TORONTO INSPECTION LTD.
GEO-ENVIRONMENTAL CONSULTANTS

REPORT ON
GEOTECHNICAL INVESTIGATION
NW YONGE AND GREEN LANE SECONDARY PLAN
EAST GWILLIMBURY, ONTARIO

REPORT NO.: 4007-14-G-YON-A
REPORT DATE: JUNE 8, 2015

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Toronto Inspection Ltd.

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1.0 INTRODUCTION

Toronto Inspection Ltd. was retained by Yonge Green Lane GP Inc. to conduct a geotechnical borehole investigation for the proposed NW Yonge and Green lane Secondary Plan in East Gwillimbury, Ontario (hereinafter described as "the Site"). We understand that the Site will consist of the following uses: commercial mixed use, medium and low density residential, parks and schools.

The subject Site is undulating with grade difference of almost 27m between the borehole locations. Only a limited number of boreholes were carried out at the Site to provide a preliminary assessment of the Site conditions and the report should, therefore, be considered as a preliminary report.

The following preliminary geotechnical data has been provided on the basis of the subsoil and groundwater conditions, encountered at the borehole locations:

- General founding conditions
- Foundation design for foundations
- Pavement Design and Construction
- Other Recommendations of Construction

Additional geotechnical investigation(s) will have to be carried out, once the final Site grading and the type, elevations and locations of the proposed development have been established, to confirm the design features relevant to the geotechnical analyses and the recommendations and comments provided in the preliminary report.

2.0 SITE CONDITION

The Site, approximately 106 ha. in area, fronts on the west side of Yonge Street and on the north side of Green Lane in East Gwillimbury. At the time of investigation, the Site was a farmland with farmhouses, including barns and silos at the southeast portion of the Site. The existing site gradient is undulating, having a grade difference of more than 27m across the Site.

3.0 INVESTIGATION PROCEDURE

The field work for the preliminary investigation was carried out between December December 9 and 15, 2014, which included drilling 21 sampled boreholes (BH-1 to BH-21) using a track mounted drill rig, equipped with sampling rods and continuous solid

stem augers. The drilling and the sampling equipments were supplied and operated by a specialist drilling contractor.

The boreholes extended to depths of 6.2m to 6.6m from grade. Soil samples were recovered from the boreholes at regular intervals with a split spoon sampler in conjunction with Standard Penetration Tests using a driving energy of 475 joules (350 ft-lbs). The retrieved soil samples were identified and logged in the field. They were carefully bagged and delivered to our laboratory for later visual identification and determination of in-situ moisture contents. Groundwater observations were made in the open boreholes during and upon the completion of drilling. Boreholes BH-5, BH-14 to BH-17 and BH-20 were completed as observation wells to determine the current static groundwater condition.

The borehole locations were established with stakes in the field, at the locations shown on the appended Borehole Location Plan (Drawing No.1).

The geodetic ground elevations at the borehole locations were provided by the client.

4.0 SUMMARIZED SITE AND SUBSURFACE CONDITIONS

Reference is made to the Borehole Location Plan (Drawing No. 1) and the appended Logs of Borehole sheets (Drawing Nos. 2 to 22) for details of field work, including soil classification, inferred stratigraphy and groundwater observations carried out during and on completion of drilling of the boreholes.

The subsoil below the surficial topsoil, consisted of native deposits of silt, silt till and silty sand/sand layers or fill material of sandy silt to clayey silt below the topsoil in some of the borehole areas. Brief descriptions of the subsoils encountered at the borehole locations are as follows:

4.1 Surface Course

Topsoil, 250mm to 900mm in thickness, was contacted at the ground surface at the borehole locations.

4.2 (Reworked) Fill

At the locations of BH-2, BH-4, BH-8 to BH-10, BH-14 to BH-21, a layer of fill was contacted below the topsoil. It is our opinion that the fill may represent the

material used in previous regrading of the Site or the reworked soils during the previous farming process.

The fill consisted of dark brown to brown sandy silt to clayey silt with trace of rootlets, scattered or pockets of topsoil. It extended to depths of 0.6m to 1.7m from the existing ground level.

4.3 Sandy Silt

Underlying the topsoil at BH-1, BH-11 and BH-13 locations and below the fill at BH-4 location, at depths of 0.3m to 0.6m from grade, a sandy silt deposit, with silty sand, clayey silt, gravel or seams of sand, was contacted. Based on the Standard Penetration N-values of 5 to 25 blows per 0.3m penetration, the relative density of the sandy silt deposit was loose to compact.

The sandy silt deposit extended to depths of 1.4m to 4.3m from grade. The in-situ moisture content of the soil samples retrieved from this deposit ranged from 5% to 19%, indicating moist to wet conditions.

A lower sandy silt deposit was contacted below a sandy silt till deposit at BH-4 location, at a depth of 5.8m from grade. BH-4 was terminated in the lower sandy silt deposit and the lower limit of this deposit was not established.

Based on the Standard Penetration N-value of more than 100 blows per 0.3m penetration, the relative density of the lower sandy silt deposit was very dense. The in-situ moisture content of the soil sample retrieved from this deposit was 8%, indicating moist conditions.

4.4 Clayey Silt

Underlying the topsoil at BH-3 location and underlying the fill at BH-15, BH-16, BH-19 to BH-21 location, a clayey silt deposit was contacted at depths of 0.6m to 1.7m from grade. The clayey silt deposit contained trace to some sandy silt, gravel or seams of fine sand. Based on the Standard Penetration N-values of 4 to 13 blows per 0.3m penetration, the consistency of the deposit was firm to stiff.

The clayey silt deposit extended to depths of 1.4m to 4.3m from the existing ground level. The in-situ moisture content of the soil samples retrieved from the clayey silt deposits ranged from 13% to 28%, indicating moist to very moist conditions, with wet spots near the ground surface.

A lower clayey silt deposit was contacted below a sandy silt till deposit at BH-3 location, at a depth of 4.9m from grade. BH-3 was terminated in the lower clayey silt deposit and the lower limit of this deposit was not established.

Based on the Standard Penetration N-value of 25 blows per 0.3m penetration, the consistency of the lower clayey silt deposit was very stiff. The in-situ moisture content of the soil sample retrieved from this deposit was 12%, indicating moist conditions.

4.5 Sandy Silt Till

Underlying the topsoil, or fill or deposits of sandy silt or clayey silt or clayey silt till at BH-1 to BH-3, BH-5 to BH-12, BH-14, BH-17 and BH-19 to BH-21, at depths of 0.6m to 5.8m from grade, a sandy silt till deposit, with some silty sand , gravel, trace of clayey silt, or seams of fine sand, was contacted. Based on the Standard Penetration N-values of 9 to more than 100 blows per 0.3m penetration, the relative density of the silty silt till deposit was loose to very dense, generally in compact to dense state.

Boreholes BH-2, BH-5, BH-6, BH-9 to BH-11, BH-17 and BH-19 to BH-21 were terminated in the sandy silt till deposit at depths of 6.2m to 6.6m from grade and the lower limit of this deposit was not established. The sandy silt till deposit, at BH-1, BH-3, BH-7, BH-8, BH-12 and BH-14 extended to depths of 2.1m to 5.8m from grade.

The in-situ moisture content of the soil samples retrieved from this deposit ranged from 7% to 20%, indicating moist to very moist conditions, with wet pockets or layers.

4.6 Clayey Silt Till

Underlying the topsoil or fill or deposits of sandy silt or clayey silt, at BH-4, BH-7, BH-13, BH-15 and BH-17 locations, a clayey silt till deposit was contacted at depths of 0.6m to 4.3m from grade. The clayey silt till deposit contained trace to some sandy silt or gravel. Based on the Standard Penetration N-values of 8 to 48 blows per 0.3m penetration, the consistency of the deposit was firm to hard, generally in firm to very stiff state.

Boreholes BH-13, BH-15 were terminated in the clayey silt till deposit at depths of 6.6m from grade and the lower limit of this deposit was not established. The clayey silt till deposit, at BH-4, BH-7 and BH-17 locations, extended to depths of 2.1m to 5.8m from the existing ground level. The in-situ moisture content of the soil samples retrieved from the clayey silt till deposits ranged from 8% to 22%, indicating moist to very moist conditions, with wet spots near the ground surface.

4.7 Silty Sand/Sand

Underlying deposits of sandy silt till or clayey silt or clayey silt till, at BH-7, BH-8, BH-12, BH-14, BH-16, BH-18 and BH-19 locations, at depths of 2.1m to 5.8m from garde, silty and or sand deposits were contacted. The deposits, generally fine to medium grained, consisted of some silt or gravel, with occasional trace of clayey silt. Based on the Standard Penetration N-values of 36 to more than 100 blows per 0.3m penetration, the relative density of the deposits was dense to very dense.

Boreholes BH-7, BH-8, BH-12, BH-14, BH-16 and BH-18 were terminated in the silty sand/sand deposits at depths of 6.2m to 6.6m from grade and the lower limit of these deposits was not established. The silty sand deposit, at BH-19 locations, extended to a depth of 5.8m from grade.

The in-situ moisture content of the soil samples retrieved from this deposit ranged from 8% to 17%, indicating moist to wet conditions.

4.8 Ground Water

Free water or wet cave-in was recorded in the open boreholes at BH-1, BH-2, BH-4, BH-7 to BH-16 and BH-18 to BH-20, at depths between 2.7m and 6.0m from the existing ground level, upon the completion of borehole drilling. No free water was contacted in the remaining boreholes throughout the investigation.

On January 5, 6, March 24 and April 14, 2015, the water levels were documented in the observation wells at BH-5, BH-14 to BH-17 and BH-20:

Well Location	Jan 5 & 6, 2015		Mar 26, 2015		Apr 14, 2015	
	Depth (m)	Elevation (m)	Depth (m)	Elevation (m)	Depth * (m)	Elevation (m)
BH-5	1.10	287.37	1.62	286.85	1.87	286.60
BH-14	0.50	276.78	1.37	275.91	1.02	276.26
BH-15	0.53	275.88	1.07	275.34	0.70	275.71
BH-16	1.05	277.00	1.92	276.13	1.33	276.72
BH-17	0.90	267.26	1.71	266.45	1.62	266.54
BH-20	1.50	263.17	2.96	261.71	2.65	262.02

*: Water levels in the wells were measured after bailing out and recharge on and after March 26, 2015.

Based on the field records and the moisture content profiles of soil samples, as shown on the appended borehole logs, it is our opinion that the depths of free water or cave-in represent perched water in discontinuous sand layers or lenses. It is our opinion that there is no continuous groundwater table at the Site, within the depths of investigation.

5.0 RECOMMENDATIONS

We understand that the Site will be used for commercial, residential, parks and schools. However, the details of the development and the final gradients of the Site will be determined at detailed design.

Since the existing site gradient is undulating, with a grade difference of more than 27m across the Site, we recommend that additional boreholes should be required to obtain site specific subsoil and groundwater data and confirm our recommendations. For the purpose of this preliminary report, we have assumed that the final grade will be close to the existing ground surface.

Based on the subsoil data obtained at the borehole locations, our recommendations are as follows:

5.1 Site Preparation

The soil description and depth of fill shown on the Borehole Logs are specific depths at the borehole locations only. The thickness of topsoil and the depth of fill at locations beyond the boreholes may be thicker or deeper, especially in the location of previous excavations. We recommend that the contractor bidding for the job should determine the depths of deleterious material by test pits and allow for removal of any deleterious fill and material, with high moisture and/or organic content, during the site preparation for site grading.

Compressible topsoil and fill material containing relatively high organic content will not be suitable for reuse in areas where future settlement cannot be tolerated. This material will have to be disposed off-site or reused in landscaped areas, subject to approval by the landscape architect.

Any new fill at the Site should consist of organic free material, placed in lifts of 200 to 300mm and compacted to at least 98% of its Standard Proctor maximum dry density (SPMDD).

5.2 Pipe Bedding

Based on the borehole information, the subsoil at service trench inverts may consist of fill, silt, till or sand deposits. Any unstable fill material at the trench invert should be sub-excavated and replaced with a granular material, compacted in lifts to the invert level to 98% of its SPMDD.

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 95% of its Standard Proctor maximum dry density (SPMDD). If free water is encountered in the trenches, from saturated sand layers, 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.

5.3 Foundation Design

The existing fill is not competent to support building foundations. The proposed building foundations will have to extend through the fill and founded in the underlying native soil deposits.

The following design bearing pressures should be used for the design of footings, founded in the native undisturbed soils:

- Conventional footings founded in the sandy silt till or sandy silt deposits below the fill, at BH-2, B-4, BH-5, BH-8 to BH-10 and BH-12 locations, at a minimum depth of 1.2m from grade:
  - Factored Ultimate Limit State: 200 kPa
  - Serviceability Limit State: 150 kPa

- Conventional footings founded in the sandy silt, clayey silt, sandy silt till or clayey silt till deposits, at the remaining boreholes, at a minimum depth of 1.2m from grade:
  - Factored Ultimate Limit State: 150 kPa
  - Serviceability Limit State: 100 kPa

Other alternatives will be to remove all of the existing fill in the proposed building areas and replaced with selected on-site / imported organic free material, compacted in lifts not exceeding 200mm, in accordance with the engineered fill requirement (Guideline of Engineered Fill is attached in Appendix A). Conventional footings founded in the engineered fill can be designed for:

- Factored Ultimate Limit State: 200 kPa
- Serviceability Limit State: 150 kPa

The total and differential settlement of footings, with the designed bearing pressures as recommended above, will not exceed 25 mm and 20mm respectively.

Footings founded in engineered fill should be reinforced with at least 2 x 15M bars continuously. Consequently, the foundation walls on engineered fill should be reinforced with 2 x 15M bars at the top of the walls.

It should be noted that the recommendations for footings have been analysed by ***Toronto Inspection Ltd.*** from the information obtained at the borehole location. Further borehole investigation is necessary after the locations of the proposed buildings are finalised. In addition, 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 the construction stage.

5.4 Perimeter Wall Construction

Where subsurface walls will retain unbalanced earth loads, the lateral soil pressure may be computed using the following expression:

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

where	p = lateral earth pressure	(kPa)
	K = lateral earth pressure coefficient	0.4
	γ = bulk unit weight of backfill	21.0 kN/m^3
	H= depth of wall below the finished grade	(m)
	q = surcharge loads adjacent to the walls	(kPa)

This expression assumes that a permanent free drainage system is provided to prevent a build up of hydrostatic pressure next to the wall. A typical installation detail of the permanent perimeter drainage system is shown on appended Figure No.1. In addition, the ground surface around the building should be sloped away from the building.

5.5 Slab Construction

If the existing fill will be left in place for supporting a slab-on-grade, long term settlement may occur. If some movement in the floor slab is acceptable, conventional slab-on-grade can be constructed, having the floor subgrade re-compacted with a roller, to at least 95% of its Standard Proctor maximum dry density. Any loose or wet spot as identified in the compaction process will have to be removed and replaced with selected on-site dry material.

If no movement in the floor slab is tolerable, the fill below the slab-on-grade will have to be completely removed. Selected on-site / imported material, free of organics, may be used to bring the excavation to the required grade, compacted to a minimum of 98% of its Standard Proctor maximum dry density. If heavy floor loading is anticipated, especially for the industrial buildings, the fill should be compacted in 200mm lifts to at least 98% of its Standard Proctor maximum dry density.

A minimum of 150 mm thick layer of 19mm OPSS Granular A, or equivalent, is recommended as a moisture barrier below the floor slab. The bedding should be compacted to at least 100% SPMDD. In our opinion, no underfloor drains will be required below the ground floor slab or basement slab for depths of up to 2.0m from the existing grades.

5.6 Earthquake Consideration

The 2006 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 soils).

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. of the Ontario Building Code. These values should be reviewed by the Structural Engineer.

5.7 Excavation and Backfilling

All excavations should comply with the Ontario Occupational Health and Safety Act. Any excavation deeper than 1.2m should be sloped back to a safe angle of around 45°. A flatter slope will be required for excavation in the fill or in saturated soils.

No groundwater problems are anticipated for excavation up to depths of 2.7m to 6.0m from grade, at the borehole locations. Groundwater seepage from wet sand layers will be minor which can be handled by pumping from filtered sumps, as necessary.

The on-site excavated material, separated from topsoil and organics, can be reused for site grading and trench backfill. In order to achieve the specified degree of compaction, drying of the on-site material may be required, prior to placement and compaction. Therefore, it is recommended that the excavation and backfilling process should be conducted in the dry and frost free seasons.

Any unsuitable fill, such as topsoil and other compressible fill, may be reused in landscape areas, subject to the approval of the landscape architect.

Backfill around catch basins, manholes and narrow trenches should consist of imported granular material, and should be compacted using a medium or light vibratory equipment.

5.8 Pavement Construction

The existing on-site material contains mixture of clayey silt to sandy silt, and is susceptible to frost heaving. The following 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:

		Light Duty LD Parking	Heavy Duty Fire Route
Asphaltic Concrete	OPSS HL3 or equivalent	65mm	40mm
	OPSS HL8 or equivalent	-	60mm
Base:	OPSS Granular A or 20mm crusher-run	150mm	150mm
Sub-base:	OPSS Granular B or 50mm crusher-run	200mm	350mm

Roads and driveways to be assumed by the local municipality should be constructed to the municipal standards.

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, 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 95% of the Standard Proctor maximum dry density (SPMDD) to 300mm below the subgrade level. The upper 300mm of the subgrade should be compacted to 98% SPMDD.

Continuous perforated, OPSS 405, longitudinal drains, minimum diameter of 100mm, should be used as sub-drains, on both sides of the roadways. The sub-drains should be installed on a positive gradient towards the outlets (collecting into catch basins), at a minimum depth of 800mm below the pavement level, to allow for a free flow of water. The backfill above the drains should comprise of free draining Granular B or its equivalent and should be continuous with the granular sub-base of the pavement. This will help in draining the pavement structure and minimize the differential heave of the pavement.

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 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.

David S. Wang

David S. Wang, P.Eng.
Project Engineer

Upkar S. Sappal

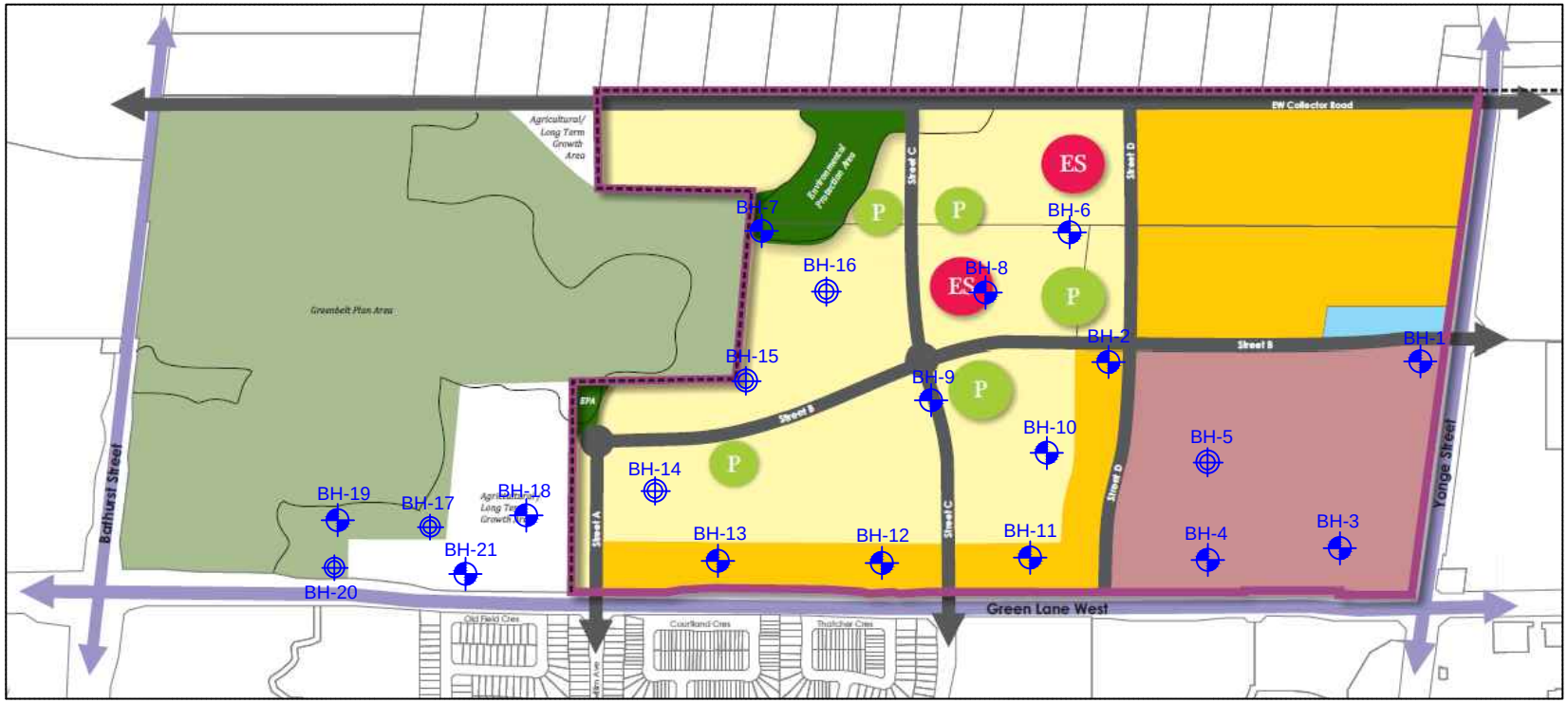
Upkar S. Sappal, P.Eng.
Principal Engineer

Toronto Inspection Ltd.

Drawings

Borehole Location Plan

Logs of Boreholes 1 to 22



LEGEND :

/ Borehole/Monitoring Well Location

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TITLE:	Borehole/ Monitoring Well Location Plan
LOCATION:	NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario
PROJECT NO. 4007-14-G-YON-A	DATE : December 2014 / DRAWING NO : 1

Project No. 4007-14-G-YON-A

Log of Borehole BH-1

Dwg No. 2

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

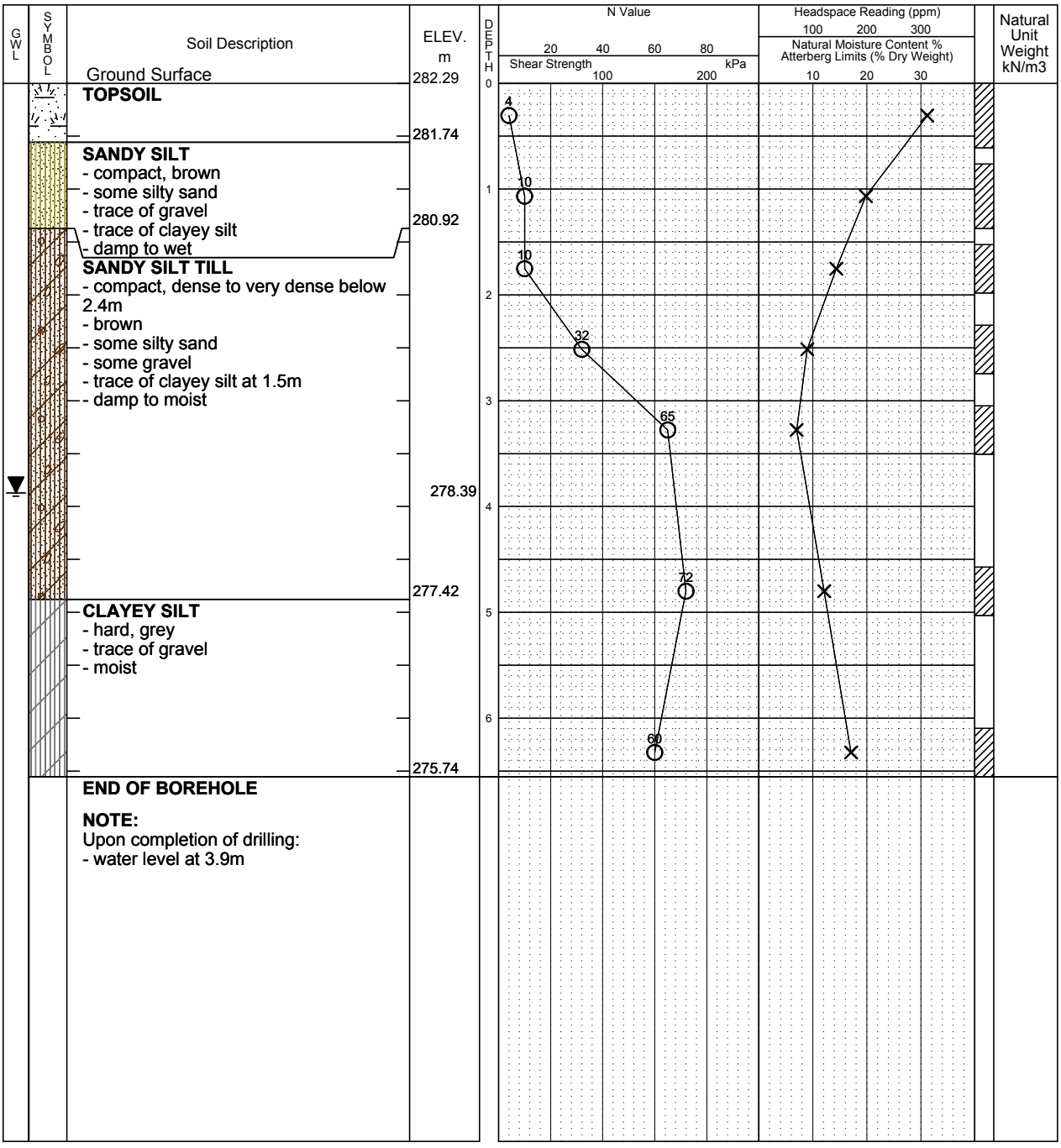
Date Drilled: 12/9/14

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



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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)

Project No. 4007-14-G-YON-A

Log of Borehole BH-2

Dwg No. 3

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/12/14

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	291.99
		TOPSOIL	291.71
		REWORK FILL - brown sandy silt to clayey silt - some rootlets - damp	290.93
▼		**SANDY SILT TILL** - very dense to dense - brown - some gravel - trace of clayey silt - seams of fine sand - moist	287.29
			285.44
		END OF BOREHOLE	

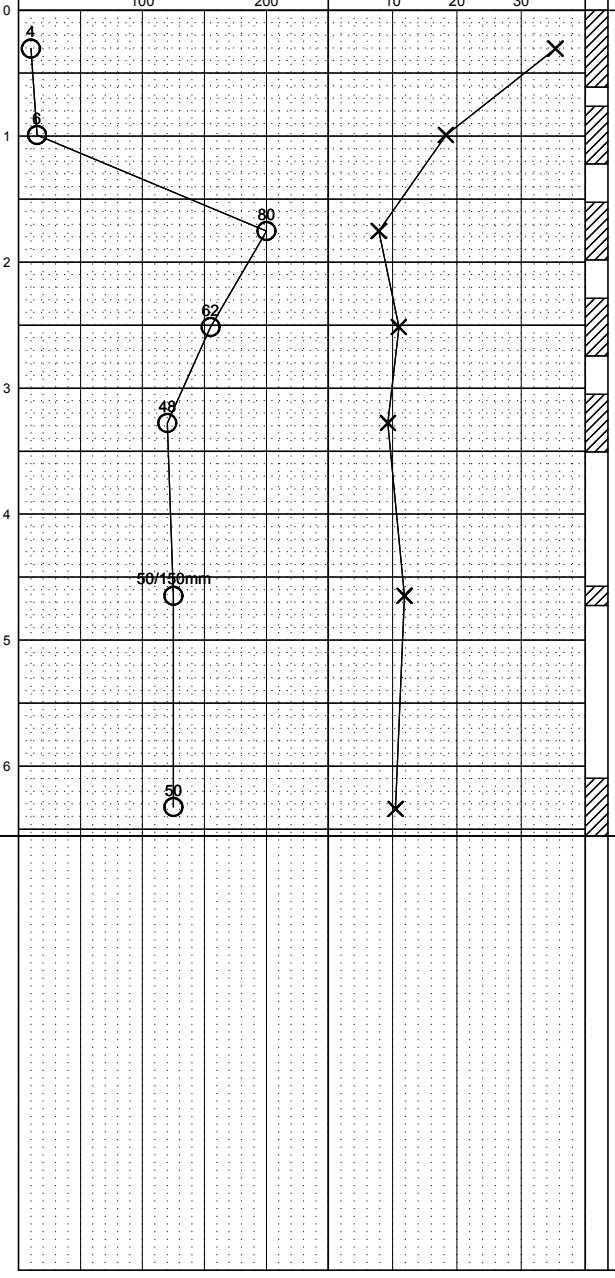
NOTES:
Upon completion of drilling:
- water level at 4.7m

DEPTH 0 1 2 3 4 5 6

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



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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)

Project No. 4007-14-G-YON-A

Log of Borehole BH-3

Dwg No. 4

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/9/14

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	280.20
		TOPSOIL	279.64
		CLAYEY SILT - firm, brown - trace of sandy silt - trace of gravel - moist to damp	278.07
		SANDY SILT TILL - compact, dense to very dense below 3.0m - some clayey silt - some gravel - seams of fine sand - moist	275.32
		CLAYEY SILT - very stiff, grey - low plasticity - trace of sandy silt - trace of gravel - moist	273.65
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - no free water	

DEPTH (m): 0, 1, 2, 3, 4, 5, 6

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: 4, 7, 9, 24, 32, 47, 25

Natural Moisture: 44

LGBE3 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-4

Dwg No. 5

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/9/14

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	283.29	0
		TOPSOIL	282.98	
		REWORK FILL - brown sandy silt to clayey silt - trace of rootlets - moist	282.68	
		SANDY SILT - compact, brown - trace of clayey silt - trace of gravel - seams of sand at 3.6m - moist		1
				2
				3
			279.02	4
		CLAYEY SILT TILL - hard, grey - some gravel - trace of sandy silt - moist		
▼			277.59 277.50	5
		SANDY SILT - very dense, grey - some silty sand - trace of gravel - moist	277.13	6
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 5.7m		

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, 19, 18, 24, 25, 46, 50/65mm

LGBE3 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-5

Dwg No. 6

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

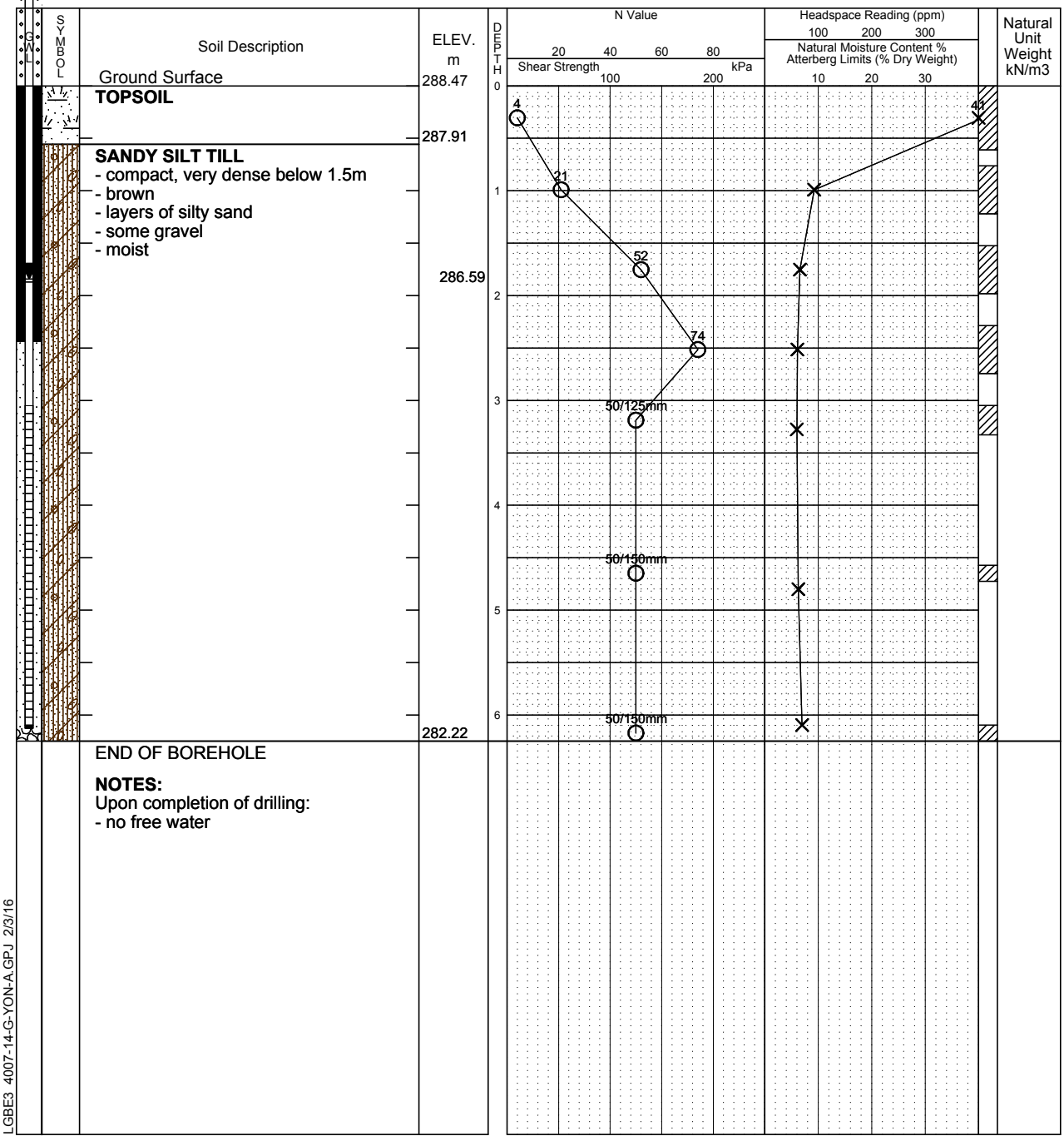
Date Drilled: 12/15/14

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 4007-14-G-YON-A.GPJ 2/3/16

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)
January 5, 2015	1.10m	
March 26, 2015	1.62m	
April 14, 2015	1.89m	

Project No. 4007-14-G-YON-A

Log of Borehole BH-6

Dwg No. 7

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/12/14

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	288.89
		TOPSOIL	
			288.28
		SANDY SILT TILL - compact, dense to very dense below 3.0m - brown, grey below 6.0m - trace of clayey silt - trace to some gravel - seams of fine sand - moist	
			282.49
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - no free water	

DEPTH

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

5
11
23
19
44
72
50/150mm

LGBE3 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-7

Dwg No. 8

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/12/14

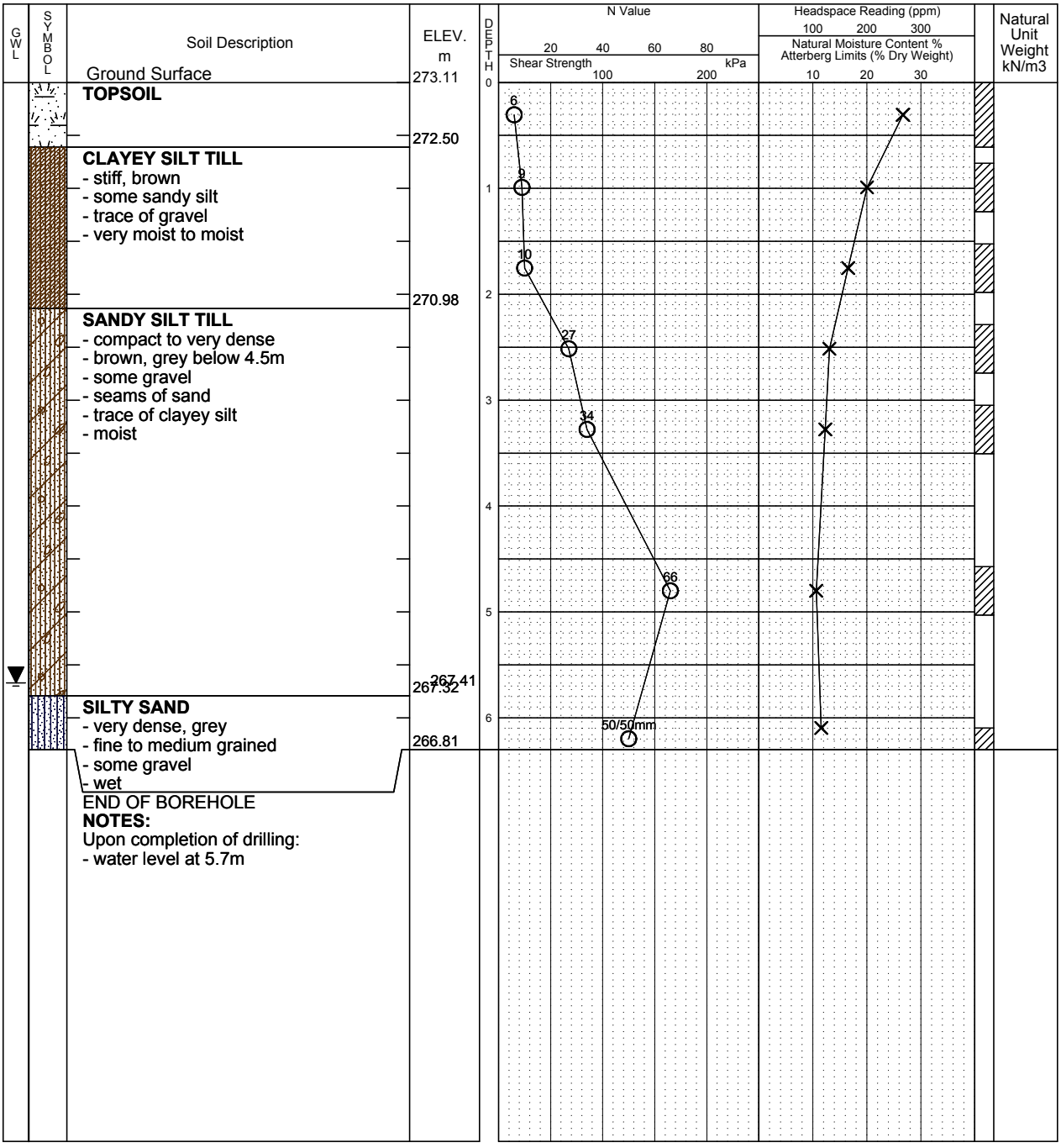
Drill Type: Track Mounted Drill Rig

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	273.11
		TOPSOIL	
			272.50
		CLAYEY SILT TILL - stiff, brown - some sandy silt - trace of gravel - very moist to moist	
			270.98
		SANDY SILT TILL - compact to very dense - brown, grey below 4.5m - some gravel - seams of sand - trace of clayey silt - moist	
▼			267.41
			267.32
		SILTY SAND - very dense, grey - fine to medium grained - some gravel - wet	
			266.81
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 5.7m	



LGBE3 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-8

Dwg No. 9

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/12/14

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	290.52	0
		TOPSOIL	290.11	
		REWORK FILL - brown sandy silt - trace of rootlets - very moist	289.76	
		SANDY SILT TILL - compact, very dense below 1.5m - brown - some gravel - some silty sand - moist		1 2 3
▼			287.22	
			286.25	4
		SAND - very dense, brown - fine to medium grained - silty at 4.5m - some gravel - damp to wet		5
			284.27	6
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 3.3m - cave-in at 5.1m		

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: 4, 13, 60, 63, 75, 79, 50/150mm

LGBE3 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-9

Dwg No. 10

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

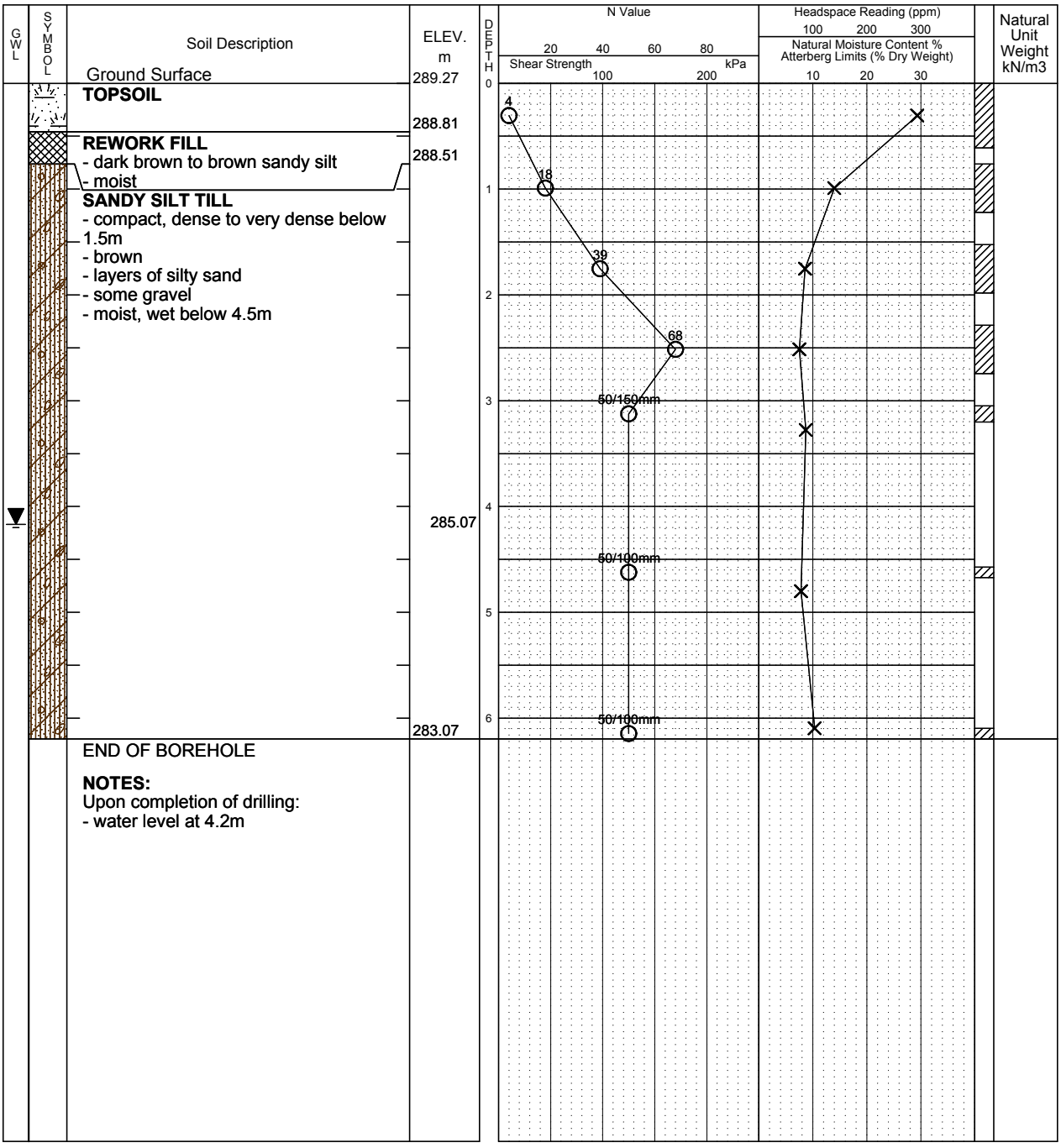
Date Drilled: 12/15/14

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 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-10

Dwg No. 11

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

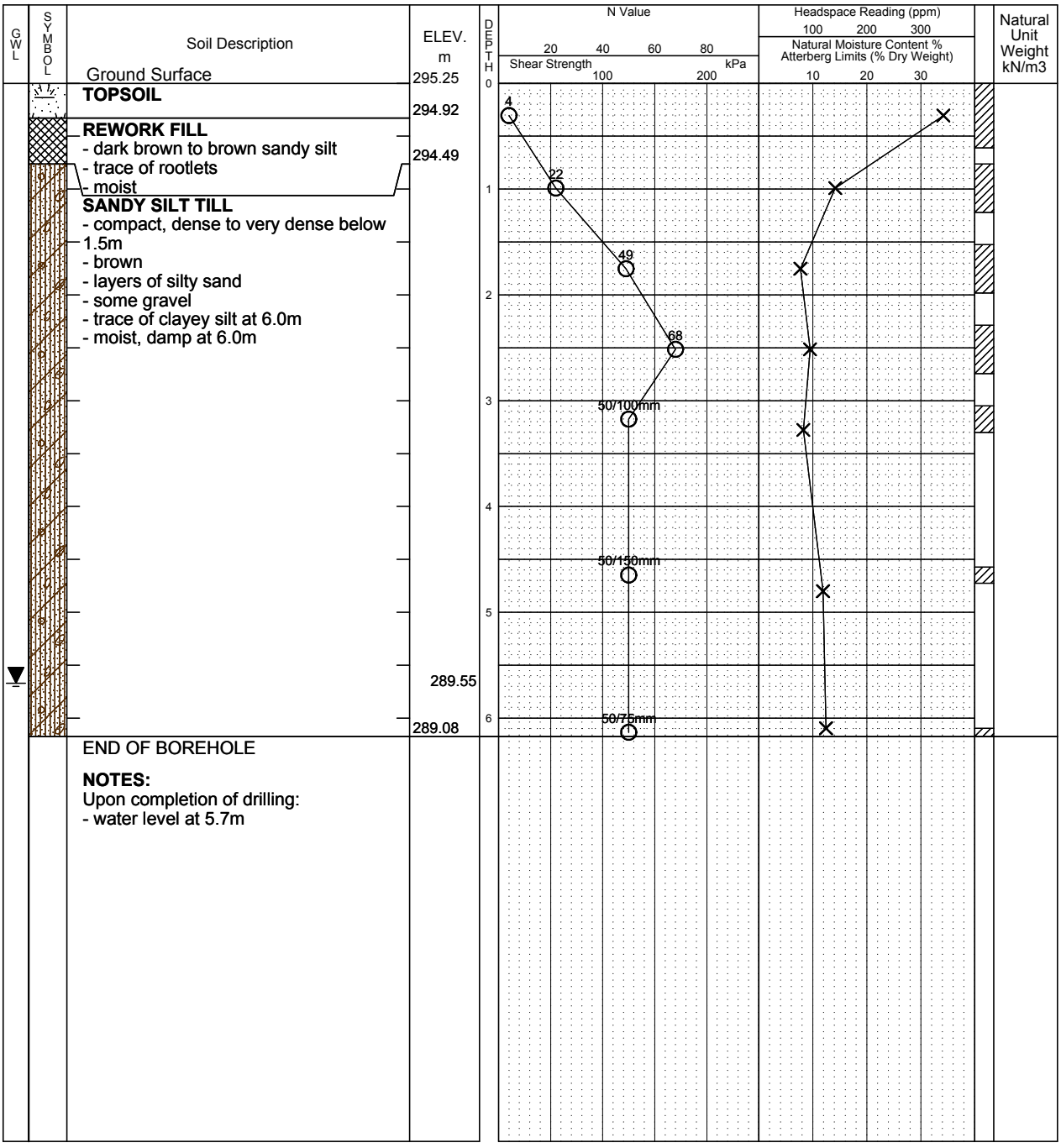
Date Drilled: 12/15/14

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 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-11

Dwg No. 12

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/9/14

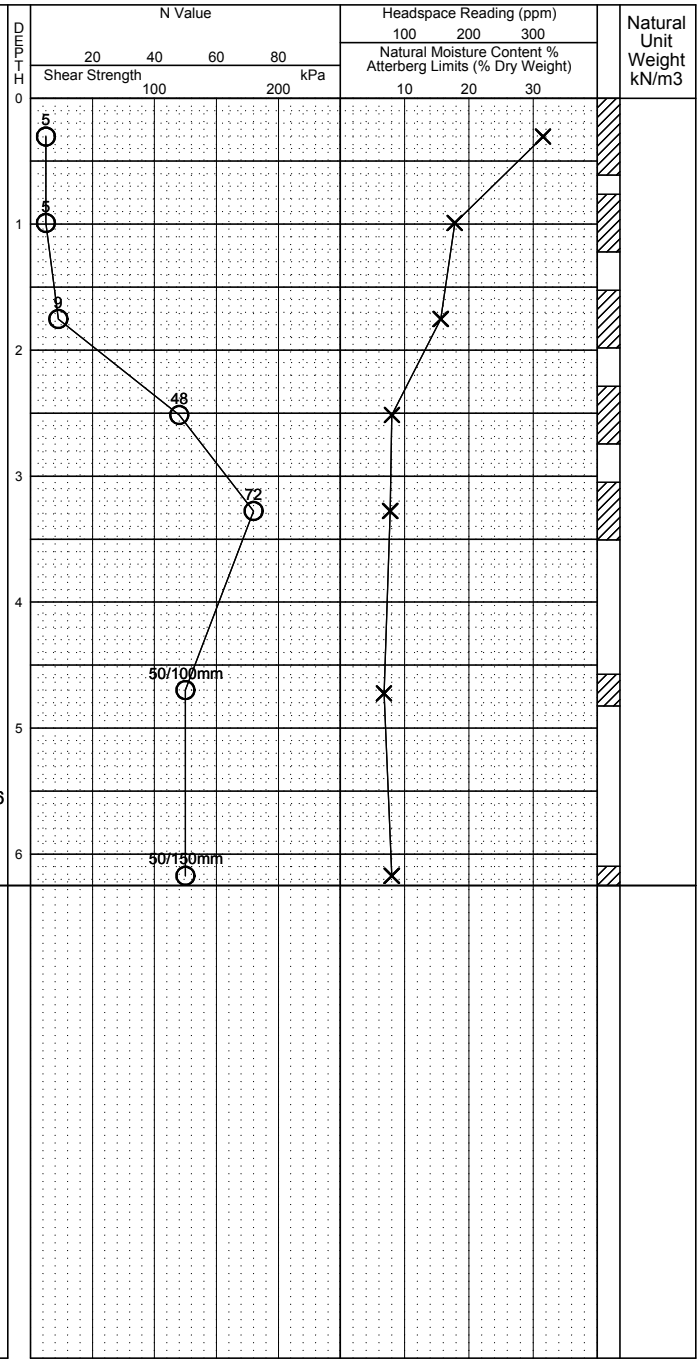
Drill Type: Track Mounted Drill Rig

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	290.06
		TOPSOIL	289.76
		SANDY SILT - loose, brown - some clayey silt at 1.5m - some gravel at 1.5m - wet to very moist	
			287.93
		SANDY SILT TILL - dense to very dense - brown, grey below 6.0m - some gravel - seams of fine sand - moist	
▼			284.46
			283.81
		END OF BOREHOLE	
		NOTES: Upon completion of drilling: - water level at 5.6m	



LGBE3 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-12

Dwg No. 13

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/9/14

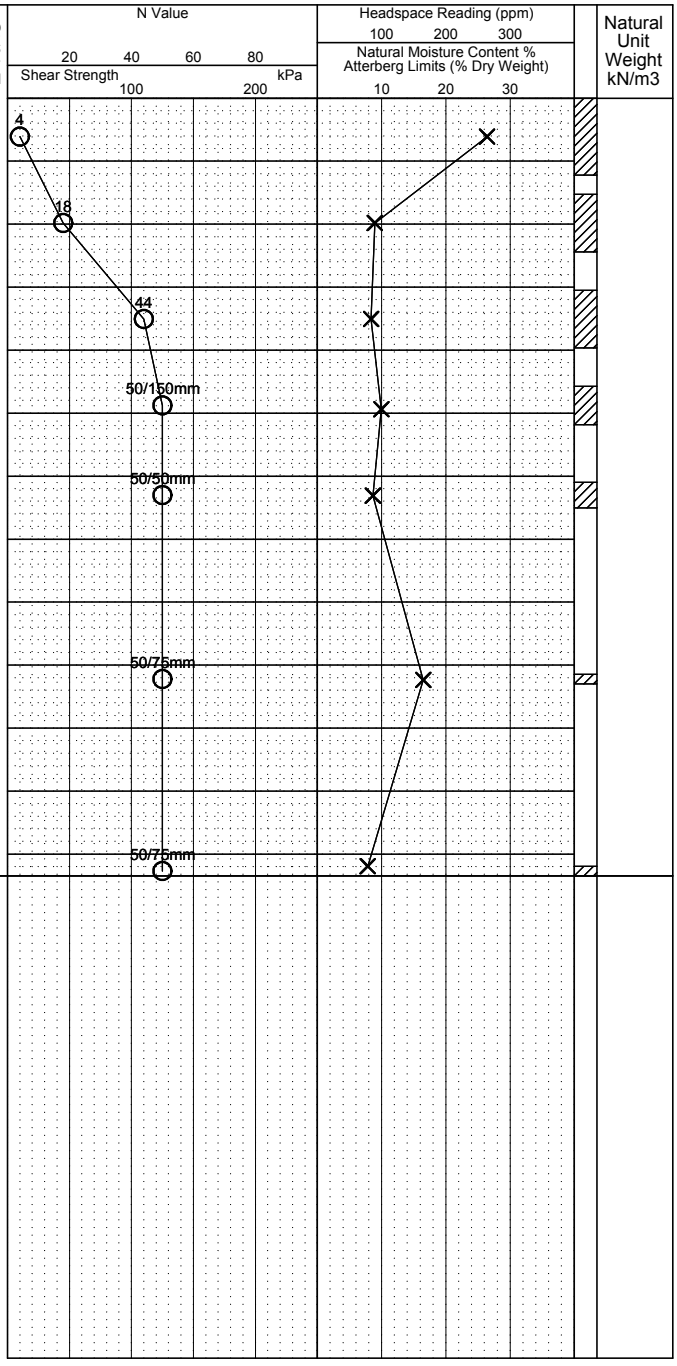
Drill Type: Track Mounted Drill Rig

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	291.96
		TOPSOIL	291.35
		SANDY SILT TILL - compact to dense, brown - some silty sand - trace of gravel - moist	289.83
▼		**SILTY SAND** - very dense - brown, grey below 6.0m - trace of gravel - layer of sandy silt at 4.5m - moist, wet at 4.5m	287.46
			285.79
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 4.5m	



Natural Unit Weight kN/m3

LGBE3 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-13

Dwg No. 14

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/10/14

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	283.04
		TOPSOIL	
			282.43
		SANDY SILT - compact, brown - some silty sand - wet	281.67
▼		**CLAYEY SILT TILL** - firm to very stiff, hard below 6.0m - brown, grey below 4.8m - trace of some gravel - trace of sandy silt - layers of sandy silt at 4.5m - moist to damp	280.34
			276.48
		END OF BOREHOLE	

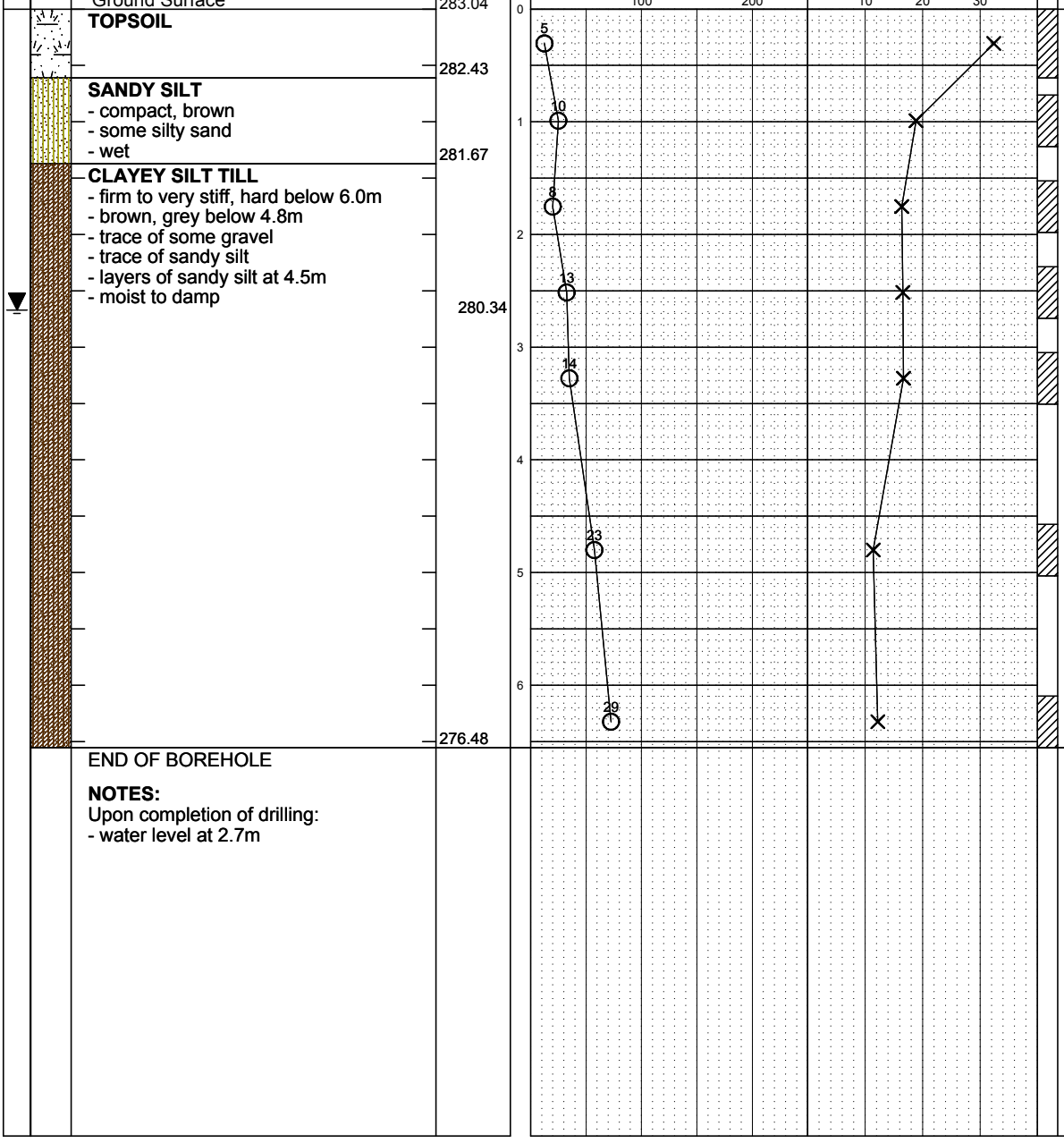
NOTES:
Upon completion of drilling:
- water level at 2.7m

DEPTH 0 1 2 3 4 5 6

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 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-14

Dwg No. 15

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

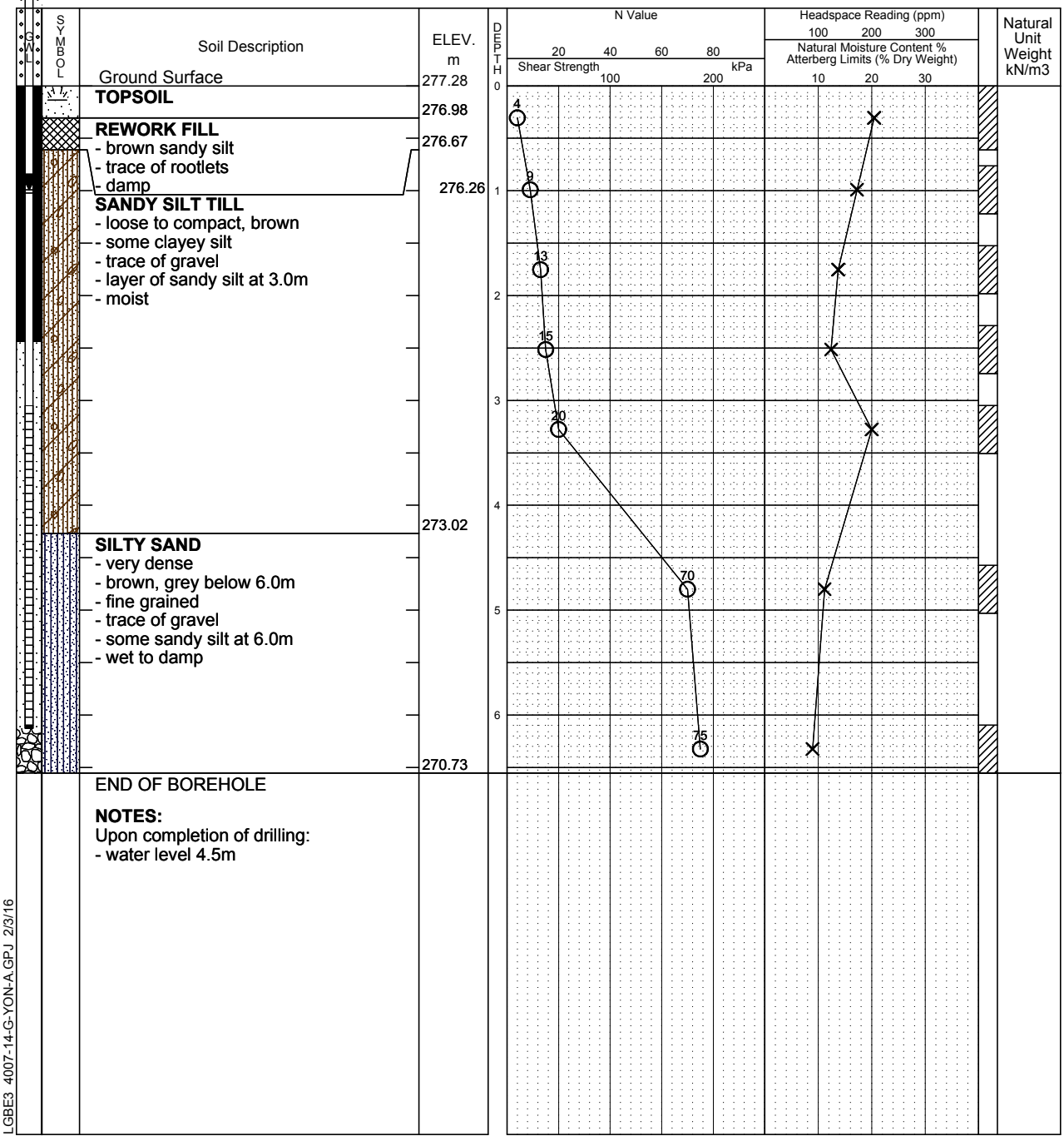
Date Drilled: 12/11/14

Drill Type: Track 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



LGBE3 4007-14-G-YON-A.GPJ 2/3/16

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)
January 6, 2015	0.50m	
March 26, 2015	1.37m	
April 14, 2015	1.02m	

Project No. 4007-14-G-YON-A

Log of Borehole BH-15

Dwg No. 16

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/15/14

Drill Type: Track 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

SYMBOL	Soil Description	ELEV. m	DEPTH
	Ground Surface	276.41	0
	TOPSOIL	276.15	
	REWORK FILL - dark brown to brown clayey silt - damp	275.80 275.71	
	CLAYEY SILT - stiff, brown - trace of sandy silt - very moist	275.04	1
	CLAYEY SILT TILL - stiff to very stiff, hard below 6.0m - brown, grey below 4.5m - some sandy silt - trace of gravel - layer of sandy silt at 6.0m - moist, wet at 6.0m		2 3 4 5 6
		269.85	
	END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 5.7m		

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

4, 13, 9, 12, 15, 19, 48

LGBE3 4007-14-G-YON-A.GPJ 2/3/16

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)
January 6, 2015	0.53m	
March 26, 2015	1.07m	
April 14, 2015	0.70m	

Project No. 4007-14-G-YON-A

Log of Borehole BH-16

Dwg No. 17

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/12/14

Drill Type: Track 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

SYMBOL	Soil Description	ELEV. m	DEPTH
	Ground Surface	278.05	0
	TOPSOIL	277.44	
	REWORK FILL - dark brown to brown clayey silt to sandy silt - trace of rootlets - wet	276.83	1
	CLAYEY SILT - firm, brown - some sandy silt - very moist	276.72 275.92	2
	SILTY SAND - very dense, brown - layers of sandy silt at 2.2m - trace of sandy silt - layer of clayey silt at 4.5m - trace of some gravel - moist to damp, wet below 4.5m	271.83	3 4 5 6
	END OF BOREHOLE		

N Value: 3, 5, 6, 56, 50/150mm, 50/150mm, 50/125mm

Shear Strength: 20 40 60 80 kPa; 100 200

Headspace Reading (ppm): 100 200 300

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

Natural Unit Weight kN/m3

NOTES:
Upon completion of drilling:
- water level at 3.2m

LGBE3 4007-14-G-YON-A.GPJ 2/3/16

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)
January 6, 2015	1.05m	
March 26, 2015	1.92m	
April 14, 2015	1.33m	

Project No. 4007-14-G-YON-A

Log of Borehole BH-17

Dwg No. 18

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

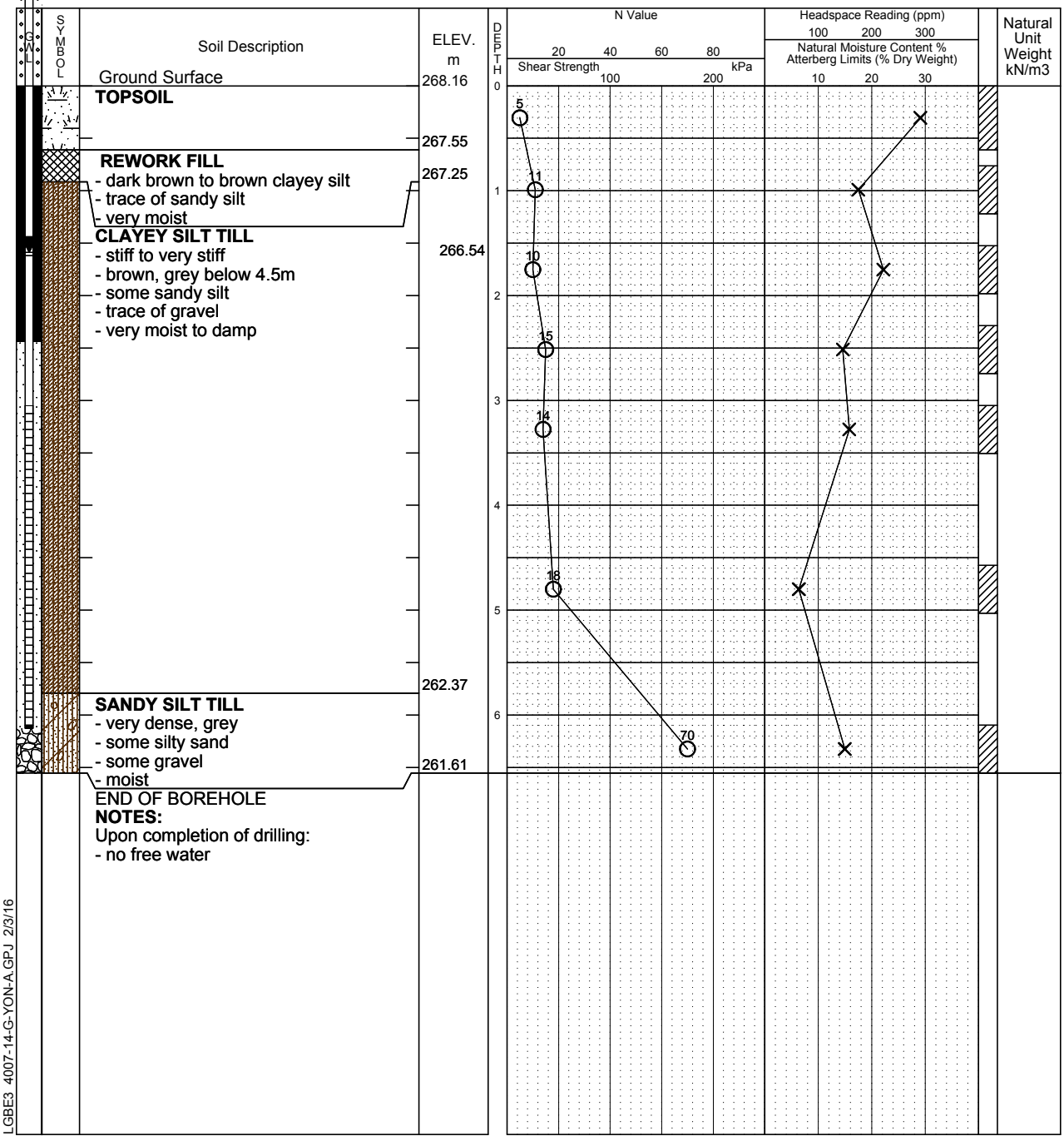
Date Drilled: 12/11/14

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 4007-14-G-YON-A.GPJ 2/3/16

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)
January 6, 2015	0.90m	
March 26, 2015	1.71m	
April 14, 2015	1.62m	

Project No. 4007-14-G-YON-A

Log of Borehole BH-18

Dwg No. 19

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/15/14

Drill Type: Track Mounted Drill Rig

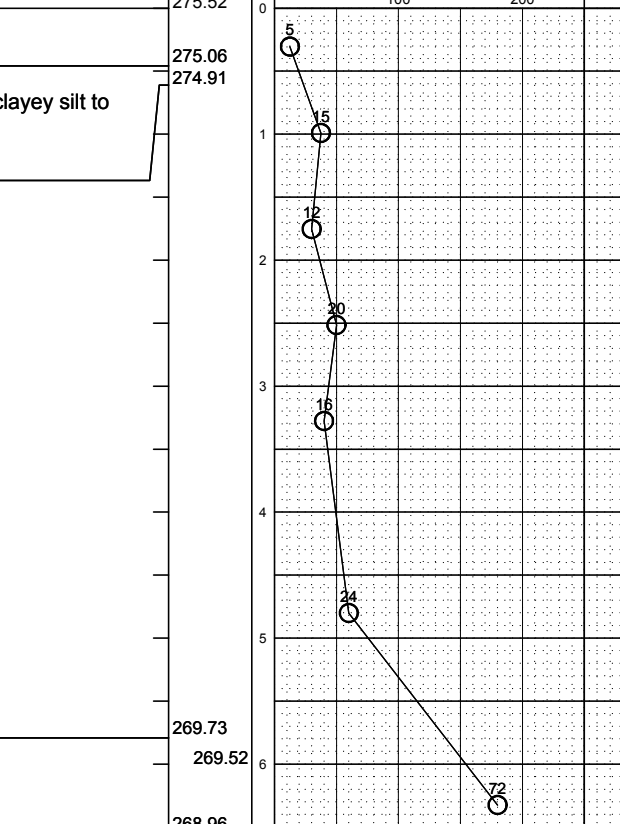
Datum: Geodetic

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	275.52	0
		TOPSOIL	275.06	
		REWORK FILL - dark brown to brown clayey silt to sandy silt - trace of rootlets - moist	274.91	
		CLAYEY SILT TILL - stiff to very stiff - brown - some sandy silt - trace of gravel - seams of fine sand - moist	269.73	1 2 3 4 5
▼		**SILTY SAND** - very dense, grey - some gravel - trace of clayey silt - damp	269.52 268.96	6
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 6.0m		

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 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-19

Dwg No. 20

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

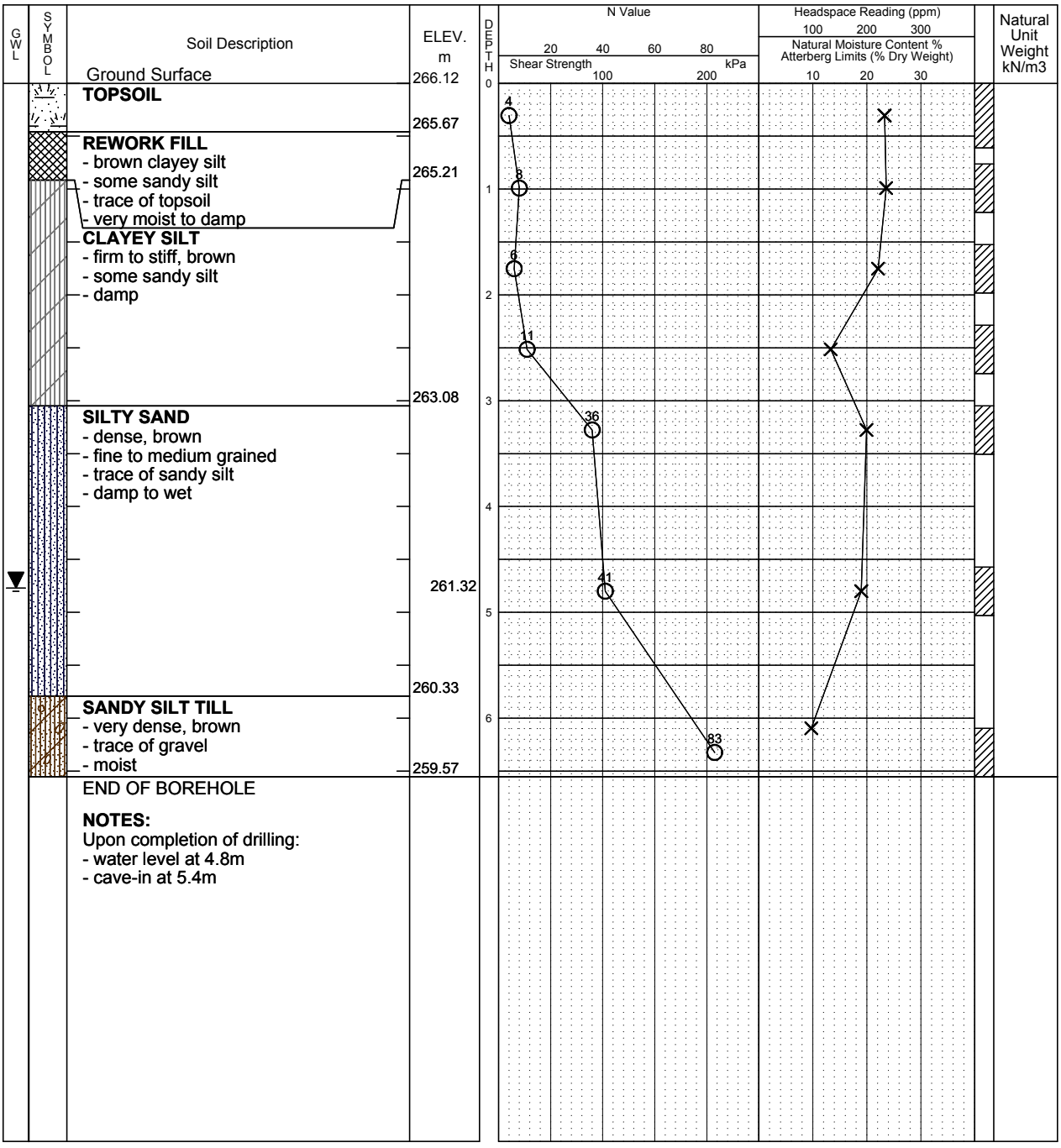
Date Drilled: 12/11/14

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 4007-14-G-YON-A.GPJ 2/3/16

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. 4007-14-G-YON-A

Log of Borehole BH-20

Dwg No. 21

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

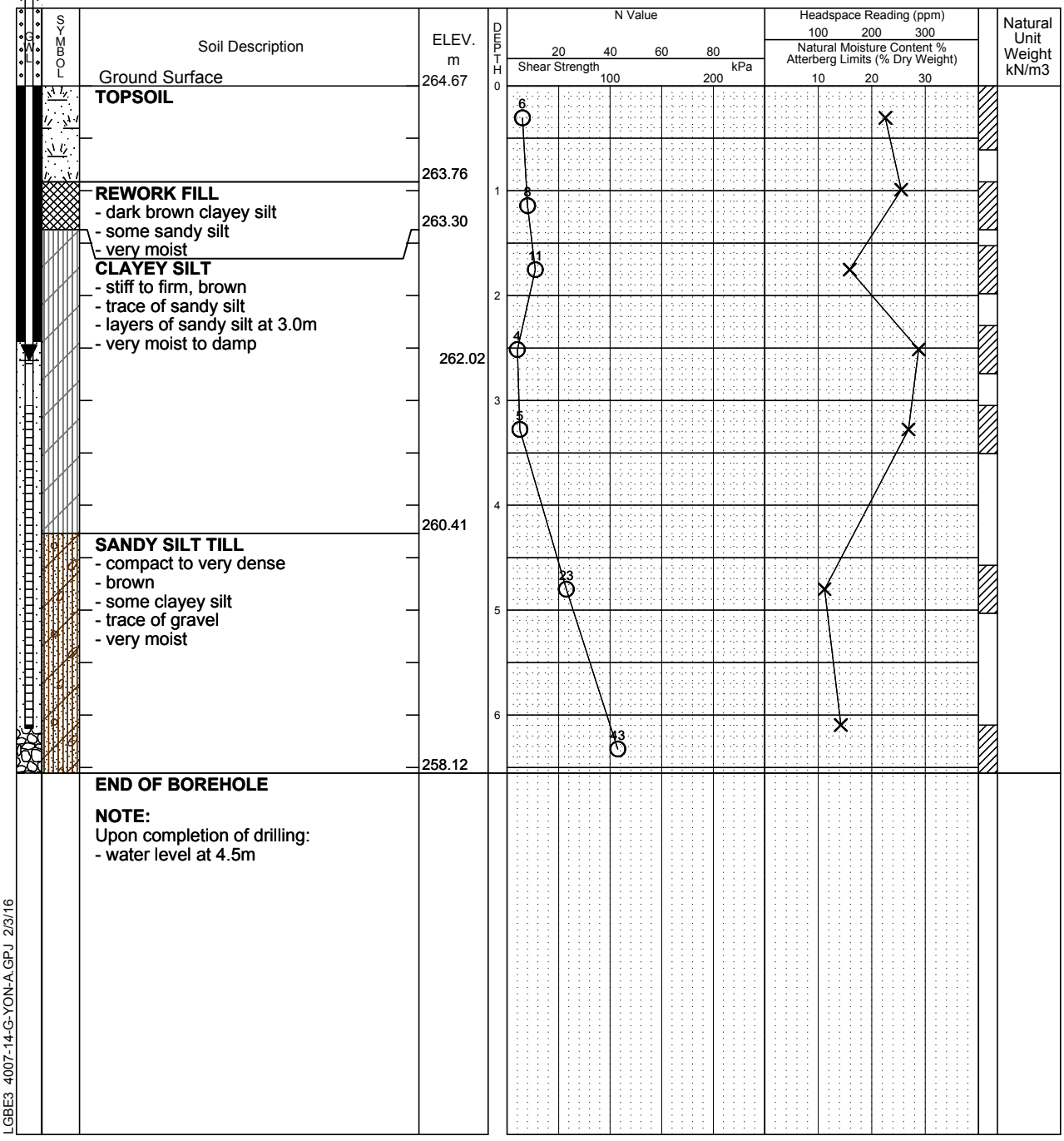
Date Drilled: 12/11/14

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 4007-14-G-YON-A.GPJ 2/3/16

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)
January 6, 2015	1.50m	
March 26, 2015	2.96m	
April 14, 2015	2.65m	

Project No. 4007-14-G-YON-A

Log of Borehole BH-21

Dwg No. 22

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: NW Yonge and Green Lane Secondary Plan, East Gwillimbury, Ontario

Date Drilled: 12/11/14

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	272.86
		TOPSOIL	272.48
		REWORK FILL - dark brown to brown sandy silt - some clayey silt - trace of rootlets and topsoil - very moist	271.19
		CLAYEY SILT - stiff to firm, brown - some sandy silt - moist to very moist	268.60
		SANDY SILT TILL - compact, brown - some clayey silt - trace of gravel - seams of sand - moist to very moist	266.31
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - no free water	

DEPTH

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

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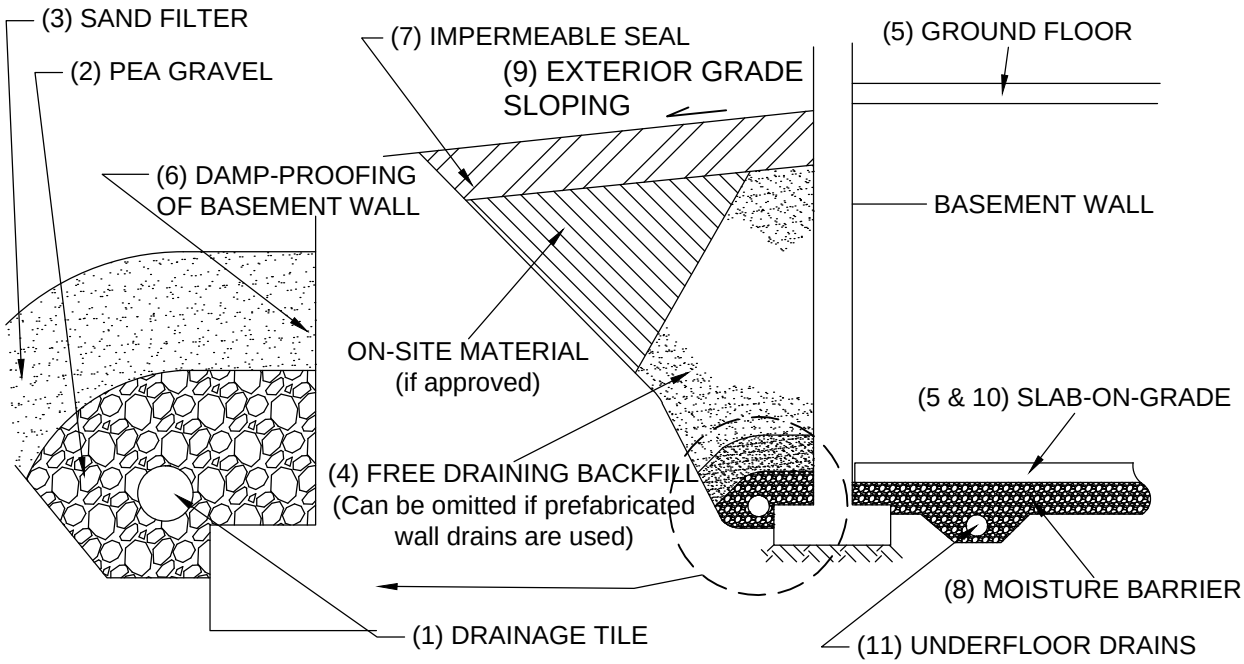
NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

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

Toronto Inspection Ltd.

Figure
Details of Permanent Perimeter Drainage System



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. 1

Toronto Inspection Ltd.

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.