Toronto Inspection LTD.
GEO-ENVIRONMENTAL CONSULTANTS

REPORT ON
PRELIMINARY GEOTECHNICAL INVESTIGATION
603 – 699 KINGSTON ROAD
PICKERING, ONTARIO

REPORT NO.: 4986-18-GC (R)
REPORT DATE: APRIL 20, 2020

PREPARED FOR
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Toronto Inspection Ltd.

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1.0 INTRODUCTION

Toronto Inspection Ltd. (TIL) carried out a preliminary geotechnical Investigation for the proposed redevelopment at a property, designated as 603-643 & 645-699 Kingston Road, Pickering, Ontario (hereinafter referred to as "the Site"). The report of our findings and recommendations for the design and construction of the proposed structures was presented in the Preliminary Geotechnical Investigation Report No.: 4986-18-GC, dated April 30, 2019.

The report has been revised based on a review of the architectural drawings, Conceptual Site Plan and Underground Plan, prepared by Graziani + Corazza Architects, dated April 6, 2020. The current concept development will consist of 4 blocks of 4 storey stacked towns, with two levels of underground parking, and eight 18 to 42 storey mid-rise and high-rise buildings (towers), with one or two levels of underground parking.

The recommendations provided in the revised report are based on the subsoil and groundwater conditions at the Site, obtained at the borehole locations, carried out in February and March, 2019, under supervision of ***Toronto Inspection Ltd.*** and the information provided in the above drawings. In particular, the geotechnical data, provided in the revised report, are 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 proposed structures will be in accordance with the applicable guidelines, building codes and standards. If there are any changes in the design features relevant to the geotechnical analyses, our office should be consulted to review the design and to conform that the geotechnical parameters and recommendations / comments, provided in the report, have been followed.

This report supersedes the previous preliminary geotechnical investigation report and any verbal or written recommendations provided for the Site.

2.0 SITE CONDITION

The Site, approximately 4.85 hectares in area and approximately rectangle in shape, is located on the south side of Kingston Road, on the west side of Whites Road North and on the north side of Highway 401 in Pickering, Ontario.

At the time of the investigation, the Site was occupied with three single-storey commercial buildings, containing a number of retail stores. The Site gradient was relatively flat, generally lower than the Kingston Road, Whites Road and Highway 401, sloping slightly towards the south.

3.0 INVESTIGATION PROCEDURE

The field work for the investigation was carried out in the period of February 4 to 20 and March 19 to 21, 2019, and consisted of drilling sixteen boreholes (BH-1 to BH-16), extending to depths of 6.2m to 20.3m from grade, at the locations within the open spaces, outside the existing buildings, shown on the appended Borehole Location Plan (Drawing No. 1).

The boreholes were advanced using a truck mounted drill rig, equipped with continuous flight solid stem augers and sampling rods, supplied by a specialist drilling contractor. Soil samples were generally retrieved from the boreholes at 0.76m intervals to depths of 3m below the existing ground level. Below these depths, the sampling frequency was increased to 1.5m. The samples were obtained using a split spoon sampler in conjunction with Standard Penetration Tests (SPT) using a driving energy of 475 joules (350 ft-lbs). The samples were identified and logged in the field and were carefully bagged and delivered to our laboratory for moisture content determination and visual identification by a geotechnical engineer.

Groundwater observations were made in the open boreholes during and upon the completion of drilling. Ten of the boreholes, BH-1, BH-5 to BH-7, BH-9 and BH-12 to BH-16, were completed as observation wells for the determination of groundwater conditions. In additional, MW-6, MW-12 and MW-15 were drilled beside BH-6, BH-12 and BH-15 locations, without sampling, to depths of 4.5m, 5.2m and 6.1m from grade, respectively, and completed as monitoring wells, to supplement the groundwater data for the Hydrogeological Study.

The borehole locations were established in the field by our site personnel. The ground elevations at the borehole locations were determined using "TOP OF CB & MH", located

in the pavement area, between the buildings, as shown on the Borehole Location Plan, as the temporary bench mark (TBM).

The geodetic elevations of 104.96m, 104.68m, 104.81m and 104.73m for the TBMs were obtained from the Topographical Survey of Part of Lot 29, Range 3, Broken Front Concession, City of Pickering, prepared by R. Avis Surveying Inc., dated November 12, 2018, provided to our office by the client.

4.0 SUMMARISED SUBSURFACE CONDITIONS

Reference is made to the appended Borehole Location Plan (Drawing No. 1) and Logs of Borehole sheets (Drawing Nos. 2 to 17), including Logs of Monitoring Wells (Drawing Nos. 18 to 20) for details of field work, including soil classification, inferred stratigraphy, ground water observations carried out during and on completion of the boreholes.

The subsoil, below the surface course of asphalt pavement, consisted of fill overlying native sandy silt till, sand, silty sand, and sand and gravel deposits. Brief descriptions of the subsurface materials, encountered at the borehole locations are as follows:

4.1 Surface Course

A pavement structure, consisting of approximately 50mm to 115mm of asphalt over granular base courses, was contacted at the ground surface at all borehole locations, and extended to depths of 0.2m to 0.4m from grade.

4.2 Fill

Below the surface course of asphalt pavement at all borehole locations, a layer of fill was contacted, at depths of 0.2m to 0.4m from grade. The fill consisted of a mixture of sandy silt to clayey silt, trace to some gravel, trace silty sand, scattered organics or topsoil, isolated wood pieces. The fill extended to depths of 0.4m to 2.4m from grade.

4.3 Sandy Silt Till

A sandy silt till deposit was contacted at all borehole locations, below the fill at depths of 0.4m to 2.4m from grade. The deposit consisted of a heterogeneous mixture of silt, sand and clay with some gravel, and contained occasional seams or thin layers of fine sand, silty sand, sandy silt or clayey silt, with occasional cobbles.

Boreholes BH-13 to BH-15 were terminated in the sandy silt till deposit at depths of 6.2m to 9.1m from grade; Boreholes BH-1, BH-2, BH-6 and BH-16 were terminated in the sandy silt till deposit at depths of 20.0m to 20.3m from grade. The sandy silt till deposit at BH-3 to BH-5 and BH-7 to BH-12 extended to depths of 5.8m to 18.0m from grade.

A lower sandy silt till deposit was contacted at BH-4, BH-7 to BH-9, BH-11 and BH-12 locations, below sand / silty sand deposits, at depths of 7.3m to 16.8m from grade. Boreholes BH-7 to BH-9 were terminated in the lower sandy silt till deposit at depths of 19.9m to 20.2m from grade, with Borehole BH-12 terminated at a depth of 7.9m from grade. The lower sandy silt till deposit at BH-4 and BH-11 locations extended to depths of 12.2m and 13.4m from grade, respectively.

An another deeper sandy silt till deposit was contacted at BH-11 location, below a lower sand deposit, at a depth of 18.0m from grade. Borehole BH-11 was terminated in the deeper sandy silt till deposit, at a depth of 20.1m from grade.

Based on the Standard Penetration N-values, in the range of 10 to more than 100 blows per 0.3m penetration, the relative density of these sandy silt till deposits was compact to very dense.

The in-situ moisture contents of the soil samples, retrieved from the sandy silt till deposit, varied from 3% to 18%, indicating moist to very moist conditions, with occasional wet layers or pockets.

Grain size analyses were carried out on two selected soil samples, obtained from BH-1 (SS9 - at a depth of 9.1m) and BH-16 (SS11 – at a depth of 12.2m), using both of mechanical sieves and hydrometer. The grain size distributions are shown on the appended Figure No. 1.

4.4 Sand / Silty Sand

An upper sand deposit was contacted at BH-4, BH-11 and BH-12 locations, below the sandy silt till deposit at depths of 8.8m, 5.5m, and 5.5m from grade, respectively. The sand deposit was medium with coarse grained and contained some gravel, with occasional silty sand to sandy silt at BH-4 location. The sand deposit at the shallow portion extended to depths of 10.9m, 10.4m and 7.3m from grade, respectively.

A deeper sand or silty sand deposit was contacted at BH-4, BH-5, BH-7 to BH-9 and BH-11 locations, at depths of 12.2m to 16.5m from grade. The sand / silty sand deposit was fine to medium grained or fine to coarse grained, and contained trace to some gravel, with occasional layers of sandy silt or silty sand. Boreholes BH-4 and BH-5 were terminated in the deeper sand deposit at depths of 20.0m to 20.3m from grade. The sand / silty sand deposit at BH-7 to BH-9 and BH-11 locations extended to depths of 14.9m to 18.0m from grade.

Based on the Standard Penetration N-values, in the range of 22 to more than 100 blows per 0.3m penetration, the relative density of the sand / silty sand deposit was generally dense to very dense with an isolated compact layer at BH-7 location.

The in-situ moisture contents of the soil samples, retrieved from the sand / silty sand deposit, varied from 8% to 18%, indicating moist to wet conditions.

A grain size analysis was carried out on one selected soil sample, obtained from BH-4 (SS9 - at a depth of 9.1m), using mechanical sieves. The grain size distribution is shown on the appended Figure No. 1.

4.5 Sand and Gravel

A sand and gravel deposit was contacted at BH-3 and BH-10 locations, below the sandy silt till deposit at depths of 18.0m and 7.3m from grade, respectively. The deposit was a mixture of fine to coarse grained sand and gravel. The deposit contained a thin layer of fine sand at a depth of 18.6m from grade at BH-3 location, and contained a layer of silty sand to sandy silt below a depth of 18.3m from grade at BH-10 location. Boreholes BH-3 and BH-10 were terminated in the sand and gravel deposit at depths of 20.0m and 20.2m from grade, respectively.

Based on the Standard Penetration N-values, in the range of 27 to more than 100 blows per 0.3m penetration, the relative density of the sand and gravel deposit was generally very dense, with a compact layer.

The in-situ moisture contents of the soil samples, retrieved from the sand and gravel deposit, varied from 12% to 19%, indicating wet conditions.

A grain size analysis was carried out on one selected soil sample, obtained from BH-10 (SS8 - at a depth of 7.9m), using both mechanical sieves and hydrometer. The grain size distribution is shown on the appended Figure No. 1.

4.6 Groundwater

Free water was recorded in all open boreholes, except BH-8 and BH-14 to BH-16, at depths of 1.8m to 12.0m from grade; cave-in was recorded in all open boreholes, except BH-7 and BH-14 to BH-16, at depths of 5.2m to 17.7m from grade, upon completion of the drilling operation. No free water or cave-in was recorded in open Boreholes BH-14 to BH-16.

During the groundwater monitoring rounds on March 7, 11, 25 and 26, 2019, free water, measured in the observation wells at Boreholes BH-1, BH-5 to BH-7, BH-9 & BH-13 to BH-16, and monitoring wells MW-6, MW-12 & MW-15, were at depths as follow.

BH/ Well Location	Well Depth	Groundwater Measured Depths				
		Upon Completion	March 7, 2019 *	March 11, 2019	March 25, 2019	March 26, 2019
BH-1	9.1m	1.8m	3.11m	7.31m	-	(Blocked)
BH-5	9.1m	6.7m	3.62m	4.37m	-	3.59m
BH-6	9.1m	7.0m	-	-	-	3.01m
BH-7	19.8m	12.0m	3.98m	4.00m	-	3.92m
BH-9	9.1m	5.4m	2.98m	3.05m	-	3.06m
BH-13	6.1m	5.5m	2.58m	2.53m	-	2.30m
BH-14	4.6m	Dry	4.31m	Dry	-	4.54m
BH-15	9.1m	Dry	Dry	Dry	8.48m	8.89m
BH-16	19.8m	Dry	-	-	6.95m	8.25m
MW-6	4.6m	Dry	2.08m	2.07m	-	1.40m
MW-12	5.2m	4.0m	-	-	4.16m	4.15m
MW-15	6.1m	5.8m cave-in	-	-	Dry	Dry

*: water purged from wells after measurement on March 7, 2019.

Based on the moisture content profile of the soil samples retrieved from the boreholes and our field observation at the Site and the groundwater records, it is our opinion that the water levels recorded represent water in the layers/seams of sand within the till deposit, the discontinuous sand / silty sand / sand and gravel deposits, or perched water from the fill.

We recommend that the static groundwater table conditions at the Site should be confirmed by the hydrogeological study.

5.0 RECOMMENDATIONS

As per a review of the architectural drawings, Conceptual Site Plan and Underground Plan, prepared by Graziani + Corazza Architects, dated April 6, 2020, provided to our office by the client, we understand that the proposed redevelopment at the Site, after demolition and removal of the existing structures and asphalt pavements, will consist of 4 blocks of 4 storey stacked towns, with two levels of underground parking, and eight 18 to 42 storey mid-rise and high-rise buildings (towers), with one or two levels of underground parking.

The ground floor elevations and the slab-on-grade elevations of the underground parking were not known at the time of preparation of this report. However, we have assumed that the ground floor elevations will be at or above the existing ground level and the slab-on-grade levels will be at depths of approximately 3.0m and 6.0m below the existing ground level, for the one and two levels of underground parking. The founding levels of the spread footings are assumed to be 1.0m lower than the above assumed slab-on-grade depths, i.e. at or below depths of 4.0m and 7.0 below the existing ground level. However, the elevator and the surrounding foundations, for the high-rise buildings, are anticipated to be deeper than the above assumed founding levels, at depths of 6.0m and 9.0m below the existing ground level.

The proposed slab-on-grade for the one level of underground parking will be close to or slightly above the documented groundwater levels, at BH-6 to BH-9 and BH-13 locations. The proposed slab-on-grade for the two levels of underground parking will be approximately 3m below the static groundwater levels, documented at most of the monitoring wells at the Site. Unless a permanent groundwater control system is used to maintain the water level a minimum of 0.5m below the proposed lowest slab-on-grade elevation, we recommend that the part of the underground parking, below the highest anticipated water level, should be designed as a water tight structure and consideration should, therefore, be given to use a raft slab as the foundation of the proposed structures.

The following foundation recommendations for the design and construction of the redevelopment, are based on the subsoil encountered at the borehole locations and are on the assumption that the groundwater table will be maintained below the slab-on-grade elevation and are for preliminary design purpose only. Additional boreholes will have to be carried out, including within each tower area, to update this report, after the details of the redevelopment have been finalized and the existing structures have been demolished.

The Hydrogeological Study should be consulted to confirm the static groundwater conditions at the Site, before deciding the most suitable foundation types that can be used at the Site.

5.1 Foundations
(Boreholes BH-1 to BH-13, BH-15 and BH-16)

The subsoil at and below the assumed founding depths of 4.0m to 6.0m and 7.0m to 9.0m from grade for one or two levels of underground parking are anticipated to consist of dense to very dense sandy silt till, sand and gravel or sand deposits at BH-1 to BH-13, BH-15 and BH-16 locations, with compact sandy silt till layers at BH-2 and BH-6 locations. Conventional spread and strip footings, founded in these undisturbed sandy silt till to sand / sand and gravel deposits, can be designed using the following bearing pressures at Serviceability Limit State (SLS) and at Factored Ultimate Limit State (ULS):

AREA	BH ID	BH Elevation	Founding Depth	Founding Subsoil	Bearing Pressures	
					SLS	ULS
Block 1 Block 2 Tower 4	BH-1	105.35m	7m~9m	Very dense sandy silt till	800 kPa	1200 kPa
	BH-2	105.55m	7m~9m	Compact to dense sandy silt till*	200 kPa	300 kPa
	BH-3	105.42m	7m~9m	Very dense sandy silt till**	600 kPa	900 kPa
Block 3 Block 4 Tower 5	BH-4	105.77m	7m~9m	Very dense sandy silt till to sand	800 kPa	1200 kPa
	BH-5	104.76m	7m~9m	Very dense sandy silt till	800 kPa	1200 kPa
	BH-12	105.01m	7m~9m	Very dense sandy silt till	800 kPa	1200 kPa
	BH-15	105.42m	7m~9m	Very dense sandy silt till	800 kPa	1200 kPa
	BH-16	105.00m	7m~9m	Very dense sandy silt till	800 kPa	1200 kPa
Tower 1 to Tower 3	BH-13	105.01m	4m~6m	Very dense sandy silt till	800 kPa	1200 kPa
	BH-6	104.97m	4m~6m	Compact to very dense sandy silt till	600 kPa	900 kPa
	BH-7	105.73m	4m~6m	Very dense sandy silt till**	600 kPa	900 kPa
	BH-8	105.19m	4m~6m	Very dense sandy silt till	800 kPa	1200 kPa
	BH-9	104.89m	4m~6m	Very dense sandy silt till	800 kPa	1200 kPa
Tower 6 Tower 7	BH-9	104.89m	7m~9m	Very dense sandy silt till	800 kPa	1200 kPa
	BH-10	104.78m	7m~9m	Very dense sandy silt till to sand and gravel	800 kPa	1200 kPa
	BH-11	104.91m	7m~9m	Very dense sand	800 kPa	1200 kPa

*: Please note that the relative density of the glacial till at Boreholes BH-2 was significantly lower than the other boreholes. We recommend that additional boreholes should be carried out around this borehole, to determine the aerial extent of the lower relative density deposit.
**: a relatively weaker pocket below the founding subsoil.

The total and differential settlement of the new foundations, under the above recommended bearing pressures at Serviceability Limit State, will not exceed 25 mm and 20 mm, respectively.

All perimeter footings or any footings, which may be exposed to freezing penetration, should be placed below the frost penetration depth of 1.2 m below the outside grade or be provided with an equivalent thermal protection.

There is no official rule governing the footing depth for a fully enclosed unheated garage. Unmonitored experience in the past has shown that footing depths of less than the frost penetration depths 1.2 m have been adequate. For the one level of underground parking, the interior columns / walls and the perimeter wall footings can be founded at depths of 0.9m and 0.8m, respectively, below the top of the garage slab. For the two levels of underground parking, the interior columns / walls and the perimeter wall footings can be founded at depths of 0.8m and 0.6m, respectively, below the top of the garage slab. However, footings adjacent to the fresh air ducts, the entrance of the garage and any other areas which may be exposed to the outside, a minimum frost cover of 1.2 m should be provided. In addition, a nominal 50 mm of Styrofoam insulation should be provided under the floor slab within the close proximity to the fresh air ducts.

If the groundwater table cannot be maintained below the slab-on-grade for the two levels of underground parking, consideration should be given to use a raft slab. The raft foundation can be designed using the above bearing pressures at the borehole locations. For the design of raft foundation, a modulus of subgrade reaction of 50 MN/m3 can be used on the dense to very sandy silt till to sand deposits.

For the construction of the raft construction, provision will have to be made to provide a space between the top of the raft and the slab-on-grade, for the installation of sewers and any other in-ground services. **Since the founding of the raft foundation will be below the groundwater table, we recommend that the part of the structure below the highest anticipated groundwater table, as established by the hydrogeological study, should be designed as a water right structure.**

It is our opinion that the temporary dewatering, before and during construction, would be to use sump pits, an eductor system, deep wells, vacuum well points or a combination of these systems, after the excavation has reached approximately 1m above the current static water level. The dewatering system should be designed by the dewatering contractor to maintain the water level a minimum 0.5m below the deepest footing level.

It should be noted that the above recommendations for the design and construction of footings 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 ***TIL***, to validate the information for use during construction.

5.2 Floor Slab Construction

The subsoil under the proposed slab-on-grade for one or two levels of underground parking will consist of sandy silt till to sand deposits. The floor slab of the proposed buildings can be designed and constructed as a conventional slab-on-grade method, provided that the groundwater table is maintained a minimum of 0.5m below the slab-on-grade. For the one level of underground parking, a subfloor drainage system may be feasible to maintain the groundwater table a minimum of 0.5m below the slab-on-grade.

A granular base course, consisting of at least of 150 mm of Granular A (OPSS Form 1010) or its approved equivalent, should be provided between the subsoil and the slab-on-grade as a moisture barrier. The granular base should be compacted to at least 100% of its Standard Proctor maximum dry density.

For raft foundation design, the space between the top of the raft foundation and the slab-on-grade, for installation of sewers and other in-ground services, can be filled with 19mm clear stone. The floor slab can be poured directly over the clear stone backfill.

5.3 Earthquake Consideration

The Ontario Building Code requires that all buildings be designed to resist earthquake forces. In accordance with Table 4.1.8.4.A of the Ontario Building Code, the site classification for the Seismic Site Response is Class C (very dense soil), which we recommend should be confirmed using a shear wave velocity testing.

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.

5.4 Excavation

All excavations should comply with the Ontario Occupational Health and Safety Act. Any excavation in the fill should be sloped back to a safe angle of 45 degrees or flatter.

In areas where adequate space will not be available for an open excavation, a temporary shoring system will have to be used to support the vertical faces of the excavation. The shoring design parameters and our recommendations on the installation and testing of the shoring system are provided in Appendix A of this report.

5.5 Lateral Earth Pressure

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

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

where	P = Lateral earth pressure	kPa
	K_o = Lateral earth pressure coefficient	0.4
	γ = Bulk unit weight of the soil	21.5 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.

For part of the structure is below the static groundwater table, it should be designed as a water tight structure. The lateral pressure of the structure, to a minimum of one metre above the static water level, should be computed using the following expression:

$$\mathbf{P_s} = K (\gamma' H_s + q) + \gamma_\omega H_s$$

where	$\mathbf{P_s}$ = Lateral earth pressure below the water table	kPa
	K = Lateral earth pressure coefficient	0.4
	γ' = Submerged unit weight of the soil	11.7 kN / m^3
	H = Depth of the wall below the water level	m
	$\gamma\omega$= Unit weight of water	9.8 kN / m3
	q = Surcharge loads adjacent to the basement wall	kPa

5.6 Permanent Perimeter Drainage

Permanent perimeter drains should be provided around the basement structure. At the shoring location, the permanent perimeter drain should consist of a prefabricated continuous blanket of Miradrain 6000 or its equivalent, as shown in Figure No. 2. The installation of this type of vertical drainage system and its connections should be carried out as per the manufacturer's specifications. For an open cut excavation at the location of a basement / the one level of underground parking, the recommended permanent perimeter system is shown on Figure No. 3.

5.7 Groundwater Control

We recommend that a hodrogeological study should be referred for source of the groundwater, the groundwater table and the temporary / permanent groundwater control.

5.8 Subsurface Concrete Requirements

Chemical tests of pH, Sulphate and Sulphide contents were undertaken on two selected soil samples of the soils. The test results, as attached in Appendix B, are summarized below:

LOCATION	DEPTH	pH	SULPHATE (µg/g)	SULPHIDE (%)
BH-3(19BH-3)	6.1m – 6.3m	8.32	310	0.30
BH-12(19MW-12)	7.6m – 8.1m	8.73	110	0.13

The test results indicated that the soil samples contained pH values slightly higher than 7, indicating slightly alkaline. The highest sulphate content of the samples was 310 µg/g (0.031 %). This concentration of sulphate in the soils would have a negligible potential of sulphate attack on subsurface concrete.

In accordance with National Standards of Canada, CAN/CSA – A23.1-04, normal Type 10 Portland Cement can be used in the construction of substructures with direct contact with the soils.

The sulphide contents of the samples were less than 0.3%. The concentration of sulphide in the soil would, therefore, have a negligible potential of sulphide attack for steel reinforcement.

6.0 GENERAL STATEMENT OF LIMITATION

The comments and recommendations presented in this preliminary 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, lost 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.

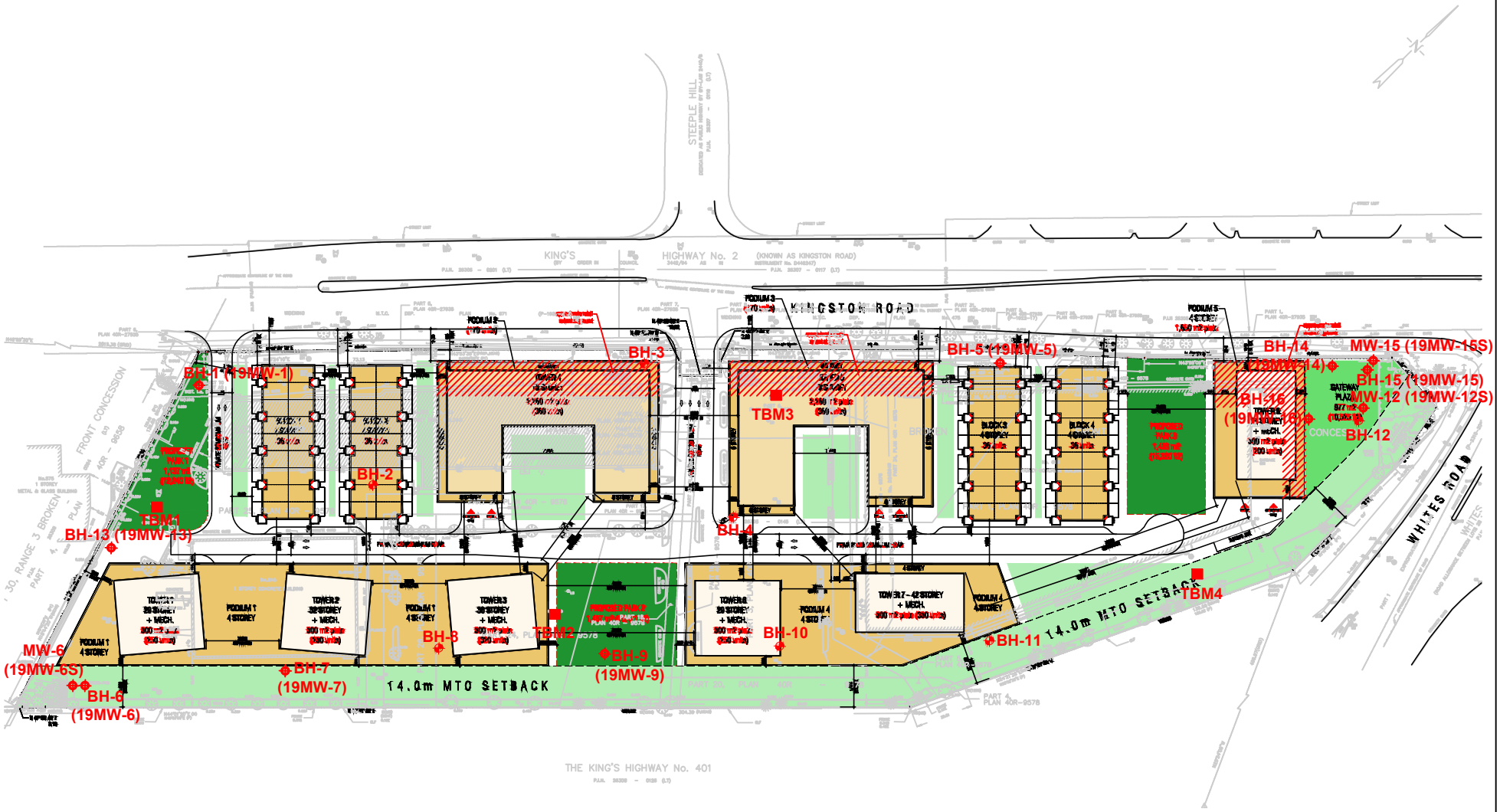
David S. Wang

David S. Wang, P.Eng.
Senior Engineer

Upkar S. Sappal, P.Eng.
Principal Engineer

Toronto Inspection Ltd.

Drawings
Borehole Location Plan
Logs of Boreholes &
Monitoring Wells
Section



LEGEND:

Borehole / Monitoring Well Location

Temporary Benchmark

Not to Scale

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

Tel: 905-940 8509

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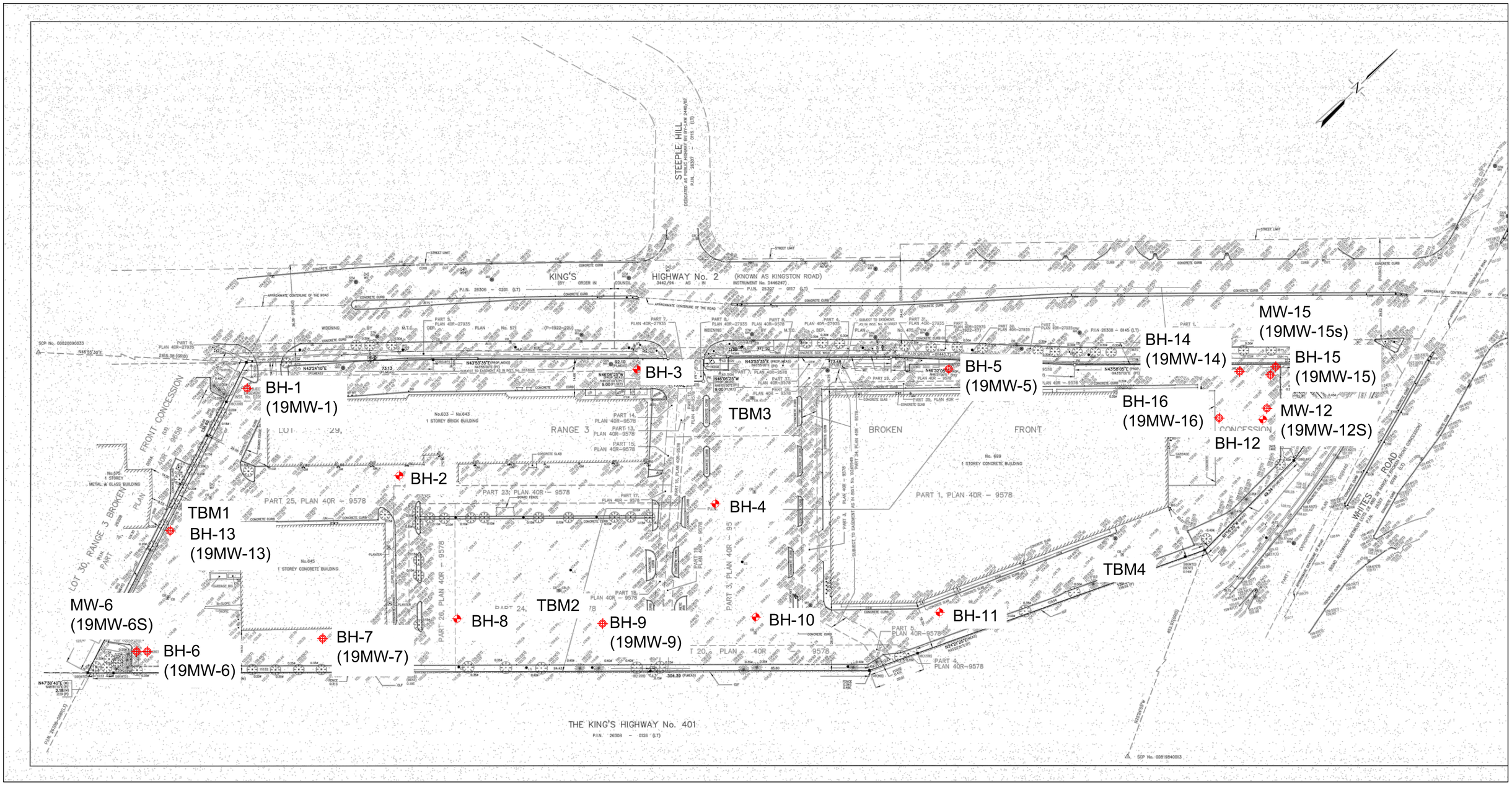
TITLE: Borehole / Monitoring Well Location Plan

LOCATION: 603 - 643 & 645 - 699 Kingston Road, Pickering, Ontario

PROJECT NO.	DATE :	DRAWING NO:
4986-19-GC (R)	April, 2020	1



LEGEND:

Borehole / Monitoring Well Location

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TITLE: Borehole / Monitoring Well Location Plan		
LOCATION: 603-699 Kingston Road, Pickering, Ontario		
PROJECT NO. 4896-19-GC	DATE : April, 2019	DRAWING NO: 1

Project No. 4986-19-GC

Log of Borehole BH-1

Dwg No. 2

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

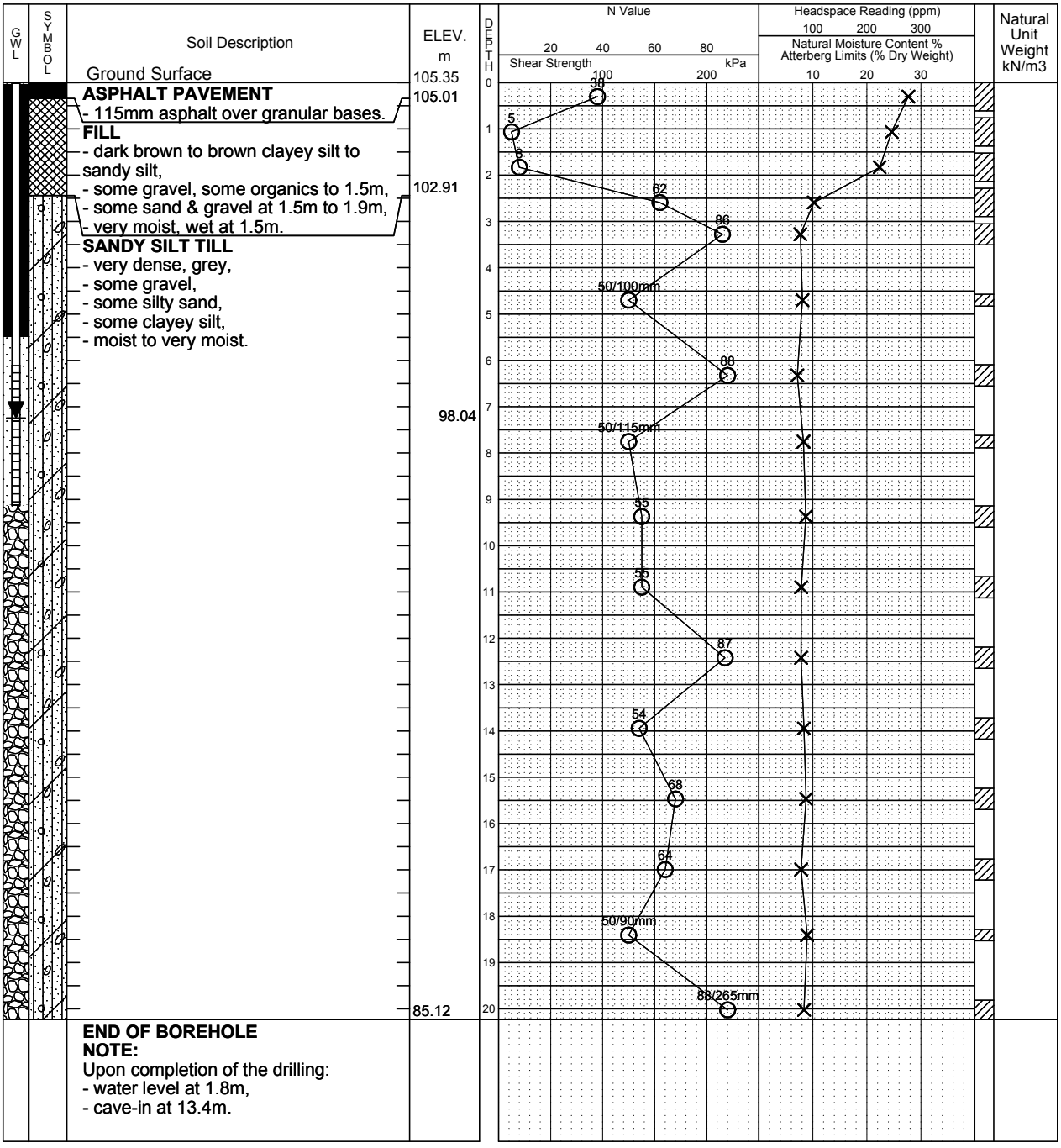
Date Drilled: 2/11/19

Drill Type: Truck Mount 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 4986-19-GC.GPJ 4/16/19

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)
March 7, 2019	3.11m	
March 11, 2019	7.31m	
March 26, 2019	Blocked	

Project No. 4986-19-GC

Log of Borehole BH-2

Dwg No. 3

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

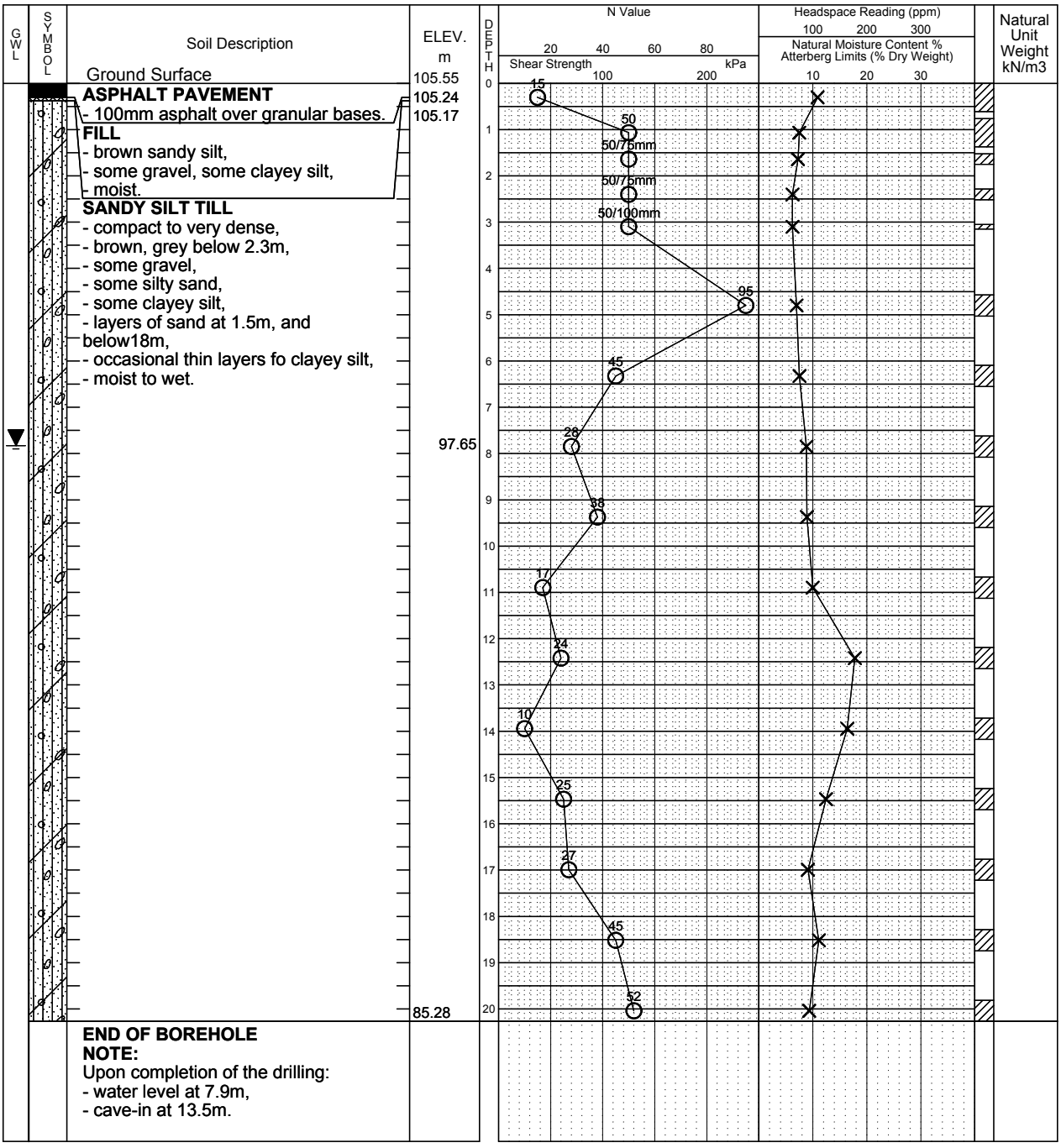
Date Drilled: 2/8/19

Drill Type: Truck Mount 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 4986-19-GC.GPJ 4/16/19

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. 4986-19-GC

Log of Borehole BH-3

Dwg No. 4

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

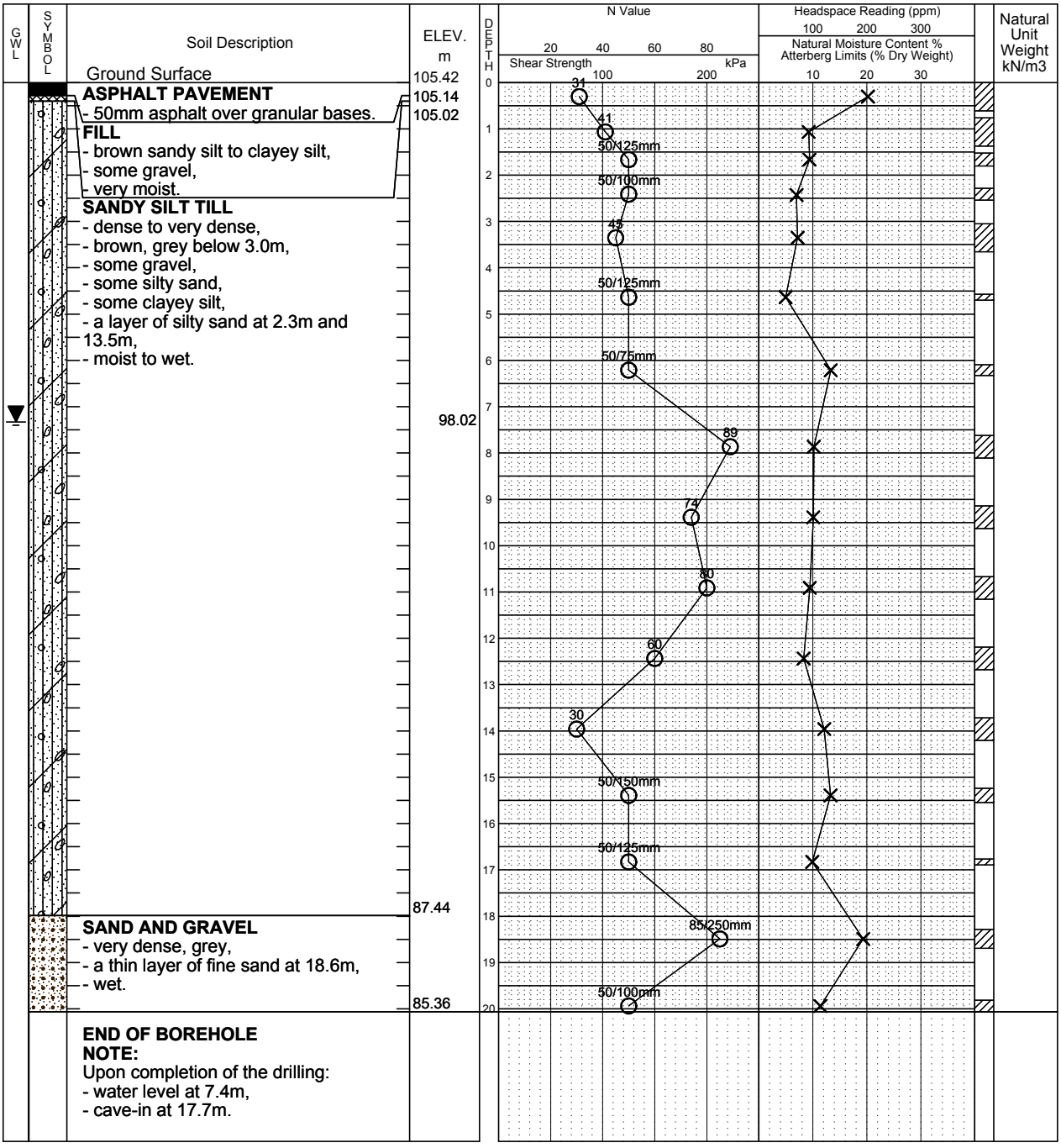
Date Drilled: 2/12/19

Drill Type: Truck Mount 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 4986-19-GC.GPJ 4/16/19

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. 4986-19-GC

Log of Borehole BH-4

Dwg No. 5

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

Date Drilled: 2/15/19

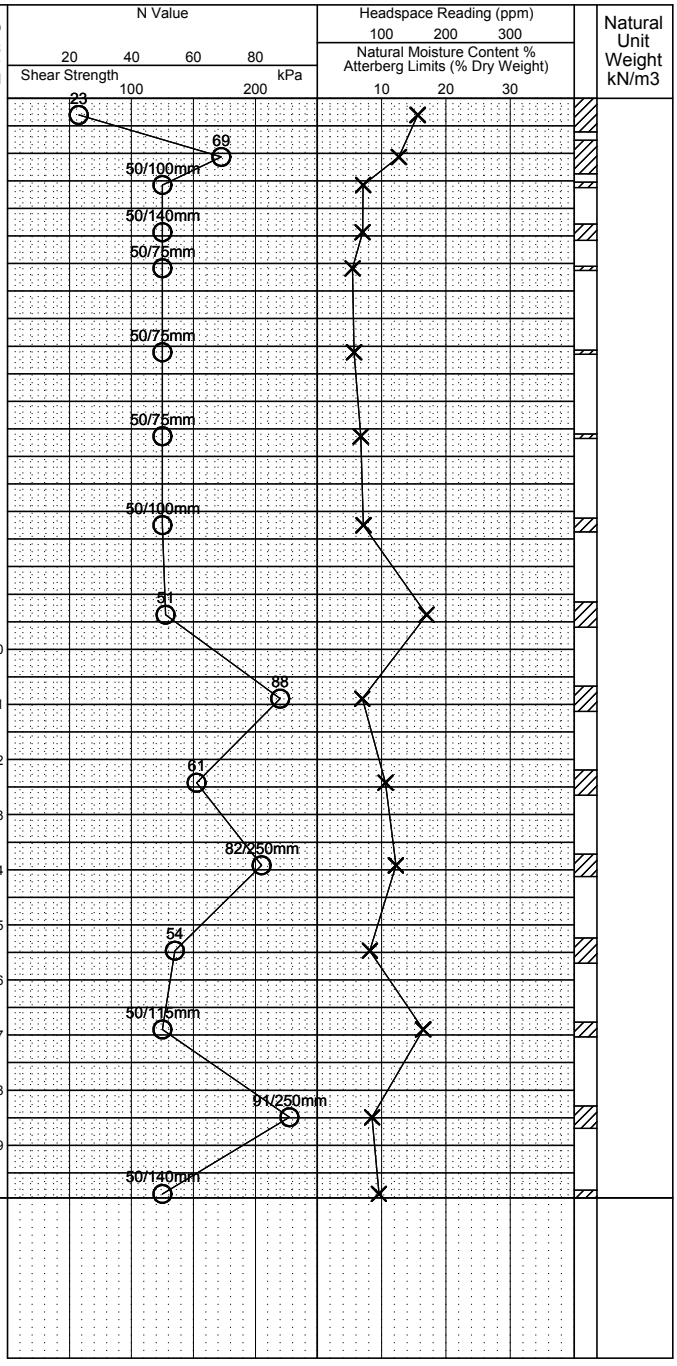
Drill Type: Truck Mount Drill Rig

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	105.77	0
		ASPHALT PAVEMENT - 100mm asphalt over granular bases.	105.41 104.85	
		FILL - dark brown sandy silt, - some gravel, some clayey silt, - some organics, - moist.		1
▼		**SANDY SILT TILL** - very dense, - brown, grey below 3.0m, - some gravel, - some clayey silt, - moist.	100.57	2 3 4 5
		SAND - very dense, grey, - medium grained, - some gravel, - some silty sand to sandy silt at 10.8m, - very moist to wet.	96.93 94.87	6 7 8 9 10 11
		SANDY SILT TILL - very dense, grey, - some gravel, - trace clayey silt, - moist.	93.58	12
		SAND - very dense, grey, - fine to coarse grained, - some gravel, - some silty sand, - thin layers of sandy silt at 15.3m, 18.3m, 19.8m, - wet, moist to very moist pockets.		13 14 15 16 17 18 19
			85.82	
		END OF BOREHOLE **NOTE:** Upon completion of the drilling: - water level at 5.2m, - cave-in at 8.0m.		



Natural Unit Weight kN/m3

LGBE3 4986-19-GC.GPJ 4/16/19

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. 4986-19-GC

Log of Borehole BH-5

Dwg No. 6

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

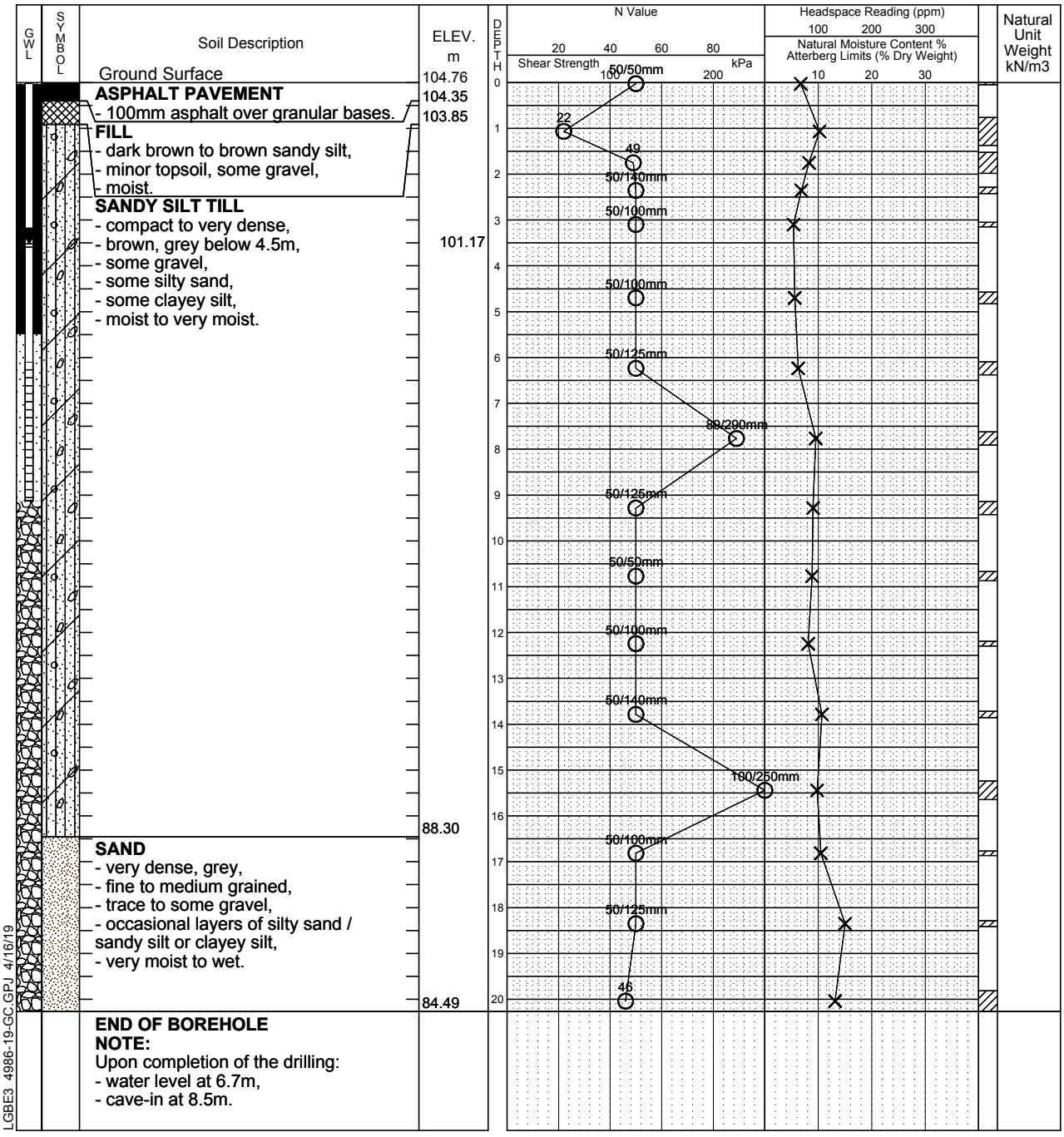
Date Drilled: 2/13/19

Drill Type: Truck Mount 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 4986-19-GC.GPJ 4/16/19

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)
March 7, 2019	3.62m	
March 11, 2019	4.37m	
March 26, 2019	3.59m	

Project No. 4986-19-GC

Log of Borehole BH-6

Dwg No. 7

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

Date Drilled: 2/4/19

Drill Type: Truck Mount 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	104.97	0			
		ASPHALT PAVEMENT - 90mm asphalt over granular bases.	104.73				
		FILL - dark brwon to brown sandy silt to clayey silt, - some organics, wood pieces at 0.8m, - trace gravel, - very moist.	103.14				
		SANDY SILT TILL - compact to very dense, - brown, grey below 7.8m, - some gravel, - some sandy silt, - some clayey silt, - a layer of slity sand at 18m, - occasional thin layers fo clayey silt, - moist to very moist, wet pockets.	101.96				
			84.93	20			
		END OF BOREHOLE **NOTE:** Upon completion of the drilling: - water level at 7.0m, - cave-in at 9.7m.					

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

Headspace Reading (ppm): 100 200 300

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

50/125mm
8
5
28
21
50/125mm
50/100mm
40
49
50/125mm
86/275mm
50/140mm
50/100mm
50/125mm
50/125mm
50/75mm

LGBE3 4986-19-GC.GPJ 4/16/19

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)
March 26, 2019	3.01m	

Project No. 4986-19-GC

Log of Borehole BH-7

Dwg No. 8

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

Date Drilled: 2/5/19

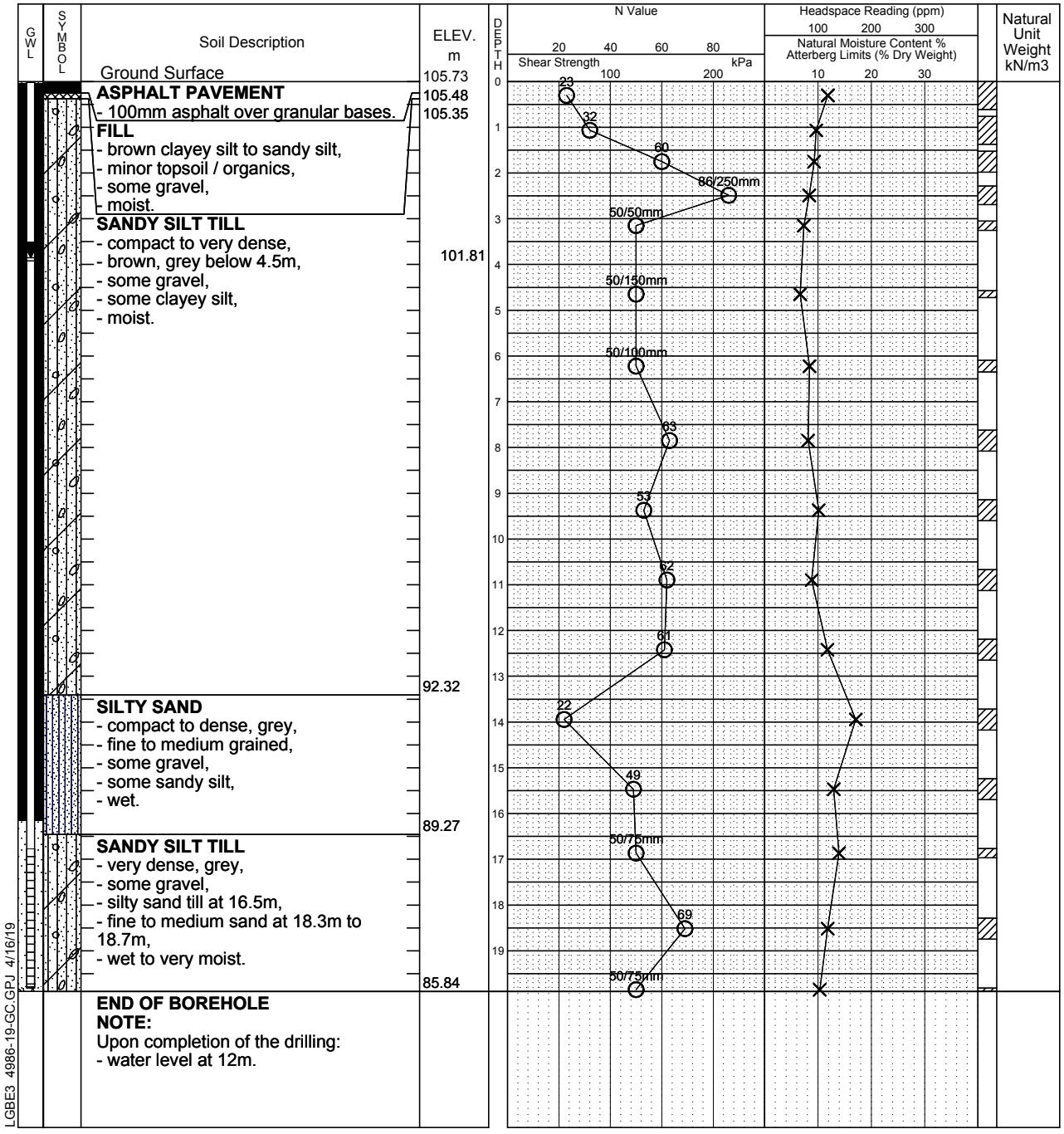
Drill Type: Truck Mount Drill Rig

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

Soil Description	ELEV. m
Ground Surface	105.73
ASPHALT PAVEMENT - 100mm asphalt over granular bases.	105.48
FILL - brown clayey silt to sandy silt, - minor topsoil / organics, - some gravel, - moist.	105.35
SANDY SILT TILL - compact to very dense, - brown, grey below 4.5m, - some gravel, - some clayey silt, - moist.	101.81
SILTY SAND - compact to dense, grey, - fine to medium grained, - some gravel, - some sandy silt, - wet.	92.32
SANDY SILT TILL - very dense, grey, - some gravel, - silty sand till at 16.5m, - fine to medium sand at 18.3m to 18.7m, - wet to very moist.	89.27
END OF BOREHOLE **NOTE:** Upon completion of the drilling: - water level at 12m.	85.84



Natural Unit Weight kN/m3

LGBE3 4986-19-GC.GPJ 4/16/19

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)
March 7, 2019	3.98m	
March 11, 2019	4.00m	
March 26, 2019	3.92m	

Project No. 4986-19-GC

Log of Borehole BH-8

Dwg No. 9

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

Date Drilled: 2/7/19

Drill Type: Truck Mount 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	DEPTH
		Ground Surface	105.19	0
		ASPHALT PAVEMENT - 100mm asphalt over granular bases.	104.83 104.78	
		FILL - brown sandy silt, - some gravel, some clayey silt, - moist.		1 2
		SANDY SILT TILL - dense to very dense, - brown, grey below 2.3m, - some gravel, - some clayey silt, - a thin layer of sand at 7.8m, - moist.		3 4 5 6 7 8 9 10 11 12
			91.78	13
		SAND - very dense, grey, - fine to medium grained, - some silty sand, - wet.	90.25	14 15
		SANDY SILT TILL - very dense, grey, - some gravel, - some clayey silt, - moist.		16 17 18 19
			85.12	20
		END OF BOREHOLE **NOTE:** Upon completion of the drilling: - cave-in at 7.8m.		

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

50/100mm
56
58
46
66
50/115mm
72
61
80/275mm
54
81/290mm
50/140mm
50/50mm
50/115mm
50/100mm

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

Natural Unit Weight kN/m3

LGBE3 4986-19-GC.GPJ 4/16/19

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. 4986-19-GC

Log of Borehole BH-9

Dwg No. 10

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

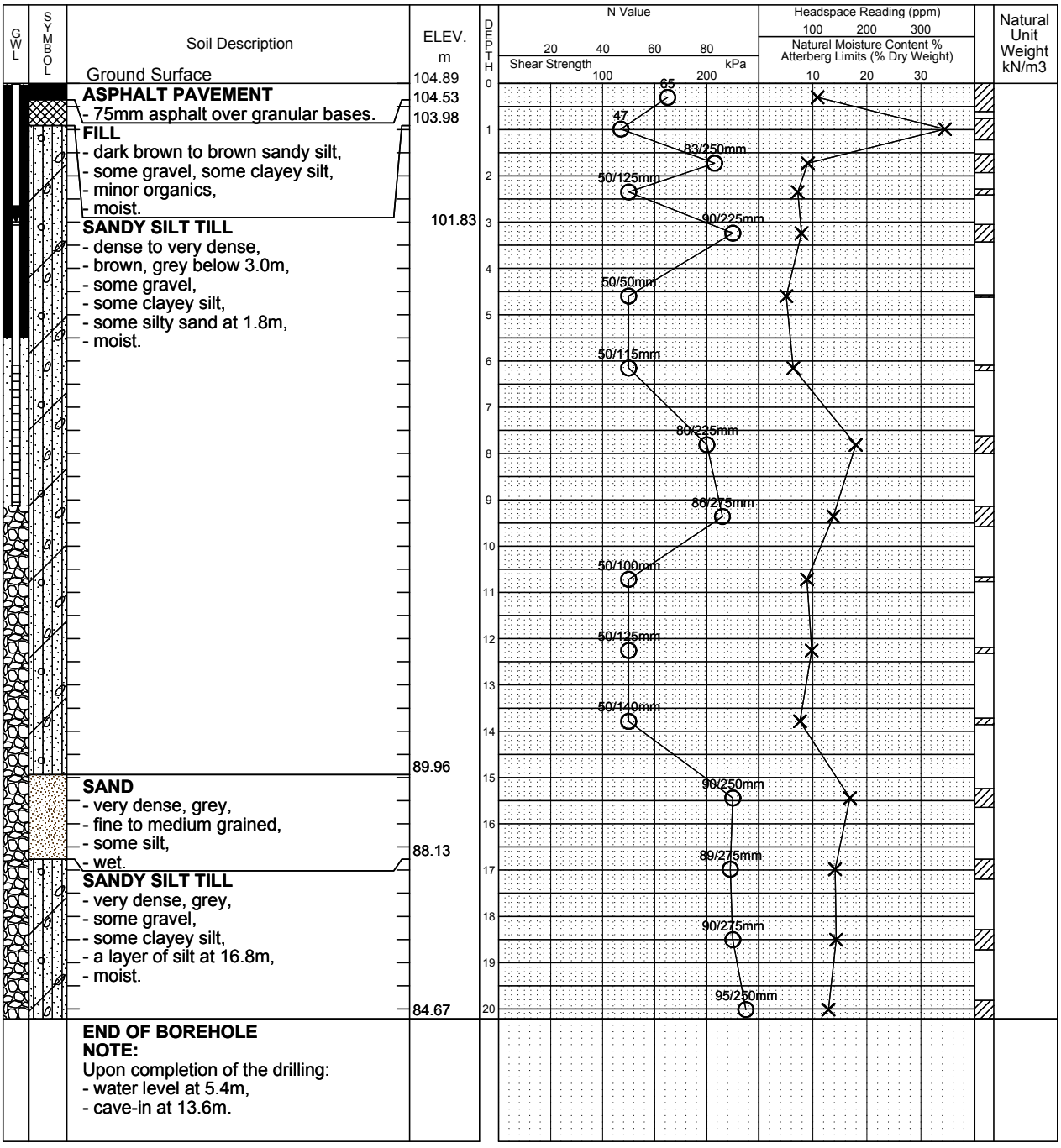
Date Drilled: 2/8/19

Drill Type: Truck Mount 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 4986-19-GC.GPJ 4/16/19

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)
March 7, 2019	2.98m	
March 11, 2019	3.05m	
March 26, 2019	3.06m	

Project No. 4986-19-GC

Log of Borehole BH-10

Dwg No. 11

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

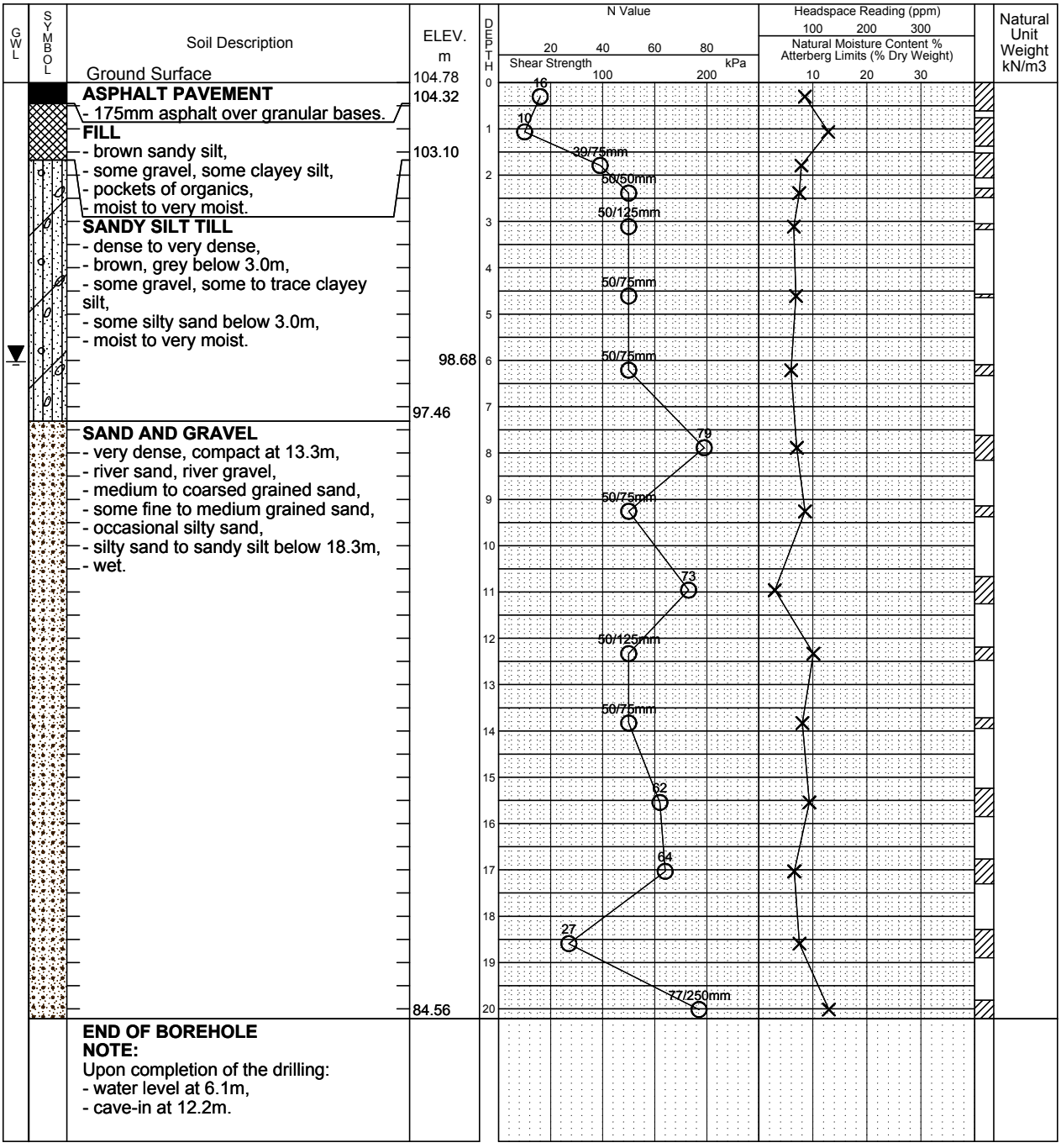
Date Drilled: 3/19/19

Drill Type: Truck Mount 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 4986-19-GC.GPJ 4/16/19

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. 4986-19-GC

Log of Borehole BH-11

Dwg No. 12

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

Date Drilled: 2/14/19

Drill Type: Truck Mount 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	104.91	0
		ASPHALT PAVEMENT - 100mm asphalt over granular bases.	104.48	
		FILL - dark brown to brown sandy silt, - some organics, - trace gravel, trace clayey silt, - moist.	103.84	1
▼		**SANDY SILT TILL** - compact to very dense, - brown, grey below 2.3m, - some gravel, - some clayey silt, - moist.	100.81	4
			99.12	6
		SAND - very dense, grey, - medium grained, - some gravel, - very moist to wet.	94.55	10
		SANDY SILT TILL - very dense, grey, - some gravel, - some clayey silt, - moist.	91.50	12
		SAND - very dense, grey, - fine to coarse grained, - some silt, - some gravel, - river sand with gravel at 16.8m, - very moist to wet.	86.93	18
		SANDY SILT TILL - very dense, gery, - some gravel, some clayey silt, - some silty sand at 18.3m, - very wet to moist.	84.84	20
		END OF BOREHOLE **NOTE:** Upon completion of the drilling: - water level at 4.1m, - cave-in at 7.0m.		

N Value
20 40 60 80
Shear Strength 100 200 kPa

31
16
48
55
99/275mm
50/125mm
57
64
94/275mm
50/125mm
96/225mm
50/100mm
50/90mm
50/115mm
50/90mm
50/100mm

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

Natural Unit Weight kN/m3

LGBE3 4986-19-GC.GPJ 4/16/19

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. 4986-19-GC

Log of Borehole BH-12

Dwg No. 13

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

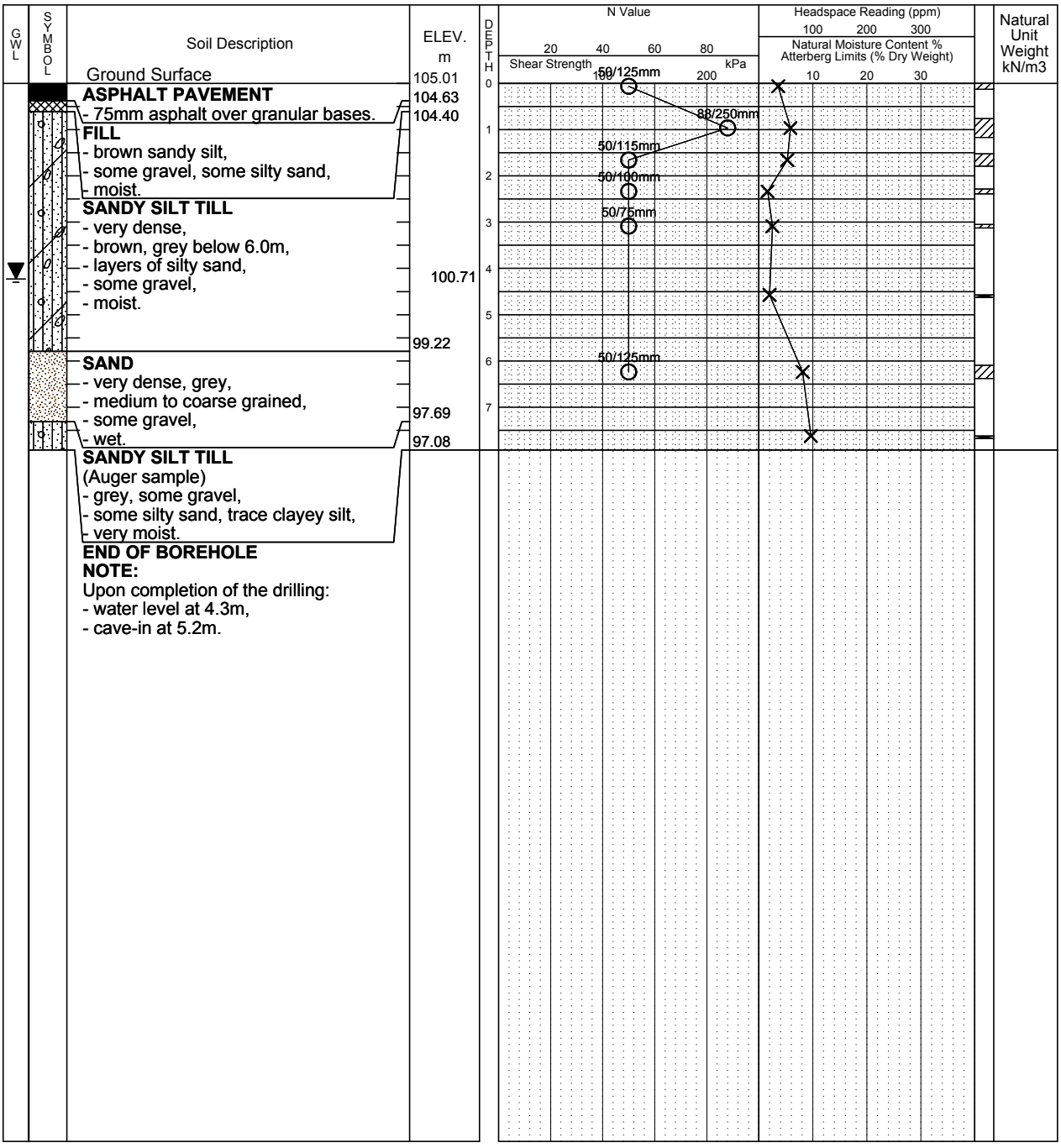
Date Drilled: 2/20/19

Drill Type: Truck Mount 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 4986-19-GC.GPJ 4/16/19

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. 4986-19-GC

Log of Borehole BH-13

Dwg No. 14

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

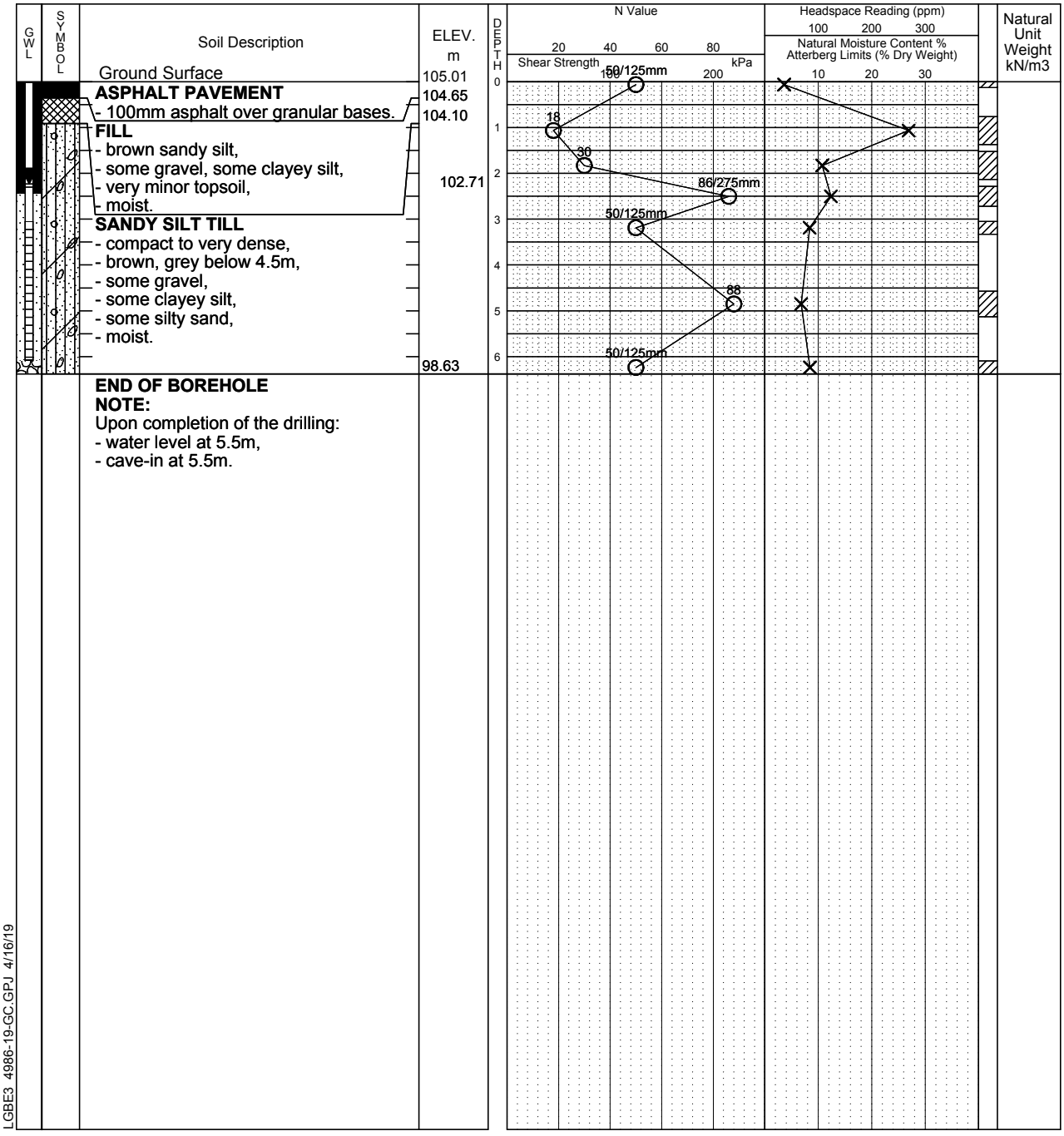
Date Drilled: 2/4/19

Drill Type: Truck Mount 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 4986-19-GC.GPJ 4/16/19

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)
March 7, 2019	2.58m	
March 11, 2019	2.53m	
March 26, 2019	2.30m	

Project No. 4986-19-GC

Log of Borehole BH-14

Dwg No. 15

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

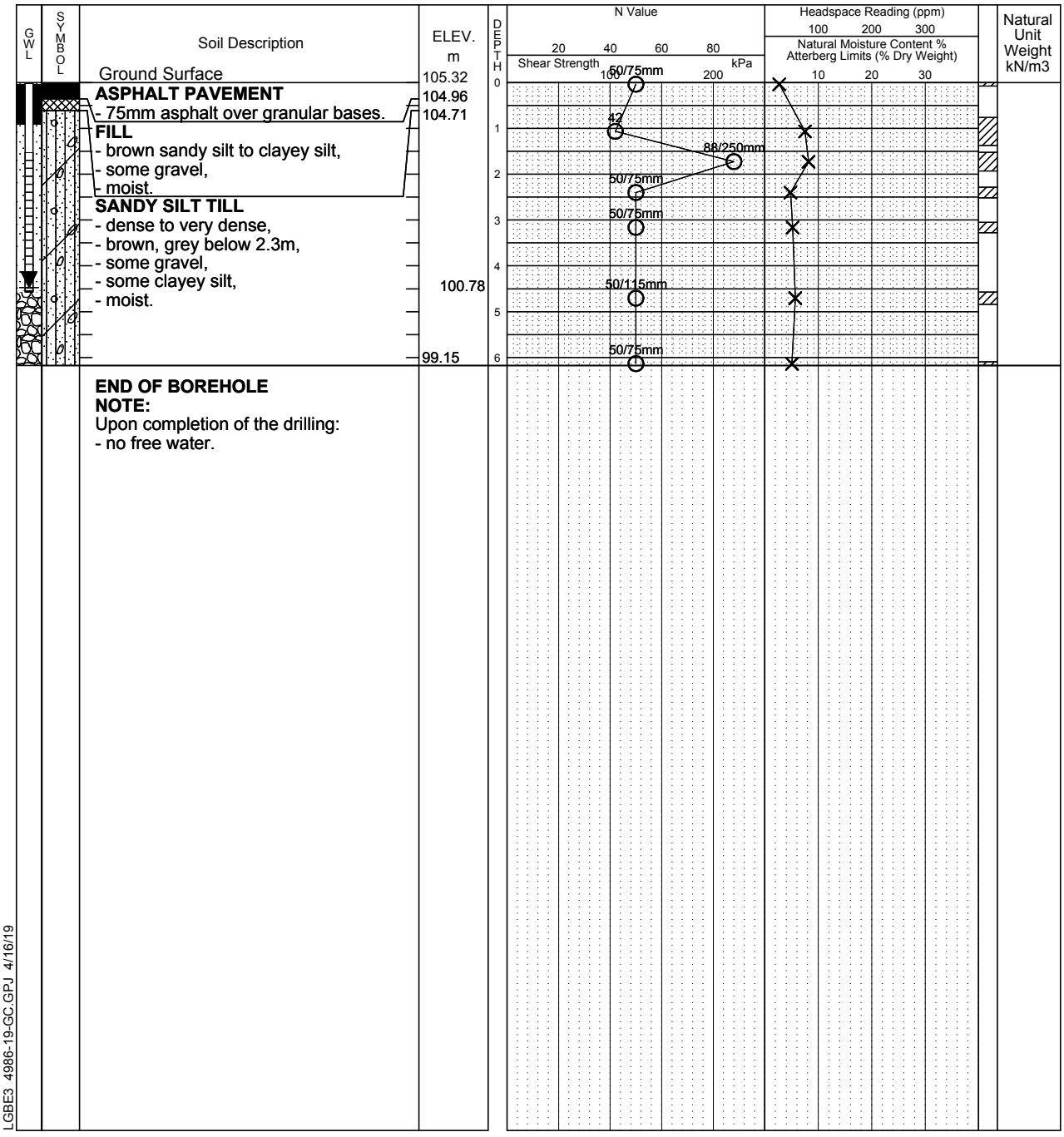
Date Drilled: 2/19/19

Drill Type: Truck Mount 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 4986-19-GC.GPJ 4/16/19

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)
March 7, 2019	4.31m	
March 11, 2019	4.59m	
March 26, 2019	4.54m	

Project No. 4986-19-GC

Log of Borehole BH-15

Dwg No. 16

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

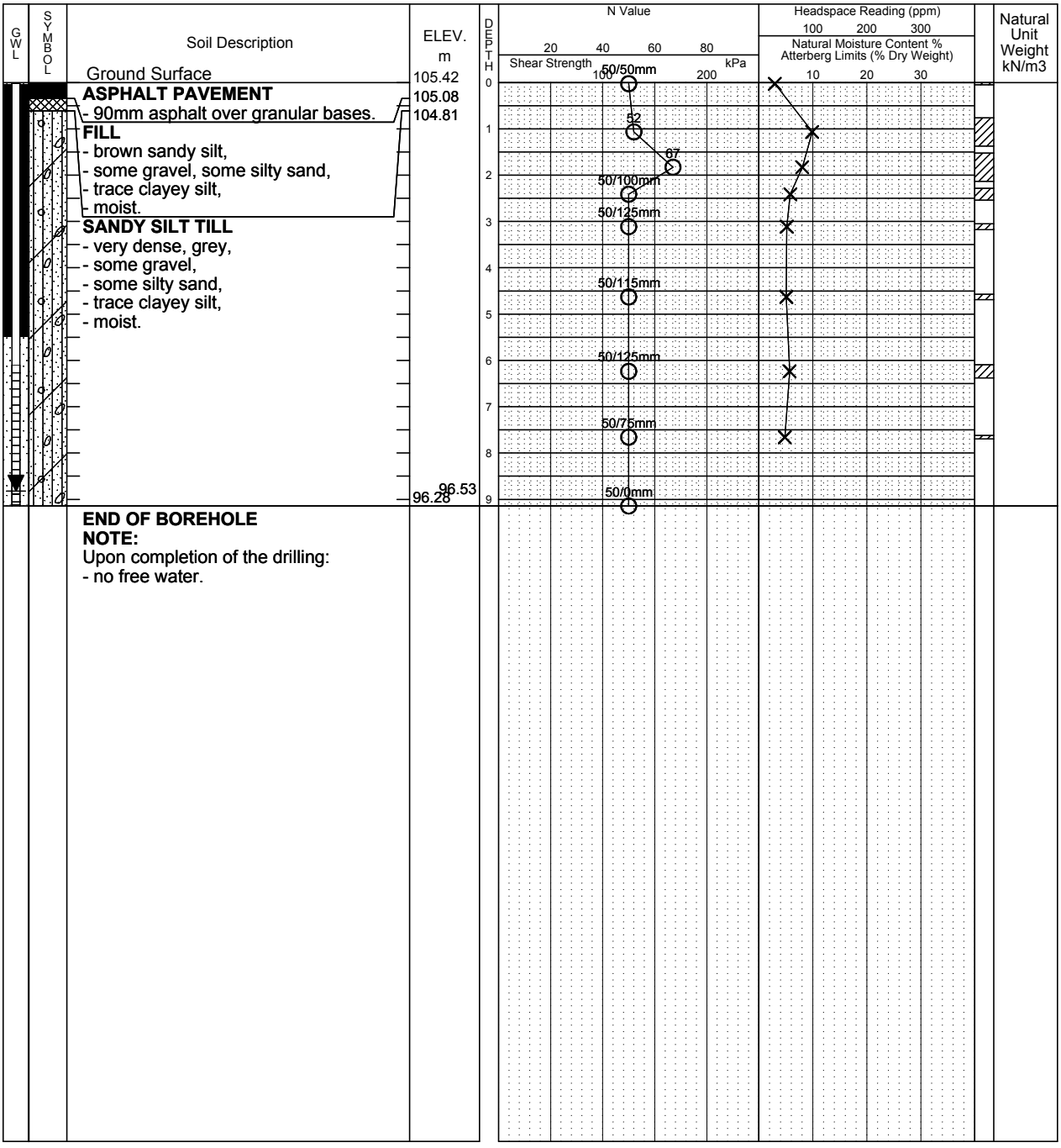
Date Drilled: 2/20/19

Drill Type: Truck Mount 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 4986-19-GC.GPJ 4/16/19

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)
March 7, 2019	Dry	
March 11, 2019	Dry	
March 25, 2019	8.48m	
March 26, 2019	8.89m	

Project No. 4986-19-GC

Log of Borehole BH-16

Dwg No. 17

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

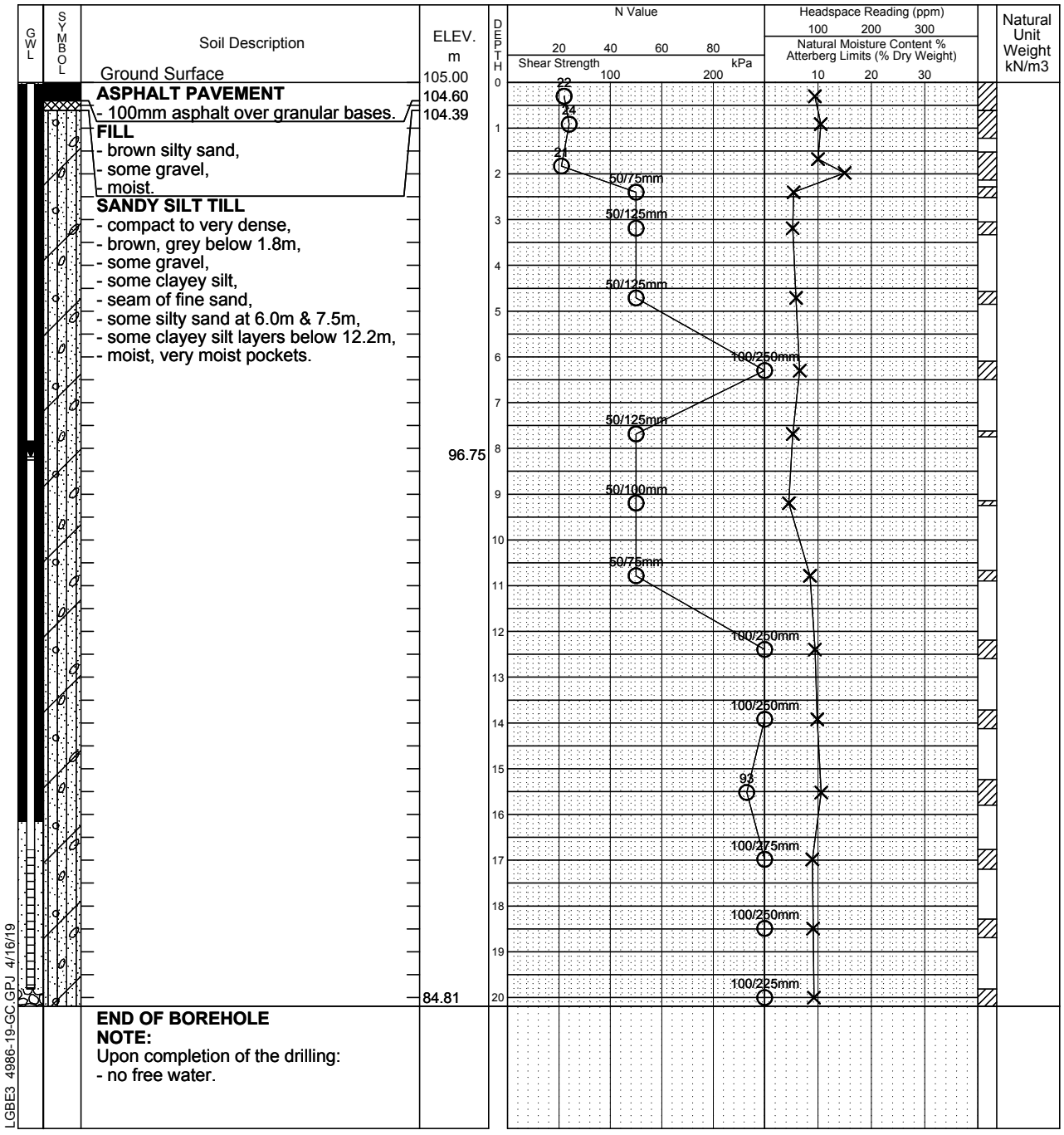
Date Drilled: 3/21/19

Drill Type: Truck Mount 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 4986-19-GC.GPJ 4/16/19

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)
March 25, 2019	6.95m	
March 26, 2019	8.25m	

Project No. 4986-19-GC

Log of Borehole MW-6

Dwg No. 18

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

Date Drilled: 2/4/19

Drill Type: Truck Mount 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	104.97	0	20 40 60 80 / Shear Strength 100 200 kPa	100 200 300 / 10 20 30	
		NO SAMPLING		1			
			103.57	2			
				3			
				4			
			100.40				
		END OF BOREHOLE **NOTE:** Upon completion of the drilling: - no free water.					

LGBE3 4986-19-GC.GPJ 4/16/19

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)
March 7, 2019	2.08m	
March 11, 2019	2.07m	
March 26, 2019	1.40m	

Project No. 4986-19-GC

Log of Borehole MW-12

Dwg No. 19

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

Date Drilled: 3/20/19

Drill Type: Truck Mount 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	105.01	0	20 40 60 80 / 100 200	100 200 300 / 10 20 30	
		NO SAMPLING		1			
				2			
				3			
			101.01	4			
			100.44				
		SAND - very dense, grey, - medium to coarse grained, - some gravel, - wet.	99.83	5	51		
		END OF BOREHOLE **NOTE:** Upon completion of the drilling: - water level at 4.0m.					

LGBE3 4986-19-GC.GPJ 4/16/19

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)
March 25, 2019	4.16m	
March 26, 2019	4.15m	

Project No. 4986-19-GC

Log of Borehole MW-15

Dwg No. 20

Project: Geotechnical investigation

Sheet No. 1 of 1

Location: 603-699 Kingston Road, Pickering, Ontario

Date Drilled: 3/20/19

Drill Type: Truck Mount 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

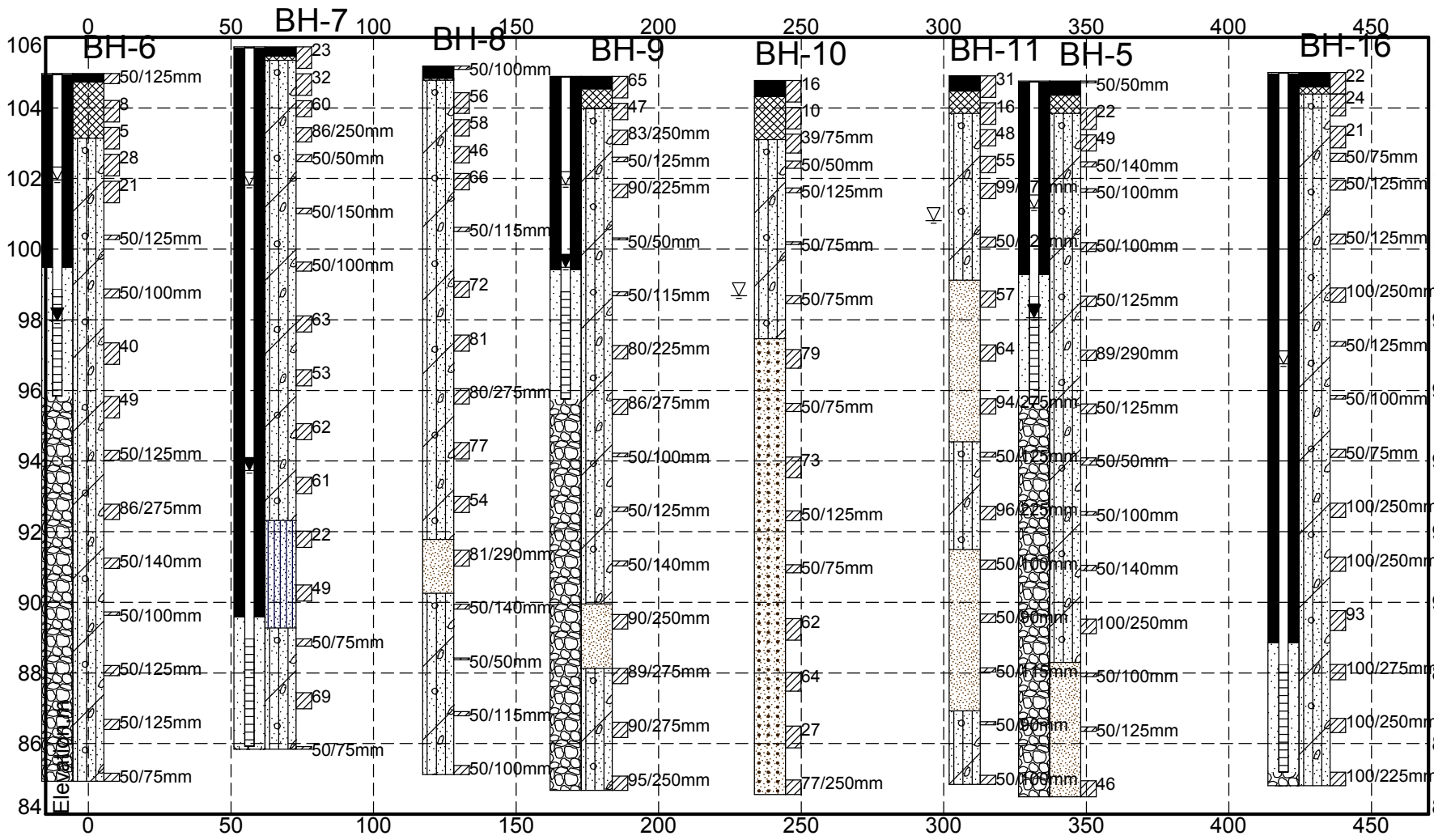
GWL	SYMBOL	Soil Description	ELEV. m	DEPTH	N Value / Shear Strength (kPa)	Headspace Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	Natural Unit Weight kN/m3
		Ground Surface	105.42	0	20 40 60 80 / Shear Strength 100 200 kPa	100 200 300 / 10 20 30	
		NO SAMPLING		1			
				2			
				3			
				4			
				5			
			99.33	6			
		END OF BOREHOLE **NOTE:** Upon completion of the drilling: - cave-in at 5.8m.					

LGBE3 4986-19-GC.GPJ 4/16/19

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)
March 25, 2019	Dry	
March 26, 2019	Dry	



Borehole No	Elev.	Depth
BH-10	104.8	20.2
BH-11	104.9	20.1
BH-16	105.0	20.2
BH-5	104.8	20.3
BH-6	105.0	20.0
BH-7	105.7	19.9
BH-8	105.2	20.1

Toronto Inspection Ltd.

SUBSURFACE STRATIGRAPHY

Section

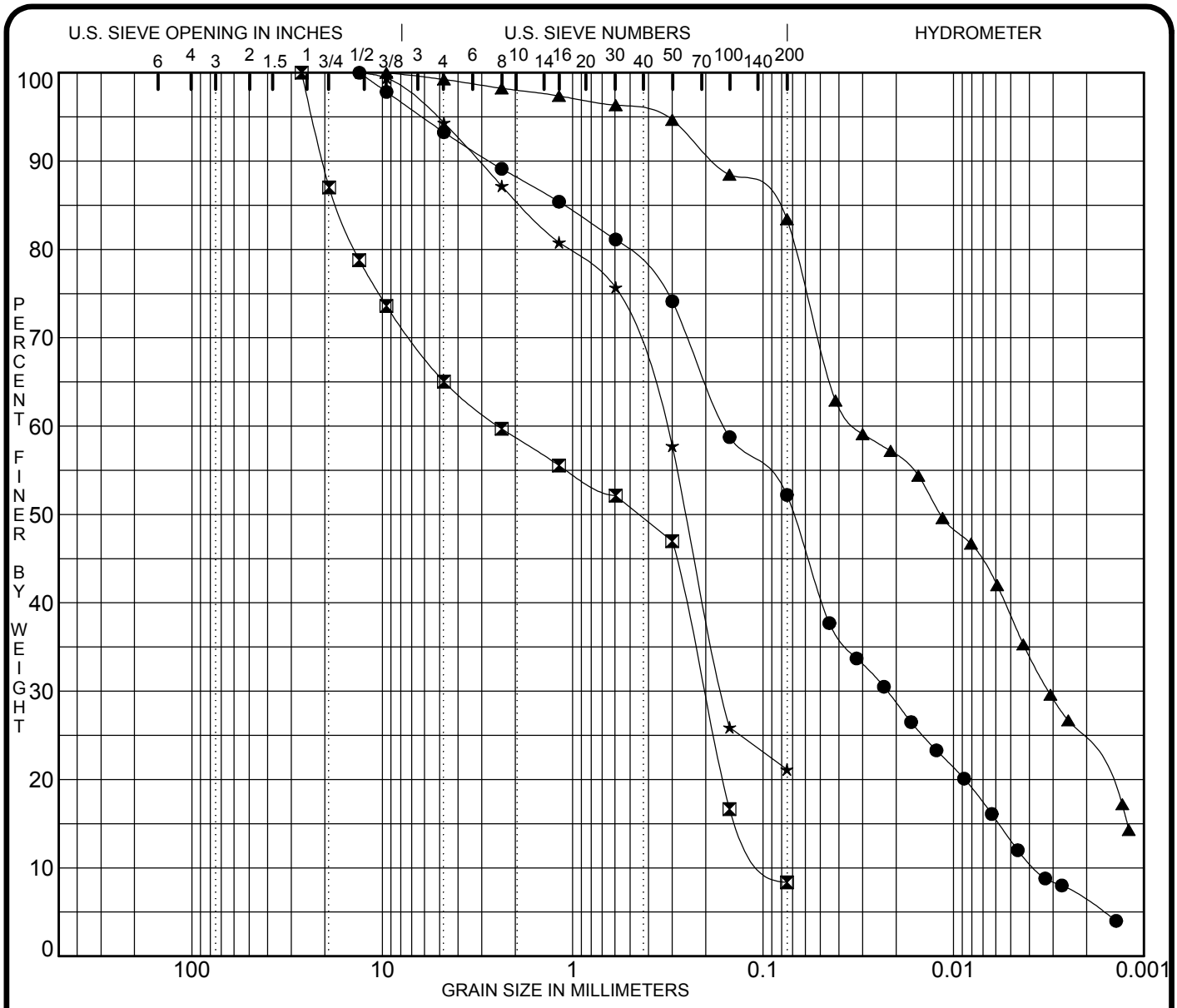
Geotechnical investigation

603-699 Kingston Road, Pickering, Ontario

PROJECT #	DATE	DRAWING
4986-19-GC	Apr 19	21

Toronto Inspection Ltd.

Figures
Gradation Curves
Permanent Perimeter Drainage System
Details of Perimeter Subdrain and Basement Backfill



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	**BH-1**	**9.1**						**0.84**	**42.5**
⊠	**BH-10**	**7.9**						**0.20**	**28.5**
▲	**BH-16**	**12.2**							
★	**BH-4**	**9.1**							

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH-1**	**9.1**	**13.20**	**0.16**	**0.022**	**0.0037**	**6.7**	**41.0**	**39.1**	**13.1**
⊠	**BH-10**	**7.9**	**26.50**	**2.45**	**0.204**	**0.0860**	**35.0**	**56.7**	**8.4**	
▲	**BH-16**	**12.2**	**9.50**	**0.03**	**0.003**		**0.8**	**15.8**	**44.9**	**38.5**
★	**BH-4**	**9.1**	**13.20**	**0.33**	**0.164**		**5.6**	**73.2**	**21.1**	

PROJECT **Geotechnical Investigation - 603-699 Kingston Rd, Pickering, Ontario**

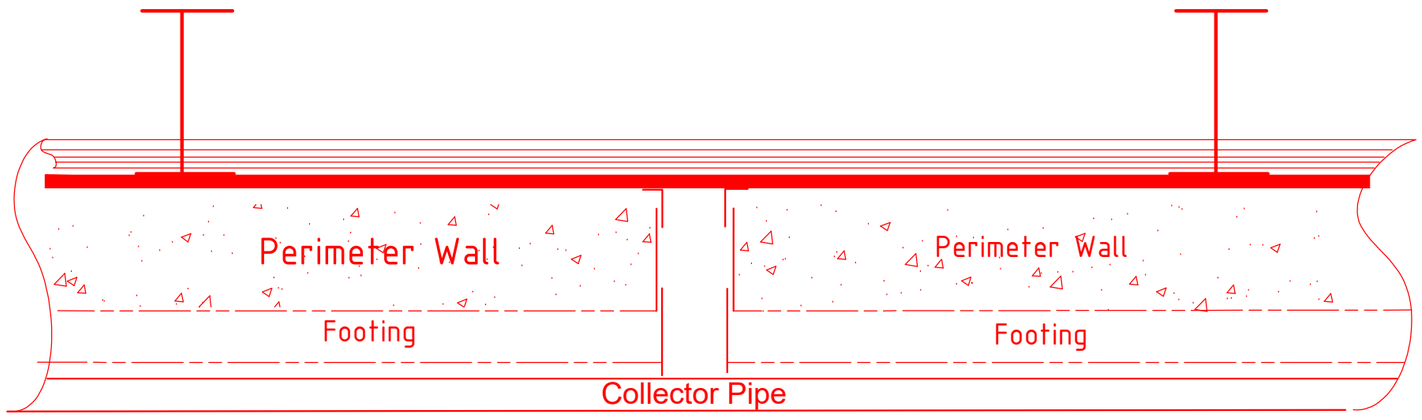
JOB NO. **4986-19-EB**

DATE **3/27/19**

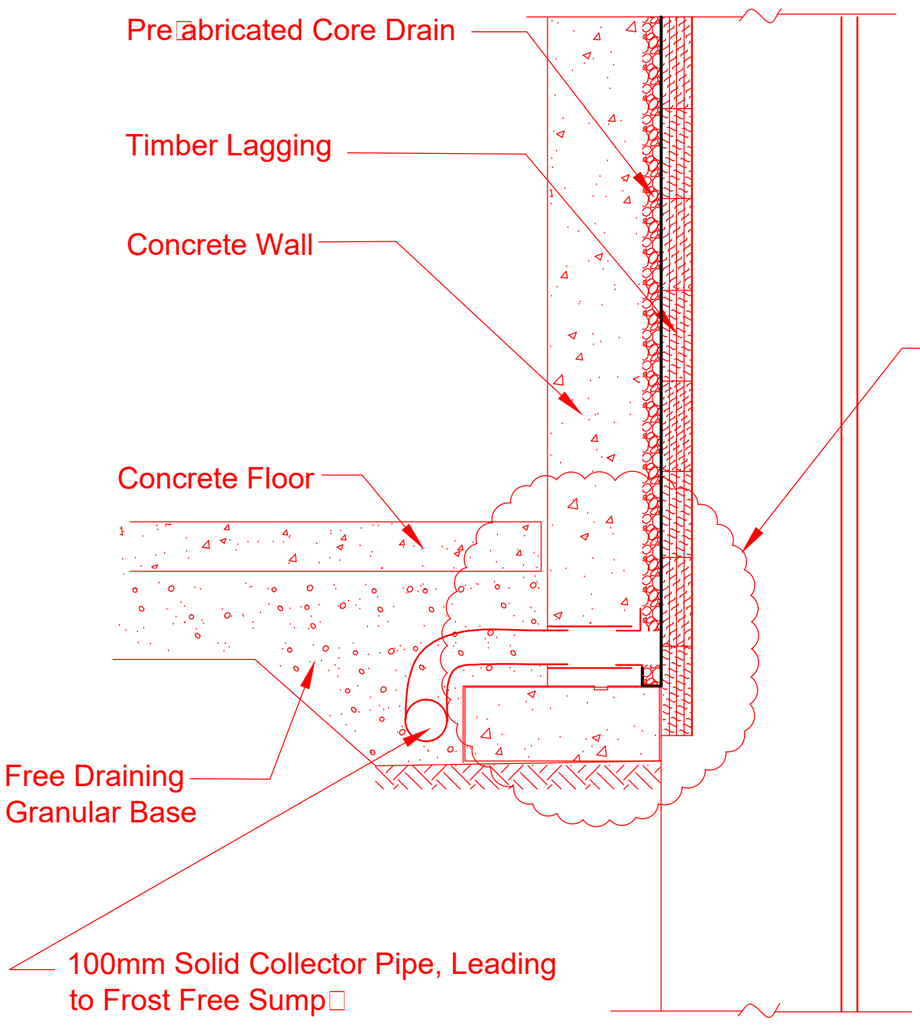
GRADATION CURVES

Toronto Inspection Ltd.

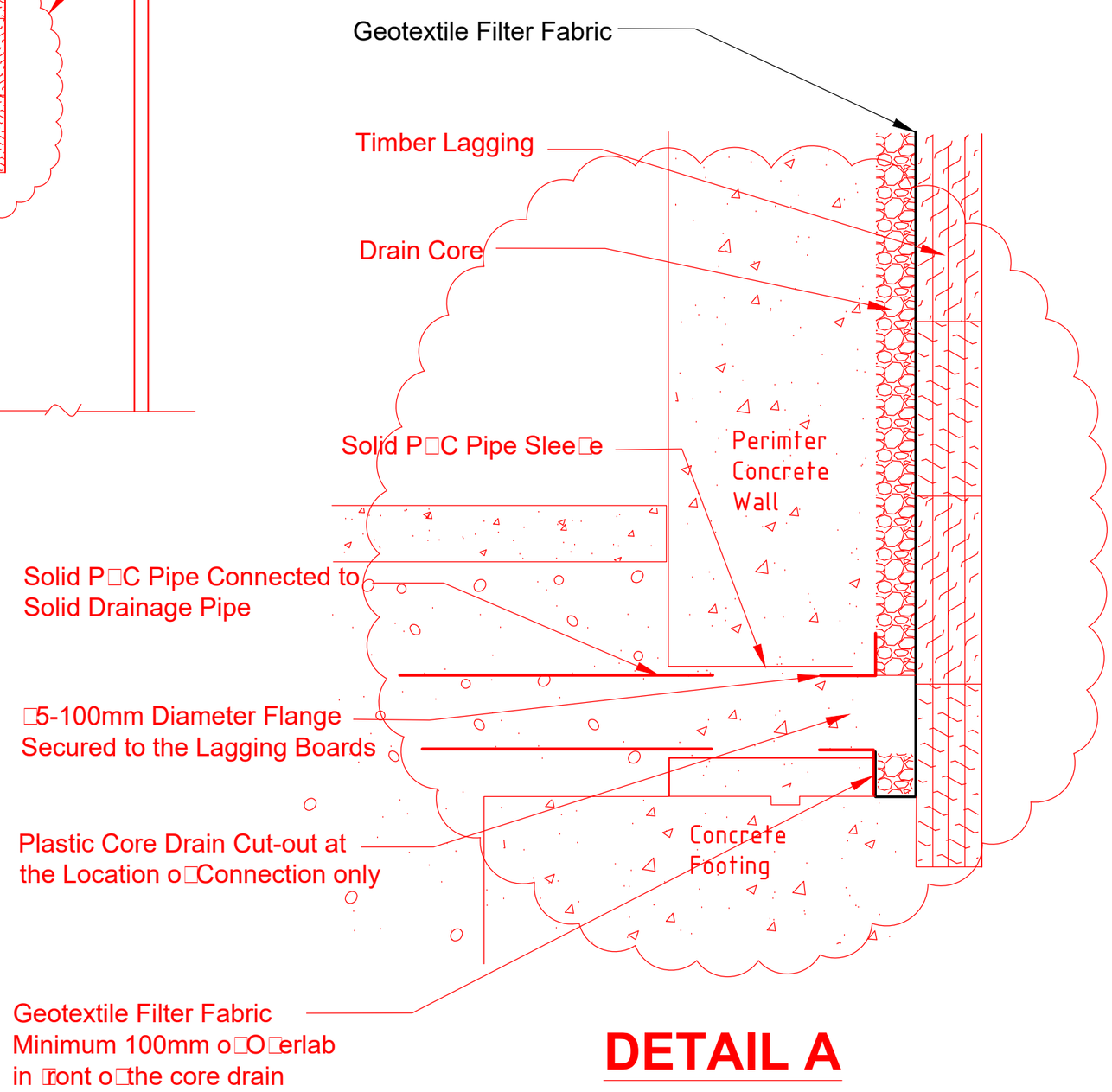
FIGURE NO.1



PLAN



TYPICAL SECTION



DETAIL A

Note:

1□□ continuous blanket o□pre□abricated drainage system, Miradrain 6000 or e□ui□alent, should extend continuously □rom the top o□□ootings to approximately 1□2m belo□ the ground sur□ace□

2□□ll □oints o□the Miradrain should be taped□□ll openings, including the exposed end abo□e the □ooting, must be co□ered □ith □ilter □abic to pre□ent intrusion o□concrete into the core o□the drain□

3□The back□ll behind the lagging must be □ree draining□Filter □abric or stra□ should be used to pre□ent loss o□□ines behind the lagging□

4□The perimeter drainage and sub□loor drainage systems must be kept separate□

NOT TO SC□LE

TiL TorontoInspection LTD.
GEO-ENVIRONMENTAL CONSULTANTS

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

Tel: 905-940 8509 Fax: 905-940 8192

TITLE:	Permanent Perimeter Drainage System		
LOCATION:	603 -699 Kingston Road, Pickering, Ontario		
PROJECT NO.:	4986-19-GC	DATE: □pril, 2019	FIGURE NO. 2

Appendix A
Shoring Design

APPENDIX A

SHORING DESIGN

All specifications for the design of the shoring system are in accordance with Chapter 26 of the 4th Edition of the Canadian Foundation Engineering Manual (Manual).

The construction of the shoring system should be carried out by a contractor experienced in this type of construction.

1. Earth pressure

For a single and multiple level support systems, the recommended earth pressure distributions are shown on Drawing A1.

The lateral earth pressure expressions, recommended in the drawings, assume that there will be no build up of hydrostatic pressure behind the shoring.

2. Pile Penetration

The soldier piles should be installed in pre-augured holes which should be filled to excavation level with 20 MPa (3000 psi) concrete and above that with 1-1/2 bag mix.

The depth of pile penetration in the non-cohesive sandy silt till, sand / sand and gravel deposits should be calculated from the following expressions:

$$R \text{ (sandy silt till)} = 1.5\ D\ Kp\ L^2 \gamma$$

where	R	= Ultimate Load to be restrained	kN
	D	= Diameter of concrete filled hole	m
	Kp	= Passive resistance in the silt till and sand deposits	5.0
	L	= Embedment Depth of the pile	m
	γ	= Unit weight of the soil - use 21 kN/m^3 for unsaturated soils	

The shoring system should be designed for a factor of safety of F = 2. The overall factor of safety of the anchored block of soil must be considered.

3. Lagging Boards

The following thicknesses of lagging boards have been recommended in the Manual:

Thickness of lagging	Maximum Spacing of Soldier Piles
50 mm (2 in)	2.0 m (6.5 ft)
75 mm (3 in)	2.5 m (8.0 ft)
100 mm (4 in)	3.0 m (10 ft)

Local experience has indicated that the lagging thickness of 75 mm has been adequate for soldier pile spacing of 3 m for soil conditions similar to those encountered at the subject site. However, it is important to consider all local conditions, such as the duration of excavation, the weather likely to be encountered, seasonal variations in the ground water and ice lensing causing frost heave in determining the lagging thickness.

All spaces behind the lagging must be filled with free draining granular fill. If wet conditions are encountered the space between boards should be packed with geotextile filter fabric or straw to prevent loss of ground.

4. Tie Backs

The minimum spacing and the depths of the soil anchors should be as recommended in the Manual.

The tie back anchor lengths, in the non-cohesive sandy silt till, sand / sand and gravel deposits, can be estimated using an adhesion values of 50 kPa (1000 psf). At least two full scale load tests should be carried out on the tieback anchors in each of the above subsoils. These tests should be taken to 200% of the design load or until there is a significant increase in the pullout rate. In the latter case, the design load must be limited to 50% of the load at which the pullout increases. Based on the results of the pullout test, it may be necessary to modify the anchor design and place limits on the capacity.

In addition, each anchor must be proof loaded. This is done by loading the anchor to 133% of the design load, and the anchor must be capable of sustaining this load for a minimum of 10 minutes without creep. The load may then be relaxed to 100% of design and locked in. The higher the lock in loads, the less will be the outward movement after excavation.

The proposed design of the tie-back system and method of installation must be discussed with this office prior to the finalization. Systems involving high grout pressures should be avoided if working near other basements or buried services.

5. Rakers

An alternative to tie backs is to use rakers. Rakers founded in the sandy silt till, sand/sand and gravel deposits should be designed for allowable bearing pressure of 400 kPa (8.0 k.s.f.), (100 kPa (2.0 k.s.f.) around BH-2 location), for rakers inclined at an angle of 45 degrees. The raker footings should be located outside the zone of influence of the buried portion of the soldier piles and at a distance of not less than 1.5 L from the piles, where L = the embedment of the pile. No excavation should be made within two footing width of the raker footings on the side opposite the rakers.

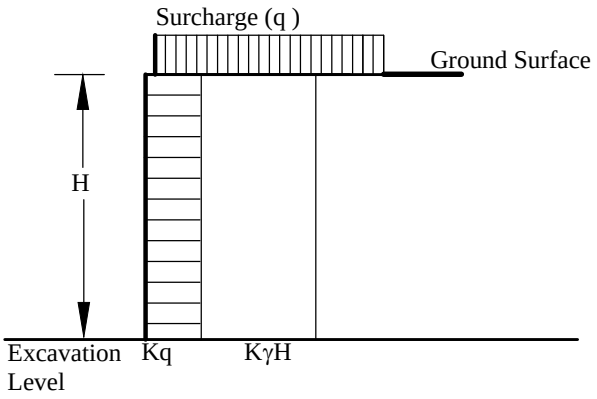
6. General Shoring Notes

It is recommended that close monitoring of vertical and lateral movement of the shoring system should be carried out at the site. If movements at the top of the piles are more than 12 mm (0.5 in), extra bracing may be required. In this regard, monitoring by inclinometers and by survey on targets should be instituted to ensure that the contractor maintains movements within design limit.

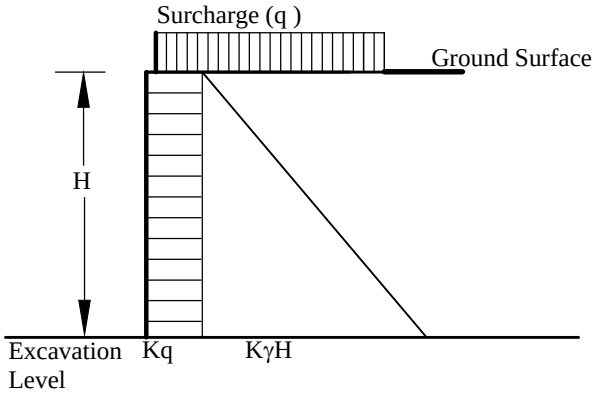
TEMPORARY SHORING

Laterial Pressure

I. Multiple Level Support



II. Single Level Support



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

where H = Height of Shoring — m
γ = Unit Weight of Retained Soil — 21.0 kN/ m^3
q = Surcharge — kPa
K = Earth Pressure Coefficient

If moderate ground and shoring movements are permissible then:
K = Ka = Active Earth Pressure Coefficient = 0.25

If there are building foundations or underground services within a distance of 0.5 H behind the shoring then:
K = Ko = Earth Pressure at rest = 0.4

If there are building foundations or underground services within a distance of between 0.5 H and H behind the shoring then:
K = 0.5 (Ka + Ko) = 0.33

Note:
The lateral pressure equation assumes effective drainage from behind the temporary shoring

NOT TO SCALE

TorontoInspection LTD
GEO-ENVIRONMENTAL CONSULTANTS
110 Konrad Crescent, Unit 16, Markham, Ontario L3R 9X2
Tel: 905-940 8509 Fax: 905-940 8192

TITLE:	Temporary Shoring Design
LOCATION:	603 - 699 Kingston Road, Pickering, Ontario
PROJECT NO.: 4986-19-GC	DRAWING NO.:
DATE: April, 2019	A1

Appendix B
Chemical Test Results

FINAL REPORT

CA14117-MAR19 R1

4986

Prepared for

Toronto Inspection Ltd.

FINAL REPORT

First Page

CLIENT DETAILS

Client	Toronto Inspection Ltd.
Address	110 Konrad Crescent, Unit 16 Markham, ON L3R 9X2. Canada
Contact	Sanjay Goel
Telephone	905-940-8509
Facsimile	905 940 8192
Email	lab@torontoinspection.com
Project	4986
Order Number	
Samples	Soil (2)

LABORATORY DETAILS

Project Specialist	Brad Moore Hon. B.Sc
Laboratory	SGS Canada Inc.
Address	185 Concession St., Lakefield ON, K0L 2H0
Telephone	705-652-2000
Facsimile	705-652-6365
Email	
SGS Reference	CA14117-MAR19
Received	03/06/2019
Approved	03/13/2019
Report Number	CA14117-MAR19 R1
Date Reported	03/13/2019

COMMENTS

Temperature of Sample upon Receipt: 6 degrees C
Cooling Agent Present: no
Custody Seal Present: no

Chain of Custody Number: 006404

Corrosivity Index is based on the American Water Works Corrosivity Scale according to AWWA C-105. An index greater than 10 indicates the soil matrix may be corrosive to cast iron alloys.

SIGNATORIES

Brad Moore Hon. B.Sc

TABLE OF CONTENTS

Client: Toronto Inspection Ltd.
Project: 4986
Project Manager: Sanjay Goel
Samplers: Ankit Patel

PACKAGE: **- Corrosivity Index** (SOIL)

Sample Number	5	7
Sample Name	19BH-3 SS-7	19MW12 SS-8
Sample Matrix	Soil	Soil
Sample Date	12/02/2019	20/02/2019

Parameter	Units	RL		Result	Result
Corrosivity Index					
Corrosivity Index	none	1		4.5	8.5
Soil Redox Potential	mV	-		206	157
Sulphide	%	0.02		0.30	0.13
pH	pH Units	0.05		8.32	8.73
Resistivity (calculated)	ohms.cm	-9999		3880	2760

PACKAGE: **- General Chemistry** (SOIL)

Sample Number	5	7
Sample Name	19BH-3 SS-7	19MW12 SS-8
Sample Matrix	Soil	Soil
Sample Date	12/02/2019	20/02/2019

Parameter	Units	RL		Result	Result
General Chemistry					
Conductivity	uS/cm	2		258	362

PACKAGE: **- Metals and Inorganics** (SOIL)

Sample Number	5	7
Sample Name	19BH-3 SS-7	19MW12 SS-8
Sample Matrix	Soil	Soil
Sample Date	12/02/2019	20/02/2019

Parameter	Units	RL		Result	Result
Metals and Inorganics					
Moisture Content	%	0.1		11.9	8.1
Sulphate	µg/g	0.4		310	110

FINAL REPORT

CA14117-MAR19 R1

Client: Toronto Inspection Ltd.
Project: 4986
Project Manager: Sanjay Goel
Samplers: Ankit Patel

PACKAGE: **- Other (ORP)** (SOIL)

Sample Number	5	7
Sample Name	19BH-3 SS-7	19MW12 SS-8
Sample Matrix	Soil	Soil
Sample Date	12/02/2019	20/02/2019

Parameter	Units	RL		Result	Result
Other (ORP)					
Chloride	µg/g	0.4		16	160

QC SUMMARY

Anions by IC

Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-[ENV]IC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0164-MAR19	µg/g	0.4	<0.4	3	20	97	80	120	108	75	125
Sulphate	DIO0164-MAR19	µg/g	0.4	<0.4	4	20	99	80	120	98	75	125

Carbon/Sulphur

Method: ASTM E1915-07A | Internal ref.: ME-CA-[ENV]ARD-LAK-AN-020

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphide	ECS0006-MAR19	%	0.02	<0.02	11	20	119	80	120			

Conductivity

Method: SM 2510 | Internal ref.: ME-CA-[ENV]EWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0125-MAR19	uS/cm	2	< 2	0	10	100	90	110	NA		

QC SUMMARY

pH

Method: SM 4500 I Internal ref.: ME-CA-[ENV]EWL-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0125-MAR19	pH Units	0.05	NA	0		100			NA		

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.
RL Reporting Limit.
↑ Reporting limit raised.
↓ Reporting limit lowered.
NA The sample was not analysed for this analyte
ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

-- End of Analytical Report --