REPORT ON
GEOTECHNICAL INVESTIGATION
51 WRIGHT STREET
RICHMOND HILL, ONTARIO

REPORT NO.: 6381W-23-GA
REPORT DATE: JUNE 28, 2023

PREPARED FOR
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1.0 INTRODUCTION

Toronto Inspection Ltd. (TIL) was retained by Ms. Layla Tran on behalf of Barry Bryan Associates (BBA) to conduct a geotechnical investigation, within and around the existing gymnasium, located at 51 Wright Street in Richmond Hill, Ontario (hereinafter described as "the Site").

The purpose of the investigation was to evaluate the subsoil and groundwater conditions, at the Site in order to determine the most probable cause(s) of excessive water infiltration and damage to the installed wood floor and sub-flooring systems within the gym and provide our comments and recommendations for the reinstatement of a new concrete slab and flooring system.

2.0 SITE CONDITIONS

The Site is located on the north side of Wright Street and on the east side of Hall Street, in Richmond Hill, Ontario. The development at the Site, known as École secondaire Norval-Morrisseau, consists of a school building, with associated driveways, parking spaces, walkways and landscaping around the building, at the south half of the Site, and a play field at the north half of the Site.

A gym is located at the northwest portion of the building, with an existing door into the gym from the concrete sidewalk to the north, and with a landscaping area to the west that is slight higher than the floor level of the gym.

A Memorandum, Subject: Request for Geotechnical & Environmental Soil Investigations, prepared by BBA, dated March 28, 2023, and a Preliminary Assessment of Gymnasium Floor, prepared by IRC Building Sciences Group, dated September 6, 2022, were provided by the client for reference. A review of the Memorandum and the Preliminary Assessment report indicated that during removal of the wood floor (consisting of wood flooring over the plywood, approximately 3.0cm to 4.5cm in thickness) and the vapour barrier, underlain by the concrete slab, condensed water was evident underneath the wood flooring over the plywood, or at the lower layer of the plywood sheathing, and water seepage was observed from the floor slab along the saw cut joint lines. Heaving of the concrete slab of the walkway to the north of the door of the gym was noticed.

A site review to measure the water levels was carried out on June 26, 2023. The surface of the concrete floor appeared to be dry.

3.0 INVESTIGATION PROCEDURE

The field work for the investigation was carried out on May 25 and 26, 2023. Four sampled boreholes (23BH-1 to 23BH-4) were drilled outside of the building, to the west and north of the Gym, extending to depths of 2.1m from grade, and five sampled boreholes (23BH-5 to 23BH-9) were drilled within the gym, extending to depths of 2.0m to 2.1m from grade. In addition, four boreholes, 23BH-1B to 23BH-4B, were drilled beside Boreholes 23BH-1 to 23BH-4, respectively, without sampling until depths of 2.1m from grade, extending to depths of 3.4m to 3.7m from grade, and were completed as monitoring wells. These borehole locations are shown in the appended Borehole Location Plan, Drawing No. 1.

The boreholes, 23BH-1 to 23BH-4, were advanced using a beaver drill rig, equipped with continuous flight solid stem augers, sampling rods and a drop hammer, supplied by a specialist drilling contractor. Soil samples were continuously taken at 0.6m intervals to the terminated depths. The samples were obtained using a split spoon sampler in conjunction with Standard Penetration Tests using a driving energy of 475 joules (350 ft-lbs). The boreholes, 23BH-5 to 23BH-9, were advanced using a manual machine, equipped with continuous flight solid stem augers, sampling rods and a drop hammer, supplied by a specialist drilling contractor. Soil samples were generally continuously taken at 0.6m intervals to the terminated depths. The samples were obtained using a split spoon sampler in conjunction with Standard Penetration Tests using a driving energy of 238 joules (175 ft-lbs). The soil samples were identified and logged in the field and were carefully bagged for later visual identification and the determination of moisture content.

Groundwater observations were made in the boreholes during and upon the completion of drilling. All boreholes, 23BH-1 to 23BH-9, including 23BH-1B to 23BH4B, were completed as monitoring wells to document the current static groundwater levels. The symbol (MW), beside the borehole identification, indicates a monitoring well.

The locations of boreholes are shown on the appended Borehole Location Plan (Drawing No. 1). The ground elevations at the borehole locations were determined in the field using the “TOP OF CONCRETE FLOOR” of the gym, beside the door, as a temporary bench mark (TBM).

The geodetic elevation of 236.40m (236.43m-0.03m) for the TBM was obtained from the Ground Floor Plan (As-Built Drawings), Drawing No.: A2.1, prepared by The Atlas Corporation, dated October 12, 2012.

4.0 SUMMARIZED SITE AND SUBSURFACE CONDITIONS

Reference is made to the appended Borehole Location Plan (Drawing No. 1), Logs of Boreholes (Drawing Nos. 2 to 14) and Sections (Drawing Nos. 15 to 16), for details of field work, including soil classification, inferred stratigraphy, and groundwater observations carried out during and on completion of borehole drilling.

The boreholes revealed that the subsoil, below the surficial topsoil or concrete slab/floor with its granular base course, consisted of granular fill, overlying a silty sand deposit or sandy silt till deposit.

Brief descriptions of the subsoils, at the borehole locations, were as follows:

4.1 Surface Course

Landscaped Area

Topsoil, approximately 100mm to 200mm in thickness, was contacted at the ground surface at Boreholes 23BH-1 to 23BH-3 locations.

Concrete Walkway North of Gym Door

A concrete slab, approximately 200mm concrete overlying a granular base, was contacted at the ground surface at Borehole 23BH-4 location, extending to a depth of 0.4m from grade. The granular base appeared in a wet condition.

Gym Area

After removal of the wood floor and the vapour barrier, the concrete floor, approximately 140mm to 200mm concrete over a granular base, was contacted at the ground surface at Boreholes 23BH-5 to 23BH-9 locations, extending to depths of 0.4m to 0.5m from grade. The granular base appeared in a moist condition.

4.2 Fill

Landscaped Area

Underlying the topsoil at Boreholes 23BH-1 to 23BH-3 locations, a layer of fill was contacted at depths of 0.1m to 0.2m from grade. The fill consisted of a mixture of sandy silt, clayey silt, trace to some gravel, with minor to some topsoil and rootlets generally at the upper portion. The fill extended to depths of 1.8m,

0.8m and 0.9m from grade, respectively. Based on the soil quality and the Standard Penetration N-values of 9 to 13 blows per 0.3m penetration, the fill appeared to be loose to compact. The in-situ moisture content of the soil samples obtained from the fill ranged from 12% to 14%, indicating moist to very moist conditions.

Concrete Walkway North of Gym Door

Underlying the concrete slab at Borehole 23BH-4 location, a layer of fill was contacted at a depth of 0.4m from grade. The fill consisted of silty sand, with some gravel and some sandy silt. Borehole 23BH-4 was terminated in the fill at a depth of 2.1m from grade. Based on the soil quality and the Standard Penetration N-values of 2 to 4 blows per 0.3m penetration, the fill appeared to be very loose to loose. A high N-value of 52 blows per 0.3m penetration could be due to presence of big gravel, cobble or concrete rubble. The in-situ moisture content of the soil samples obtained from the fill ranged from 17% to 22%, indicating a wet condition.

Gym Area

Underlying the concrete floor at Boreholes 23BH-5 to 23BH-9 locations, a layer of fill was contacted at depths of 0.4m to 0.5m from grade. The fill consisted primarily of sandy silt, with trace to some gravel and clayey silt. Borehole 23BH-9 was terminated in the fill at a depth of 2.3m from grade. The fill at Boreholes 23BH-5 to 23BH-8 locations extended to depths of 0.5m, 0.5m, 0.5m and 2.0m from grade, respectively. Based on the soil quality and the Standard Penetration N-values, in the range of 4 to 20 blows per 0.3m penetration, the fill appeared to be compact at Boreholes 23BH-5 and 23BH-6 locations, but loose at 23BH-7 to 23BH-9 locations. The in-situ moisture content of the soil samples obtained from the fill ranged from 9% to 14%, indicating moist to very moist conditions with wet pockets.

A grain size analysis was conducted in one selected soil sample, obtained from 23BH-9 (SS3, at a depth of 1.5m), using both of mechanical sieves and hydrometer methods. The grains size distribution chart was shown in the appended Figure No. 1.

4.3 Sandy Silt Till

Underlying the fill, a sandy silt till deposit was contacted at Boreholes 23BH-1 to 23BH-3 and 23BH-5 to 23BH-8 locations, at depths of 0.5m to 2.0m from grade.

The sandy silt till deposit consisted of a heterogeneous mixture of silt and sand, with gravel and clay, with seams of fine sand.

Boreholes 23BH-1 to 23BH-3 and 23BH-5 to 23BH-8 were terminated in the sandy silt till deposit, at depths of 2.1m to 2.4m from grade.

Based on the Standard Penetration N-values of 5 to 100 blows per 0.3m penetration, the relative density of the sandy silt till deposit was generally compact to very dense, with a loose layer at Borehole 23BH-8 location.

The in-situ moisture content of the soil samples retrieved from the sandy silt till deposit ranged from 9% to 18%, indicating moist to very moist conditions.

A grain size analysis was conducted in one selected soil sample, obtained from 23BH-2 (SS3, at a depth of 1.5m), using both of mechanical sieves and hydrometer methods. The grains size distribution chart was shown in the appended Figure No. 1.

4.4 Silty Sand

Landscaped Area and Walkway

Four boreholes, 23BH-1B to 23BH-4B, were drilled beside Boreholes 23BH-1 to 23BH-4, respectively, without sampling until depths of 2.1m from grade, extending to depths of 3.4m to 3.7m from grade, and were completed as monitoring wells. A silty sand deposit was contacted at depths of 2.1m from grade and extended to depths of 2.6m from grade. Based on the Standard Penetration N-values of 72 to more than 100 blows per 0.3m penetration, at Boreholes 23BH-1B to 23BH-3B locations, the relative density of the silty sand deposit was very dense. The in-situ moisture content of the soil samples retrieved from the silty sand deposit ranged from 10% to 18%, indicating moist to wet conditions.

4.5 Groundwater

Free water was recorded in the open boreholes, 23BH-4 to 23BH-9 and 23BH-1B to 23BH-4B, at depths of 0.6m to 2.8m from grade; and wet cave-in was recorded in the open boreholes, 23BH-9 and 23BH-1B, at depths of 1.8m to 3.4m from grade, upon the completion of drilling and sampling on May 25 and 26, 2023.

On June 5 and 26, 2023, the static groundwater levels, measured in the monitoring wells, installed at 23BH-1 to 23BH-9, including 32BH-1B to 23BH-4B, were at

depths of 0.15m to 1.76m from grade. The measured groundwater levels are listed below:

BH/ Well Location	BH Elevation	Groundwater Measured Depth/Elevation		
		Upon Completion	June 5, 2023	June 26, 2023
22BH-1 (MW)	236.35m	No free water	1.24m/235.11m	1.32m/235.03m
22BH-1B (MW)	236.35m	2.4m/233.95m	1.25m/235.10m	1.36m/234.99m
22BH-2 (MW)	236.50m	No free water	1.26m/235.24m	1.28m/235.22m
22BH-2B (MW)	236.50m	2.3m/234.20m	1.25m/235.25m	1.41m/235.09m
22BH-3 (MW)	236.70m	No free water	1.57m/235.13m	1.70m/235.00m
22BH-3B (MW)	236.70m	2.8m/233.90m	1.58m/235.12m	1.74m/234.96m
22BH-4 (MW)	236.50m	0.6m/235.90m	1.26m/235.24m	0.15m/236.35m
22BH-4B (MW)	236.50m	0.6m/235.90m	1.21m/235.29m	1.20m/235.30m
22BH-5 (MW)	236.40m	0.7m/235.70m	1.16m/235.24m	1.30m/235.10m
22BH-6 (MW)	236.40m	0.7m/235.70m	1.76m/234.64m	1.65m/234.75m
22BH-7 (MW)	236.40m	1.5m234.90m	1.32m/235.08m	1.44m/234.96m
22BH-8 (MW)	236.40m	1.6m/234.80m	1.41m/234.99m	1.56m/234.84m
22BH-9 (MW)	236.40m	0.6m/235.80m	1.28m/235.12m	1.38m/235.02m

Based on the field observations and the moisture content profile of the soil samples retrieved from the boreholes, it is our opinion that there is a continuous groundwater table, at depths of 1.20m to 1.74m from grade, in the wet silty sand deposit at Boreholes 23BH-1/1B to 23BH-4/4B locations, with perched water up to depths of 0.15m to 0.6m from grade in the wet granular base and wet fill at Boreholes 23BH-4/4B locations. The water encountered at Boreholes 23BH-5 to 23BH-9, within the gym, indicates perched water in seams of find sand within the sandy silt till deposit and in the fill. The water table may fluctuated with the seasonal condition.

5.0 COMMENT AND RECOMMENDATION

Based on the subsoil and groundwater conditions, encountered at the borehole locations, and the laboratory test results, out comments and recommendations are listed below:

Comments:

1. The existing ground level in the landscaped area to the west and concrete walkway to the north of the gym, at Boreholes 23BH-2 to 23BH-4 locations, is slightly higher than the concrete floor level of the gym. Water from rain or snow melting may flow towards the gym, particularly into the door of the gym from the concrete walkway. The play field, higher than the driveway and the walkway, may bring some surface water to the south portion of the Site.
2. The heaving of the concrete slab of the walkway, to the north of the door of the gym, could be due to the freeze-thaw effects to the wet and saturated granular base and silty sand fill under the concrete slab, revealed at Boreholes 23BH-4/4B locations.
3. The recorded groundwater levels, ranging from depths of 0.6m to 1.76m below the concrete floor level, at Boreholes 23BH-5 to 23BH-9 locations, could be due to the fluctuation, affected by the seasonal condition, and the wet pockets in the loose fill at Boreholes 23BH-8 and 23BH-9 locations.

Recommendations:

- A surface drainage or weeping tiles be installed in the landscaped area along the west of the building/gym and along the south boundary of the play field to catch most of the surface water.
- Weeping tiles be installed along the south curb of the driveway and adjacent to the foundation wall below the concrete walkway, for the water to drain out of and not collect in the granular base courses. The subdrains should be at least 800mm below the road pavement or concrete walkway level, and installed on a positive gradient to allow for a free flow of water.
- A subfloor drainage system will be necessary to keep the groundwater level at least 1.0m below the concrete floor in the gym. The recommended permanent perimeter drainage system is shown in Figure No. 2, Item 11.

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.

TORONTO INSPECTION LTD.

David S. Wang, P.Eng.
Senior Engineer

Drawings & Figure

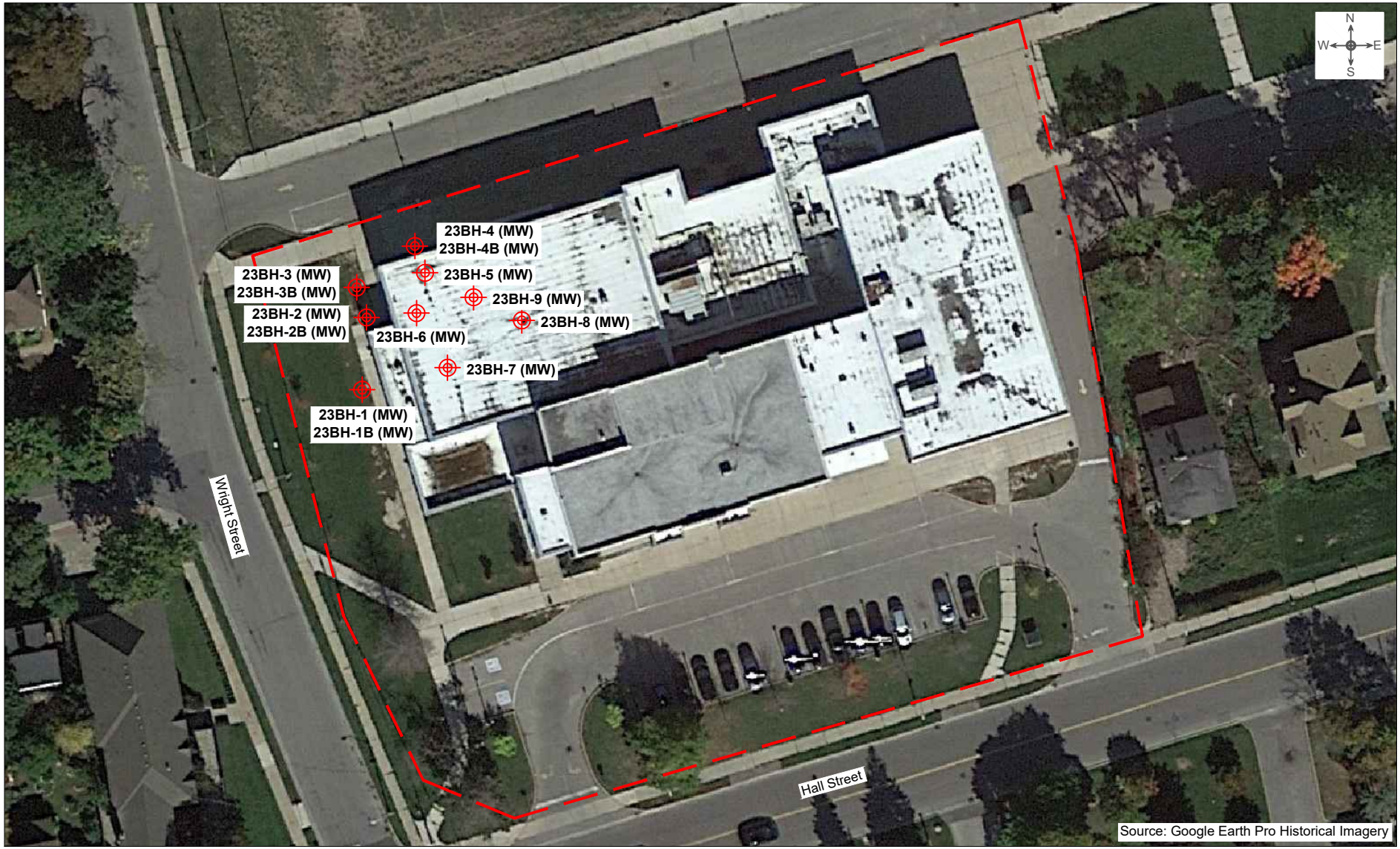
Borehole Location Plan

Borehole Logs

Sections

Gradation Curves

Subfloor Drainage



LEGEND:

Borehole Location / Monitoring Well Location

Site Boundary

NOT TO SCALE

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TITLE:	Borehole and Monitoring Well Location Plan		
LOCATION:	51 Wright Street, Richmond Hill, Ontario		
PROJECT NO. 6381W-23-GA	DATE : June 2023	DRAWING NO. 1	

Project No. 6381W-23-GA

Log of Borehole 23BH-1 (MW)

Dwg No. 2

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

Date Drilled: 5/25/23

Drill Type: Beaver

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	236.35	0
		TOPSOIL	236.25	
		FILL - brown sandy silt - pockets of topsoil and rootlets, and at 1.7m - some gravel, some clayey silt - moist to very moist		
			235.03	1
		SANDY SILT TILL - compact, brown - some gravel, some clayey silt - seams of fine sand - moist	234.52	
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - no free water	234.22	2

N Value: 9, 9, 17

Shear Strength (kPa): 20, 40, 60, 80; 100, 200

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)
June 5, 2023	1.24m	
June 26, 2023	1.32m	

Project No. 6381W-23-GA

Log of Borehole 23BH-1B (MW)

Dwg No. 3

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

Date Drilled: 5/25/23

Drill Type: Beaver

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	236.35	0
		(No Sampling)		
			234.99	1
			234.22	2
		SILTY SAND - very dense, brown - fine to medium grained - some gravel, some sandy silt - very moist to wet	233.76	
		(No Sampling)		3
			232.69	
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 2.4m - cave-in at 3.4m		

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

96 ○ ×

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

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Time	Water Level (m)	Depth to Cave (m)
June 5, 2023	1.25m	
June 26, 2023	1.36m	

Project No. 6381W-23-GA

Log of Borehole 23BH-2 (MW)

Dwg No. 4

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

Date Drilled: 5/25/23

Drill Type: Beaver

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	236.50	0
		TOPSOIL	236.30	
		FILL - brown sandy silt to clayey silt - some topsoil, some rootlets - moist	235.74	
		SANDY SILT TILL - dense to very dense, brown - some gravel, trace to some clayey silt - seams of fine sand - moist to very moist	235.22	1
			234.37	2
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - no free water		

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

9
37
100

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

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Time	Water Level (m)	Depth to Cave (m)
June 5, 2023	1.26m	
June 26, 2023	1.28m	

Project No. 6381W-23-GA

Log of Borehole 23BH-2B (MW)

Dwg No. 5

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

Date Drilled: 5/25/23

Drill Type: Beaver

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	236.50	0	20 40 60 80 / 100 200	100 200 300 / 10 20 30	
		(No Sampling)					
				1			
			235.09				
				2			
			234.37				
		SILTY SAND - very dense, brown - grey pockets, trace gravel - fine to medium grained - very moist, wet pockets			117 ○	×	
			233.91				
		(No Sampling)					
				3			
			232.84				
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 2.3m					

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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)
June 5, 2023	1.25m	
June 26, 2023	1.41m	

Project No. 6381W-23-GA

Log of Borehole 23BH-3 (MW)

Dwg No. 6

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

Date Drilled: 5/25/23

Drill Type: Beaver

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	N Value / Shear Strength (kPa)	Headspace Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	Natural Unit Weight kN/m3
		Ground Surface	236.70	0	N Value: 20 40 60 80; Shear Strength: 100 200 kPa	Headspace Reading (ppm): 100 200 300; Natural Moisture Content % Atterberg Limits (% Dry Weight): 10 20 30	
		TOPSOIL	236.55				
		FILL - dark brown to brown - clayey silt with sandy silt - some topsoil, minor rootlets - trace gravel - moist	235.78		13		
		SANDY SILT TILL - compact, brown - some gravel, some clayey silt - seams of fine sand - moist	235.00	1	14		
					29		
			234.56	2			
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - no free water					

LGBE3 6381W-23-GA.GPJ 6/27/23

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)
June 5, 2023	1.57m	
June 26, 2023	1.70m	

Project No. 6381W-23-GA

Log of Borehole 23BH-3B (MW)

Dwg No. 7

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

Date Drilled: 5/25/23

Drill Type: Beaver

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	236.70	0	20 40 60 80 / 100 200	100 200 300 / 10 20 30	
		(No Sampling)					
				1			
			234.96				
			234.56	2			
		SILTY SAND - very dense, brown - fine to coarse grained - some gravel - moist to very moist			○ 72	×	
			234.11				
		(No Sampling)		3			
			233.29				
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 2.8m					

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

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Time	Water Level (m)	Depth to Cave (m)
June 5, 2023	1.58m	
June 26, 2023	1.74m	

Project No. 6381W-23-GA

Log of Borehole 23BH-4 (MW)

Dwg No. 8

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

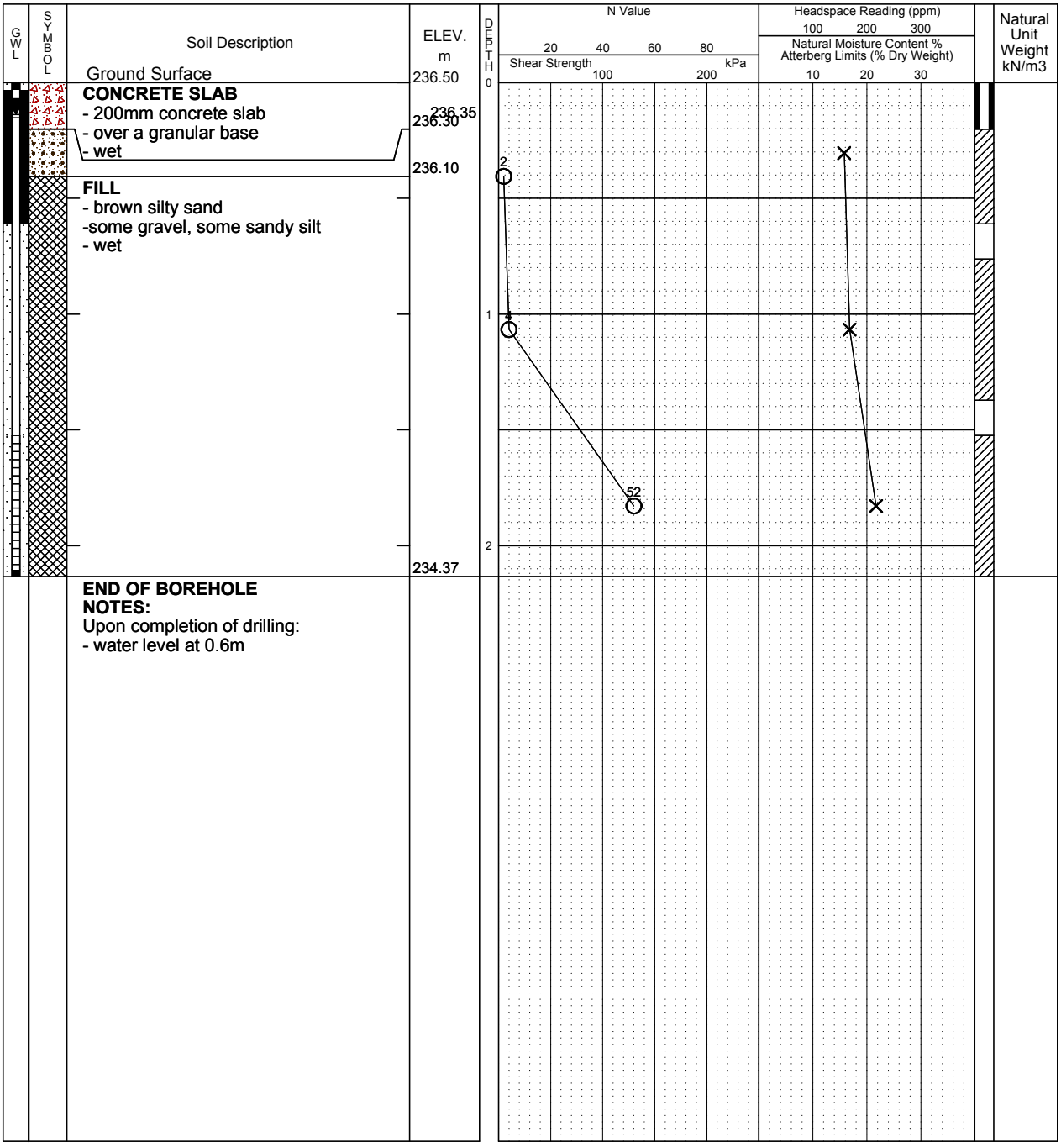
Date Drilled: 5/25/23

Drill Type: Beaver

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 6381W-23-GA.GPJ 6/27/23

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)
June 5, 2023	1.26m	
June 26, 2023	0.15m	

Project No. 6381W-23-GA

Log of Borehole 23BH-4B (MW)

Dwg No. 9

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

Date Drilled: 5/25/23

Drill Type: Beaver

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	236.50	0			
		(No Sampling)					
			235.30	1			
				2			
			234.37				
		SILTY SAND - wet at auger sample					
			233.91				
		(No Sampling)		3			
			233.15				
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 0.6m					

LGBE3 6381W-23-GA.GPJ 6/27/23

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)
June 5, 2023	1.21m	
June 26, 2023	1.20m	

Project No. 6381W-23-GA

Log of Borehole 23BH-5 (MW)

Dwg No. 10

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

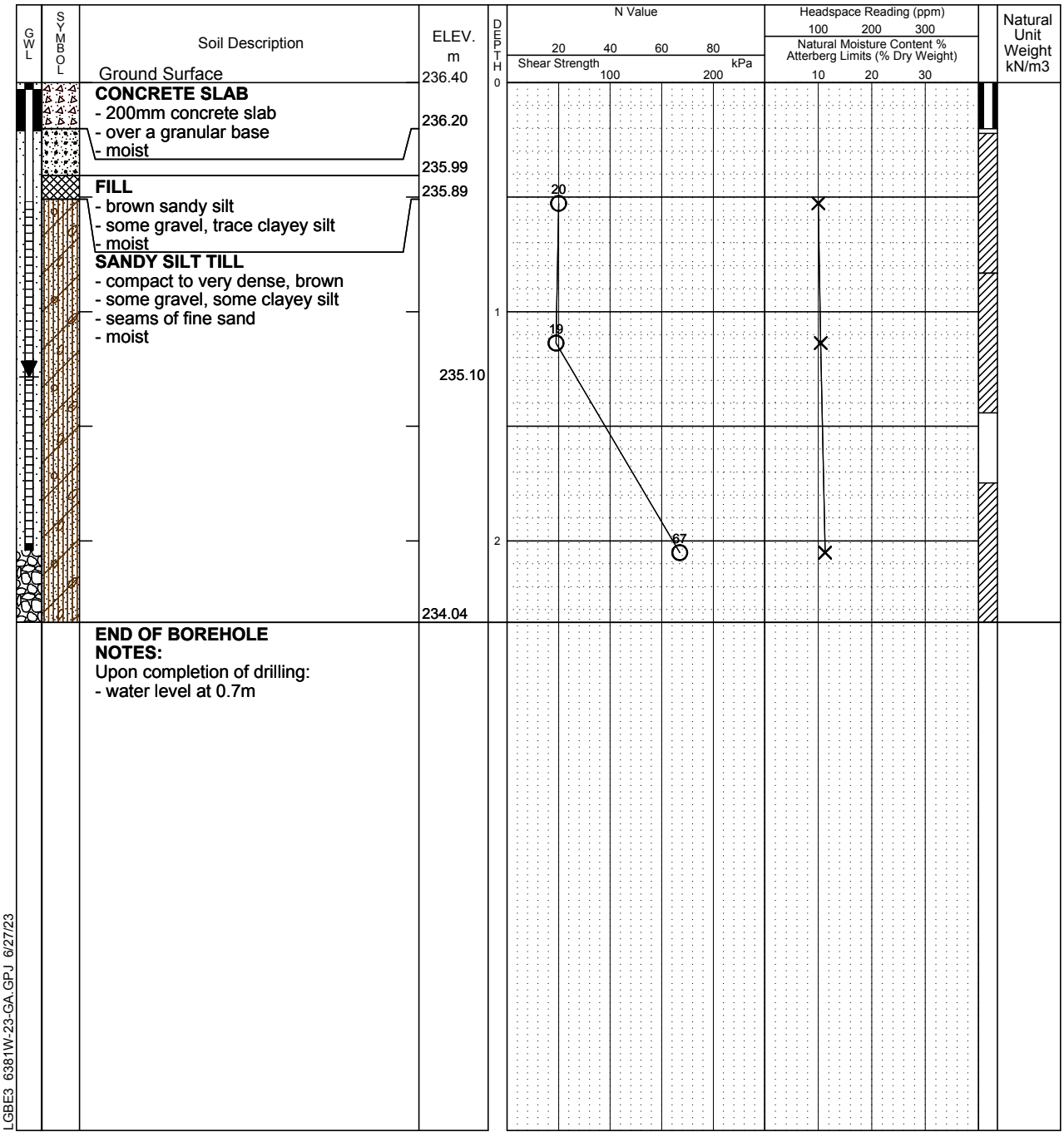
Date Drilled: 5/25/23

Drill Type: Hand Hammer

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 6381W-23-GA.GPJ 6/27/23

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)
June 5, 2023	1.16m	
June 26, 2023	1.30m	

Project No. 6381W-23-GA

Log of Borehole 23BH-6 (MW)

Dwg No. 11

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

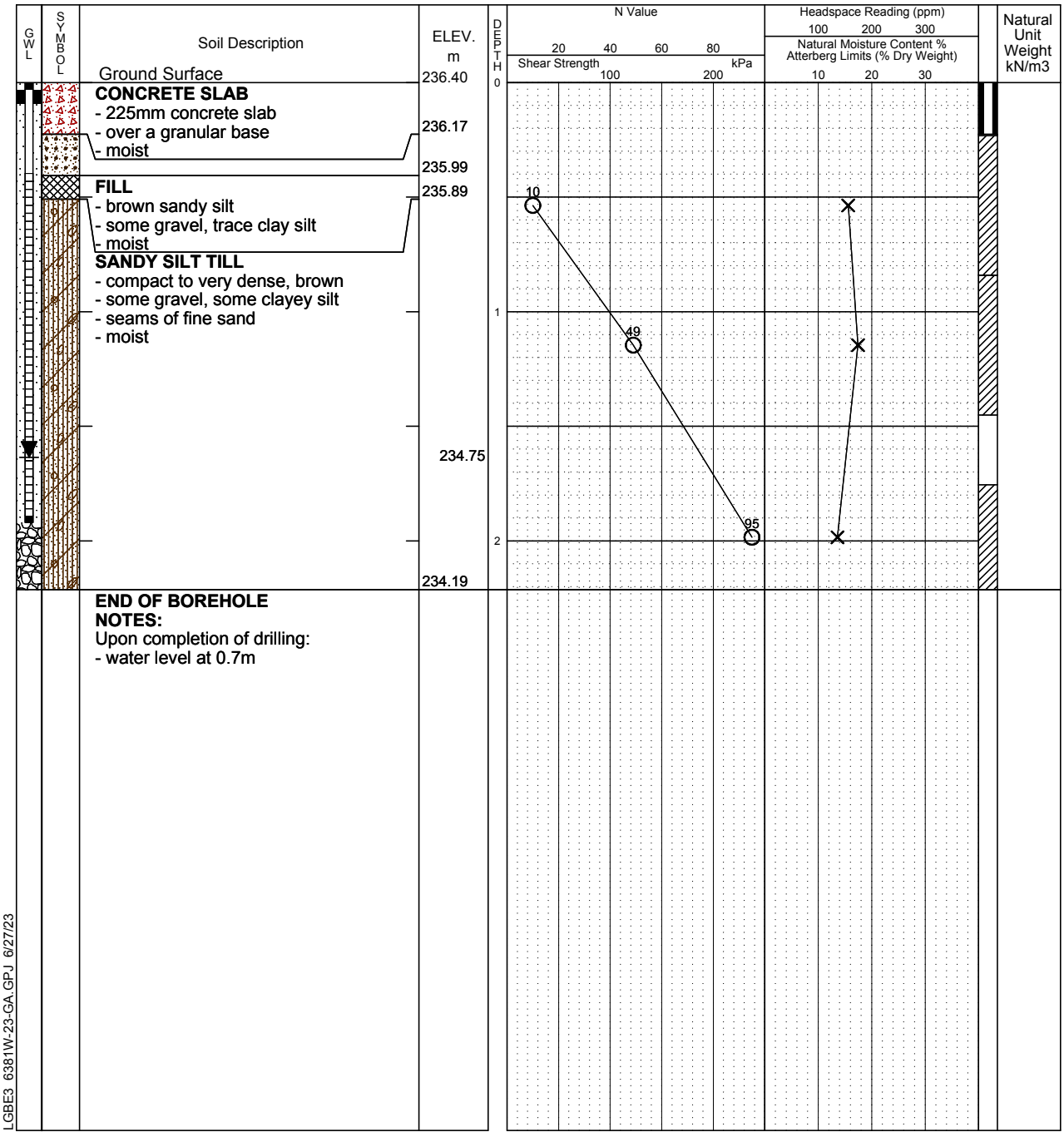
Date Drilled: 5/26/23

Drill Type: Hand Hammer

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 6381W-23-GA.GPJ 6/27/23

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)
June 5, 2023	1.76m	
June 26, 2023	1.65m	

Project No. 6381W-23-GA

Log of Borehole 23BH-7 (MW)

Dwg No. 12

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

Date Drilled: 5/26/23

Drill Type: Hand Hammer

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	236.40	0
		CONCRETE SLAB - 165mm concrete slab - over a granular base - moist	236.24 236.02	
		FILL - brown sandy silt - some gravel, trace clayey silt - moist	235.89	
		SANDY SILT TILL - compact to very dense, brown - some gravel, some clayey silt - seams of fine sand - moist	234.96	1
			234.25	2
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 1.5m		

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

7
22
54

LGBE3 6381W-23-GA.GPJ 6/27/23

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)
June 5, 2023	1.32m	
June 26, 2023	1.44m	

Project No. 6381W-23-GA

Log of Borehole 23BH-8 (MW)

Dwg No. 13

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

Date Drilled: 5/26/23

Drill Type: Hand Hammer

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	236.40	0
		CONCRETE SLAB - 190mm concrete slab - over a granular base - moist	236.21	
		FILL - brown sandy silt - some gravel, some clayey silt - pockets of topsoil at 0.6m and 1.7m - brick pieces at 1.8m - moist to very moist, wet pockets below 1.5m	235.94	
			234.84	1
		SANDY SILT TILL - loose, brown - trace gravel, trace clayey silt - very moist	234.42	2
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 1.6m	234.07	

N Value: 9, 7, 5

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 6381W-23-GA.GPJ 6/27/23

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)
June 5, 2023	1.41m	
June 26, 2023	1.56m	

Project No. 6381W-23-GA

Log of Borehole 23BH-9 (MW)

Dwg No. 14

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 51 Wright Street, Richmond Hill, Ontario

Date Drilled: 5/26/23

Drill Type: Hand Hammer

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	236.40	0
		CONCRETE SLAB - 190mm concrete slab - over a granular base - moist	236.26	
		FILL - brown sandy silt - trace gravel, some clayey silt - pockets of topsoil at 0.9m and 1.9m - moist to very moist, wet pockets	235.97	
			235.02	1
				2
		END OF BOREHOLE **NOTES:** Upon completion of drilling: - water level at 0.6m - cave-in at 1.8m	234.10	

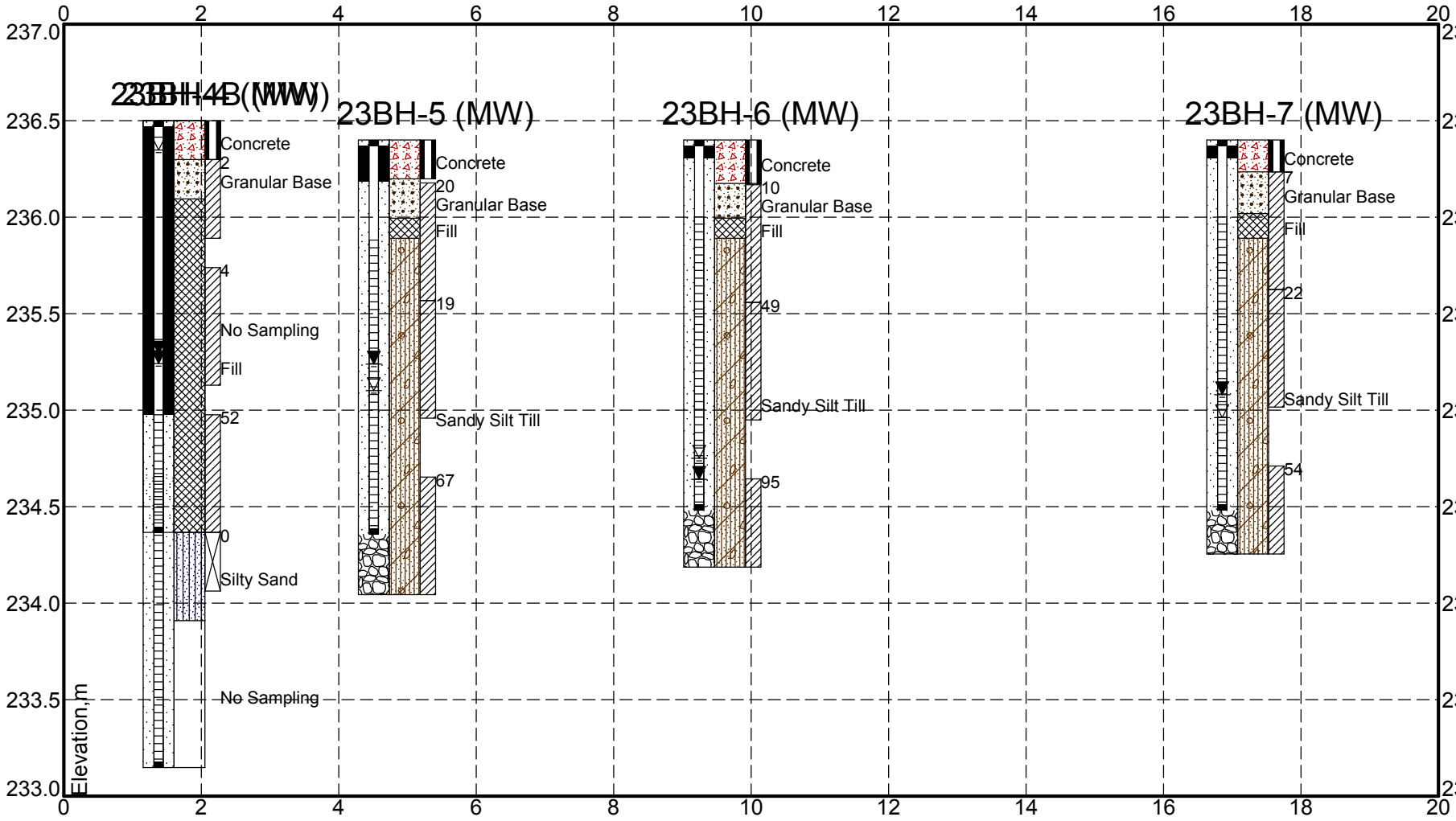
N Value: 20, 40, 60, 80
Shear Strength: 100, 200 kPa
Headspace Reading (ppm): 100, 200, 300
Natural Moisture Content % Atterberg Limits (% Dry Weight): 10, 20, 30
Natural Unit Weight kN/m3

LGBE3 6381W-23-GA.GPJ 6/27/23

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)
June 5, 2023	1.28m	
June 26, 2023	1.38m	



Borehole No	Elev.	Depth
23BH-4 (MW)	236.5	2.1
23BH-4B (MW)	236.5	3.4
23BH-5 (MW)	236.4	2.4
23BH-6 (MW)	236.4	2.2
23BH-7 (MW)	236.4	2.1

Toronto Inspection Ltd.

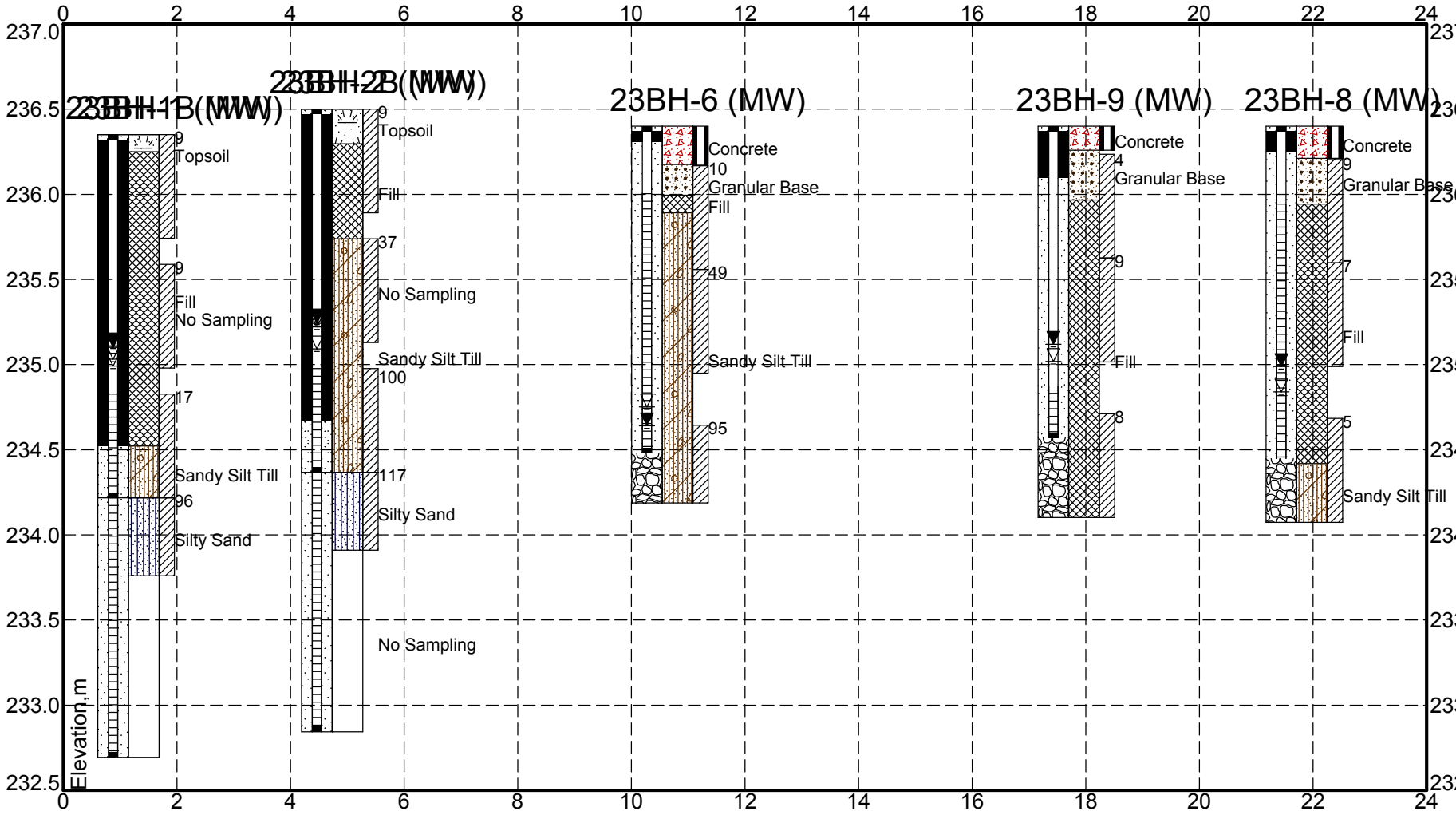
SUBSURFACE STRATIGRAPHY

Section 1

Geotechnical Investigation

51 Wright Street, Richmond Hill, Ontario

PROJECT #	DATE	DRAWING
6381W-23-GA	Jun 23	15



Borehole No	Elev.	Depth
23BH-1 (MW)	236.4	2.1
23BH-1B (MW)	236.4	3.7
23BH-2 (MW)	236.5	2.1
23BH-2B (MW)	236.5	3.7
23BH-6 (MW)	236.4	2.2
23BH-8 (MW)	236.4	2.3
23BH-9 (MW)	236.4	2.3

Toronto Inspection Ltd.

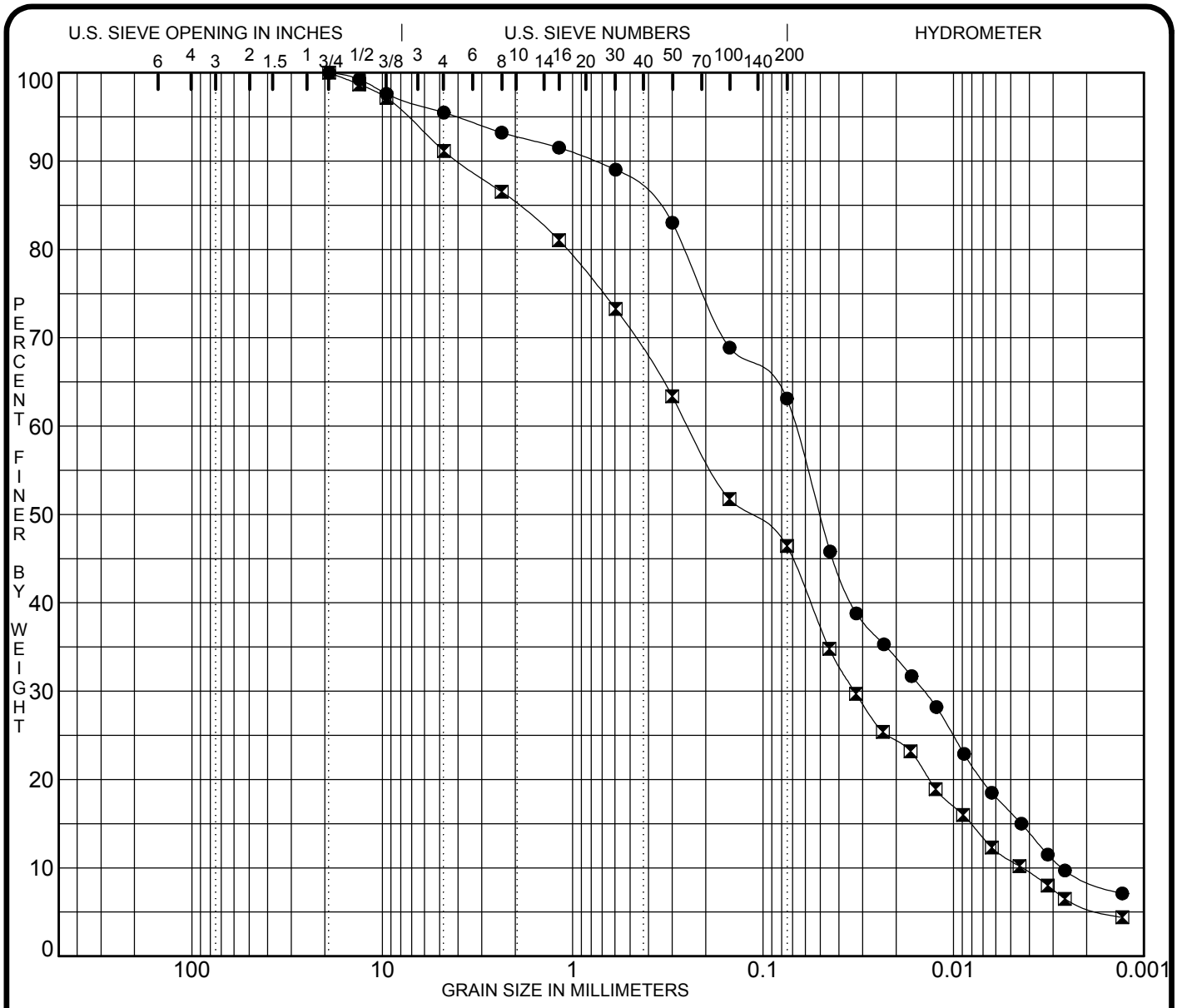
SUBSURFACE STRATIGRAPHY

Section 2

Geotechnical Investigation

51 Wright Street, Richmond Hill, Ontario

PROJECT #	DATE	DRAWING
6381W-23-GA	Jun 23	16



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	MC%	LL	PL	PI	Cc	Cu
●	**23BH-2 (MW) 1.5**						**1.12**	**25.4**
⧓	**23BH-9 (MW) 1.5**						**1.02**	**56.3**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**23BH-2 (MW) 1.5**	**19.00**	**0.07**	**0.014**	**0.0027**	**4.5**	**32.4**	**46.9**	**16.2**
⧓	**23BH-9 (MW) 1.5**	**19.00**	**0.25**	**0.033**	**0.0044**	**8.9**	**44.7**	**35.6**	**10.9**

PROJECT **Geotechncial Investigation - 51 Wright Street, Richmond Hill, Ontario**

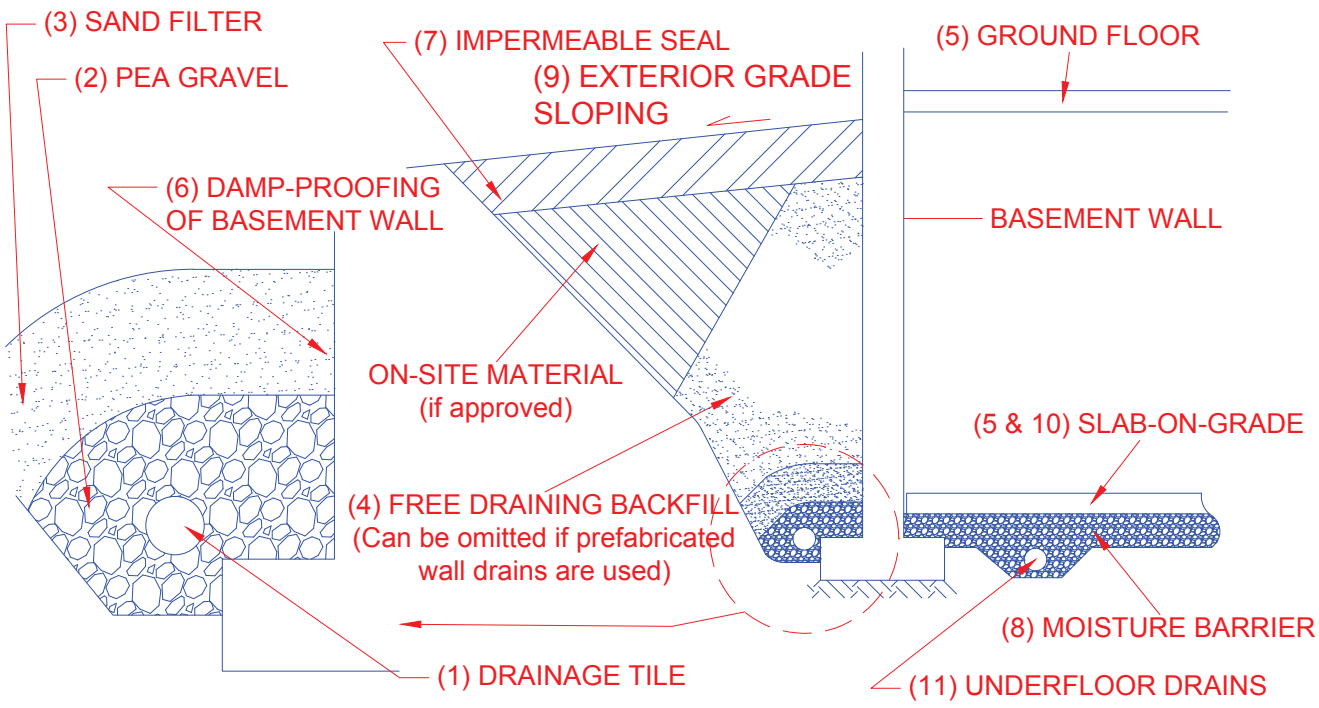
JOB NO. **6381W-23-GA**

DATE **6/15/23**

GRADATION CURVES

Toronto Inspection Ltd.

FIGURE NO. 1



Notes:

1. **Drainage tile**: consist of 100mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. invert to be at minimum of 150mm (6") below underside of basement floor level.
2. **Pea gravel**: at 150mm (6") on the top and sides of drain. If drain is not placed on footing, provide 100mm (4") of pea gravel below drain. The pea gravel may be replaced by 20mm clear stone provided that the drain is covered by a porous geotextile membrane of Terrafix 270 R or equivalent.
3. **Filter material**: consists of C.S.A. fine concrete aggregate. A minimum of 300mm (12") on the top and sides of gravel. This may be replaced by an approved porous geotextile membrane of Terrafix 270R or equivalent.
4. **Free-draining backfill**: OPSS Granular B or equivalent, compacted to 93 to 95% (maximum) Standard Proctor Density. Do not ocmpact closer than 1.8m (6ft.) from wall with heavy equipment. This may be replaced by on site material if prefabicated wall drains (Miradrain) extending from the finished grade to the bottom of the basement wall are used.
5. **Do not backfill** until the wall is supported by the basement floor slab and ground floor framing, or adequate bracing.
6. **Damp-proofing** of the basement wall is requred before backfilling.
7. **Impermeable backfill seal** of compacted clay, clayey silt or equivalent. If the original soil in the vicinity is a free draining sand, the seal may be omitted.
8. **Moisture barrier**: consists of 20mm clear stone or compacted OPSS Granular A, or equivalent. The thickness of this layer to be 150mm (6") minimum.
9. **Exterior Grade**: slope away from basement wall on all the sides of the building.
10. **Slab-on-grade** should not be structurally connected to walls or foundations.
11. **Underfloor drains** * should be placed in parallel rows at 6-8m (20-25 ft.) centre, on 100mm (4") of pea gravel with 150mm (6") of pea gravel on top and sides. The invert should be at least 300mm (12") below the underside of the floor slab. The drains should be connected to positive sumps or outlets. Do not connect the underfloor drains to the perimeter drains.

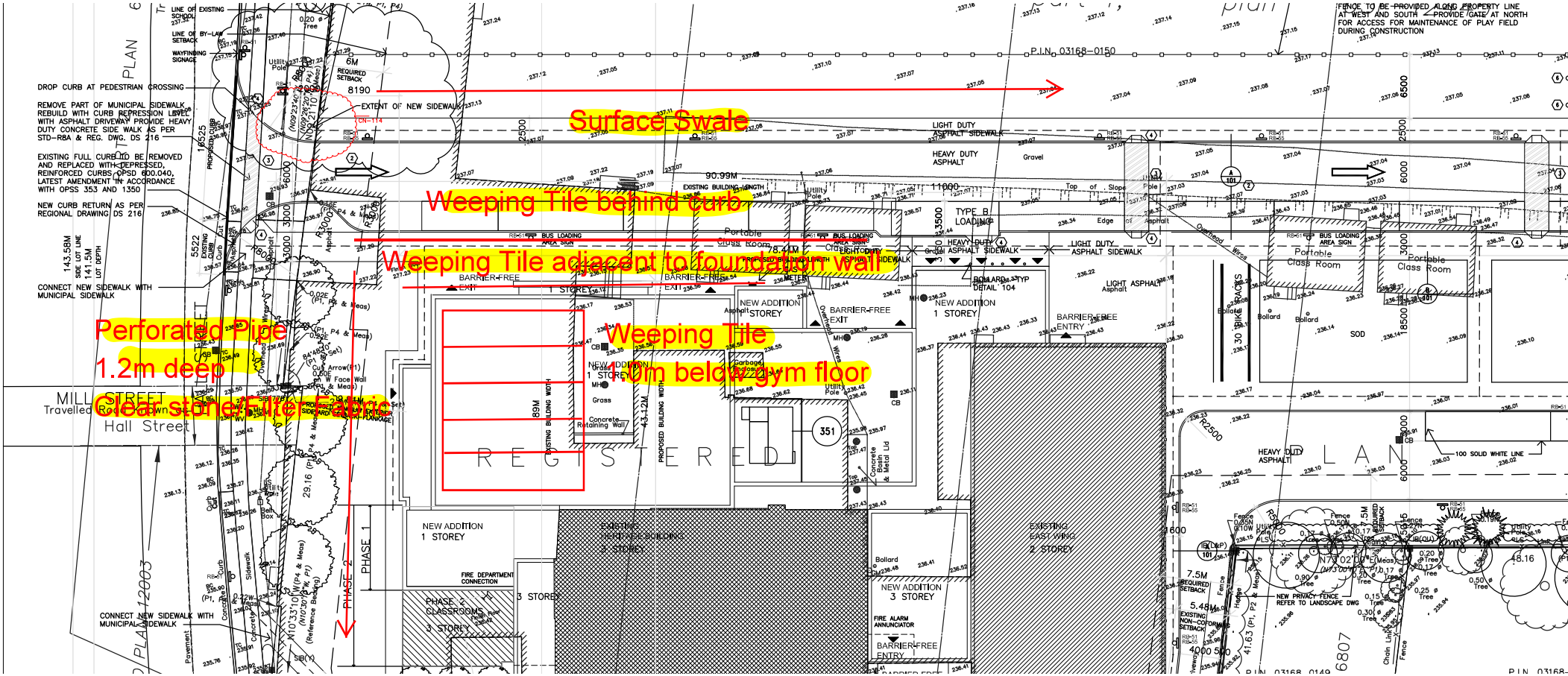
* Underfloor drains can be deleted where not required.

NOT TO SCALE

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

TITLE:
Details of Perimeter Subdrain and Basement Backfill

FIGURE NO.
2


Surface Swale
Weeping Tile behind curb
Weeping Tile adjacent to foundation wall
Perforated Pipe
1.2m deep
Weeping Tile
1.0m below gym floor
Clear stone filter media
MILL STREET
Hall Street
PHASE 1
PHASE 2
NEW ADDITION
1 STOREY
NEW ADDITION
3 STOREY
EXISTING
EAST WING
2 STOREY
PHASE 2
CLASSROOMS
3 STOREY
Portable
Class Room
P.I.N. 03168-0150
DROP CURB AT PEDESTRIAN CROSSING
REMOVE PART OF MUNICIPAL SIDEWALK
REBUILD WITH CURB DEPRESSION LEVEL
WITH ASPHALT DRIVEWAY PROVIDE HEAVY
DUTY CONCRETE SIDE WALK AS PER
STD-R8A & REG. DWG. DS 216
EXISTING FULL CURB TO BE REMOVED
AND REPLACED WITH DEPRESSED,
REINFORCED CURBS OPSD 600.040,
LATEST AMENDMENT IN ACCORDANCE
WITH OPSS 353 AND 1350
NEW CURB RETURN AS PER
REGIONAL DRAWING DS 216
CONNECT NEW SIDEWALK WITH
MUNICIPAL SIDEWALK
FENCE TO BE PROVIDED ALONG PROPERTY LINE
AT WEST AND SOUTH - PROVIDE GATE AT NORTH
FOR ACCESS FOR MAINTENANCE OF PLAY FIELD
DURING CONSTRUCTION
HEAVY DUTY
ASPHALT
LIGHT DUTY
ASPHALT SIDEWALK
TYPE B
LOADING
BUS LOADING
AREA SIGN
BARRIER-FREE
ENTRY
BARRIER-FREE
EXIT
BOLLARD TYP
DETAIL 104
SOD
100 SOLID WHITE LINE
FIRE DEPARTMENT
CONNECTION
FIRE ALARM
ANNUNCIATOR
EXISTING
NON-CONFORMING
SETBACK
NEW PRIVACY FENCE
REFER TO LANDSCAPE DWG
REGISTERED PLAN