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September 9, 2025

Reference No. 2507-W026

Page 1 of 7

De Zen Realty Company Limited  
4890 Tomken Road, Units 1-4  
Mississauga, Ontario  
L4W 1J8

Attention: Mr. Mark Palmieri

**Re: Monitoring Well Installation, Groundwater Monitoring and In-Situ Guelph  
Permeameter Infiltration Testing Report  
Proposed Road Extension  
7140 Hurontario Street  
City of Mississauga**

Dear Sir:

As requested, Soil Engineers Ltd. (SEL) has completed a monitoring well installation and groundwater monitoring program along with in-situ infiltration testing and laboratory analysis for the collected shallow soil samples in support of the proposed Low Impact Development (LID) stormwater management infrastructure planning and design at the captioned development site located at 7140 Hurontario Street, in the City of Mississauga, Ontario (the Subject Site). The assessment and findings are presented in the current letter report.

## **1.0 Introduction**

The Subject Site is located at the south quadrant of the overpass of Highway 407 and Hurontario Street, in the City of Mississauga. The Subject Site is currently known as 0 Vicksburg Drive and 7174 Derrycrest Drive. As per the reviewed plans shared to SEL, the Subject Site covers an area of 17.60 hectares (1,76,000.0 m<sup>2</sup>). The Subject Site is bounded by the Hydro One Easement to the north and northeast, Fletcher's Creek to the west, Derrydale Golf Course and an office building to the south, and Derrycrest Drive, a vacant land and a commercial property to the east. A portion of the Subject Site has been divided by a tributary of Fletcher's Creek. At the time of investigation, the west portion of the Subject Site was being used as farm land and a portion of the land along Derrycrest Drive was used as a winter light show venue which was being dismantled. The grading of the Subject Site gradually descends toward Fletcher's Creek to the west and south. The Site Location Plan can be reviewed on **Drawing No. 1**.

## **2.0 Borehole Advancement and Monitoring Well Installation**

Drilling boreholes and construction of monitoring wells were conducted by SEL within the vicinity of the proposed stormwater management tanks as requested by the client on August 01, 2025. The program consisted of drilling two (2) boreholes (BH) extending to a depth 4.6 metres below ground surface (mbgs) and installing monitoring wells within each BH. The location of the boreholes and monitoring wells is shown on **Drawing No. 2**.



Borehole drilling and monitoring well construction were completed by a licensed water well contractor, under the full-time supervision of SEL's geotechnical supervisor who logged the soil strata encountered during borehole advancement and collected representative soil samples for textural classification. The boreholes were drilled using a track-mounted drill rig equipped with solid stem augers and split spoons. Detailed descriptions of the encountered subsoil and groundwater conditions are provided by SEL and presented on the borehole and monitoring well logs, in the enclosed **Appendix A**.

The monitoring wells were constructed using 50-mm diameter PVC pipes at the two (2) borehole locations. 1.5 m long 10-slot well screens were installed at two (2) monitoring well locations. All monitoring wells were equipped with monument steel casing at the ground surface.

The UTM coordinates and ground surface elevations at the monitoring wells' locations, as well as the monitoring well construction details, are presented in **Table 1**. The ground surface elevations and horizontal coordinates at the monitoring well locations were determined at the time of the investigation, using the Trimble TSC3 handheld Global Navigation Satellite System.

**Table 1 - Monitoring Well Installation Details**

Monitoring Well ID	Installation Date	UTM Coordinates (m)		Ground EL. (masl)	Screen Interval (mbgs)	Soil in the Screen Interval	Casing Dia. (mm)	Protective Casing Type
		Easting	Northing					
BH/MW 4	August 01, 2025	603473	4833519	200.50	3.1 – 4.6	Silty Clay Till	50	Monument
BH/MW 5	August 01, 2025	603593	4833346	200.00	3.1 – 4.6	Silty Clay Till	50	Monument

*Note:*

*mbgs: metres below ground surface*

*masl: metres above sea level*

### **3.0 Subsoil Lithology**

The study has disclosed beneath the layer of topsoil, 8 to 13 cm thick, the Subject Site is generally underlain by a stratum of silty clay till to a maximum termination depth of investigation at 4.6 metres below ground surface (mbgs). Subsoil profile contacted at the BH/MW locations is presented below:

*Silty Clay Till:* Beneath the layer of topsoil, a silty clay till layer was encountered at both BH/MW locations. The silty clay till unit extended completely to the termination depth of investigation i.e. 4.6 mbgs. It consists of a random mixture of particle sizes ranging from clay to gravel, with the silt and clay being the dominant fraction. Sample examination indicates that it is sandy and contains a trace of gravel, with occasional sand seams, cobbles and boulders. The unit was found to be stiff to hard in relative consistency. For BH/MW 4, it was found to be brown in color to a depth of 3.0 mbgs and changed to grey below 3.0 mbgs, whereas, for BH/MW 5, it was found to be brown to the termination depth of investigation at 4.6 mbgs.

Detailed description of subsoil lithology is provided in **Appendix A (Figure 1 to 2)**, inclusive.

### **4.0 Groundwater Monitoring Program**

The groundwater levels in the monitoring wells were monitored, manually over three (3) monitoring events on August 05 and 18, 2025 and September 02, 2025, to record the fluctuation of the shallow groundwater table beneath the Subject Site. SEL measured the groundwater levels using an interface probe (Heron Water Tape Series #1900).



A summary of the groundwater level observations and their corresponding elevations are provided in **Table 2**.

**Table 2-** A Summary of Groundwater Monitoring

MW ID	Unit	Groundwater Level		
		Aug 05, 2025	Aug 18, 2025	Sep 02, 2025
BH/MW 4	mbgs	> 4.60	4.40	4.10
	masl	< 195.90	196.10	196.40
BH/MW 5	mbgs	>4.60	4.30	3.80
	masl	<195.40	195.70	196.20

Notes:

mbgs metres below ground surface

masl metres above sea level

## 5.0 In-situ Infiltration Tests

The study was undertaken to verify the permeability and percolation times of the subsoil profile at the proposed location and the depth of the proposed LID measures in the Subject Site. The study will confirm the feasibility of subsoil for the design of infiltration infrastructure to manage collected stormwater runoff, for its redirection to the subsurface, to recharge groundwater, and to meet the stormwater management planning and design objectives for the proposed developed site.

### 5.1 Work Program

SEL intended to conduct in-situ percolation testing at the proposed locations and depths provided by Skira & Associates Ltd. The testing was designed to be conducted at the approximate base of the proposed LID infiltration facilities and  $\pm 0.5$  m below the proposed base. This testing will more accurately determine the local infiltration rate and will assist in appropriately sizing the facility.

Our representative performed the site visit on August 05, 2025, to conduct the in-situ infiltration (percolation) testing. An excavator was used to create pits in order to achieve the target depths at the test locations, in the vicinity for the proposed LID infrastructures. The in-situ infiltration (percolation) testing program was conducted at two (2) test locations. The approximate test locations, where the in-situ percolation tests were attempted are shown on **Drawing 2**, enclosed. The ground surface elevations at the test pit locations, are provided in **Table 3**.

**Table 3 -** Test Locations and Depths

Test Location	UTM Coordinates (m)		Ground Surface Elevation (masl)	Depth (mbgs)	Estimated Bottom Elevation (masl)
	Easting	Northing			
1	603568	4833324	$\pm 200.1$	$\pm 3.2$	$\pm 196.9$
				$\pm 3.7$	$\pm 196.4$
2	603453	4833498	$\pm 200.5$	$\pm 4.2$	$\pm 196.3$
				$\pm 4.7$	$\pm 195.8$

Note:

mbgs: metres below ground surface

masl: metres above sea level

For this study, four (4) in-situ infiltration tests were conducted within two (2) test pit excavations; one (1) test each at the bottom of elevation for the proposed LID infrastructure, and one (1) test each at a depth of  $\pm 0.5$  meters below the bottom elevations for the proposed LID infrastructure. The in-situ infiltration percolation testing was performed using the Guelph Permeameter (GP) instrument (Model



2800K1). The in-situ tests were conducted at the approximate depth, ranging from  $\pm 3.2$  m to  $\pm 4.7$  m below the existing ground surface (mbgs) at elevations, ranging from  $\pm 195.8$  to  $196.9$  metres above sea level (masl).

## 5.2 Methodology

The Guelph Permeameter (GP) is a constant head infiltrometer instrument which operates using the Marriott Bottle principle, whereby a constant ponded head of water is allowed to infiltrate into the unsaturated surface soil via a small test hole augured to penetrate the shallow soil horizon. The constant water head for the instrument is maintained within the test hole by an air tube and its height setting within the instrument. A steady-state flow of water into the subsoil should result after a relatively short period, corresponding to the instrument's ponded water head setting. A higher ponded water head setting should result in a higher steady-state flow of water into the subsoil, than the previous, lower ponded water head setting.

The Field Saturated (fs) hydraulic conductivity (K) estimates for the soil are obtained using the mathematical equations established for the instrument, whereby two (2) steady-state flow measurements, corresponding to the two (2) ponded water head settings for the instrument, can be used as minimum information to estimate the field saturated hydraulic conductivity ( $K_{fs}$ ) for the soil. The  $K_{fs}$  estimates can also be determined, using the one-ponded water head approach which corresponds to one steady-state water flow measurement into the subsoil.

It is critical to note that the  $K_{fs}$  and infiltration rates are two (2) different concepts and that translation from one parameter to another cannot be done through unit a of conversion. In accordance with the guidelines from the Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation Authority (CVC), the infiltration rates are based on the "Low Impact Development Stormwater Management Planning and Design Guide, Table C1", as provided in **Table 4**, below.

**Table 4 - Approximate Relationship between  $K_{fs}$ , Percolation Time and Infiltration Rate**

Hydraulic Conductivity, $K_{fs}$ (cm/sec)	Percolation Time, T (min/cm)	Infiltration Rate, 1/T (mm/hr)
0.1	2	300
0.01	4	150
0.001	8	75
0.0001	12	50
0.00001	20	30
0.000001	50	12

$K_{fs}$  – field saturated hydraulic conductivity

Source: Ontario Ministry of Municipal Affairs and Housing (OMMAH). 1997; Supplementary Guidelines to the Ontario Building Code 1997, SG-6 Percolation Time and Soil Description.

## 5.3 Infiltration Test Results and Discussion

The in-situ infiltration tests were conducted at depths, ranging from  $\pm 3.2$  to  $\pm 4.7$  mbgs. Based on the visual observations in the field, the existing shallow subsoils beneath the site comprise:

- Silty Clay Till with trace of gravel

The results from the attempted in-situ infiltration testing and review and interpretation of the soil grain size analyses for the collected sub-soil samples obtained at the testing depths are summarized in **Table 5**.





**Table 5** - Estimated Hydraulic Conductivity, Percolation Times, and Infiltration Rates

Test Location	Test and Depth (m)	Soil Type	Ponded Water Head Setting (cm)	Steady State Flow (cm <sup>3</sup> /sec)	Grain Size Permeability Estimation (cm/sec)	Guelph Permeameter Method	In-situ testing of Hydraulic Conductivity (cm/sec)	Estimated Infiltration Rate (mm/hr)
1	A ± 3.7	Silty Clay Till, sandy, a trace of gravel	(H1) 10	N/A	10 <sup>-7</sup> (Appendix B, Figure 1) (GS)	N/A	N/A	N/A
			(H2) 22	N/A				
	*B ± 3.2	Silty Clay Till with trace of gravel	(H1) 10	N/A	-	N/A	N/A	N/A
			(H2) 22	N/A				
2	*A ± 4.7	Silty Clay Till with trace of gravel	(H1) 10	N/A	-	N/A	N/A	N/A
			(H2) 20	N/A				
	B ± 4.2	Silty Clay Till, sandy, a trace of gravel	(H1) 11	N/A	10 <sup>-7</sup> (Appendix B, Figure 2) (GS)	N/A	N/A	N/A
			(H2) 22	N/A				

GS – Soil Grain Size Distribution

N/A – The test was not successful due to low permeable soil

\* Inferred soil textured based on visual examination

Attempts were made to complete the in-situ infiltration tests. However, due to the presence of compact, low-permeable shallow subsoils at both the testing locations, the in-situ percolation test could not be successfully performed using the GP instrument at a depth of 3.2 and 3.7 mbgs at Test Location 1, and at a depth of 4.2 and 4.7 mbgs at Test Location 2.

Since the use of Guelph Permeameter was not successful at providing results at the testing locations, at the indicted depths, representative subsoil samples were also collected at the testing depths for follow-up, laboratory, grain size analysis as per Ministry of Transpiration (MTO) Laboratory Standards 602 and 702 to confirm the shallow subsoil sample texture classifications in order to interpret and estimate the soil's percolation (T) times and associated infiltration rates. The results for the soil grain size analyses for the collected soil samples, as performed in our laboratory are enclosed for your reference, **Appendix B (Figure 1 to 2)**, inclusive.

Based on the interpretation from the soil grain size analyses plots, as performed in our laboratory, the estimated permeability for the subsoils contacted at the testing locations (1A and 2B) is found to be  $1.0 \times 10^{-7}$  cm/sec. The estimated infiltration rates for the subsoil contacted at the testing depths (1A and 2B), is found to be approximately 7.3 mm/hr. The corresponding estimated Percolation T-Time for 1A and 2B is 80 min/cm. The infiltration rates will vary depending on the soil density and the amounts of sand and/or silt present in the native subsoils, and for the presence of any vertical soil structure fracturing, and/or macro pores.

#### 5.4 General Comments

Toronto and Region Conservation Authority (TRCA) design manual, titled “Low Impact Development Stormwater Management Planning and Design Guide”, a safety factor is to be incorporated in the determining of the infiltration rates for the design of LID infiltration infrastructure, such as infiltration galleries, soak away pits or similar technology that would be implemented as part of stormwater management planning and design for site development.



*Test Location 1:* The attempt to complete the in-situ infiltration test at the test location 1A and 1B was unsuccessful due to the occurrence of low-permeability subsoil at the indicated depth for 1A and 1B. As such, the in-situ percolation tests cannot be interpreted at this test location.

*Test Location 2:* The attempt to complete the in-situ infiltration test at the test location 2A and 2B was unsuccessful due to the occurrence of low-permeability subsoil at the indicated depth for 2A and 2B. As such, the in-situ percolation tests cannot be interpreted at this test location.

It is a common practice to maintain infiltration elevations at least 1.0 m above the highest groundwater level. The shallow groundwater table was monitored on three (3) events, and the findings can be reviewed in **Section 4.0** of the current letter report.

Soil exhibiting percolation rate less than of 15 mm/hr does not meet the minimum 15 mm/hr infiltration rate required for conventional designs for LID infrastructure, such as infiltration galleries, soak away pits, or similar technology that would be implemented as part of stormwater management planning and design for the proposed site development. Other methods such as thickening of topsoil within landscaped areas should be also considered to meet the LID planning and design objectives for stormwater management design throughout portions of the proposed development site as an alternative means for addressing LID infrastructure.

Any infiltration system infrastructure designed for the Subject Site should include an overflow valve to divert any excess runoff to a second infiltration gallery, or to a grass swale, or to the municipal storm sewer at the surface, should a high intensity runoff event not be adequately accommodated by any proposed holding tank, and/or an infiltration trench/exfiltration tank, or infiltration gallery completed for the developed site. Due to the low permeability for shallow native soils, limited opportunities exist to implement LIDs to promote infiltration and groundwater recharge at the developed site to address future stormwater management planning for the propose industrial development.



## 6.0 Closure

We trust that this correspondence addresses your current needs and ask that you contact the undersigned should you have any questions or require additional information.

Yours truly,  
**SOIL ENGINEERS LTD.**

Gurkaranbir Singh, M.Eng., EIT  
GS/NA

Narjes Alijani, M.Sc., P.Geo.



## ENCLOSURES

Site Location Plan .....	Drawing No. 1
Borehole and Monitoring Well and Test Pit Location Plan .....	Drawing No. 2
Borehole and Monitoring Well Logs.....	Appendix A
Grain Size Distribution Graphs .....	Appendix B



# ***Soil Engineers Ltd.***

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## **DRAWINGS**

**REFERENCE NO. 2507-W026**





References: Ontario Ministry of Natural Resources and Forestry  
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Key Map

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community  
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

### Legend

- Approximate Boundary Of Subject Site
- Expressway/Freeway
- Major Road
- Local Road
- Waterbody
- Watercourse

**Soil Engineers Ltd.**

Site Location Plan

Hydrogeological Assessment  
Proposed Road Extension and Storm Outfall  
7140 Hurontario Street  
City of Mississauga

Reference No. 2507-W026

Date: September 08, 2025

Scale:

0 37.5 75 150 225 300 375  
Metres

Drawing No. 1





N

References: Ontario Ministry of Natural Resources and Forestry  
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Key Map

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community  
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

Approximate Boundary Of Subject Site

Local Road

Watercourse

Borehole with Monitoring Well

Test Pit

**Soil Engineers Ltd.**

Borehole and Monitoring Well  
and Test Pit Location Plan

Hydrogeological Assessment  
Proposed Road Extension and Storm Outfall  
7140 Hurontario Street  
City of Mississauga

Reference No. 2507-W026

Date: September 08, 2025

Scale:  
 0 12.5 25 50 75 100 125  
Metres

Drawing No. 2





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## **APPENDIX 'A'**

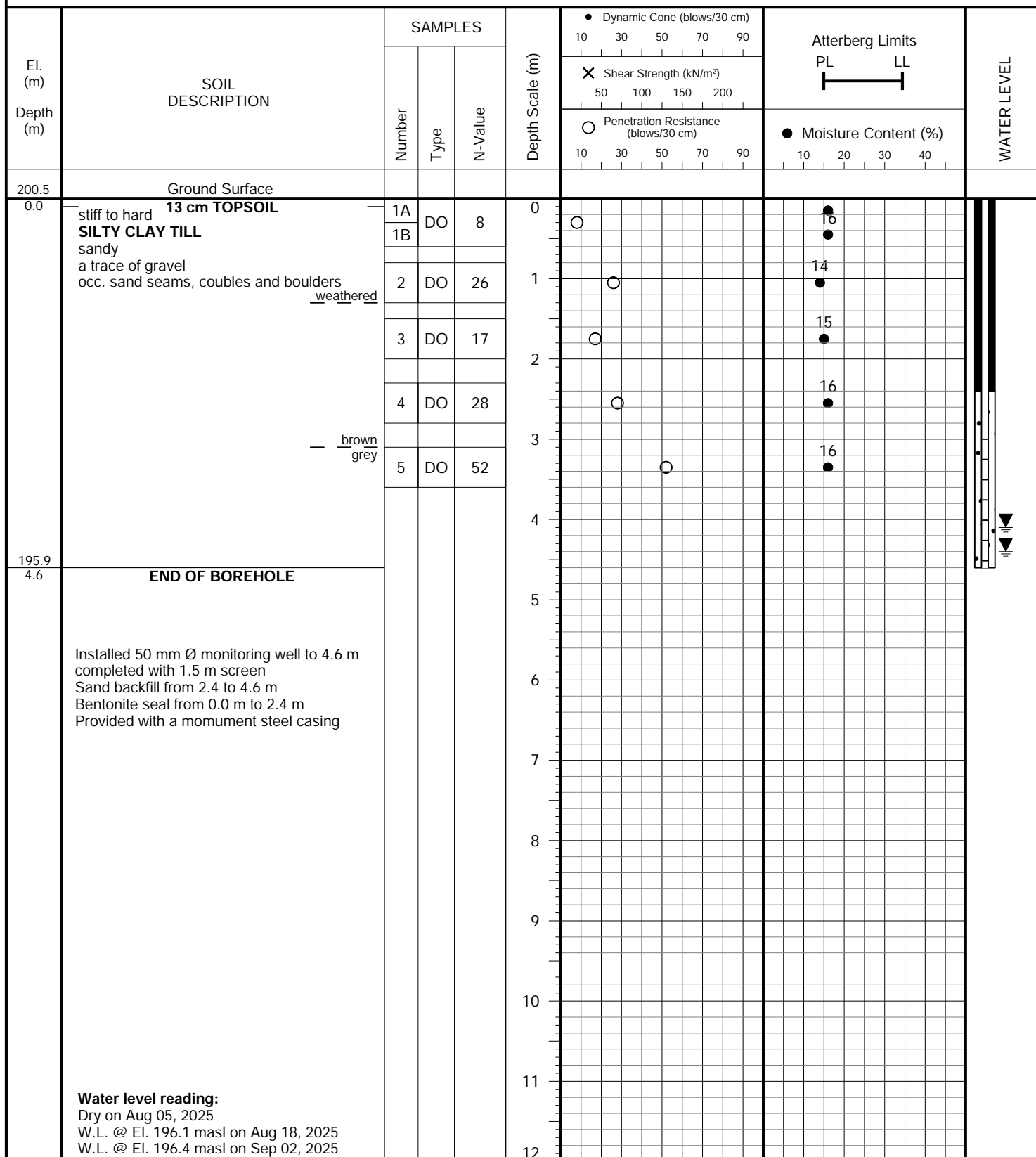
### **BOREHOLE AND MONITORING WELL LOGS**

**REFERENCE NO. 2507-W026**

JOB NO.: 2507-W026

**LOG OF BOREHOLE: BH/MW 4**

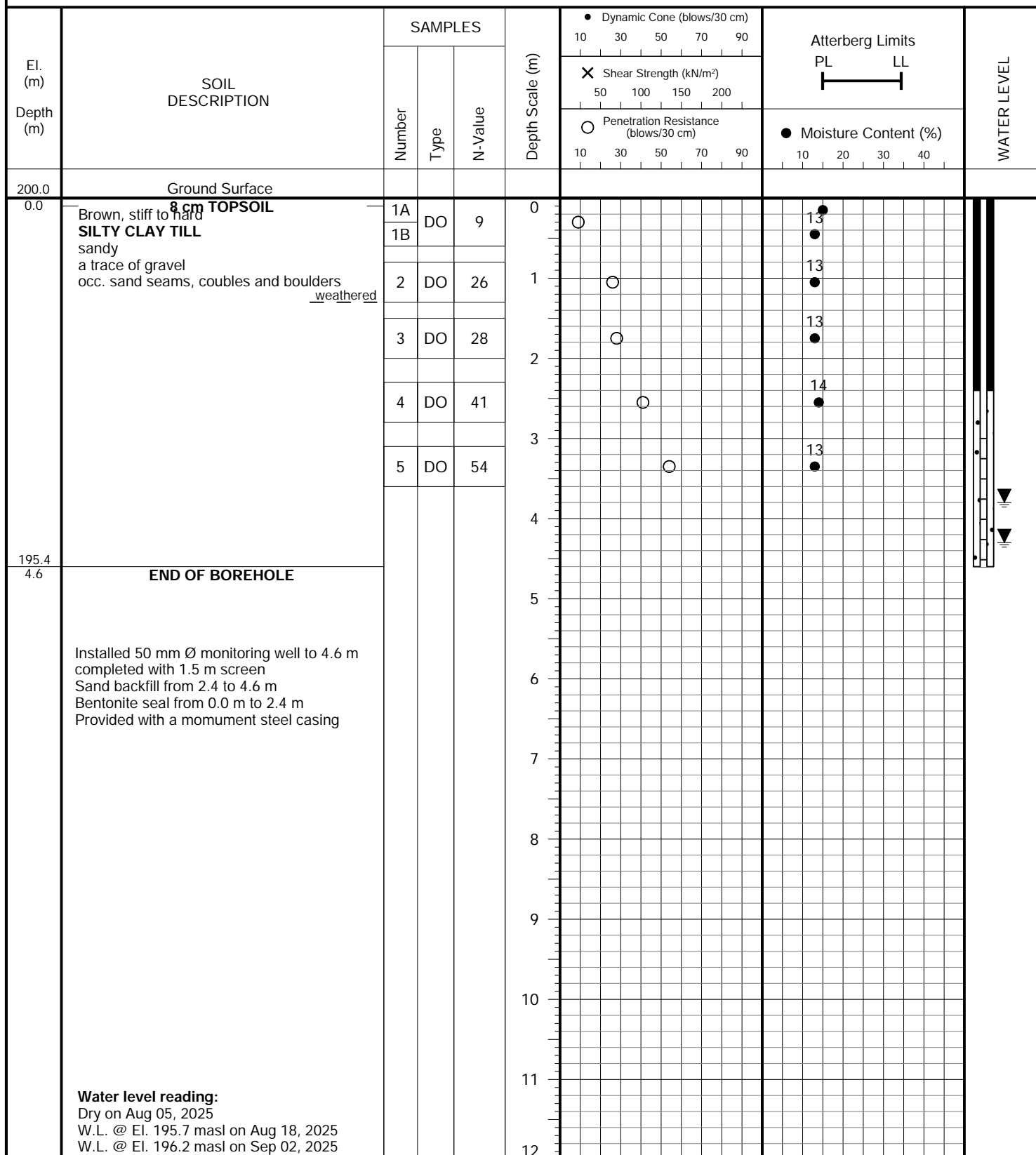
FIGURE NO.: 1

**PROJECT DESCRIPTION:** Proposed Road Extension**METHOD OF BORING:** Solid Stem Augers**PROJECT LOCATION:** 7140 Hurontario Street, City of Mississauga**DRILLING DATE:** August 1, 2025**Soil Engineers Ltd.**

JOB NO.: 2507-W026

**LOG OF BOREHOLE: BH/MW 5**

FIGURE NO.: 2

**PROJECT DESCRIPTION:** Proposed Road Extension**METHOD OF BORING:** Solid Stem Augers**PROJECT LOCATION:** 7140 Hurontario Street, City of Mississauga**DRILLING DATE:** August 1, 2025**Soil Engineers Ltd.**



# ***Soil Engineers Ltd.***

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## **APPENDIX 'B'**

### **GRAIN SIZE DISTRIBUTION GRAPHS**

**REFERENCE NO. 2507-W026**

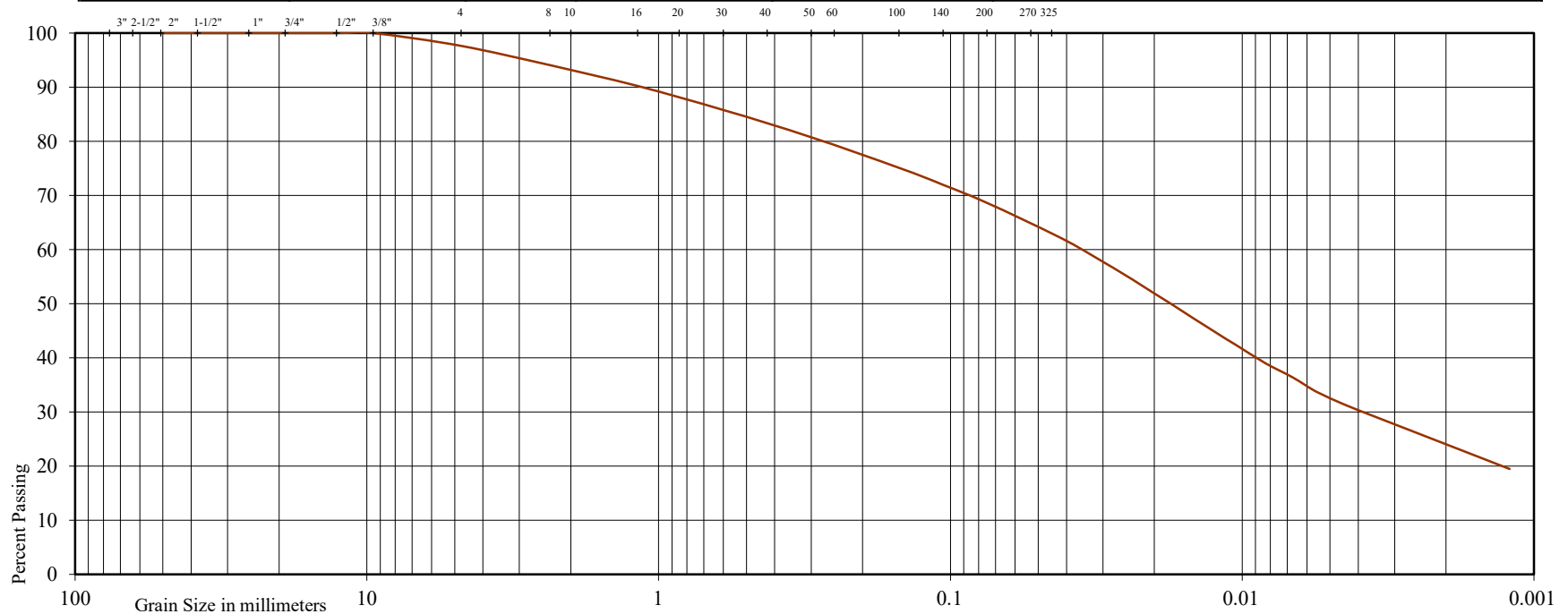


U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL			SAND				SILT	CLAY
COARSE		FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND					SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE			



Project: Proposed Road Extension

Location: 7140 Hurontario Street, City of Mississauga

Test Pit No: 1

Sample No: 1A

Depth (m): 3.7

Elevation (m):

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = -

Estimated Permeability (cm./sec.) =  $10^{-7}$

Estimated Percolation Time (min/cm) = 80

Classification of Sample [& Group Symbol]: SILTY CLAY, TILL  
sandy, a trace of gravel

Figure: 1



U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL			SAND				SILT	CLAY
COARSE		FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND				SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE		

