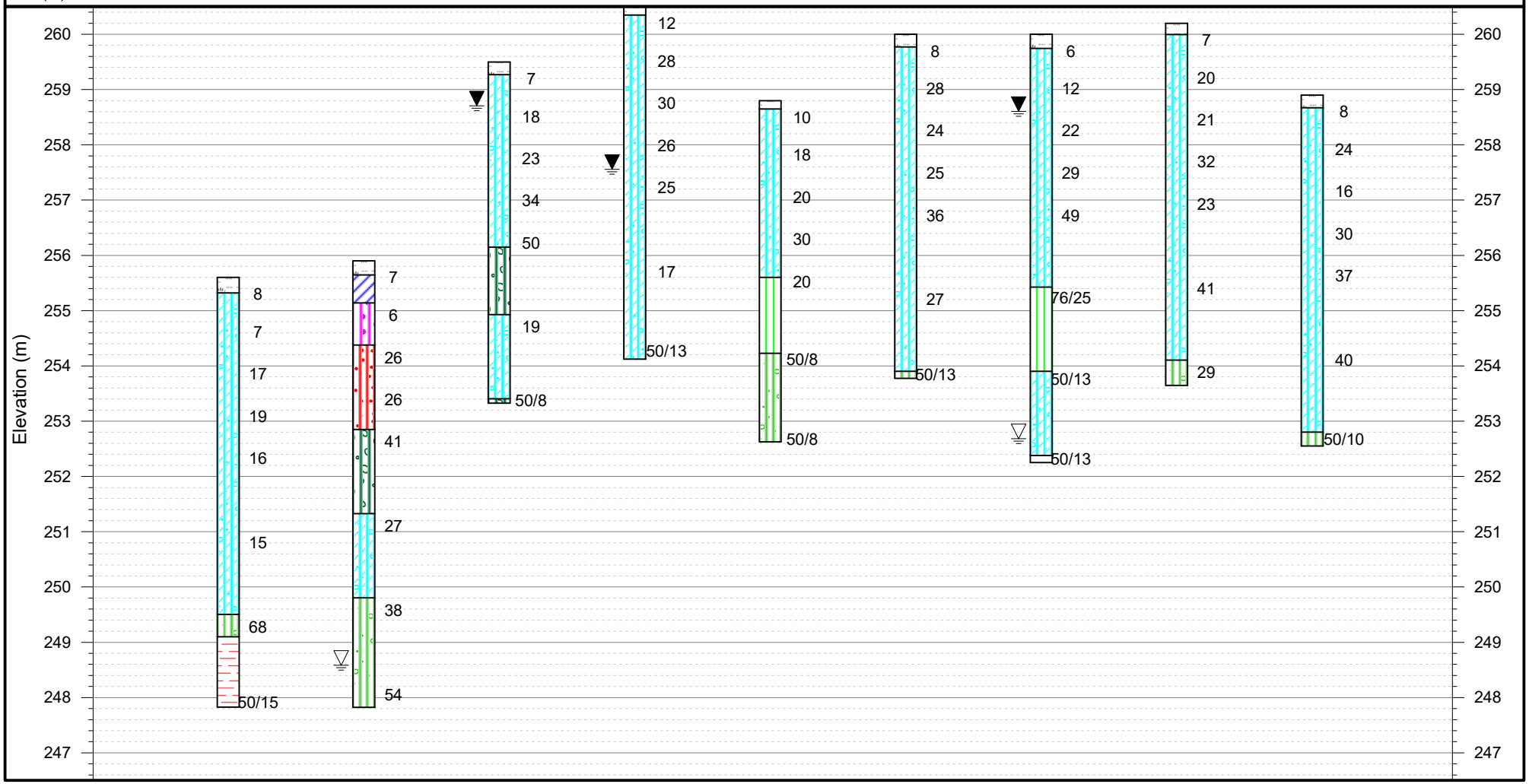
# SUBSURFACE PROFILE
**DRAWING NO. 5**
**SCALE: AS SHOWN**

**JOB NO.:** 1708-S057
**REPORT DATE:** April 2018
**PROJECT DESCRIPTION:** Proposed Residential Development
**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**LEGEND**

TOPSOIL | SANDY SILT | SILT | SILTY CLAY TILL
SILTY FINE SAND | SANDY SILT TILL | SILTY CLAY | SHALE
SILTY SAND TILL

WATER LEVEL (END OF DRILLING) | WATER LEVEL (STABILIZED)



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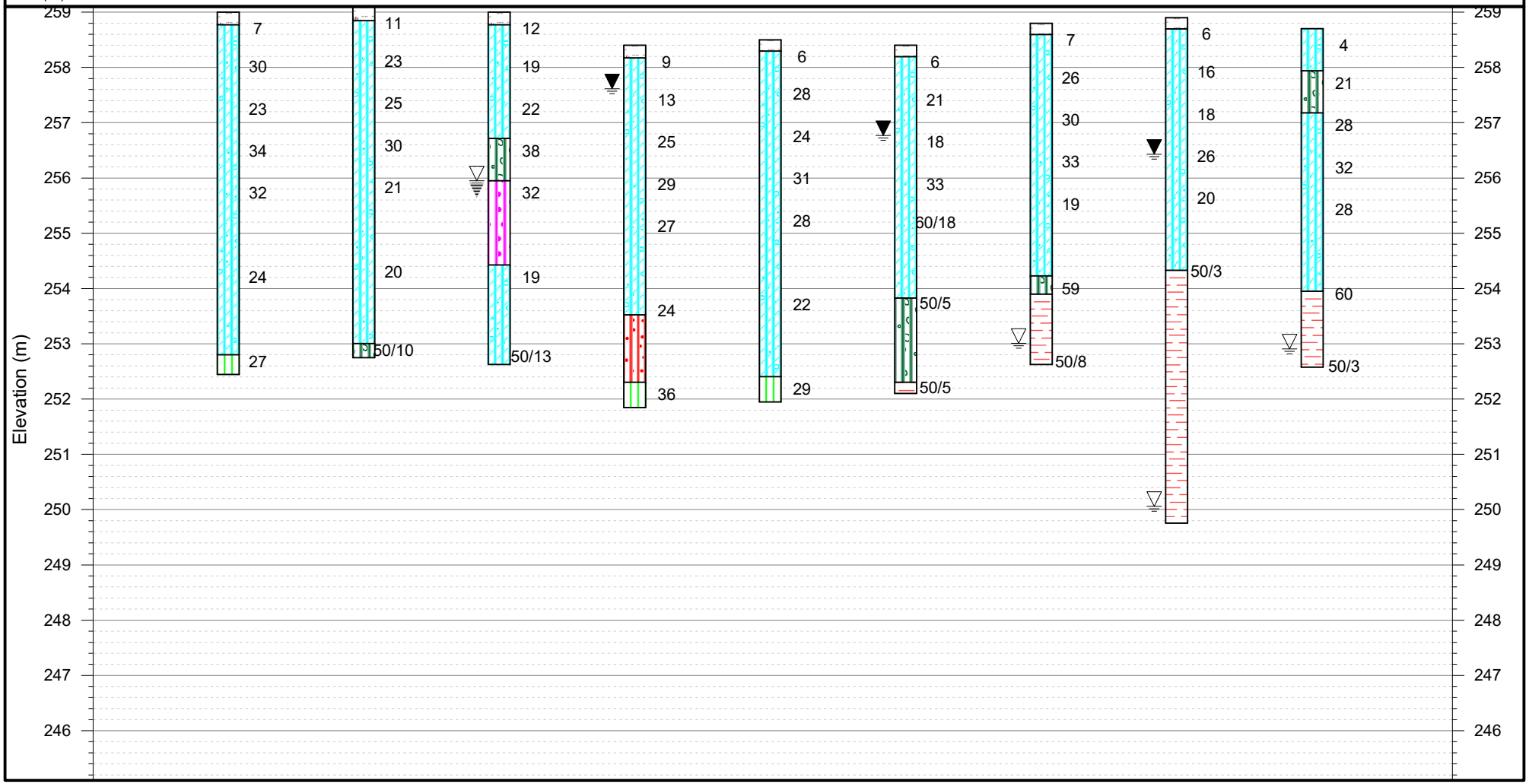
**SUBSURFACE PROFILE**
**DRAWING NO. 6**
**SCALE: AS SHOWN**

**JOB NO.:** 1708-S057
**REPORT DATE:** April 2018
**PROJECT DESCRIPTION:** Proposed Residential Development
**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**LEGEND**

TOPSOIL | SILTY SAND TILL | SILT | SHALE
SILTY FINE SAND | SANDY SILT | SILTY CLAY TILL

WATER LEVEL (END OF DRILLING) | CAVE-IN | WATER LEVEL (STABILIZED)



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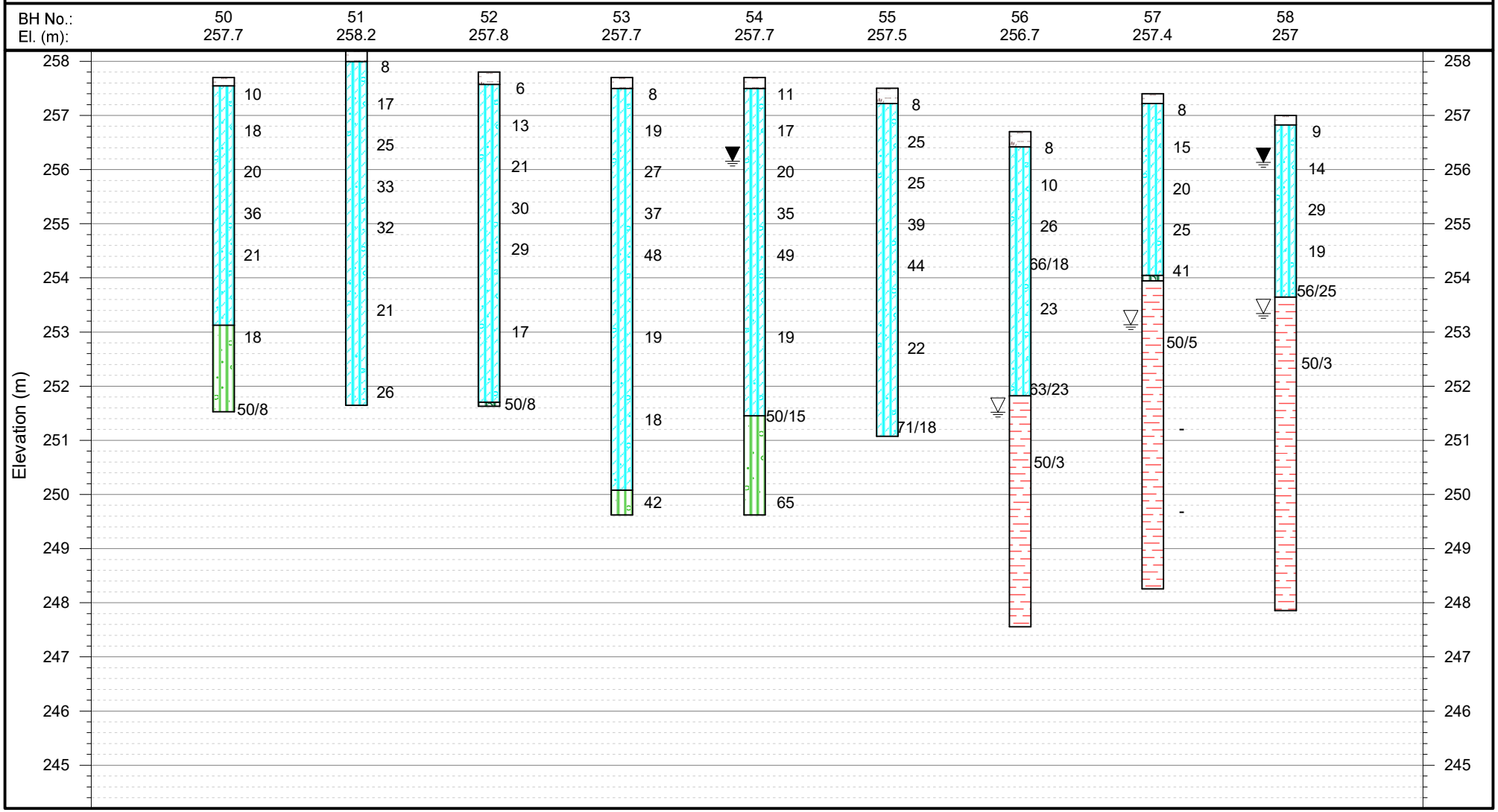
**SUBSURFACE PROFILE**
**DRAWING NO. 7**
**SCALE: AS SHOWN**

**JOB NO.:** 1708-S057
**REPORT DATE:** April 2018
**PROJECT DESCRIPTION:** Proposed Residential Development
**PROJECT LOCATION:** Mayfield West Phase 2
Part of Lot 18, Concession 2
North side of Mayfield Road, between McLaughlin Road and Chinguacousy Road
Town of Caledon

**LEGEND**

TOPSOIL | SANDY SILT TILL | SILTY CLAY TILL | SHALE | SILTY SAND TILL

WATER LEVEL (END OF DRILLING) | WATER LEVEL (STABILIZED)



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# APPENDIX

## SELECT BOREHOLE LOGS AND BOREHOLE LOCATION PLAN FROM

## REPORT ON GEOTECHNICAL INVESTIGATION
## SANITARY TRUNK SEWER ON MAYFIELD WEST PHASE 2
## CALEDON, ONTARIO

## PREPARED BY WSP CANADA INC.
## PREPARED FOR MAYFIELD STATION LANDOWNERS GROUP INC.

## PROJECT NO. 161-01403-00, DATED JULY 11, 2017

## REFERENCE NO. 1708-S057

# LOG OF BOREHOLE 16-1

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4841118.71 E 592627.42

Method: Hollow Stem Auger
Diameter: 203 mm
Date: Jan/28/2016

REF. NO.: 161-01403-00
ENCL NO.: 1

| (m) ELEV / DEPTH | DESCRIPTION | NUMBER | TYPE | BLOWS 0.3 m "N" | ELEVATION |
|---|---|---|---|---|---|
| 259.29 | Ground Surface | | | | |
| 0.00 | **FILL:** silty clay, trace sand, trace gravel, trace rootlets, trace organics, dark grey to brown, moist, firm to very stiff. | 1 | SS | 5 | |
| 1 | | 2 | SS | 18 | |
| 258.07 | | | | | |
| 1.22 | **SILTY CLAY TILL:** some sand, trace gravel, oxidized, brown, moist, very stiff. | 3 | SS | 21 | |
| 2 | | 4 | SS | 24 | |
| 256.24 | | | | | |
| 3.05 | **SILT:** some clay to clayey, trace sand, grey, moist, compact . | 5 | SS | 20 | |
| 255.63 | | | | | |
| 3.66 | **SILTY CLAY TILL:** some sand, trace gravel, grey, moist, stiff. | | | | |
| 4 | | | | | |
| 5 | | 6 | SS | 11 | |
| 253.65 | | | | | |
| 5.64 | **SILTY CLAY :** trace sand, trace gravel, grey, moist, firm to stiff. | | | | |
| 6 | | 7 | SS | 8 | |
| 7 | | | | | |
| 252.13 | | | | | |
| 7.16 | **SILTY CLAY TILL:** some sand, trace gravel, contain silty clay layers, grey, moist, very stiff. | | | | |
| 8 | | 8 | SS | 22 | |
| 9 | contain silt seams below 9.1m | | | | |
| | | 9 | SS | 25 | |
| 10 | | | | | |

GROUND WATER CONDITIONS: Rising Up Casing; Sand; W. L. 255.22 m Mar 21, 2016; Holeplug

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 |
|---|---|---|
| | | |
| | | |
| | | |
| >225 | | |
| | | |
| | | |
| 60 | | |
| | | |
| 60 | | |
| | | |
| >225 | | |
| | | |
| >225 | | |

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 16-1

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4841118.71 E 592627.42

Method: Hollow Stem Auger
Diameter: 203 mm
Date: Jan/28/2016

REF. NO.: 161-01403-00
ENCL NO.: 1

| (m) ELEV / DEPTH | DESCRIPTION | STRATA PLOT | SAMPLES NUMBER | TYPE | "N" BLOWS 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Continued | | | | | | | | | | | |
| 249.08 | | | | | | | | | | | | |
| 10.21 | **SILT:** trace clay, trace sand, dilatant, grey, saturated, very dense. | | | | | | 249 Sand | | | | | |
| 11 | | | 10 | SS | 51 | | | | ○ | | | 0 9 84 7 |
| 247.56 | | | | | | | 248 | | | | | |
| 11.73 | **SANDY SILT TILL:** trace clay, trace gravel, grey, moist, very dense. | | | | | | Screen | | | | | |
| 12 | | | 11 | SS | 67 | | 247 | | ○ | | | |
| 13 | | | | | | | | | | | | |
| 246.03 | | | | | | | 246 | | | | | |
| 13.26 | **CLAYEY SILT TILL:** sandy, some gravel, reddish brown, moist, hard. | | | | | | | | | | | |
| 14 | | | 12 | SS | 79 | | Sand | | ○ ⊢ | | | 15 31 41 13 |
| 245.12 | cobbles/boulders (inferred) | | | | | | | | | | | |
| 14.17 | **END OF BOREHOLE** | | | | | | | | | | | |

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

| Date | W. L. Depth (m) |
|---|---|
| Mar. 21, 2016 | 4.07 |

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

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

# LOG OF BOREHOLE 16-2

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4840946.6 E 592800.61

Method: Hollow Stem Auger
Diameter: 203 mm
Date: Jan/27/2016

REF. NO.: 161-01403-00
ENCL NO.: 2

| (m) ELEV / DEPTH | DESCRIPTION | NUMBER | TYPE | BLOWS 0.3 m "N" | ELEVATION |
|---|---|---|---|---|---|
| 256.37 | Ground Surface | | | | |
| 0.00 | **FILL:** silty clay, some sand, trace gravel, trace rootlets, brown, moist, firm to very stiff. | 1 | SS | 7 | 256 |
| | | 2 | SS | 13 | |
| 254.69 | | | | | 255 |
| 1.68 | **SILTY CLAY TILL:** some sand, trace gravel, brown, moist, hard to stiff. | 3 | SS | 17 | |
| | oxidized between 1.7m to 3.7m | | | | |
| | | 4 | SS | 63/ 225mm | 254 |
| | cobbles/boulders (inferred) | | | | |
| | brown to grey below 3.0m | 5 | SS | 17 | 253 |
| | grey below 4.6m | 6 | SS | 13 | 252 |
| 250.73 | | | | | 251 |
| 5.64 | **CLAYEY SILT TO SILT:** trace sand, trace gravel, contain clayey silt till layers, grey, dilatant, moist to saturated, very stiff . | 7 | SS | 27 | 250 |
| 249.21 | | | | | 249 |
| 7.16 | **SILTY CLAY TILL:** sandy, trace gravel, grey, moist, hard. | 8 | SS | 48 | |
| | cobbles/boulders at 8.1m | | | | 248 |
| 247.68 | | | | | |
| 8.69 | **CLAYEY SILT TILL:** sandy, trace gravel, reddish brown, moist, very stiff. | 9 | SS | 23 | 247 |

| DEPTH | POCKET PEN. (Cu) (kPa) | NATURAL UNIT WT (kN/m³) | REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---|---|---|---|
| 1.68 | >225 | | |
| 5.64 | 175 | | |
| 7.16 | 100 | | spoon wet |

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)

Continued Next Page

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

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

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4840946.6 E 592800.61

Method: Hollow Stem Auger
Diameter: 203 mm
Date: Jan/27/2016

REF. NO.: 161-01403-00
ENCL NO.: 2

| (m) ELEV / DEPTH | DESCRIPTION | STRATA PLOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES "N" BLOWS 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Continued | | | | | | | | | | | |
| 246.16 | | | | | | | | | | | | |
| 10.21 | **SANDY SILT TILL:** trace to some clay, trace gravel, contain clayey silt till layers, grey, moist, very dense. | | | | | | 246 | | | | | |
| 11 | | | 10 | SS | 68 | | | | ○ | | | |
| 244.64 | | | | | | | 245 | | | | | |
| 11.73 | **CLAYEY SILT TILL:** sandy, trace gravel, contain sandy silt till layers, grey, moist, hard. | | | | | | | | | | | |
| 12 | | | 11 | SS | 34 | | 244 | | ○ | | | |
| 13 | | | | | | | | | | | | |
| 243.11 | | | | | | | | | | | | |
| 13.26 | **SILTY CLAY :** trace sand, occasional gravel, contain silt layers, grey, moist, stiff. | | | | | | 243 | | | | | |
| 14 | | | 12 | SS | 13 | | | | ○ | | | |
| 242.04 | | | | | | | | | | | | |
| 14.33 | **END OF BOREHOLE**<br>Notes:<br>1) Borehole was open upon completion.<br>2) Water level was at 12.2m during drilling. | | | | | | | | | | | |

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

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

# LOG OF BOREHOLE 16-3

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4840823.21 E 592950.32

Method: Hollow Stem Auger
Diameter: 203 mm
Date: Jan/28/2016

REF. NO.: 161-01403-00
ENCL NO.: 3

| (m) ELEV / DEPTH | DESCRIPTION | STRATA PLOT | NUMBER | TYPE | BLOWS "N" 0.3 m | GROUND WATER CONDITIONS | ELEVATION |
|---|---|---|---|---|---|---|---|
| 255.89 | Ground Surface | | | | | | |
| 0.00 | **FILL:** silty clay, some sand, trace gravel, trace rootlets, brown, moist, stiff to very stiff. | | 1 | SS | 9 | Rising Up Casing / Sand | 255 |
| 254.82 | | | 2 | SS | 21 | | |
| 1.07 | **SILTY CLAY TILL:** some sand, trace gravel, brown, moist, very stiff to stiff. oxidized between 1.1m to 3.6m | | 3 | SS | 17 | | 254 |
| | | | 4 | SS | 30 | | 253 |
| | brown to grey below 3.0m | | 5 | SS | 21 | | 252 |
| | grey below 4.6m | | 6 | SS | 14 | W. L. 251.60 m Mar 21, 2016 | 251 |
| 250.25 | | | | | | Holeplug | |
| 5.64 | **CLAYEY SILT TILL:** sandy, trace gravel, grey to reddish brown, moist, very stiff to hard. | | 7 | SS | 26 | | 250 |
| | reddish brown below 7.6m contain sandy silt till layers between 7.6m to 8.2m | | 8 | SS | 30 | | 249 |
| | cobbles/boulders at 9.4m | | 9 | SS | 88 | | 248 |
| | | | | | | | 247 |
| | | | | | | | 246 |

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 |
|---|---|---|
| | | |
| | | |
| >225 | | |
| | | |
| >225 | | |
| | | |
| 140 | | |
| | | |
| >225 | | |
| | | |
| | | |
| | | |

Continued Next Page

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

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

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4840823.21 E 592950.32

Method: Hollow Stem Auger
Diameter: 203 mm
Date: Jan/28/2016

REF. NO.: 161-01403-00
ENCL NO.: 3

| (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Continued | | | | | | | | | | | |
| | **CLAYEY SILT TILL:** sandy, trace gravel, grey to reddish brown, moist, very stiff to hard.(Continued) | | | | | | Sand | | | | | |
| | grey below 10.7m | | | | | | | | | | | |
| 11 | | | 10 | SS | 41 | | 245 | | | | | |
| 244.16 | | | | | | | | | | | | |
| 11.73 | **SILTY CLAY TILL:** sandy, trace gravel, grey, moist, very stiff. | | | | | | 244 | | | | | |
| 12 | | | | | | | Screen | | | | | |
| | | | 11 | SS | 26 | | | | | | | |
| 13 | | | | | | | 243 | | | | | |
| 242.63 | | | | | | | | | | | | |
| 13.26 | **SILTY CLAY :** trace sand, contain silt seams/layers, grey, moist to wet, very stiff. | | | | | | 242 | | | | | |
| 14 | | | 12 | SS | 17 | | Sand | | | | | |
| 241.56 | | | | | | | | | | | | |
| 14.33 | **END OF BOREHOLE** | | | | | | | | | | | |

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

| Date | W. L. Depth (m) |
|---|---|
| Mar. 21, 2016 | 4.29 |

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4840925.62 E 593030.48

Method: Hollow Stem Auger
Diameter: 203 mm
Date: Jan/27/2016

REF. NO.: 161-01403-00
ENCL NO.: 4

| (m) ELEV / DEPTH | 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 256.11 | Ground Surface | | | | | | | | | |
| 0.00 | **FILL:** silty clay, trace sand, trace gravel, trace rootlets, trace organics, dark grey to brown, moist, stiff to very stiff. | | 1 | SS | 14 | | 256 | | | |
| 255.04 | | | 2 | SS | 22 | | 255 | | | |
| 1.07 | **SILTY CLAY TILL:** some sand, trace gravel, brown, moist, very stiff. oxidized between 1.1m to 3.6m | | 3 | SS | 20 | | | >225 | | |
| | | | 4 | SS | 40 | | 254 | | | |
| | brownish grey to grey below 3.0m | | 5 | SS | 27 | | 253 | >225 | | |
| | grey below 4.6m | | 6 | SS | 13 | | 252 | 100 | | |
| | sandy below 6.1m | | 7 | SS | 18 | | 251 | | | |
| 248.95 | | | | | | | 250 | | | |
| 7.16 | **CLAYEY SILT:** trace sand, trace gravel, contain sandy silt till layers, grey, moist to wet, hard. | | 8 | SS | 39 | | 249 | | | spoon wet |
| 247.42 | | | | | | | 248 | | | |
| 8.69 | **SANDY SILT TILL:** trace to some clay, trace gravel, contain clayey silt till layers, reddish brown, moist, dense. | | 9 | SS | 40 | | 247 | | | |

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)

Continued Next Page

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

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

PROJECT: Mayfield West Phase 2, Caledon, ON

CLIENT: Mayfield Station Landowners Group Inc.

PROJECT LOCATION: Caledon, ON

DATUM: Geodetic

BH LOCATION: See Borehole Location Plan N 4840925.62 E 593030.48

Method: Hollow Stem Auger

Diameter: 203 mm

Date: Jan/27/2016

REF. NO.: 161-01403-00

ENCL NO.: 4

| (m) ELEV / DEPTH | DESCRIPTION | STRATA PLOT | SAMPLES: NUMBER | SAMPLES: TYPE | SAMPLES: "N" BLOWS 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Continued | | | | | | | | | | | |
| 245.90 | | | | | | | 246 | | | | | |
| 10.21 | **CLAYEY SILT TILL:** sandy, trace gravel, reddish brown, moist, very stiff. | | | | | | | | | | | |
| 11 | | | 10 | SS | 16 | | | | ○ | 100 | | |
| 244.38 | | | | | | | 245 | | | | | |
| 11.73 | **SILTY CLAY :** trace sand, trace gravel, contain sandy silt till layers, grey, moist, very stiff. | | | | | | | | | | | |
| 12 | | | | | | | | | | | | |
| | | | 11 | SS | 21 | | 244 | | ○ | | | |
| 13 | | | | | | | | | | | | |
| 242.85 | | | | | | | 243 | | | | | |
| 13.26 | **SANDY SILT TILL:** trace to some clay, trace gravel, reddish brown, moist, dense. | | | | | | | | | | | |
| 14 | | | 12 | SS | 33 | | | | ○ | | | |
| 241.78 | | | | | | | 242 | | | | | |
| 14.33 | **END OF BOREHOLE**<br>Notes:<br>1) Borehole was open upon completion.<br>2) Water level was at 12.5m during drilling. | | | | | | | | | | | |

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

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

# LOG OF BOREHOLE 16-5

PROJECT: Mayfield West Phase 2, Caledon, ON

CLIENT: Mayfield Station Landowners Group Inc.

PROJECT LOCATION: Caledon, ON

DATUM: Geodetic

BH LOCATION: See Borehole Location Plan N 4841129.66 E 593028.26

Method: Hollow Stem Auger

Diameter: 203 mm

Date: Jan/26/2016 to Jan/27/2016

REF. NO.: 161-01403-00

ENCL NO.: 5

| (m) ELEV / DEPTH | DESCRIPTION | STRATA PLOT | NUMBER | TYPE | BLOWS "N" 0.3 m | GROUND WATER CONDITIONS | ELEVATION | REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---|---|---|---|---|---|---|---|---|
| 256.35 | Ground Surface | | | | | | | |
| 0.00 | **FILL:** silty clay, some sand, trace gravel, trace rootlets, trace organics, dark grey to brown, moist, firm to stiff. | | 1 | SS | 7 | Rising Up Casing<br>Sand | 256 | |
| 1 | | | 2 | SS | 8 | | 255 | |
| 254.83 | | | | | | | | |
| 1.52 | **SILTY CLAY TILL:** some sand, trace gravel, oxidized, brown, moist, very stiff. | | 3 | SS | 19 | W. L. 254.55 m<br>Mar 21, 2016<br>Holeplug | | |
| 2 | | | 4 | SS | 27 | | 254 | |
| 3 | brown to grey below 3.0m | | 5 | SS | 15 | | 253 | |
| 4 252.24 | | | | | | | | |
| 4.11 | **SILTY SAND TILL:** trace clay, trace gravel, contain silt seams, grey, wet to saturated, compact. | | 6 | SS | 20 | Sand | 252 | spoon wet |
| 5 250.71 | | | | | | | 251 | |
| 5.64 | **SILTY CLAY TILL:** sandy, trace gravel, contain wet coarse sand layers, grey, moist, very stiff. | | 7 | SS | 27 | Screen | 250 | |
| 6 7 249.19 | | | | | | | | |
| 7.16 | **SILT:** some clay to clayey, trace sand, contain silty clay layers, dilatant, grey, saturated, compact . | | 8 | SS | 20 | Sand | 249<br>248 | |
| 8 247.66 | | | | | | | | |
| 8.69 | **CLAYEY SILT TILL:** sandy, trace gravel, trace limestone fragments, reddish brown, moist, hard. | | 9 | SS | 99/ 225mm | | 247 | |
| 9 | | | | | | | | |
| 10 | cobbles/boulders (inferred) | | | | | | | auger grinding |

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): >225 at 1.52 m; >225 at 3.05 m; 125 at 4.11 m

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

# LOG OF BOREHOLE 16-5

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4841129.66 E 593028.26

Method: Hollow Stem Auger
Diameter: 203 mm
Date: Jan/26/2016 to Jan/27/2016

REF. NO.: 161-01403-00
ENCL NO.: 5

| (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Continued | | | | | | | | | | | |
| 246.14 | | | | | | | Holeplug | | | | | |
| 10.21 | **CLAYEY SILT TILL /SHALE COMPLEX:** sandy, trace gravel, trace limestone/shale fragments, reddish brown, moist, hard. | | 10 | SS | 50/ 75mm | | 246 | | | | | |
| 11 | cobbles/boulders (inferred) | | | | | | 245 | | | | | hammer bouncing /auger grinding |
| | | | 11 | SS | 50/ initial 125mm | | | | | | | |
| 12 | cobbles/boulders (inferred) | | | | | | | | | | | auger grinding |
| 244.11 | | | | | | | | | | | | hammer |
| 12.24 | **END OF BOREHOLE** | | 12 | SS | 100/ initial 50mm | | | | | | | bouncing |

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

| Date | W. L. Depth (m) |
|---|---|
| Mar. 21, 2016 | 1.80 |

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

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ $^{\varepsilon}$=3% Strain at Failure

# LOG OF BOREHOLE 16-6

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4841226.15 E 592912.85

Method: Hollow Stem Auger
Diameter: 203 mm
Date: Jan/26/2016

REF. NO.: 161-01403-00
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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 257.45 | Ground Surface | | | | | | | | | | | |
| 0.00 | **FILL:** silty clay, some sand, trace gravel, trace rootlets, trace organics, dark grey to brown, moist, stiff to very stiff. | | 1 | SS | 14 | | 257 | | ○ | | | |
| 1 256.23 | | | 2 | SS | 20 | | | | ○ | | | |
| 1.22 | **SILTY CLAY TILL:** some sand, trace gravel, brown, moist, very stiff to stiff. oxidized between 1.2m to 3.6m | | 3 | SS | 23 | | 256 | | ○ | >225 | | |
| 2 | brownish grey below 2.3m | | 4 | SS | 25 | | 255 | | ○ | >225 | | |
| 3 | brownish grey to grey below 3.0m | | 5 | SS | 20 | | 254 | | ○ | 200 | | |
| 4 | | | | | | | 253 | | | | | |
| 5 | sandy, grey below 4.6m | | 6 | SS | 10 | | | | ○ | | | |
| 6 | | | | | | | 252 | | | | | |
| 7 | | | 7 | SS | 19 | | 251 | | ○ | >225 | | |
| 8 | | | 8 | SS | 18 | | 250 | | ○ | >225 | | |
| 248.76 | | | | | | | 249 | | | | | |
| 8.69 | **SANDY SILT TILL:** trace to some clay, trace gravel, contain silt layers, grey, moist, very dense. | | 9 | SS | 51 | | 248 | | ○ | | | |
| 9 10 | | | | | | | | | | | | |

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

PROJECT: Mayfield West Phase 2, Caledon, ON

CLIENT: Mayfield Station Landowners Group Inc.

PROJECT LOCATION: Caledon, ON

DATUM: Geodetic

BH LOCATION: See Borehole Location Plan N 4841226.15 E 592912.85

Method: Hollow Stem Auger

Diameter: 203 mm

Date: Jan/26/2016

REF. NO.: 161-01403-00

ENCL NO.: 6

| (m) ELEV / DEPTH | DESCRIPTION | STRATA PLOT | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES "N" BLOWS 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Continued | | | | | | | | | | |
| 247.24 | | | | | | | | | | | |
| 10.21 | **SILTY CLAY TILL:** with sand and gravel layers, some sand, trace gravel, grey, wet, hard. | | | | | | 247 | | | | |
| 11 | | | 10 | SS | 62 | | | | ○ | | spoon wet |
| 245.72 | | | | | | | 246 | | | | |
| 11.73 | **SAND AND SILT TILL:** some clay, trace gravel, reddish brown, moist, compact. | | | | | | | | | | |
| 12 | | | 11 | SS | 22 | | 245 | | ○ H | | 6 37 46 11 |
| 244.65 | | | | | | | | | | | |
| 12.80 | **END OF BOREHOLE**<br>Notes:<br>1) Borehole was open upon completion.<br>2) Water level was at 11.1m during drilling. | | | | | | | | | | |

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

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

# LOG OF BOREHOLE 16-8

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4841430.85 E 592697.12

Method: Hollow Stem Auger
Diameter: 203 mm
Date: Jan/26/2016

REF. NO.: 161-01403-00
ENCL NO.: 8

| (m) ELEV / DEPTH | DESCRIPTION | STRATA PLOT | NUMBER | TYPE | BLOWS 0.3 m "N" | GROUND WATER CONDITIONS | ELEVATION |
|---|---|---|---|---|---|---|---|
| 259.29 | Ground Surface | | | | | | |
| 0.00 | **FILL:** silty clay, trace sand, trace gravel, trace rootlets, trace organics, dark grey to brown, moist, firm to very stiff. | | 1 | SS | 5 | Rising Up Casing | 259 |
| | | | 2 | SS | 7 | Sand | 258 |
| 257.46 | | | 3 | SS | 20 | W. L. 257.71 m Mar 21, 2016 | |
| 1.83 | **SILTY CLAY TILL:** some sand, trace gravel, oxidized, brown, moist, stiff to hard. | | | | | Holeplug | 257 |
| | | | 4 | SS | 27 | | |
| | brown to grey below 3.0m contain silt seams between 3.0m to 5.2m | | 5 | SS | 16 | | 256 |
| | | | | | | Sand | |
| | grey below 4.6m contain saturated sandy silt layers and silt seams between 4.6m to 5.2m | | 6 | SS | 10 | | 254 |
| | | | | | | Screen | |
| | sandy, reddish brown below 6.1m contain silty sand till layers between 6.1m to 6.7m | | 7 | SS | 18 | | 253 |
| | | | | | | | 252 |
| | grey below 7.6m contain silt layers between 7.6m to 8.2m | | 8 | SS | 31 | Sand | |
| | | | | | | | 251 |
| | contain sandy silt layers between 9.1m to 9.7m | | 9 | SS | 39 | | 250 |

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 |
|---|---|---|
| | | |
| >225 | | |
| 110 | | |
| >225 | | |

Continued Next Page

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

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

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4841430.85 E 592697.12

Method: Hollow Stem Auger
Diameter: 203 mm
Date: Jan/26/2016

REF. NO.: 161-01403-00
ENCL NO.: 8

| (m) ELEV / DEPTH | DESCRIPTION | STRATA PLOT | NUMBER | TYPE | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Continued | | | | | | | | | | | |
| | **SILTY CLAY TILL:** some sand, trace gravel, oxidized, brown, moist, stiff to hard.(Continued) | | | | | | 249 | | | | | |
| 11 | | | 10 | SS | 27 | | | | ○ | >225 | | |
| | | | | | | | Holeplug | | | | | |
| | | | | | | | 248 | | | | | |
| 12 | | | | | | | | | | | | |
| | | | | | | | 247 | | | | | |
| | | | 11 | SS | 23 | | | | ○ | >225 | | |
| 13 | | | | | | | | | | | | |
| 246.03 | | | | | | | | | | | | |
| 13.26 | **CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff. | | | | | | 246 | | | | | |
| 14 | | | 12 | SS | 29 | | | | ○ | | | |
| 244.96 | | | | | | | 245 | | | | | |
| 14.33 | **END OF BOREHOLE** | | | | | | | | | | | |

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

| Date | W. L. Depth (m) |
|---|---|
| Mar. 21, 2016 | 1.58 |

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ ε=3% Strain at Failure

# LOG OF BOREHOLE 16-24



PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4841681.88 E 593375.95

Method: Solid Stem Auger
Diameter: 150 mm
Date: Feb/12/2016

REF. NO.: 161-01403-00
ENCL NO.: 22

| (m) ELEV / DEPTH | DESCRIPTION | NUMBER | TYPE | BLOWS 0.3 m "N" | ELEVATION | REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---|---|---|---|---|---|---|
| 257.93 | Ground Surface | | | | | |
| 0.00 | **FILL:** silty clay, some sand, trace gravel, trace rootlets, trace organics, dark grey to brown, moist, firm to stiff. | 1 | SS | 6 | Rising Up Casing<br>Sand | |
| 256.71 | | 2 | SS | 11 | W. L. 257.33 m Mar 21, 2016<br>257 | |
| 1.22 | **SILTY CLAY TILL:** some sand, trace gravel, brown, moist, very stiff to hard.<br>oxidized between 1.2m to 2.9m | 3 | SS | 22 | Holeplug<br>256 | |
| | | 4 | SS | 31 | Sand | |
| | grey below 4.6m | 5 | SS | 24 | 255 | |
| 253.82 | | | | | 254 | |
| 4.11 | **SAND AND SILT TILL:** some clay, trace gravel, grey, moist to saturated, compact to very dense. | 6 | SS | 15 | Screen<br>253 | 3 38 48 11 |
| | contain saturated sand seams below 6.1m | | | | 252 | |
| 251.38 | | 7 | SS | 90/ 300mm | Sand | spoon wet |
| 6.55 | **END OF BOREHOLE**<br>Notes:<br>1) Borehole was open upon completion.<br>2) Water level was at 6.0m during drilling.<br>3) 50mm dia. monitoring well was installed upon completion.<br>4) Water Level Readings:<br>Date W. L. Depth (m)<br>Mar. 21, 2016 0.60 | | | | | |

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): >225 >225

NATURAL UNIT WT (kN/m³): 23.1

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

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

# LOG OF BOREHOLE 16-25



PROJECT: Mayfield West Phase 2, Caledon, ON

CLIENT: Mayfield Station Landowners Group Inc.

PROJECT LOCATION: Caledon, ON

DATUM: Geodetic

BH LOCATION: See Borehole Location Plan N 4841831.93 E 593253.47

Method: Solid Stem Auger

Diameter: 150 mm

Date: Feb/16/2016

REF. NO.: 161-01403-00

ENCL NO.: 23

| (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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 258.26 | Ground Surface | | | | | | | | | | | |
| 0.00 | **FILL:** silty clay, some sand, trace gravel, trace rootlets, trace organics, dark grey to brown, moist, firm to very stiff. | | 1 | SS | 7 | | 258 | | ○ | | | |
| 1 | | | 2 | SS | 7 | | | | ○ | | | |
| 256.43 | | | | | | | 257 | | | | | |
| 1.83 | **SILTY CLAY TILL:** some sand, trace gravel, oxidized, brown, moist, very stiff. | | 3 | SS | 21 | | | | ○ | | >225 | |
| 2 | | | 4 | SS | 27 | | 256 | | ○ | | >225 | |
| 3 | greyish brown below 3.0m | | 5 | SS | 24 | | 255 | | ○ | | | |
| 254.15 | | | | | | | | | | | | |
| 4.11 | **CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff. | | 6 | SS | 23 | | 254 | | ○ | | >225 | |
| 5 | | | | | | | | | | | | |
| 252.62 | | | | | | | 253 | | | | | |
| 5.64 | **CLAYEY SILT:** trace sand, contain silty clay layers, grey, moist, very stiff. | | | | | | | | | | | |
| 6 | | | 7 | SS | 24 | | 252 | | ○ | | | |
| 251.55 | | | | | | | | | | | | |
| 6.71 | **END OF BOREHOLE** | | | | | | | | | | | |

Notes:
1) Borehole was open upon completion.

GROUNDWATER ELEVATIONS

Measurement 1st ▽ 2nd ▼ 3rd ▼ 4th ▼

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

# LOG OF BOREHOLE 16-26

PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4841858.93 E 593212.44

Method: Solid Stem Auger
Diameter: 150 mm
Date: Feb/16/2016

REF. NO.: 161-01403-00
ENCL NO.: 24

| (m) ELEV / DEPTH | DESCRIPTION | NUMBER | TYPE | BLOWS 0.3 m "N" | ELEVATION | REMARKS AND GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---|---|---|---|---|---|---|
| 258.74 | Ground Surface | | | | | |
| 0.00 | **FILL:** silty clay, some sand, trace gravel, trace rootlets, trace organics, dark grey to brown, moist, firm to stiff. | 1 | SS | 5 | Rising Up Casing<br>Sand<br>W. L. 258.31 m Mar 21, 2016 | |
| 1 257.52 | | 2 | SS | 13 | 258 | |
| 1.22 | **SILTY CLAY TILL:** some sand, trace gravel, oxidized, brown, moist, stiff to very stiff. | 3 | SS | 16 | Holeplug<br>257 | |
| 2 256.45 | | | | | | |
| 2.29 | **SAND AND SILT TILL:** some clay, trace gravel, contain silty clay till layers, brown, wet, compact to dense. | 4 | SS | 21 | | spoon wet |
| 3 | contain dilatant silty sand layers below 3.0m | 5 | SS | 30 | Sand<br>255 | 5 46 38 11<br>Non-plasticity |
| 4 254.63 | | | | | | |
| 4.11 | **CLAYEY SILT TILL:** sandy, trace gravel, grey, moist, very stiff. | 6 | SS | 21 | Screen<br>254 | |
| 5 253.10 | | | | | | |
| 5.64 | **SANDY SILT TILL:** trace clay, trace gravel, contain clayey silt till layers and sandy silt seams, grey, moist to wet, very dense. | | | | 253 | |
| 6 252.42 | | 7 | SS | 50/ 75mm | Sand | |
| 6.32 | **END OF BOREHOLE**<br>Notes:<br>1) Borehole was open upon completion.<br>2) Water level was at 5.5m during drilling.<br>3) 50mm dia. monitoring well was installed upon completion.<br>4) Water Level Readings:<br>Date W. L. Depth (m)<br>Mar. 21, 2016 0.43 | | | | | |

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): >225 at 1.22 m; >225 at 4.11 m

NATURAL UNIT WT (kN/m³)

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

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

# LOG OF BOREHOLE 16-36



PROJECT: Mayfield West Phase 2, Caledon, ON
CLIENT: Mayfield Station Landowners Group Inc.
PROJECT LOCATION: Caledon, ON
DATUM: Geodetic
BH LOCATION: See Borehole Location Plan N 4842103.37 E 593544.05

Method: Solid Stem Auger
Diameter: 150 mm
Date: Feb/16/2016

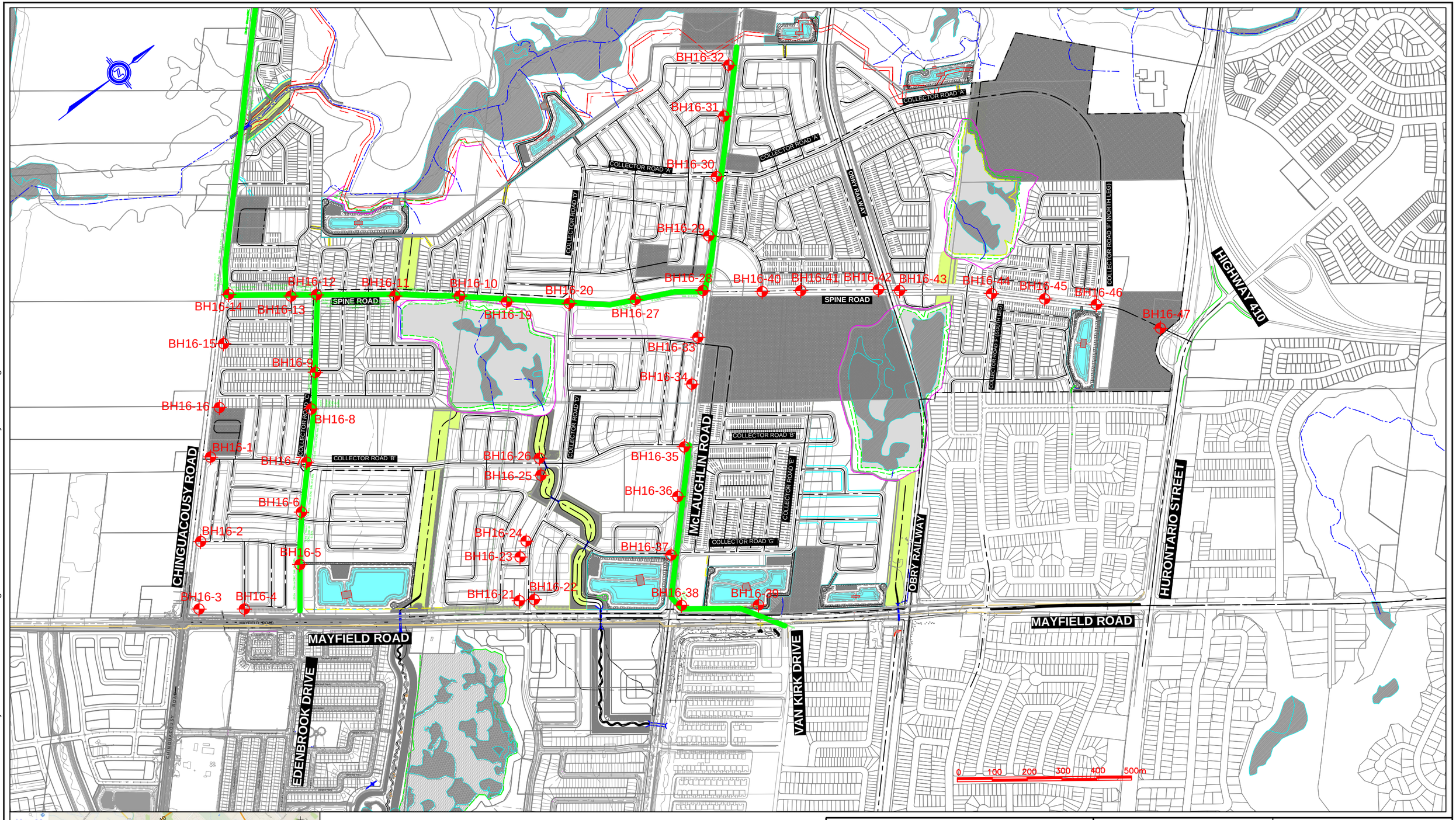
REF. NO.: 161-01403-00
ENCL NO.: 34

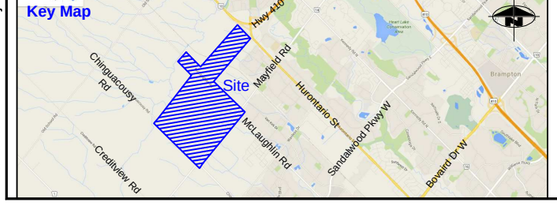
| (m) ELEV / DEPTH | DESCRIPTION | STRATA PLOT | NUMBER | TYPE | BLOWS 0.3 m "N" | GROUND WATER CONDITIONS | ELEVATION | DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (kPa) ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE & Sensitivity × LAB VANE (20 40 60 80 100) | PLASTIC LIMIT $w_P$ / 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 259.23 | Ground Surface | | | | | | | | | | | |
| 0.00 | **FILL:** silty clay, some sand, trace gravel, trace rootlets, trace organics, dark grey to brown, moist, firm to stiff. | | 1 | SS | 6 | | 259 | | | | | |
| 1 | | | 2 | SS | 8 | | 258 | | | | | |
| 257.71 | | | | | | | | | | | | |
| 1.52 | **SILTY CLAY TILL:** some sand, trace gravel, oxidized, brown, moist, very stiff. | | 3 | SS | 19 | | | | | >225 | | |
| 2 | | | | | | | 257 | | | | | |
| 256.94 | | | | | | | | | | | | |
| 2.29 | **CLAYEY SILT TILL:** with sandy silt layers, sandy, trace gravel, brown, moist, hard. | | 4 | SS | 35 | | | | | | | |
| 256.18 | | | | | | | | | | | | |
| 3.05 | **SAND AND SILT TILL:** trace to some clay, trace to some gravel, reddish brown, moist, very dense. | | 5 | SS | 65/ 150mm | | 256 | | | | | 10 36 44 10 |
| 4 | | | | | | | | | | | | |
| 255.12 | | | | | | | | | | | | |
| 4.11 | **SILTY SAND TILL /SHALE COMPLEX:** sandy, some gravel, contain shale/limestone fragments, reddish brown, moist to saturated, very dense. | | 6 | SS | 35 | | 255 | | | | 23.0 | 25 31 33 11 |
| 5 | | | | | | | | | | | | |
| 6 | | | | | | | 254 | | | | | |
| 253.13 | | | | | | | | | | | | |
| ~~258.00~~ | ~~**QUEENSTON FORMATION**~~ | | 7 | SS | ~~100/~~ initial 75mm | | | | | | | auger refusal |
| 6.17 | reddish brown and grey shale bedded with siltstone and limestone | | | | | | | | | | | |
| | **END OF BOREHOLE** | | | | | | | | | | | |

Notes:
1) Borehole was open upon completion.
2) Water level was at 6.0m during drilling.

GROUNDWATER ELEVATIONS
Measurement 1st 2nd 3rd 4th

GRAPH NOTES: $+^3$, $\times^3$: Numbers refer to Sensitivity; ○ $\varepsilon_f$=3% Strain at Failure




**LEGEND**

- Borehole Location
- Proposed Sanitary Trunk Sewer

| | | | | | |
|---|---|---|---|---|---|
| Client: | **Mayfield Station Landowners Group Inc.** | | | Project No.: **161-01403-00** | Drawing No.: **1** |
| Drawn: | **ZMO** | Approved: | **DT** | Title: | **Borehole Location Plan** |
| Date: | **July 11, 2017** | Scale: | **As Shown** | Project: | **Geotechnical Investigation - Sanitary Trunk Sewer on Mayfield West Phase 2, Caledon, Ontario** |
| Original Size: | **Tabloid** | Rev: | **N/A** | WSP | 51 Constellation Court<br>Toronto, Ontario<br>M9W 1K4 |

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