REPORT ON
GEOTECHNICAL INVESTIGATION
150 CEMETERY ROAD
UXBRIDGE, ONTARIO

REPORT NO.: 5431W-20-GA
REPORT DATE: JANUARY 12, 2021

PREPARED BY
TORONTO INSPECTION LIMITED

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1.0 INTRODUCTION

Toronto Inspection Ltd. was retained by Coral Creek Homes to conduct a geotechnical investigation at a property located at 150 Cemetery Road in Uxbridge, Ontario (hereinafter described as "the Site"). The geotechnical investigation was carried out in conjunction with a Hydrogeotechnical Study. The report of findings for the Hydrogeotechnical Study will be issued under a separate cover.

The purpose of the investigation was to determine the subsoil and groundwater conditions affecting the design and construction of the proposed townhouse development, and to carry out the slope stability assessment. In particular, geotechnical data was to be provided for:

- General founding conditions
- Foundation design bearing pressures
- Construction recommendations
- Excavation recommendations
- Pavement recommendations
- Slope stability assessment

This report is provided on the basis of the above terms of reference and on an assumption that the design of the townhouses will be in accordance with the applicable building codes and standards. If there are any changes in the design features relevant to the geotechnical analysis, our office should be consulted to review the design and to confirm the recommendations and comments provided in the report.

2.0 SITE CONDITION

The Site is a 10 acre irregular shaped property located on the west side of Cemetery Road, approximately 250m north of Toronto Street South in Uxbridge, Ontario. The eastern one-quarter of the property is a table land, and the remaining three-quarters comprise a slope, a pond with a small creak and a densely treed floodplain. The proposed development will be built on the tableland.

At the time of the investigation, a two storey house occupied the west side of the tableland, and was accessible by a driveway on the south side of the Site. A in-ground swimming pool was located to the north of the house and a tennis court was located to the east of the swimming pool. The remainder of the tableland was mostly vacant sodded area.

The properties to the north and to the east, across the road, were occupied by a residential

dwelling. The property to the south was an on-going townhouse development, and to the west is a rail track, then a pond.

3.0 INVESTIGATION PROCEDURE

The field work for the investigation was carried out on December 1, 2020, and consisted of drilling five sampled boreholes (20BH-1 to 20BH-5), extending to depths of 6.6m to 12.6m from grade.

The boreholes were advanced using a truck mounted drill rig, equipped with continuous flight solid stem augers and sampling rods, supplied and operated by a specialist drilling contractor. Soil samples were retrieved from the boreholes at 0.76m intervals for the top 3.0m, and 1.5m intervals thereafter, using a split spoon sampler in conjunction with Standard Penetration Tests using a driving energy of 475 joules (350 ft-lbs).

The soil samples were identified and logged in the field and were carefully bagged for later visual identification and laboratory testing, including moisture content determination and grain size analysis.

Groundwater observations were made in the boreholes during and upon the completion of drilling. Boreholes 20BH-1, 20BH-3, 20BH-4 and 20BH-5 were completed as monitoring wells to determine the current static groundwater conditions and as part of a concurrent hydrogeological investigation. The symbol (MW) besides the borehole identification number, indicates a monitoring well. The groundwater records are presented in the borehole logs.

The borehole and monitoring well locations, established in the field by our site personnel, are shown on the appended Borehole Location Plan, Drawing No. 1.

The ground elevations at the borehole locations were interpolated from the contour and spot elevations shown on the "Draft Plan of Subdivision of Part of Lot 27, Concession 6, Geographic Township of Uxbridge, now in the Town of Uxbridge, Regional Municipality of Durham" prepared by H.F. Grander Co. Ltd., OLS, dated June 24, 2020, provided to our office by the client.

4.0 SUMMARIZED SUBSURFACE CONDITIONS

Reference is made to the appended Borehole Location Plan (Drawing No. 1) and Log of Boreholes (Drawing Nos. 2 to 6) for details of field work, including soil classification, inferred stratigraphy, and groundwater observations.

The subsoil, below the pavement and surficial mulch and topsoil at the borehole locations, consisted of disturbed material, overlying sand, silty sand, sandy silt, and sandy silt till deposits.

Brief descriptions of the subsurface materials, encountered at the borehole locations, are as follows:

4.1 Surface Course

A pavement, consisting of 75mm asphalt on a 150mm thick granular base, was contacted at the ground surface at the location of borehole 20BH-2. Mulch, 25mm thick, and topsoil, 50mm thick, were contacted at the ground surface at the location of borehole 20BH-1. Topsoil, approximately 50mm to 150mm in thickness, was contacted at the ground surface at the locations of boreholes 20BH-3 to 20BH-5.

4.2 Disturbed Soil

Underlying the pavement and mulch/topsoil, a layer of disturbed soil was encountered at the borehole locations. This material consisted of sand or silty sand, with some topsoil or gravel. The disturbed soil at the borehole locations extended to depths of between 0.9m and 2.1m from grade.

Based on the Standard Penetration N-values of 1 to 5 blows for a penetration of 300mm, the disturbed soil is considered to be in a very loose to loose condition.

The in-situ moisture content of the soil samples retrieved from the disturbed soil ranged from 11 % to 32%, indicating moist to wet conditions.

4.3 Sand

A deposit of sand was contacted below the disturbed soil at the locations of boreholes 20BH-4 and 20BH-5 at depths of between 0.9m and 2.1m from grade. This deposit consisted of fine sand, and contained some seams of silt in borehole

20BH-5, and extended to depths of 2.9m to 4.0m from grade.

Based on the Standard Penetration N-value of 11 to 34 blows for a penetration of 300mm, the relative density of the sand was compact to dense.

The in-situ moisture content of the soil samples retrieved from the sand deposit ranged from 6% to 13%, indicating moist conditions.

A grain size analysis was conducted on a sample of the sand deposit, obtained from Borehole 20BH-5 sample SS4, at a depth of 2.3m using both mechanical sieves and hydrometer. The grain size distribution is shown on the appended Figure No. 1.

4.4 Sandy Silt Till

A deposit of sandy silt till was contacted below the sand deposit at a depth of 2.9m from grade at borehole 20BH-4 location. This deposit consisted of a brown heterogeneous mixture of silt and sand with trace to some gravel and trace clay, and some seams of fine sand. The sandy silt till deposit extended to a depth of 5.5m from grade at the borehole location.

Based on the Standard Penetration N-values of 45 to more than 100 blows for a penetration of 300mm, the relative density of the sandy silt till deposit was dense to very dense.

The in-situ moisture content of the soil samples retrieved from the sandy silt till deposit ranged from 12% to 13%, indicating moist conditions.

4.5 Silty Sand/Sandy Silt

A silty sand/sandy silt deposit was contacted below the disturbed material at depths of 0.9m from grade at boreholes 20BH-1, 20BH-2 and 20BH-3 locations, below the sand deposit at a depth of 4m from grade at borehole 20BH-5 location, and below the sandy silt till deposit at a depth of 5.5m from grade at borehole 20BH-4 location. This deposit contained occasional seams of silt in boreholes 20BH-1 and 20BH-2 locations.

Boreholes 20BH-3, 20BH-4 and 20BH-5 were terminated in the silty sand /sandy silt deposit at depths of 6.6m from grade. The silty sand deposit extended to depths of

between 7.0m and 8.7m from grade at boreholes 20BH-1 and 20BH-2 locations.

Based on the Standard Penetration N-values of 9 to more 100 blows for a penetration of 300mm, the relative density of the silty sand/sandy silt deposit was loose to very dense.

The in-situ moisture content of the soil samples retrieved from the silty sand/sandy silt deposit ranged from 11% to 17%, indicating moist to very moist conditions.

A grain size analysis was conducted on a sample of the sandy silt deposit, obtained from Borehole 20BH-3 sample SS3, at a depth of 1.5m using both mechanical sieves and hydrometer. The grain size distribution is shown on the appended Figure No. 1.

4.6 Lower Sand

A lower deposit of sand was contacted below the silty sand deposit at depths of between 7.0m and 8.7m from grade at the locations of boreholes 20BH-1 and 20BH-2. This deposit consisted of fine sand, with some silt, or occasional layers of sand and silt. Both boreholes were terminated the lower sand deposit at depths of 12.6m from grade.

Based on the Standard Penetration N-values of 19 to more than 100 blows for a penetration of 300mm, the relative density of the lower sand deposit was compact to very dense.

The in-situ moisture content of the soil sample retrieved from the lower sand deposit ranged from 6% to 20%, indicating moist to wet conditions. The lower N-value of 19 at the bottom of the borehole was likely due to the wet sand.

A grain size analysis was conducted on a sample of the lower sand deposit, obtained from Borehole 20BH-1 sample SS9, at a depth of 9.1m using both mechanical sieves and hydrometer. The grain size distribution is shown on the appended Figure No. 1.

4.7 Groundwater

A free water surface was encountered in borehole 20BH-1 at a depth of 12.0m from grade, and the remaining open boreholes were dry and open to the full depth, on completion of drilling.

The groundwater levels in the monitoring wells were measured on December 7, 2020, and the findings were as follows:

Monitoring Well No. Depth	Groundwater	
	Depth	Elevation
20BH-1 (MW), 12.36m	11.92m	284.28m
20BH-3 (MW), 6.13m	dry	Below 289.82m
20BH-4 (MW), 6.13m	dry	Below 292.87m
20BH-5 (MW), 6.24m	dry	Below 290.06m

Based on the findings, it is our opinion that the the groundwater table is located at a depth of at least 6m from grade on the east side and at least 11m from grade on the west side of the table land. Perched water conditions may occur in the silty sand and sand deposits, in the sand seams within the sandy silt till deposit or in the disturbed material.

5.0 RECOMMENDATIONS

Based on the Draft Subdivision Plan, the proposed development at the Site will include five blocks (Block 2 to Block 6, 23 units) of townhouses fronting an access road with a cul-de-sac. It is understood that the townhouses will have two storeys and basements. The existing house will remain on the property and will be resold with the property behind (i.e. Lot 1, which includes the slope, the pond and the floodplain).

Based on the subsoils encountered at the borehole locations, our comments and recommendations for the design and construction of the development are as follows:

5.1 Site Preparation

All vegetation remains, topsoil, loose fill and disturbed soil should be removed to a firm ground from within the footprint of the proposed buildings and the paved areas. The contractor must also allow for the removal of any deleterious fill and materials with high moisture and/or organic content, if encountered during the construction, as directed by a geotechnical engineer / technician from ***Toronto Inspection Ltd .***

Where backfilling will be required, the backfill should be composed of engineered fill. Prior to placement of engineered fill, the top of the exposed subgrade should be inspected and proof-rolled under the supervision of a geotechnical engineer / technician from ***Toronto Inspection Ltd.*** Any soft or wet areas identified should be sub-excavated and replaced with compacted granular fill.

The material proposed for engineered fill should be pre-approved a geotechnical engineer / technician from ***Toronto Inspection Ltd***. If the fill material is wet, its should be allowed to dry to within 2% of its optimum moisture value prior to placement. The backfill should be placed in loose lifts not exceeding 200mm and compacted, using heavy compaction equipment, to at least 100% of its Standard Proctor maximum dry density (SPMDD). The Guidelines for Engineered Fill, shown in Appendix A, provides some of the conditions that must be satisfied for fill to be classified as engineered fill.

The excavated native sand and silty sand may be suitable for re-use for engineered fill, following the moisture content requirement and the guidelines in Appendix A. The existing topsoil and disturbed material, if it contains excessive topsoil and organics, will have to be disposed off-site or reused in landscaped areas, subject to approval by the landscape architect.

5.2 Foundation Design

The footings of the structures should be founded on the compact native silty sand/sandy silt or sand deposits, which were encountered at the locations of boreholes 20BH-1 to 20BH-4 at depths of between 1m and 1.5m from grade, and at the location of borehole 20BH-5 at a depth of 3.0m from grade. Conventional spread and strip footings, founded at these depths and strata can be designed for the following bearing pressures:

- 150 kPa at Serviceability Limit State (SLS)
- 225 kPa at Factored Ultimate Limit State (ULS)

Following the site preparation discussed in Section 5.1, footings founded on engineered fill can be designed for the following bearing pressures, and should be reinforced:

- 150 kPa at Serviceability Limit State (SLS)
- 225 kPa at Factored Ultimate Limit State (ULS)

All footings exposed to freeze/thaw cycles should be extended to a minimum of 1.2m from finished grade.

It should be noted that the above recommendations for the foundations have been analyzed by ***Toronto Inspection Ltd.*** from the information obtained at the borehole locations. The bearing material, the interpretation between the boreholes and the recommendations of this report must be checked through field inspection provided by ***Toronto Inspection Ltd***. to validate the information for use during construction.

5.3 Basement Slab Construction

Following the site preparation recommended in Section 5.1, the floor slab can be designed and constructed as a conventional slab-on-grade.

The exposed subgrade should be inspected by a geotechnical technician from ***Toronto Inspection Ltd.*** Any compressible, loose or weak spots observed during the inspection should be sub-excavated to a firm ground. Any new fill below the slab-on-grade should consist of organic free soils, compacted to at least 98% SPMDD.

A granular bedding consisting of at least 150 mm of granular A (OPSS Form 1010) or its approved equivalent, should be provided under the floor slab as a moisture barrier. The bedding should be compacted to at least 100% SPMDD.

5.4 Earthquake Consideration

The Ontario Building Code requires that all buildings be designed to resist earthquake forces. In accordance with Table 4.1.8.4.A of the Ontario Building Code, the Site classification for the Seismic Site Response is Class 'C' (Very dense soil).

The acceleration and velocity based site coefficients, Fa and Fv, should conform to Tables 4.1.8.4.B and 4.1.8.4.C. These values should be reviewed by the Structural Engineer.

5.5 Lateral Earth Pressure

Where subsurface walls will retain unbalanced loads, the lateral earth pressure in the overburden may be computed using the following equation:

$$P = K (\gamma H + q)$$

where	P =	Lateral earth pressure	kPa
	K =	Lateral earth pressure coefficient	0.5
	γ =	Bulk unit weight of the soil	21.0 kN/m^3
	H =	Depth of the wall below the finish grade	m
	q =	Surcharge loads adjacent to the basement wall	kPa

The equation assumes that a permanent free draining system will be provided to prevent the buildup of hydrostatic pressure next to the wall. The recommended backfill and drainage system, at the basement excavation, is shown on the attached Figure No. 2.

5.6 Excavation and Backfilling

All excavations should comply with the Ontario Occupational Health and Safety Act. The disturbed material and sand deposit are considered as Type 3 soil, and the silty sand deposit is considered as Type 2 soil. Excavations within the disturbed material and sand deposit should be sloped back to a safe angle of 45° or shallower. Excavations within the silty sand deposit may be subvertical for the bottom 1.2m, then sloped at a safe angle of 45° thereafter.

The pipe bedding for underground services, including catch basins and manholes, should consist of OPSS Granular A, 20mm crusher run limestone, or equivalent, compacted to 98% SPMDD. If free water is encountered in the trenches, from saturated layers in the disturbed soil or within the silty sand deposit, the bedding in the service trenches may consist of HL6 stone or equivalent, provided that a geotextile filter fabric (Terrafix 270R or equivalent) is used to separate the stone bedding from the base and the sides of the excavation. The geotextile filter fabric must surround the clear stone bedding completely.

We do not anticipate any groundwater problems during the excavation and construction of the building. However, provision should be made to use filtered sumps to remove any perched ground water that may be encountered.

5.7 Pavement Construction

Following the site preparation recommended in Section 5.1, the subgrade of the paved areas will generally consist of silty sand or sand. The silty sand and sand are moderately frost susceptible.

The following minimum pavement design is recommended based on the assumption that perforated sub-drains will be installed to prevent buildup of water in the granular bases of the pavement:

Pavement Structure		Light Duty Car Parking	Heavy Duty Access Road/ Fire Route
Asphaltic Concrete:	**OPSS HL3 or equivalent**	**65mm**	**40mm**
	OPSS HL8 or equivalent	**-**	**50mm**
Base:	**OPSS Granular A or 20mm crusher-run**	**150mm**	**150mm**
Sub-base:	**OPSS Granular B or 50mm crusher-run**	**200mm**	**300mm**

The granular base and sub-base should be compacted to a minimum of 100% SPMDD. Asphaltic concrete should be compacted to at least 96% Marshall density.

The above pavement thicknesses are based on favourable site conditions and the construction being carried out during the drier time of the year, that the subgrade is stable, and not heaving under construction traffic. If the subgrade is wet and unstable, additional thickness of sub-base material will be required.

Following site grading, the subgrade of the entire pavement should be proof-rolled

using a heavy vibratory roller. Any soft spots revealed by the proof-rolling should be sub-excavated and replaced with approved dry material and compacted to at least 98% SPMDD.

Continuous perforated plastic longitudinal sub-drains should be installed on a positive gradient on the sides of the driveway and under the parking areas, and between catch basins and manholes to prevent the build-up of water in the granular base courses. The subdrain pipes should be surrounded by a geotextile filter fabric as per Ontario Provincial Specifications Standard (OPSS 405). The sub-drains should be placed at least 300 mm below the subgrade level. Backfill above the drain should comprise of free draining sub-base material.

6.0 SLOPE ASSESSMENT

The Site is located above a waterway and a slope, and it is anticipated that a slope assessment to determine the long term stable top of slope will be required by the Lake Simcoe Region Conservation Authority (LSRCA). The location of the long term stable top of slope is to be shown on the site plan.

6.1 Description of the Slope

The topographic survey plan of the Site is shown in Appendix B. The staked top of bank (TOB) is shown on the plan. A site visit was carried out on December 14, 2020 and photographs taken during the site visit are shown in Appendix C.

The west facing slope was 8m to 11m high and the slope inclination was generally between 2.5H:1V at the south side, and 5H:1V at the north side. The slope backs onto a pond, and a small creek at the north side.

The slope is densely vegetated with mature and younger trees on the north and south sides. The middle part of the slope is mainly sodded. The trees on the slope are generally vertical, indicating that the slope has been generally stable.

6.2 Toe Erosion Allowance

Based on the MNR Technical Guide (2002), the location of the long term stable top of slope is determined by the toe erosion allowance and the stable slope allowance. A toe erosion allowance is required where the toe of the slope is within 15 m from a waterway, and the allowance is to be based on Table 2 of the Guide.

The waterway at the bottom of the slope is a pond and a small creek. There was no evidence of active bank erosion on both the edge of the pond and the creek bank. There was dense grass on the edge of the pond. The boreholes indicated that the native soil structure at the pond and creek is likely to be very dense sand. Based on Table 2 of the Technical Guide the toe erosion allowance is 1m.

6.3 Stable Slope Allowance

The stable top of slope was determined using geotechnical slope stability analyses. To carry out the analyses, geological profiles were developed along the three section lines, Section A, Section B and Section C, as shown in Drawing No. 7. The Borehole

Logs indicated that the slope geology is comprised of a thin surficial layer of disturbed soil, underlain by compact to dense silty sand deposit, then dense to very dense sand deposit. It is assumed that the very dense sand deposit extends to below the bottom of the slope and under the pond, the creek bed and the floodplain below.

The soil parameters were based previous experience on similar materials. The soil parameters used in the analyses are shown on the upper left corner of the slope sections. It is noted that these soil parameters are consistent with or on the conservative side of the parameters given in Tables 2.4 to 2.6 of the Geotechnical Principles of Stable Slopes (MNR, November 2007). The groundwater table was assumed to be at elevation 285m below the top of the slope, and rises up slightly under the tableland.

The analyses were carried out using the commercial slope program Slope/W by Geo Studio 2020. This limit equilibrium slope stability analysis program calculates the Factor of Safety (FOS) against circular failure of different slope configurations using the assessed soil and groundwater parameters. The FOS is the factor by which the soil strength must be reduced in order to bring the slope into a state of limit equilibrium (or imminent failure) along a given slip surface. Bishop's Modified Method was used in the analysis. LSRCA requires an FOS of at least 1.5 for stable slopes.

The results of the analyses are shown in Figure Nos. 3 to 6. Figure Nos. 3, 4 and 5 show that the slip circle extending from the top of the slope has a minimum FOS of 2.1. The analyses show that the existing slope is stable and the existing top of slope is also the Stable Top of Slope. Figure No. 6 shows the effect of the house surcharge on the slope stability and that the slip circle extending to the house has an FOS of at least 3.9.

6.4 Long Term Stable Top of Slope

The long term stable top of slope is determined by adding the toe erosion allowance of 1m landward of the stable top of slope. The Long Term Stable Top of Slope Line (LTSTS Line) is shown on the site plan in Figure 8.

6.5 Erosion and Construction Control

The vegetation aids in improving slope stability against shallow failures by increasing the effective cohesion within the surficial soils. The vegetation on the

slope should, therefore, be maintained. To minimize slope surface erosion, run-off should be diverted away from the slope.

During construction, all heavy equipment, construction materials and soil stockpiles should be located away from the slope. The disturbed ground surface from the construction works should be protected from erosion with sodding or hardscaping, or similar means, as soon as possible after construction.

7.0 GENERAL STATEMENT OF LIMITATION

The comments and recommendations presented in this report are based on the subsoil and ground water conditions encountered at the borehole locations indicated in the borehole location plan, and are intended for the guidance of the design engineer. Although we consider this report to be representative of the subsurface conditions at the subject property, the soil and the ground water conditions between and beyond the borehole locations may differ from those encountered at the time of our investigation and may become apparent during construction. Any contractor bidding on, or undertaking the works, should decide on their own investigation and interpretations of the groundwater and the soil conditions between the borehole locations.

Any use and / or the interpretation of the data presented in this report, and any decisions made on it by the third party are responsibility of the third parties. The responsibility of ***Toronto Inspection Ltd.*** is limited to the accurate interpretation of the soil and ground water conditions prevailing in the locations investigated and accepts no responsibility for the loss of time and damages, if any, suffered by the third party as a result of decisions or actions based on this report.

Any legal actions arising directly or indirectly from this work and/or ***Toronto Inspection Ltd.'s*** performance of the services shall be filed no longer than two years from the date of ***Toronto Inspection Ltd.'s*** substantial completion of the services. ***Toronto Inspection Ltd.*** shall not be responsible to the client for lost revenues, loss of profits, cost of content, claims of customers, or other special indirect, consequential or punitive damages.

To the fullest extent permitted by law, the client's maximum aggregate recovery against ***Toronto Inspection Ltd.***, its directors, employees, sub-contractors and representatives, for any and all claims by clients for all causes including, but not limited to, claims of breach of contract, breach of warranty and /or negligence, shall be the amount of the fee paid to ***Toronto Inspection Ltd.*** for its professional services rendered under the agreement with respect to the particular site which is the subject of the claim by the client.

Yours very truly,
TORONTO INSPECTION LTD.

Rene Quiambao, P.Eng.
Senior Engineer

Toronto Inspection Ltd.

Drawings

Borehole Location Plan
Borehole Logs
Location of Cross Sections
Long Term Stable Top of Slope

Source: Durham Region Interactive Map

LEGEND:

Borehole and Monitoring Well Location

Site Boundary

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TITLE:	Borehole and Monitoring Well Location Plan		
LOCATION:	150 Cemetery Road, Uxbridge, Ontario		
PROJECT NO. 5431W-20-GA	DATE : December 2020	DRAWING NO : 1	

Project No. 5431W-20-GA

Log of Borehole 20BH-1 (MW)

Dwg No. 2

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 150 Cemetery Road, Uxbridge, Ontario

Date Drilled: 12/1/20

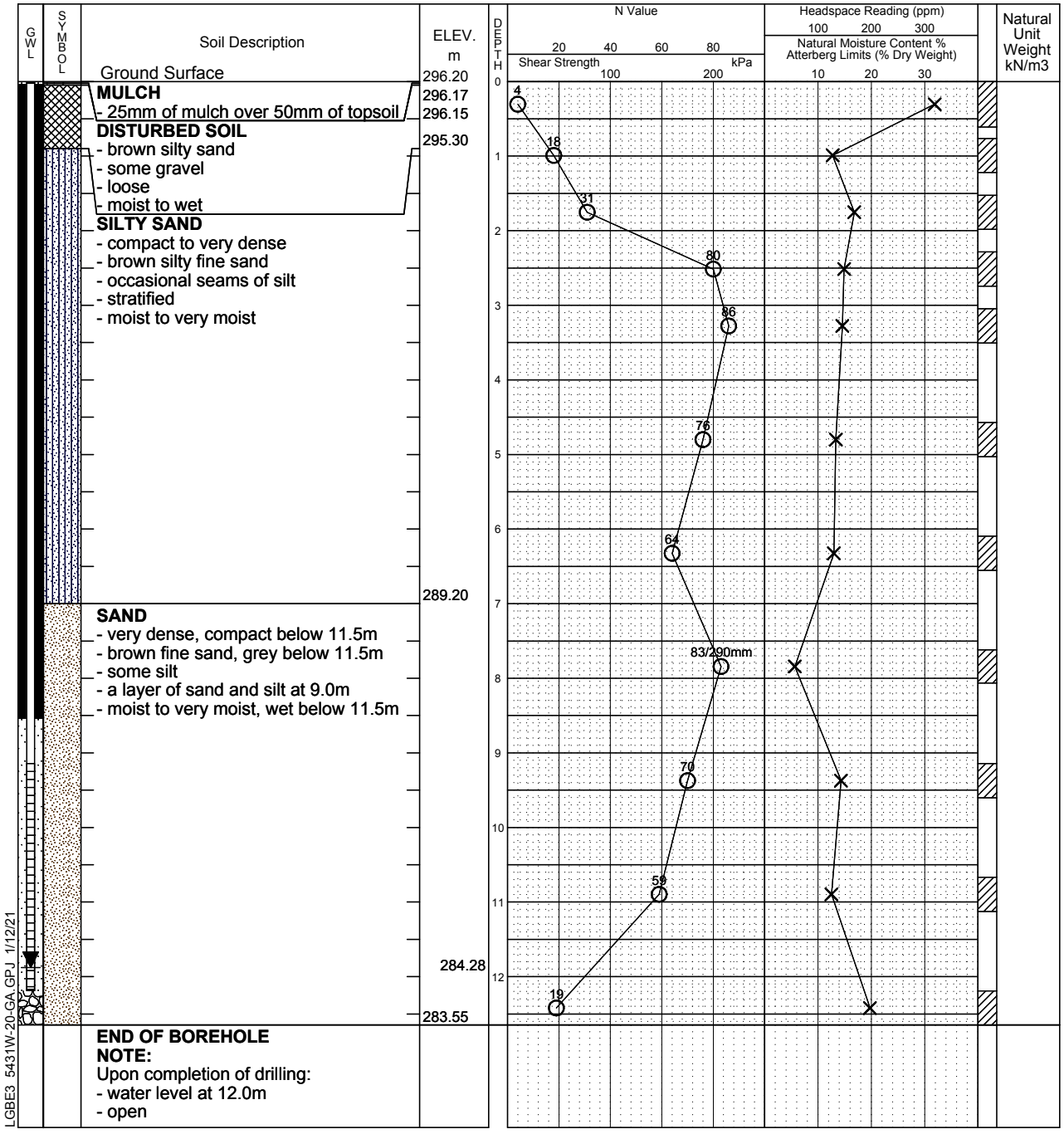
Drill Type: Truck Mounted Drill Rig

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Headspace Reading (ppm)
Natural Moisture
Plastic and Liquid Limit
Unconfined Compression % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
		Ground Surface	296.20
		MULCH - 25mm of mulch over 50mm of topsoil	296.17 296.15
		DISTURBED SOIL - brown silty sand - some gravel - loose - moist to wet	295.30
		SILTY SAND - compact to very dense - brown silty fine sand - occasional seams of silt - stratified - moist to very moist	
			289.20
		SAND - very dense, compact below 11.5m - brown fine sand, grey below 11.5m - some silt - a layer of sand and silt at 9.0m - moist to very moist, wet below 11.5m	
			284.28
			283.55
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 12.0m - open	



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NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
December 7, 2020	11.92m	

Project No. 5431W-20-GA

Log of Borehole 20BH-2

Dwg No. 3

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 150 Cemetery Road, Uxbridge, Ontario

Date Drilled: 12/1/20

Drill Type: Truck Mounted Drill Rig

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Headspace Reading (ppm)
Natural Moisture
Plastic and Liquid Limit
Unconfined Compression
% Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		Ground Surface	297.10	0
		ASPHALT PAVEMENT - 75mm of asphalt over 150mm granular base	297.03 296.95	
		DISTURBED SOIL - brown silty sand - some gravelly sand - loose - moist	296.20	1
		SILTY SAND - loose to compact at the top, very dense below 2.2m - brown silty fine sand - seams of sandy silt till at 4.5m - occasional seams of silt - moist to very moist		2 3 4 5 6 7 8
			288.40	
		SAND - dense to very dense - brown fine sand - some silt - moist to very moist		9 10 11 12
			284.45	
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - borehole open and dry		

N Value: 20 40 60 80
Shear Strength: 100 200 kPa

Headspace Reading (ppm): 100 200 300
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30

Natural Unit Weight kN/m3

N Value: 5, 9, 14, 57, 60, 56, 57, 52, 66, 57, 48

LGBE3 5431W-20-GA.GPJ 1/12/21

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

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

Project No. 5431W-20-GA

Log of Borehole 20BH-3 (MW)

Dwg No. 4

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 150 Cemetery Road, Uxbridge, Ontario

Date Drilled: 12/4/20

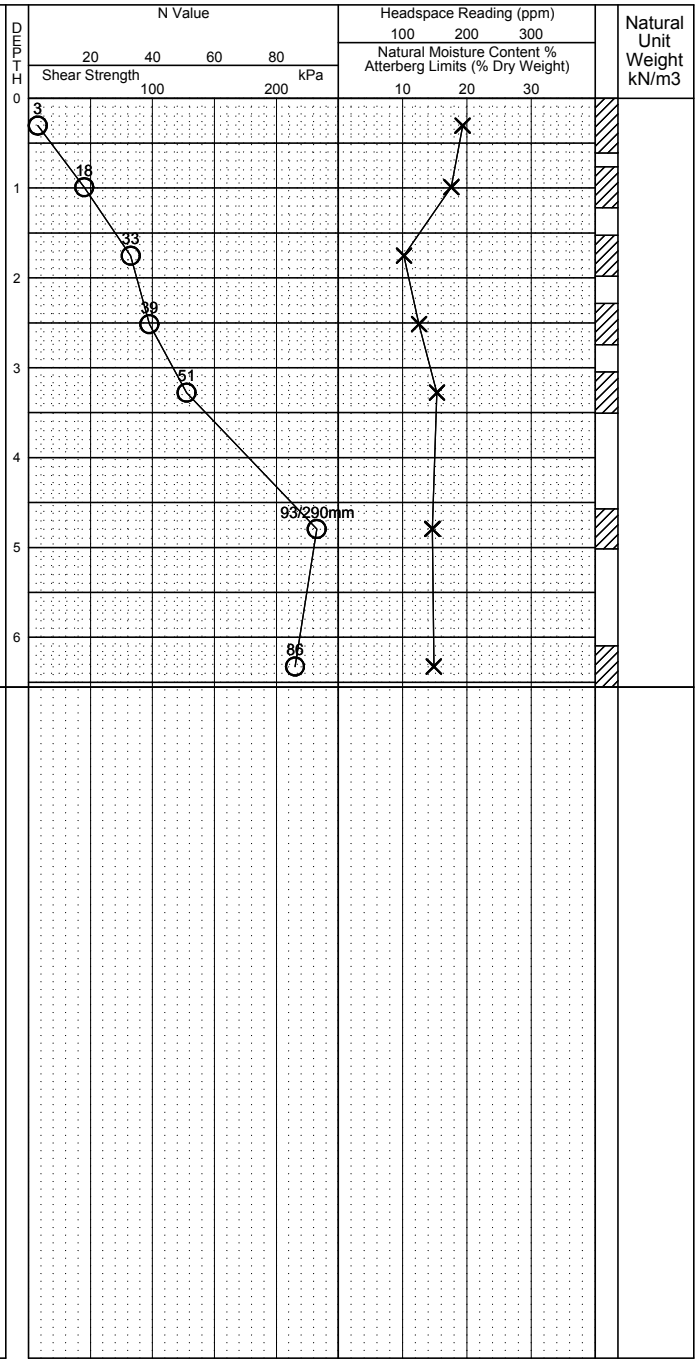
Drill Type: Truck Mounted Drill Rig

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test

Headspace Reading (ppm)
Natural Moisture
Plastic and Liquid Limit
Unconfined Compression % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
		Ground Surface	295.95
		TOPSOIL - 150mm in thickness	295.80
		DISTURBED SOIL - brown fine sand - trace topsoil, rootlets - very loose - very moist	295.05
		SANDY SILT - compact to very dense - brown - some seams of sand - moist to very moist	
			289.40
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - borehole open and dry	



Natural Unit Weight kN/m3

LGBE3 5431W-20-GA.GPJ 1/12/21

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
December 7, 2020	Dry	

Project No. 5431W-20-GA

Log of Borehole 20BH-4 (MW)

Dwg No. 5

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 150 Cemetery Road, Uxbridge, Ontario

Date Drilled: 12/4/20

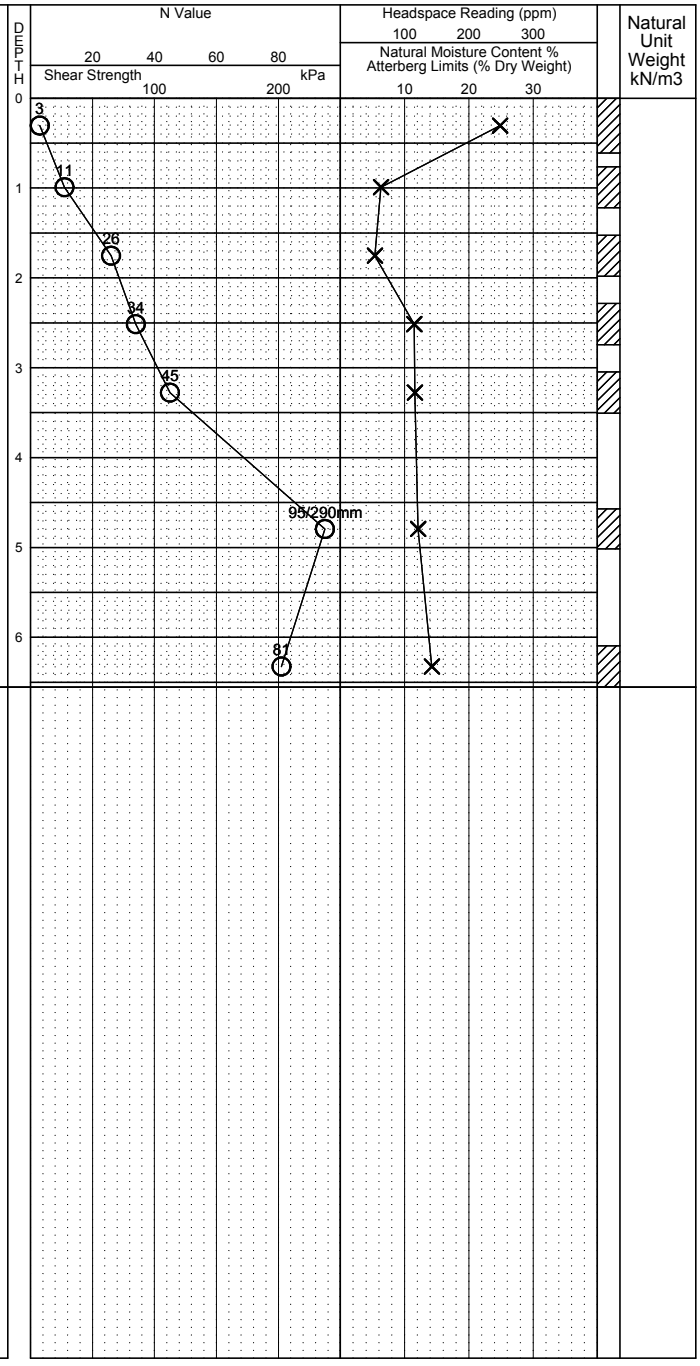
Drill Type: Truck Mounted Drill Rig

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Headspace Reading (ppm)
Natural Moisture
Plastic and Liquid Limit
Unconfined Compression
% Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m
		Ground Surface	299.00
		TOPSOIL - 150mm in thickness	298.85
		DISTURBED SOIL - brown to black fine sand and topsoil - trace silt - very loose - wet	298.10
		SAND - compact to dense - brown fine sand - moist	296.10
		SANDY SILT TILL - dense to very dense, brown - trace to some gravel - some seams of fine sand - trace clayey silt - moist	293.50
		SILTY SAND - very dense - brown silty fine sand - very moist	292.45
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - borehole open and dry	



Natural Unit Weight kN/m3

LGBE3 5431W-20-GA.GPJ 1/12/21

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
December 7, 2020	Dry	

Project No. 5431W-20-GA

Log of Borehole 20BH-5 (MW)

Dwg No. 6

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 150 Cemetery Road, Uxbridge, Ontario

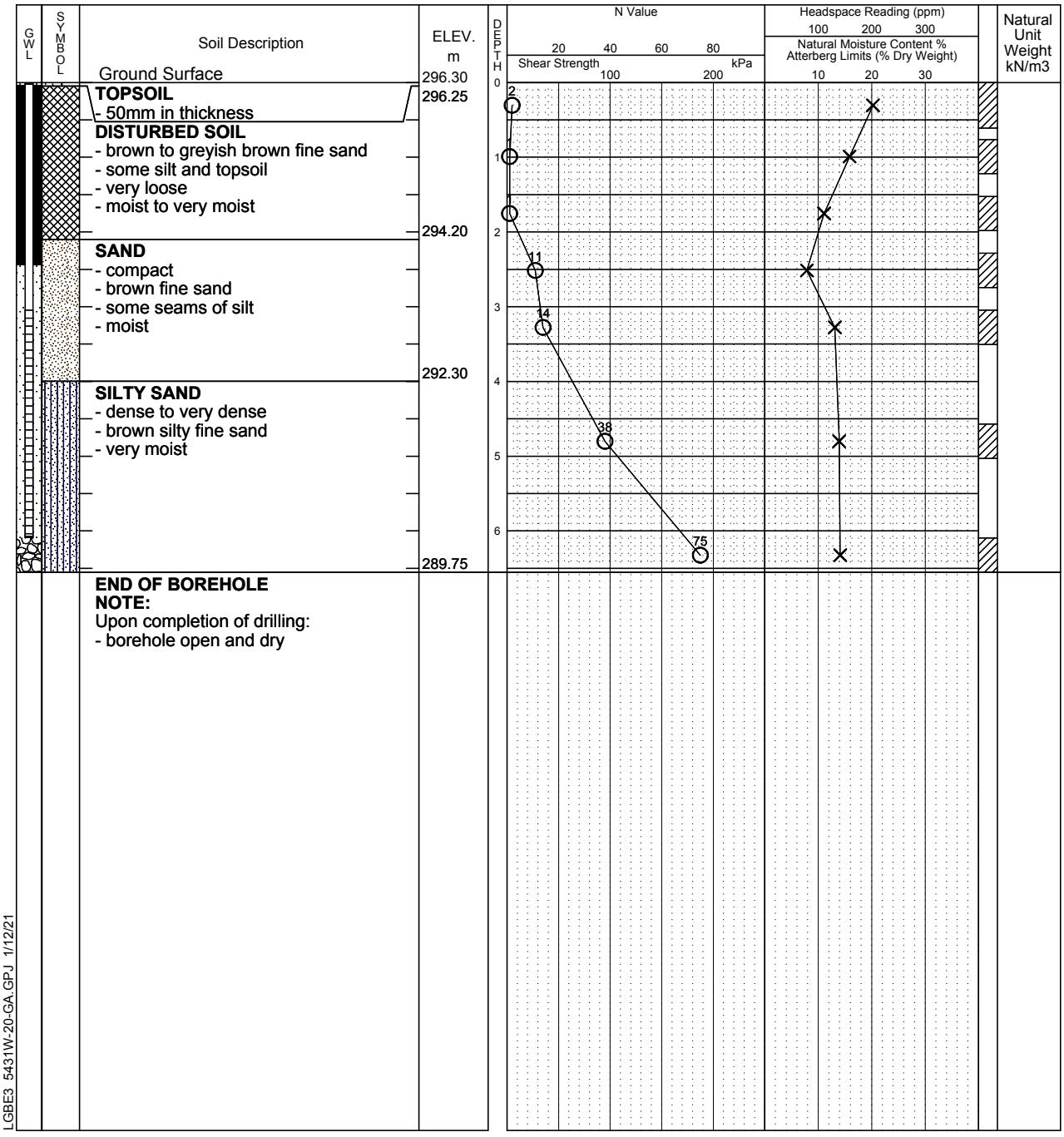
Date Drilled: 12/4/20

Drill Type: Truck Mounted Drill Rig

Datum: Geodetic

Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Field Vane Test (S)

Headspace Reading (ppm)
Natural Moisture
Plastic and Liquid Limit
Unconfined Compression % Strain at Failure
Penetrometer

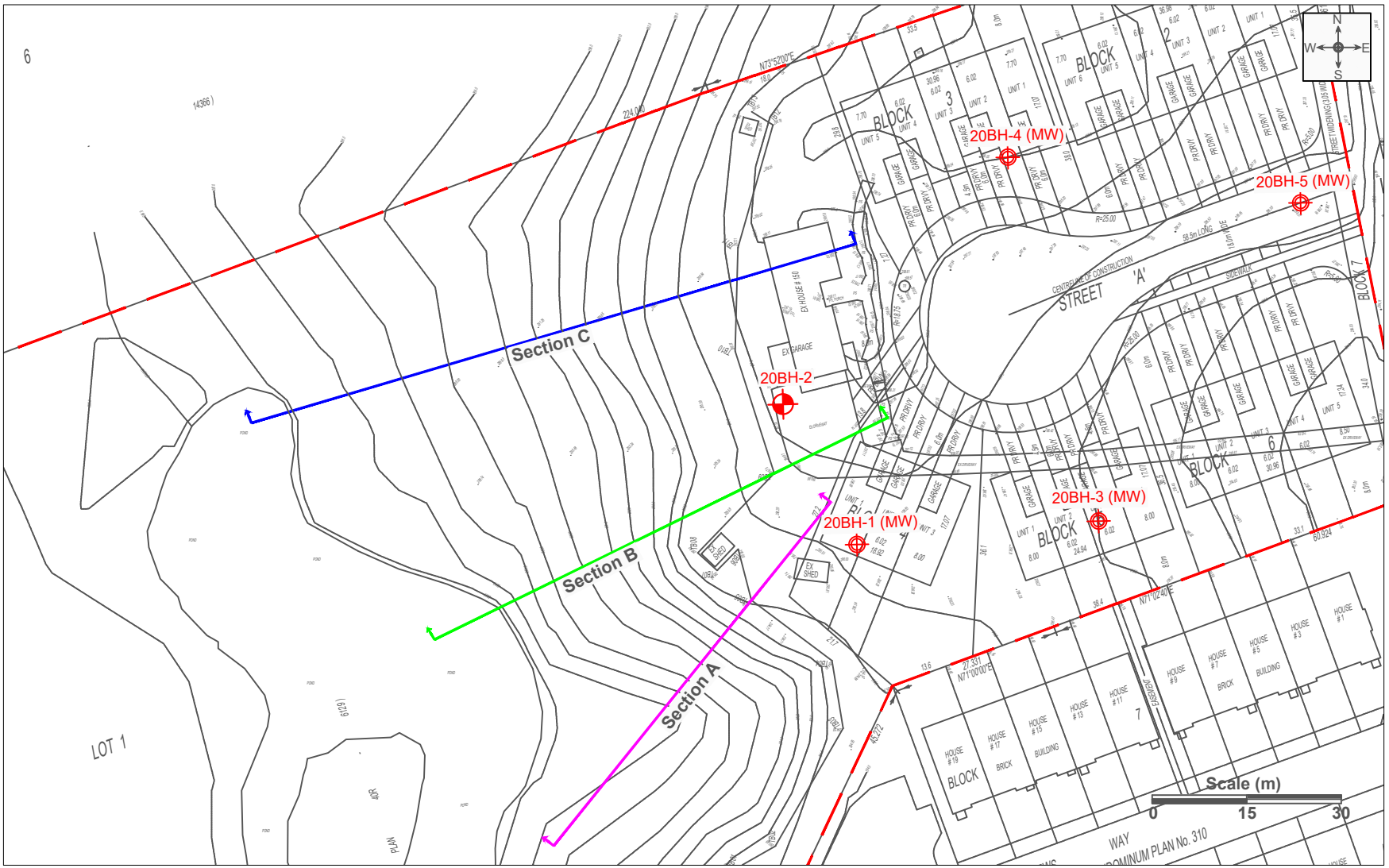


LGBE3 5431W-20-GA.GPJ 1/12/21

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)
December 7, 2020	Dry	



LEGEND:

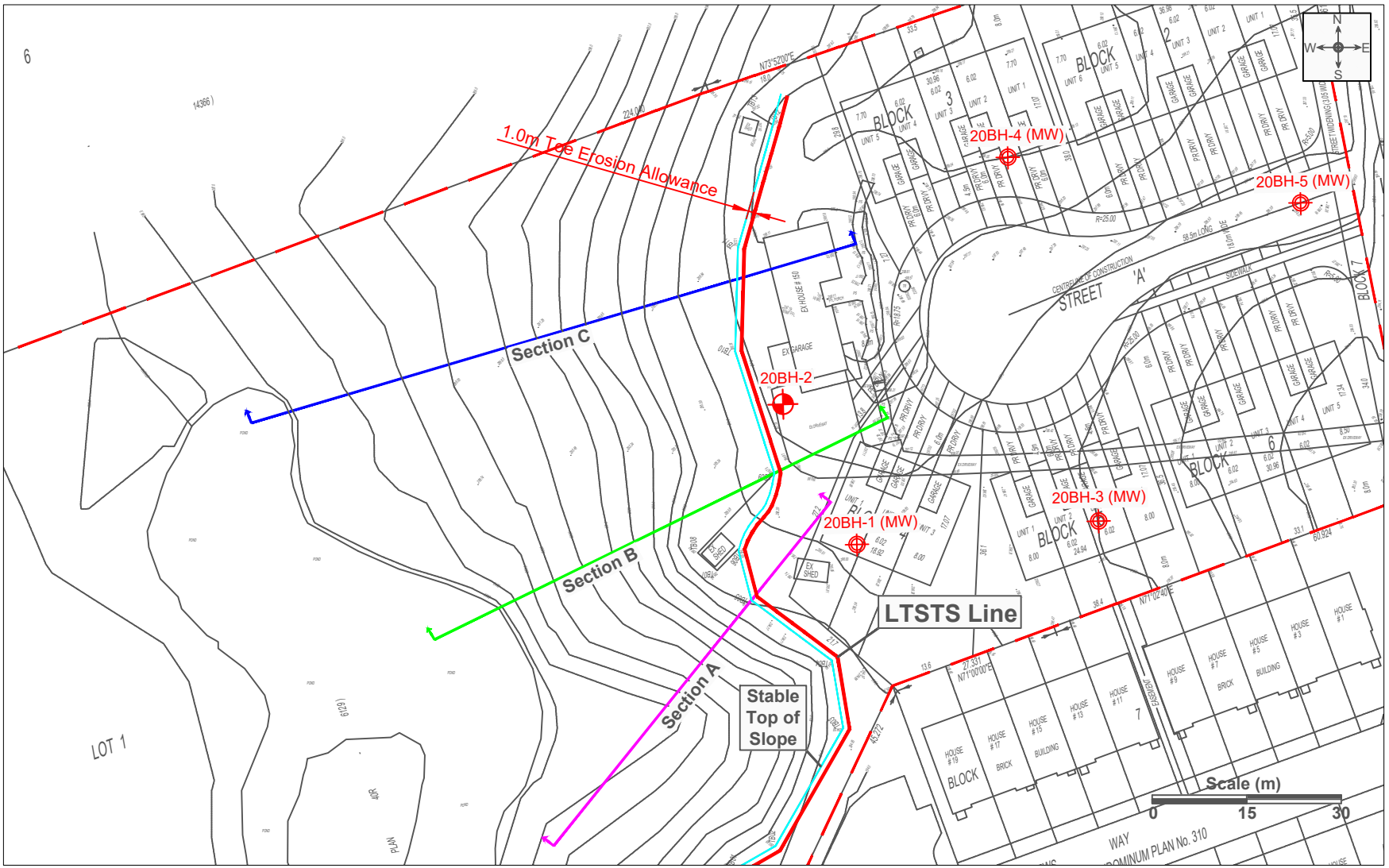
Borehole and Monitoring Well Location — Site Boundary

TorontoInspection LTD
GEO-ENVIRONMENTAL CONSULTANTS

110 Konrad Crescent,
Unit 16
Markham, Ontario
L3R 9X2

Tel: 905-940 8509 Fax: 905-940 8192 Email : TIL@torontoinspection.com

TITLE:	Section Lines for Slope Assessment
LOCATION:	150 Cemetery Road, Uxbridge, Ontario
PROJECT NO.	5431W-20-GA
DATE :	December 2020
DRAWING NO :	7



LEGEND:

Borehole and Monitoring Well Location

Site Boundary

TorontoInspection LTD
GEO-ENVIRONMENTAL CONSULTANTS

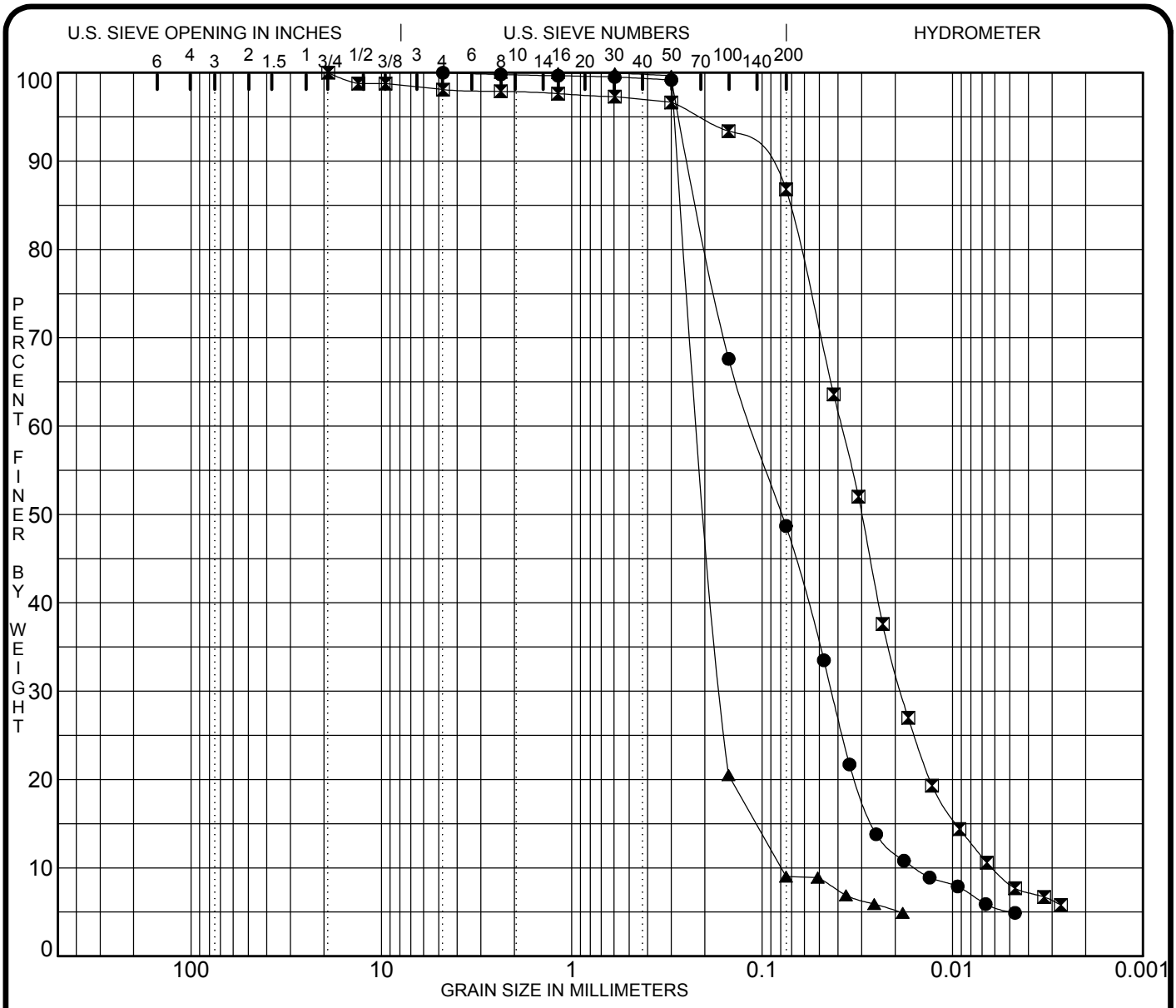
110 Konrad Crescent,
Unit 16
Markham, Ontario
L3R 9X2

Tel: 905-940 8509 Fax: 905-940 8192 Email : TIL@torontoinspection.com

TITLE:	Long Term Stable Top of Slope
LOCATION:	150 Cemetery Road, Uxbridge, Ontario
PROJECT NO.	5431W-20-GA
DATE :	January 2021
DRAWING NO :	8

Figures

Grain Size Distribution
Backfill & Drainage System
for Open Cut Excavation
Slope Stability Analysis



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	MC%	LL	PL	PI	Cc	Cu
●	**20BH-1 (MW) 9.1**						**1.04**	**7.2**
⊠	**20BH-3 (MW) 1.5**						**1.48**	**6.2**
▲	**20BH-5 (MW) 2.3**						**1.57**	**2.7**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**20BH-1 (MW) 9.1**	**4.75**	**0.11**	**0.043**	**0.0158**	**0.0**	**51.3**	**43.6**	**5.1**
⊠	**20BH-3 (MW) 1.5**	**19.00**	**0.04**	**0.019**	**0.0062**	**1.9**	**11.3**	**78.6**	**8.2**
▲	**20BH-5 (MW) 2.3**	**2.36**	**0.21**	**0.163**	**0.0796**	**0.0**	**91.0**	**9.0**	

PROJECT **Geotechnical Investigation - 150 Cemetery Road, Uxbridge, Ontario**

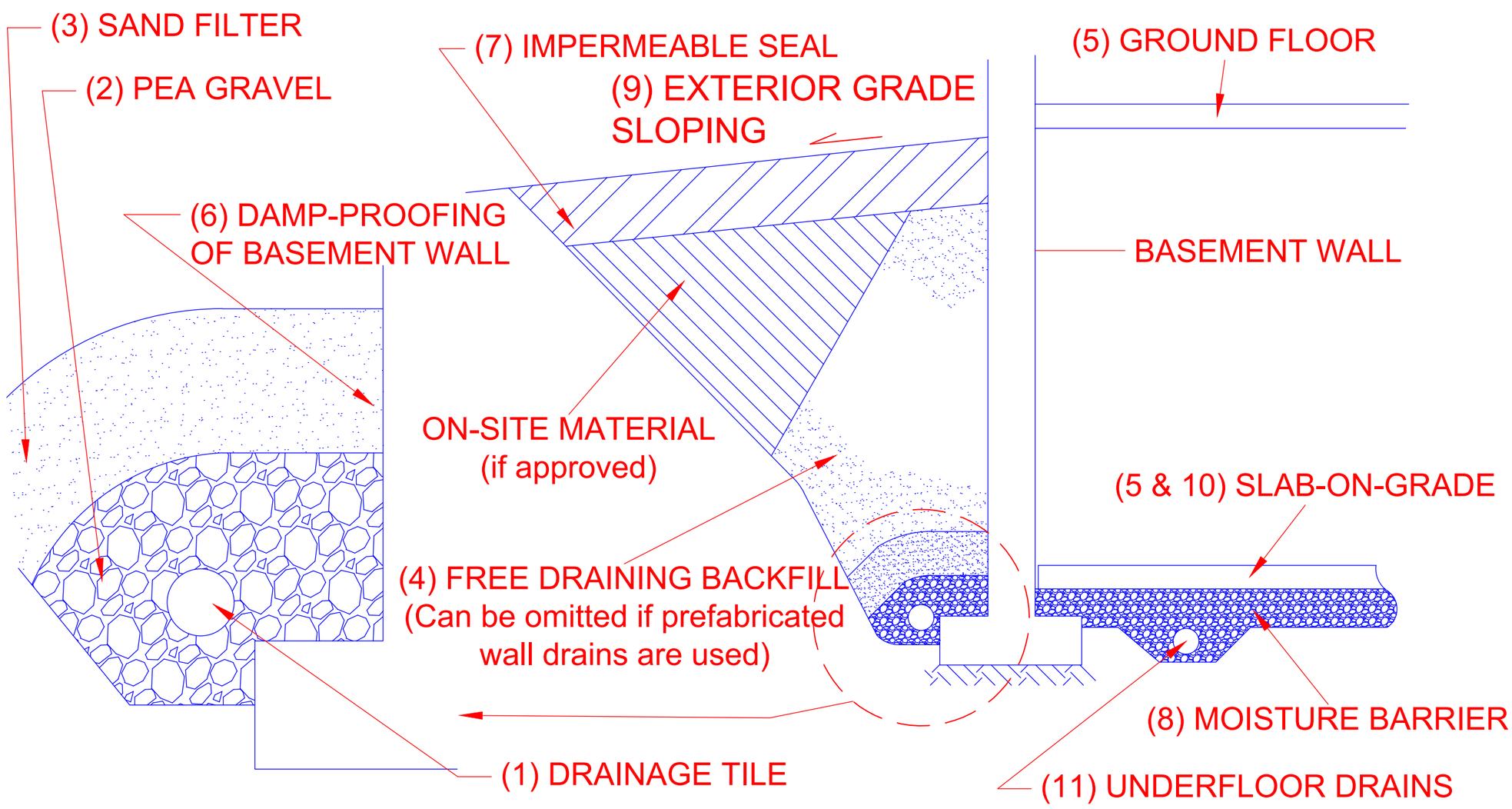
JOB NO. **5431W-20-GA**

DATE **1/5/21**

GRADATION CURVES

Toronto Inspection Ltd.

FIGURE NO.1



Notes:

1. **Drainage tile**: consist of 100mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. invert to be at minimum of 150mm (6") below underside of basement floor level.
2. **Pea gravel**: at 150mm (6") on the top and sides of drain. If drain is not placed on footing, provide 100mm (4") of pea gravel below drain. The pea gravel may be replaced by 20mm clear stone provided that the drain is covered by a porous geotextile membrane of Terrafix 270 R or equivalent.
3. **Filter material**: consists of C.S.A. fine concrete aggregate. A minimum of 300mm (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 93 to 95% (maximum) Standard Proctor Density. Do not ocmpact closer than 1.8m (6ft.) from wall with heavy equipment. This may be replaced by on site material if prefabicated 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. **Damp-proofing** of the basement wall is requred 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**: consists of 20mm clear stone or compacted OPSS Granular A, or equivalent. The thickness of this layer to be 150mm (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 6-8m (20-25 ft.) centre, on 100mm (4") of pea gravel with 150mm (6") of pea gravel on top and sides. The invert should be at least 300mm (12") below the underside of the floor slab. The drains should be connected to positive sumps or outlets. Do not connect the underfloor drains to the perimeter drains.

* Underfloor drains can be deleted where not required.

NOT TO SCALE

110 Konrad Crescent, Unit 13, Markham, Ontario L3R 9X2
Tel: 905 604-4911 Fax: 905 940-8192

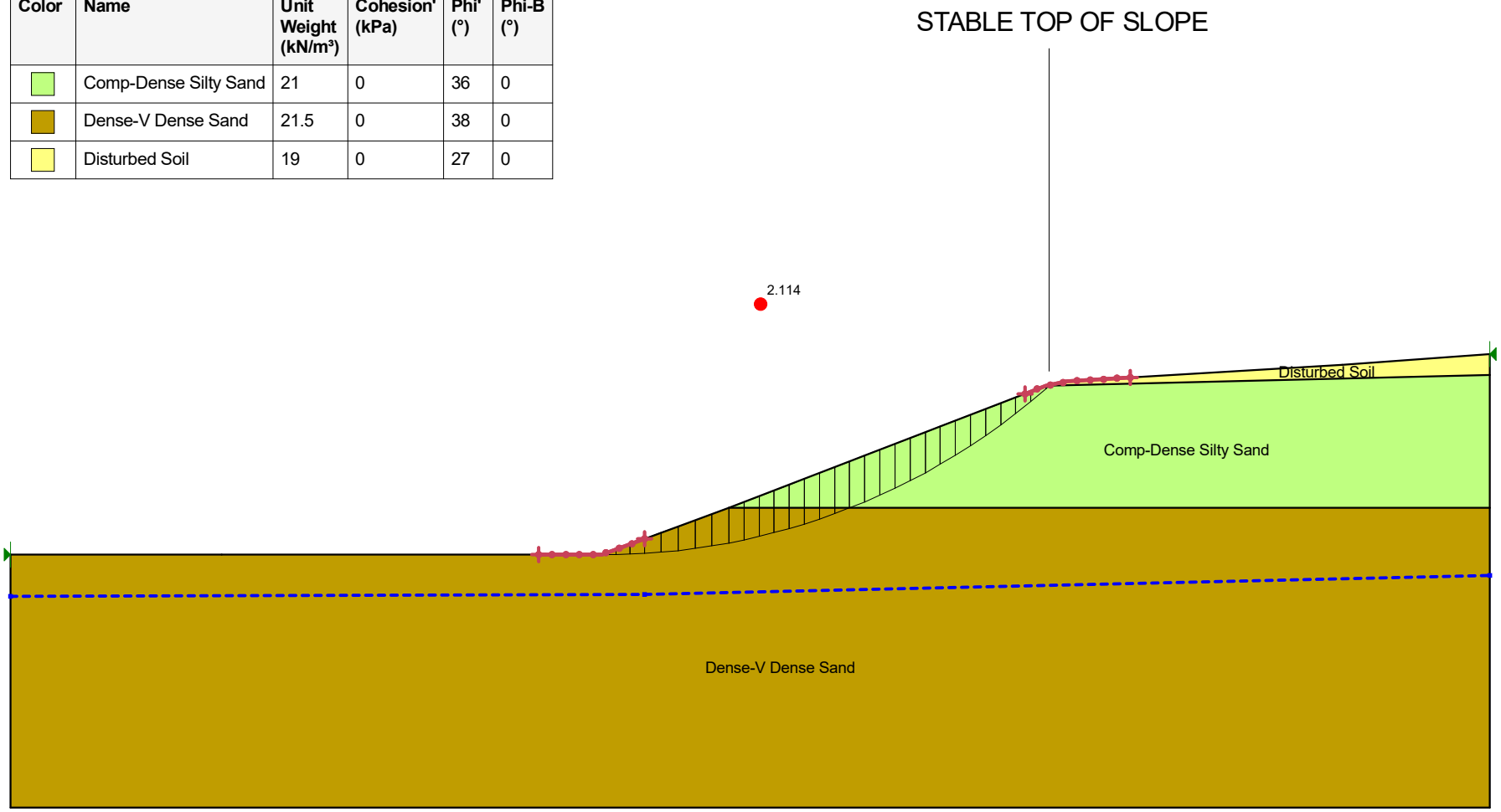
TITLE:

Details of Perimeter Subdrain and Basement Backfill

FIGURE NO.

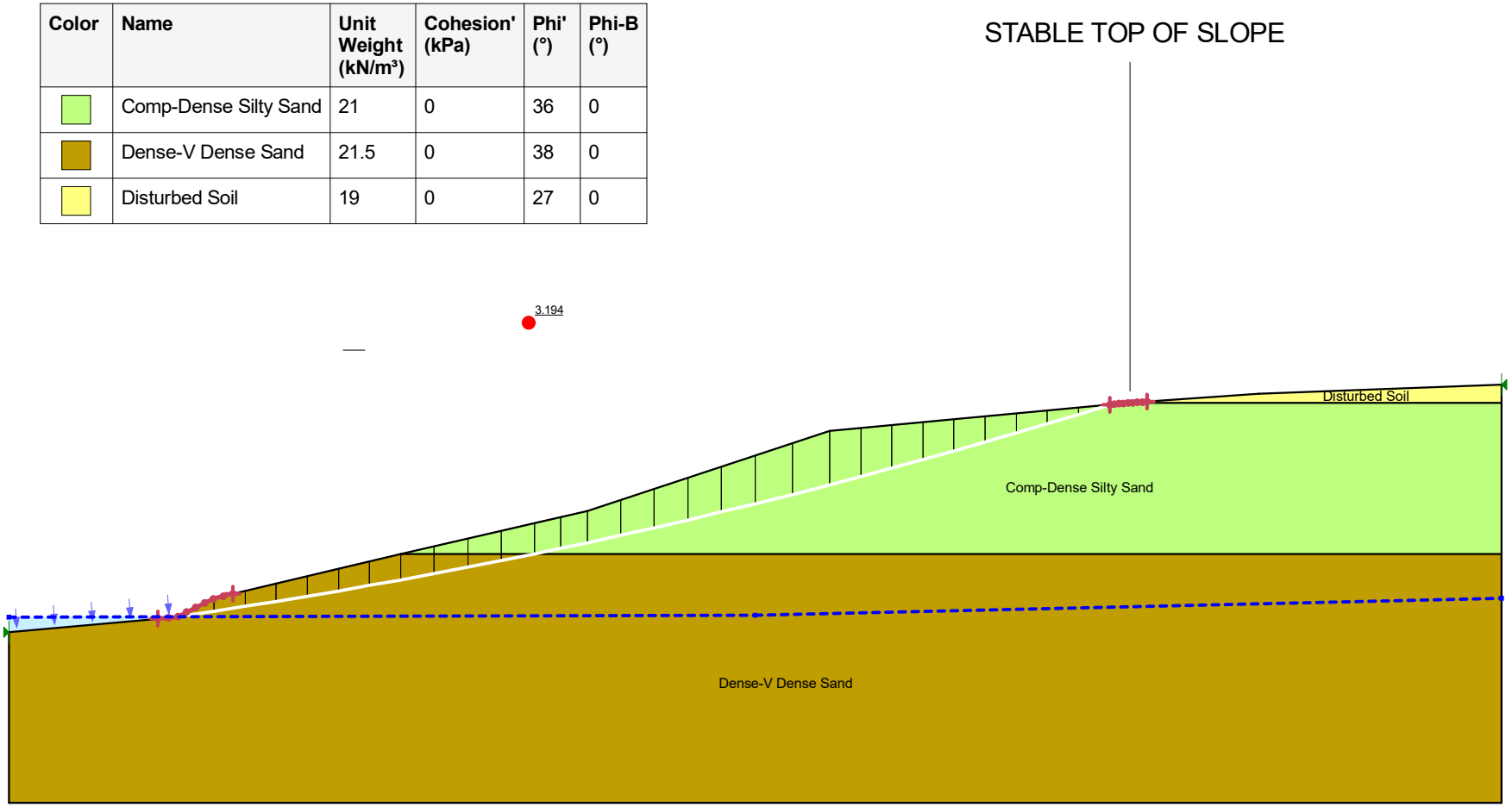
2

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)
	Comp-Dense Silty Sand	21	0	36	0
	Dense-V Dense Sand	21.5	0	38	0
	Disturbed Soil	19	0	27	0



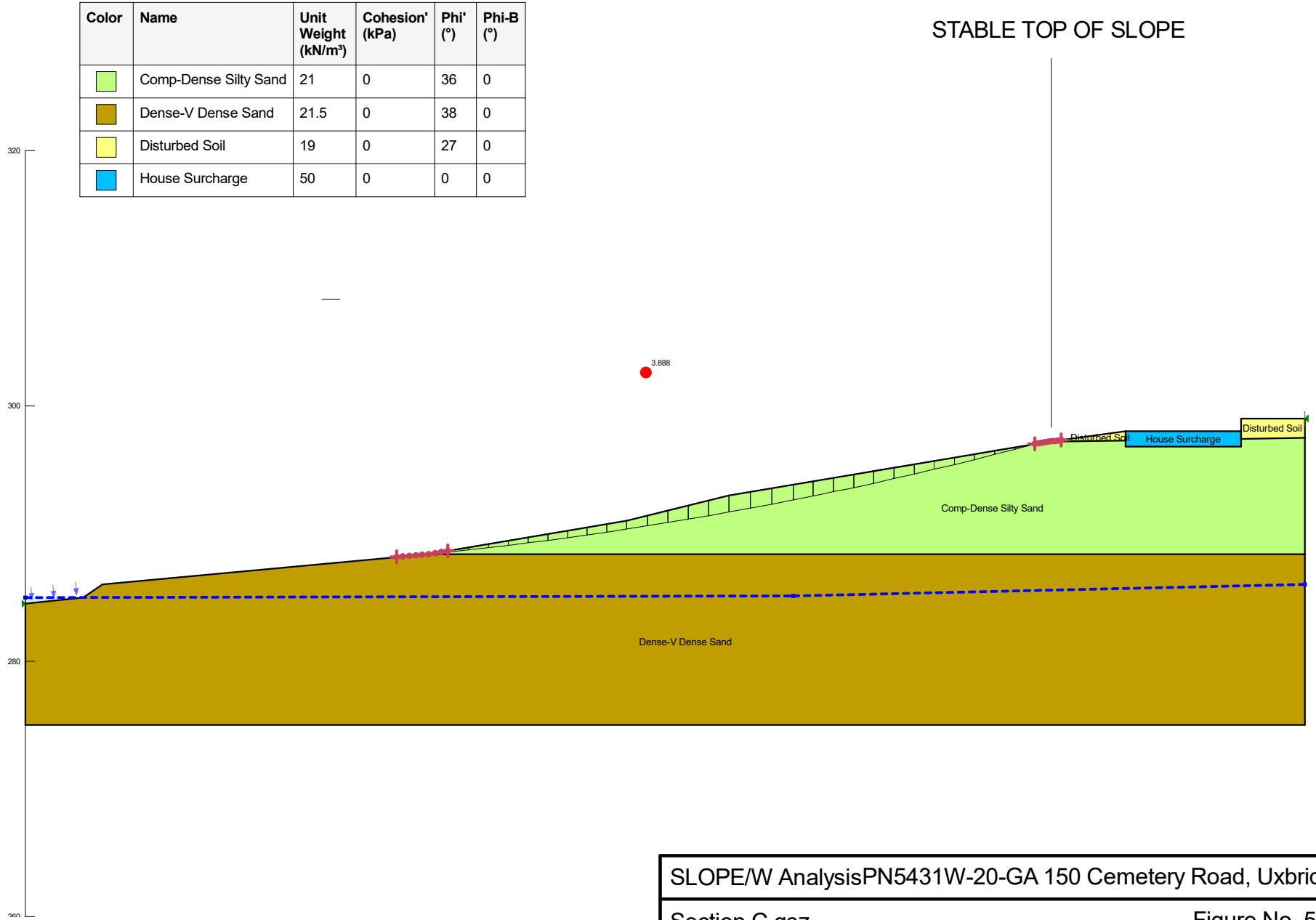
SLOPE/W Analysis PN5431W-20-GA 150 Cemetery Road, Uxbridge	
Section A.gsz	Figure No. 3
2021-01-06	1:300

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)
	Comp-Dense Silty Sand	21	0	36	0
	Dense-V Dense Sand	21.5	0	38	0
	Disturbed Soil	19	0	27	0



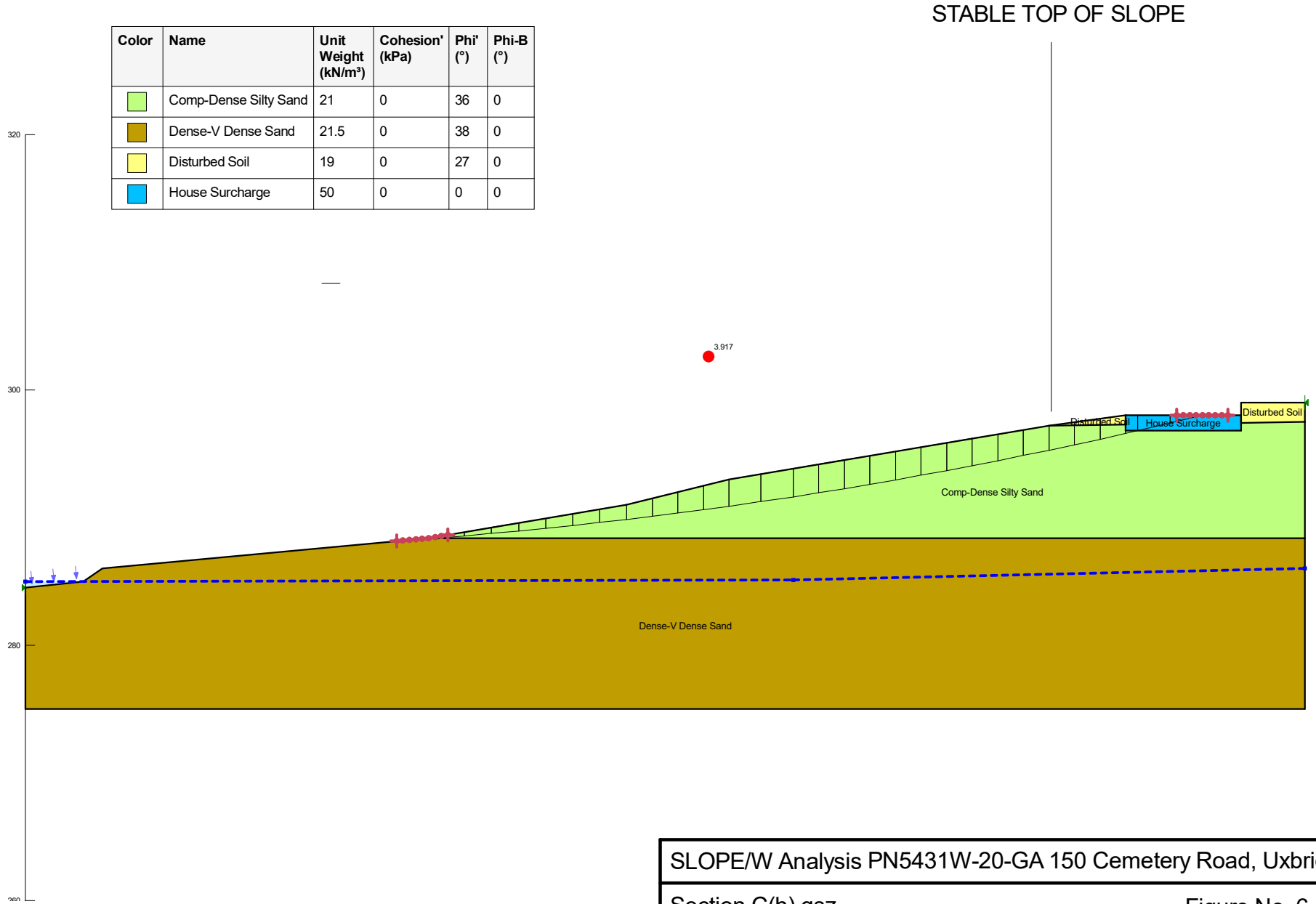
SLOPE/W Analysis PN5431W-20-GA 150 Cemetery Road, Uxbridge	
Section B.gsz	Figure No. 4
2021-01-06	1:350

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)
	Comp-Dense Silty Sand	21	0	36	0
	Dense-V Dense Sand	21.5	0	38	0
	Disturbed Soil	19	0	27	0
	House Surcharge	50	0	0	0



SLOPE/W AnalysisPN5431W-20-GA 150 Cemetery Road, Uxbridge	
Section C.gsz	Figure No. 5
2021-01-06	1:430

Color	Name	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Phi-B (°)
	Comp-Dense Silty Sand	21	0	36	0
	Dense-V Dense Sand	21.5	0	38	0
	Disturbed Soil	19	0	27	0
	House Surcharge	50	0	0	0



SLOPE/W Analysis PN5431W-20-GA 150 Cemetery Road, Uxbridge

Section C(h).gsz — Figure No. 6

2021-01-06 — 1:430

Toronto Inspection Ltd.

Appendices

Guidelines for Engineered Fill
Topographic Survey
Site Photographs

GUIDELINES FOR ENGINEERED FILL

The information presented in this guideline is intended for general guidance only. Site specific and prevailing weather conditions may require modification of the material(s) to be used and the compaction standards or procedures changed. The site preparation and the material(s) to be used must be discussed and procedures agreed with ***Toronto Inspection Ltd.*** prior to the start of the earthworks and must be subjected to on going review during construction.

For fill to be classified as engineered fill, suitable for supporting structural loads, a number of conditions must be satisfied, including but not necessarily limited to the following:

1. Areal Extent

The engineered fill must extend beyond the envelope of the structure to be supported. The minimum extent should be 2.0m beyond the envelope in all directions at the foundation level, including the loading dock pad and the front sidewalk, and sloping downwards to the sub-grade at 45°. Once the envelope is set, the structure cannot be moved out of the envelope without consultation with ***Toronto Inspection Ltd.*** Similarly, no excavation should encroach on the engineered fill envelope without consultation with ***Toronto Inspection Ltd.***

2. Survey Control

Accurate survey control is essential to the success of an engineered fill project. The boundaries of the engineered fill must be laid out by a surveyor. During construction. it is necessary to have qualified surveyors providing control stations on the three-dimensional extent of the engineered fill.

3. Subsurface Preparation

Prior to placement of the engineered fill, the sub-grade must be prepared to the satisfaction of ***Toronto Inspection Ltd.*** All deleterious material must be removed and in some cases excavation of native mineral soils may also be required. Particular attention must be paid to wet sub-grade and possible additional measures required to achieve sufficient compaction. Where fill is placed against a slope, benching will be necessary and natural drainage paths must not be blocked.

4. Suitable Fill Material

All material to be used as fill must be approved by ***Toronto Inspection Ltd.*** Such approval will be influenced by weather factors. External sources of fill material must be sampled, tested and approved prior to material being hauled to the job site.

5. Trial Test Section

In advance of the construction of the engineered fill pad, the contractor should conduct a trial test section. The compaction criterion will be assessed for the backfill material to be used, using specified lift thicknesses and number of passes for the compaction equipment proposed by the contractor. To achieve a uniform degree of compaction of each layer, the lift thickness of loose

material, prior to start of compaction, must not exceed 200mm (8 inches). Additional trial test section(s) may be required throughout the course of the project to reflect changes in material sources, the moisture content of the material and the weather conditions.

6. Degree of Compaction

The minimum degree of compaction for the engineered fill should not be less than 100% of the Standard Proctor maximum dry density, or 95% of the Modified Proctor maximum dry density, to the level at or above 0.3m from proposed footing founding level. Each layer must be tested and approved by this office before the next layer is placed.

7. Inspection and Testing

Uniform and thorough compaction is crucial to the performance of the fill and the supported structure. Hence, all subgrade preparation, filling and compacting must be done with full time inspection and to the satisfaction of ***Toronto Inspection Ltd.*** All founding surfaces must be inspected and approved by ***Toronto Inspection Ltd.*** prior to placement of concrete.

8. Protection of Fill

Fills are generally more susceptible to the effects of weather than are natural soils. Fill placed and approved to the level at which structural support is required must be protected from excessive wetting, drying, erosion or freezing. Where inadequate protection had been provided, it may be necessary to provide deeper founding level for footings or to strip and re-compact some of the filled layers.

9. Limitations

The engineered fill is subjected to the following limitations:

i. Proper drainage must be maintained at all times within the engineered fill pad.
ii. If the engineered fill is left in place during the winter months, adequate protection must be provided against frost penetration to the proposed footing depths.
iii. If the engineered fill depth exceeds 5m below the foundation depth, the construction of the foundations might have to be delayed for a period of 1 year after placement, depending on the type of fill material used.
iv. Strip footings and foundation walls founded on engineered fill must be reinforced continuously with a minimum of two 15mm steel bars with at least 1m of overlap.

KEY PLAN SCALE : NOT TO SCALE

DRAFT PLAN OF SUBDIVISION

OF PART OF LOT 27, CONCESSION 6,
GEOGRAPHIC TOWNSHIP OF UXBRIDGE,
NOW IN THE,

TOWNSHIP OF UXBRIDGE

REGIONAL MUNICIPALITY OF DURHAM
SCALE - 1 : 500 METRES

DISTANCES & COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

LAND USE SCHEDULE.

LOT 1 (SINGLE-FAMILY DWELLING HOUSE) (R2-_.)	**3.5502± Ha.**
- LOT 1 - LOT FRONTAGE = 15.00m (15.0 MIN)	
BLOCK 2 (ROW DWELLING HOUSE) (RM-_.)	**0.1626± Ha.**
- UNIT 1 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 2 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 3 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 4 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 5 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 6 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
BLOCK 3 (ROW DWELLING HOUSE) (RM-_.)	**0.1100± Ha.**
- UNIT 1 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 2 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 3 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 4 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 5 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
BLOCK 4 (ROW DWELLING HOUSE) (RM-_.)	**0.1008± Ha.**
- UNIT 1 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 2 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 3 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
BLOCK 5 (ROW DWELLING HOUSE) (RM-_.)	**0.1023± Ha.**
- UNIT 1 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 2 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 3 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 4 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
BLOCK 6 (ROW DWELLING HOUSE) (RM-_.)	**0.1403± Ha.**
- UNIT 1 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 2 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 3 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 4 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
- UNIT 5 - LOT FRONTAGE = 0.0m (0.0 MIN) - LOT AREA = 000 SQ.M. (000 SQ.M. MIN)	
BLOCK 7 (STREET WIDENING)	**0.0296± Ha.**
STREET 'A' - 58.5m LONG	**0.1810± Ha.**
TOTAL	**4.3768± Ha.**

INFORMATION REQUIRED AS REQUIRED UNDER SECTION 51(2) OF THE PLANNING ACT R.S.O. 1990 CHAP. P. 13.

A. AS SHOWN
B. AS SHOWN
C. AS SHOWN
D. AS SHOWN ON THE SCHEDULE OF LAND USE
E. AS SHOWN
F. AS SHOWN
G. AS SHOWN
H. MUNICIPAL WATER
I. SANDY TILL
J. AS SHOWN
K. MUNICIPAL SANITARY AND STORM SEWERS
L. AS SHOWN

SURVEYOR'S CERTIFICATE.

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

JUNE 24, 2020 — DATE

RALPH F. GRANDER
ONTARIO LAND SURVEYOR

OWNER'S CERTIFICATE.

I, THE REGISTERED OWNERS OF THE SUBJECT LANDS, HEREBY AUTHORIZE H. F. GRANDER Co. Ltd. TO PREPARE A DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

JUNE 24, 2020 — DATE

REGION OF DURHAM FILE: S-U-2020-_.

CADDFILE: 8052-MCP_1.DPD
PROJECT No. 8052-MCP

H. F. GRANDER Co. Ltd.
ONTARIO LAND SURVEYOR
1575 HIGHWAY 7A WEST, UNIT 2A
POST OFFICE BOX 616
PORT PERRY, ONTARIO
L9L 1A6
TEL. (905) 985-3500
FAX. (905) 985-2347

Geotechical Investigation - Site Photographs
150 Cemetery Road, Uxbridge, Ontario

P1 - View of bottom of slope at south side

P2 - View of dense trees on slope

P3 - The trees extend to top of slope on south side

P4 - Monitoring well at Borehole 20BH-1(MW)

P5 - View of slope and house at top of slope on north side

P6 - View of top of slope

Geotechical Investigation - Site Photographs
150 Cemetery Road, Uxbridge, Ontario

P7 - View of the slope below the existing house

P8 - View of the table land on the east side of the site

P9 - Edge of the pond, looking north

P10 - Edge of the pond, looking south

P11 - View of the pond, looking west

P12 - Bottom of the slope on the north side of the site