TORONTO INSPECTION LTD.
GEO-ENVIRONMENTAL CONSULTANTS

REPORT ON
GEOTECHNICAL INVESTIGATION
1656 GREEN LANE EAST
EAST GWILLIMBURY, ONTARIO

REPORT NO.: 2177-24-GL
REPORT DATE: OCTOBER 8, 2024

PREPARED FOR
NEWROADS AUTOMOTIVE GROUP
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L3Y 3V1

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Toronto Inspection Ltd.

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1.0 INTRODUCTION

Toronto Inspection Ltd. (TIL) was retained by Newroads Automotive Group to conduct a geotechnical investigation on one parcel of land at 1656 Green Lane East, in East Gwillimbury, Ontario (hereinafter described as "the Site").

The Geotechnical Investigation was carried out in conjunction with a Hydrogeological investigation. The report of findings, relating to the hydrogeological study, will be issued under a separate cover.

A review of the Overall Site Plan, Drawing No: A1.0, prepared by Ware Malcomb, dated August 29, 2024, and provided to ***Toronto Inspection Ltd.*** by the client, indicated that the development at the Site will consist of a one storey commercial building with no basement.

The purpose of the geotechnical investigation was to determine the subsoil and groundwater conditions, encountered at boreholes carried out within the subject Site and provide our recommendations for the design and construction of the proposed structures at the Site. In particular, Geotechnical data was to be provided for:

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

The parameters and recommendations for the design and construction of the proposed buildings are based on the factual subsoil and groundwater conditions, obtained at the borehole locations, on the basis of the terms of reference and on an assumption that the design of the structure 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, ***TIL*** should be consulted to review the design and to confirm the recommendations and comments provided in the report.

2.0 SITE CONDITION

The Site, approximately 2.87 Ha in area and near rectangle in shape, is located on the north side of Green Lane East, on the west side of Harry Walker Parkway North, in Newmarket, Ontario. The Site was an open parcel of land and used to be a farmland.

At the time of the investigation, the Site was cleared of the surficial topsoil and vegetation. The site gradient was fairly flat, sloping gently from east to west. We understand that some site regrading work was in progress at the Site at the time of preparation of this report.

3.0 INVESTIGATION PROCEDURE

The field work for the investigation was carried out on July 29, 2024, and consisted of drilling five sampled boreholes (24BH-1 to 24BH-5), to depths varying from 6.2m to 7.7m from grade.

The boreholes were advanced using a track mounted drill rig, equipped with continuous flight solid stem augers, sampling rods and a dropped hammer, supplied and operated by a specialist drilling contractor. Soil samples were taken at 0.76m intervals to depths of 3.0m below the existing ground level. Below the depths, the sampling frequency was increased to 1.5m. 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). Each sample was identified and logged in the field and was carefully bagged for later visual identification and laboratory testing, including moisture content determination.

Groundwater observations were made in the open boreholes during and upon completion of the drilling. Two boreholes, 24BH-1 and 24BH-5, were also completed as monitoring wells to document the current static groundwater levels. The symbol (MW), besides the borehole identification on the Borehole Location Plan, indicates a monitoring well. The groundwater records are presented in the borehole logs.

In addition, one more monitoring well was installed at Borehole 24BH-4 location at a depth of 6.1m from grade on September 11, 2024. The well profile has been included in the borehole 24BH-4 (MW) log.

The locations of boreholes, established in the field by our field personnel, are shown on the appended Borehole Location Plan (Drawing No. 1). ***The ground elevations, at the borehole locations, were surveyed and provided by the client to our office via an email on October 2, 2024.***

4.0 SUMMARISED SITE AND SUBSURFACE CONDITIONS

Reference is made to the appended Borehole Location Plan (Drawing No. 1), and Logs of Boreholes 24BH-1 to 24BH-5 (Drawing Nos. 2 to 6), for details of field work including soil classification, inferred stratigraphy and groundwater observations carried out during and upon completion of borehole drilling.

The boreholes revealed that the subsoil, generally consisted of the surficial layer of fill, overlying native deposits of silty sand till to sandy silt till deposits.

The brief descriptions of the subsoil and groundwater conditions, encountered at the borehole locations, are as follows:

4.1 Fill (Disturbed Material)

A layer of fill was contacted at the ground surface at Boreholes 24BH-2 to 24BH-5 locations. The fill extended to depths of 0.6m to 1.2m from grade, with the exception at Boreholes 24BH-3 and 24BH-4, where the fill extended to depths of 2.1m to 2.3m from grade.

The fill consisted of a mixture of sandy silt, silty sand, some clayey silt, trace to some gravel. It is our opinion that this material probably represents either the material reworked during the previous farming operation in the area or from the recent site grading process. For identification purpose, this material has been identified as fill in the borehole logs.

Based on the Standard Penetration N-values of 2 to 16 blows for a penetration of 300mm, the compactness of the fill was very loose to compact state. The in-situ moisture content of the soil samples, retrieved from the fill, ranged from 8% to 19%, indicating moist to very moist conditions with wet pockets.

4.2 Sandy Silt Till / Silty Sand Till

Sandy silt till / silty sand till deposits were contacted at the ground surface at Borehole 24BH-1 location and underlying the fill at the remaining boreholes, at depths of 0.0m to 2.3m from grade. The sandy silt till / silty sand till deposits consisted of a heterogeneous mixture of silt and sand, some gravel, trace clay, with occasional seams of fine sand, cobbles or sand and gravel layers.

All boreholes, 24BH-1 to 24BH-5, were terminated in the sandy silt till / silty sand till deposits at depths of 6.2m to 7.7m from grade.

Based on the Standard Penetration N-values of 11 to more than 100 blows for a penetration of 300 mm, the relative density of the sandy silt till / silty sand till deposits was compact to very dense. The in-situ moisture content of the soil samples, retrieved from the deposits, ranged from 6% to 25%, indicating moist to very moist conditions with wet pockets or layers.

A grain size analysis was carried out on one soil sample from the till deposit, obtained from Borehole 24BH-1 (SS3 – at a depth of 1.8m), using both of mechanical sieves and hydrometer methods. The result of the grain side distribution is shown on the appended Figure No. 1.

4.3 Groundwater

Free water was recorded in the open boreholes 24BH-2 to 24BH-5, at depths of 1.83m to 2.13m from grade, with cave-in in boreholes 24BH-2 and 24BH-4 at depths of 2.44m to 3.05m from grade, during and upon completion of the drilling. No free water or cave-in was recorded in open borehole 24BH-1.

Groundwater levels, documented in the monitoring wells installed at Boreholes 24BH-1, 24BH-4 and 24BH-5, on September 25, 2024, were at depths of 1.77m, 1.24m and 2.06m from grade, respectively. The results of the groundwater measurements in the monitoring wells are presented below:

WELL LOCATION	GROUND ELEVATION	WATER LEVEL DEPTH / ELEVATION			
		Upon Completion		Sept 25, 2024	
24BH-1 (MW)	269.92m	Dry	-	1.77m	268.15m
24BH-4 (MW)	270.53m	2.13m	268.40m	1.24m	269.29m
24BH-5 (MW)	272.16m	1.83m	270.33m	2.06m	270.10m

Based on the moisture content profile of the soil samples and our field observations at the Site during the drilling investigation and water level measurements, it is ***TIL's*** opinion that there is no continuous groundwater table of consequence, within the depths of the investigation. However, some water might be encountered in the discontinuous thin wet sand seams or layers of sand and gravel within the till deposits. It is our opinion that the water from these layers, if any, will be very small and can be safely handled during the construction operation.

5.0 COMMENTS AND RECOMMENDATIONS

A review of the Overall Site Plan, Drawing No: A1.0, prepared by Ware Malcomb, dated August 29, 2024, and provided to ***Toronto Inspection Ltd.*** by the client, indicated that the development at the Site will consist of a one storey commercial building with no basement.

We understand that the finished floor elevation (FFE) of the proposed commercial building will be at 272.60m, as per an email from GEI Consultants, dated October 4, 2024. This indicated that the building pad and the surrounding area will be uplifted by approximately 0.5m to 2.9m at the borehole locations.

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

5.1 Site Preparation

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

Based on the information provided by the client to ***TIL***, the Site will be uplifted by approximately 0.5m to 2.9m. The on-site excavated fill and/or native soils, to be used for site grading, should be organic free and maintained at or close to its optimum moisture content during placement and compaction. The new fill, outside the building pad, should be compacted in lifts not exceeding 200mm to at least 98% of its Standard Proctor maximum dry density (SPMDD).

At locations of excessive fill, and within the building pad, the site preparation must include removal of the existing fill and any compressible topsoil and deleterious material, if encountered, and backfilling the building pad with selected on-site or pre-approved material, free of organics, to the subgrade level. The backfill for the building pad should be replaced and compacted in 200mm lifts to at least 100% of its Standard Proctor maximum dry density, according to the Guidelines of Engineered Fill, as attached in Appendix A.

Imported fill to be used for the engineered fill or uplifting the Site should consist of pre-approved organic free material, suitable for the intended uses and meets the MOE regulations. The new fill should be maintained on the dry side of the optimum moisture content and compacted in lifts to 100% of its Standard Proctor maximum dry density within the building pad and 98% of its SPMDD outside the building pad.

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

5.2 Foundation Design

The proposed one storey building can be supported on conventional spread/strip footings, founded in the engineered fill and native undisturbed till deposits, at the borehole locations.

Conventional spread/strip footings founded in the engineered fill and native undisturbed till deposits, at depths of 1.2m below the finished outside grade, can be designed for the following bearing pressures:

- 150 kPa at Serviceability Limit State
- 220 kPa at Factored Ultimate Limit State

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

The total and differential settlement of footings, designed for the above bearing pressures at Serviceability Limit State, will not exceed 25mm and 20mm, respectively.

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

It should be noted that the above recommendations for the foundations have been analyzed by ***TIL*** 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.

5.3 Floor Slab Construction

Following Section 5.1 Site Preparation, the floor slab can be designed and constructed as a conventional slab-on-grade method.

The subgrade should be thoroughly proof-rolled under the supervision of a geotechnical technician from ***TIL***. Any compressible, loose or weak spots encountered during the proof rolling process should be sub-excavated to a firm ground. Any backfill of the sub-excavated areas or new fill, below the slab-on-grade, should consist of organic free soils, compacted to at least 98% of its Standard Proctor maximum dry density (SPMDD).

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

A modulus of subgrade reaction of 20 MN/m3 is recommended for the design of the slab-on-grade.

5.4 Earthquake Consideration

The Ontario Building Code requires that all buildings be designed to resist earthquake forces. The Soil Classification for Seismic Site Response, in accordance with Table 4.1.8.4.A of the Ontario Building Code of Canada, is Class C (Very Dense Soil).

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

5.5 Excavation and Backfilling

All excavations should comply with the Ontario Occupational Health and Safety Act. Any excavation deeper than 1.2m should be sloped back to a safe angle of 45°.

Perched water from the fill and/or slight seepage of water from the sand seams within the native till deposits may be encountered during the excavation. The amount of free water from these sources is anticipated to be minor and, in ***TIL's*** opinion, filtered sumps will be adequate to handle the water accumulated in the excavation, from where it can be pumped out. Major groundwater problems are not anticipated during foundation excavation depths of the proposed building.

The in-situ moisture content of the fill and part of the native soils was at or higher than its optimum moisture content. Selected on-site excavated soils can be reused for backfilling, provided they are free of organics and allowed to air dry to the dry side of its optimum, if needed, prior to placement. The use of the compressible fill should be limited to backfilling of locations where future settlement will be of little consequence.

Based on the borehole information, the subsoil at service trench inverts may consist of fill or sandy silt till to silty sand till deposits.

The invert depths of the proposed site services were not available at the time of preparing the report. It is possible that the sewer and watermain installations will require excavations between about 2m to 5m below the finished grade. The native soils at these depths are considered to be suitable for supporting the pipes, provided the integrity of the base of the trench can be maintained during construction. The suitability of the existing fill material to support the pipes, if encountered at the base of the trenches, should be further assessed during construction. This assessment will require inspection during construction by qualified geotechnical personnel from ***TIL*** to determine the suitability of the fill materials for supporting the pipes.

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

5.6 Lateral Earth Pressure

Where subsurface walls will retain unbalanced loads or where a retaining wall is proposed, the lateral earth pressure of the retained soil may be computed using the following equation:

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

where	P = Lateral earth pressure	kPa
	K = Lateral earth pressure coefficient	0.40
	γ = Bulk unit weight of the soil	21.0 kN/m^3
	H = Depth of the wall below the finish grade	m
	q = Surcharge loads adjacent to the retaining wall	kPa

The equation assumes that a permanent free draining system will be provided to prevent the buildup of hydrostatic pressure next to the wall.

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

5.7 Pavement Construction

The existing on-site material generally consists of sandy silt to silty sand with clayey silt. These materials are highly frost susceptible.

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

Pavement Structure		Light Duty Parking	Heavy Duty Fire Routes
Asphaltic Concrete:	**OPSS HL3 or equivalent**	**65mm**	**40mm**
	OPSS HL8 or equivalent	**-**	**60mm**
Base:	**OPSS Granular A or 20mm crusher-run**	**150mm**	**150mm**
Sub-base:	**OPSS Granular B or 50mm crusher-run**	**300mm**	**450mm**

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

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

Following site grading, the subgrade of the entire pavement should be proof-rolled using a heavy vibratory roller. Any soft spots revealed by the proof-rolling should be sub-excavated and replaced with approved dry material and compacted to at least 95% of the Standard Proctor maximum dry density (SPMDD) to 300mm below the subgrade level. The upper 300mm of the subgrade should be compacted to 98% SPMDD.

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

6.0 GENERAL STATEMENT OF LIMITATION

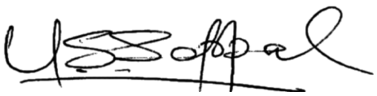
The comments and recommendations presented in this report are based on the subsoil and ground water conditions encountered at the borehole locations, indicated in the borehole location plan, and are intended for the guidance of the design engineer.

Although we consider this report to be representative of the subsurface conditions at the subject property, the soil and the ground water conditions between and beyond the borehole locations may differ from those encountered at the time of our investigation and may become apparent during construction. Any contractor bidding on, or undertaking the works, should decide on their own investigation and interpretations of the groundwater and the soil conditions between the borehole locations.

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

Yours very truly
TORONTO INSPECTION LTD.

David S. Wang, P.Eng.
Senior Engineer



Upkar S. Sappal, P. Eng.
Principal Engineer

Toronto Inspection Ltd.

Drawings

Borehole Location Plan
Borehole Logs

LEGEND:

Borehole and Monitoring Well Location

Site Boundary

NOT TO SCALE

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TITLE:	Borehole and Monitoring Well Location Plan		
LOCATION:	1656 Green Lane East, East Gwillimbury, Ontario (Toyota)		
PROJECT NO.: 2177-24-GL	DATE : September 2024	DRAWING NO. 1	

Project No. 2177-24-GL

Log of Borehole 24BH-1 (MW)

Dwg No. 2

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 1656 Green Lane East, Sharon, Ontario

Date Drilled: 7/29/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

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

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

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		Ground Surface	269.92	0
		SILTY SAND TILL - compact to very dense - brown, grey below 4.5m - some gravel, some sandy silt - trace clayey silt - occasional cobbles - moist		1
			268.15	2
				3
				4
				5
			263.73	6
		END OF BOREHOLE **NOTE:** 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

33
53
64
50/100mm
50/125mm
50/125mm
50/100mm

LGBE3 2177-24-GL.GPJ 10/4/24

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)
Sept. 25, 2024	1.77m	

Project No. 2177-24-GL

Log of Borehole 24BH-2

Dwg No. 3

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 1656 Green Lane East, Sharon, Ontario

Date Drilled: 7/29/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

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

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

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		Ground Surface	269.70	0
		FILL (DISTURBED MATERIAL) - brown silty sand - some gravel, some sandy silt - thin layer of clayey silt - very moist to wet	268.48	1
▼		**SILTY SAND TILL** - dense to very dense - brown, grey below 2.3m - some gravel, some sandy silt - trace clayey silt - thin layers of sand below 4.5m - occasional cobbles - moist to very moist, wet pockts/layers	268.18	2
				3
				4
				5
				6
				7
			261.98	
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 1.52m - cave-in at 2.44m		

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

5
9
33
64
50/150mm
50/150mm
50/75mm
50/100mm

LGBE3 2177-24-GL.GPJ 10/4/24

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)

Project No. 2177-24-GL

Log of Borehole 24BH-3

Dwg No. 4

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 1656 Green Lane East, Sharon, Ontario

Date Drilled: 7/29/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

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

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

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
		Ground Surface	271.53	0
		FILL (DISTURBED MATERIAL) - brown sandy silt, some silty sand - moist	271.07	
		SANDY SILT - some silty sand, trace gravel - moist to very moist		1
▼			269.70	
		SILTY SAND TILL - very dense - gray - some gravel, some sandy silt - occasional cobbles - moist	269.40	2
				3
				4
				5
			265.33	6
		END OF BOREHOLE **NOTE:** Upon completion of drilling: - water level at 1.83m		

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

11
14
19
50/100mm
50/100mm
50/75mm
50/100mm

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

Natural Unit Weight kN/m3

LGBE3 2177-24-GL.GPJ 10/4/24

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

Project No. 2177-24-GL

Log of Borehole 24BH-4 (MW)

Dwg No. 5

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 1656 Green Lane East, Sharon, Ontario

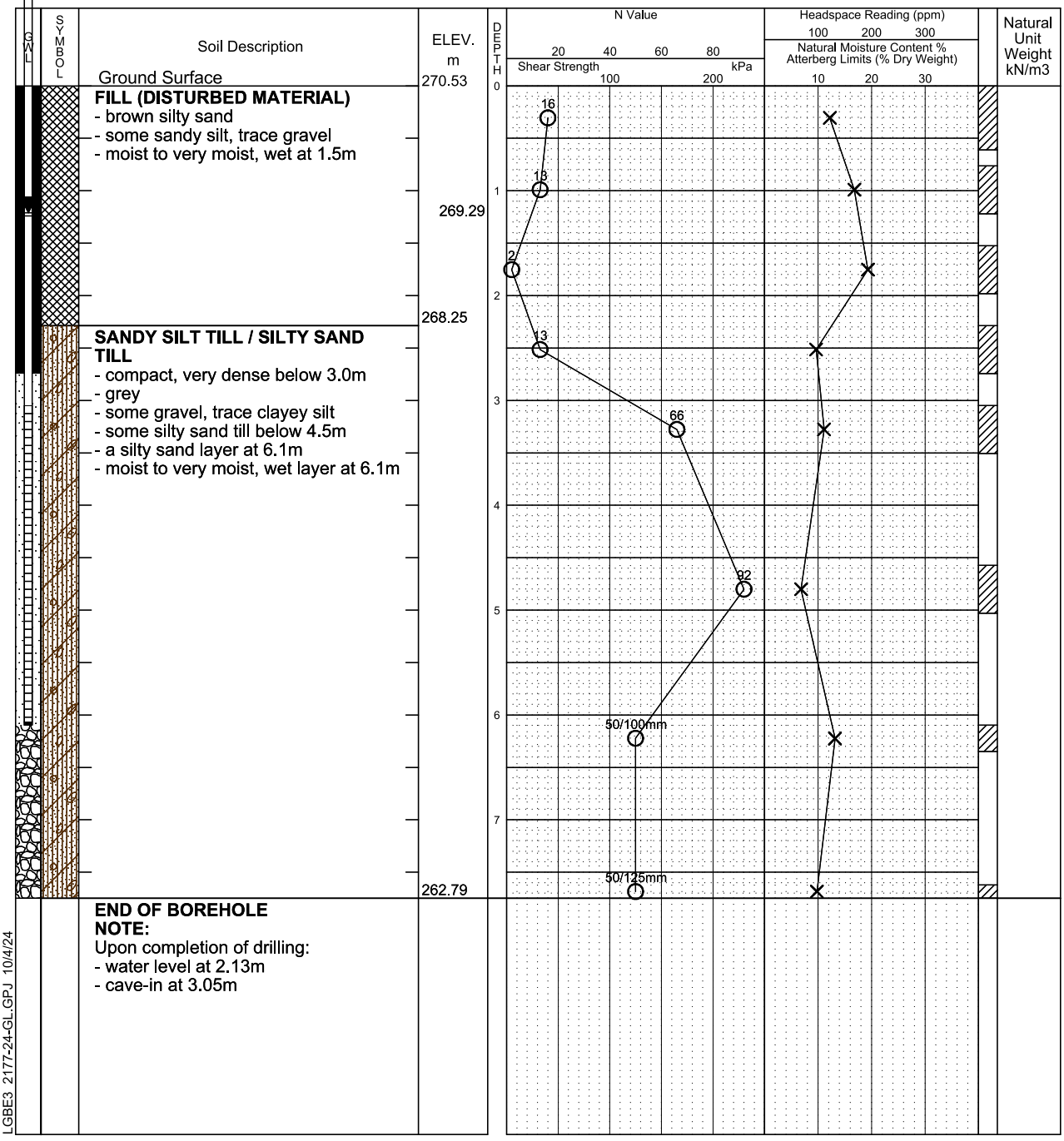
Date Drilled: 9/11/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

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

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



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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)
Sept. 25, 2024	1.24m	

Project No. 2177-24-GL

Log of Borehole 24BH-5 (MW)

Dwg No. 6

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 1656 Green Lane East, Sharon, Ontario

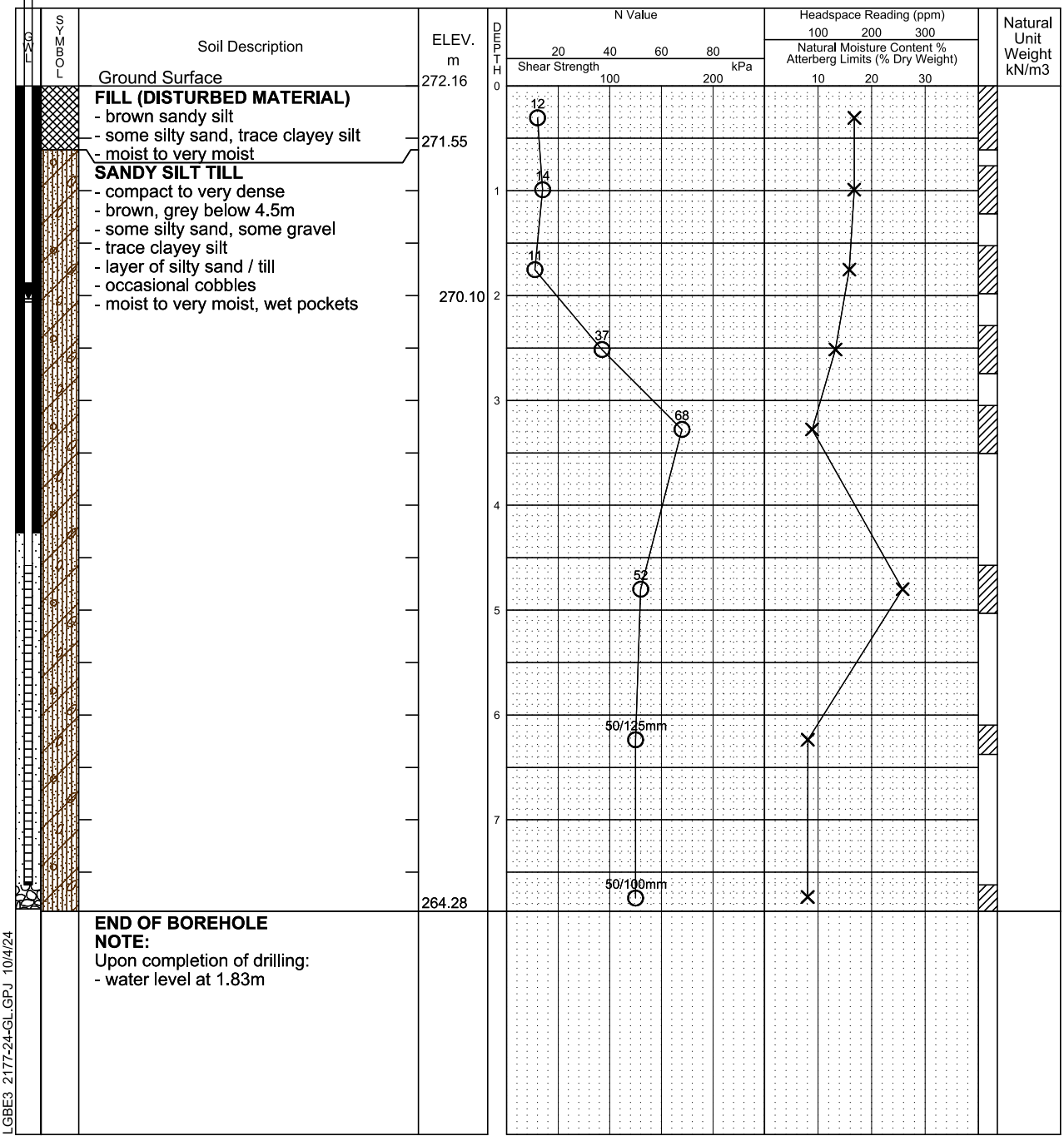
Date Drilled: 7/29/24

Drill Type: Track Mounted Drill Rig

Datum: Geodetic

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

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



LGBE3 2177-24-GL.GPJ 10/4/24

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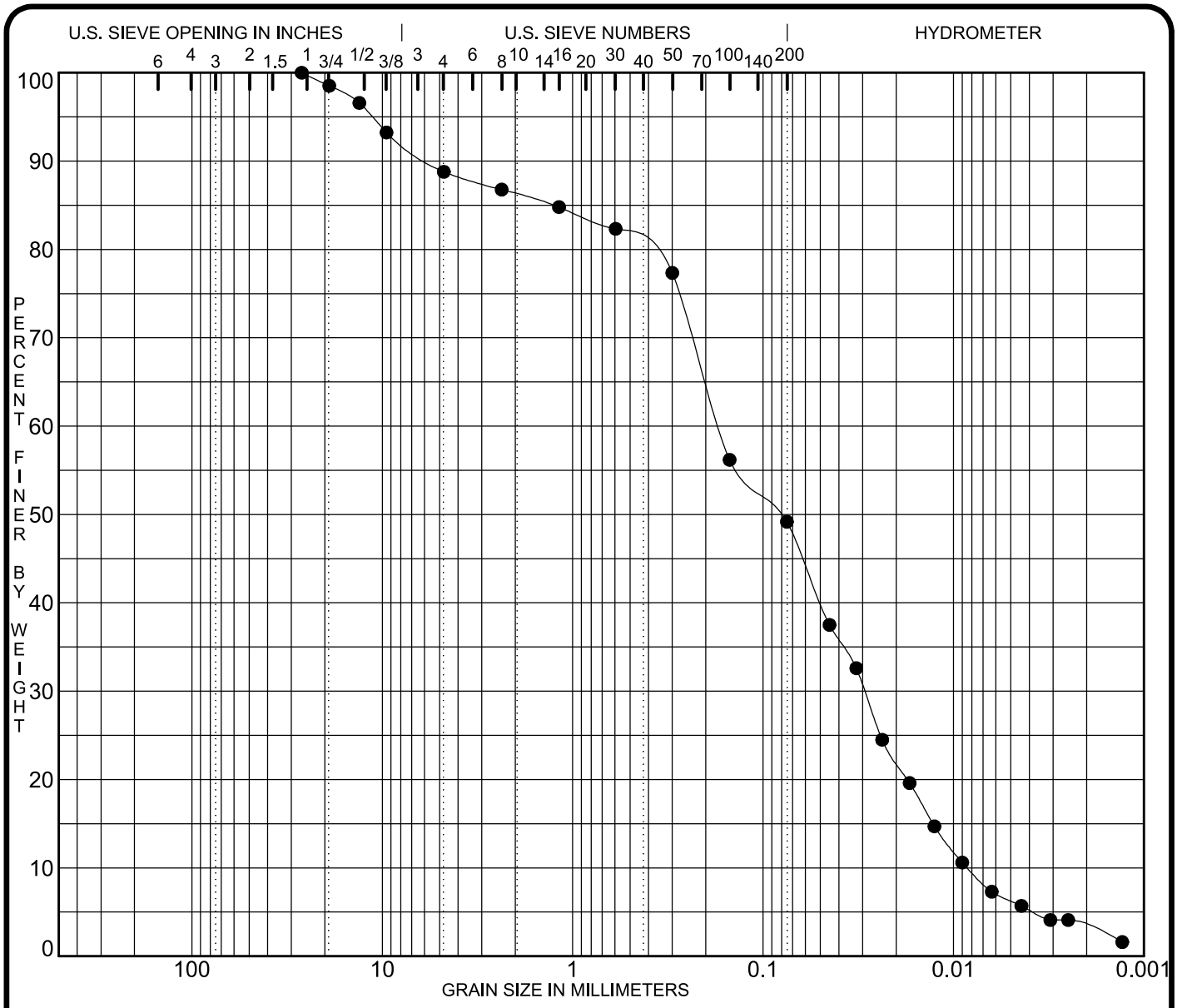
Time	Water Level (m)	Depth to Cave (m)
Sept. 25, 2024	2.06m	

Figure

Grain Size Distribution



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification	Classification	MC%	LL	PL	PI	Cc	Cu
●	**24BH-1 (MW) 1.8**						**0.60**	**20.2**

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**24BH-1 (MW) 1.8**	**26.50**	**0.17**	**0.029**	**0.0084**	**11.2**	**39.6**	**42.9**	**6.3**

PROJECT **Geotechnical Investigation - 1656 Green Lane East**
Sharon, Ontario

JOB NO. **2177-24-GL**
DATE **9/4/24**

GRADATION CURVES

Toronto Inspection Ltd.

FIGURE NO. 1

Appendix A
Engineering Fill Guidelines

GUIDELINES FOR ENGINEERED FILL

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

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

1. Areal Extent

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

2. Survey Control

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

3. Subsurface Preparation

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

4. Suitable Fill Material

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

5. Trial Test Section

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

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

6. Degree of Compaction

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

7. Inspection and Testing

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

8. Protection of Fill

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

9. Limitations

The engineered fill is subjected to the following limitations:

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