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A REPORT TO
NORTHCAPE INVESTMENTS INC.

A GEOTECHNICAL INVESTIGATION FOR PROPOSED RESIDENTIAL DEVELOPMENT

12811 TENTH LINE

TOWN OF WHITCHURCH-STOUFFVILLE

REFERENCE NO. 1910-S052

MARCH 2026
(REVISION TO REPORT DATED APRIL 2020)

DISTRIBUTION

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1.0 INTRODUCTION

In accordance with written authorization from Mr. Paul Tobia of Northcape Investments Inc., dated October 29, 2025, a geotechnical report update is carried out for 12811 Tenth Line, in the Town of Whitchurch-Stouffville.

The original geotechnical investigation, as authorized by Mr. David Farrow of Trinison Management Corp. on behalf of Northcape Investments Inc. on December 11, 2019, and the supplementary geotechnical investigation, as authorized by Ms. Toula Nessinis of Trinison Management Corp., on behalf of Northcape Investments Inc. on February 25, 2022, are incorporated into this geotechnical report update.

The purpose of this present report is to review the subsurface conditions from the previous 2020 and 2022 geotechnical reports and to determine the engineering properties of the disclosed soils for the design and construction of a residential development based on the latest Conceptual Demonstration plan prepared by Bousfield Inc., updated February 2026.

2.0 SITE AND PROJECT DESCRIPTION

The subject site, located in the northeastern portion of the Town of Whitchurch-Stouffville, lies within the Physiographic Region of South Slope. A review of the Quaternary Geology data published by Ontario Geological Survey indicates that the overburden at the site consists of the Halton Till plain, which is characterized predominantly as a silt to silty clay matrix, high in matrix carbonate content and clast poor. Beneath the relatively shallow upper Halton Till, the area is underlain by sediments derived from the Oak Ridges Moraine Aquifer Complex (ORAC), which is primarily composed of interbedded fine sand and silt deposits. Based on interpretation of the geological cross-section from the Oak Ridges Moraine Groundwater Program (ORMGP), the ORAC unit within the area has an approximate thickness of 30 m.

The property, encompassing an approximate area of 5 hectares, is located on the east side of Tenth Line, approximately 550 m south of Bethesda Side Road, in the Town of Whitchurch-Stouffville. At the time of investigation, it was a vacant field with a wooded area at the northeast portion. The existing site topography is undulating, descending gently to the south and east towards Reesor Creek, which traverses from north to south within the valley land on the east side of the property.

The site was once used as a farmland, with houses and barns situated in the southeast portion of the property. These structures, however, have since been demolished.

Based on the Conceptual Demonstration Plan prepared by Bousfields Inc., the site will be developed as a residential subdivision consisting of townhouse blocks and mixed-use residential buildings fronting Tenth Line. The development will be provided with municipal services and paved roadways. The mixed-use residential buildings are understood to have up to 2 levels of underground parking garage. The remaining area within the property are reserved for a park, a stormwater management facility and environmental lands. The land fronting York Durham Line is designated for future development.

3.0 FIELD WORK

The field work from the geotechnical investigations described above, consists of a total of 12 drilled locations and 15 monitoring wells. The more recent boreholes are numbered in the 100-series to differentiate them from the original 2020 geotechnical investigation:

- Seven (7) boreholes (Boreholes 1 to 7, inclusive), extending to depths ranging from 6.5 to 8.1 m below the prevailing ground surface, was completed between March 3 and 6, 2020. A monitoring well or a well cluster was installed at all borehole locations.
- Six (6) boreholes (Boreholes 101 to 106, inclusive), extending to depths ranging from 14.0 to 14.2 m below the prevailing ground surface, was completed between March 11 and 21, 2022. A monitoring well was installed at all borehole locations.

The borehole and monitoring well locations are shown on the Borehole and Monitoring Well Location Plan, Drawing No. 1, enclosed.

The boreholes were advanced by a track-mounted machine using solid or hollow stem augers, equipped with tri-cone accessories, and split spoon sampler for soil sampling. In boreholes where saturated sand was contacted, water was used for wash-boring to prevent caving or base heaving in the boreholes. Standard Penetration Tests, using the procedures described on the enclosed “List of Abbreviations and Terms”, were performed at intervals to the sampling depths. The test results are recorded as the Standard Penetration Resistance (or ‘N’ values) of the subsoil. The compactness of the cohesionless 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. The field work was supervised and the findings were recorded by a geotechnical technician.

Upon completion of borehole drilling and sampling, monitoring wells, 50 mm in diameter, were installed at all borehole locations, with a 2-well cluster at 2 selected locations. A suffix of ‘S’ or ‘D’, representing the shallow well and deep well, respectively, was used to differentiate the well depths at the nested well locations. The depth and details of the monitoring wells are shown on the corresponding Borehole Logs.

The ground elevation at each borehole location was determined using hand-held Global Navigation Satellite System (GNSS) equipment.

4.0 SUBSURFACE CONDITIONS

The investigation has disclosed that beneath a topsoil veneer and a layer of ploughed soil or earth fill, the site is underlain by strata of sandy silt till/silty sand till and silty clay/silty clay till, overlying deposits of sand and silt. Detailed descriptions of the subsurface conditions are presented on the Borehole Logs, comprising Figures 1 to 15, inclusive. The revealed stratigraphy is plotted on the Subsurface Profile, Drawing No. 2. The engineering properties of the disclosed soils are discussed herein.

4.1 Topsoil

The revealed topsoil veneer ranges from 5 to 25 cm in thickness. Thicker topsoil layers may occur in places, especially in low-lying areas that have been filled during previous farming activities.

4.2 Ploughed Soil

The site was a farm field in the past. Ploughed soil, consisting of silty clay and organics, was contacted below the topsoil. It extends to depths of 0.7 to 1.1 m from grade.

4.3 Earth Fill

A layer of earth fill was contacted below the topsoil veneer at Boreholes 4 and 106, located in the vicinity of the previously demolished structures. The earth fill consists of silty clay, with topsoil inclusions and rootlets, extending to a depth of 1.4 m from grade. It may represent the grading material after the structures were demolished. The water content of the earth fill samples was determined to range between 12% and 21%.

One must be aware that the samples retrieved from boreholes may not be truly representative of the geotechnical quality of the earth fill, and do not indicate whether the topsoil beneath the earth fill was completely stripped. This should be further assessed by test pits at the time of construction.

4.4 Sandy Silt Till/Silty Sand Till

The sandy silt till was contacted predominantly below the earth fill in majority of the boreholes, extending to depths of 4.0 to 5.6 m from grade. In Borehole 7, the sandy silt till was also contacted below a depth of 7.1 m from grade. Localized silty sand till layers were observed in Boreholes 103 and 104 in the upper stratigraphy.

The tills consist of a random mixture of particle sizes ranging from clay to gravel, with the sand and silt being the dominant fraction. Intermittent to frequent hard resistance to augering was encountered, indicating the presence of cobbles and boulders in the till deposits. Grain size analyses were performed on representative samples of the silt and sand tills; the results are plotted on Figures 16 and 17, respectively.

The compactness of the till deposits is compact to very dense, being generally dense, as inferred from the ‘N’ values ranging from 14 to more than 100, with a median of 42 blows per 30 cm of penetration.

The natural water content values of the till samples range from 7% to 18%, with a median of 11%, indicating moist to very moist, generally moist conditions.

The engineering properties of the sandy silt till and silty sand till are presented below:

- High frost susceptibility with moderate soil-adfreezing potential.
- Moderately low water erodibility.
- The tills will be stable in relatively steep cuts; however, under prolonged exposure, localized erosion and sheet collapse may occur.

4.5 Silty Clay/Silty Clay Till

The silty clay and silty clay till deposits were contacted in 7 boreholes, located in the east portion of the property.

The silty clay is laminated with silt and fine sand seams. The 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 the soil properties. Grain size analyses were performed on representative samples of the silty clay and silty clay till; the results are plotted on Figures 18 and 19, respectively.

The obtained 'N' values in the silty clay range from 7 to 43, with a median of 21 blows per 30 cm of penetration, indicating firm to hard, generally very stiff in consistency. The obtained 'N' values in the silty clay till range from 11 to more than 100, with a median of 25 blows per 30 cm of penetration, indicating stiff to hard, generally very stiff in consistency. The firm clays are generally limited in the surficial zone, which was possibly weakened due to weathering.

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

	Silty Clay	**Silty Clay Till**
Liquid Limit	26% and 28%	24% and 25%
Plastic Limit	17% and 18%	16% and 17%
Natural Water Content	15% to 27% (median 19%)	12% to 19% (median 15%)

The above results show that the clay and clay till are low plasticity. The natural water content generally lies below or near the plastic limit, confirming the consistency as disclosed by the 'N' values.

The engineering properties of the clay and clay till are presented below:

- High frost susceptibility and high soil-adfreezing potential.
- Low water erodibility.
- They will be stable in relatively steep cut. However, prolonged exposure will allow infiltrating precipitation to saturate the fissures, leading to localized sloughing.

4.6 Silt/Sandy Silt

The silt and sandy silt deposits were contacted below the tills or clay at depths below 4.0 m or 5.6 m from grade, generally overlying the deeper sand unit. It is understood that the silts form part of the ORAC complex in this area. Grain size analyses were performed on representative samples of the silt and sandy silt; the results are plotted on Figures 20 and 21, respectively.

The obtained 'N' values of the silts range from 18 to more than 100, with a median of 61 blows per 30 cm of penetration, indicating that the deposits are compact to very dense, being generally very dense in compactness.

The natural water content values of the soil samples range from 9% to 21%, with a median of 17%, indicating moist to wet, generally very moist conditions. The silts are generally water-bearing below a depth of 5.6 to 6.0 m from grade.

The engineering properties of the silt and sandy silt are presented below:

- High frost susceptibility and moderately high soil-adfreezing potential.
- High water erodibility; they are susceptible to migration through small openings under seepage pressure.
- In excavation, the silts will slough and run slowly with seepage bleeding from the cut face. They will boil with an approximate piezometric head exceeding 0.3 m.

4.7 Sand

The sand was generally encountered below the till and silt deposits, extending to the terminated depth of 8 of the boreholes. The sand is fine to fine-to-medium grained with a trace of silt to being silty. Similar to the silts, the sand forms part of the ORAC unit, and is generally water-bearing below a depth of 5.6 to 6.0 m from grade. Grain size analyses were performed on 5 representative samples; the results are presented on Figures 22 and 23.

The obtained 'N' values range from 17 to over 100, with a median of 52 blows per 30 cm of penetration, showing the compactness of the sand is compact to very dense, being generally very dense.

The natural water content values of the sand samples range from 5% to 20%, with a median of 17%, showing the sand deposit is damp to wet, generally being saturated with depth.

The engineering properties of the sand are presented below:

- High in frost susceptibility and moderately high soil adfreezing potential.
- Highly water erodible, the sand particles will migrate under the hydrostatic pressure.
- In excavation, the sand will slough, run with seepage and boil under an approximate piezometric head exceeding 0.3 m.

4.8 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 for Standard Proctor compaction are presented in Table 1:

Table 1 - Estimated Water Content for Compaction

Soil Type	**Determined Natural Water Content (%)**	**Water Content (%) for Standard Proctor Compaction**	
		100% (optimum)	**Range for 95% or +**
Sandy Silt Till/ Silty Sand Till	7 to 18 (median 11)	12	8 to 15
Silty Clay/ Silty Clay Till	15 to 27 (median 19) 12 to 19 (median 15)	16 to 18	12 to 22
Silt/Sandy Silt	9 to 21 (median 17)	12 to 13	8 to 15
Sand	5 to 20 (median 17)	10	6 to 13

* The above values are provided as a guideline. Standard Proctor Tests must be performed on bulk samples collected from site during construction prior to backfill and compaction.

The above values show that the on-site soils are generally suitable for 95% or + Standard Proctor compaction. However, parts of the silts and sand are too wet and will require aeration prior to structural compaction. The aeration can be achieved by stockpiling or spreading the wet soils thinly on the ground in the dry and warm weather.

The existing earth fill must be subexcavated and inspected, sorted free of topsoil inclusions and deleterious materials, if any, prior to being reused for structural backfill. The ploughed soil should be further assessed to determine its suitability for reuse at the time of construction. Any ploughed soil with high concentration of topsoil must be sub-excavated, sorted free of topsoil, organics and deleterious materials, if any, prior to being reused for site grading. Otherwise, they should be stockpiled with the topsoil for reuse for general landscaping purpose only.

5.0 <u>SLOPE STABILITY STUDY</u>

A slope stability study is carried out for the west valley slope of the Reesor Creek valley, where the slope gradient is steeper than 6H:1V in the northeast corner of the site as well as immediately east of the site. The details and results are presented in a separate letter.

6.0 GROUNDWATER CONDITIONS

The boreholes were checked for the presence of groundwater upon completion of drilling. Water was used during the drilling of Boreholes 101 to 106, inclusive, therefore, groundwater levels could not be recorded from these boreholes on completion.

The groundwater level in the monitoring wells was recorded between April 2020 and September 2024, and again in December 2025 and January 2026. The water levels recorded on completion of the drilling program and the highest and lowest water level recorded to date are summarized in Table 2. The detailed monitoring well records are enclosed in the Appendix for reference.

Table 2 - Groundwater Levels

MW No.	Ground Elevation (m)	Well Depth (m)	Upon Completion		Lowest		Highest	
			Depth (m)	El. (m)	Depth (m)	El. (m)	Depth (m)	El. (m)
1D	293.6	7.6	6.4	287.2	7.6	286.0	5.5	288.1
1S	293.6	6.1	Not Evident		6.1	287.5	5.5	288.1
2	291.8	6.1	5.8	286.0	6.1	285.7	3.2	288.6
3	295.8	6.1	6.0	289.8	6.1	289.7	5.8	290.0
4	293.7	6.1	Dry	-	6.1	287.6	5.8	287.9
5	295.8	6.1	Dry	-	6.1	289.7	4.8	291.0
6	294.4	6.1	Dry	-	6.1	288.3	5.9	288.5
7D	292.5	7.6	5.9	286.6	5.9	286.6	4.1	288.4
7S	292.5	6.1	Not Evident		6.0	286.5	4.2	288.3
101	293.9	13.7	Water was used		7.4	286.5	5.6	288.3
102	293.2	13.7	Water was used		6.9	286.3	5.1	288.1
103	291.8	13.4	Water was used		5.7	286.1	3.9	287.9
104*	295.5	13.7	Water was used		7.5	288.0	7.2	288.3
105	293.4	13.7	Water was used		7.1	286.3	5.3	288.1
106	293.0	13.7	Water was used		6.8	286.2	5.0	288.0

* MW104 was damaged since June 2022.

Detailed groundwater records and profiles will be provided in the hydrogeological assessment, to be presented under separate cover. The groundwater levels measured within the site is primarily associated with the wet silts and sand unit. The water levels recorded in the monitoring well, ranged from El. 286.0 to 291.0 m, indicates that the groundwater flows in a southerly drainage pattern. It will fluctuate with seasons and may be affected by the water level of the Reesor Creek located within the east side of limit of the property. During wet seasons, localized shallow water table derived from infiltrated precipitation may occur in the sand and silt layers embedded in the tills.

7.0 DISCUSSION AND RECOMMENDATIONS

The investigation has disclosed that beneath a topsoil veneer, with a layer of ploughed soil or earth fill, the site is underlain by strata of sandy silt till/silty sand till and silty clay/silty clay till, overlying deposits of silts and sand. Ploughed soil was found extending to approximate depths of 0.7 to 1.1 m below the existing grade. The silt and sand deposits in the lower stratigraphy are generally saturated.

Groundwater levels recorded from the monitoring wells ranged from El. 286.0 to 291.0 across the site, with a southerly drainage pattern following the topography. This is generally consistent with the water-bearing silts and sand identified from the boreholes. The groundwater is subject to seasonal fluctuation.

Based on the Conceptual Demonstration Plan prepared by Bousfields Inc., the site will be developed as a residential subdivision consisting of townhouse blocks and mixed-use residential buildings fronting Tenth Line. It will be provided with municipal services and paved roadways. The mixed-use residential buildings are understood to have up to 2 underground parking levels. The balance of the site will consist of a stormwater management facility, a park and environmental lands. The land fronting York Durham Line is designated for future development. The geotechnical findings warranting special consideration for the proposed project are presented below:

1. The topsoil must be removed prior to project construction, and can only be used for landscaping purposes.
2. The ploughed soil should be further assessed to determine its suitability for reuse at the time of construction. Badly weathered or ploughed soils with high concentration of topsoil must also be sub-excavated and sorted.
3. In the area of the previous structures, any debris and organic containing material must be removed and disposed off-site. The existing earth fill must be removed and assessed before reuse on site.

4. Where additional earth filling is required for site grading, it is more economical to place an engineered fill for conventional footing, underground services and pavement construction.
5. The sound native soils and engineered fill are suitable for supporting the low-rise structures on conventional footings. For medium rise structures, the foundations should be supported on the native soil stratum.
6. In accordance to the Town of Whitchurch-Stouffville requirement, the underground or basement structures should be designed such that the underside of footings is founded at least 0.6 m above the seasonal high groundwater level, and be provided with a perimeter drainage system connected to a positive outlet.
7. If the underground or basement structure is to be founded in the wet silts or sand below the groundwater table, the submerged structure must be waterproofed and designed to resist the hydrostatic pressure.
8. Any excavation extending below the water-bearing strata must be stabilized by construction dewatering or depressurization. Details of appropriate dewatering methods should be referred to the hydrogeological assessment.
9. A Class ‘B’ bedding, consisting of compacted 19-mm Crusher-Run Limestone (CRL), is recommended for the construction of underground services. In saturated soils or where extensive dewatering is necessary, a Class ‘A’ concrete bedding should be used.

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 this become apparent during construction, a geotechnical engineer must be consulted to determine whether the following recommendations require revision.

7.1 Site Preparation

The existing topsoil and surficial vegetation must be removed for site development. The ploughed soil should be further assessed to determine its suitability for reuse at the time of construction. Badly weathered soils or ploughed soils with high concentrations of topsoil and organics must be sub-excavated, sorted free of organics and deleterious materials, if any, aerated before reuse for site grading. Otherwise, they should be stockpiled with the topsoil for reuse for general landscaping purpose only.

In the area of the demolished structures, all remaining debris must be removed and disposed off site. The existing earth fill, due to its unknown history, should also be removed and assessed before reuse on site.

Where additional earth fill is required for site grading, it is more economical to place engineered fill for conventional footing, underground services and pavement construction. The engineering requirements for a certifiable fill for road construction, municipal services, and footings designed with the recommended bearing pressures in Section 7.2 are presented below:

1. The exposed subgrade must be inspected and proof-rolled prior to any fill placement. Any loose soil identified during proof-rolling must be subexcavated, sorted free of organics and deleterious materials, aerated before reuse for site grading and structural backfill.
2. Inorganic soils must be used for engineered fill construction, and they must be uniformly compacted in lifts of 20 cm thick to at least 98% Standard Proctor Maximum Dry Density (SPMDD) with its moisture content controlled near its optimum. If the foundations are to be built shortly after the fill placement, the densification process for the engineered fill must be increased to 100% SPMDD.
3. If the engineered fill is compacted with the moisture content on the wet side of the optimum, the underground services and pavement construction should not begin until the pore pressure within the fill mantle has completely dissipated. This must be further assessed at the time of the engineered fill construction.
4. If imported fill is to be used, it must 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.
5. The engineered fill must not be placed during the period where freezing ambient temperatures occur either persistently or intermittently. This is to ensure that the fill is free of frozen soils, ice and snow. If the fill is to be left over the winter months, adequate earth cover, or equivalent, must be provided for protection against frost action.
6. Where the fill is to be placed on sloping ground steeper than 3 horizontal (H):1 vertical (V), the face of the sloping ground should be benched or flattened so that it is suitable for safe operation of the compactor and the required compaction can be obtained.
7. The fill operation must be inspected on a full-time basis by a geotechnical technician under the direction of a geotechnical engineer.
8. The engineered fill envelope and finished elevations must be clearly and accurately defined in the field, and they must be precisely documented by a surveyor.
9. Despite stringent control in the placement of the engineered fill, variations in soil type and density may occur in the engineered fill. Therefore, the foundations must be reinforced, or be designed by the structural engineer for the project to allow distribution of stress induced by the abrupt differential settlement. The total and

differential settlements of 25 mm and 20 mm, respectively, should be considered in the design of the foundation founded on both engineered fill and native soils.

10. Any excavation carried out in certified engineered fill must be reported to the geotechnical consultant who supervised the fill placement in order to document the locations of excavation and/or to supervise 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.
11. The footing, slab-on-grade and underground services subgrade must be inspected by the geotechnical consulting firm which supervised the engineered fill placement. This is to ensure that the foundations and service pipes 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 any excavation.

7.2 Foundations

Based on a review of the Conceptual Demonstration Plan, the site will consist of townhouse blocks and multi-storey mixed-use residential buildings with up to 2 underground parking levels fronting Tenth Line. According to the Town of Whitchurch-Stouffville's design requirement, the underside of footing is required to be founded a minimum 0.6 m above the seasonal high groundwater level, otherwise, the underground structure must be waterproofed to eliminate the need for long-term dewatering. Alternatively, a cut-off wall surrounding the underground structures can also be considered, subject to approval from the Town.

Townhouse Blocks

Conventional spread and strip footings can be used to support the house structures. The footings must be placed onto the engineered fill or sound native soil below the earth fill and weathered/ploughed soils. The recommended soil bearing pressures for the design of conventional footings are provided below:

- Maximum Soil Bearing Pressure at Serviceability Limit State (SLS) = 150 kPa
- Factored Ultimate Bearing Pressure at Ultimate Limit State (ULS) = 240 kPa

The total and differential settlements of foundations designed with the recommended bearing pressure at SLS, are estimated to be 25 mm and 20 mm, respectively.

Mixed-Use Residential Buildings

For the construction of the multi-storey mixed-use residential buildings with up to 2 levels of underground parking garage, it is anticipated that the foundations will extend to approximately 8 m below the finished grade. Once the building design becomes available, additional boreholes must be completed to assess and verify the ground condition within the footprint of the building for the future development.

For design of the underground structures supported on conventional spread and strip footings, the underside of footings should be maintained at least 0.6 m above the groundwater level. As a preliminary and general guide, the recommended soil bearing pressures at SLS and ULS for the design of conventional spread and strip footings founded in the sound native soils are presented below:

- Maximum Allowable Bearing Pressure at SLS = 250 to 350 kPa
- Factored Ultimate Bearing Pressure at ULS = 350 to 500 kPa

The total and differential settlements for foundations designed with the recommended bearing pressures at SLS are estimated to be 25 mm and 20 mm, respectively.

Weaker soils were contacted at lower depths in the sand deposit in the vicinity of Borehole 103. Should the proposed underground structure be founded in the weaker soil stratum, lower bearing pressures of 200 kPa (SLS) and 300 kPa (ULS) should be used. This can be assessed during the detailed design stage once additional boreholes are carried out to elaborate on the available data.

Where the separation between the highest groundwater level and the underground structure is less than 0.6 m or the underground structures are submerged into the groundwater, the underground structure must be either be provided with a cut-off wall surrounding the underground structure or the structure must be water-proofed and designed to resist the hydrostatic uplift pressure by a raft foundation.

The recommended soil bearing pressures and Modulus of Subgrade Reaction for the design of a raft foundation is provided below:

- Maximum Allowable Bearing Pressure at SLS = 400 kPa
- Factored Ultimate Bearing Pressure at ULS = 600 kPa
- Modulus of Subgrade Reaction = 30 MPa/m

The total and differential settlements for raft foundations designed using the recommended bearing pressure at SLS are estimated to be less than 30 mm and 20 mm, respectively.

One must be aware that the recommended bearing pressures are given as a guide for assessment. A comprehensive geotechnical investigation must be completed for each future building within the property at the detailed design stage. Once detailed design of the underground structures is available, it should be reviewed by the project geotechnical engineer to verify the design bearing pressures at the respective underside of footing elevations.

Footings exposed to weathering, or in unheated areas, should have at least 1.2 m of earth cover for protection against frost action, or must be properly insulated.

The foundations for the multi-storey mixed-use residential buildings should meet the requirements specified in the latest Ontario Building Code. The structures should be designed to resist an earthquake force using Site Classification ‘D’ (stiff soil). A Multi-Channel Analysis of Surface Waves (MASW) survey can be performed to determine the appropriate shear wave velocity (V_s) for seismic design.

The footing 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.

If groundwater seepage is encountered in excavation, or the subgrade of the foundation is found to be wet, the foundation must be poured immediately after subgrade inspection or the subgrade should be protected by a concrete mud-slab immediately after exposure. This will prevent construction disturbance and costly rectification of the bearing subsoil.

7.3 Basement Structures and Slab-On-Grade

With the minimum 0.6 m separation maintained between the underside of footing and the seasonal groundwater level, the basement slab will likewise remain above the groundwater level. In conventional design, the perimeter walls of the basement structure should be provided with a drainage board and subdrain system at the wall base (Drawing No. 3). The perimeter walls of the underground structure should be designed to sustain a lateral earth pressure calculated using the soil parameters stated in Section 7.8. Any applicable surcharge loads adjacent to the proposed building, must also be considered in the design of the underground structure.

The house basement slabs should be constructed on a granular base, minimum 15 cm thick, consisting of 19-mm Clear Stone, or equivalent, compacted to 100% SPMDD.

Should the proposed underground parking garage extend below the groundwater level, the underground structure must be waterproofed and designed to resist the hydrostatic pressure and buoyancy uplift forces or provided with a cut-off wall system. The elevator pit of mixed-use buildings, which normally extends a few meters below the lowest basement floor level, should be designed as a submerged ‘tank’ structure with waterproofed pit walls and pit floor. A Modulus of Subgrade Reaction of 25 MPa/m can be used for the design of the underground parking floor slab.

The floor slab of the lowest underground parking garage should be constructed on a granular base, 20 cm thick, consisting of 19-mm CRL, or equivalent, compacted to the maximum SPMDD.

The subgrade for the floor slabs should consist of sound native soil or properly compacted inorganic earth fill. Any new fill should consist of organic-free soil, compacted to at least 98% SPMDD.

The exterior grade should slope away from the building structures to prevent ponding of water adjacent to the underground structures.

7.4 **Underground Services**

The subgrade for the underground services should consist of sound native soils or properly compacted, organic-free earth fill. Where earth fill, badly weathered, soft or loose soils are encountered, they should be subexcavated and replaced with bedding material compacted to at least 95% SPMDD.

A Class ‘B’ bedding, consisting of compacted 19-mm CRL, is recommended for the construction of the underground services. Where the subgrade consists of wet sand or silt, or it needs to be stabilized by extensive dewatering, a Class ‘A’ concrete bedding should be used for proper pipe support.

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

The pipe joints into manholes and catch basins should be leak-proof, or wrapped with an appropriate waterproof membrane. Openings to subdrains and catch basins should be shielded with a fabric filter to prevent blockage by silting.

All ductile iron pipes and metal fittings for the underground services should be protected against soil corrosion. For estimation for the anode weight requirements, the electrical resistivity of the disclosed soils in Table 4 can be used. The proposed anode weight must meet the minimum requirements as specified by the municipality standard.

7.5 Backfilling in Trenches and Excavated Areas

The on-site inorganic soils are suitable for trench backfill. Saturated soils should be properly stockpiled to drain the excess water or they can be spread thinly on the ground for aeration prior to be reused. In using the existing fill for structural backfill, pavement subgrade or slab-on-grade construction, it must be sorted free of concentrated topsoil inclusions or deleterious materials, and properly recompacted in layers. Boulders over 15 cm in size must be sorted and removed from the backfill material.

The backfill should be compacted to at least 95% SPMDD. In areas below the slab-on-grade and in the zone within 1.0 m below the road subgrade, the materials should be compacted to at least 98% SPMDD, with the water content at 2% to 3% drier than the optimum, in order to provide the required stiffness for floor or pavement construction. The lift of each backfill layer should be limited to a thickness of 20 cm, or the thickness should be determined by test strips at the time of compaction.

In normal construction practice, the problem areas of settlement largely occur adjacent to manholes, catch basins, service crossings, foundation walls and columns. In areas which are inaccessible to a heavy compactor, sand backfill which can be appropriately compacted using a smaller/handheld vibratory compactor should be used.

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

- Subsequent to backfilling a trench, one must be aware that minor future settlement is to be expected along the service alignment unless the sides of excavation are flattened to 2H:1V or the excavation is properly benched, and the lifts of the fill is limited to no more than 20 cm (or less if the backfilling conditions dictate) and uniformly compacted to achieve at least 98% SPMDD, with the moisture content stringently controlled within 2% to 3% of the optimum.

- It is often difficult to achieve uniform compaction of the backfill in the lower vertical section of a trench, particularly in the sector close to the trench walls or the sides of the box. These sectors must be backfilled with Granular 'B' Type I or sand, and the compaction must be carried out diligently prior to the placement of the backfill 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 the underground services 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 the final surfacing of the new pavement and slab-on-grade construction.
- 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. 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 groundwater movement is expected in the pipe bedding, trench backfill and/or sand fill mantle, anti-seepage collars (OPSD 802.095) should be provided.

7.6 **Pavement Design**

The road subgrade is anticipated to consist of silty subsoils. The recommended minimum pavement design for local residential and collector roads is presented in Table 3.

Table 3 - Road Pavement Design

Course	Thickness (mm)	OPS Specifications
Asphalt Surface	40	HL3
Asphalt Binder Local Residential Collector/Bus Route	 50 100	HL8
Granular Base	150	19-mm CRL
Granular Sub-base Local Residential Collector/Bus Route	 300 450	50-mm CRL

Prior to the placement of granular bases, the subgrade must be proof-rolled. Any weak or soft areas must be subexcavated and replaced with approved material and compacted in layers. In the zone within 1.0 m below the road subgrade, the backfill should be compacted to at least 98% SPMDD, with the water content at 2% to 3% drier than the optimum. In the lower zone, a 95%+ SPMDD compaction is considered adequate. All the granular bases should be compacted to 100% SPMDD.

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

- If the pavement 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.
- Lot areas adjacent to the roadway should be properly graded to prevent ponding of water. Otherwise, the water will seep into the subgrade mantle and induce a regression of the subgrade strength with costly consequences for the pavement construction.
- In extreme cases during the wet seasons, if soft or weak subgrade is identified, the granular sub-base should be thickened in order to compensate for the inadequate strength of the soft or weak subgrade. This can be assessed during construction.
- Fabric filter-encased curb subdrains will be required on both sides of the roadway to meet the Town of Whitchurch-Stouffville requirements.

7.7 Stormwater Management Facility

Based on the Conceptual Plan, a stormwater management (SWM) facility is proposed in the vicinity of Boreholes 6 and 7. The overall SWM pond footprint is to extend into the neighbouring property to the south. Detailed design of the SWM facility is not available for review at the time of this report preparation.

With reference to the borehole and monitoring well records, the subsoil is anticipated to consist of silty clay and glacial tills in the upper stratigraphy, overlying sandy silt and sand deposits. Highest groundwater is recorded at El. 288.5 m in the monitoring wells in this vicinity.

Where the excavation of the pond will extend into the wet sand and silt, positive dewatering will be necessary to lower the groundwater before commencement of the excavation and construction of the SWM facility. In addition, an impervious clay liner or geosynthetic liner with ballast will be required. The SWM facility should be designed to resist the hydrostatic uplift pressure should the facility extends below the groundwater level. Otherwise, an underlying subdrain system will be required to relieve the hydrostatic uplift pressure beneath the pond. Further assessment will be required once the detailed design of the SWM pond is available for review.

From a slope stability point of view, the side slopes of the SWM pond should be maintained at a gradient no steeper than 3H:1V above the wet perimeter, and flatter than 4H:1V below the wet perimeter. However, the design shall conform to all town and government agencies' design requirements. All exposed slopes must be vegetated and/or sodded to prevent runoff erosion.

Where earth embankments are proposed around the SWM facility, topsoil must be removed and the subgrade must be proof-rolled before placement of earth fill for the berms. Selected silty clay and/or silty clay till material, free of organics, should be used for berm construction, compacted to 98% SPMDD in 20 cm thick lifts.

The footings of control structures must be placed below the scouring depths and be provided with a minimum earth cover of 1.2 m for the protection against frost damage. The inlets and outlets of the ponds should be lined with gabion mats, rip rap or equivalent measures for protection against scouring.

7.8 Soil Parameters

The recommended soil parameters for the project design are given in Table 4.

Table 4 - Soil Parameters

Unit Weight and Bulk Factor	**Unit Weight (kN/m^3)**		**Estimated Bulk Factor**	
	Bulk	**Submerged**	**Loose**	**Compacted**
Sandy Silt Till/Silty Sand Till	22.5	12.5	1.33	1.05
Silty Clay Till	22.5	12.5	1.30	1.05
Silty Clay	20.5	10.5	1.35	1.05
Sand and Silt	20.5	10.5	1.20	1.00

Lateral Earth Pressure Coefficients	**Active K_a**	**At Rest K_0**	**Passive K_p**
Compacted Earth Fill, Clay/Clay Till	0.39	0.56	2.56
Sandy Silt Till/Silty Sand Till, Sand and Silt	0.32	0.48	3.12

Coefficients of Permeability (k) and Percolation Time (T)	**K (cm/sec)**	**T (min/cm)**
Sand	10^{-2} to 10^{-4}	4 to 12
Silt/Sandy Silt	10^{-4} to 10^{-5}	12 to 20
Sandy Silt Till/Silty Sand Till	10^{-4} to 10^{-6}	12 to 50
Silty Clay/Silty Clay Till	10^{-7}	80+

Electrical Resistivity to Corrosion of Buried Metal	
Silty Clay/Silty Clay Till	3500 ohm·cm
Sandy Silt Till/Silty Sand Till	4500 ohm·cm
Silt/Sandy Silt/Sand	4500 ohm·cm

Coefficients of Friction	
Between Concrete and Granular Base	0.50
Between Concrete and Sound Native Soils	0.35

7.9 Excavation

Excavation should be carried out in accordance with Ontario Regulation 213/91. The types of soils are classified in Table 5.

Table 5 - Classification of Soils for Excavation

Material	Type
Sound Tills and Silty Clay	2
Weathered/Ploughed Soils, Existing Earth Fill, drained Sand and Silt	3
Saturated Soils	4

In excavation above the saturation level, groundwater yield is expected to be slow in rate and limited in quantity. It can be drained locally and removed by conventional pumping from sumps. Any excavation extending into the saturated sand or silt, construction dewatering will be required to lower the groundwater to at least 1.0 m below the intended excavation depth. Detailed groundwater conditions and appropriate dewatering methods should be referred to the hydrogeological report, presented under a separate cover.

Prospective contractors must be asked to assess the in situ subsurface conditions for soil cuts by digging test pits to at least 1.0 m below the intended bottom of excavation. Where stable excavation slope is not feasible, the excavation must be supported by shoring, or the service trenches should be supported by trench boxes.

8.0 LIMITATIONS OF REPORT

This report was prepared by Soil Engineers Ltd. for the account of Northcape Investments Inc. and for review by their designated consultants and government agencies. Use of this report is subject to the conditions and limitations of the contractual agreement.

The material in the report reflects the judgement of Hui Wing Yang, P.Eng., and Kelvin Hung, 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, is 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.

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Kelvin Hung, P.Eng.

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

Standard Penetration Resistance or ‘N’ Value:

> The number of blows of a 63.5 kg hammer falling from a height of 76 cm required to advance a 51 mm outer diameter drive open sampler 30 cm into undisturbed soil, after an initial penetration of 15 cm.
>
> Plotted as ‘○’

Dynamic Cone Penetration Resistance:

> A continuous profile showing the number of blows per each 30 cm of penetration of a 51 mm diameter, 90° point cone driven by a 63.5 kg hammer falling from a height of 76 cm.
>
> 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/30 cm)	Compactness
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
> 50	very dense

Cohesive Soils:

Undrained Shear Strength (kPa)	‘N’ (blows/30 cm)	Consistency
<12	<2	very soft
12 to <25	2 to <4	soft
25 to <50	4 to <8	firm
50 to <100	8 to <15	stiff
100 to 200	15 to 30	very stiff
>200	>30	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

METRIC CONVERSION FACTORS

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

JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 1D

FIGURE NO.: 1

PROJECT DESCRIPTION: Proposed Residential Development

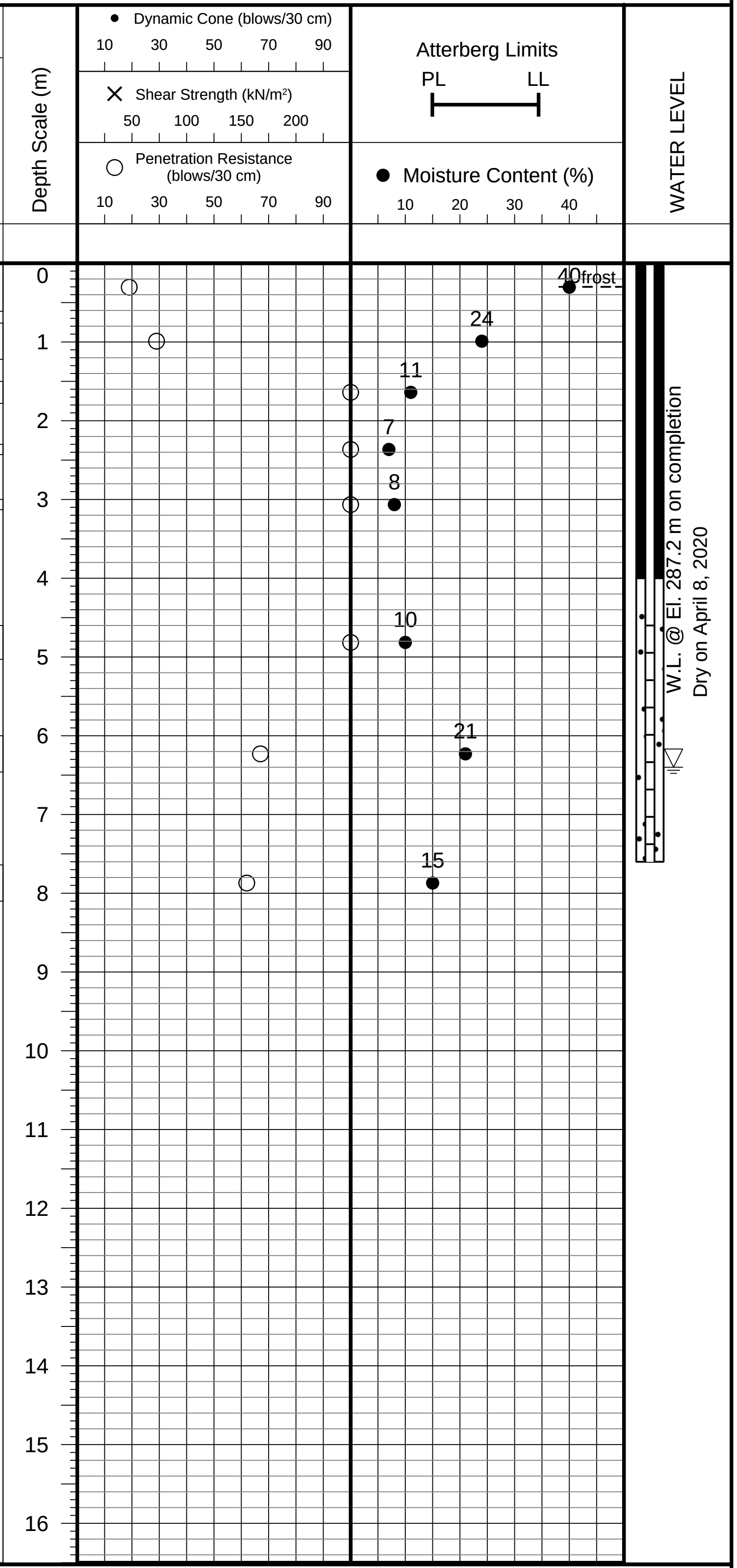
METHOD OF BORING: Flight-Auger

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 3, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
293.6	Ground Surface			
0.0	**8 cm TOPSOIL**	1	DO	19
	PLOUGHED SOIL	2	DO	29
292.6 1.0	Brown, compact to very dense **SANDY SILT TILL** a trace to some clay, a trace of gravel occ. sand seams, cobbles and boulders	3	DO	50/13
		4	DO	50/13
		5	DO	50/13
289.6 4.0	Brown, very dense **SANDY SILT** occ. clay seams	6	DO	50/13
		7	DO	67
286.4 7.2	Brown, very dense **SAND** fine-grained, some silt	8	DO	62
285.5 8.1	**END OF BOREHOLE**			

Installed 50 mm Ø monitoring well to 7.6 m
completed with 3.0 m screen
Sand backfill from 4.0 m to 7.6 m
Bentonite seal from 0.0 m to 4.0 m
Provided with a protective steel casing.



Soil Engineers Ltd.

JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 1S

FIGURE NO.: 2

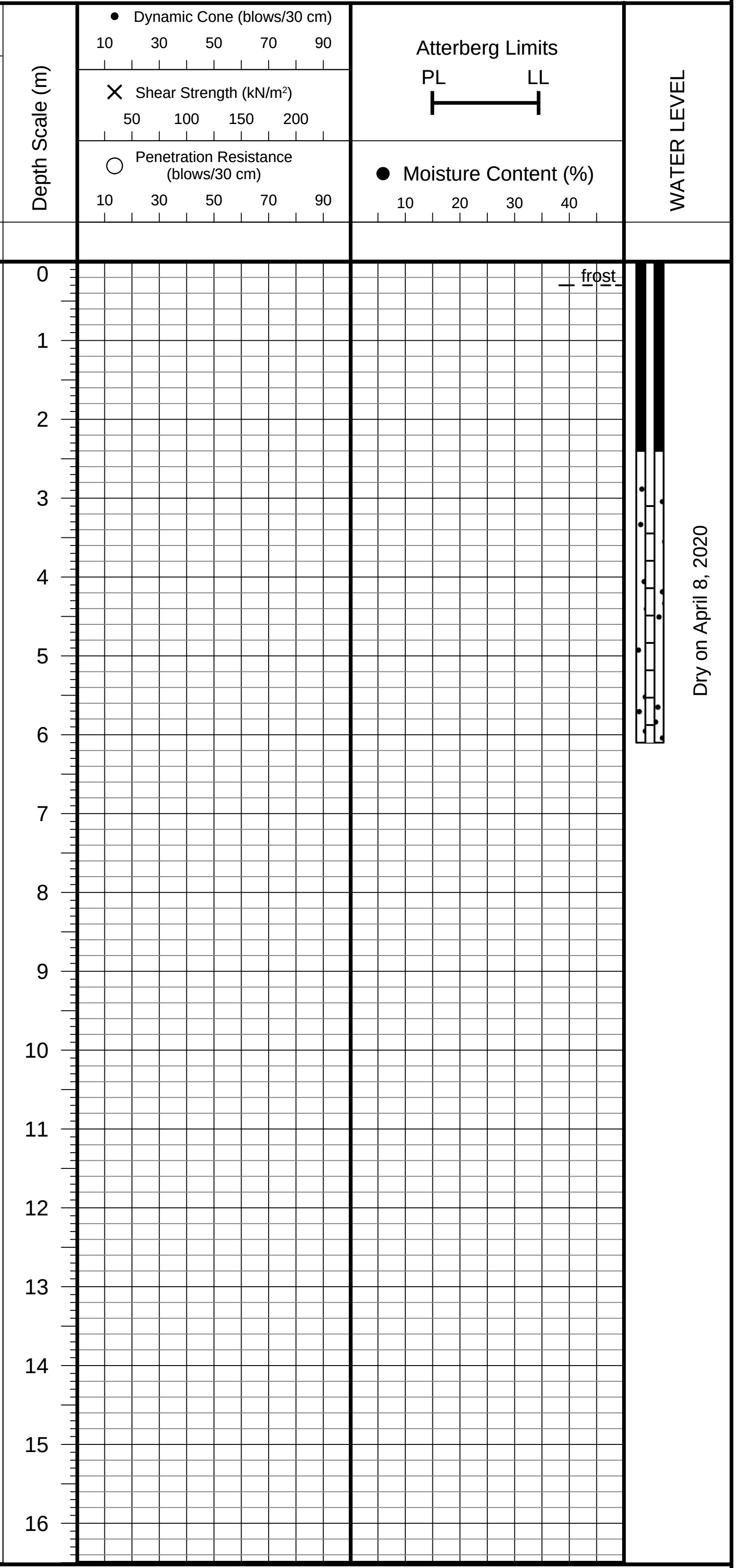
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight-Auger

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 3, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value
293.6	Ground Surface			
0.0	**Straight auger to 6.1 m for installation of shallow monitoring well in well nest.**			
287.5 6.1	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 6.1 m completed with 3.0 m screen Sand backfill from 2.4 m to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a protective steel casing.			



Soil Engineers Ltd.

JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 2

FIGURE NO.: 3

PROJECT DESCRIPTION: Proposed Residential Development

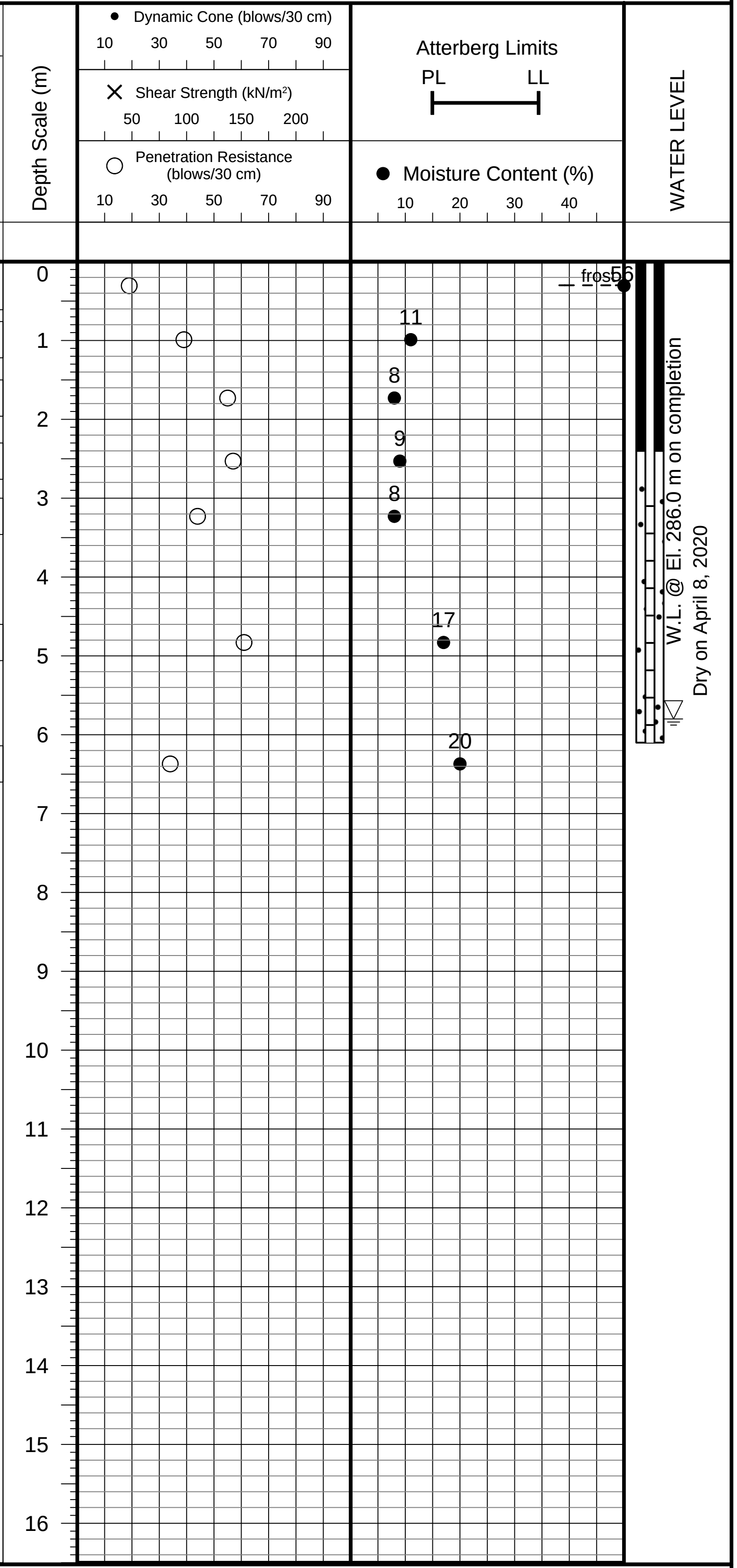
METHOD OF BORING: Flight-Auger

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 3, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
291.8	Ground Surface			
0.0	**10 cm TOPSOIL** **PLOUGHED SOIL**	1	AS	7
291.1 0.7	Brown, dense to very dense **SANDY SILT TILL** a trace to some clay, a trace of gravel occ. sand seams, cobbles and boulders	2	DO	39
		3	DO	55
		4	DO	57
		5	DO	44
287.8 4.0	Brown, very dense to dense **SANDY SILT** occ. clay seams	6	DO	61
		7	DO	34
285.2 6.6	**END OF BOREHOLE**			

Installed 50 mm Ø monitoring well to 6.1 m
completed with 3.0 m screen
Sand backfill from 2.4 m to 6.1 m
Bentonite seal from 0.0 m to 2.4 m
Provided with a protective steel casing.



Soil Engineers Ltd.

JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 3

FIGURE NO.: 4

PROJECT DESCRIPTION: Proposed Residential Development

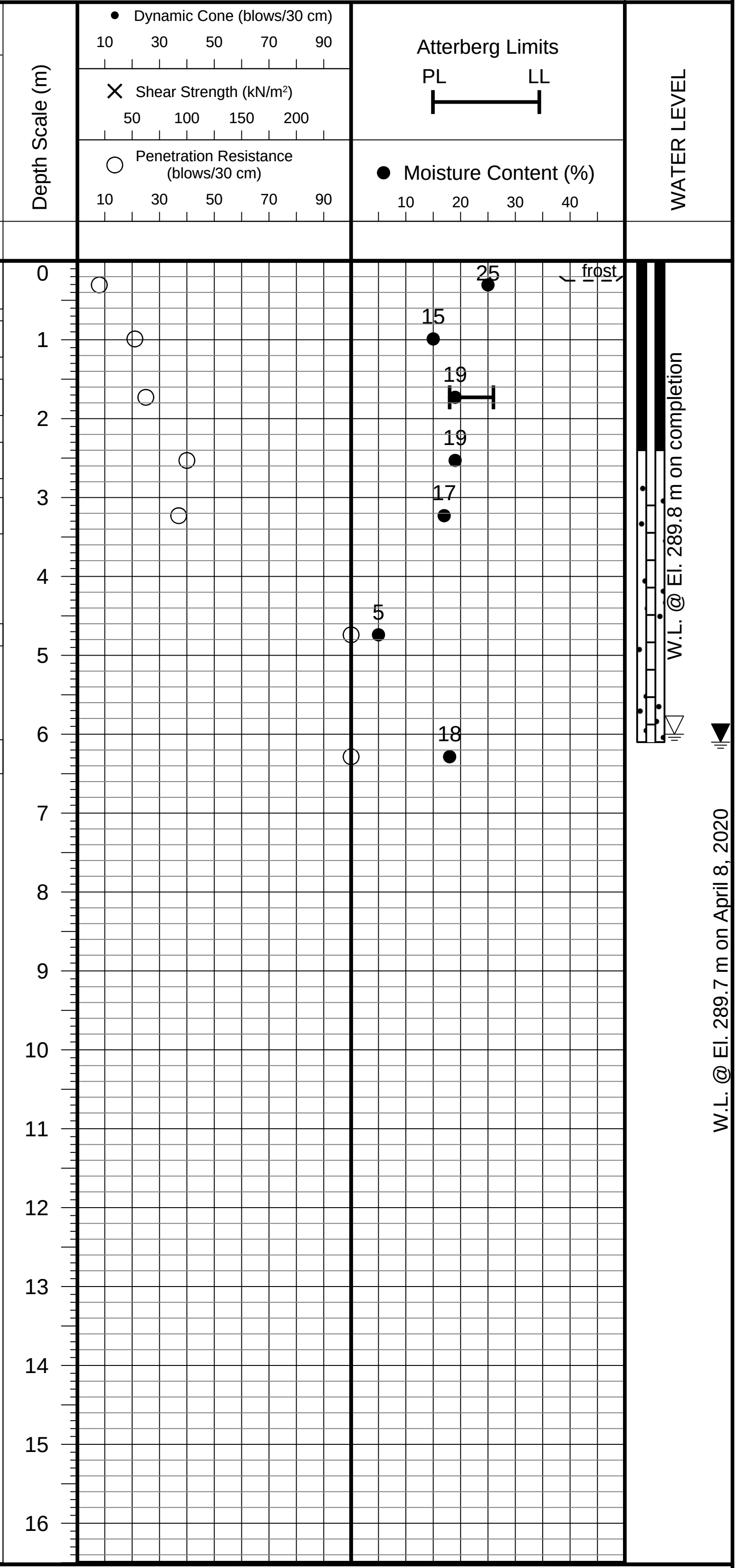
METHOD OF BORING: Flight-Auger

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 3, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES		
		Number	Type	N-Value
295.8	Ground Surface			
0.0	**5 cm TOPSOIL** **PLOUGHED SOIL**	1	DO	8
295.1 0.7	Brown, very stiff to hard **SILTY CLAY** traces of sand and gravel occ. silt seams and layers	2	DO	21
		3	DO	25
		4	AS	40
		5	DO	37
291.8 4.0	Brown, very dense **SAND** fine-grained some silt	6	DO	50/13
290.2 5.6	Brown, very dense **SILT** traces of sand and clay	7	DO	50/13
289.3 6.5	**END OF BOREHOLE**			

Installed 50 mm Ø monitoring well to 6.1 m
completed with 3.0 m screen
Sand backfill from 2.4 m to 6.1 m
Bentonite seal from 0.0 m to 2.4 m
Provided with a protective steel casing.



Soil Engineers Ltd.

JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 4

FIGURE NO.: 5

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight-Auger

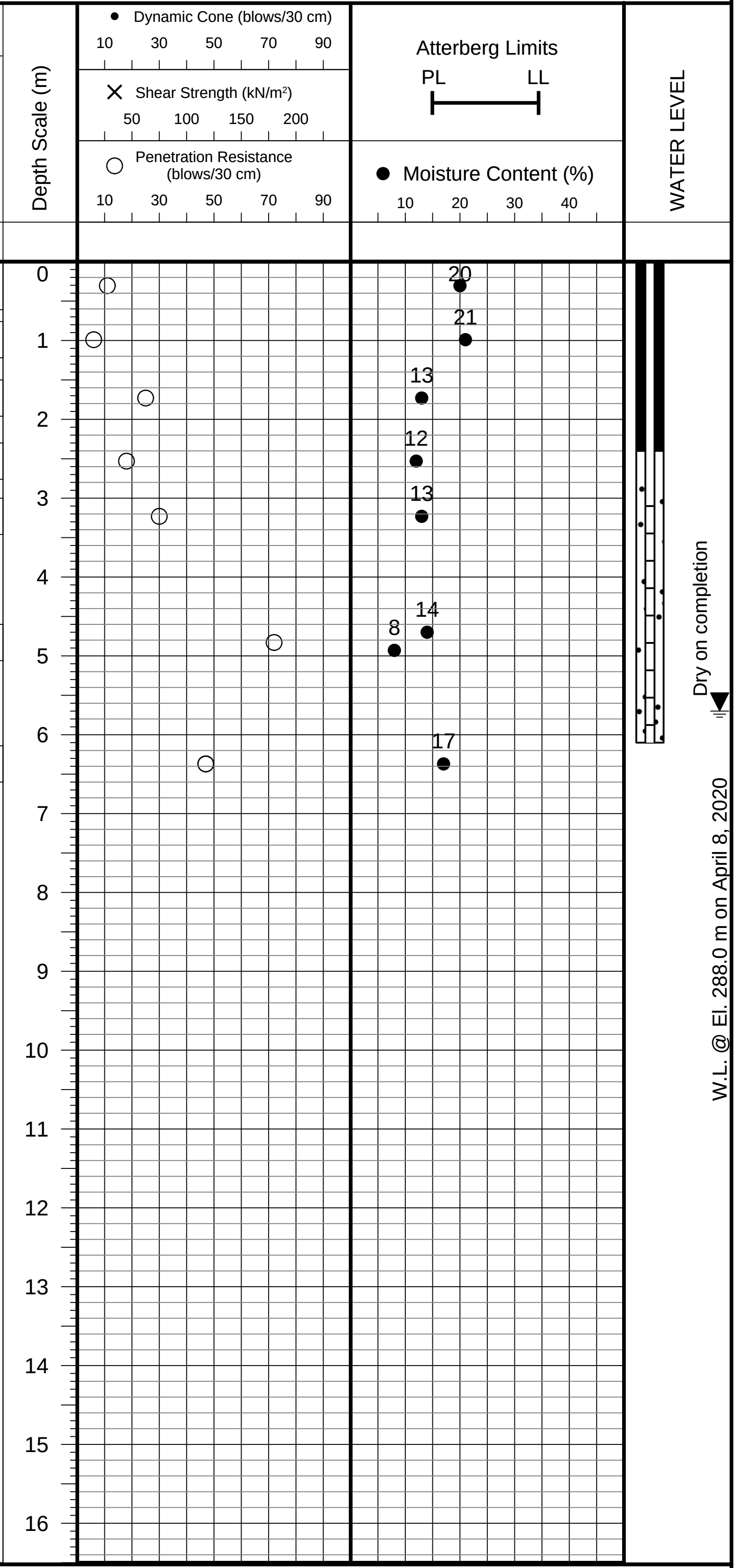
PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 6, 2020

El. (m) Depth (m)	SOIL DESCRIPTION
293.7	Ground Surface
0.0	**10 cm TOPSOIL** Dark brown to brown **EARTH FILL** silty clay occ. rootlets and topsoil inclusions
292.3 1.4	Brown, compact to dense **SANDY SILT TILL** a trace to some clay, a trace of gravel occ. silt seams and layers, cobbles and boulders
288.9 4.8	Brown, very dense **SAND** fine-to-medium grained to fine-grained some silt to silty
288.1 5.6	Brown, dense **SANDY SILT** occ. clay seams
287.1 6.6	**END OF BOREHOLE**

SAMPLES Number	Type	N-Value
1	DO	11
2	DO	6
3	DO	25
4	DO	18
5	DO	30
6A 6B	DO	72
7	DO	47

Installed 50 mm Ø monitoring well to 6.1 m
completed with 3.0 m screen
Sand backfill from 2.4 m to 6.1 m
Bentonite seal from 0.0 m to 2.4 m
Provided with a protective steel casing.



JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 5

FIGURE NO.: 6

PROJECT DESCRIPTION: Proposed Residential Development

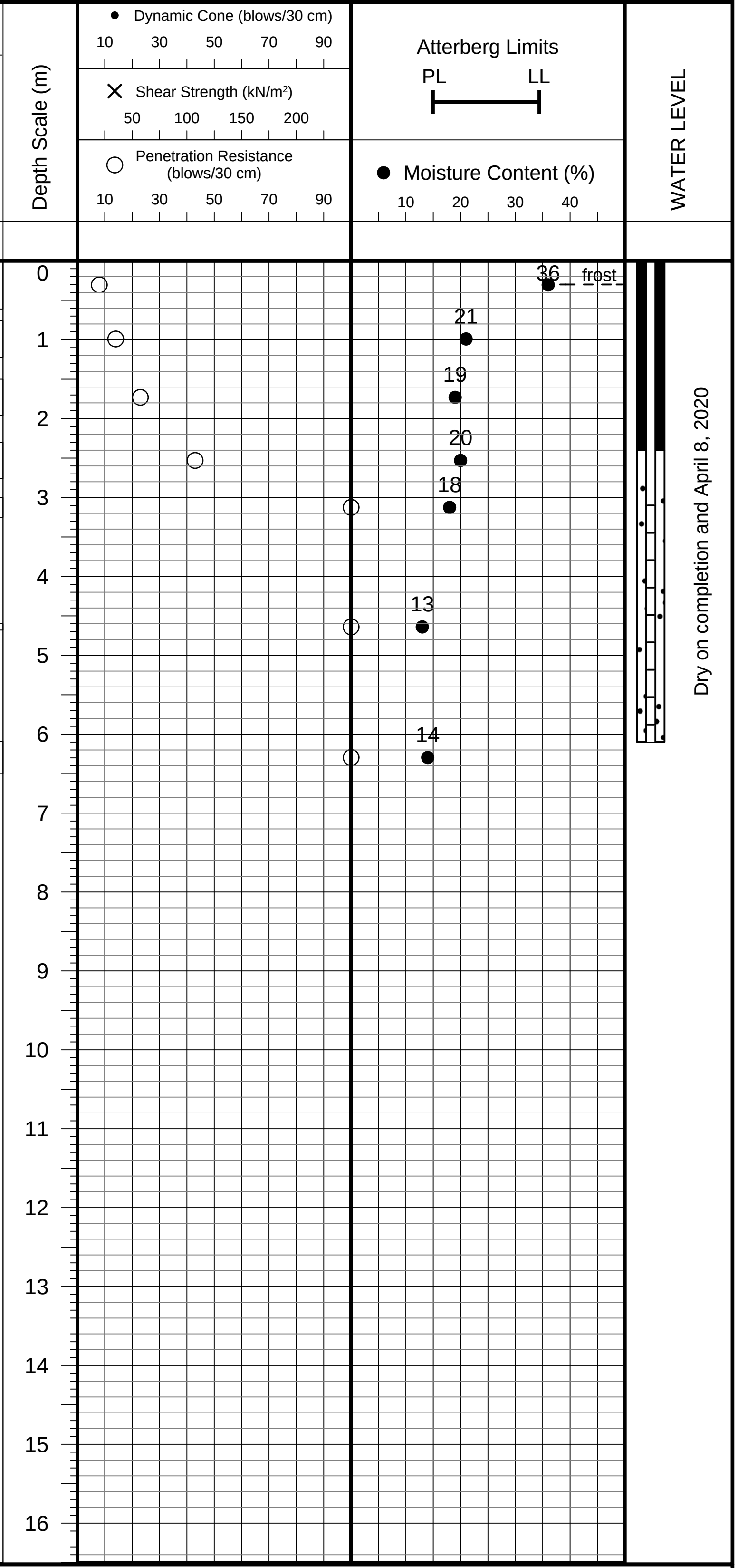
METHOD OF BORING: Flight-Auger

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 5, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
295.8	Ground Surface			
0.0	**10 cm TOPSOIL**	1	DO	8
	PLOUGHED SOIL	2	DO	14
294.8 1.0	Brown, stiff to hard **SILTY CLAY** traces of sand and gravel occ. silt seams and layers	3	DO	23
		4	DO	43
292.9 2.9	Brown, very dense **SANDY SILT TILL** a trace to some clay, a trace of gravel occ. silt seams and layers, cobbles and boulders	5	DO	50/10
		6	DO	50/8
290.2 5.6	Brown, very dense **SANDY SILT** occ. clay seams	7	DO	50/10
289.3 6.5	**END OF BOREHOLE**			

Installed 50 mm Ø monitoring well to 6.1 m
completed with 3.0 m screen
Sand backfill from 2.4 m to 6.1 m
Bentonite seal from 0.0 m to 2.4 m
Provided with a protective steel casing.



JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 6

FIGURE NO.: 7

PROJECT DESCRIPTION: Proposed Residential Development

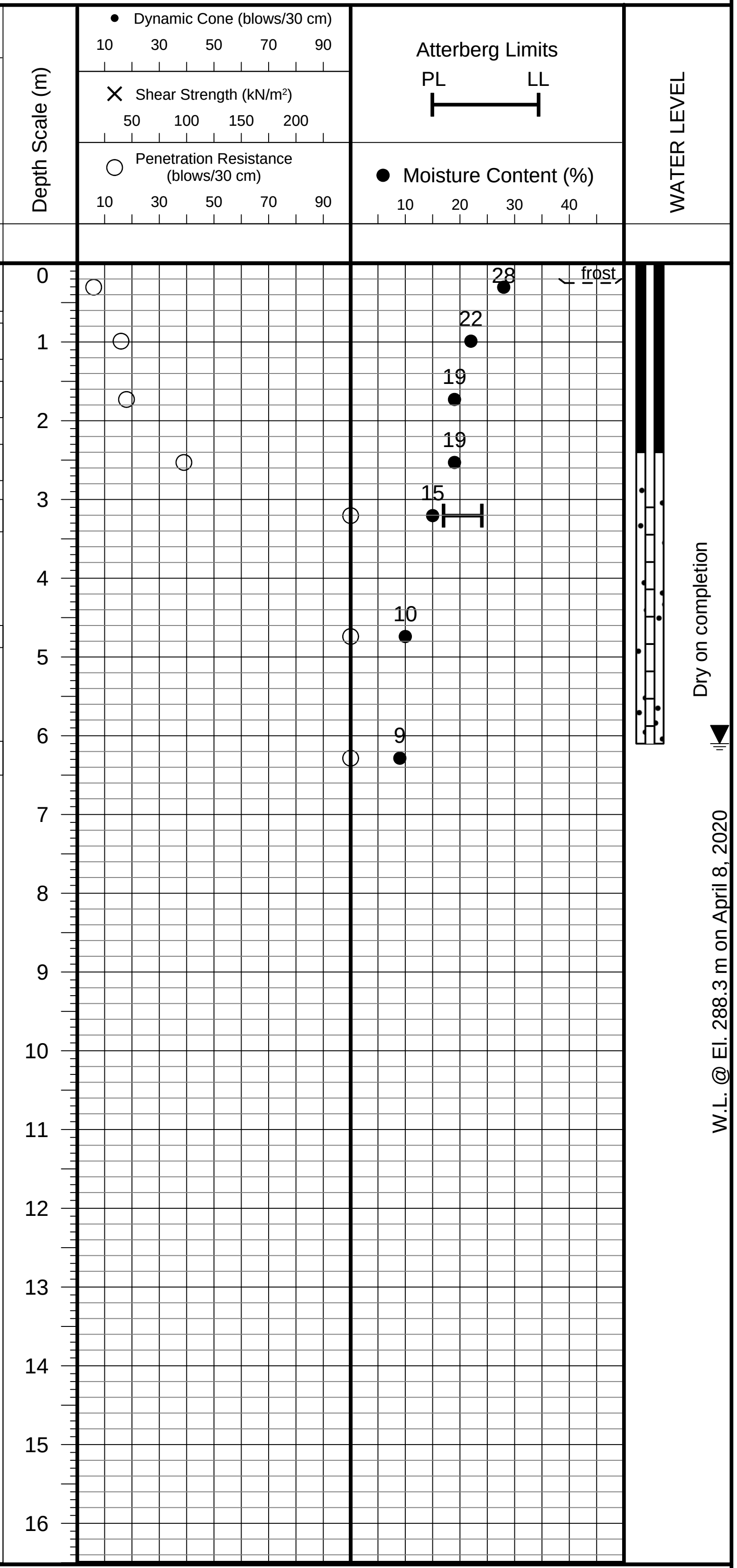
METHOD OF BORING: Flight-Auger

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 5, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
294.4	Ground Surface			
0.0	**15 cm TOPSOIL**	1	DO	6
	PLOUGHED SOIL	2	DO	16
293.4 1.0	Brown, very stiff to hard **SILTY CLAY** a trace of sand occ. silt seams and layers	3	DO	18
		4	DO	39
291.5 2.8	Brown, hard **SILTY CLAY TILL** some sand, a trace of gravel occ. sand seams, cobbles and boulders	5	DO	50/10
290.4 4.0	Brown, very dense **SANDY SILT** occ. clay seams	6	DO	50/13
288.8 5.6	Brown, very dense **SAND** fine-grained, some silt	7	DO	50/13
287.9 6.5	**END OF BOREHOLE**			

Installed 50 mm Ø monitoring well to 6.1 m
completed with 3.0 m screen
Sand backfill from 2.4 m to 6.1 m
Bentonite seal from 0.0 m to 2.4 m
Provided with a protective steel casing.



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JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 7D

FIGURE NO.: 8

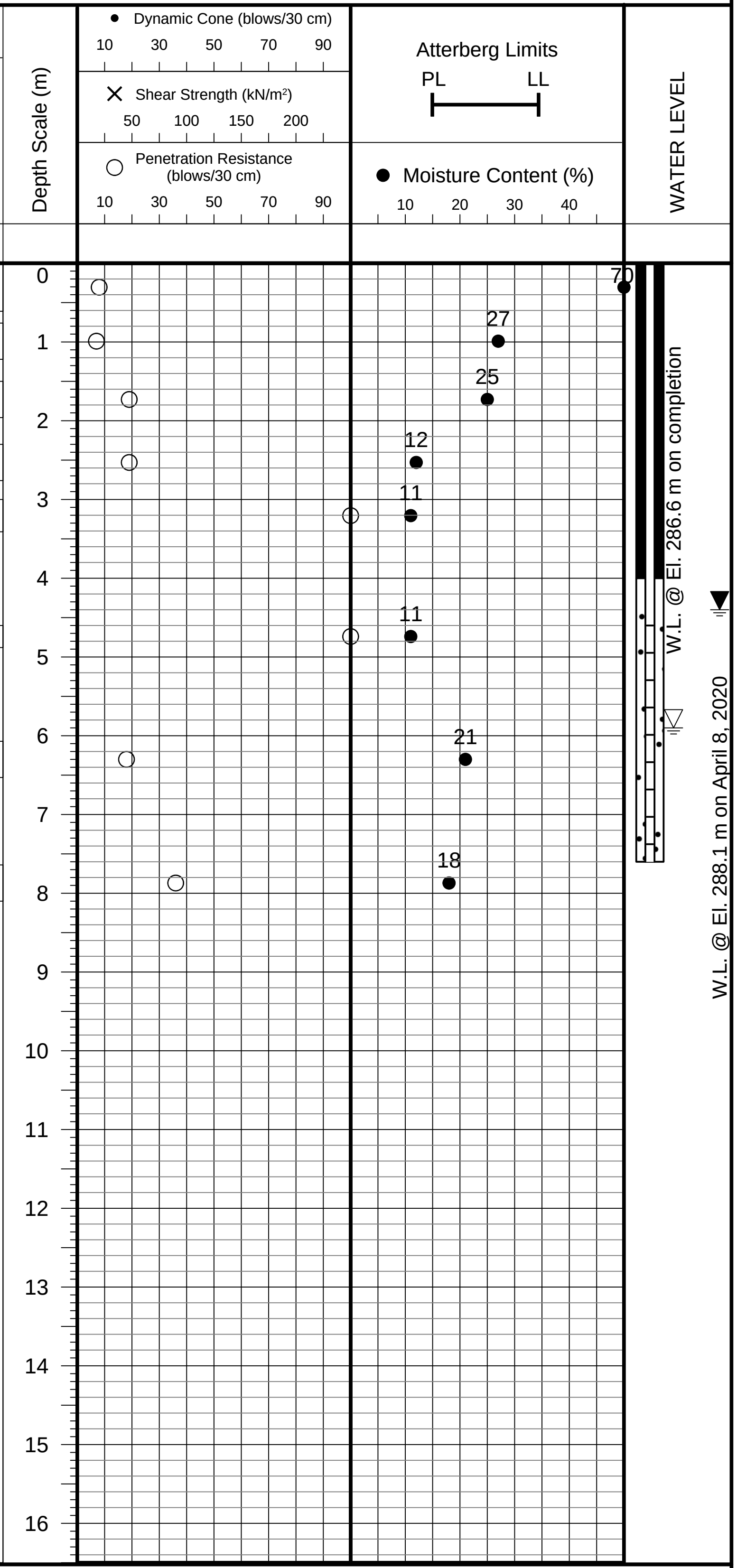
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight-Auger

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 6, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
292.5	Ground Surface			
0.0	**15 cm TOPSOIL** **PLOUGHED SOIL**	1	DO	8
291.6 0.9	Brown, firm, weathered **SILTY CLAY** a trace of sand occ. silt seams and layers	2 3	DO DO	7 19
290.7 1.8	Brown, compact to very dense **SANDY SILT TILL** traces of clay and gravel occ. sand seams and layers, cobbles and boulders	4 5 6	DO DO DO	19 50/10 50/13
286.9 5.6	Brown, compact **SANDY SILT** occ. clay seams	7	DO	18
285.4 7.1	Grey, dense **SANDY SILT TILL** traces of clay and gravel occ. silt seams and layers, cobbles and boulders	8	DO	36
284.4 8.1	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 7.6 m completed with 3.0 m screen Sand backfill from 4.0 m to 7.6 m Bentonite seal from 0.0 m to 4.0 m Provided with a protective steel casing.			



JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 7S

FIGURE NO.: 9

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight-Auger

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 6, 2020

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
292.5	Ground Surface			
0.0	**Straight auger to 6.1 m for installation of shallow monitoring well in well nest.**			
286.4 6.1	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 6.1 m completed with 3.0 m screen Sand backfill from 2.4 m to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a protective steel casing.			

Depth Scale (m)

● Dynamic Cone (blows/30 cm): 10 30 50 70 90

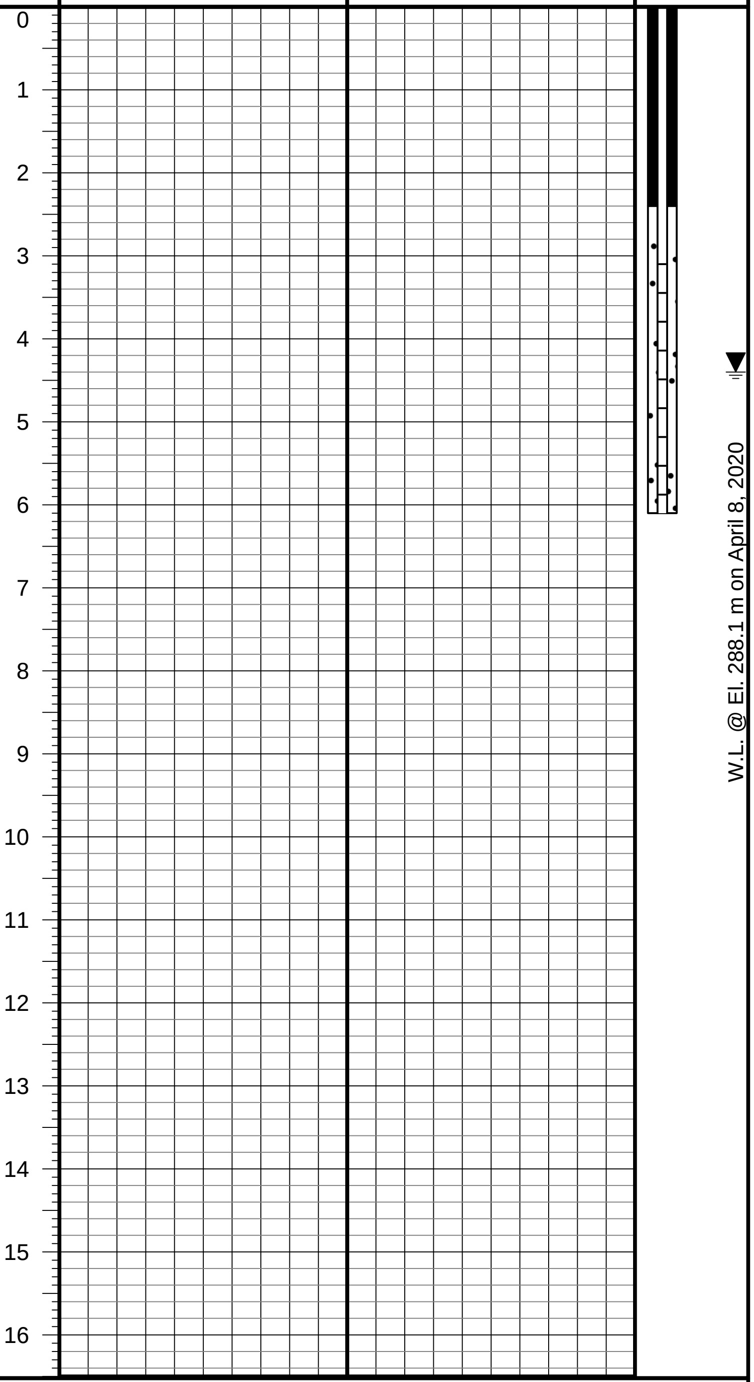
× Shear Strength (kN/m²): 50 100 150 200

○ Penetration Resistance (blows/30 cm): 10 30 50 70 90

Atterberg Limits: PL LL

● Moisture Content (%): 10 20 30 40

WATER LEVEL



W.L. @ El. 288.1 m on April 8, 2020

Soil Engineers Ltd.

JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 101

FIGURE NO.: 10

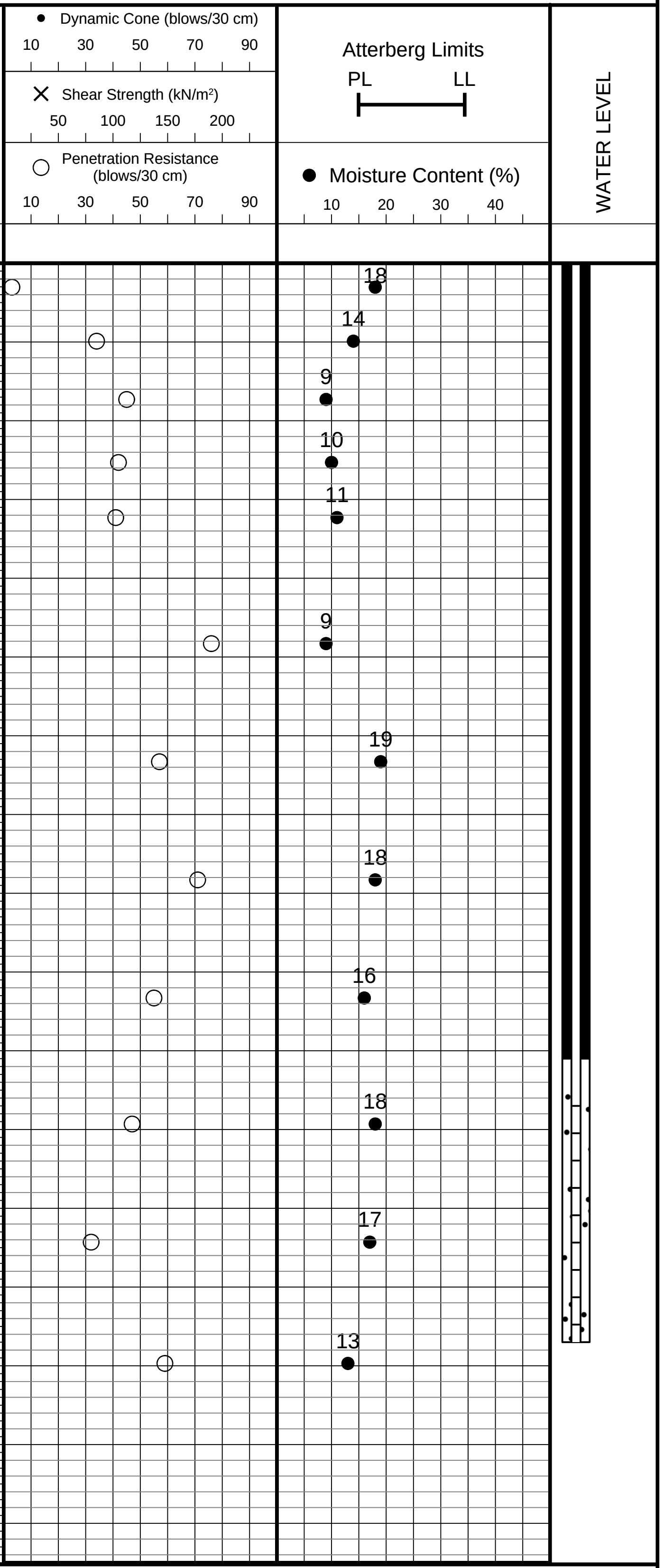
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow-Stem

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 18, 2022

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Depth Scale (m)
293.9	Ground Surface				
0.0	**18 cm TOPSOIL**	1	DO	3	0
	PLOUGHED SOIL	2	DO	34	1
	Brown, dense **SANDY SILT TILL** a trace to some clay, a trace of gravel occ. sand pockets, cobbles and boulders	3	DO	45	2
		4	DO	42	
		5	DO	41	3
289.9 4.0	Brown, very dense **SILT** sandy, with sand seams	6	DO	76	4 5
288.3 5.6	Brown, dense to very dense **SAND** fine to fine to medium grained some silt to silty occ. silt layers wet	7	DO	57	6
		8	DO	71	7 8
		9	DO	55	9
		10	DO	47	10 11
		11	DO	32	12
		12	DO	59	13 14
279.7 14.2	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 13.7 m completed with 3.1 m screen Sand backfill from 10.1 to 13.7 m Bentonite seal from 0.0 m to 10.1 m Provided with a momument steel casing				15 16



Soil Engineers Ltd.

JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 102

FIGURE NO.: 11

PROJECT DESCRIPTION: Proposed Residential Development

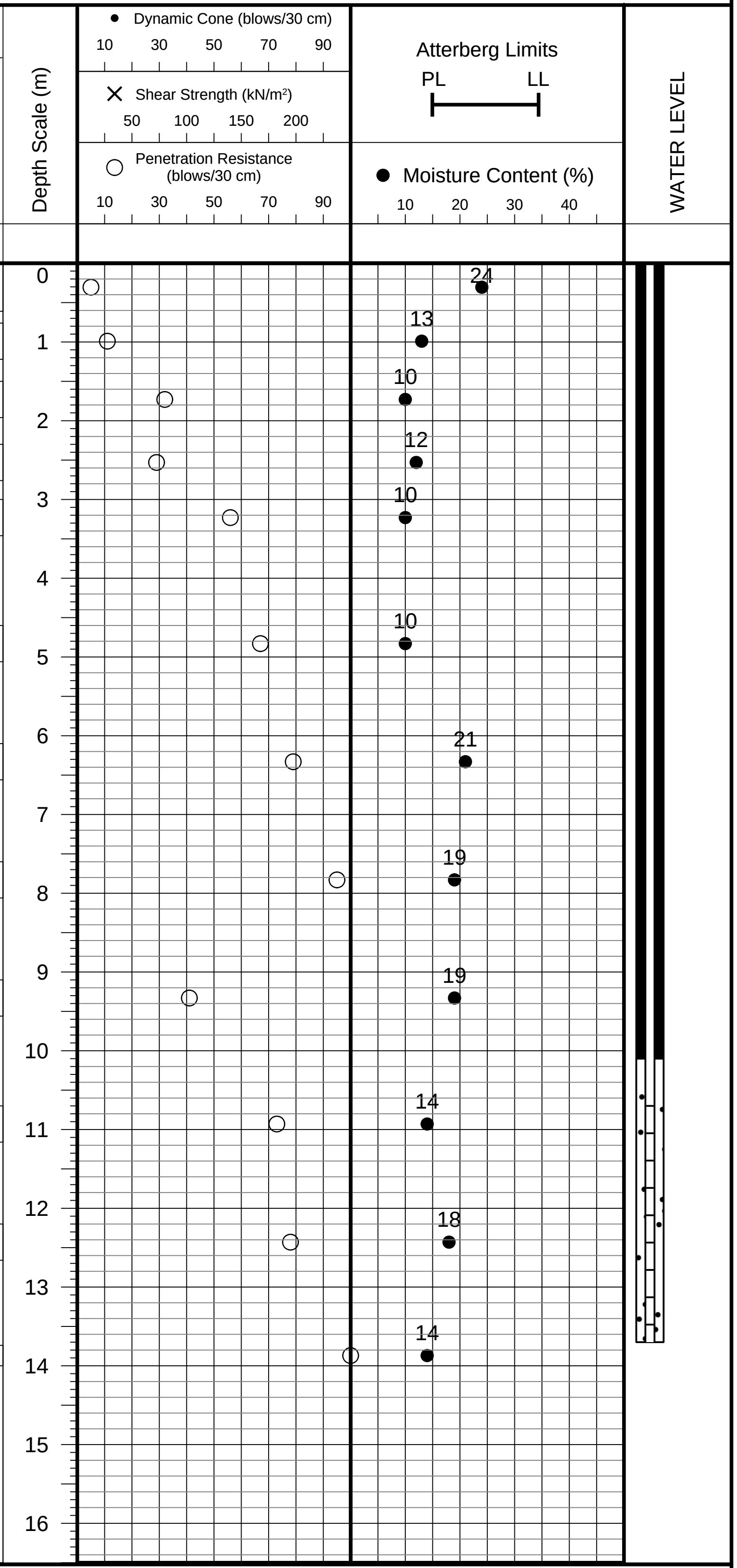
METHOD OF BORING: Hollow-Stem/ Tri-cone

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 21, 2022

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES		
		Number	Type	N-Value
293.2	Ground Surface			
0.0	**3 cm TOPSOIL**	1	DO	5
	PLOUGHED SOIL	2	DO	11
	Brown, compact to very dense **SANDY SILT TILL** a trace to some clay, a trace of gravel occ. sand seams, cobbles and boulders	3	DO	32
		4	DO	29
		5	DO	56
289.2 4.0	Brown, very dense **SILT** sandy, with sand seams wet below 6.0 m	6	DO	67
		7	DO	79
286.1 7.1	Brown, dense to very dense **SAND** fine to fine to medium grained a trace of silt to silty occ. silt layers wet	8	DO	95
		9	DO	41
		10	DO	73
		11	DO	78
		12	DO	50/10
279.2 14.0	**END OF BOREHOLE**			

Installed 50 mm Ø monitoring well to 13.7 m
completed with 3.1 m screen
Sand backfill from 10.1 to 13.7 m
Bentonite seal from 0.0 m to 10.1 m
Provided with a momument steel casing



Soil Engineers Ltd.

JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 103

FIGURE NO.: 12

PROJECT DESCRIPTION: Proposed Residential Development

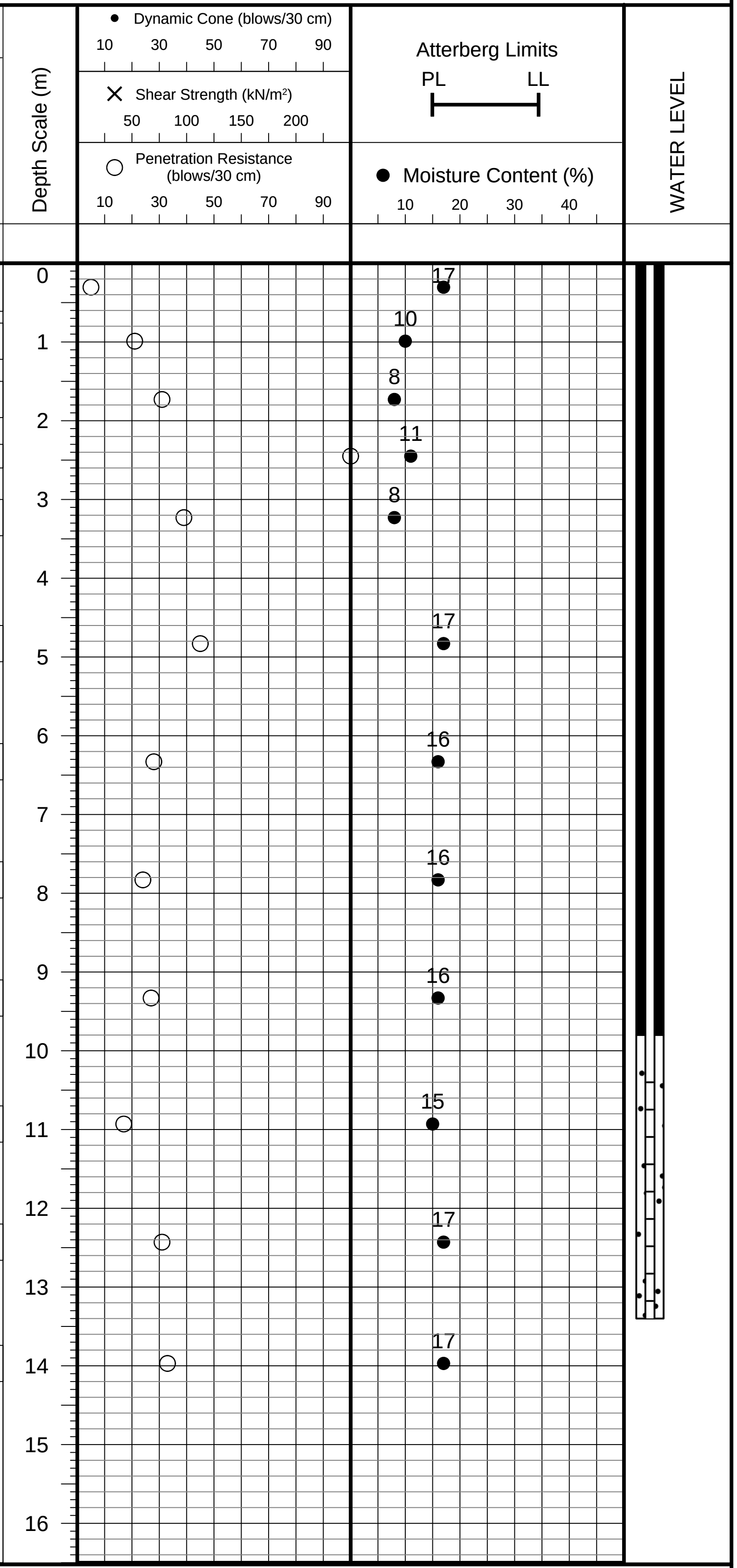
METHOD OF BORING: Flight-Auger/ Hollow-Stem

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 11, 2022

El. (m) Depth (m)	SOIL DESCRIPTION
291.8	Ground Surface
0.0	**25 cm TOPSOIL** **PLOUGHED SOIL**
	Brown, compact to very dense **SANDY SILT TILL** a trace to some clay, a trace of gravel occ. sand seams, cobbles and boulders
288.9 2.9	Brown, dense **SILTY SAND TILL** gravelly, a trace of clay occ. cobbles and boulders
287.8 4.0	Brown, very dense **SILT** sandy, with sand seams, wet
286.2 5.6	Brown, compact to dense **SAND** fine to fine to medium grained a trace of silt to silty occ. silt layers wet
277.6 14.2	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 13.4 m completed with 3.1 m screen Sand backfill from 9.8 to 13.4 m Bentonite seal from 0.0 m to 9.8 m Provided with a momument steel casing

SAMPLES		
Number	Type	N-Value
1	DO	5
2	DO	21
3	DO	31
4	DO	50/15
5	DO	39
6	DO	45
7	DO	28
8	DO	24
9	DO	27
10	DO	17
11	DO	31
12	DO	33



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Page: 1 of 1

JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 104

FIGURE NO.: 13

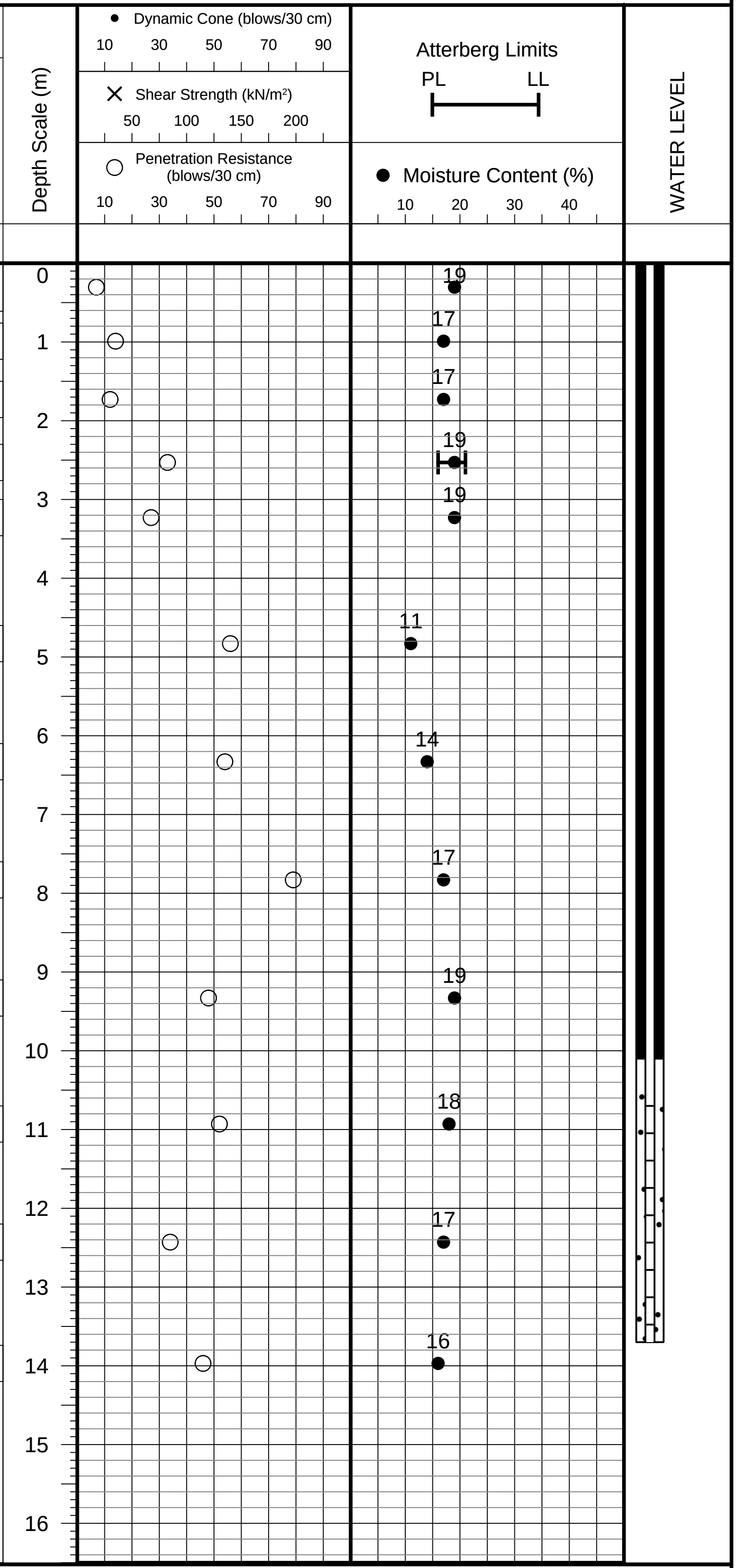
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow-Stem

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 17/18, 2022

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value
295.5	Ground Surface			
0.0	**20 cm TOPSOIL** **PLOUGHED SOIL**	1	DO	7
	Brown, compact **SANDY SILT TILL**	2	DO	14
294.1 1.4	Brown, stiff to hard **SILTY CLAY** traces of sand and gravel occ. silt seams and layers	3	DO	12
		4	DO	33
		5	DO	27
291.5 4.0	Brown, very dense **SILTY SAND TILL** gravelly, a trace of clay occ. cobbles and boulders	6	DO	56
289.9 5.6	Brown, dense to very dense **SILT** traces of sand and clay occ. sand seams wet below 7.6 m	7	DO	54
		8	DO	79
		9	DO	48
285.4 7.1	Brown, dense to very dense **SAND** fine to medium-grained a trace to some silt wet	10	DO	52
		11	DO	34
		12	DO	46
281.3 14.2	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 13.7 m completed with 3.1 m screen Sand backfill from 10.1 to 13.7 m Bentonite seal from 0.0 m to 10.1 m Provided with a momument steel casing			



JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 105

FIGURE NO.: 14

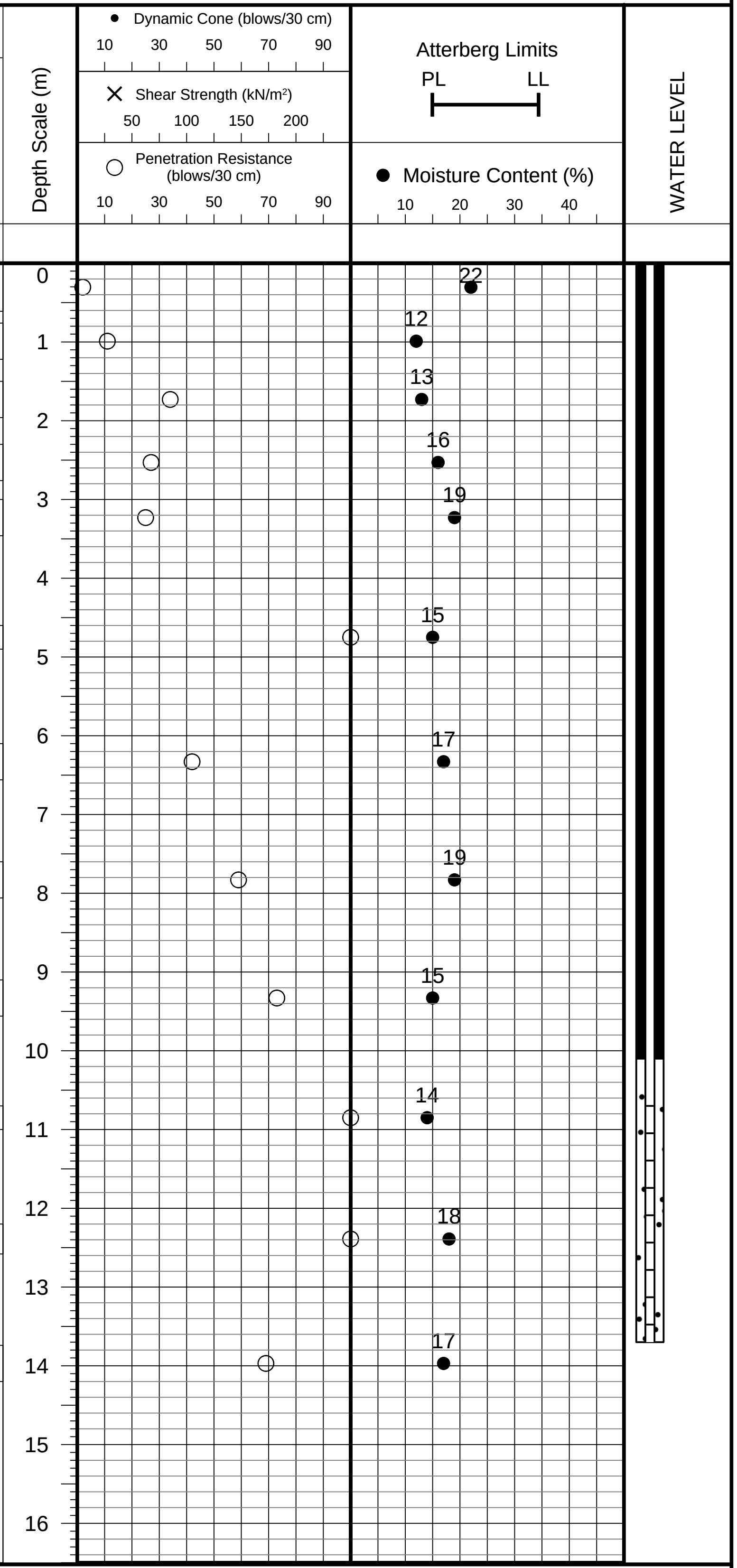
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Hollow-Stem/ Tri-cone

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 17, 2022

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value
293.4	Ground Surface			
0.0	**25 cm TOPSOIL** **PLOUGHED SOIL**	1	DO	2
	Brown, stiff to hard **SILTY CLAY TILL** sandy, a trace of gravel occ. cobbles and boulders	2	DO	11
		3	DO	34
		4	DO	27
		5	DO	25
289.4 4.0	Brown, very dense **SANDY SILT TILL** a trace to some clay, a trace of gravel occ. sand seams, cobbles and boulders	6	DO	50/15
287.8 5.6	Grey, dense **SILT** sandy, with sand seams	7	DO	42
286.3 7.1	Brown, very dense **SAND** fine to fine to medium grained a trace of silt to silty occ. silt layers wet	8	DO	59
		9	DO	73
		10	DO	50/15
		11	DO	50/8
		12	DO	69
279.2 14.2	**END OF BOREHOLE** Installed 50 mm Ø monitoring well to 13.7 m completed with 3.1 m screen Sand backfill from 10.1 to 13.7 m Bentonite seal from 0.0 m to 10.1 m Provided with a momument steel casing			



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Page: 1 of 1

JOB NO.: 1910-S052

LOG OF BOREHOLE NO.: 106

FIGURE NO.: 15

PROJECT DESCRIPTION: Proposed Residential Development

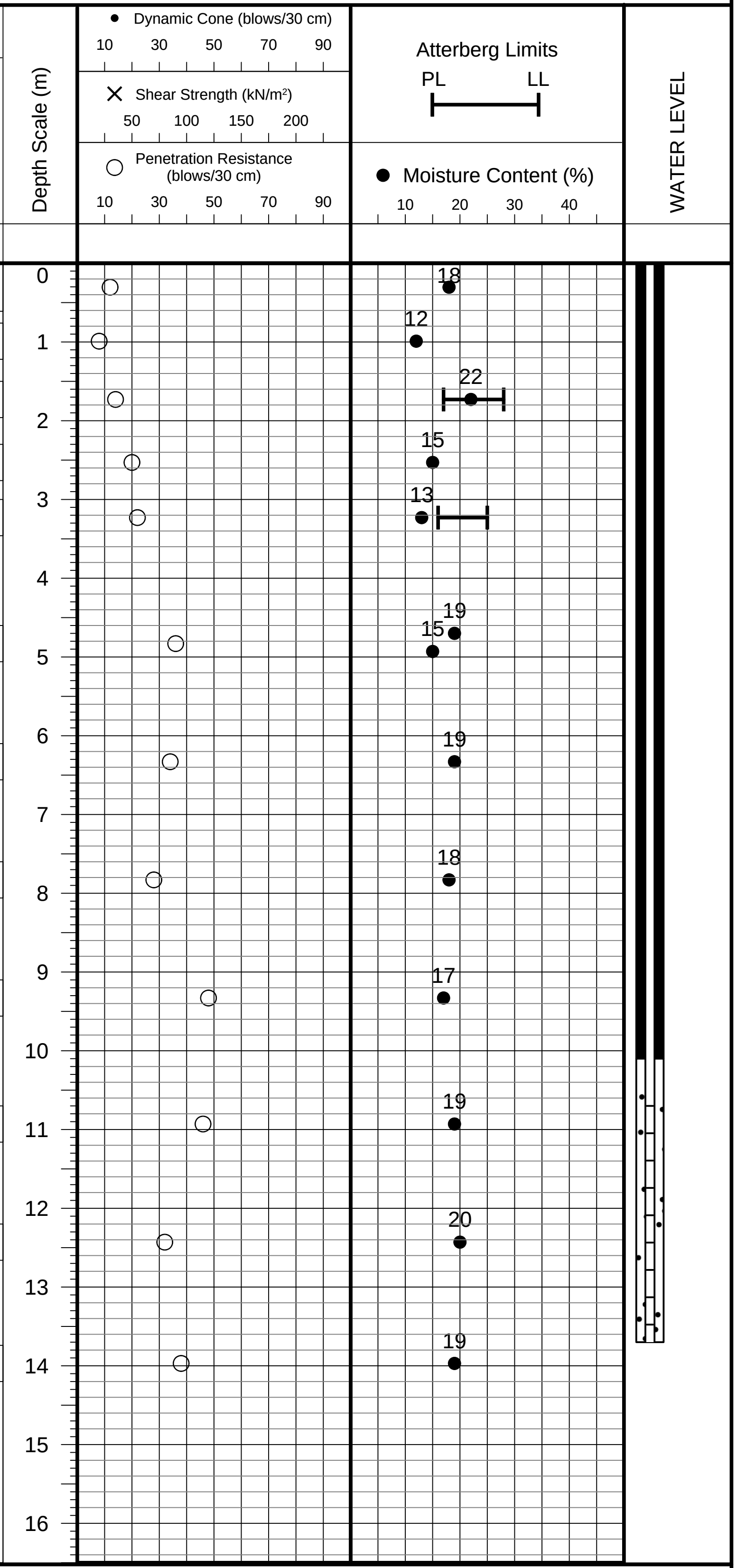
METHOD OF BORING: Hollow-Stem

PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

DRILLING DATE: March 16, 2022

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Moisture Content (%)
293.0	Ground Surface				
0.0	**20 cm TOPSOIL** Dark brown to brown **EARTH FILL** silty clay occ. topsoil inclusions	1	DO	12	18
		2	DO	8	12
291.6 1.4	Brown, stiff **SILTY CLAY** some sand	3	DO	14	22
290.9 2.1	Brown, very stiff **SILTY CLAY TILL** sandy, a trace of gravel occ. cobbles and boulders	4	DO	20	15
		5	DO	22	13
288.2 4.8	Brown, dense **SILT** sandy, traces of clay and gravel	6A 6B	DO	36	19 15
287.4 5.6	Compact to very dense **SAND** fine to fine to medium grained some silt to silty occ. silt layers wet brown / grey	7	DO	34	19
		8	DO	28	18
		9	DO	48	17
		10	DO	46	19
		11	DO	32	20
		12	DO	38	19
278.8 14.2	**END OF BOREHOLE**				

Installed 50 mm Ø monitoring well to 13.7 m
completed with 3.1 m screen
Sand backfill from 10.1 to 13.7 m
Bentonite seal from 0.0 m to 10.1 m
Provided with a momument steel casing



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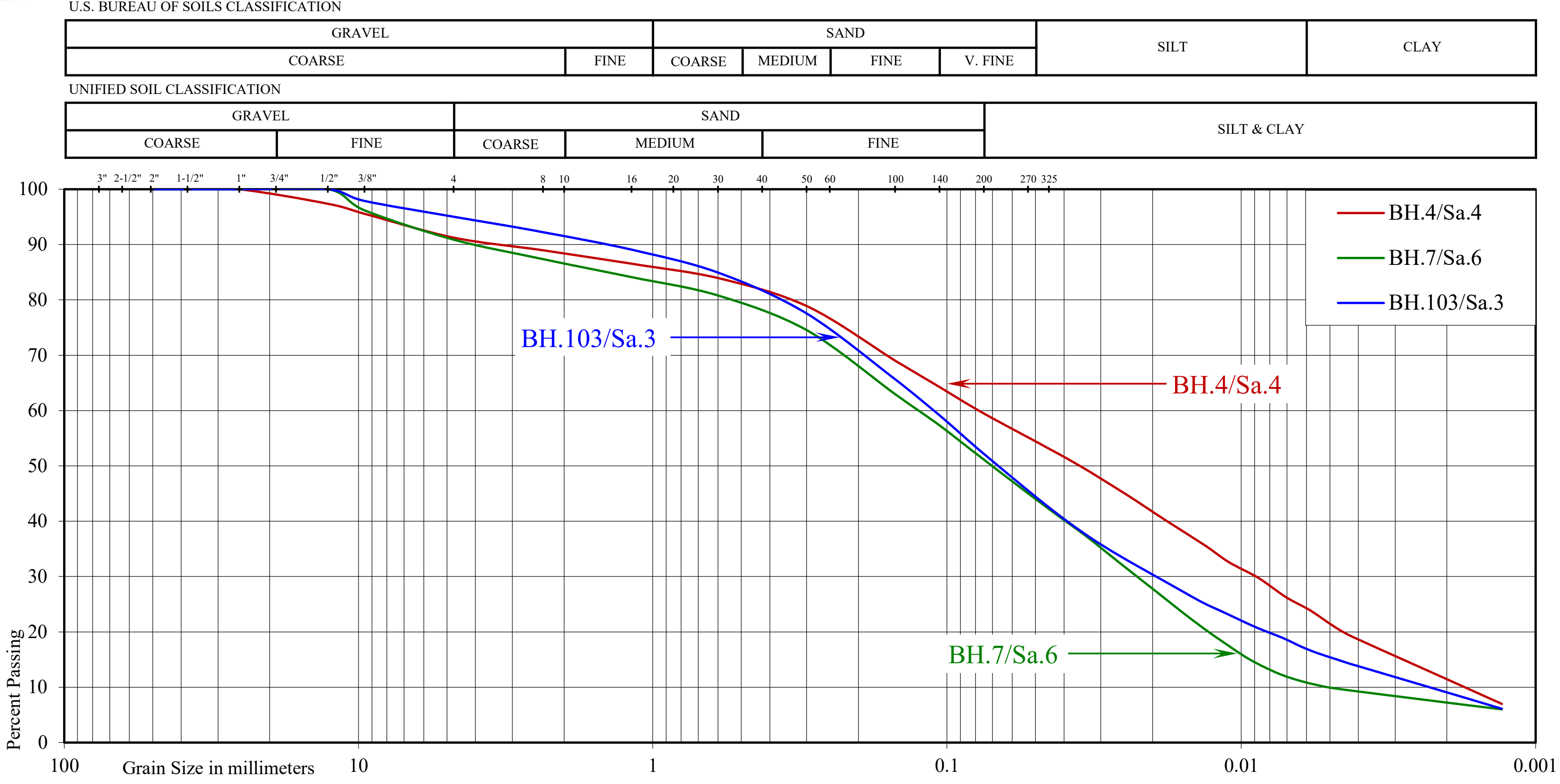
GRAIN SIZE DISTRIBUTION

Reference No: 1910-S052



Project: Proposed Residential Development

Location: 12811 Tenth Line, Town of Whitchurch-Stouffville

Borehole No:	4	7	103
Sample No:	4	6	3
Depth (m):	2.6	4.8	1.7
Elevation (m):	291.1	287.7	290.1

BH./Sa.	4/4	7/6	103/3
Liquid Limit (%) =	-	-	-
Plastic Limit (%) =	-	-	-
Plasticity Index (%) =	-	-	-
Moisture Content (%) =	12	11	16
Estimated Permeability (cm./sec.) =	10^{-6}	10^{-5}	10^{-6}

Classification of Sample [& Group Symbol]: SANDY SILT TILL

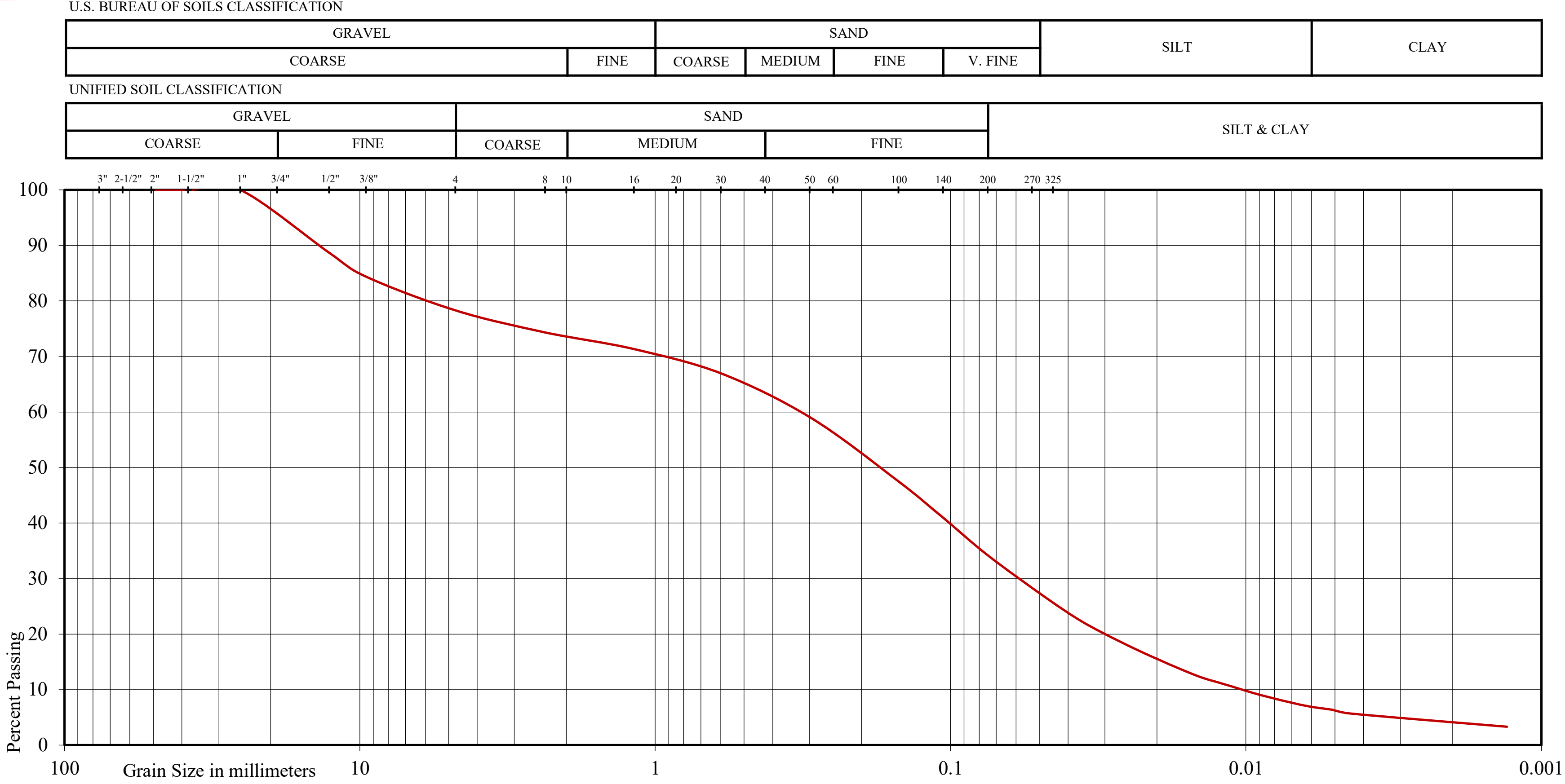
a trace to some clay, a trace of gravel

Figure: 16

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1910-S052



Project: Proposed Residential Development

Location: 12811 Tenth Line, Town of Whitchurch-Stouffville

BH./Sa. 103/5

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = 8

Estimated Permeability (cm./sec.) = 10^{-4}

Borehole No: 103

Sample No: 5

Depth (m): 3.2

Elevation (m): 288.6

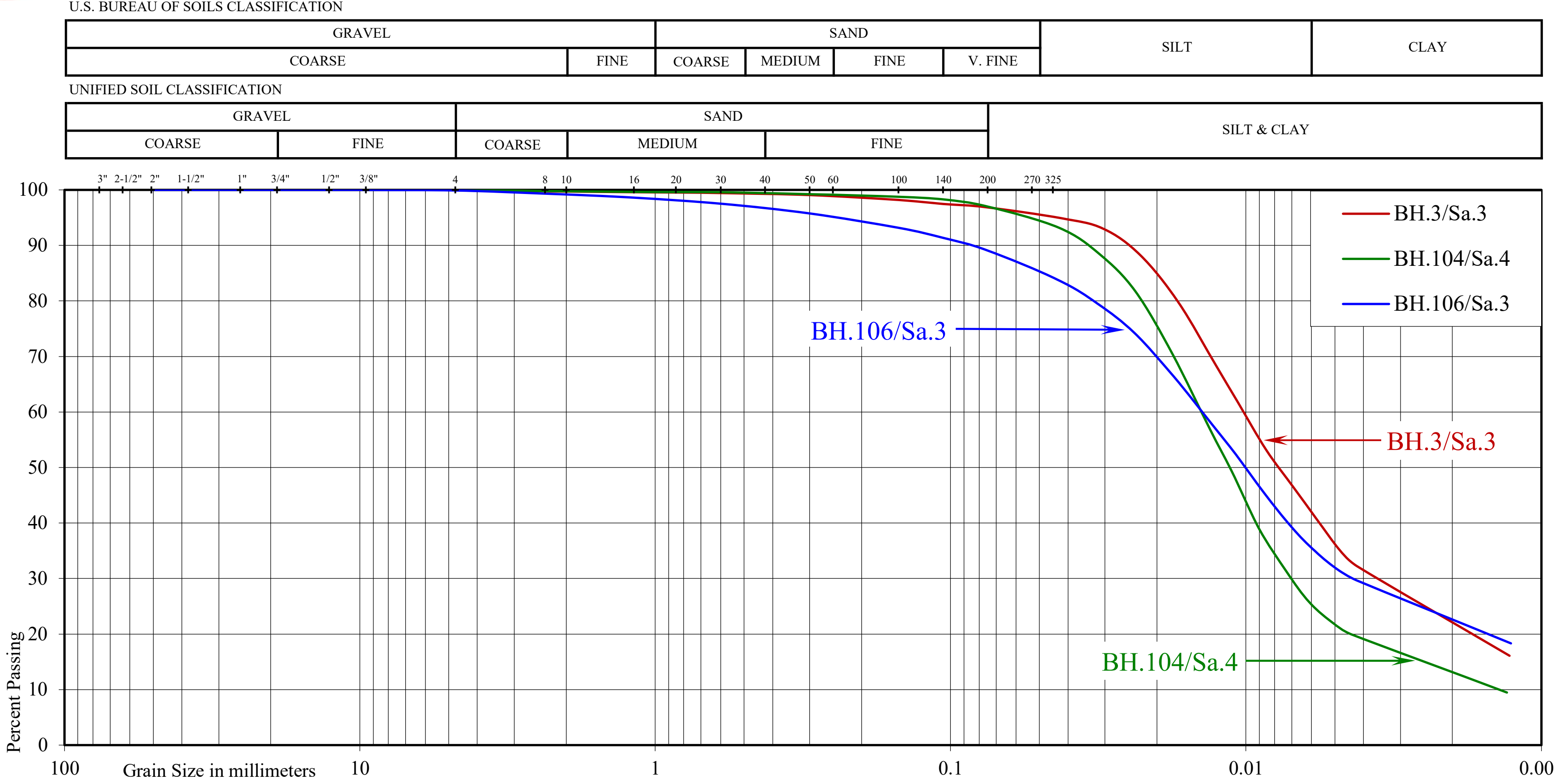
Classification of Sample [& Group Symbol]: SILTY SAND TILL
gravelly, a trace of clay

Figure: 17

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1910-S052



Project: Proposed Residential Development

Location: 12811 Tenth Line, Town of Whitchurch-Stouffville

Borehole No:	3	104	106
Sample No:	3	4	3
Depth (m):	1.8	2.5	1.7
Elevation (m):	294.0	293.0	291.3

BH./Sa.	3/3	104/4	106/3
Liquid Limit (%) =	26	-	28
Plastic Limit (%) =	18	-	17
Plasticity Index (%) =	8	-	11
Moisture Content (%) =	19	19	22
Estimated Permeability (cm./sec.) =	10^{-7}	10^{-6}	10^{-7}

Classification of Sample [& Group Symbol]: SILTY CLAY

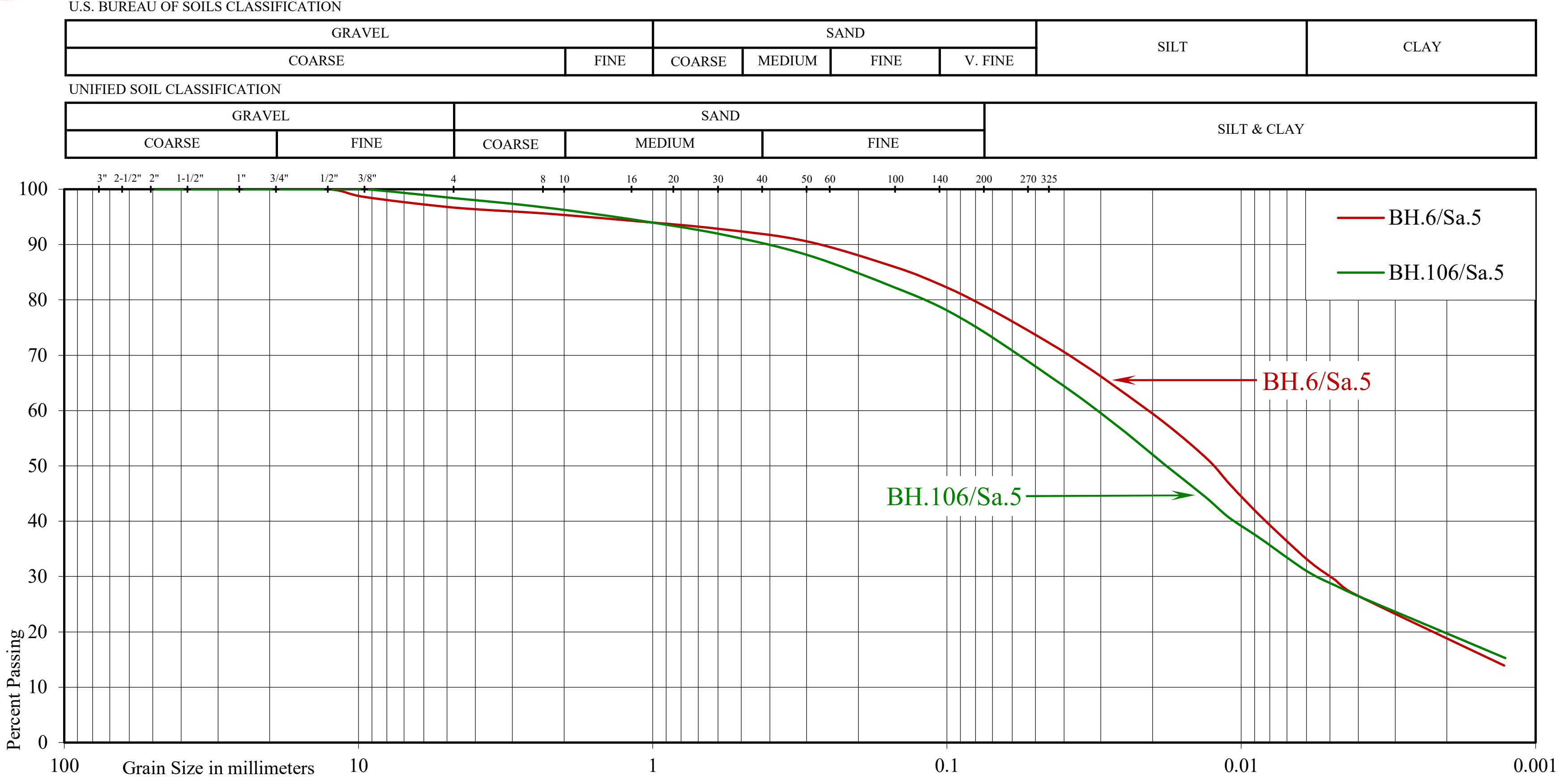
a trace to some sand

Figure: 18

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1910-S052



Project: Proposed Residential Development

Location: 12811 Tenth Line, Town of Whitchurch-Stouffville

Borehole No:	6	106
Sample No:	5	5
Depth (m):	3.2	3.2
Elevation (m):	291.2	289.8

BH./Sa.	6/5	106/5
Liquid Limit (%) =	24	25
Plastic Limit (%) =	17	16
Plasticity Index (%) =	7	9
Moisture Content (%) =	15	13
Estimated Permeability (cm./sec.) =	10^{-7}	10^{-7}

Classification of Sample [& Group Symbol]: SILTY CLAY TILL

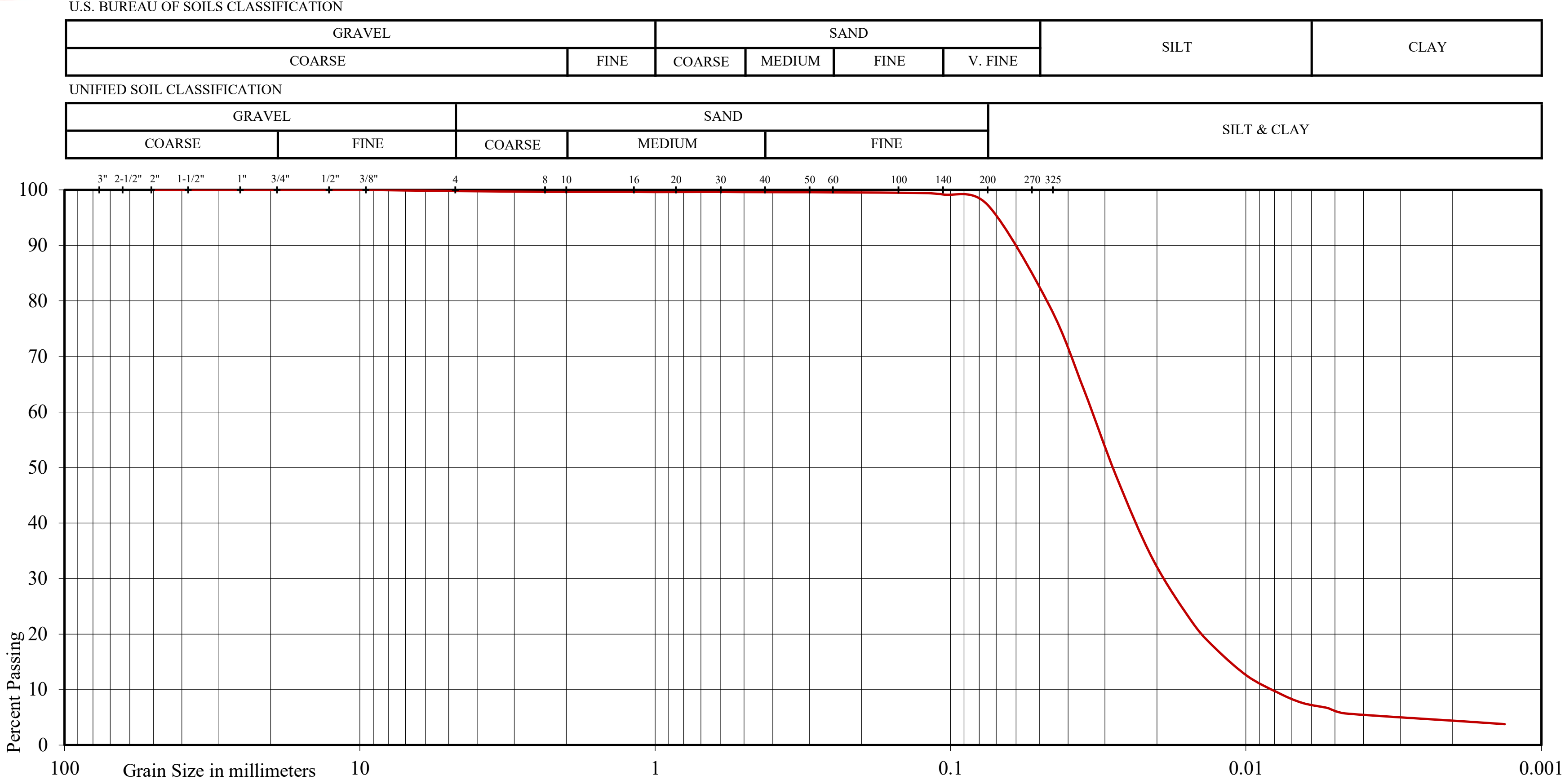
some sand to sandy, a trace of gravel

Figure: 19

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1910-S052



Project: Proposed Residential Development

Location: 12811 Tenth Line, Town of Whitchurch-Stouffville

BH./Sa. 3/7

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = 18

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

Borehole No: 3

Sample No: 7

Depth (m): 6.3

Elevation (m): 289.5

Classification of Sample [& Group Symbol]: SILT

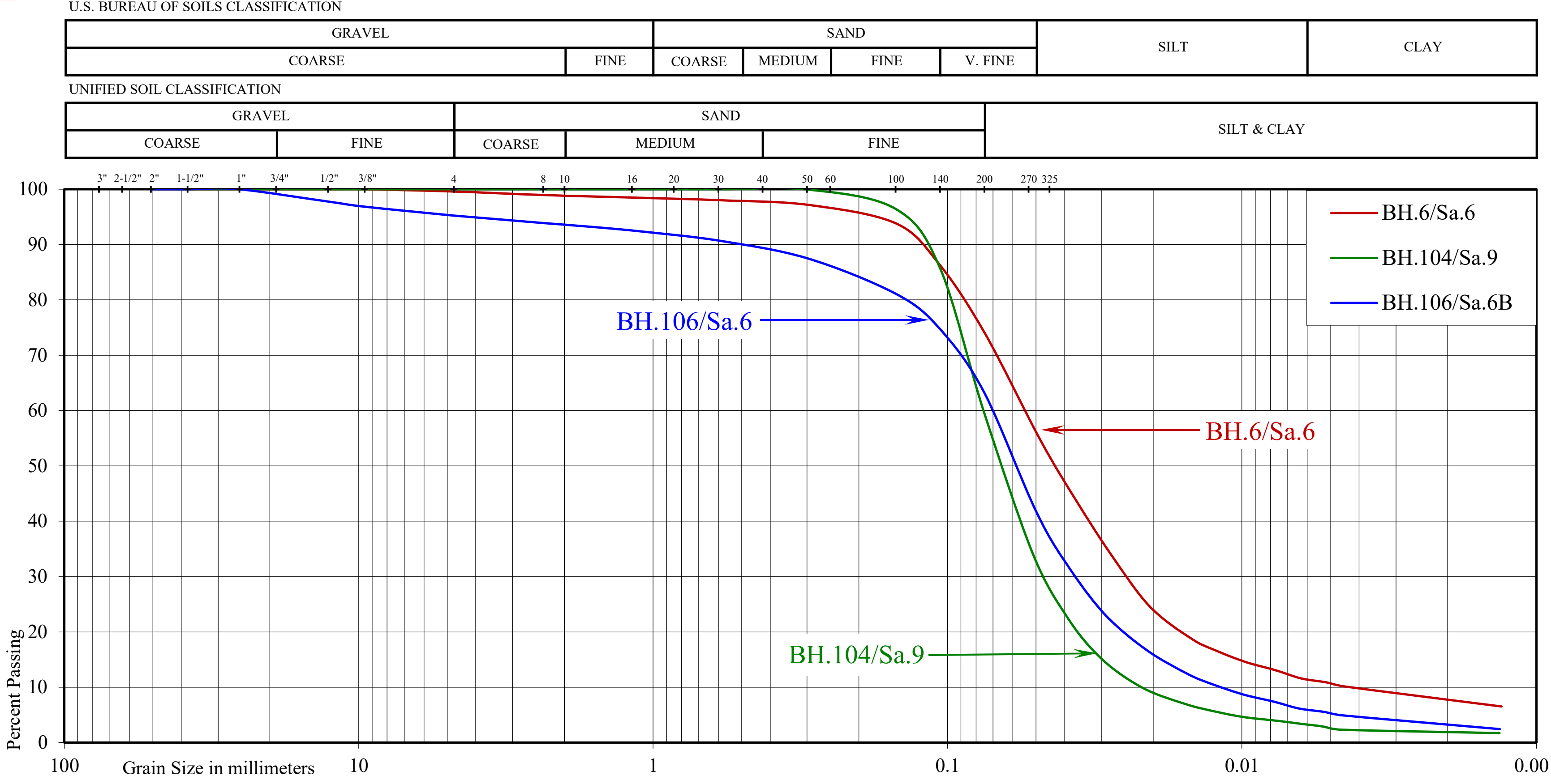
traces of fine sand and clay

Figure: 20

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1910-S052



Project: Proposed Residential Development

Location: 12811 Tenth Line, Town of Whitchurch-Stouffville

Borehole No:	6	104	106
Sample No:	6	9	6B
Depth (m):	4.8	2.5	5.0
Elevation (m):	289.6	293.0	288.0

BH./Sa.	6/6	104/9	106/6B
Liquid Limit (%) =	-	-	-
Plastic Limit (%) =	-	-	-
Plasticity Index (%) =	-	-	-
Moisture Content (%) =	10	19	22
Estimated Permeability (cm./sec.) =	10^{-5}	10^{-4}	10^{-4}

Classification of Sample [& Group Symbol]: SANDY SILT

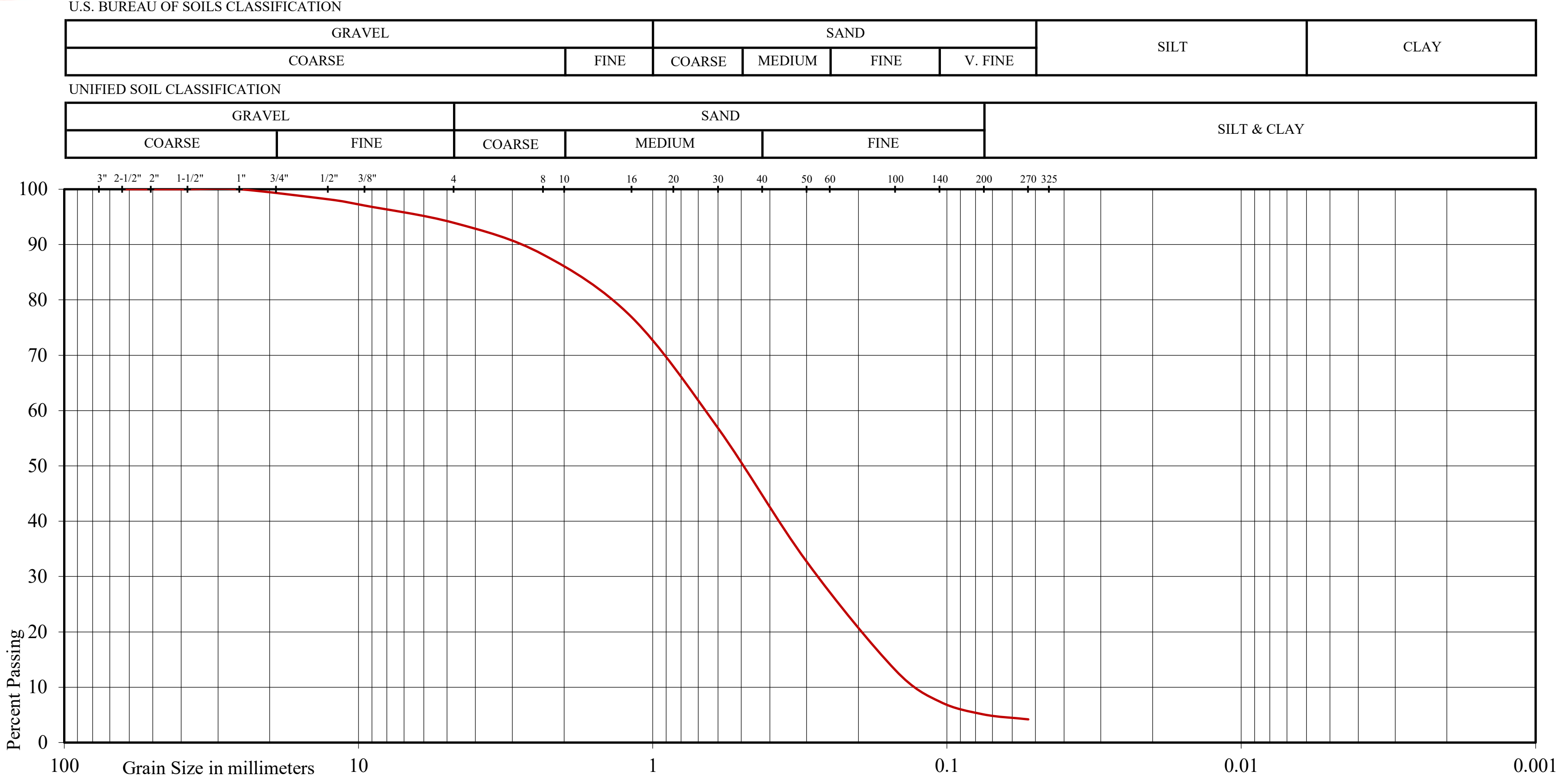
a trace of clay, occ. a trace of gravel

Figure: 21

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1910-S052



Project: Proposed Residential Development

Location: 12811 Tenth Line, Town of Whitchurch-Stouffville

BH./Sa. 105/10

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = 18

Estimated Permeability (cm./sec.) = 10^{-2}

Borehole No: 105

Sample No: 10

Depth (m): 10.9

Elevation (m): 282.5

Classification of Sample [& Group Symbol]: SAND

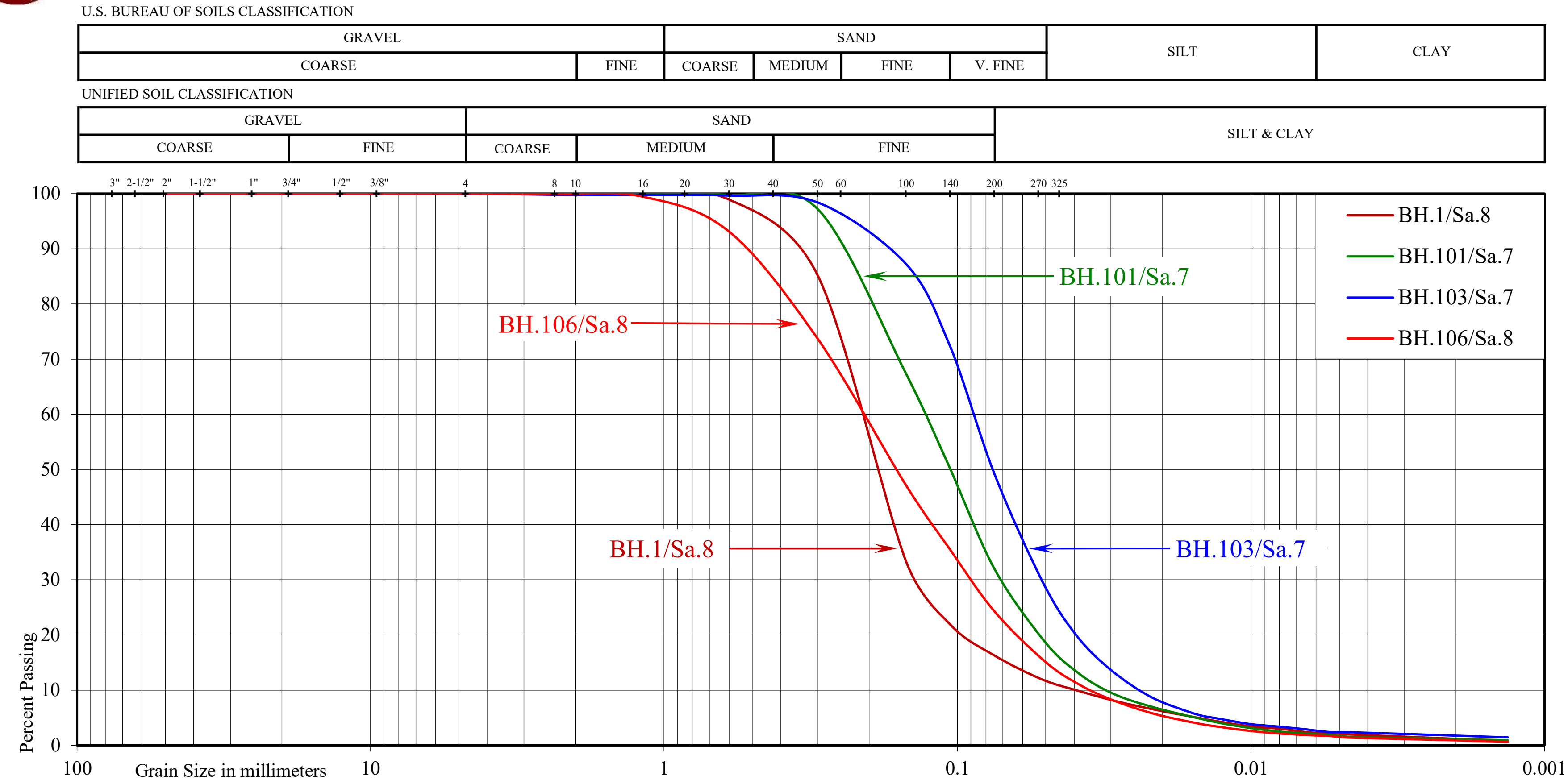
fine to medium grained, traces of silt and gravel

Figure: 22

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 1910-S052



Project: Proposed Residential Development

Location: 12811 Tenth Line, Town of Whitchurch-Stouffville

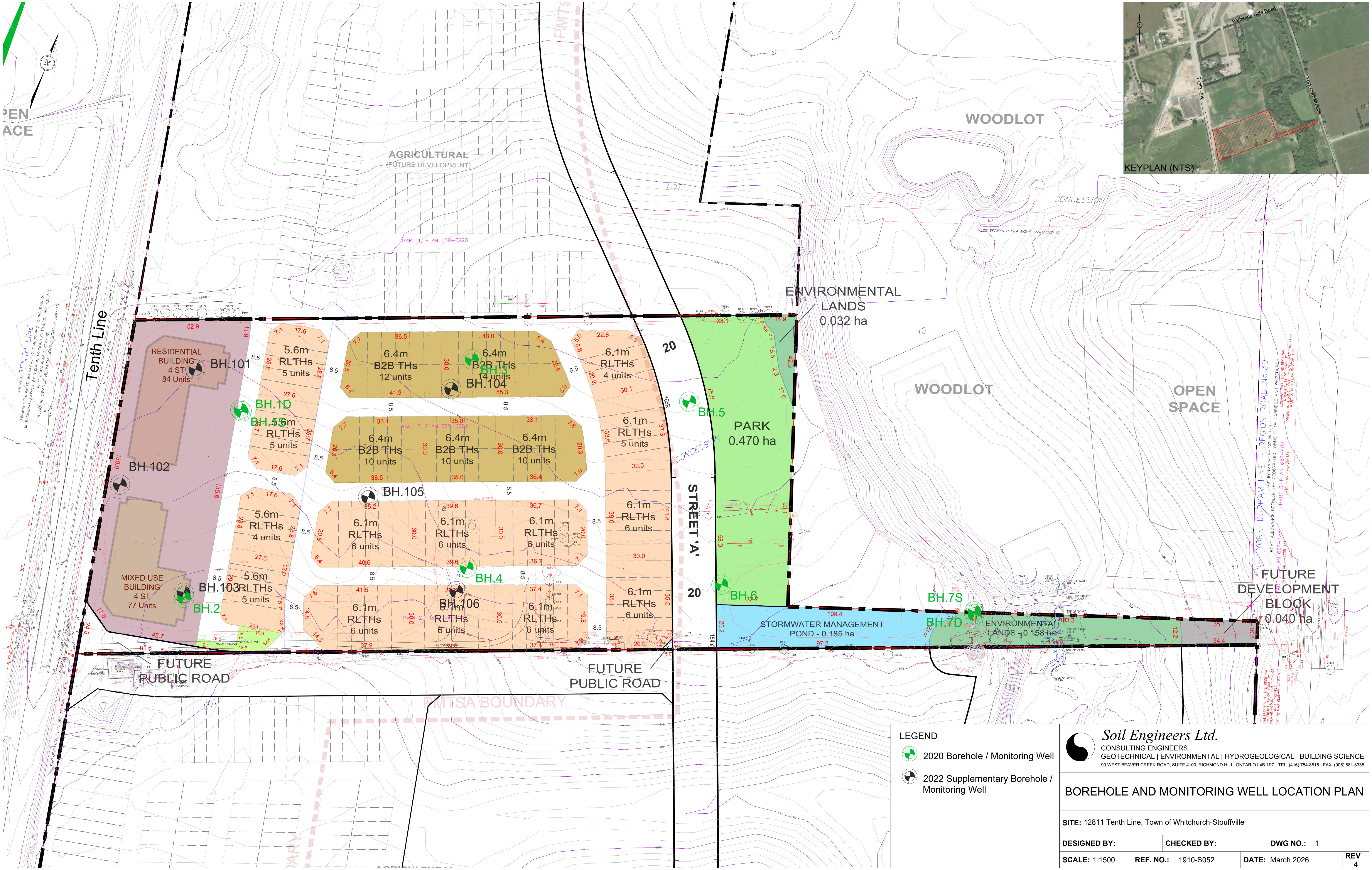
Borehole No:	1	101	103	106
Sample No:	8	7	7	8
Depth (m):	7.9	6.3	6.3	7.8
Elevation (m):	285.7	287.6	285.5	285.2

BH./Sa.	1/8	101/7	103/7	106/8
Liquid Limit (%) =	-	-	-	-
Plastic Limit (%) =	-	-	-	-
Plasticity Index (%) =	-	-	-	-
Moisture Content (%) =	15	19	16	18
Estimated Permeability (cm./sec.) =	10^{-3}	10^{-4}	10^{-4}	10^{-3}

Classification of Sample [& Group Symbol]: SAND

fine to fine to medium grained, some silt to silty

Figure: 23



LEGEND

- 2020 Borehole / Monitoring Well
- 2022 Supplementary Borehole / Monitoring Well

Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE
90 WEST BEAVER CREEK ROAD, SUITE #100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BOREHOLE AND MONITORING WELL LOCATION PLAN

SITE: 12811 Tenth Line, Town of Whitchurch-Stouffville

DESIGNED BY:
CHECKED BY:
DWG NO.: 1
SCALE: 1:1500
REF. NO.: 1910-S052
DATE: March 2026
REV 4

Soil Engineers Ltd.
CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE

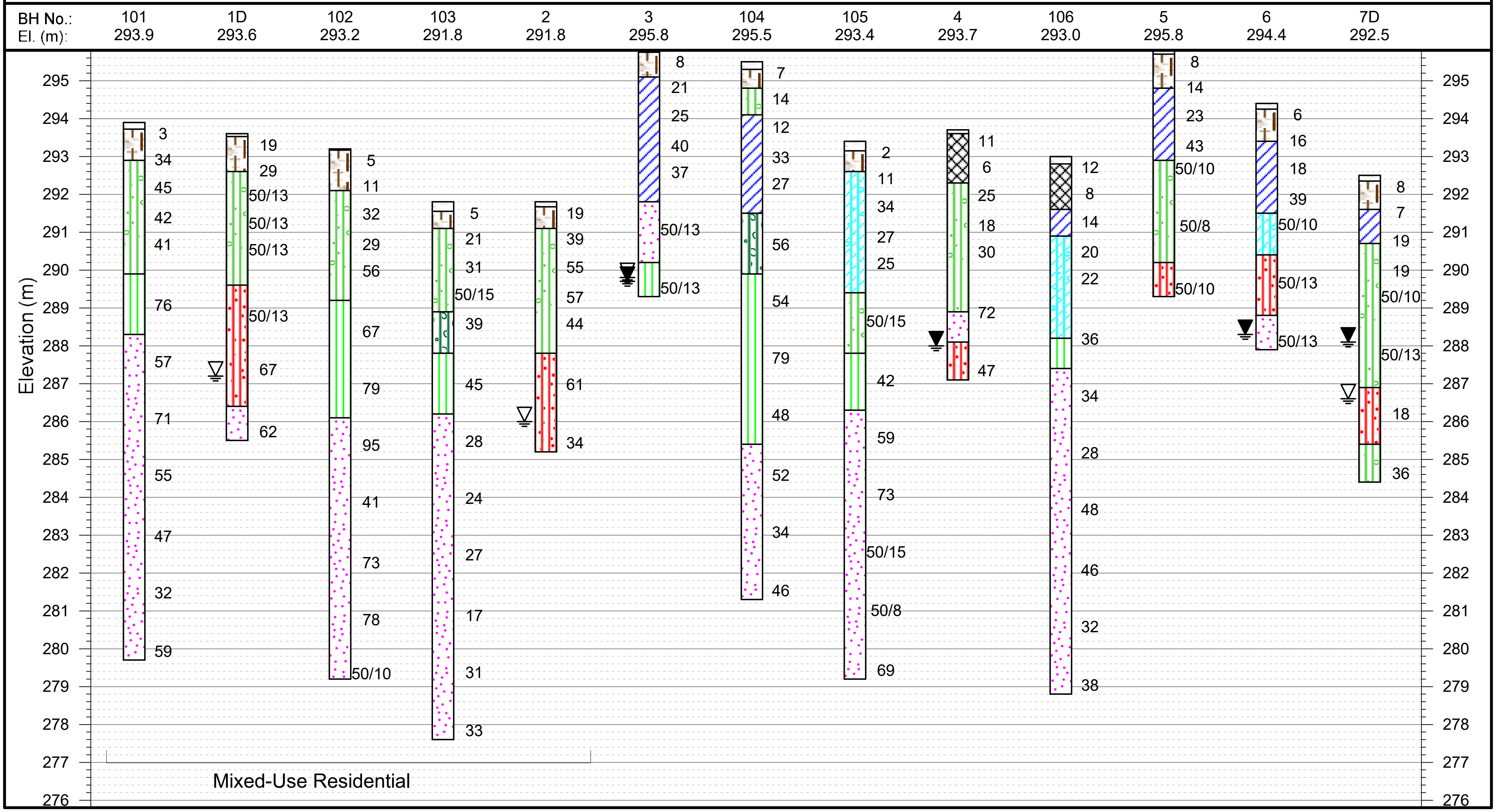
SUBSURFACE PROFILE
DRAWING NO. 2
SCALE: AS SHOWN

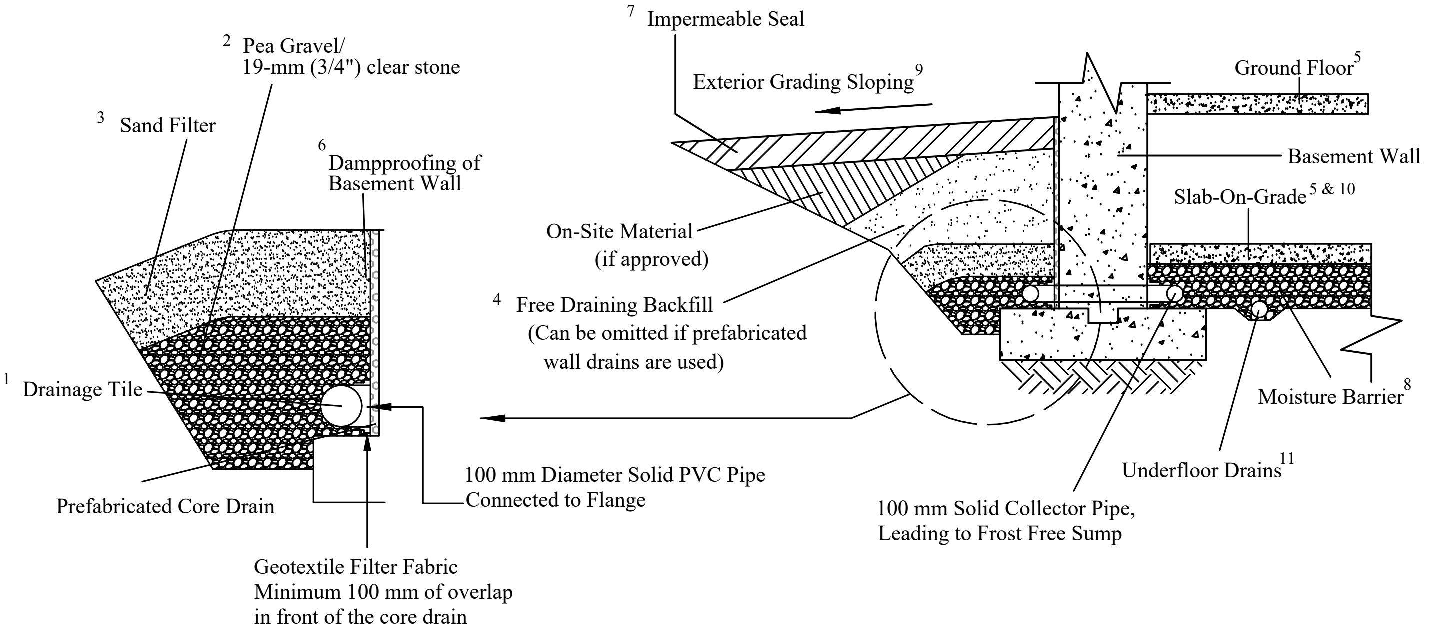
JOB NO.: 1910-S052
REPORT DATE: March 2026
PROJECT DESCRIPTION: Proposed Residential Development
PROJECT LOCATION: 12811 Tenth Line
Town of Whitchurch-Stouffville

LEGEND

- ▨ TOPSOIL
- ▨ PLOUGHED SOIL
- ▩ FILL
- ▨ SAND
- ▨ SILTY SAND TILL
- 🟥 SANDY SILT
- 🟩 SANDY SILT TILL
- 🟩 SILT
- ▨ SILTY CLAY
- ▨ SILTY CLAY TILL

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





NOTES:

1. **Drainage tile**: consists of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be at minimum of 150 mm (6") below underside of basement floor slab.

2. **Pea gravel**: at 150 mm (6") on the top and sides of drain. If drain is not placed on concrete footing, provide 100 mm (4") of pea gravel below drain. The pea gravel may be replaced by 19-mm (3/4") clear stone provided that the drain is covered by a porous geotextile membrane of Terrafix 270R or equivalent.

3. **Filter material**: consists of C.S.A. fine concrete aggregate. A minimum of 300 mm (12") on the top and sides of gravel. This may be replaced by an approved porous geotextile membrane of Terrafix 270R or equivalent.

4. **Free-draining backfill**: OPSS Granular 'B' or equivalent, compacted to 95% to 98% (maximum) Standard Proctor dry density. Do not compact closer than 1.8 m (6') from wall with heavy equipment. This may be replaced by on-site material if prefabricated wall drains (Miradrain) extending from the finished grade to the bottom of the basement wall are used.

5. **Do not backfill** until the wall is supported by the basement floor slab and ground floor framing, or adequate bracing.

6. **Dampproofing** of the basement wall is required before backfilling

7. **Impermeable backfill seal** of compacted clay, clayey silt or equivalent. If the original soil in the vicinity is a free-draining sand, the seal may be omitted.

8. **Moisture barrier**: 19-mm (3/4") clear stone. The thickness of this layer should be 150 mm (6") minimum.

9. **Exterior Grade**: slope away from basement wall on all the sides of the building.

10. **Slab-On-Grade** should not be structurally connected to walls or foundations.

11. **Underfloor drains**[*] should be placed in parallel rows at 6 to 8 m (20'-25') centre, on 100 mm (4") of pea gravel with 150 mm (6") of pea gravel on top and sides. The spacing should be at least 300 mm (12") between the underside of the floor slab and the top of the pipe. The drains should be connected to positive sumps or outlets. Do not connect the underfloor drains to the perimeter drains.

[*] Underfloor drains can be omitted where not required.

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90 WEST BEAVER CREEK ROAD, SUITE #100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

PERMANENT PERIMETER DRAINAGE SYSTEM
(OPEN EXCAVATION FOR PART 9 BUILDINGS)

SITE: 12811 Tenth Line, Town of Whitchurch-Stouffville

DESIGNED BY: K.L. **CHECKED BY:** B.L. **DWG NO.:** 3

SCALE: N.T.S. **REF. NO.:** 1910-S052 **DATE:** March 2026 **REV** -

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90 WEST BEAVER CREEK ROAD, SUITE 100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

BARRIE	MISSISSAUGA	OSHAWA	NEWMARKET	MUSKOKA	HAMILTON
TEL: (705) 721-7863	TEL: (905) 542-7605	TEL: (905) 440-2040	TEL: (905) 853-0647	TEL: (705) 721-7863	TEL: (905) 777-7956
FAX: (705) 721-7864	FAX: (905) 542-2769	FAX: (905) 725-1315	FAX: (905) 881-8335	FAX: (705) 721-7864	FAX: (905) 542-2769

APPENDIX

MONITORING WELL RECORDS
1910-W052

REFERENCE NO. 1910-S052

BH/MW	Ground Level Elevation (masl)	Units	8-Apr-20	25-May-20	29-Jun-20	28-Aug-20	28-Oct-20	29-Dec-20	26-Feb-21	27-Apr-21	25-Jun-21	27-Aug-21	29-Oct-21	21-Dec-21	3-Mar-22
1D	293.62	mbgs	Dry	5.90	6.33	6.42	6.87	6.91	Dry	6.60	6.88	Dry	Dry	6.57	6.24
		masl	<286.02	287.72	287.29	287.20	286.75	286.71	<286.02	287.02	286.74	<286.02	<286.02	287.05	287.38
1S	293.61	mbgs	Dry	5.87	5.97	5.96	5.97	5.98	5.98	5.98	5.97	5.97	6.00	5.98	5.98
		masl	<287.51	287.74	287.64	287.65	287.64	287.63	287.63	287.63	287.64	287.64	287.61	287.63	287.63
2	291.75	mbgs	Dry	4.43	4.88	4.84	5.39	5.54	5.50	5.05	5.37	5.66	5.61	4.88	4.59
		masl	<285.65	287.32	286.87	286.91	286.36	286.21	286.25	286.70	286.38	286.09	286.14	286.87	287.16
3	295.75	mbgs	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
		masl	<289.65	<289.65	<289.65	<289.65	<289.65	<289.65	<289.65	<289.65	<289.65	<289.65	<289.65	<289.65	<289.65
4	293.65	mbgs	5.70	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
		masl	287.95	<287.55	<287.55	<287.55	<287.55	<287.55	<287.55	<287.55	<287.55	<287.55	<287.55	<287.55	<287.55
5	295.84	mbgs	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
		masl	<289.74	<289.74	<289.74	<289.74	<289.74	<289.74	<289.74	<289.74	<289.74	<289.74	<289.74	<289.74	<289.74
6	294.41	mbgs	Dry	6.03	6.00	5.94	5.96	Dry	Dry	Dry	5.97	Dry	6.00	5.97	5.97
		masl	<288.31	288.38	288.41	288.47	288.45	<288.31	<288.31	<288.31	288.44	<288.31	288.41	288.44	288.44
7S	292.49	mbgs	4.44	5.02	5.32	5.43	5.67	5.72	5.71	5.39	5.74	5.96	5.86	5.42	5.00
		masl	288.05	287.47	287.17	287.06	286.82	286.77	286.78	287.10	286.75	286.53	286.63	287.07	287.49
7D	292.53	mbgs	4.37	4.90	5.21	5.29	5.54	5.57	5.58	5.27	5.62	5.86	5.70	5.28	4.90
		masl	288.16	287.63	287.32	287.24	286.99	286.96	286.95	287.26	286.91	286.67	286.83	287.25	287.63
101	293.94	mbgs	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
		masl													
102	293.18	mbgs	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
		masl													
103	291.76	mbgs	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
		masl													
104	295.47	mbgs	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
		masl													
105	293.39	mbgs	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
		masl													
106	292.96	mbgs	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
		masl													

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BH/MW	Ground Level Elevation (masl)	Units	25-Mar-22	27-Apr-22	24-May-22	30-Jun-22	21-Sep-22	18-Dec-22	10-Apr-23	26-May-23	13-Jun-23	19-Jul-23	23-Nov-23	24-Jan-24	12-Mar-24
1D	293.62	mbgs	5.73	5.55	5.93	6.36	7.02	Dry	5.53	5.72	5.94	6.10	6.79	6.48	6.07
		masl	287.89	288.07	287.69	287.26	286.60	<286.02	288.09	287.90	287.68	287.52	286.83	287.14	287.55
1S	293.61	mbgs	5.78	5.54	5.91	5.98	5.96	5.98	5.62	5.69	5.92	5.94	5.95	5.96	5.95
		masl	287.83	288.07	287.70	287.63	287.65	287.63	287.99	287.92	287.69	287.67	287.66	287.65	287.66
2	291.75	mbgs	3.87	3.99	4.43	4.90	5.50	5.77	3.18	4.20	4.42	4.63	5.29	5.06	4.48
		masl	287.88	287.76	287.32	286.85	286.25	285.98	288.57	287.55	287.33	287.12	286.46	286.69	287.27
3	295.75	mbgs	Dry	Dry	Dry	Dry	Dry	6.06	Dry	Dry	Dry	Dry	Dry	Dry	Dry
		masl	<289.65	<289.65	<289.65	<289.65	<289.65	289.69	<289.65	<289.65	<289.65	<289.65	<289.65	<289.65	<289.65
4	293.65	mbgs	Dry	5.88	6.04	Dry	Dry	Dry	5.80	5.99	Dry	Dry	Dry	Dry	Dry
		masl	<287.55	287.77	287.61	<287.55	<287.55	<287.55	287.85	287.66	<287.55	<287.55	<287.55	<287.55	<287.55
5	295.84	mbgs	Dry	Dry	Dry	Dry	Dry	Dry	4.77	5.95	5.94	5.91	5.90	5.90	5.90
		masl	<289.74	<289.74	<289.74	<289.74	<289.74	<289.74	291.07	289.89	289.90	289.93	289.94	289.94	289.94
6	294.41	mbgs	5.98	5.98	5.97	5.99	5.98	5.99	5.97	5.97	5.97	NA	5.96	Dry	5.97
		masl	288.43	288.43	288.44	288.42	288.43	288.42	288.44	288.44	288.44		288.45	<288.31	288.44
7S	292.49	mbgs	4.25	4.73	5.00	5.38	5.78	5.88	4.22	4.80	4.92	5.11	5.51	5.46	4.87
		masl	288.24	287.76	287.49	287.11	286.71	286.61	288.27	287.69	287.57	287.38	286.98	287.03	287.62
7D	292.53	mbgs	4.30	4.60	4.88	5.26	5.65	5.76	4.11	4.67	4.78	4.99	5.38	5.12	4.75
		masl	288.23	287.93	287.65	287.27	286.88	286.77	288.42	287.86	287.75	287.54	287.15	287.41	287.78
101	293.94	mbgs	5.97	5.72	6.10	6.52	7.13	7.43	5.64	5.87	6.09	6.26	6.92	6.63	6.21
		masl	287.97	288.22	287.84	287.42	286.81	286.51	288.30	288.07	287.85	287.68	287.02	287.31	287.73
102	293.18	mbgs	5.23	5.16	5.57	6.03	6.61	6.90	5.06	5.35	5.57	5.75	6.41	6.09	5.66
		masl	287.95	288.02	287.61	287.15	286.57	286.28	288.12	287.83	287.61	287.43	286.77	287.09	287.52
103	291.76	mbgs	3.96	3.98	4.40	4.87	5.45	5.71	3.86	4.35	4.40	4.60	5.24	4.92	4.48
		masl	287.80	287.78	287.36	286.89	286.31	286.05	287.90	287.41	287.36	287.16	286.52	286.84	287.28
104	295.47	mbgs	7.37	7.18	7.53	Damaged	Damaged	Damaged	Damaged	Damaged	Damaged	Damaged	Damaged	Damaged	Damaged
		masl	288.10	288.29	287.94										
105	293.39	mbgs	5.49	5.38	5.76	6.20	6.79	7.08	5.28	5.55	5.75	5.94	6.59	6.31	6.31
		masl	287.90	288.01	287.63	287.19	286.60	286.31	288.11	287.84	287.64	287.45	286.80	287.08	287.08
106	292.96	mbgs	5.17	5.10	5.49	5.94	6.51	6.78	4.97	5.28	5.49	5.88	6.30	6.01	6.01
		masl	287.79	287.86	287.47	287.02	286.45	286.18	287.99	287.68	287.47	287.08	286.66	286.95	286.95

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BH/MW	Ground Level Elevation (masl)	Units	22-May-24	31-Jul-24	25-Sep-24	24-Dec-25	7-Jan-26
1D	293.62	mbgs	5.51	6.13	6.31	Dry	Dry
		masl	288.11	287.49	287.31	<286.02	<286.02
1S	293.61	mbgs	5.49	5.95	5.96	Dry	Dry
		masl	288.12	287.66	287.65	<287.51	<287.51
2	291.75	mbgs	4.05	4.62	4.90	Dry	Dry
		masl	287.70	287.13	286.85	<285.65	<285.65
3	295.75	mbgs	5.80	5.87	Dry	Dry	Dry
		masl	289.95	289.88	<289.65	<289.65	<289.65
4	293.65	mbgs	Dry	Dry	Dry	Dry	Dry
		masl	<287.55	<287.55	<287.55	<287.55	<287.55
5	295.84	mbgs	5.96	5.92	5.92	Dry	Dry
		masl	289.88	289.92	289.92	<289.74	<289.74
6	294.41	mbgs	5.97	5.97	5.96	Dry	Dry
		masl	288.44	288.44	288.45	<288.31	<288.31
7S	292.49	mbgs	4.69	5.16	5.31	5.79	5.70
		masl	287.80	287.33	287.18	286.70	286.79
7D	292.53	mbgs	4.56	5.03	5.18	5.65	5.57
		masl	287.97	287.50	287.35	286.88	286.96
101	293.94	mbgs	5.66	6.26	6.52	7.37	7.36
		masl	288.28	287.68	287.42	286.57	286.58
102	293.18	mbgs	5.16	5.74	6.01	6.85	6.80
		masl	288.02	287.44	287.17	286.33	286.38
103	291.76	mbgs	4.02	4.57	4.85	NA	5.65
		masl	287.74	287.19	286.91		286.11
104	295.47	mbgs	Damaged	Damaged	Damaged	Damaged	Damaged
		masl					
105	293.39	mbgs	5.36	5.94	6.20	7.02	6.98
		masl	288.03	287.45	287.19	286.37	286.41
106	292.96	mbgs	5.11	5.67	5.93	6.72	6.69
		masl	287.85	287.29	287.03	286.24	286.27

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