

APPENDIX E

Geotechnical Investigation Report

Geotechnical Investigation Report

Stevenson Road North, Oshawa

Gannett Fleming
Final Report

April 11, 2023
02112515.000-0100-GE-R-0001-00



eNGLOBE

Gannett Fleming

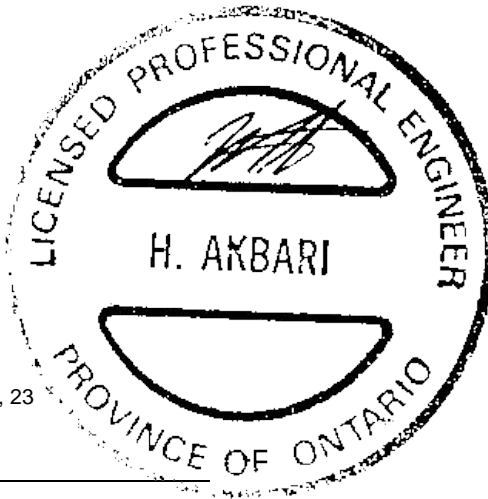


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Revisions and publications log

REVISION No.	DATE	DESCRIPTION
0A	December 15, 2022	Draft version published for comments
00	April 11, 2023	Final Report

Distribution

1 PDF copy	Catherine Voytenkov
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1 Introduction

Englobe Corp. (Englobe) was retained by Gannett Fleming to conduct a geotechnical investigation for Environmental Assessment of Stevenson Road North between Taunton Road West and Conlin Road as per City of Oshawa *Request for Proposal* with a Contract Number of C2021-121. It is understood that Municipal Class Environmental Assessment Study (M.C.E.A. or Study) for upgrades to the Stevenson Road North corridor from Taunton Road West to Conlin Road West was proposed by the City of Oshawa and geotechnical investigation for the same section of the road was required.

The purpose of this geotechnical investigation was to determine the subsurface conditions at the borehole locations and from the findings in the boreholes make engineering recommendations for the design and construction of the road.

This report deals with the geotechnical aspect of the project only. Environmental Assessments and Hydrogeological Study of the Site are beyond the scope of this investigation.



2 Project Methodology

2.1 Field Investigation

Subsequent to obtaining public clearances, twenty (20) boreholes (BH1 to BH20) were drilled to depth varying from 4.0 to 4.4 meters below ground surface (mbgs) as indicated on the attached borehole logs in Appendix 2. The boreholes were completed between October 24, 2022 to October 26, 2022, using continuous flight solid stem auger drilling equipment supplied and operated by Geotech Support Service under the continuous supervision of an Englobe field technician. Ten (10) asphalt concrete cores were obtained by Englobe to determine the asphalt concrete thicknesses

Subsoil samples were recovered from the boreholes at depth intervals of 0.76 m using a 50 mm O.D. split-barrel sampler driven into the subsoil in accordance with the Standard Penetration Test procedure (ASTM D1586). The recovered subsoil samples were visually examined in the field and then preserved and transported to the Englobe Toronto laboratory for examination and testing. Groundwater observations were carried out in the open boreholes upon completion of the field work.

The asphalt concrete was cored at ten (10) borehole locations to determine the asphalt concrete thicknesses.

Monitoring wells were installed in five (5) boreholes for long term groundwater monitoring.

The borehole locations were surveyed by Englobe using Sokkia GRX2 GNSS Receiver GPS connected to MAGNET Enterprise network referenced to UTM Zone 17T (NAD83) and presented in the attached Borehole Location Drawing in Appendix A. The information of the drilled boreholes is summarized in table 1.

Table 1: Summary of Borehole Information

BH No.	NORTHING	EASTING	ELEVATION (m)	DEPTH OF BH (m)	DEPTH OF MONITORING WELL (m)
BH1	4866124.43	668685.26	141.55	4.4	--
BH2	4866197.40	668666.28	142.18	4.4	3.8
BH3	4866284.56	668629.37	142.45	4.4	--
BH4	4866371.01	668605.70	143.04	4.4	--
BH5	4866537.49	668540.90	144.93	4.4	--
BH6	4866591.60	668529.17	144.27	4.0	3.8
BH7	4866672.38	668493.70	144.76	4.4	--
BH8	4866749.63	668473.13	145.51	4.0	--
BH9	4866885.26	668420.62	146.00	4.3	--
BH10	4866974.04	668395.72	146.42	4.4	3.8
BH11	4867076.94	668354.00	146.83	4.4	--
BH12	4867178.95	668323.93	147.53	4.4	--
BH13	4867282.44	668282.47	148.03	4.4	--
BH14	4867365.31	668258.86	148.37	4.4	--
BH15	4867492.67	668209.43	149.40	4.4	3.8
BH16	4867630.48	668167.03	149.26	4.4	--
BH17	4867665.98	668148.65	150.43	4.4	--
BH18	4867770.45	668119.01	150.35	4.4	--
BH19	4867877.24	668075.46	150.06	4.4	3.8
BH20	4867926.66	668069.08	149.22	4.4	--

2.2 Geotechnical Laboratory Tests

Soil samples recovered during this investigation were preserved and transported to the Englobe Toronto laboratory for additional testing. In the laboratory, each soil sample was examined as to its visual and textural characteristics by the Project Engineer. Moisture content determinations were carried out on all recovered soil samples. The results are plotted on the borehole logs attached in Appendix B.

Seven (7) grainsize analyses were performed on selected soil samples. The geotechnical laboratory test results are provided in Appendix C of this report as well as presented on the respective borehole logs provided in Appendix B.

2.3 Environmental Testing

A total of two (2) representative subsoil samples were selected by Englobe and submitted to Eurofins for the environmental analysis including metals and inorganic parameters, Volatile Organic Compounds (VOCs), Petroleum Hydrocarbons (BTEX, F1 to F4) and Polycyclic Aromatic Hydrocarbon (PAHs) parameters in accordance with Ontario Regulation 153/04 (as amended). The environmental testing results, including Eurofins Certificates of Analysis are attached in Appendix D of this report.



3 Site and Subsurface Conditions

The site under investigation is located at the north rural area at the City of Oshawa. Bounded by Taunton Road West from the south and Conlin Road from the north, the site is approximately 2,0 km in length. The ground elevation of the site varies from 141.6 m to 150.4 m above Sea Level, from south to north.

The approximate borehole locations are showed on the attached Borehole Locations Drawing provided in Appendix A. The subsurface conditions in the geotechnical boreholes are presented in the individual Borehole Logs (presented in Appendix B) and summarized in the following paragraphs.

3.1 Pavement Conditions

Flexible pavement structure consisting of Asphalt Concrete followed by Granular Base and Subbase was encountered at all borehole locations. The thickness of the Asphalt Concrete varied from 14 mm to 150mm. The pavement structure thicknesses are summarized in Table 2.

Table 2: Summary of Pavement Structure

BH No.	THICKNESS OF ASPHALT CONCRETE (mm)	THICKNESS OF GRANULAR BASE/SUBBASE (mm)	NOTE
BH1	25	175	
BH-CH2	25	585	
BH-CH3	20	590	
BH4	20	590	
BH-CH5	20	590	
BH6	25	585	
BH-CH7	20	590	
BH8	20	560	
BH9	20	590	

BH No.	THICKNESS OF ASPHALT CONCRETE (mm)	THICKNESS OF GRANULAR BASE/SUBBASE (mm)	NOTE
BH-CH10	20	590	
BH-CH11	20	590	
BH12	25	585	
BH13	20	590	
BH-CH14	22	590	
BH-CH15	20	590	
BH16	20	650	
BH17	20	590	
BH-CH18	14	595	
BH-CH19	150	460	
BH20	150	460	

3.2 Subsoil Conditions

The dominant subgrade soils under the pavement structure within the project limits were observed to consist of fill (clayey silt, sandy silt, silty sand and gravelly sand) followed by native deposit of clayey silt/clayey silt and/or sandy silt/silty sand.

Fill: Fill material was encountered in all boreholes except for BH3, BH9, BH12 and BH19, underneath the pavement structure and extended to depth ranging from 1.4 to 3.7 mbgs. In general, the fill was comprised of gravelly sand, silty sand to sandy silt and clayey silt. The in-situ moisture content of the fill material ranged from 4 to 30 percent. The recorded SPT 'N'-value ranging from 4 to 40 blows per 300 mm of penetration for cohesionless material and 7 to 14 blows per 300 mm of penetration for cohesive material, indicating a loose to dense state for cohesionless material and firm to stiff consistency for cohesive material.

The laboratory test result for a soil sample from fill material is presented in Appendix 3. A summary of testing for this material is briefly outlined in Table 3:

Table 3: Summary of Gradation Results - Fill

BH No.	SAMPLE NO.	GRAIN SIZE DISTRIBUTION ANALYSES (%)			
		GRAVEL	SAND	SILT	CLAY
BH15	SS2	34	57	7	2

Clayey Silt/Silty Clay: Native soil consisting of clayey silt/silty clay deposits was encountered underneath the fill material or directly below the pavement structure at most boreholes except for BH6, BH10 and BH20. Some of the silty clay/clayey silt deposit has a till like structure. The clayey silt was also encountered underneath the sandy silt/silty sand deposit in some boreholes. The clayey silt/silty clay deposit presented in a firm to hard consistency, having a SPT 'N'-value of 6 to over 46 blows per 300 mm of penetration. The in-situ moisture content of the silty clay varied 8 to 26 percent.

The laboratory test results for the silty clay/silty clay deposit are presented in Appendix 3. A summary of testing for this material is briefly outlined in Table 4:

Table 4: Summary of Gradation Results - Silty Clay/Clayey Silt

BH No.	SAMPLE NO.	GRAIN SIZE DISTRIBUTION ANALYSES (%)			
		GRAVEL	SAND	SILT	CLAY
BH2	SS3	0	5	40	55
BH9	SS5	7	36	44	13
BH12	SS3	0	31	49	20
BH17	SS5	0	1	27	72
BH19	SS4	1	23	47	29

Sandy Silt/Silty Sand: Cohesionless deposit comprised of sandy silt to silty sand was observed in some boreholes underneath the fill material or clayey silt deposit. The sandy silt/silty sand deposit was generally presented in a loose to very dense state, having SPT 'N'-value ranging from 6 to over 50 blows per 300 mm of penetration. The in-situ moisture content of this deposit ranged from 4 to 21 percent.

The laboratory test results for the silty sand/sandy silt deposit are presented in Appendix 3. A summary of testing for this material is briefly outlined in Table 5:

Table 5: Summary of Gradation Results - Silty Sand/Sandy Silt

BH No.	SAMPLE NO.	GRAIN SIZE DISTRIBUTION ANALYSES (%)			
		GRAVEL	SAND	SILT	CLAY
BH6	SS4	1	46	49	4

3.3 Groundwater Conditions

Groundwater level measured in the monitoring wells on November 07, 2022, was at 1.5 m to 3.9 m below the existing grade, corresponding to Elevation 140.68 m to 147.60 m, as listed in Table 6.

Table 6: Groundwater levels observed in Monitoring wells

BH No.	WELL DEPTH (m)	DATE MEASURED	DEPTH OF GROUNDWATER TABLE (m)	ELEVATION OF GROUNDWATER TABLE (m)	NOTE
BH2	3.8	07/11/2022	1.5	140.68	
BH6	3.8	07/11/2022	2.5	141.77	
BH10	3.8	07/11/2022	3.9	142.52	
BH15	3.8	07/11/2022	1.8	147.60	
BH19	3.8	07/11/2022	3.9	146.16	

It should be noted that the groundwater levels can vary and are subject to seasonal fluctuations in response to major weather events.



4 Environmental Analysis Results

None of the soil samples which were extracted from the boreholes exhibited any visible or olfactory evidence of chemical contamination. Two (2) subsoil samples were selected by Englobe and submitted to Eurofins for environmental analysis in accordance with Ontario Regulation 153/04 (as amended by Ontario Regulation 511/09) for metals and inorganic parameters, Volatile Organic compounds (VOCs), Petroleum Hydrocarbons (BTEX, F1 to F4) and Polycyclic Aromatic Hydrocarbon (PAHs) parameters. The bulk analysis results were then compared to the Industrial / Commercial / Community property use standards as defined in Table 3.1 - Full Depth Excess Soil Quality Standards in a Non-Potable Ground Water Condition of the O. Reg. 406/19 Standards (hereafter referred to as the MECP Table 3.1 Standards) and Table 1 - Full Depth Background Site Condition Standards for Residential / Parkland / Institutional / Industrial / Commercial / Community property use (hereafter referred to as the MECP Table 1) Standards.

The complete environmental analysis results including the Eurofins Certificate of Analysis are provided in Appendix D. The analysis indicated exceedances of the parameters tested for EC and SARs. Table 7 summarizes the exceedance of parameters tested in comparison with Table 1 RPIICC and Table 3.1 ICC standards.

Table 7: Summary of Environmental Testing Exceedances

SAMPLE ID	MECP TABLE 1 STANDARDS RPIICC					MECP TABLE 3.1 STANDARDS ICC	
	EC	SARs	PAH	PHC	VOC	EC	SARs
BH15-SS2	✓	✓	--	--	--	--	✓
BH15-SS3	✓	✓	--	--	--	--	✓

Note: ✓ - One or more parameters analyzed in the sample submitted exceed the MECP Table 1 or Table 3.1 Standards.



5 Geotechnical Consideration and Recommendations

In general, the field exploration revealed that below the existing pavement structure, the site is predominantly underlain by fill (clayey silt, sandy silt, silty sand, and gravelly sand) with varied thickness followed by native deposit of clayey silt/clayey silt and/or sandy silt/silty sand. No groundwater problem was anticipated for the construction of the road.

5.1 Subgrade Preparation

After removing of the existing pavement structure (topsoil within the road widening area if required), the site should be stripped off all loose fill and any organic or otherwise unsuitable soils to the full depth of the roads, both in cut and fill areas under roads.

Following stripping, the site should be graded to the subgrade level and approved. The subgrade should then be proof-rolled, in the presence of the Geotechnical Engineer, by at least several passes of a heavy compactor having a rated capacity of at least 8 tonnes. Any soft spots thus exposed should be removed and replaced by select fill material, like the existing subgrade soil and approved by the Geotechnical Engineer. The subgrade should then be re-compacted from the surface to at least 98% of its Standard Proctor Maximum Dry Density (SPMDD). The final subgrade should be cambered or otherwise shaped properly to facilitate rapid drainage and to prevent the formation of local depressions in which water could accumulate.

Due to the clayey (i.e. impervious) nature of the subsoil in the upper portions, proper cambering and allowing the water to escape towards the sides (where it can be removed by means of sub-drains) is considered to be beneficial for this project. Otherwise, any water collected in the granular sub-base materials could be trapped thus causing problems due to softened subgrade, differential frost heave,

etc. For the same reason damaging the subgrade during and after placement of the granular materials by heavy construction traffic should be avoided. If the moisture content of the local material cannot be maintained at $\pm 2\%$ of the optimum moisture content, imported granular material may be required.

Any fill required for regrading the site or backfill should be select, clean material, free of topsoil, organic or other foreign and unsuitable matter. The fill should be placed in layers and compacted to at least 95% of its SPMDD. The degree of compaction should be increased to 98% within the top 1.0 m of the subgrade. The compaction of the new fill should be checked by enough field compaction tests.

5.2 Pavement Recommendations

The geotechnical investigation results indicate that the thickness of the existing pavement structure is inadequate to meet the proposed usage of the road (Type “E” Arterial Road of City of Oshawa design), the following minimum pavement thickness is recommended in accordance with City of Oshawa’s Pavement Design Guideline:

- 50 mm HL3HS PGAC 64-28XJ
- 80 mm HDBC PGAC 64-28XJ
- 150 mm Granular ‘A’
- 920 mm Granular ‘B’ Type II

Strengthening of the pavement with asphalt concrete and granular materials is not a practical approach since this will require raising the grade of the existing road.

Pavement reconstruction is recommended for Stevenson Road North to address the poor condition of the existing pavement, inadequate pavement thickness and grade raise restriction. The reconstruction strategy should be carried out in conformance with the City of Oshawa as follows:

- Mill/excavate the existing asphalt full depth (ranging between 20 and 150 mm) and dispose off-site. The existing asphalt concrete millings may be re-used as reclaimed asphalt pavement (RAP) in recycled hot-mix asphalt mixtures;
- Excavate the existing granular fill material and subgrade to a depth of 1200 mm below ground surface to accommodate the new pavement structure and dispose the excavated material off-site;
- Proof-roll the exposed sub-grade material to identify “weak zones/soft area” under the supervision of a qualified geotechnical engineer. In weak areas excavate the subgrade to competent subgrade and replace with new Granular B, Type I and compact to 100% of the materials’ Standard Proctor Maximum Dry Density (SPMDD). Any modifications required due to soft area shall be modified a minimum of 300 mm across the entire width of the road.
- Place a minimum of 920 mm Granular B Type II sub-base course on the prepared subgrade compact to 100% of the material’s Standard Proctor Maximum Dry Density (SPMDD) and provide the required crossfall. It should be noted that excessive rolling using heavy rollers and/or dynamic compaction can lead to subgrade softening;
- Place 150 mm Granular A base course, compact to 100% of the material’s SPMDD and provide the required crossfall;
- Place two (2) lifts of new hot-mix asphalt concrete consisting of one (1) lift of 40 mm of SP 12.5 B or HL3 surface course and one (1) lift of 80 mm of SP 19.0 B or HL8 binder courses, placed and compacted in conformance with OPSS.MUNI 1151 and OPSS 310. The surface of the

completed pavement should be provided with a minimum centre-to-edge cross-fall of 2 percent, and

- Place tack coat between the hot-mix asphalt lifts.

5.3 Temporary Construction Dewatering

Upon completion of boreholes, un-stabilized groundwater was measured at depth of 1.8 to 2.7 mbgs and stabilized groundwater measured in the installed monitoring wells were found at 1.5 to 3.9 mbgs. No groundwater issue is anticipated for the pavement reconstruction.

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6 General Comments

The comments provided in this report have been developed for the use of Gannett Fleming and City of Oshawa. It should be noted that the soil boundaries indicated on the Borehole Logs are inferred from non-continuous sampling and observations during drilling and should not be interpreted as exact planes of geological change. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design. Also, the subsoil and groundwater conditions have been determined at the borehole locations only. Additional boreholes and/or test pits would be necessary to determine the localized conditions. Contractors bidding on, or undertaking the works, must conduct their own interpretations of the factual borehole data, and draw their own conclusions as to how the subsoil and groundwater conditions may affect their construction techniques, scheduling and costs.

It is further noted that, depending on the time of year the field work was completed, water levels should be expected to vary, perhaps significantly from those observed at the time of this investigation.

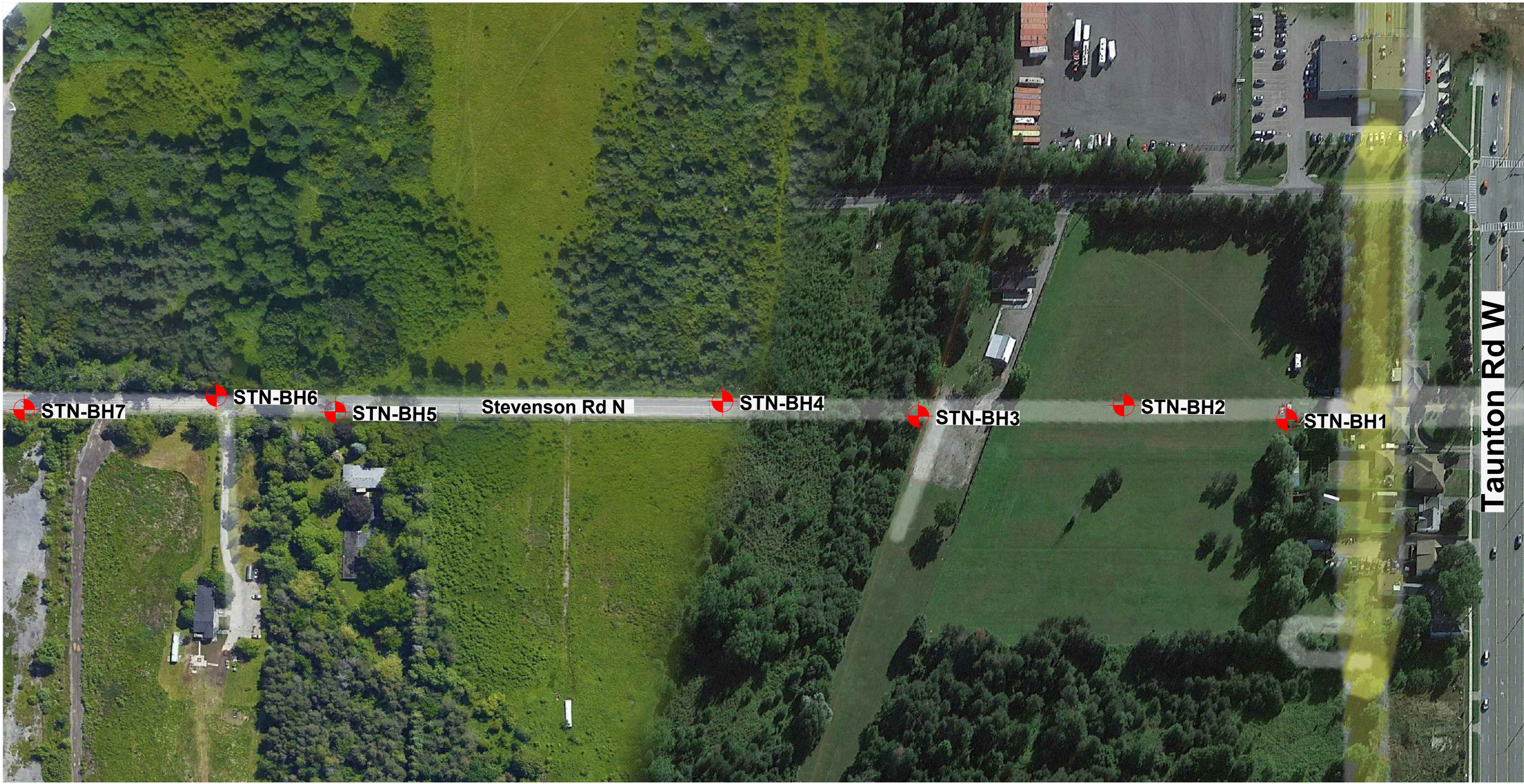
Appendix A

Borehole Location Plan





eNGLOBE

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LEGEND:

 **Borehole Location**





Project

Gannett Fleming
Geotechnical investigation
Stevenson Road North, Oshawa

Title

Borehole Location Plan

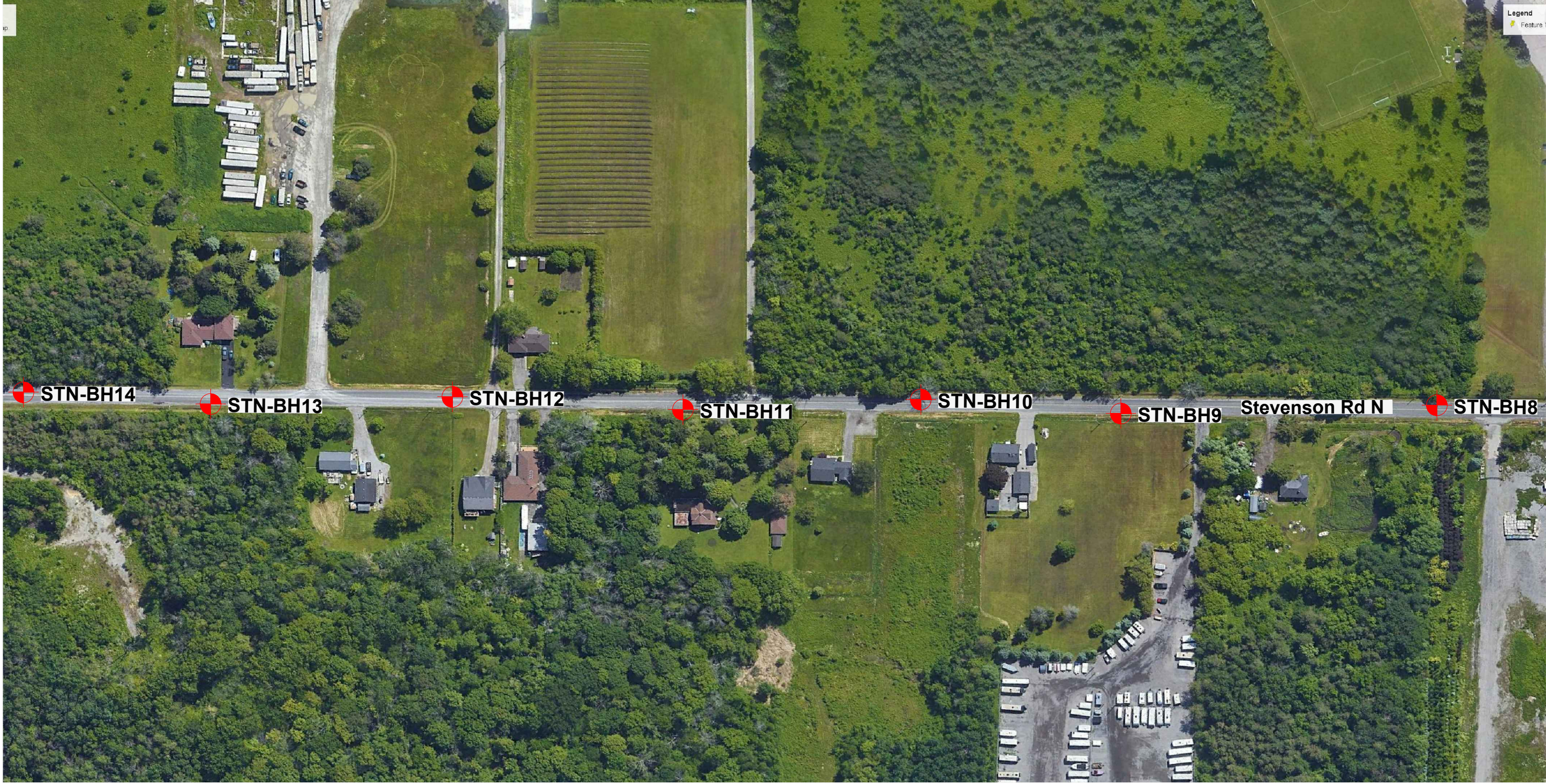


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Drawn	A. Al-Absi	Scale	N.T.S.	Sequence no. 1 of 3		
Checked	H. Akbari	Date	2022/11/22			

Resp.	Project	Phase	Disc.	Type	Drawing no.	Rev.
01	02112515.000	0100	GE	D	1	00


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LEGEND:



Borehole Location



Project

Gannett Fleming
Geotechnical investigation
Stevenson Road North, Oshawa

Title

Borehole Location Plan



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Drawn	A. Al-Absi	Scale	N.T.S.	Sequence no. 2 of 3		
Checked	H. Akbari	Date	2022/11/22			

Resp.	Project	Phase	Disc.	Type	Drawing no.	Rev.
01	02112515.000	0100	GE	D	2	00



LEGEND:



Borehole Location



Project	Gannett Fleming Geotechnical investigation Stevenson Road North, Oshawa
Title	Borehole Location Plan

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Drawn	A. Al-Absi	Scale	N.T.S.	Sequence no.	3 of 3	
Checked	H. Akbari	Date	2022/11/22			
Resp.	Project	Phase	Disc.	Type	Drawing no.	Rev.
01	02112515.000	0100	GE	D	3	00

Appendix B

Borehole Logs



eNGLOBE

LOG OF No. BH1

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4866124.43 E 668685.26

Date Drilled: 10/25/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by Vane Test



Natural Moisture Content



Atterberg Limits



Undrained Triaxial at % Strain at Failure



Shear Strength by Penetrometer Test



GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value		Natural Moisture Content % Atterberg Limits (% Dry Weight)	SAMPLING METHOD	Natural Unit Weight kN/m ³	Percent of Fines, %
					40	80				
		ASPHALT: (25 mm)	141.6	0						
		SAND & GRAVEL (Base/Subbase, 175 mm)	141.5							
		FILL: silty sand, some gravel, dark brown, moist	141.4				3.2			
				1	22		8.2			
		TILL: silty clay/clayey silt, trace sand, trace gravel, stiff to very stiff, brown to grey, moist	140.1		14		22.9			
				2	20		20.2			
				3	20		21.5			
		TILL: silty sand/sandy silt, trace gravel, very dense, grey, moist	137.8				9.7			
				4	54					
		Terminated at 4.4 m	137.1							
		Borehole advanced using continuous flight solid stem augering equipment on October 25, 2022 by Geotech Support Services.								

CLASSIFICATION LOG 02112515.000-STEVENSON ROAD NORTH_OSHAWA.GPJ LOG A GWGL02.GDT 12/8/22

Checked By: H. Akbari

Logged By: M. Zakir

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

LOG OF No. BH2

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4866197.39 E 668666.28

Date Drilled: 10/24/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



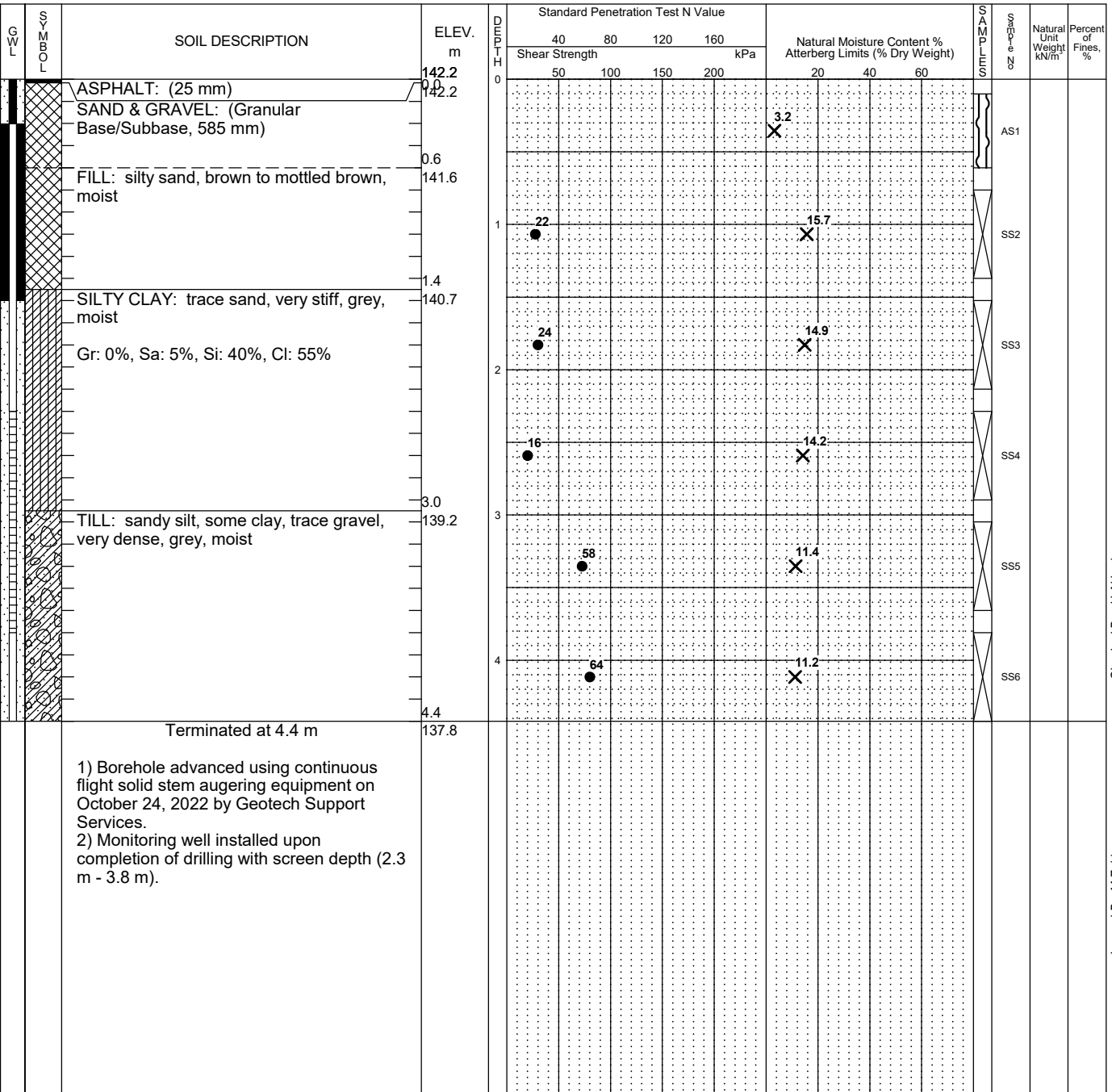
% Strain at Failure



Shear Strength by



Penetrometer Test



Checked By: H. Akbari

Logged By: M. Zakir

Time	Water Level (m)	Depth to Cave (m)
Upon Completion 11/7/2022	2.7 1.5	Open

LOG OF No. BH3

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4866284.56 E 668629.37

Date Drilled: 10/25/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure

Shear Strength by



Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value		Natural Moisture Content % Atterberg Limits (% Dry Weight)	SAMPLING LOG	Soil Type	Natural Unit Weight kN/m ³	Percent of Fines, %
					40	80	120	160			
		ASPHALT: (20 mm)	142.4	0							
		SAND & GRAVEL: (Granular Base/Subbase, 590 mm)	142.4	0							
			0.6								
		SILTY CLAY: occ. sand pockets, stiff, grey, moist	141.8	1							
			2.2								
		SANDY SILT: trace clay, compact, grey, moist	140.3	2							
			3.7								
		TILL: silty clay/clayey silt, trace sand, trace gravel, hard, grey, moist	138.7	3							
			4.4								
		Terminated at 4.4 m	138.0	4							
		Borehole advanced using continuous flight solid stem augering equipment on October 25, 2022 by Geotech Support Services.									

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	2.4	Open

CLASSIFICATION LOG 02112515.000-STEVENSON ROAD NORTH_OSHAWA.GPJ LOG A GWGL02.GDT 12/8/22

Checked By: H. Akbari

Logged By: M. Zakir

Englobe

DRAWING No. 2

Sheet No. 1 of 1

Location: N 4866371.01 E 668605.69

Date Drilled: 10/24/2022Drill Type: Solid Stem AugersDatum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by

Vane Test



Natural Moisture Content



Atterberg Limits



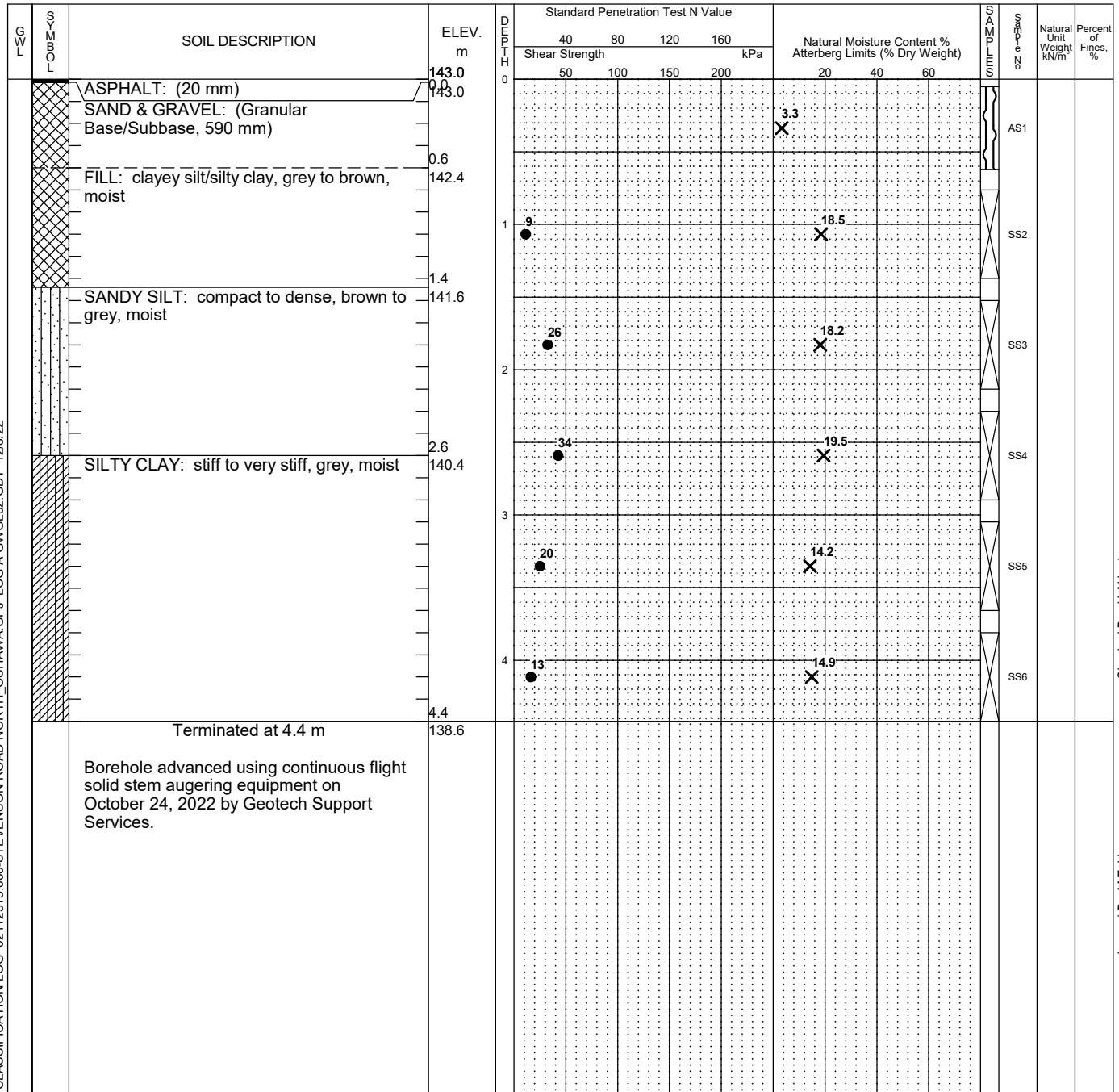
Undrained Triaxial at



% Strain at Failure



Shear Strength by



Time	Water Level (m)	Depth to Cave (m)
Upon Completion	2.4	Open

LOG OF No. BH5

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4866537.49 E 668540.90

Date Drilled: 10/25/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure



Shear Strength by



Penetrometer Test



GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value				Natural Moisture Content % Atterberg Limits (% Dry Weight)			SAMPLING METHOD	Soil Type	Natural Unit Weight kN/m ³	Percent of Fines, %	
					Shear Strength											
					40	80	120	160	kPa							
					50	100	150	200		20	40	60				
		ASPHALT: (20 mm)	144.9	0						2.3						
		SAND & GRAVEL: (Granular Base/Subbase, 590 mm)	144.9											AS1		
		FILL: silty sand, loose, brown, moist	0.6 144.3													
		SILTY CLAY: trace sand, trace gravel, stiff, brown to grey, moist	1.5 143.5	1	7					12.5				SS2		
		SILTY CLAY: trace sand, trace gravel, stiff, brown to grey, moist	2.2 143.5	2	14					10.3				SS3		

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	2.4	Open

Checked By: H. Akbari

Logged By: M. Zakir

CLASSIFICATION LOG 02112515.000-STEVENSON ROAD NORTH_OSHAWA.GPJ LOG A GWGL02.GDT 12/8/22

LOG OF No. BH6

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4866591.60 E 668529.17

Date Drilled: 10/24/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



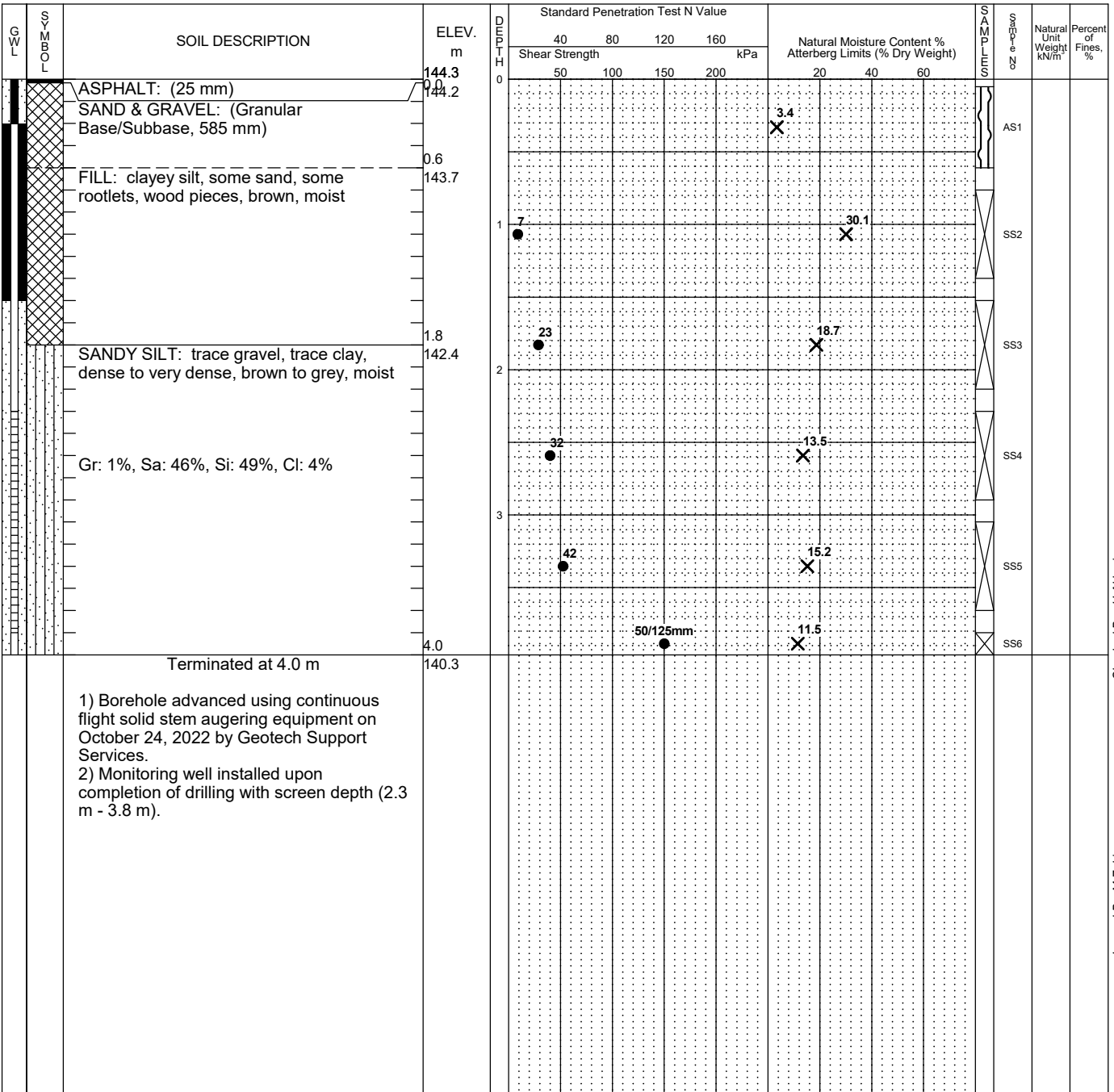
% Strain at Failure



Shear Strength by



Penetrometer Test



Time	Water Level (m)	Depth to Cave (m)
Upon Completion 11/7/2022	2.6 2.5	Open

Checked By: H. Akbari

Logged By: M. Zakir

LOG OF No. BH7

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4866672.38 E 668493.69

Date Drilled: 10/26/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure



Shear Strength by



Penetrometer Test



GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value		Natural Moisture Content % Atterberg Limits (% Dry Weight)	SAMPLING LOG	Soil Type	Natural Unit Weight kN/m ³	Percent of Fines, %
					40	80	120	160			
		ASPHALT: (20 mm)	144.8	0							
		SAND & GRAVEL: (Granular Base/Subbase, 590 mm)	144.7	0							
		FILL: silty clay/clayey silt, some sand, brown to grey, moist	0.6 144.2	0.6							
				1							
				2							
				3							
		TILL: silty clay/clayey silt, trace sand, trace gravel, stiff to very stiff, brown, moist	3.0 141.8	3.0							
				4							
		Terminated at 4.4 m	4.4 140.3	4.4							
		Borehole advanced using continuous flight solid stem augering equipment on October 26, 2022 by Geotech Support Services.									

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

CLASSIFICATION LOG 02112515.000-STEVENSON ROAD NORTH_OSHAWA.GPJ LOG A GWGL02.GDT 12/8/22

Checked By: H. Akbari

Logged By: M. Zakir

LOG OF No. BH8

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4866749.63 E 668473.13

Date Drilled: 10/24/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure

Shear Strength by



Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value		Natural Moisture Content %		SAMPLING METHOD	Soil Type	Natural Unit Weight kN/m ³	Percent of Fines, %
					40	80	120	160				
		ASPHALT: (20 mm)	145.5	0	Shear Strength kPa							
		SAND & GRAVEL: (Granular Base/Subbase, 560 mm)	145.5		50	100	150	200				
		FILL: silty sand, some gravel, loose, brown, moist	144.9						2.1			
			144.1	1					5.8			
		SANDY SILT: some clay, compact, brown, moist	144.1									
			143.2	2					20.0			
		SILTY CLAY: trace sand, hard, grey, moist	143.2									
			142.2	3					11.1			
		TILL: silty sand, trace gravel, dense to very dense, grey, moist	142.2						16.7			
		Terminated at 4.0 m	141.5						9.5			
		Borehole advanced using continuous flight solid stem augering equipment on October 26, 2022 by Geotech Support Services.										

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	2.4	Open

Checked By: H. Akbari

Logged By: M. Zakir

CLASSIFICATION LOG 02112515.000-STEVENSON ROAD NORTH_OSHAWA.GPJ LOG A GWGL02.GDT 12/8/22

Englobe

DRAWING No. 2

Sheet No. 1 of 1

Location: N 4866885.26 E 668420.62

Date Drilled: 10/26/2022Drill Type: Solid Stem AugersDatum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by

Vane Test



Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure



Shear Strength by Penetrometer Test



G.W.L.	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value				Natural Moisture Content % Atterberg Limits (% Dry Weight)	SAMPLE NO.	Soil Type	Natural Unit Weight kN/m³	Percent of Fines, %
					Shear Strength								
					40	80	120	160					
		ASPHALT: (20 mm)	146.0	0									
		SAND & GRAVEL: (Granular Base/Subbase, 590 mm)	146.0					2.1			AS1		
		CLAYEY SILT: some sand, firm to very stiff, brownish grey, moist	0.6 145.4										
				1	16			14.0			SS2		
				2	12			14.9			SS3		
				3	6			14.6			SS4		
		TILL: sandy clayey silt, trace gravel, very stiff, brown, moist	3.0 143.0										
		Gr: 7%, Sa: 36%, Si: 44%, Cl: 13%			18			21.0			SS5		
		SANDY SILT: compact, brown, wet	3.7 142.3										
				4	14			21.0			SS6		
		Terminated at 4.4 m	4.4 141.6										
		Borehole advanced using continuous flight solid stem augering equipment on October 26, 2022 by Geotech Support Services.											

Checked By: H.Akbari

Logged By: M.Zakir

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

LOG OF No. BH10

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4866974.04 E 668395.72

Date Drilled: 10/24/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



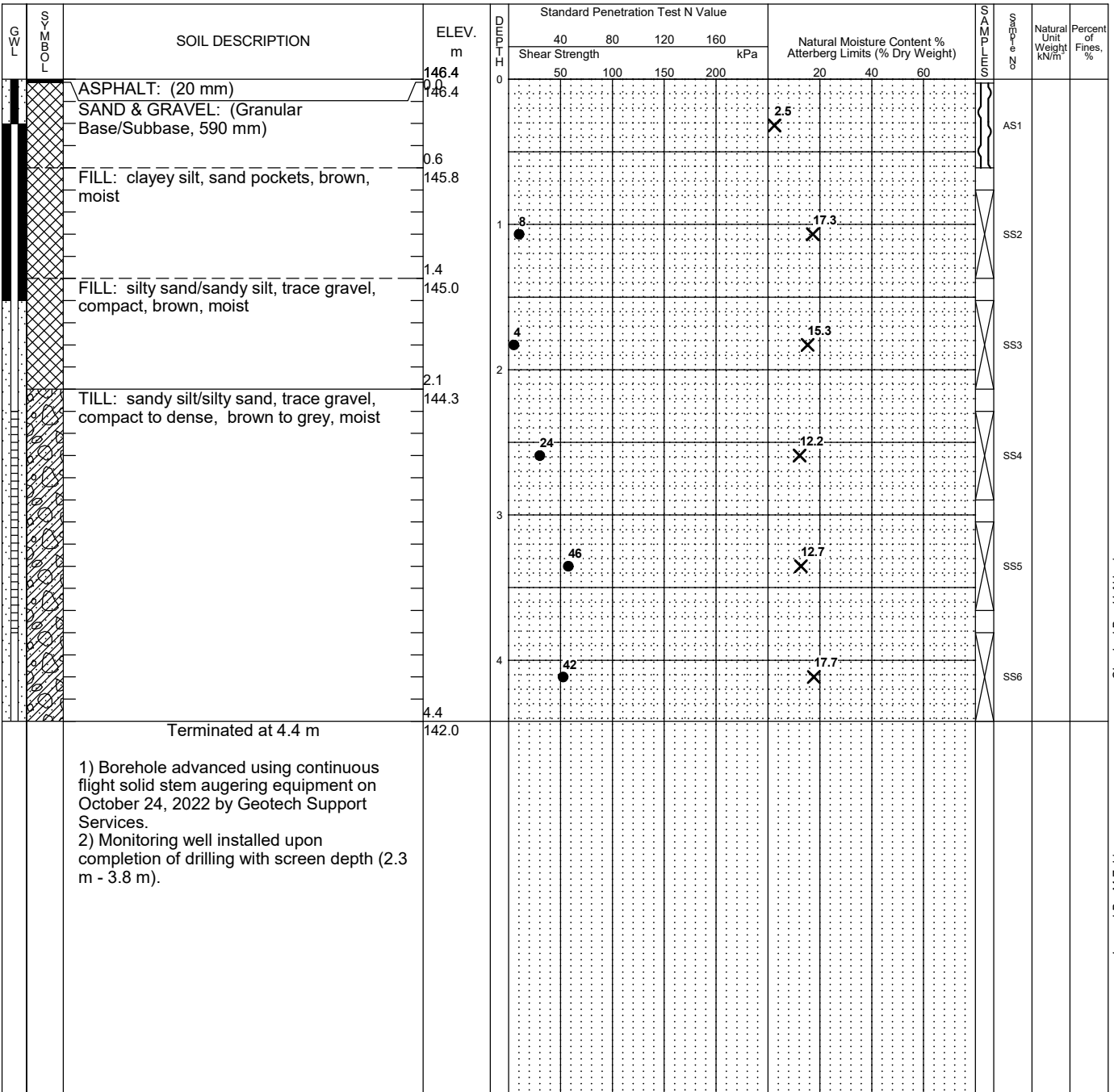
% Strain at Failure



Shear Strength by



Penetrometer Test



Checked By: H. Akbari

Logged By: M. Zakir

Time	Water Level (m)	Depth to Cave (m)
Upon Completion 11/7/2022	1.8 3.9	Open

LOG OF No. BH11

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4867076.94 E 668353.99

Date Drilled: 10/26/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



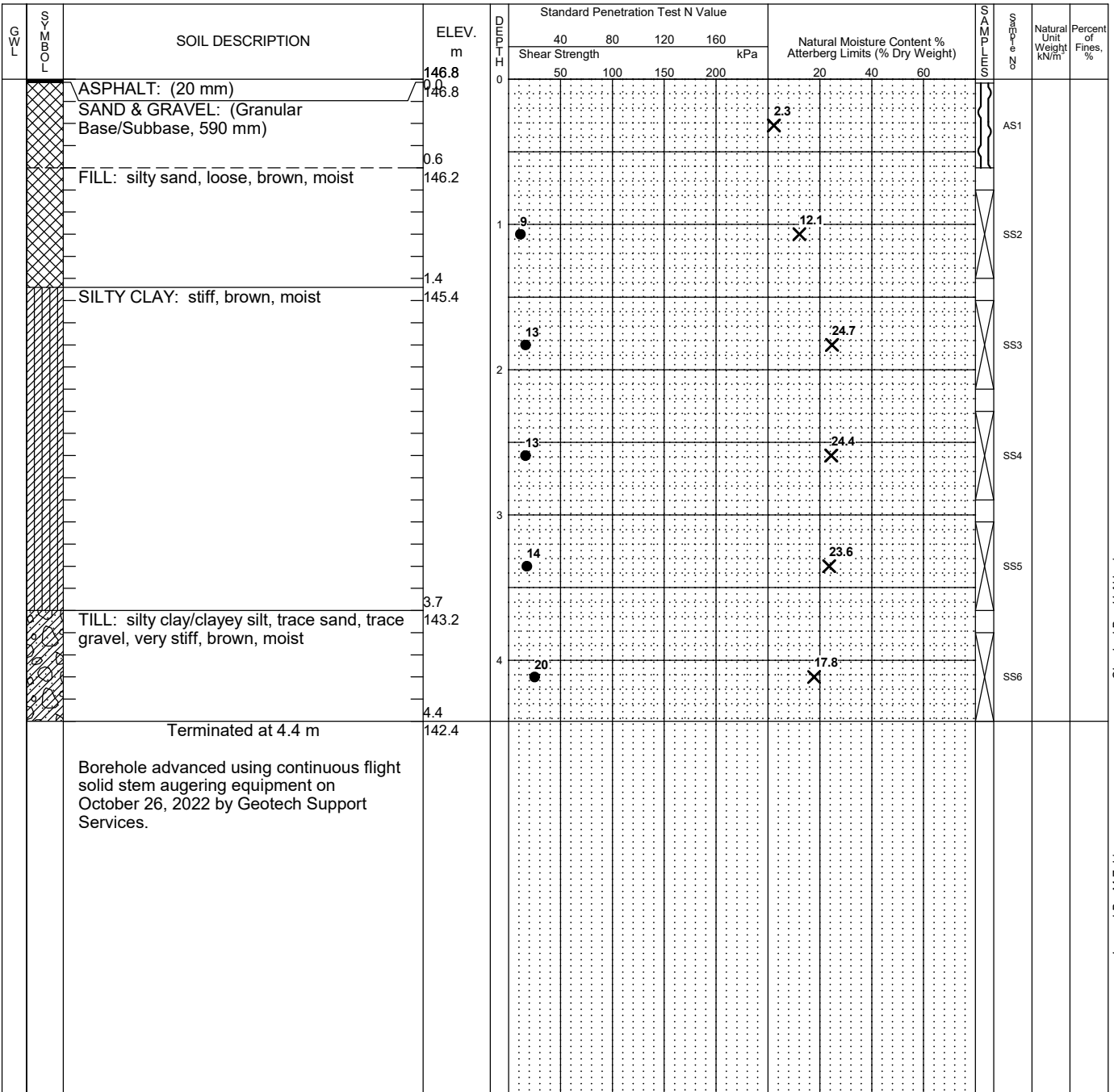
% Strain at Failure



Shear Strength by



Penetrometer Test



Checked By: H. Akbari

Logged By: M. Zakir

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

CLASSIFICATION LOG 02112515.000-STEVENSON ROAD NORTH_OSHAWA.GPJ LOG A GWGL02.GDT 12/8/22

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4867178.95 E 668323.94

Date Drilled: 10/24/2022Drill Type: Solid Stem AugersDatum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by

Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at

% Strain at Failure

Shear Strength by

Penetrometer Test

[illegible]

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

LOG OF No. BH13

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4867282.44 E 668282.47

Date Drilled: 10/26/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure



Shear Strength by



Penetrometer Test



GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value		Natural Moisture Content % Atterberg Limits (% Dry Weight)	SAMPLING METHOD	Natural Unit Weight kN/m ³	Percent of Fines, %
					40	80	120	160		
		ASPHALT: (20 mm)	148.0	0						
		SAND & GRAVEL: (Granular Base/Subbase, 590 mm)	148.0	0						
		FILL: silty sand, compact, brown, moist	147.4	0.6						
		SILTY CLAY: trace sand, stiff, brown, moist	146.6	1.5						
		TILL: silty clay/clayey silt, trace sand, trace gravel, very stiff, grey, moist	144.3	3.7						
		Terminated at 4.4 m	143.6	4.4						
		Borehole advanced using continuous flight solid stem augering equipment on October 26, 2022 by Geotech Support Services.								

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

CLASSIFICATION LOG 02112515.000-STEVENSON ROAD NORTH_OSHAWA.GPJ LOG A GWGL02.GDT 12/8/22

Checked By: H. Akbari

Logged By: M. Zakir

LOG OF No. BH14

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4867365.31 E 668258.86

Date Drilled: 10/24/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure



Shear Strength by



Penetrometer Test



GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value		Natural Moisture Content % Atterberg Limits (% Dry Weight)	SAMPLING LOG	Natural Unit Weight kN/m ³	Percent of Fines, %
					40	80	120	160		
		ASPHALT: (20 mm)	148.4	0						
		SAND & GRAVEL: (Granular Base/Subbase, 590 mm)	148.3	0						
		FILL: silty sand, trace gravel, moist, brown	147.8	0.6						
		SILTY CLAY: firm to very stiff, brown to grey, moist	146.9	1.4						
				1						
				2						
				3						
				4						
		Terminated at 4.4 m	144.0							
		Borehole advanced using continuous flight solid stem augering equipment on October 24, 2022 by Geotech Support Services.								

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

CLASSIFICATION LOG 02112515.000-STEVENSON ROAD NORTH_OSHAWA.GPJ LOG A GWGL02.GDT 12/8/22

Checked By: H. Akbari

Logged By: M. Zakir

LOG OF No. BH15

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4867492.67 E 668209.43

Date Drilled: 10/26/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



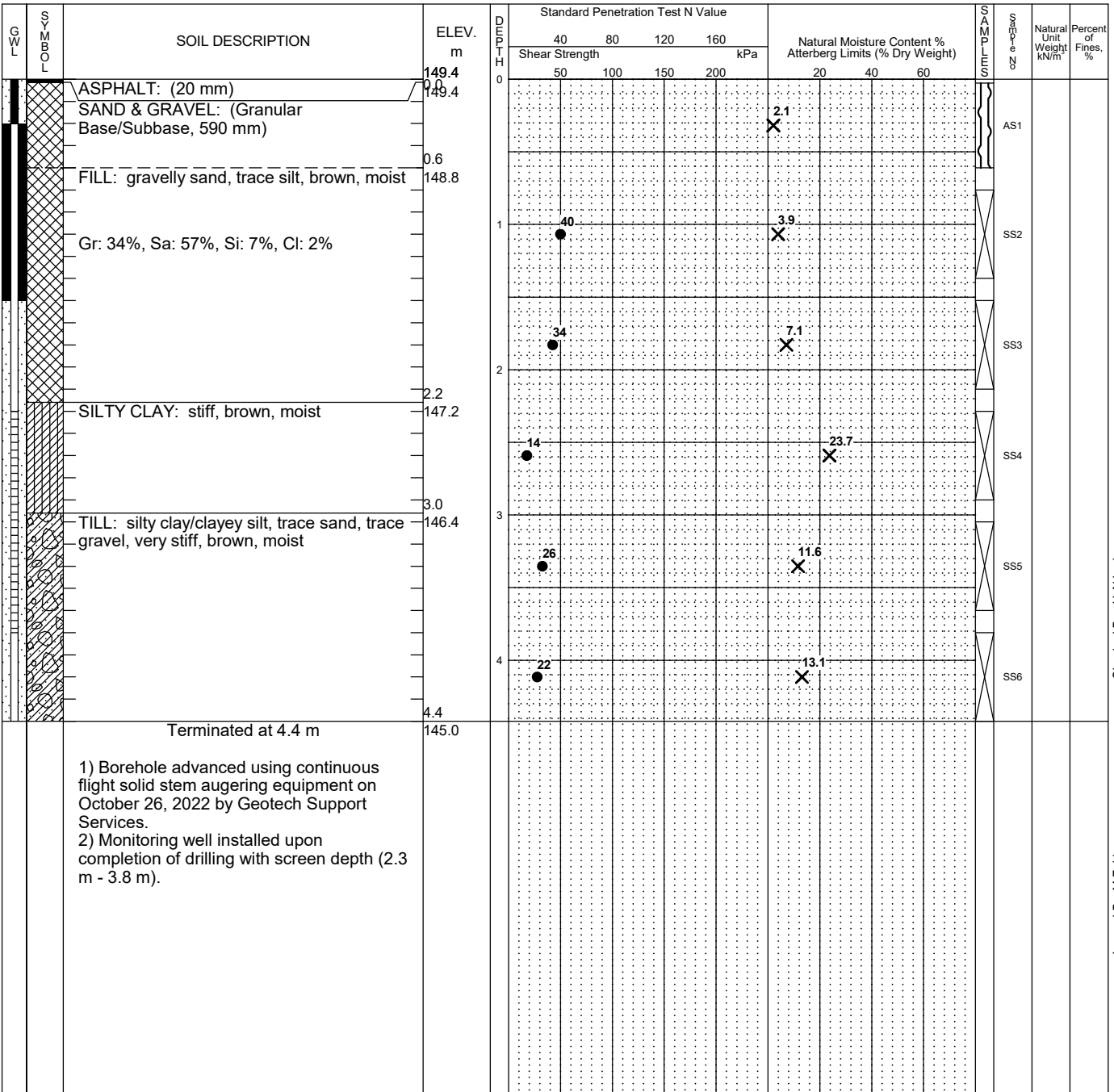
% Strain at Failure



Shear Strength by



Penetrometer Test



Checked By: H. Akbari

Logged By: M. Zakir

Time	Water Level (m)	Depth to Cave (m)
Upon Completion 11/7/2022	Dry 1.8	Open

Englobe

DRAWING No. 2

Sheet No. 1 of 1

Location: N 4867630.48 E 668167.03

Date Drilled: 10/26/2022Drill Type: Solid Stem AugersDatum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by

Vane Test



Natural Moisture Content



Atterberg Limits



Undrained Triaxial at


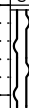
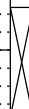


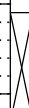



% Strain at Failure



Shear Strength by Penetrometer Test



SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value				Natural Moisture Content % Atterberg Limits (% Dry Weight)		SAMPLE No.	Soil Type	Natural Unit Weight kN/m ³	Percent of Fines, %		
				Shear Strength											
				40	80	120	160	kPa							
				50	100	150	200	20	40	60					
	ASPHALT: (20 mm)	149.3	0									AS1			
	SAND & GRAVEL: (Granular Base/Subbase, 650 mm)	149.2													
	FILL: silty sand, loose, brown, moist	148.6											SS2		
													SS3		
													SS4		
		SILTY CLAY: firm, brown, moist	147.0										SS5		
		TILL: silty clay/clayey silt, trace sand, trace gravel, stiff, brown, moist	146.3										SS6		
	Terminated at 4.4 m	144.8													
	Borehole advanced using continuous flight solid stem augering equipment on October 26, 2022 by Geotech Support Services.														

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

LOG OF No. BH17

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4867665.98 E 668148.65

Date Drilled: 10/26/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure



Shear Strength by



Penetrometer Test



GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value		Natural Moisture Content % Atterberg Limits (% Dry Weight)	SAMPLING LOG	Soil Type	Natural Unit Weight kN/m ³	Percent of Fines, %
					40	80	120	160			
		ASPHALT: (20 mm)	150.4	0							
		SAND & GRAVEL: (Granular Base/Subbase, 590 mm)	150.4	0							
		FILL: silty sand, some gravel, compact, brown, moist	149.8	0.6							
				1							
				2							
		SILTY CLAY: trace sand, stiff, brown, moist	148.1	2.3							
		Gr: 0%, Sa: 1%, Si: 27%, Cl: 72%		3							
		-- turns grey	146.7	3.7							
		Terminated at 4.4 m	146.0	4.4							
		Borehole advanced using continuous flight solid stem augering equipment on October 26, 2022 by Geotech Support Services.									

CLASSIFICATION LOG 02112515.000-STEVENSON ROAD NORTH_OSHAWA.GPJ LOG A GWGL02.GDT 12/8/22

Checked By: H. Akbari

Logged By: M. Zakir

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4867770.45 E 668119.01

Date Drilled: 10/25/2022Drill Type: Solid Stem AugersDatum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by

Vane Test



Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure



Shear Strength by Penetrometer Test

[illegible]

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

LOG OF No. BH19

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4867877.24 E 668075.46

Date Drilled: 10/25/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure



Shear Strength by



Penetrometer Test

0

15

10

5

0

5

10

15

20

25

30

35

40

45

50

55

60

65

70

75

80

85

90

95

100

105

110

115

120

125

130

135

140

145

150

155

160

165

170

175

180

185

190

195

200

205

210

215

220

225

230

235

240

245

250

255

260

265

270

275

280

285

290

295

300

305

310

315

320

325

330

335

340

345

350

355

360

365

370

375

380

385

390

395

400

405

410

415

420

425

430

435

440

445

450

455

460

465

470

475

480

485

490

495

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505

510

515

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685

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695

700

705

710

715

720

725

730

735

740

745

750

755

760

765

770

775

780

785

790

795

800

805

810

815

820

825

830

835

840

845

850

855

860

865

870

875

880

885

890

895

900

905

910

915

920

925

930

935

940

945

950

955

960

965

970

975

980

985

990

995

1000

1005

1010

1015

1020

1025

1030

1035

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1045

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1060

1065

1070

1075

1080

1085

1090

1095

1100

1105

1110

1115

1120

1125

1130

1135

1140

1145

1150

1155

1160

1165

1170

1175

1180

1185

1190

1195

1200

1205

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1260

1265

1270

LOG OF No. BH20

Englobe

Project No. 02112515.000

DRAWING No. 2

Project: Geotechnical Investigation - Stevenson Road North

Sheet No. 1 of 1

Location: N 4867926.66 E 668069.08

Date Drilled: 10/25/2022

Drill Type: Solid Stem Augers

Datum: Geodetic

Split Spoon Sample



Auger Sample



SPT (N) Value



Dynamic Cone Test



Shelby Tube



Shear Strength by



Vane Test

Natural Moisture Content



Atterberg Limits



Undrained Triaxial at



% Strain at Failure



Shear Strength by



Penetrometer Test



GWL	SYMBOL	SOIL DESCRIPTION	ELEV. m	DEPTH m	Standard Penetration Test N Value		Natural Moisture Content % Atterberg Limits (% Dry Weight)	SAMPLING METHOD	Natural Unit Weight kN/m ³	Percent of Fines, %
					40	80	120	160		
		ASPHALT: (150 mm)	149.2	0						
		SAND & GRAVEL: (Granular Base/Subbase, 460 mm)	149.1	0.2						
		FILL: silty clay/clayey silt, some sand, trace rootlets, wood fragments, firm to stiff, brown to black, moist	148.6	0.6						
				1						
				2						
				3						
				4						
		SANDY SILT: trace clay, dense, grey, moist	145.6	3.7						
		Terminated at 4.4 m	144.8	4.4						
		Borehole advanced using continuous flight solid stem augering equipment on October 25, 2022 by Geotech Support Services.								

Time	Water Level (m)	Depth to Cave (m)
Upon Completion	Dry	Open

Checked By: H. Akbari

Logged By: M. Zakir

CLASSIFICATION LOG 02112515.000-STEVENSON ROAD NORTH_OSHAWA GP J LOG A GWGL02.GDT 12/8/22

Appendix C

Geotechnical laboratory Test Results



eNGLOBE

GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT

MTO LS-602, 702, AND 703/704

PROJECT: 02112515.000 CLIENT/JOB NAME: Gannett Fleming CONTRACT NUMBER: -

ROS ID: 104905 PROJECT/LOCATION: Geotechnical Investigation / Stevenson Road North. Oshawa

SAMPLING LOCATION: BH2_SS3

SAMPLING DEPTH, m: 1.5 - 2.1 m

SAMPLING METHOD: Split Spoon

SAMPLED BY: SA

SAMPLE DESCRIPTION: Silty Clay trace Sand

SAMPLING DATE: 2022-10-25

SAMPLE RECEIVED DATE: 2022-10-25

GRAIN SIZE PROPORTIONS, %

% GRAVEL (> 4.75 mm): 0.0

% SAND (75 µm to 4.75 mm): 5.2

% Silt (5 µm to 75 µm): 39.8

% Clay (<5 µm): 55.0

SUSCEPTIBILITY TO FROST HEAVING: Low

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53.0	100.0	0.037	84.9
37.5	100.0	0.026	79.2
26.5	100.0	0.017	73.7
19.0	100.0	0.010	65.4
13.2	100.0	0.007	60.1
9.5	100.0	0.005	55.0
4.75	100.0	0.003	47.4
2.36	99.8	0.001	30.9
1.18	99.3	ATTERBERG LIMITS, %	
0.60	99.0		
0.30	98.0		
0.15	97.8	Liquid Limit	
0.075	94.8	Plastic Index	

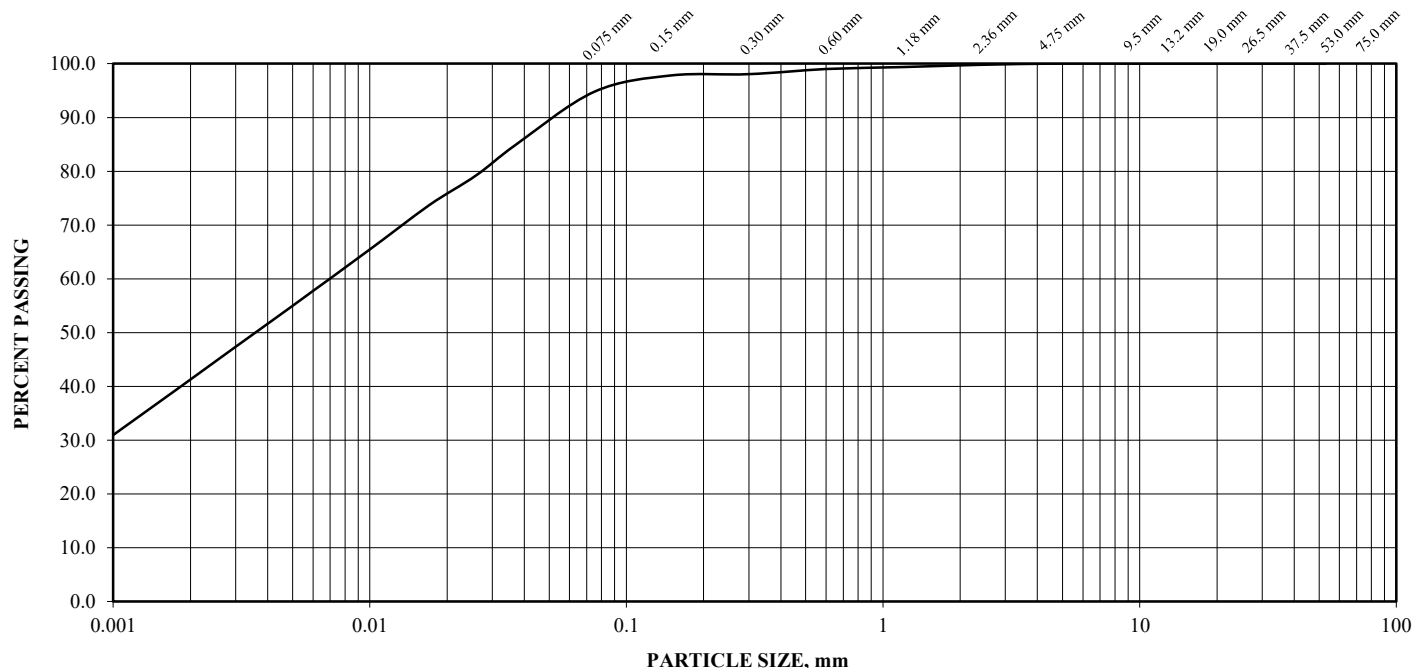
PARTICLE SIZE DISTRIBUTION, MTO LS-702

U.S. BUREAU OF SOILS CLASSIFICATION (AS USED IN MINISTRY OF TRANSPORTATION OF ONTARIO PAVEMENT DESIGNS)

CLAY	SILT	VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	GRAVEL
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UNIFIED SOILS CLASSIFICATION ASTM D 2487

FINES (SILT & CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL
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GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT

MTO LS-602, 702, AND 703/704

PROJECT: 02112515.000 CLIENT/JOB NAME: Gannett Fleming CONTRACT NUMBER: -

ROS ID: 104905 PROJECT/LOCATION: Geotechnical Investigation / Stevenson Road North. Oshawa

SAMPLING LOCATION: BH6_SS4
SAMPLING DEPTH, m: 2.3 - 2.9 m
SAMPLING METHOD: Split Spoon
SAMPLED BY: SA
SAMPLE DESCRIPTION: Sandy Silt trace Clay and Gravel
SAMPLING DATE: 2022-10-25
SAMPLE RECEIVED DATE: 2022-10-25

GRAIN SIZE PROPORTIONS, %
% GRAVEL (> 4.75 mm): 1.1
% SAND (75 µm to 4.75 mm): 45.5
% Silt (5 µm to 75 µm): 49.4
% Clay (<5 µm): 4.0
SUSCEPTIBILITY TO FROST HEAVING: Moderate

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53.0	100.0	0.037	17.1
37.5	100.0	0.026	12.3
26.5	100.0	0.017	9.5
19.0	100.0	0.010	6.5
13.2	100.0	0.007	5.0
9.5	100.0	0.005	4.0
4.75	98.9	0.003	2.7
2.36	98.5	0.001	1.0
1.18	98.5	ATTERBERG LIMITS, %	
0.60	98.5		
0.30	97.5		
0.15	88.2		
0.075	53.4	Plastic Limit	
		Liquid Limit	
		Plastic Index	

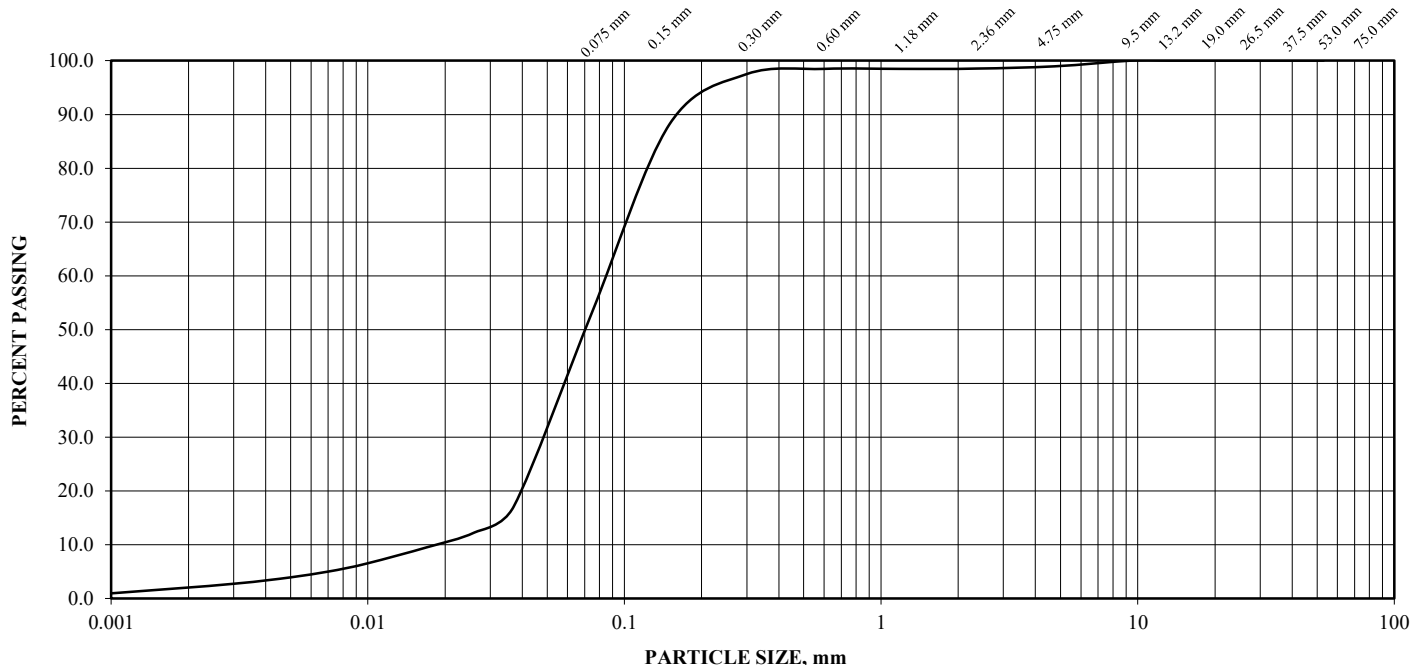
PARTICLE SIZE DISTRIBUTION, MTO LS-702

U.S. BUREAU OF SOILS CLASSIFICATION (AS USED IN MINISTRY OF TRANSPORTATION OF ONTARIO PAVEMENT DESIGNS)

CLAY	SILT	VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	GRAVEL
------	------	----------------	-----------	-------------	-------------	-------------	--------

UNIFIED SOILS CLASSIFICATION ASTM D 2487

FINES (SILT & CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL
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GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT MTO LS-602, 702, AND 703/704

PROJECT: 02112515.000 CLIENT/JOB NAME: Gannett Fleming CONTRACT NUMBER: -

ROS ID: 104905 PROJECT/LOCATION: Geotechnical Investigation / Stevenson Road North. Oshawa

SAMPLING LOCATION: BH9_SS5
SAMPLING DEPTH, m: 3.1 - 3.7 m
SAMPLING METHOD: Split Spoon
SAMPLED BY: SA
SAMPLE DESCRIPTION: Sandy Silt with Clay trace Gravel
SAMPLING DATE: 2022-10-25
SAMPLE RECEIVED DATE: 2022-10-25

GRAIN SIZE PROPORTIONS, %
% GRAVEL (> 4.75 mm): 7.5
% SAND (75 µm to 4.75 mm): 35.5
% Silt (5 µm to 75 µm): 44.2
% Clay (<5 µm): 12.8
SUSCEPTIBILITY TO FROST HEAVING: Moderate

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53.0	100.0	0.037	29.0
37.5	100.0	0.026	25.0
26.5	100.0	0.017	21.9
19.0	96.5	0.010	17.8
13.2	94.8	0.007	15.3
9.5	94.0	0.005	12.8
4.75	92.5	0.003	9.4
2.36	90.4	0.001	6.0
1.18	88.7	ATTERBERG LIMITS, %	
0.60	86.9		
0.30	83.8		
0.15	75.2	Plastic Limit	
0.075	57.0	Liquid Limit	
		Plastic Index	

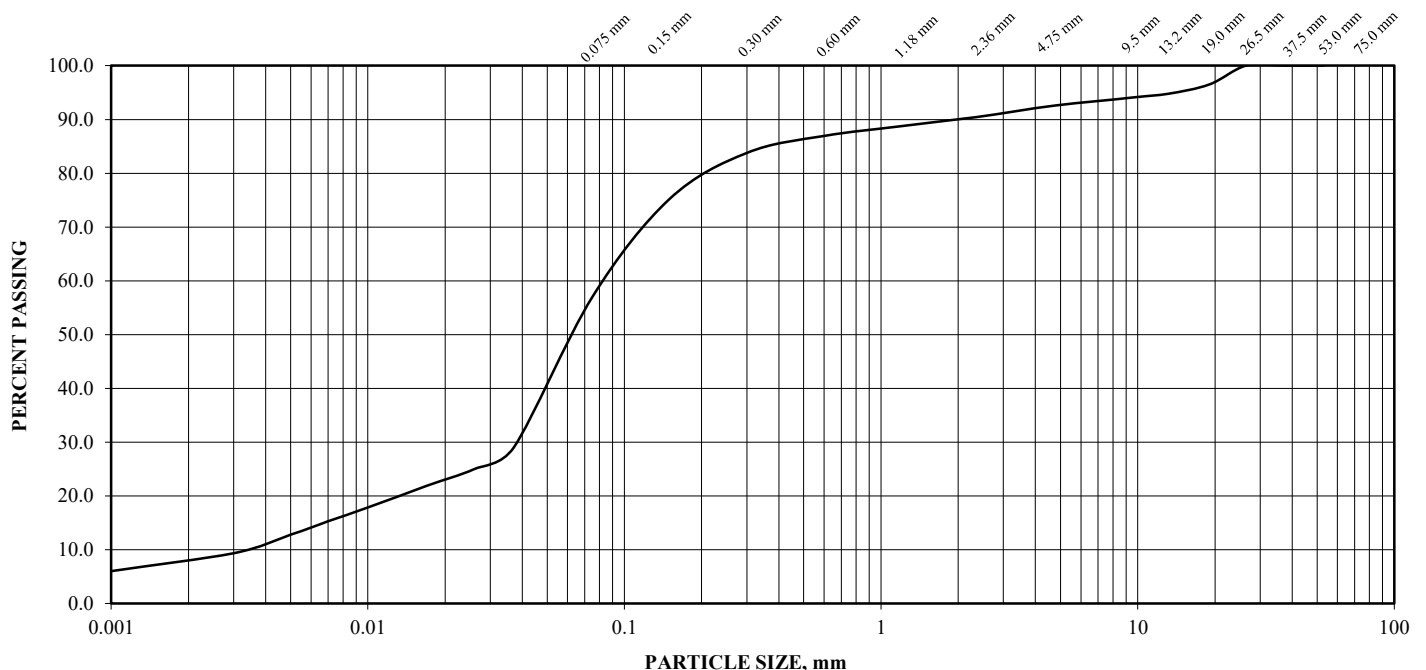
PARTICLE SIZE DISTRIBUTION, MTO LS-702

U.S. BUREAU OF SOILS CLASSIFICATION (AS USED IN MINISTRY OF TRANSPORTATION OF ONTARIO PAVEMENT DESIGNS)

CLAY	SILT	VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	GRAVEL
------	------	----------------	-----------	-------------	-------------	-------------	--------

UNIFIED SOILS CLASSIFICATION ASTM D 2487

FINES (SILT & CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL
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GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT

MTO LS-602, 702, AND 703/704

PROJECT: 02112515.000 CLIENT/JOB NAME: Gannett Fleming CONTRACT NUMBER: -

ROS ID: 104905 PROJECT/LOCATION: Geotechnical Investigation / Stevenson Road North. Oshawa

SAMPLING LOCATION: BH12_SS3

SAMPLING DEPTH, m: 1.5 - 2.1 m

SAMPLING METHOD: Split Spoon

SAMPLED BY: SA

SAMPLE DESCRIPTION: Sandy Silt with Clay

SAMPLING DATE: 2022-10-25

SAMPLE RECEIVED DATE: 2022-10-25

GRAIN SIZE PROPORTIONS, %

% GRAVEL (> 4.75 mm): 0.4

% SAND (75 µm to 4.75 mm): 30.4

% Silt (5 µm to 75 µm): 49.3

% Clay (<5 µm): 19.9

SUSCEPTIBILITY TO FROST HEAVING: Moderate

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53.0	100.0	0.037	42.2
37.5	100.0	0.026	36.5
26.5	100.0	0.017	31.3
19.0	100.0	0.010	25.6
13.2	100.0	0.007	22.6
9.5	100.0	0.005	19.9
4.75	99.6	0.003	16.2
2.36	98.9	0.001	10.4
1.18	98.8	ATTERBERG LIMITS, %	
0.60	98.2		
0.30	95.3		
0.15	85.5	Liquid Limit	
0.075	69.2	Plastic Index	

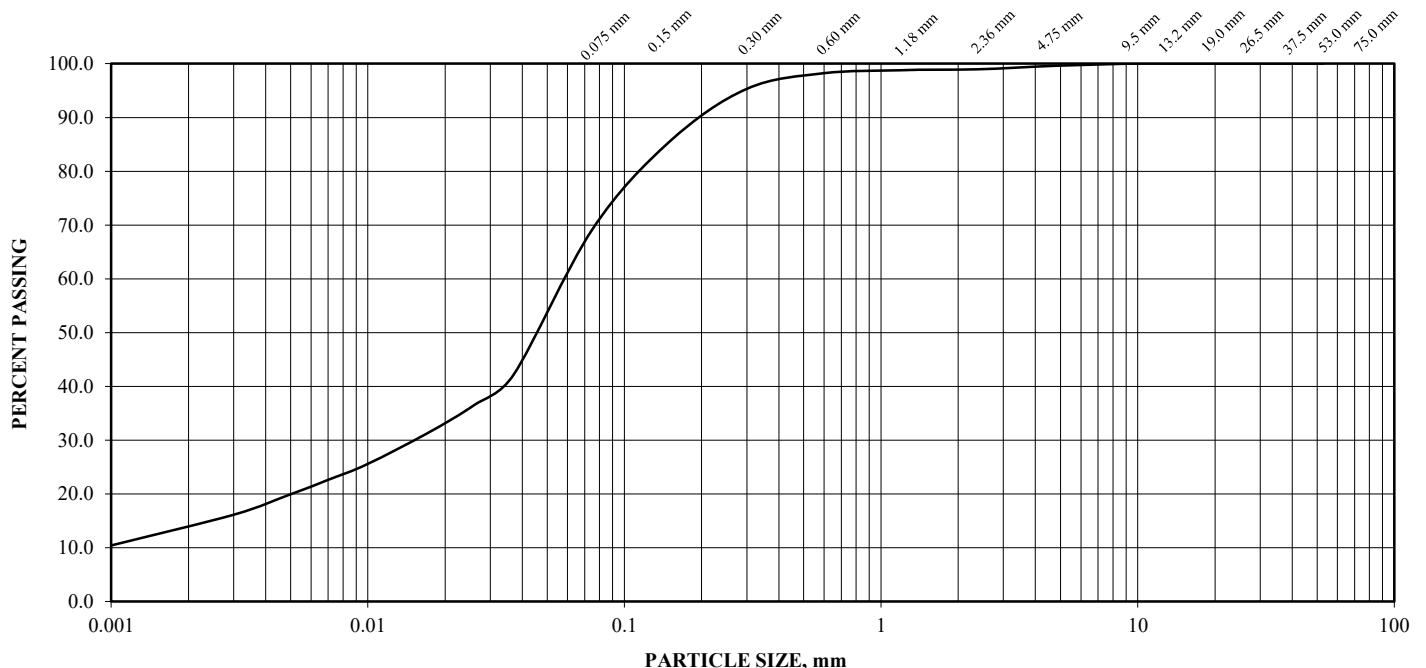
PARTICLE SIZE DISTRIBUTION, MTO LS-702

U.S. BUREAU OF SOILS CLASSIFICATION (AS USED IN MINISTRY OF TRANSPORTATION OF ONTARIO PAVEMENT DESIGNS)

CLAY	SILT	VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	GRAVEL
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UNIFIED SOILS CLASSIFICATION ASTM D 2487

FINES (SILT & CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL
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GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT

MTO LS-602, 702, AND 703/704

PROJECT: 02112515.000 CLIENT/JOB NAME: Gannett Fleming CONTRACT NUMBER: -
ROS ID: 104905 PROJECT/LOCATION: Geotechnical Investigation / Stevenson Road North. Oshawa

SAMPLING LOCATION: BH15_SS2
SAMPLING DEPTH, m: 0.87 - 1.4 m
SAMPLING METHOD: Split Spoon
SAMPLED BY: SA
SAMPLE DESCRIPTION: Gravelly Sandy trace Silt and Clay
SAMPLING DATE: 2022-10-25
SAMPLE RECEIVED DATE: 2022-10-25

GRAIN SIZE PROPORTIONS, %
% GRAVEL (> 4.75 mm): 33.9
% SAND (75 µm to 4.75 mm): 56.9
% Silt (5 µm to 75 µm): 7.4
% Clay (<5 µm): 1.8
SUSCEPTIBILITY TO FROST HEAVING: Low

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53.0	100.0	0.037	4.6
37.5	100.0	0.026	4.1
26.5	100.0	0.017	3.7
19.0	100.0	0.010	2.7
13.2	88.6	0.007	2.1
9.5	80.4	0.005	1.8
4.75	66.1	0.003	1.4
2.36	55.3	0.001	0.5
1.18	49.2	ATTERBERG LIMITS, %	
0.60	42.6		
0.30	30.0		
0.15	16.3		
0.075	9.2	Plastic Limit	
		Liquid Limit	
		Plastic Index	

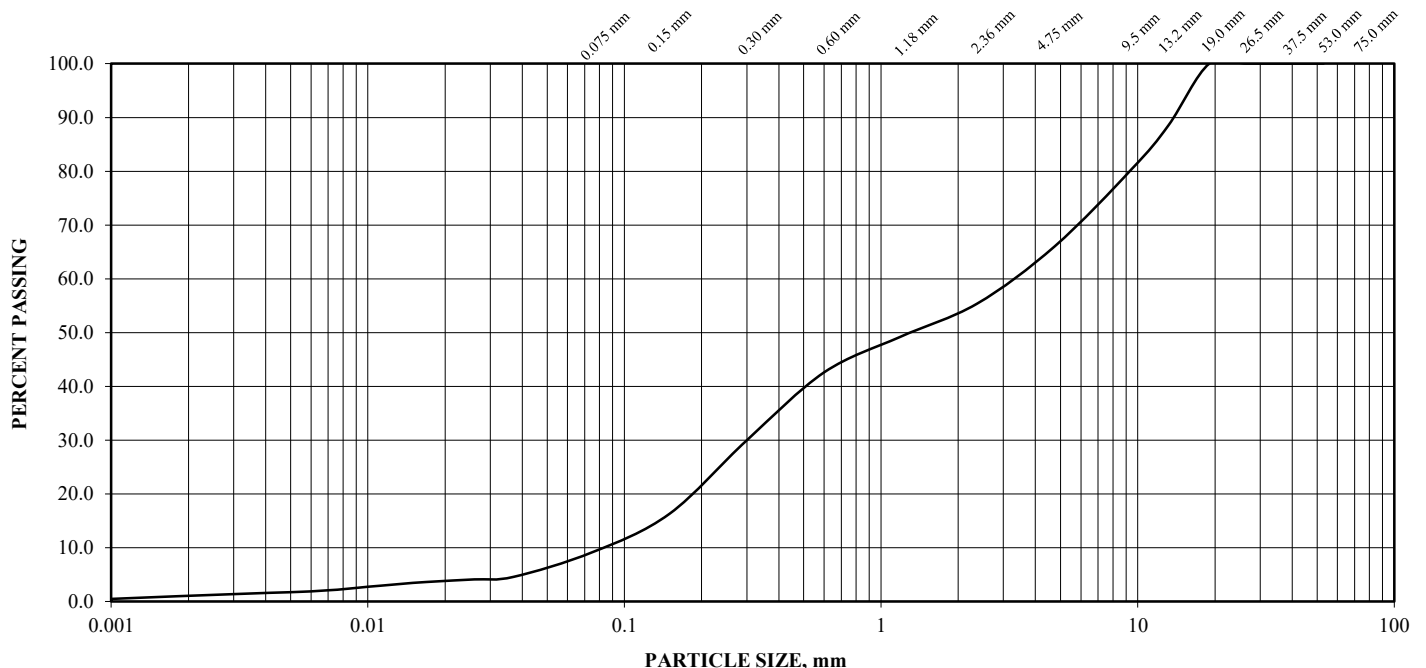
PARTICLE SIZE DISTRIBUTION, MTO LS-702

U.S. BUREAU OF SOILS CLASSIFICATION (AS USED IN MINISTRY OF TRANSPORTATION OF ONTARIO PAVEMENT DESIGNS)

CLAY	SILT	VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	GRAVEL
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UNIFIED SOILS CLASSIFICATION ASTM D 2487

FINES (SILT & CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL
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GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT

MTO LS-602, 702, AND 703/704

PROJECT: 02112515.000 CLIENT/JOB NAME: Gannett Fleming CONTRACT NUMBER: -

ROS ID: 104905 PROJECT/LOCATION: Geotechnical Investigation / Stevenson Road North. Oshawa

SAMPLING LOCATION: BH17_SS5

SAMPLING DEPTH, m: 3.1 - 3.7 m

SAMPLING METHOD: Split Spoon

SAMPLED BY: SA

SAMPLE DESCRIPTION: Silty Clay trace Sand

SAMPLING DATE: 2022-10-25

SAMPLE RECEIVED DATE: 2022-10-25

GRAIN SIZE PROPORTIONS, %

% GRAVEL (> 4.75 mm): 0.2

% SAND (75 µm to 4.75 mm): 1.4

% Silt (5 µm to 75 µm): 27.0

% Clay (<5 µm): 71.4

SUSCEPTIBILITY TO FROST HEAVING: Low

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53.0	100.0	0.037	96.7
37.5	100.0	0.026	94.2
26.5	100.0	0.017	89.9
19.0	100.0	0.010	82.6
13.2	100.0	0.007	77.3
9.5	100.0	0.005	71.4
4.75	99.8	0.003	62.0
2.36	99.6	0.001	40.9
1.18	99.1	ATTERBERG LIMITS, %	
0.60	98.9		
0.30	98.8		
0.15	98.6		
0.075	98.4	Plastic Limit	
		Liquid Limit	
		Plastic Index	

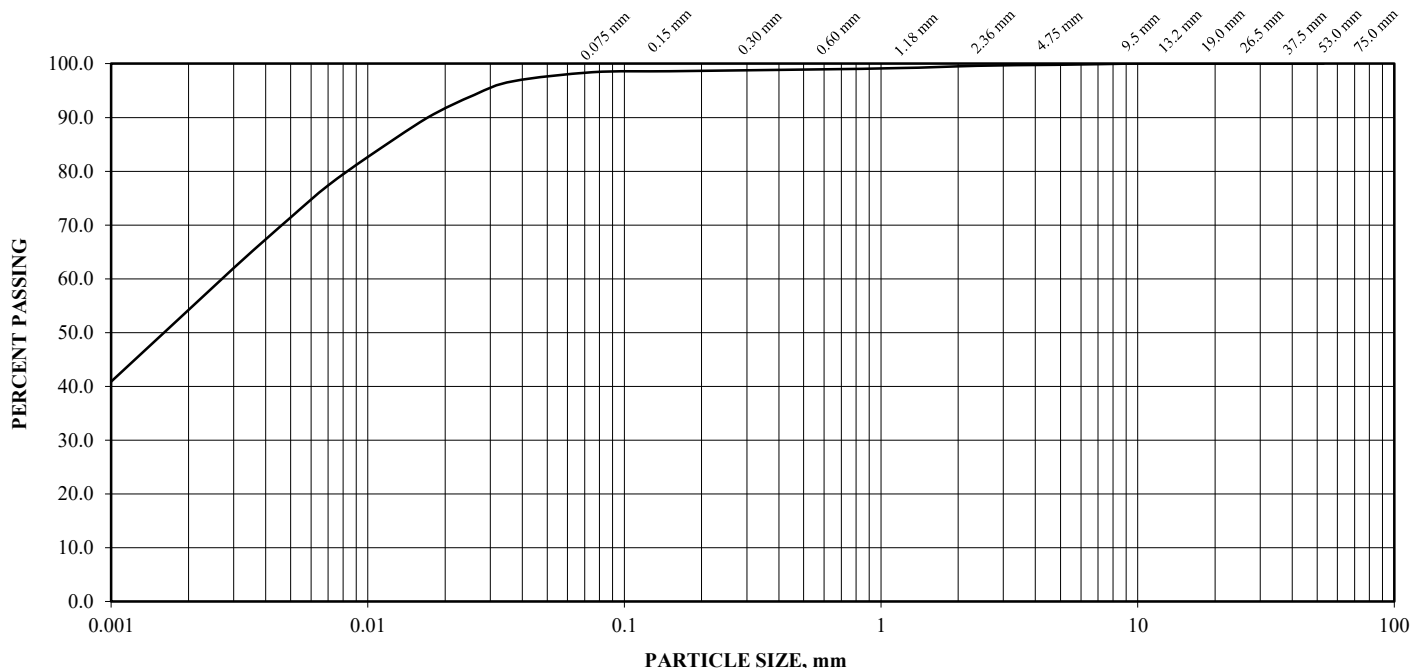
PARTICLE SIZE DISTRIBUTION, MTO LS-702

U.S. BUREAU OF SOILS CLASSIFICATION (AS USED IN MINISTRY OF TRANSPORTATION OF ONTARIO PAVEMENT DESIGNS)

CLAY	SILT	VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	GRAVEL
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UNIFIED SOILS CLASSIFICATION ASTM D 2487

FINES (SILT & CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL
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GRAIN SIZE ANALYSIS AND HYDROMETER TEST REPORT MTO LS-602, 702, AND 703/704

PROJECT: 02112515.000 CLIENT/JOB NAME: Gannett Fleming CONTRACT NUMBER: -

ROS ID: 104905 PROJECT/LOCATION: Geotechnical Investigation / Stevenson Road North. Oshawa

SAMPLING LOCATION: BH19_SS4
SAMPLING DEPTH, m: 2.3 - 2.9 m
SAMPLING METHOD: Split Spoon
SAMPLED BY: SA
SAMPLE DESCRIPTION: Sandy Silty Clay trace Gravel
SAMPLING DATE: 2022-10-25
SAMPLE RECEIVED DATE: 2022-10-25

GRAIN SIZE PROPORTIONS, %
% GRAVEL (> 4.75 mm): 1.3
% SAND (75 µm to 4.75 mm): 22.4
% Silt (5 µm to 75 µm): 47.3
% Clay (<5 µm): 29.0
SUSCEPTIBILITY TO FROST HEAVING: Moderate

GRAIN SIZE ANALYSIS		HYDROMETER ANALYSIS	
SIEVE SIZE mm	% PASSING	DIAMETER mm	% PASSING
53.0	100.0	0.037	54.5
37.5	100.0	0.026	48.9
26.5	100.0	0.017	43.5
19.0	100.0	0.010	36.6
13.2	100.0	0.007	32.8
9.5	100.0	0.005	29.0
4.75	98.7	0.003	24.4
2.36	96.5	0.001	14.9
1.18	95.2	ATTERBERG LIMITS, %	
0.60	93.4		
0.30	89.6		
0.15	84.7		
0.075	76.3	Plastic Limit	
		Liquid Limit	
		Plastic Index	

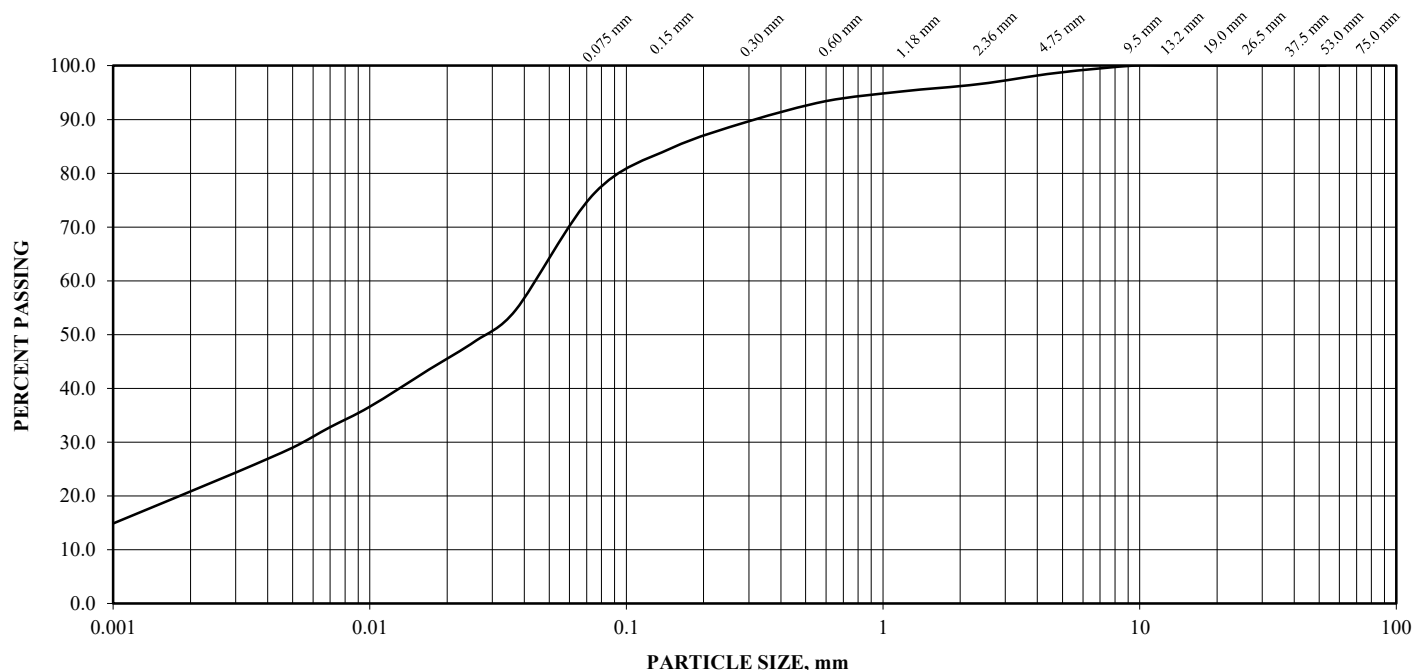
PARTICLE SIZE DISTRIBUTION, MTO LS-702

U.S. BUREAU OF SOILS CLASSIFICATION (AS USED IN MINISTRY OF TRANSPORTATION OF ONTARIO PAVEMENT DESIGNS)

CLAY	SILT	VERY FINE SAND	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	GRAVEL
------	------	----------------	-----------	-------------	-------------	-------------	--------

UNIFIED SOILS CLASSIFICATION ASTM D 2487

FINES (SILT & CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL
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Appendix D

Environmental Testing Results



eNGLOBE

Client: EnGlobe Corp. (Toronto)
1821 Albion Road, Unit 7
Toronto, ON
M9W 5W8
Attention: Mr. Houshang Akbari
Invoice to: EnGlobe Corp.
PO#:

Report Number: 1988970
Date Submitted: 2022-10-27
Date Reported: 2022-11-03
Project: 02112515.000 -
Stevenson Rd. Oshawa
COC #: 902239
Temperature (C): 7
Custody Seal:

Page 1 of 16

Dear Houshang Akbari:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Sample Comment Summary

Sample ID: 1659284 BH5-SS3 The result for F4 (C34-C50) gravimetric must be substituted if it is greater than the result for F4 (C34-C50). Sample was cleaned with silica gel.

Report Comments:

Emma-Dawn Ferguson, Chemist

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise stated

Eurofins Environment Testing Canada Inc. is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at <https://directory.cala.ca/>

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline or regulatory limits listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official guideline or regulation as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Client: EnGlobe Corp. (Toronto)
1821 Albion Road, Unit 7
Toronto, ON
M9W 5W8
Attention: Mr. Houshang Akbari
PO#:
Invoice to: EnGlobe Corp.

Report Number: 1988970
Date Submitted: 2022-10-27
Date Reported: 2022-11-03
Project: 02112515.000 -
Stevenson Rd. Oshawa
COC #: 902239

O.Reg 153-T1-All Other Soils

Exceedence Summary

Sample I.D.	Analyte	Result	Units	Criteria
Inorganics				
BH15-SS2	Electrical Conductivity	0.75	mS/cm	STD 0.57
BH15-SS2	Sodium Adsorption Ratio	18.2		STD 2.4
BH5-SS3	Electrical Conductivity	1.39	mS/cm	STD 0.57
BH5-SS3	Sodium Adsorption Ratio	36.4		STD 2.4

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Client: EnGlobe Corp. (Toronto)
1821 Albion Road, Unit 7
Toronto, ON
M9W 5W8
Attention: Mr. Houshang Akbari
PO#:
Invoice to: EnGlobe Corp.

Report Number: 1988970
Date Submitted: 2022-10-27
Date Reported: 2022-11-03
Project: 02112515.000 -
Stevenson Rd. Oshawa
COC #: 902239

Guideline = O.Reg 153-T1-All Other Soils - Res/Par/Ins/Ind/Com/Prop

Hydrocarbons

Lab I.D.
Sample Matrix
Sample Type
Sample Date
Sampling Time
Sample I.D.

1659284
Soil153
2022-10-25
BH5-SS3

1659285
Soil153
2022-10-26
BH15-SS2

Analyte Batch No MRL Units Guideline

PHC's F1	432304	10	ug/g	STD 25	<10	<10
PHC's F1-BTEX	432316	10	ug/g		<10	<10
PHC's F2	432383	2	ug/g	STD 10	<2	2
PHC's F2-Naph	432425	2	ug/g		<2	2
PHC's F3	432383	20	ug/g	STD 240	30	<20
PHC's F3-PAH	432426	20	ug/g		30	<20
PHC's F4	432383	20	ug/g	STD 120	120	<20
PHC's F4g	432383	100	ug/g	STD 120	<100	

Metals

Lab I.D.
Sample Matrix
Sample Type
Sample Date
Sampling Time
Sample I.D.

1659284
Soil153
2022-10-25
BH5-SS3

1659285
Soil153
2022-10-26
BH15-SS2

Analyte Batch No MRL Units Guideline

Antimony	432434	1	ug/g	STD 1.3	<1	<1
Arsenic	432434	1	ug/g	STD 18	3	3
Barium	432434	1	ug/g	STD 220	21	26
Beryllium	432434	1	ug/g	STD 2.5	<1	<1
Boron (Hot Water Soluble)	432515	0.5	ug/g		<0.5	<0.5
Boron (total)	432434	5	ug/g	STD 36	<5	<5
Cadmium	432434	0.4	ug/g	STD 1.2	<0.4	<0.4
Chromium Total	432434	1	ug/g	STD 70	19	20
Chromium VI	432482	0.20	ug/g	STD 0.66	0.20	<0.20
Cobalt	432434	1	ug/g	STD 21	3	4
Copper	432434	1	ug/g	STD 92	5	7

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational
Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim
Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial
Water Quality Guideline, IPWQO = Interim Provincial Water Quality
Objective, TDR = Typical Desired Range

Client: EnGlobe Corp. (Toronto)
1821 Albion Road, Unit 7
Toronto, ON
M9W 5W8
Attention: Mr. Houshang Akbari
PO#:
Invoice to: EnGlobe Corp.

Report Number: 1988970
Date Submitted: 2022-10-27
Date Reported: 2022-11-03
Project: 02112515.000 -
Stevenson Rd. Oshawa
COC #: 902239

Guideline = O.Reg 153-T1-All Other Soils - Res/Par/Ins/Ind/Com/Prop

Metals

					Lab I.D. Sample Matrix Sample Type Sample Date Sampling Time Sample I.D.	1659284 Soil153	1659285 Soil153
Analyte	Batch No	MRL	Units	Guideline		2022-10-25 BH5-SS3	2022-10-26 BH15-SS2
Lead	432434	1	ug/g	STD 120		6	6
Mercury	432434	0.1	ug/g	STD 0.27		<0.1	<0.1
Molybdenum	432434	1	ug/g	STD 2		<1	<1
Nickel	432434	1	ug/g	STD 82		7	10
Selenium	432434	0.5	ug/g	STD 1.5		0.5	0.6
Silver	432434	0.2	ug/g	STD 0.5		<0.2	<0.2
Thallium	432434	1	ug/g	STD 1		<1	<1
Uranium	432434	0.5	ug/g	STD 2.5		0.5	<0.5
Vanadium	432434	2	ug/g	STD 86		31	26
Zinc	432434	2	ug/g	STD 290		23	32

PAH

					Lab I.D. Sample Matrix Sample Type Sample Date Sampling Time Sample I.D.	1659284 Soil153	1659285 Soil153
Analyte	Batch No	MRL	Units	Guideline		2022-10-25 BH5-SS3	2022-10-26 BH15-SS2
1+2-methylnaphthalene	432357	0.05	ug/g			<0.05	<0.05
Acenaphthene	432026	0.05	ug/g	STD 0.072		<0.05	<0.05
Acenaphthylene	432026	0.05	ug/g	STD 0.093		<0.05	<0.05
Anthracene	432026	0.05	ug/g	STD 0.16		<0.05	<0.05
Benz[a]anthracene	432026	0.05	ug/g	STD 0.36		<0.05	<0.05
Benzo[a]pyrene	432026	0.05	ug/g	STD 0.3		<0.05	<0.05
Benzo[b]fluoranthene	432026	0.05	ug/g	STD 0.47		<0.05	<0.05
Benzo[ghi]perylene	432026	0.05	ug/g	STD 0.68		<0.05	<0.05
Benzo[k]fluoranthene	432026	0.05	ug/g	STD 0.48		<0.05	<0.05

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Client: EnGlobe Corp. (Toronto)
1821 Albion Road, Unit 7
Toronto, ON
M9W 5W8
Attention: Mr. Houshang Akbari
PO#:
Invoice to: EnGlobe Corp.

Report Number: 1988970
Date Submitted: 2022-10-27
Date Reported: 2022-11-03
Project: 02112515.000 -
Stevenson Rd. Oshawa
COC #: 902239

Guideline = O.Reg 153-T1-All Other Soils - Res/Par/Ins/Ind/Com/Prop

PAH

Lab I.D.
Sample Matrix
Sample Type
Sample Date
Sampling Time
Sample I.D.

1659284
Soil153
2022-10-25
BH5-SS3

1659285
Soil153
2022-10-26
BH15-SS2

Analyte Batch No MRL Units Guideline

Chrysene	432026	0.05	ug/g	STD 2.8	<0.05	<0.05
Dibenz[a h]anthracene	432026	0.05	ug/g	STD 0.1	<0.05	<0.05
Fluoranthene	432026	0.05	ug/g	STD 0.56	<0.05	<0.05
Fluorene	432026	0.05	ug/g	STD 0.12	<0.05	<0.05
Indeno[1 2 3-cd]pyrene	432026	0.05	ug/g	STD 0.23	<0.05	<0.05
Methlynaphthalene, 1-	432026	0.05	ug/g	STD 0.59	<0.05	<0.05
Methlynaphthalene, 2-	432026	0.05	ug/g	STD 0.59	<0.05	<0.05
Naphthalene	432026	0.013	ug/g	STD 0.09	<0.013	<0.013
Phenanthrene	432026	0.05	ug/g	STD 0.69	<0.05	<0.05
Pyrene	432026	0.05	ug/g	STD 1	<0.05	<0.05

Volatiles

Lab I.D.
Sample Matrix
Sample Type
Sample Date
Sampling Time
Sample I.D.

1659284
Soil153
2022-10-25
BH5-SS3

1659285
Soil153
2022-10-26
BH15-SS2

Analyte Batch No MRL Units Guideline

Acetone	432304	0.50	ug/g	STD 0.5	<0.50	<0.50
Benzene	432304	0.0068	ug/g	STD 0.02	<0.0068	<0.0068
Bromodichloromethane	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Bromoform	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Bromomethane	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Carbon Tetrachloride	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Chlorobenzene	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Chloroform	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dibromochloromethane	432304	0.05	ug/g	STD 0.05	<0.05	<0.05

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Volatiles

Lab I.D.
Sample Matrix
Sample Type
Sample Date
Sampling Time
Sample I.D.

1659284
Soil153
2022-10-25
BH5-SS3

1659285
Soil153
2022-10-26
BH15-SS2

Analyte	Batch No	MRL	Units	Guideline		
Dichlorobenzene, 1,2-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dichlorobenzene, 1,3-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dichlorobenzene, 1,4-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dichlorodifluoromethane	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dichloroethane, 1,1-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dichloroethane, 1,2-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dichloroethylene, 1,1-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dichloroethylene, 1,2-cis-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dichloroethylene, 1,2-trans-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dichloropropane, 1,2-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dichloropropene, 1,3-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Dichloropropene, 1,3-cis-	432304	0.05	ug/g		<0.05	<0.05
Dichloropropene, 1,3-trans-	432304	0.05	ug/g		<0.05	<0.05
Ethylbenzene	432304	0.018	ug/g	STD 0.05	<0.018	<0.018
Ethylene dibromide	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Hexane (n)	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Methyl Ethyl Ketone	432304	0.50	ug/g	STD 0.5	<0.50	<0.50
Methyl Isobutyl Ketone	432304	0.50	ug/g	STD 0.5	<0.50	<0.50
Methyl tert-Butyl Ether (MTBE)	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Methylene Chloride	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Styrene	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Tetrachloroethane, 1,1,1,2-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Tetrachloroethane, 1,1,2,2-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05

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Volatiles

Lab I.D.
Sample Matrix
Sample Type
Sample Date
Sampling Time
Sample I.D.

1659284
Soil153
2022-10-25
BH5-SS3

1659285
Soil153
2022-10-26
BH15-SS2

Analyte Batch No MRL Units Guideline

Tetrachloroethylene	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Toluene	432304	0.08	ug/g	STD 0.2	<0.08	<0.08
Trichloroethane, 1,1,1-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Trichloroethane, 1,1,2-	432304	0.05	ug/g	STD 0.05	<0.05	<0.05
Trichloroethylene	432304	0.01	ug/g	STD 0.05	<0.01	<0.01
Trichlorofluoromethane	432304	0.05	ug/g	STD 0.25	<0.05	<0.05
Vinyl Chloride	432304	0.02	ug/g	STD 0.02	<0.02	<0.02
Xylene Mixture	432310	0.05	ug/g	STD 0.05	<0.05	<0.05
Xylene, m/p-	432304	0.05	ug/g		<0.05	<0.05
Xylene, o-	432304	0.05	ug/g		<0.05	<0.05

Inorganics

Lab I.D.
Sample Matrix
Sample Type
Sample Date
Sampling Time
Sample I.D.

1659284
Soil153
2022-10-25
BH5-SS3

1659285
Soil153
2022-10-26
BH15-SS2

Analyte Batch No MRL Units Guideline

Cyanide (CN-)	432341	0.005	ug/g	STD 0.051	<0.005	<0.005
Electrical Conductivity	432477	0.05	mS/cm	STD 0.57	1.39*	0.75*
pH - CaCl2	432484	2.00			7.83	7.54
Sodium Adsorption Ratio	432507	0.01		STD 2.4	36.4*	18.2*

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Guideline = O.Reg 153-T1-All Other Soils - Res/Par/Ins/Ind/Com/Prop

Moisture

Lab I.D.	1659284	1659285
Sample Matrix	Soil153	Soil153
Sample Type		
Sample Date	2022-10-25	2022-10-26
Sampling Time		
Sample I.D.	BH5-SS3	BH15-SS2

Analyte	Batch No	MRL	Units	Guideline
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Moisture-Humidite	432383	0.1	%		5.1	7.0
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PHC Surrogate

Lab I.D.	1659284	1659285
Sample Matrix	Soil153	Soil153
Sample Type		
Sample Date	2022-10-25	2022-10-26
Sampling Time		
Sample I.D.	BH5-SS3	BH15-SS2

Analyte	Batch No	MRL	Units	Guideline
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Alpha-androstrane	432383	0	%		74	76
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VOCs Surrogates

Lab I.D.	1659284	1659285
Sample Matrix	Soil153	Soil153
Sample Type		
Sample Date	2022-10-25	2022-10-26
Sampling Time		
Sample I.D.	BH5-SS3	BH15-SS2

Analyte	Batch No	MRL	Units	Guideline
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1,2-dichloroethane-d4	432304	0	%		80	76
4-bromofluorobenzene	432304	0	%		98	87
Toluene-d8	432304	0	%		84	80

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Stevenson Rd. Oshawa
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Quality Assurance Summary

Batch No	Analyte	Blank	QC % Rec	QC Limits	Spike % Rec	Spike Limits	Dup % RPD	Duplicate Limits
432026	Methlynaphthalene, 1-	<0.05 ug/g	62	50-140	129	50-140	0	0-40
432026	Methlynaphthalene, 2-	<0.05 ug/g	57	50-140	120	50-140	0	0-40
432026	Acenaphthene	<0.05 ug/g	59	50-140	95	50-140	0	0-40
432026	Acenaphthylene	0.05 ug/g	56	50-140	88	50-140	0	0-40
432026	Anthracene	<0.05 ug/g	62	50-140	99	50-140	0	0-40
432026	Benz[a]anthracene	<0.05 ug/g	69	50-140	99	50-140	0	0-40
432026	Benzo[a]pyrene	<0.05 ug/g	63	50-140	91	50-140	0	0-40
432026	Benzo[b]fluoranthene	<0.05 ug/g	68	50-140	90	50-140	0	0-40
432026	Benzo[ghi]perylene	<0.05 ug/g	68	50-140	82	50-140	0	0-40
432026	Benzo[k]fluoranthene	<0.05 ug/g	73	50-140	93		0	0-40
432026	Chrysene	<0.05 ug/g	72	50-140	102	50-140	0	0-40
432026	Dibenz[a h]anthracene	<0.05 ug/g	74	50-140	83	50-140	0	0-40
432026	Fluoranthene	<0.05 ug/g	69	50-140	110	50-140	0	0-40
432026	Fluorene	<0.05 ug/g	58	50-140	88	50-140	0	0-40
432026	Indeno[1 2 3-cd]pyrene	<0.05 ug/g	68	50-140	81	50-140	0	0-40
432026	Naphthalene	<0.013 ug/g	60	50-140	97	50-140	0	0-40
432026	Phenanthrene	<0.05 ug/g	62	50-140	98	50-140	0	0-40
432026	Pyrene	<0.05 ug/g	69	50-140	113	50-140	0	0-40
432304	Tetrachloroethane, 1,1,1,2-	<0.05 ug/g	98	60-130	94	50-140	0	0-50
432304	Trichloroethane, 1,1,1-	<0.05 ug/g	91	60-130	98	50-140	0	0-50
432304	Tetrachloroethane, 1,1,2,2-	<0.05 ug/g	99	60-130	97	50-140	0	0-30
432304	Trichloroethane, 1,1,2-	<0.05 ug/g	97	60-130	96	50-140	0	0-50
432304	Dichloroethane, 1,1-	<0.05 ug/g	92	60-130	95	50-140	0	0-50
432304	Dichloroethylene, 1,1-	<0.05 ug/g	81	60-130	109	50-140	0	0-50
432304	Dichlorobenzene, 1,2-	<0.05 ug/g	94	60-130	99	50-140	0	0-50
432304	Dichloroethane, 1,2-	<0.05 ug/g	92	60-130	105	50-140	0	0-50
432304	Dichloropropane, 1,2-	<0.05 ug/g	92	60-130	97	50-140	0	0-50
432304	Dichlorobenzene, 1,3-	<0.05 ug/g	91	60-130	90	50-140	0	0-50
432304	Dichloropropene, 1,3-	<0.05 ug/g						
432304	Dichlorobenzene, 1,4-	<0.05 ug/g	91	60-130	90	50-140	0	0-50
432304	Acetone	<0.50 ug/g	94	60-130	105	50-140	0	0-50
432304	Benzene	<0.0068 ug/g	94	60-130	81	50-140	0	0-50

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Quality Assurance Summary

Batch No	Analyte	Blank	QC % Rec	QC Limits	Spike % Rec	Spike Limits	Dup % RPD	Duplicate Limits
432304	Bromodichloromethane	<0.05 ug/g	92	60-130	84	50-140	0	0-50
432304	Bromoform	<0.05 ug/g	94	60-130	100	50-140	0	0-50
432304	Bromomethane	<0.05 ug/g	81	60-130	97	50-140	0	0-50
432304	Dichloroethylene, 1,2-cis-	<0.05 ug/g	90	60-130	103	50-140	0	0-50
432304	Dichloropropene, 1,3-cis-	<0.05 ug/g	82	60-130	99	50-140	0	0-50
432304	Carbon Tetrachloride	<0.05 ug/g	93	60-130	84	50-140	0	0-50
432304	Chloroform	<0.05 ug/g	93	60-130	84	50-140	0	0-50
432304	Dibromochloromethane	<0.05 ug/g	93	60-130	93	50-140	0	0-50
432304	Dichlorodifluoromethane	<0.05 ug/g	92	60-130	95	50-140	0	0-50
432304	Methylene Chloride	<0.05 ug/g	97	60-130	100	50-140	0	0-50
432304	Ethylbenzene	<0.018 ug/g	90	60-130	100	50-140	0	0-50
432304	Ethylene dibromide	<0.05 ug/g	99	60-130	95	50-140	0	0-50
432304	PHC's F1	<10 ug/g	103	80-120	98	60-140	0	0-30
432304	Hexane (n)	<0.05 ug/g	104	60-130	97	50-140	0	0-50
432304	Xylene, m/p-	<0.05 ug/g	97	60-130	109	50-140	0	0-50
432304	Methyl Ethyl Ketone	<0.50 ug/g	106	60-130	110	50-140	0	0-50
432304	Methyl Isobutyl Ketone	<0.50 ug/g	86	60-130	91	50-140	0	0-50
432304	Methyl tert-Butyl Ether (MTBE)	<0.05 ug/g	94	60-130	96	50-140	0	0-50
432304	Chlorobenzene	<0.05 ug/g	93	60-130	94	50-140	0	0-50
432304	Xylene, o-	<0.05 ug/g	92	60-130	93	50-140	0	0-50
432304	Styrene	<0.05 ug/g	89	60-130	96	50-140	0	0-50
432304	Dichloroethylene, 1,2-trans-	<0.05 ug/g	93	60-130	100	50-140	0	0-50
432304	Dichloropropene, 1,3-trans-	<0.05 ug/g	86	60-130	99	50-140	0	0-50
432304	Tetrachloroethylene	<0.05 ug/g	90	60-130	98	50-140	0	0-50
432304	Toluene	<0.08 ug/g	89	60-130	99	50-140	0	0-50
432304	Trichloroethylene	<0.01 ug/g	89	60-130	85	50-140	0	0-50
432304	Trichlorofluoromethane	<0.05 ug/g	90	60-130	100	50-140	0	0-50
432304	Vinyl Chloride	<0.02 ug/g	99	60-130	99	50-140	0	0-50
432310	Xylene Mixture							
432316	PHC's F1-BTEX							
432341	Cyanide (CN-)	<0.005 ug/g	87	75-125	96	70-130	0	0-20
432357	1+2-methylnaphthalene							
432383	PHC's F2	<2 ug/g	87	80-120	108	60-140	0	0-30

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Quality Assurance Summary

Batch No	Analyte	Blank	QC % Rec	QC Limits	Spike % Rec	Spike Limits	Dup % RPD	Duplicate Limits
432383	PHC's F3	<20 ug/g	88	80-120	108	60-140	0	0-30
432383	PHC's F4	<20 ug/g	88	80-120	108	60-140	0	0-30
432383	PHC's F4g	<100 ug/g	88	80-120		60-140		0-30
432383	Moisture-Humidite	<0.1 %	100	80-120			122	
432425	PHC's F2-Napth							
432426	PHC's F3-PAH							
432434	Silver	<0.2 ug/g	113	70-130	101	70-130	0	0-20
432434	Arsenic	<1 ug/g	95	70-130	90	70-130	0	0-20
432434	Boron (total)	<5 ug/g	97	70-130	109	70-130	0	0-20
432434	Barium	<1 ug/g	104	70-130	51	70-130	6	0-20
432434	Beryllium	<1 ug/g	100	70-130	92	70-130	0	0-20
432434	Cadmium	<0.4 ug/g	108	70-130	102	70-130	0	0-20
432434	Cobalt	<1 ug/g	105	70-130	89	70-130	6	0-20
432434	Chromium Total	<1 ug/g	110	70-130	41	70-130	26	0-20
432434	Copper	<1 ug/g	113	70-130	74	70-130	9	0-20
432434	Mercury	<0.1 ug/g	100	70-130	82	70-130	0	0-20
432434	Molybdenum	<1 ug/g	101	70-130	96	70-130	0	0-20
432434	Nickel	<1 ug/g	108	70-130	77	70-130	9	0-20
432434	Lead	<1 ug/g	104	70-130	80	70-130	8	0-20
432434	Antimony	<1 ug/g	90	70-130	92	70-130	0	0-20
432434	Selenium	<0.5 ug/g	104	70-130	99	70-130	0	0-20
432434	Thallium	<1 ug/g	104	70-130	91	70-130	0	0-20
432434	Uranium	<0.5 ug/g	95	70-130	88	70-130	0	0-20
432434	Vanadium	<2 ug/g	106	70-130	69	70-130	13	0-20
432434	Zinc	<2 ug/g	105	70-130	48	70-130	8	0-20
432477	Electrical Conductivity	<0.05 mS/cm	100	90-110			0	0-10
432482	Chromium VI	<0.20 ug/g	93	70-130	86	70-130	0	0-35
432484	pH - CaCl2	7.22	98	90-110			0	
432507	Sodium Adsorption Ratio	<0.01					5	
432515	Boron (Hot Water Soluble)	<0.5 ug/g	100	70-130	104	75-125	0	0-30

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Attention: Mr. Houshang Akbari
PO#:
Invoice to: EnGlobe Corp.

Report Number: 1988970
Date Submitted: 2022-10-27
Date Reported: 2022-11-03
Project: 02112515.000 -
Stevenson Rd. Oshawa
COC #: 902239

Test Summary

Batch No	Analyte	Instrument	Preparation Date	Analysis Date	Analyst	Method
432026	Methylnaphthalene, 1-	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Methylnaphthalene, 2-	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Acenaphthene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Acenaphthylene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Anthracene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Benz[a]anthracene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Benzo[a]pyrene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Benzo[b]fluoranthene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Benzo[ghi]perylene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Benzo[k]fluoranthene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Chrysene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Dibenz[a,h]anthracene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Fluoranthene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Fluorene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Indeno[1,2,3-cd]pyrene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Naphthalene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Phenanthrene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432026	Pyrene	GC-MS	2022-10-31	2022-10-31	C_M	P 8270
432304	Tetrachloroethane, 1,1,1,2-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Trichloroethane, 1,1,1-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Tetrachloroethane, 1,1,2,2-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Trichloroethane, 1,1,2-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichloroethane, 1,1-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichloroethylene, 1,1-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichlorobenzene, 1,2-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichloroethane, 1,2-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichloropropane, 1,2-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichlorobenzene, 1,3-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichloropropene, 1,3-	GC-MS	2022-11-01	2022-11-01	PJ	V 8260B
432304	Dichlorobenzene, 1,4-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Acetone	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Benzene	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B

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Stevenson Rd. Oshawa
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Test Summary

Batch No	Analyte	Instrument	Preparation Date	Analysis Date	Analyst	Method
432304	Bromodichloromethane	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Bromoform	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Bromomethane	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichloroethylene, 1,2-cis-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichloropropene, 1,3-cis-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Carbon Tetrachloride	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Chloroform	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dibromochloromethane	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichlorodifluoromethane	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Methylene Chloride	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Ethylbenzene	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Ethylene dibromide	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	PHC's F1	GC/FID	2022-11-01	2022-11-01	PJ	CCME
432304	Hexane (n)	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Xylene, m/p-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Methyl Ethyl Ketone	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Methyl Isobutyl Ketone	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Methyl tert-Butyl Ether (MTBE)	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Chlorobenzene	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Xylene, o-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Styrene	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichloroethylene, 1,2-trans-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Dichloropropene, 1,3-trans-	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Tetrachloroethylene	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Toluene	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Trichloroethylene	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Trichlorofluoromethane	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432304	Vinyl Chloride	GC-MS	2022-10-26	2022-11-01	PJ	V 8260B
432310	Xylene Mixture	GC-MS	2022-11-01	2022-11-01	PJ	V 8260B
432316	PHC's F1-BTEX	GC/FID	2022-11-01	2022-11-01	PJ	CCME
432341	Cyanide (CN-)	Skalar CN Analyzer	2022-11-01	2022-11-01	Z_S	MOECC E3015
432357	1+2-methylnaphthalene	GC-MS	2022-11-02	2022-11-02	C_M	P 8270
432383	PHC's F2	GC/FID	2022-11-02	2022-11-02	SP	CCME

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Test Summary

Batch No	Analyte	Instrument	Preparation Date	Analysis Date	Analyst	Method
432383	PHC's F3	GC/FID	2022-11-02	2022-11-02	SP	CCME
432383	PHC's F4	GC/FID	2022-11-02	2022-11-02	SP	CCME
432383	PHC's F4g	Gravimetric	2022-11-03	2022-11-03	SP	CCME
432383	Moisture-Humidite	Oven	2022-11-02	2022-11-02	SP	ASTM 2216
432425	PHC's F2-Napth	GC/FID	2022-11-02	2022-11-02	SP	CCME
432426	PHC's F3-PAH	GC/FID	2022-11-02	2022-11-02	SP	CCME
432434	Silver	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Arsenic	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Boron (total)	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Barium	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Beryllium	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Cadmium	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Cobalt	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Chromium Total	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Copper	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Mercury	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Molybdenum	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Nickel	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Lead	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Antimony	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Selenium	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Thallium	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Uranium	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Vanadium	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432434	Zinc	ICAPQ-MS	2022-11-02	2022-11-02	SD	EPA 200.8/6020
432477	Electrical Conductivity	Electrical Conductivity Mete	2022-11-03	2022-11-03	Z_S	Cond-Soil
432482	Chromium VI	FAA	2022-11-03	2022-11-03	MW	M US EPA 3060A
432484	pH - CaCl2	pH Meter	2022-11-03	2022-11-03	IP	Ag Soil
432507	Sodium Adsorption Ratio	iCAP OES	2022-11-03	2022-11-03	Z_S	Ag Soil
432515	Boron (Hot Water Soluble)	iCAP OES	2022-11-03	2022-11-03	Z_S	MOECC E3470

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Environment Testing

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CWS for Petroleum Hydrocarbons in Soil - Tier 1**Notes:**

1. The laboratory method complies with CCME Tier 1 reference method for PHC in soil. It is validated for laboratory use.
2. Where the F1 fraction (C6 to C10) and BTEX are both measured, F1-BTEX is reported.
3. Where the F2 fraction (C10 to C16) and naphthalene are both measured, F2-naphthalene is reported.
4. Where the F3 fraction (C16 to C34) and PAHs* are both measured, F3-PAH is reported.
5. F4G is analyzed if the chromatogram does not descend to baseline before C50. Where F4 (C34 to C50) and F4G are both reported, the higher result is compared to the standard.
6. Unless otherwise stated in the sample comments, the following criteria have been met where applicable:
 - nC6 and nC10 response factors within 30% of response factor for toluene;
 - nC10, nC16, and nC34 response factors within 10% of each other;
 - C50 response factors within 70% of nC10 + nC16 + nC34 average; and,
 - Linearity is within 15%.
7. Unless otherwise stated in the sample comments, sampling requirements and analytical holding times have been met.
8. Gravimetric heavy hydrocarbons (F4G) cannot be added to the C6 and C50 hydrocarbons.
9. *PAHs = phenanthrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene and pyrene.