TORONTO INSPECTION LTD.
GEO-ENVIRONMENTAL CONSULTANTS

REPORT ON
GEOTECHNICAL INVESTIGATION
181 TORONTO STREET SOUTH,
UXBRIDGE, ONTARIO

REPORT NO.: 5555-21-GC
REPORT DATE: MAY 11, 2021

PREPARED FOR
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Toronto Inspection Ltd.

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1.0 INTRODUCTION

Toronto Inspection Ltd. was retained by Man Holdings Ltd. to conduct a geotechnical investigation for the proposed residential development at a property located at 181 Toronto Street South, Uxbridge, Ontario (hereinafter described as "the Site").

The purpose of the geotechnical investigation was to determine the subsoil and groundwater conditions, affecting the design and construction of the residential development, consisting of 4 semi-detached houses and related structures. In particular, geotechnical data was to be provided for:

- General founding conditions
- Foundation design bearing pressures
- Construction recommendations
- Excavation recommendations

This report is provided on the basis of the above terms of reference and on an assumption that the design of the structures 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, approximately 0.515 ha in area and near parallelogram in shape, is located on the east side of Toronto Street South, approximately 200m north of Elgin Park Drive, in Uxbridge, Ontario. The Site is currently a vacant parcel of land, covered by grass, weeds, and scattered trees. Single storey houses or condominium are located to the north, south and east of the Site.

The site gradient was fairly flat, with a slight drop towards the east and north.

3.0 INVESTIGATION PROCEDURE

The field work for the investigation was carried out on April 8 and 9, 2021, and consisted of drilling eight sampled boreholes, Boreholes 21BH-1 to 21BH-8, extending to depths of 6.6m to 6.7m from grade. The locations of the boreholes are shown in appended Borehole Location Plan, Drawing No. 1.

The boreholes were advanced using a track 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 at regular intervals of 0.76m to depths of 3.0m or 4.6m from grade and at 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.

Groundwater observations were made in the boreholes during and upon the completion of drilling. Boreholes 21BH-1, 21BH-4 and 21BH-8 were completed as monitoring wells for the determination of groundwater conditions. The symbol (MW) beside the borehole identification represents a monitoring well of the borehole.

The borehole 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 determined using “Top of a SANMH”, located at the east boulevard of Toronto Street South, near the south end of the Site, as the temporary benchmark (TBM).

The geodetic elevation of 278.86m for the TBM was obtained from the spot elevations shown on the Conceptual Site Plan, prepared by John G. Williams Limited (Architect), dated March 24, 2021, 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 the Logs of Boreholes, 21BH-1 to 21BH-8, (Drawing Nos. 2 to 9) for details of field work, including soil classification, inferred stratigraphy, and groundwater observations in the boreholes.

The subsoil, below the topsoil at the borehole locations, consisted of fill overlying silty sand and sand deposits. Brief descriptions of the subsurface materials, encountered at the borehole locations, are as follows:

4.1 Surface Course

Topsoil, approximately 125mm to 200mm in thickness, was contacted at the ground surface, at the borehole locations.

4.2 Fill

Underlying the topsoil, at the borehole locations, a layer of fill was contacted. The fill consisted of mixture of sand, sandy silt and silty sand, trace gravel, trace clayey silt, with trace topsoil and trace rootlets. A layer of dark sandy silt with topsoil was encountered in the fill at Boreholes 21BH-5 to 21BH-7 locations, at depths of approximately 2.0m to 2.5m from grade.

The fill at the borehole locations extended to depths varying from 1.1m to 2.6m from grade.

Based on the Standard Penetration N-values in the range of 3 to 13 blows for a penetration of 300 mm, the fill was very loose to compact, generally in a loose state.

The in-situ moisture content of the soil samples, retrieved from the fill, ranged from 8% to 21%, indicating moist to very moist conditions, with wet pockets. The moisture content more than 15% could be due to the presence of higher topsoil content.

4.3 Silty Sand

Underlying the fill, a silty sand deposit was contacted at Boreholes 21BH-1 and 21BH-5 to 21BH-8 locations, at depths of 1.7m to 2.6m from grade. The silty sand deposit contained trace to some gravel, with trace to some clay and silt. Layers of gravelly sand were observed at Borehole 21BH-6 location between depths of 2.3m to 3.7m from grade.

Boreholes 21BH-1 and 21BH-5 to 21BH-8 were terminated at the silty sand deposit, at depths of 6.6m to 6.7m from grade.

Based on the Standard Penetration N-values, of 5 to 25 blows per 0.3m penetration, the relative density of the silty sand deposit was generally compact, with loose layers at Borehole 21BH-8 location. The in-situ moisture content of the soil sample, retrieved from the silty sand deposit, ranged from 8% to 22%, indicating moist to wet conditions.

Dynamic cone penetration tests were carried out beside Borehole 21BH-8 location, below a depth of 1.5m from grade and extended to a depth of 6.1m from grade. Based on the dynamic cone test results, with the blow counts in the range of 9 to 35 blows per 0.3m penetration, the relative density of the deposit was generally in a compact state with a localized loose layer at a depth of 3.3m from grade.

A grain size analysis was carried out on a selected soil sample, obtained from Borehole 21BH-1 (SS5, at a depth of 3.0m), using both of mechanical sieves and hydrometer. The grain size distribution is shown on the appended Figure No. 1.

4.4 Sand

Underlying the fill, a sand deposit was contacted at Boreholes 21BH-2 to 21BH-4 locations, at depths of 1.1m to 1.7m from grade. The sand deposit, of fine to medium grained, contained trace gravel and some silt, with layers of gravelly sand at Borehole 21BH-4 location.

Boreholes 21BH-2 to 21BH-4 were terminated at the sand deposit, at depths of 6.6m to 6.7m from grade.

Based on the Standard Penetration N-values, of 9 to 36 blows per 0.3m penetration, the relative density of the sand deposit was loose to compact, generally in compact state with occasional loose layers at Borehole 21BH-2 and 21BH-3 locations. The in-situ moisture content of the soil sample, retrieved from the sand deposit, ranged from 6% to 23%, indicating moist to wet conditions.

4.5 Groundwater

Free water was recorded in the open boreholes 21BH-1 to 21BH-8, at depths of 2.7m to 4.0m from grade, with cave-in at depths of 3.7m to 4.6m from grade, during the drilling process and upon the completion of drilling.

On April 16, 2021, the water levels, documented in the monitoring wells at Boreholes 21BH-1, 21BH-4 and 21BH-8, were listed below:

BH/WELL ID	Ground Elevation	Water Level at Depth / Elevation		
		Upon Completion	Apr 16, 21	Apr 16, 21
21BH-1 (MW)	278.99m	4.0m	2.76m	276.10m
21BH-4 (MW)	278.71m	3.0m	2.71m	276.00m
21BH-8 (MW)	277.39m	3.7m	2.44m	274.95m

Based on the field observations and the moisture content profiles of the soil samples, obtained from the boreholes, it is our opinion that the water levels recorded in the open boreholes and documented in the monitoring wells represent a continuous groundwater table at the Site at depths of approximately 2.5m from grade, in the silty sand and sand deposits. This water level will be subject to seasonal fluctuations.

5.0 RECOMMENDATIONS

A review of a proposed Conceptual Site Plan and the information provided by the client, we understand that the development at the Site will consist of a residential development, 4 semi-detached houses without or with basements, with paved driveways, and may contain below grade services. The finished floor elevations of the semi-detached houses were not known at the time of preparation of this report. We have assumed that the finished floor levels will be at or above the existing grade and slightly above the street levels, and the basement floor slab should be 0.5m above the groundwater levels, at depths of approximately 2.0m from grade.

Based on the subsoil conditions encountered at the borehole locations, our comments and recommendations for the design and construction of the proposed development are as follow:

5.1 Site Preparation

The contractor must allow for the removal of the topsoil, deleterious fill and material with high moisture and/or organic content, if encountered during the construction, from the residential developed area, including the pavement areas, as directed by a geotechnical engineer / technician from ***Toronto Inspection Ltd.***. Material of

relatively high organic content will not be suitable for reuse within the building and pavement areas and will have to be disposed off-site or reused in landscaped areas, subject to approval by the landscape architect.

The existing fill is generally in loose state and is not suitable to support the building and the pavement of the proposed development. Since the depths of the fill and the fill quality can vary considerably at the Site, the contractor must allow for removal of any topsoil, deleterious fill and the existing fill, including all material with high moisture and/or organic content from the building envelopes and driveways, at the time of construction.

Any topsoil or compressible fill material, with relatively high organic or moisture content, will have to be removed and disposed off-site or reused in areas where future settlement will be of little consequence.

After removal of the existing loose fill within the proposed building and the pavement areas, these areas should be backfilled using organic free material and should be compacted, in lifts not exceeding 200mm, to at least 100% of its Standard Proctor maximum dry density, in accordance with the engineered fill specifications. Guidelines of Engineered Fill is attached in Appendix A.

Selected on site excavated fill material, excavated native material or pre-approved material, to be used for site grading, should be organic free and maintained at or close to its optimum moisture content during placement and compaction. Any additional fill, to be placed outside the building envelope of the proposed structures on the Site, should be compacted in lifts not exceeding 200mm to at least 98% of its Standard Proctor maximum dry density (SPMDD).

5.2 Pipe Bedding

Following the site preparation, the subsoil at service trench inverts is anticipated to consist of engineered fill and native silty sand / sand deposits. Any unsuitable fill strata, if encountered, below the invert level of the services, will have to be sub-excavated and replaced with organic free soil, compacted to at least 98% of its SPMDD.

The pipe bedding for the underground services, including catch basins and manholes should consist of OPSS Granular A, 20mm crusher run limestone, or an approved equivalent. The bedding should be compacted to 98% of its Standard Proctor

maximum dry density (SPMDD). The pipe bedding, at or below the current static water level of 2.5m from grade, may consist of HL-6 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.

5.3 Foundations

We understand that the proposed development will consist of 4 semi-detached houses without or with basements. The footings for these houses are assumed to be founded at depths of 1.2 m (without basements) or 2.3m (with basements) below the existing ground level. The footings for the houses without or with basements are anticipated to be founded on the engineered fill and native compact silty sand / sand deposits, which are partially underlain by loose layers.

Spread or strip footings, founded in the the engineered fill and the native undisturbed compact silty sand / sand deposits, at or below the depths of 1.2m to 2.3m from outside finished grade, can be designed for the following bearing pressures, subject to minimum footing with of 600mm in the sand deposits:

- 120 kPa At Serviceability Limit State
- 180 kPa At Factored Ultimate Limit State

For strip footings placed in the engineered fill, we recommend that all perimeter footings should be reinforced continuously with at least 2-15M steel bars. The reinforcement will bridge any loose pockets of fill, if any, under the footings.

The total and differential settlement of footings, founded in the native soil strata, and the engineered fill, and designed for the above recommended bearing pressure at the serviceability limit state, will not exceed 25mm and 20mm, respectively.

All the perimeter wall footings and footings exposed to freeze and thaw cycles should be founded at a minimum depth of 1.2 m below the outside 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.

5.4 Floor Slab Construction

The ground floor slab or the basement floor slab of the houses, placed over the engineered fill and the prepared subgrade, as recommended in Site Preparation, can be designed and constructed as conventional slab-on-grade.

The subgrade for slab-on-grade construction should be proof-rolled, under the supervision of a soils engineer from ***Toronto Inspection Ltd.***, prior to placement of the granular base. Any compressible, loose, or weak spots, identified in the subgrade during proof-rolling, should be sub-excavated to the competent soil strata. Fill to the subgrade, above the footing elevations, should consist of organic free soils, approved by the geotechnical engineer, and compacted in lifts not exceeding 200mm to a minimum of 98% of its Standard Proctor maximum dry density (SPMDD).

A granular base course, consisting of at least 150 mm of 20mm clear stone or equivalent, should be provided below the concrete floor as a moisture barrier.

5.5 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 D (stiff 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.

5.6 Excavation and Backfill

The open-cut excavations for service trenches and building foundations should comply with the Ontario Occupational Health and Safety Act. The silty sand / sand deposits and the fill are TYPE 3 soil, and any excavation within these non-cohesive soils, should be excavated at or flatter than a side slope of 1 H : 1V.

We do not anticipate any serious groundwater problems in shallow excavation to depths of 2.5m from grade at the Site. No excavation should be carried out below the groundwater table without temporarily lowering the water table a minimum of 0.5m

below the lowest excavation level. Above the water table, localized seepage of water from wet silty sand / sand layers can be drained to sump pits and removed by pumping from sumps.

The in-situ moisture contents in the native deposits are estimated to be at or higher than their optimum moisture contents. In our opinion, some of the on-site material will have to be dried out to the dry side of its optimum moisture content before re-use as backfill for trenches. If the weather conditions are not favourable for drying of the soils with higher moisture content, these soils should only be used for backfilling the areas where any future settlement will be of little consequence.

Backfill around manholes and narrow trenches in the pavement area should consist of imported granular material and should be compacted using a vibratory equipment. In addition, catch basins and manholes should be perforated just above the drain level and the holes should be screened with a filter fabric. This will help in draining the pavement structure as well as alleviate the problem of differential movement of manholes due to frost action.

5.7 Lateral Earth Pressure

Where subsurface walls will retain unbalanced loads or retaining walls, if any, the lateral earth pressure in the overburden, above the water table, may be computed using the following equation:

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

where	P = Lateral earth pressure	kPa
	K = Lateral earth pressure coefficient	0.4
	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 drainage system should include a free-draining granular backfill or a drainage membrane placed against the concrete wall, together with an effective perimeter weeping tile drainage system at the wall base. The weeping tile should consist of a minimum 100mm diameter perforated pipe, surrounded by a geotextile filter fabric (OPSS 405) and installed on a positive grade leading to a frost free sump or outlet.

5.8 Permanent Perimeter Drainage

For an open cut excavation at the locations of full or partial basements, the recommended permanent perimeter drainage system is shown on Figure No. 2.

We believe that subfloor weepers will not be required in this project. However, if seepage of water is observed from the wet sand lenses below the slab-on-grade level, at the time of construction, a subfloor weeper system may have to be installed.

5.9 Pavement Construction

After site grading and before the placement of granular bases for pavement construction, the subgrade should be proofrolled with a heavy roller to identify the presence of soft spots. Any soft pockets, revealed by that process, should be sub-excavated and replaced with an approved local or imported fill. The backfill should be compacted to 98% of SPMDD.

The thicknesses of road pavement are highly depending on the subgrade conditions. The following pavement design thicknesses are based on an assumption that the subgrade soils for the driveways will consist of organic free on-site mixture of sandy silt and silty sand:

		Heavy Duty Roadway	**Light Duty Driveway**
Asphaltic Concrete:	OPSS HL3	40 mm	65 mm
	OPSS HL8	60 mm	-
Base course - OPSS Granular A or equivalent		150 mm	150 mm
Sub-base - OPSS Granular B or equivalent		300 mm	200 mm

The pavement thicknesses recommended above are based on the assumption that the construction would be carried out in the dry season and that the subgrade is stable, without excessive movement during proof rolling. If excessive movements are noticed, additional granular sub-base thickness will be necessary.

Granular bases should be compacted to 100% of Standard Proctor maximum dry density. Asphaltic concrete should be placed and compacted to at least 96% Marshall density.

5.10 Field Percolation Test

For the field percolation tests, two additional boreholes, 21P-1 and 21P-2, were drilled at the locations designated by the Civil Engineer of this project in the front portion of the Site, to the proposed depths of 1.2m and 1.8m below the existing grade, respectively. The subsoil, at the bottom of Boreholes 21P-1 and 21P-2, at depths of 1.2m and 1.8m below the existing grade, consisted of sand (gravelly) deposit and sand (some gravel) deposit, respectively. No free water was documented in the open boreholes during and upon completion of drilling. The Logs of boreholes 21P-1 and 21P-2 are attached in Drawing Nos. 10 & 11.

Laboratory Testing

Grain size analyses were conducted on the soil samples retrieved at the base of each of the boreholes, at depths of 1.2m (21P-1) and 1.8m (21P-2) from grade, using both mechanical sieves and hydrometer. The grain size distributions are shown on the appended Figure No. 1. The Percolation time, based on the grain size distributions, is estimated at 5 minutes / cm to 7 minutes / cm (percolation rate of 12 cm / hour to 8.6cm / hour).

Rate of Percolation through Field Testing

In order to keep the Boreholes 21P-1 and 21P-2 open, a 100mm diameter PVC pipes were installed to the base of each borehole. The bases of PVC pipes were covered with 50mm of sand and the pipes were filled with water in order to saturate subsoil to be assessed. The tops of the PVC pipes were used as the datum to record the water levels in the pipes.

The field percolation tests, at Boreholes 21P-1 and 21P-2, were conducted on April 16, 2021. The documented field test results were as follows:

Reading No.	1	2	3	4	5	6
Time Interval (min)	10 min	10 min	10 min	10 min	10 min	10 min
21P-1 Drop (cm)	134 cm	136 cm	134 cm	134 cm	134 cm	134 cm
21P-2 Drop (cm)	58 cm	56 cm	55 cm	55 cm	55 cm	55 cm

The results at Borehole 21P-1 location, which indicated significant drop in the water level, could be due to presence of a more permeable layer and cannot be be relied on. With the exception of isolated gravelly sand layers, the soil matrix of the soil samples, retrieved from all boreholes during the drilling process and examined in our laboratory, indicated the sand / silty sand deposits consisted primarily of very fine to fine grain material of lower permeability.

The results at Borehole 21P-2 location indicated that the drop in the water level, over a period of 40 minutes, for the last four consecutive readings, steady at a rate of 330 cm / hour (a percolation time of 0.2 minutes / cm), with a base at a depth of 1.8m below grade. It is our opinion that this high percolation rate could also be due to presence of a more permeable layer in the vicinity and cannot be be relied on.

We recommend that the percolation rate of 8.6 cm / hour to 12cm / hour, estimated from the grain size distributions, can be used in design with consideration of a minimum safety correction factor of 2.5.

6.0 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 / test pit 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 in the vicinity of the Site 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.

David S. Wang

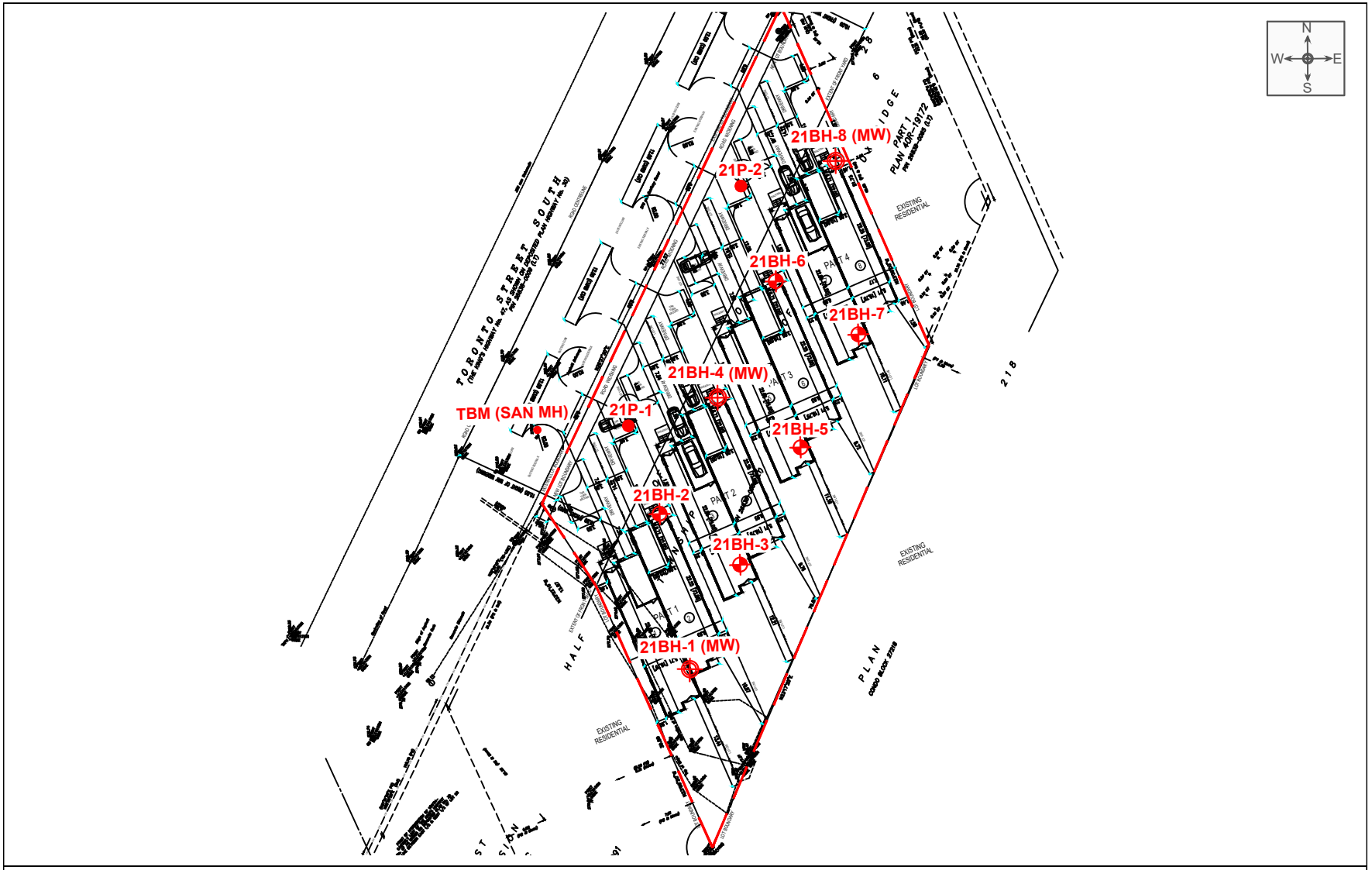
David S. Wang, P. Eng.
Senior Engineer

Upkar S. Sappal, P. Eng.
Principal Engineer

Toronto Inspection Ltd.

Drawings & Figures

Borehole Location Plan
Borehole Logs
Gradation Curve
Drainage System for Open Cut Excavation



LEGEND:

Borehole and Monitoring Well Location

Percolation Test Location

Site Boundary

NOT TO SCALE

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TITLE:	Borehole and Monitoring Well Location Plan		
LOCATION:	181 Toronto Street South, Uxbridge, Ontario		
PROJECT NO.	5555-21-GC	DATE : April 2021	DRAWING NO: 1

Project No. 5555-21-GC

Log of Borehole 21BH-1 (MW)

Dwg No. 2

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 181 Toronto Street South, Uxbridge, Ontario

Date Drilled: 4/8/21

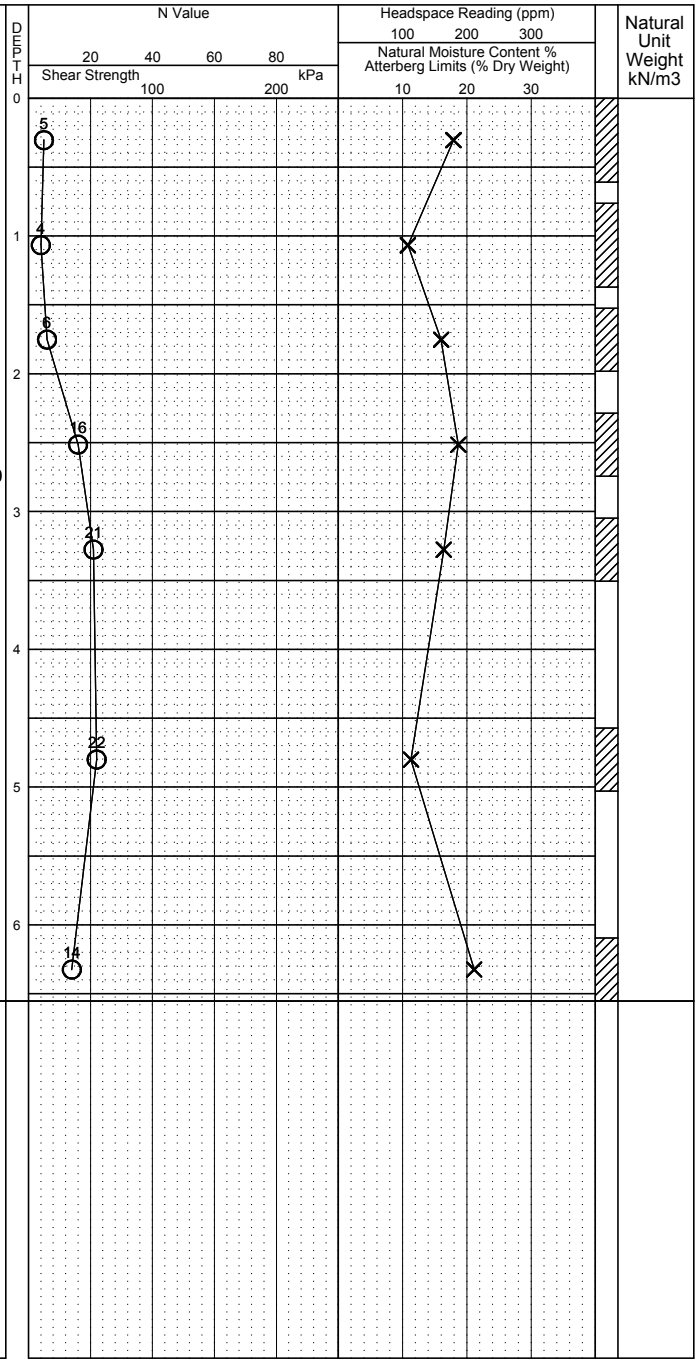
Drill Type: Track Mounted Drill Rig

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	278.99
		TOPSOIL	278.79
		FILL - brown sand - trace rootlets, trace topsoil - some sandy silt, trace gravel - very moist	
			276.86
		SILTY SAND - compact, brown - some gravel, trace clayey silt - gravelly sand from 3.3m to 5.2m - very moist, wet below 3.0m	276.20
			272.44
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 4.0m - cave-in at 4.6m	



Natural Unit Weight kN/m3

LGBE3 5555-21-GC.GPJ 4/28/21

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)
April 16, 2021	2.8m	

Project No. 5555-21-GC

Log of Borehole 21BH-2

Dwg No. 3

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 181 Toronto Street South, Uxbridge, Ontario

Date Drilled: 4/8/21

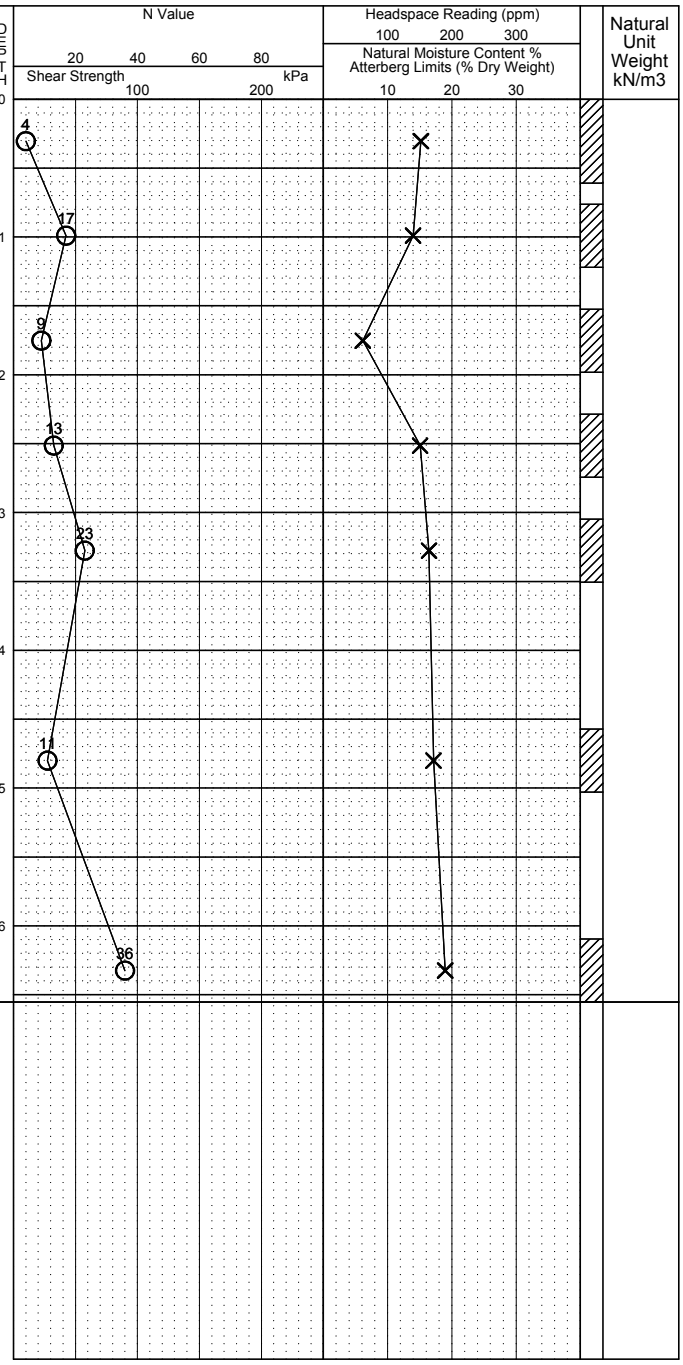
Drill Type: Track Mounted Drill Rig

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	278.75
		TOPSOIL	278.55
		FILL - brown sandy silt - trace rootlets, pockets of topsoil - trace clayey silt, trace gravel - very moist	277.68
▼		**SAND** - loose to dense, brown - fine to medium grained - some silt, trace gravel - moist to very moist, wet below 2.3m	276.05
			272.20
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 2.7m - cave-in at 3.7m	



Natural Unit Weight kN/m3

LGBE3 5555-21-GC.GPJ 4/28/21

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. 5555-21-GC

Log of Borehole 21BH-3

Dwg No. 4

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 181 Toronto Street South, Uxbridge, Ontario

Date Drilled: 4/8/21

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

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

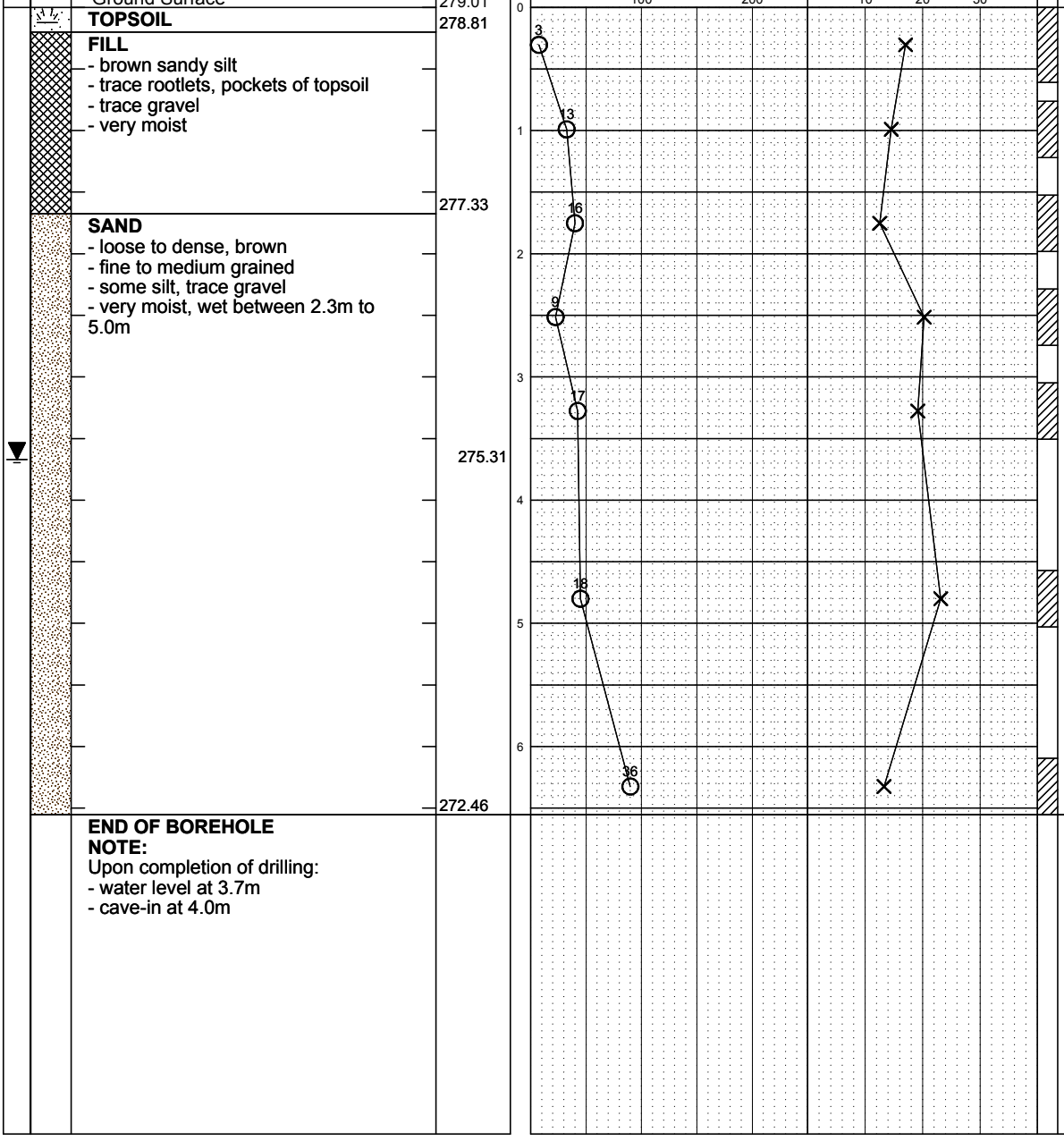
Headspace Reading (ppm)
Natural Moisture
Plastic and Liquid Limit
Unconfined Compression % Strain at Failure
Penetrometer

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		Ground Surface	279.01	0
		TOPSOIL	278.81	
		FILL - brown sandy silt - trace rootlets, pockets of topsoil - trace gravel - very moist		1
			277.33	
		SAND - loose to dense, brown - fine to medium grained - some silt, trace gravel - very moist, wet between 2.3m to 5.0m		2
▼			275.31	3
				4
				5
				6
			272.46	
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 3.7m - cave-in at 4.0m		

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



LGBE3 5555-21-GC.GPJ 4/28/21

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. 5555-21-GC

Log of Borehole 21BH-4 (MW)

Dwg No. 5

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 181 Toronto Street South, Uxbridge, Ontario

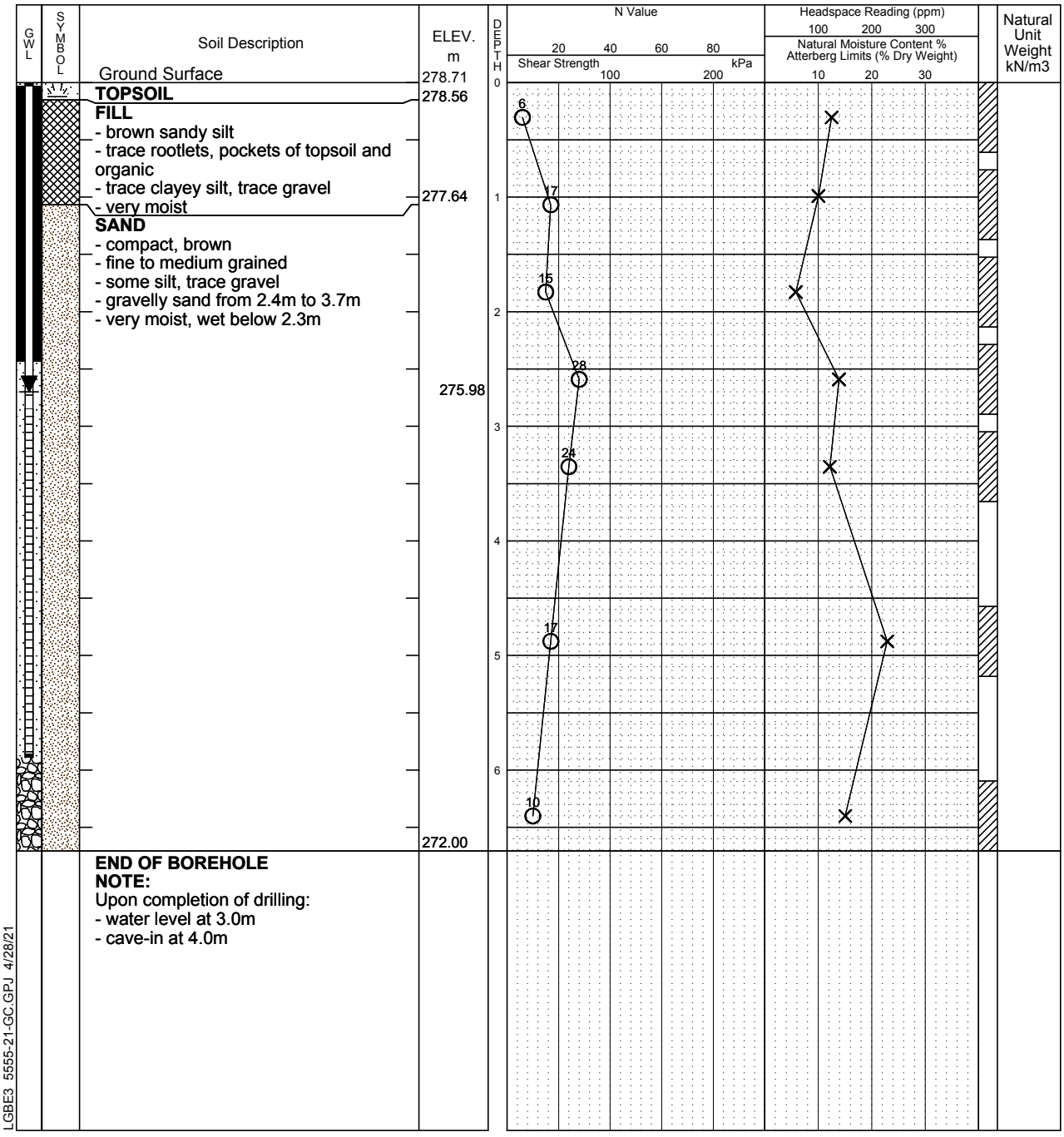
Date Drilled: 4/9/21

Drill Type: Track 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 5555-21-GC.GPJ 4/28/21

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)
April 16, 2021	2.7m	

Project No. 5555-21-GC

Log of Borehole 21BH-5

Dwg No. 6

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 181 Toronto Street South, Uxbridge, Ontario

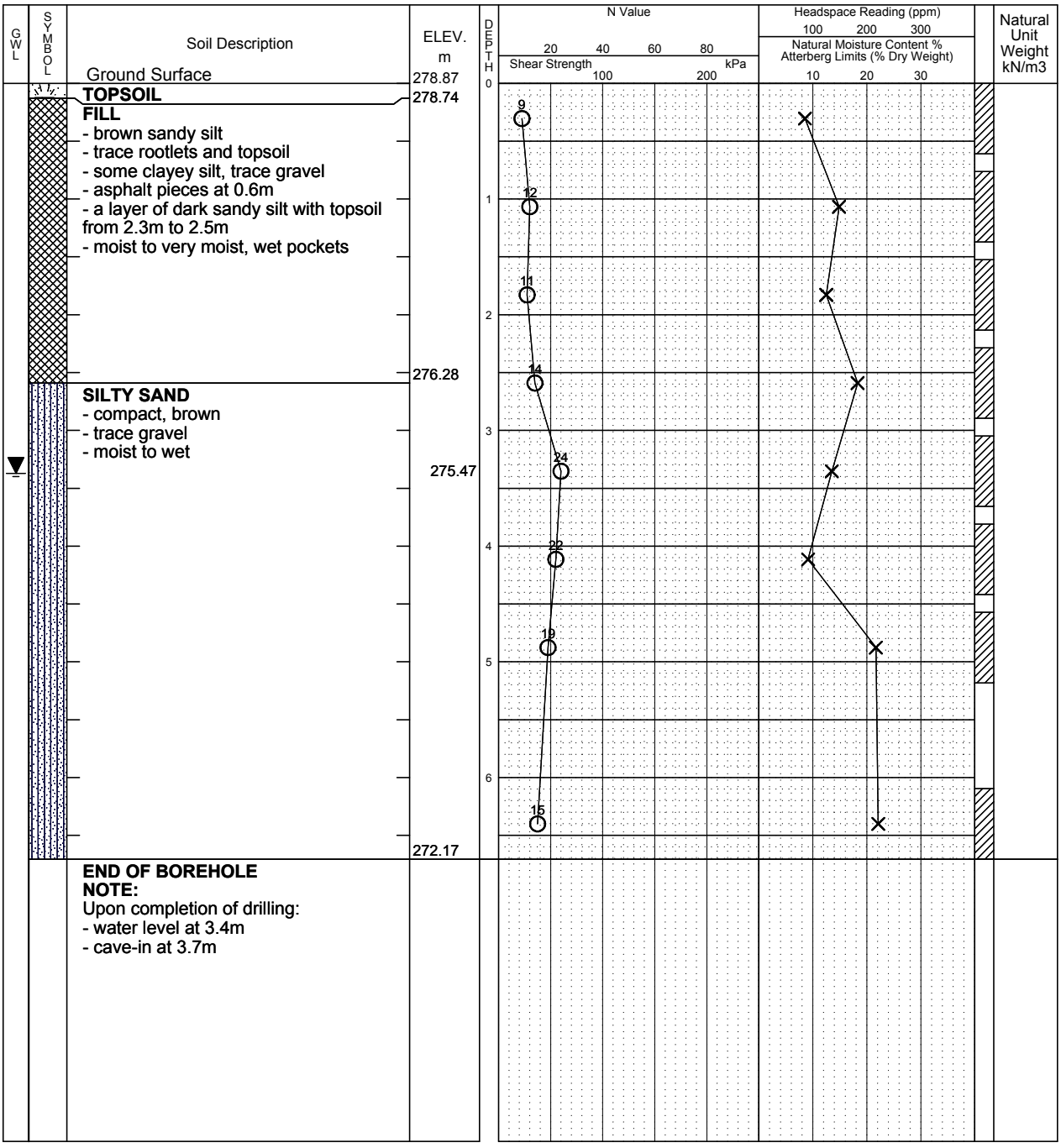
Date Drilled: 4/8/21

Drill Type: Track 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 5555-21-GC.GPJ 4/28/21

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. 5555-21-GC

Log of Borehole 21BH-6

Dwg No. 7

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 181 Toronto Street South, Uxbridge, Ontario

Date Drilled: 4/9/21

Drill Type: Track 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	278.35	0
		TOPSOIL	278.20	
		FILL - brown sandy silt - trace rootlets, trace organics - some sand, trace gravel - a layer of dark sandy silt with minor rootlets at 2.0m, 150mm in thickness - very moist		1 2
			276.06	
		SILTY SAND - loose to compact, brown - fine grained - trace gravel - gravelly sand from 2.3m to 3.7m - moist to very moist, wet below 3.0m		3
▼			274.55	4
				5
				6
			271.64	
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 3.8m - cave-in at 4.0m		

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: 6, 5, 6, 25, 20, 14, 21

LGBE3 5555-21-GC.GPJ 4/28/21

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. 5555-21-GC

Log of Borehole 21BH-7

Dwg No. 8

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 181 Toronto Street South, Uxbridge, Ontario

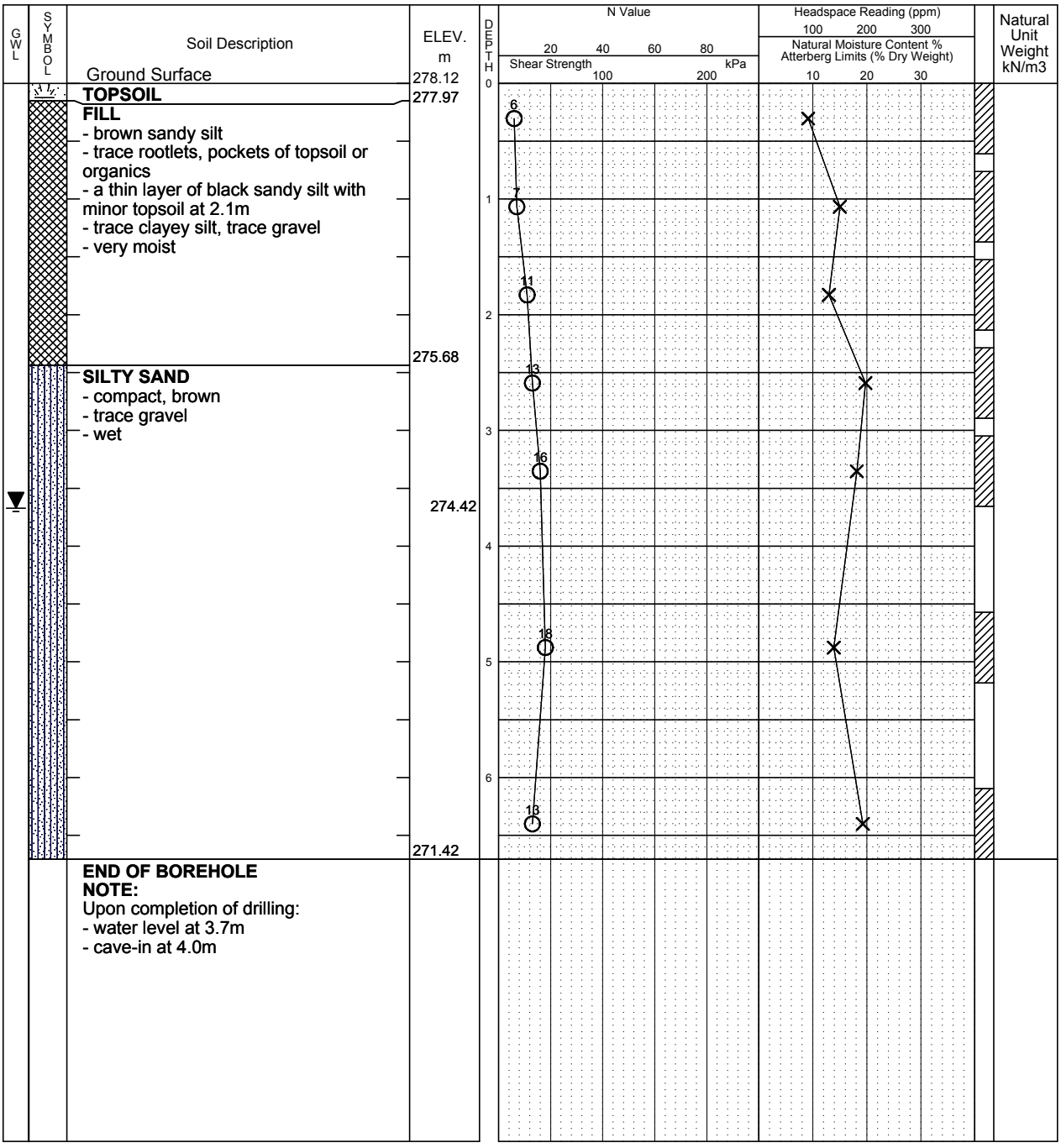
Date Drilled: 4/8/21

Drill Type: Track 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 5555-21-GC.GPJ 4/28/21

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. 5555-21-GC

Log of Borehole 21BH-8 (MW)

Dwg No. 9

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 181 Toronto Street South, Uxbridge, Ontario

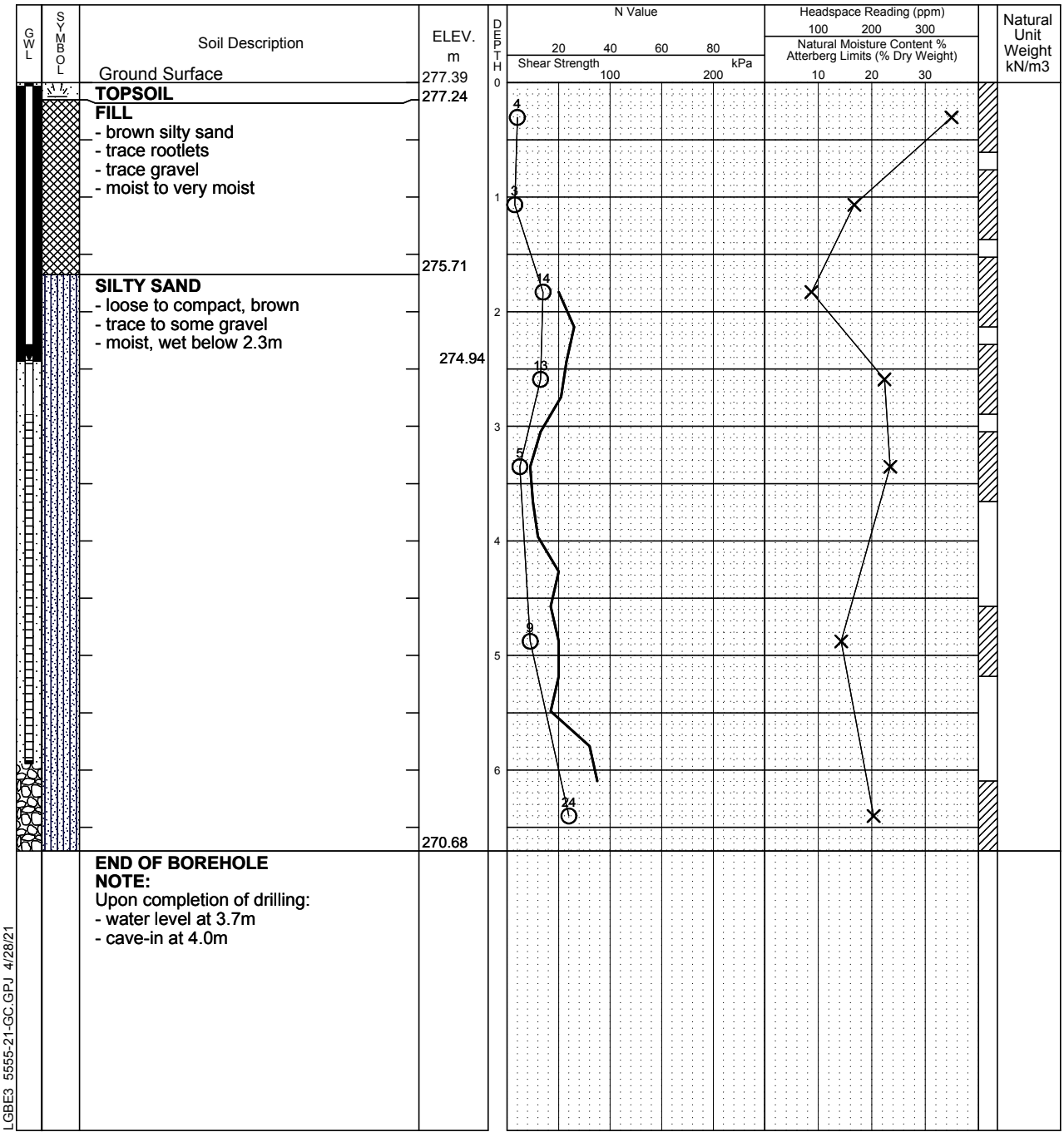
Date Drilled: 4/8/21

Drill Type: Track 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 5555-21-GC.GPJ 4/28/21

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)
April 16, 2021	2.4m	

Project No. 5555-21-GC

Log of Borehole 21P-1

Dwg No. 10

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 181 Toronto Street South, Uxbridge, Ontario

Date Drilled: 4/9/21

Drill Type: Track 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	N Value / Shear Strength (kPa)	Headspace Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	Natural Unit Weight kN/m3
		Ground Surface	278.54	0	N Value 20 40 60 80; Shear Strength 100 200 kPa	100 200 300; Natural Moisture Content % Atterberg Limits (% Dry Weight) 10 20 30	
		NO SAMPLING					
			277.32	1			
		SAND - loose, brown - fine to medium grained - gravelly - trace silt - moist			5		
			276.87				
		END OF BOREHOLE **NOTE:** Upon completion of drilling:					

LGBE3 5555-21-GC.GPJ 4/28/21

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. 5555-21-GC

Log of Borehole 21P-2

Dwg No. 11

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 181 Toronto Street South, Uxbridge, Ontario

Date Drilled: 4/8/21

Drill Type: Track 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

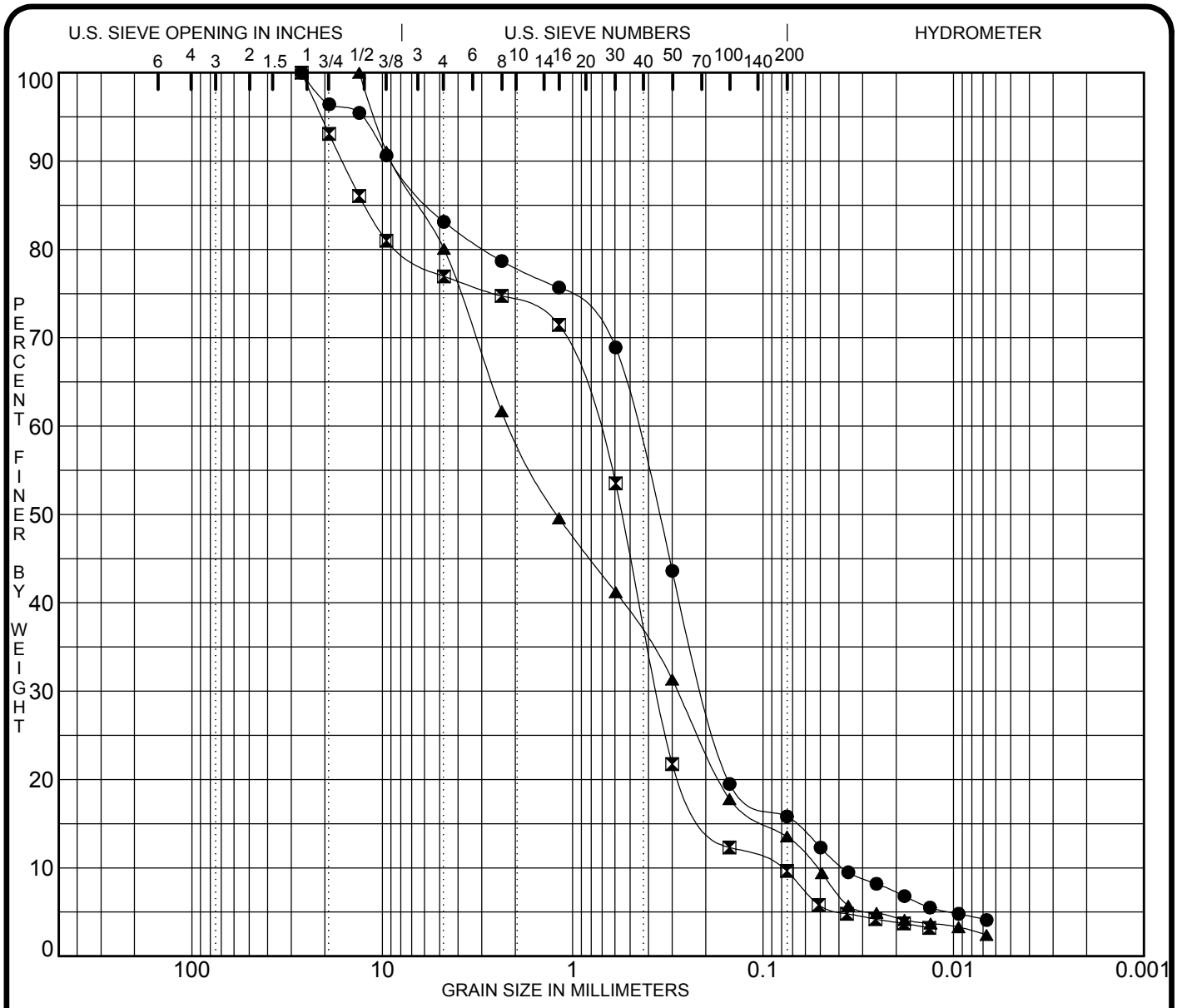
GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength (kPa)	Headspace Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	Natural Unit Weight kN/m3
		Ground Surface	277.72	0	N Value: 20 40 60 80; Shear Strength: 100 200 kPa	Headspace Reading (ppm): 100 200 300; Natural Moisture Content % / Atterberg Limits (% Dry Weight): 10 20 30	
		NO SAMPLING		1			
			275.89				
		SAND - dense, brown - some gravel, some silt - moist		2	34	×	
			275.43				
		END OF BOREHOLE **NOTE:** Upon completion of drilling:					

LGBE3 5555-21-GC.GPJ 4/28/21

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)



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	**21BH-1 (MW)**	**3.0**						**2.32**	**12.3**
⊠	**21P-1**	**1.2**						**2.05**	**9.3**
▲	**21P-2**	**1.8**						**0.70**	**41.1**

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**21BH-1 (MW)**	**3.0**	**26.50**	**0.47**	**0.203**	**0.0379**	**16.9**	**67.3**	**15.8**	
⊠	**21P-1**	**1.2**	**26.50**	**0.76**	**0.358**	**0.0823**	**23.0**	**67.3**	**9.6**	
▲	**21P-2**	**1.8**	**13.20**	**2.14**	**0.280**	**0.0522**	**19.9**	**66.5**	**13.6**	

PROJECT **Geotechnical Investigation - 181 Toronto Street South, Uxbridge, Ontario**

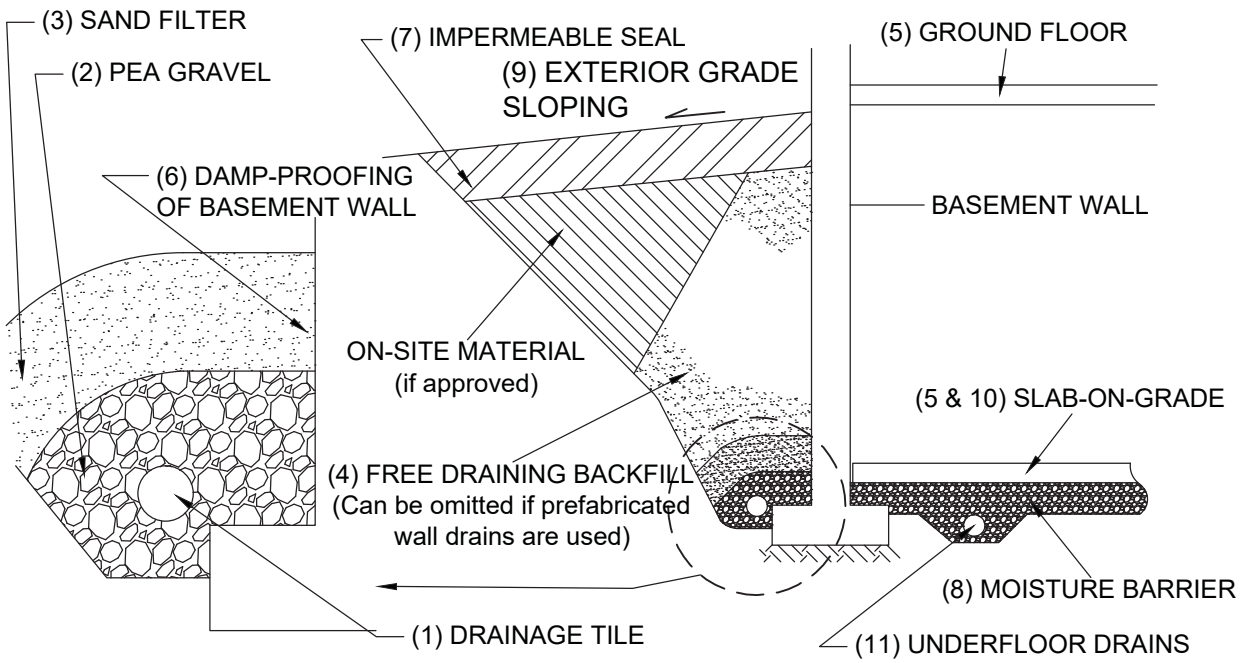
JOB NO. **5555-21-GC**

DATE **4/28/21**

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

TIL Toronto Inspection Ltd
GEO-ENVIRONMENTAL CONSULTANTS
110 Konrad Cresent, Unit 16, Markham, Ontario L3R 9X2
Tel: 905-940 8509 Fax: 905-940 8192

TITLE:
Suggested Backfill and Drainage System for Open Cut Excavation

FIGURE NO.
2

Appendix A
Guidelines of Engineered Fill

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.