

Geotechnical Investigation

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Ottawa Catholic School Board 570 West Hunt Club Road Nepean, Ontario K2G 3R4

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Project Name:

Geotechnical Investigation Proposed Riverside South Catholic Elementary School Brian Good Avenue and Solarium Avenue, Ottawa, Ontario

Project Number: OTT-22012013-A0

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Executive Summary

EXP Services Inc. (EXP) is pleased to present the results of the geotechnical investigation completed for the Proposed New Riverside South Catholic Elementary School to be located in the northwest corner of the Brian Good Avenue and Solarium Avenue intersection in Ottawa, Ontario (Figure 1). The terms and conditions of this assignment were outlined in EXP Services Inc. (EXP) proposal number: OTT-22002013-A0 dated May 4, 2022

The proposed school building will be a single-story structure with no basement located in the southeast corner of the school property. The footprint of the proposed building will be 4630 m². The proposed school development will also include portables, a sports field, play structure area, paved parking lots and access roads with access from Solarium Avenue. The proposed development will be serviced by municipal services. The design elevation of the finished floor for the proposed school building will be 92.65 m.

The test hole (borehole and test pit) fieldwork was undertaken in two (2) stages. The first stage was completed between July 14 and July 19,2022 and consists of sixteen (16) boreholes (Borehole Nos. 1 to 16) advanced to termination/auger refusal depths ranging from 4.6 m to 13.4 m below the existing ground surface. The second stage was completed between August 8 and August 10,2022 and consists of nineteen (19) test pits (Test Pit Nos. 1 to 19) extending to termination depths ranging from 1.8 m to 2.4 m below existing grade. The fieldwork was supervised on a full-time basis by a representative from EXP.

The borehole information indicates the subsurface conditions consist of a surficial fill underlain by a topsoil/organic layer contacted at depths of 0.2 m to 1.5 m (Elevation 92.3 m to Elevation 90.2 m) and ranging in thickness between 100 mm and 700 mm. The fill and topsoil are underlain by silty sand to sandy silt to clayey silt to silty clay to clay. Glacial till was contacted at 3.6 to 8.7 m depths (Elevation 88.2 m to Elevation 82.8 m). Auger refusal was met in Borehole Nos. 1 and 12 at 11.7 m and 13.4 m depths (Elevation 79.9 m to Elevation 78.1 m) respectively on inferred cobbles, boulders or bedrock. The groundwater level ranges from 2.8 m to 4.8 depths below existing grade (Elevation 89.0 m to Elevation 86.7 m).

Based on a review of the borehole information and Table 4.1.8.4.A of the 2012 Ontario Building Code (OBC) as amended May 2, 2019, the site classification for seismic response is Class D. A higher (better) seismic site classification may be assigned to this site if a shear wave velocity sounding survey is conducted at the site. Based on a review of the borehole information, the subsurface soils are not considered to be susceptible to liquefaction during a seismic event.

From a geotechnical perspective, the maximum permissible site grade raise is considered to be 1.5 m.

The design finished floor elevation of the proposed school building is Elevation 92.65 m. Based on a review of the borehole information, it is considered feasible to support the proposed building by spread and strip footings. It is our understanding that the design elevation of the underside of the footings will be Elevation 91.0 m. Based on a review of the boreholes located within the footprint of the proposed school building, the footings, at the design underside of footing elevation of Elevation 91.0 m, would be founded on the native sandy clayey silt, sandy silty clay and silty clay at Borehole Nos. 1, 2, 7 to 9 and 11 and on the existing fill in the remaining boreholes; Borehole Nos. 3 to 6 and 10. The topsoil (surficial and buried) and the existing fill are not suitable to support the footings and would have to be excavated, removed and replaced with an engineered fill pad. Therefore, the footings for the proposed school building founded at Elevation 91.0 m should be founded on the undisturbed native sandy clayey silt, sandy silty clay and 11 and on a minimum 600 mm thick engineered fill pad constructed on top of the undisturbed native soil in the remaining boreholes; Borehole Nos. 1,2, 7 to 9 and 11 and on a minimum 600 mm thick engineered fill pad

Square spread footings having a maximum width and length of 3.0 m and strip footings having a maximum width of 1.5 m founded at Elevation 91.0 m on the undisturbed native sandy clayey silt, sandy silty clay and silty clay and on a minimum 600 mm thick properly prepared engineered fill pad, constructed in accordance with the procedure in the attached geotechnical report, may be designed for a bearing capacity at serviceability limit state (SLS) of 100 kPa and factored geotechnical resistance at ultimate limit state (ULS) of 150 kPa. The factored geotechnical resistance value at ULS includes a resistance factor of 0.5. The total and differential settlements of well designed and constructed footings placed in accordance with the above recommendations are expected to be less than 25 mm and 19 mm respectively. The SLS and factored ULS values are valid provided the site grade raise to a maximum of 1.5 m is respected.

The floor slab for the proposed building may be designed and constructed as a slab-on-grade placed on a 200 mm thick 19 mm sized clear stone bed placed on a minimum 300 mm thick engineered fill pad set on the approved native subgrade constructed in accordance with Section 9 of the attached geotechnical report.

It is recommended that a perimeter drainage system should be provided around the proposed school building. Based on the design finished floor elevation of Elevation 92.65 m and the groundwater level at Elevation 89.0 m to Elevation 86.7 m, an underfloor drainage system is not required for the proposed school building.

Excavations for the construction of footings and the installation of underground services are anticipated to extend to a maximum depth of 3.0 m below the existing grade and are anticipated to extend through the fill, topsoil (organic) surficial and buried layers and into the native silty clay/clayey silt and silty sand/sandy silt and are anticipated to be at or above the groundwater level.

Excavations maybe undertaken by conventional heavy equipment capable of removing debris within the fill and cobbles and boulders within the fill.

Open cut excavation within the subsurface soils should comply with the most recent Occupational Health and Safety Act (OHSA), Ontario Regulations 213/91 (August 1, 1991). Based on the definitions contained in OHSA, the subsurface soils at the site are classified as Type 3 soil and as such the excavation sidewalls must be cut back at 1H:1V from the bottom of the excavation. Below the groundwater table, the excavation side slopes are expected to slough and will eventually stabilize at a slope of 2H:1V to 3H:1V.

If side slopes noted above for the construction of the proposed building cannot be achieved due to space restrictions on site, such as the proximity of open cut excavations to the property limits or existing infrastructure, the excavation for the new building construction would have to be undertaken within the confines of an engineered support system (shoring system). If space restrictions prevent open cut excavations, the underground services may be installed within the confines of a prefabricated support system (trench box) which is designed and installed in accordance with the above-noted regulations.

Excavations that terminate within the native silty clay/clayey silt or within the sandy silt/silty sand above the groundwater table are not expected to experience a base-heave type failure. Open cut excavations which extend below the groundwater level within the silty sand/sandy silt are susceptible to instability of the base of the excavation in the form of piping or heave. Should the excavations extend below the groundwater table, EXP should be contacted prior to the start of excavation to provide comments and recommendations to minimize instability of the excavation base.

Seepage of the surface and subsurface water into the excavations is anticipated. However, it should be possible to collect any water entering the excavations in perimeter ditches and to remove it by pumping from sumps. In areas of high infiltration or in areas where more permeable soil layers may exist, a higher seepage rate should be anticipated and will require high-capacity pumps to keep the excavation dry.

It is anticipated that the majority of the material required for backfilling purposes in the interior and exterior of the proposed building and for trench backfill would have to be imported and should preferably conform to Ontario Provincial Standard Specification (OPSS) 1010 Granular B Type II and OPSS 1010 Select Subgrade Material (SSM) specifications.

Pavement structure for light duty traffic areas should consist of 65 mm thick asphaltic concrete, 150 mm thick OPSS Granular A base and 450 mm thick OPSS Granular B Type II subbase. Pavement structure for heavy duty traffic areas should consist of 110 mm thick asphaltic concrete, 150 mm thick OPSS Granular A base and 600 mm thick OPSS Granular B Type II subbase.

The above and other related considerations are discussed in greater detail in the main body of the attached geotechnical report.

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1. Introduction

EXP Services Inc. (EXP) is pleased to present the results of the geotechnical investigation completed for the Proposed New Riverside South Catholic Elementary School to be located in the northwest corner of the Brian Good Avenue and Solarium Avenue intersection in Ottawa, Ontario (Figure 1). The terms and conditions of this assignment were outlined in EXP Services Inc. (EXP) proposal number: OTT-22002013-A0 dated May 4, 2022

The proposed school building will be a single-story structure with no basement located in the southeast corner of the school property. The footprint of the proposed building will be 4630 m². The proposed school development will also include portables, a sports field, play structure area, paved parking lots and access roads with access from Solarium Avenue. The proposed development will be serviced by municipal services. The design elevation of the finished floor for the proposed school building will be 92.65 m.

A Phase One Environmental Site Assessment (ESA) of the site was also carried out by EXP and the results of the assessment are documented in a separate report dated June 10,2022.

The geotechnical investigation was undertaken to:

- a) Establish the subsurface soil and groundwater conditions at 35 test holes located at the site (sixteen (16) boreholes and nineteen (19) test pits),
- b) Classify the site for seismic site response in accordance with the requirements of the 2012 Ontario Building Code (as amended May 2, 2019) and assess the potential for liquefaction of the subsurface soils during a seismic event,
- c) Comment on grade-raise restrictions and provide site grading requirements,
- d) Make recommendations regarding the most suitable type of foundations, founding depth and bearing pressure at serviceability limit state (SLS) and factored geotechnical resistance at ultimate limit state (ULS) of the founding strata and comment on the anticipated total and differential settlements of the recommended foundation type,
- e) Provide comment regarding slab-on-grade construction and the requirement for perimeter and underfloor drainage systems,
- f) Comment on excavation conditions and de-watering requirements during construction,
- g) Provide pipe bedding requirements for underground services,
- h) Discuss backfilling requirements and suitability of on-site soils for backfilling purposes,
- i) Recommend pavement structure thicknesses for access roads and parking lots,
- j) Comment on the corrosion potential of subsurface soils to buried concrete and metal structures/members; and
- k) Provide comment regarding restrictions to tree planting.

The comments and recommendations given in this report are based on the assumption that the above-described design concepts will proceed into construction. If changes are made either in the design phase or during construction, this office must be retained to review these modifications. The result of this review may be a modification of our recommendations, or it may require additional field or laboratory work to check whether the changes are acceptable from a geotechnical viewpoint.

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2. Site Description

The site is located in the northwest corner of the Solarium Avenue and Brian Good Avenue intersection. The site is roughly rectangular in shape with an area of approximately 2.74 hectares. It is bounded to the north by vacant land (a future city park under construction), to the west by a residential development, to the east by Brian Good Avenue and a residential development beyond (under construction) and to the south by Solarium Avenue.

The site is currently a vacant property with stockpiles of fill soil.

The topography of the site is generally flat (excluding the soil stockpiles) based on the ground surface elevations at the test holes ranging from Elevation 92.86 m to Elevation 91.06 m.

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3. Geology of the Site

3.1 Surficial Geology Map

The surficial geology was reviewed via the Google Earth applications published by the Ontario Ministry of Energy, Northern Development and Mines available via www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth/surficial-geology, last modified on May 23, 2017. The map indicates the Site is underlain by fine glaciomarine deposits consisting of silt and clay with minor sand and gravel. Coarse-textured glaciomarine deposits consisting of sand, gravel and minor silt and clay are noted to be near the site. The fine glaciomarine deposits is underlain by a stone-poor, sandy silt to silty sand-textured glacial till deposit. The surficial deposits are shown in Image 1 below.



Image 1 – Surficial Geology

3.2 Bedrock Geology Map

The bedrock geology map (Map 1508A – Generalized Bedrock Geology, Ottawa-Hull, Ontario and Quebec, Geological Survey of Canada, printed by the Surveys and Mapping Branch, 1979) indicates the site is underlain by sandstone, dolostone or minor shale of the Beekmantown Group within the Oxford formation. The bedrock geology is show in Image 2 below.



Dolostone, minor shale and sandstone of the Beekmantown Group within the Oxford formation.

Image 2 – Bedrock Geology



4. Procedure

The test hole (borehole and test pit) fieldwork was undertaken in two (2) stages. The first stage was completed between July 14 and July 19,2022 and consists of sixteen (16) boreholes (Borehole Nos. 1 to 16) advanced to termination/auger refusal depths ranging from 4.6 m to 13.4 m below the existing ground surface. The second stage was completed between August 8 and August 10,2022 and consists of nineteen (19) test pits (Test Pit Nos. 1 to 19) extending to termination depths ranging from 1.8 m to 2.4 m below existing grade. The fieldwork was supervised on a full-time basis by a representative from EXP.

The locations and the geodetic elevations of the test holes were established on site by EXP and are shown on the Test Hole Location Plan, Figure 2.

The borehole and test pit locations were cleared of private and public underground services, prior to the start of drilling and excavating operations.

The boreholes were drilled using a CME-75 track mounted drill rig equipped with continuous flight hollow stem augers and soil sampling capabilities. Borehole No. 1 was advanced from 4.6 m depth to the auger refusal depth of 11.7 m under a column of water and using drilling mud. Standard penetration tests (SPTs) were performed in all the boreholes at depth intervals of 0.75 m to 1.5 m with soil samples retrieved by the split-barrel sampler. Relatively undisturbed Shelby tube samples of the clayey soil were retrieved from selected depths in some of the boreholes. The undrained shear strength of the clayey soil was measured by conducting a penetrometer test on selected recovered soil samples and in-situ shear vane tests at selected depth intervals. The subsurface soil conditions in each borehole were logged with each soil sample placed in a labelled plastic bag.

Nineteen (19) mm diameter standpipes and thirty-two (32) mm diameter monitoring wells with slotted section were installed in selected boreholes for long-term monitoring of the groundwater levels. The standpipes and monitoring wells were installed in accordance with EXP standard practice and the installation configuration is documented on the respective borehole log. The boreholes were backfilled upon completion of drilling.

Test pits were carried out with an excavator. Soil samples (grab samples) of the different soil types exposed in the test pits were retrieved and the soil conditions from the test pits were logged, with each soil sample placed in a labeled plastic bag. Groundwater level observations were made in each test pit. The test pits were backfilled upon completion of excavating.

On completion of the fieldwork, the soil samples were transported to the EXP laboratory in Ottawa. The soil samples were visually examined in the laboratory by a geotechnical engineer. All soil samples were classified in accordance with the Unified Soil Classification System (USCS) and the modified Burmeister System (as per the 2006 Fourth Edition Canadian Foundation Engineering Manual (CFEM)).

The geotechnical engineer also assigned the laboratory testing program which is summarized in Table I.

Table I: Summary of Laboratory Testing Program							
Type of Test	Number of Tests Completed						
Soil Samples							
Moisture Content Determination	160						
Unit Weight Determination	33						
Grain Size Analysis	14						
Atterberg Limit Determination	10						
One Dimensional Consolidation Test	2						
Corrosion Analysis (pH, sulphate, chloride and resistivity)	3						



5. Subsurface Conditions and Groundwater Levels

A detailed description of the subsurface conditions and groundwater levels from the boreholes and test pits are given on the attached Borehole and Test Pit Logs, Figures 3 to 37. The borehole and test pit logs and related information depict subsurface conditions only at the specific locations and times indicated. Subsurface conditions and water levels at other locations may differ from conditions at the locations where sampling was conducted. The passage of time also may result in changes in the conditions interpreted to exist at the locations where sampling was conducted.

Boreholes were drilled and test pits were excavated to provide representation of subsurface conditions as part of a geotechnical exploration program and are not intended to provide evidence of potential environmental conditions.

It should be noted that the soil boundaries indicated on the borehole and test pit logs are inferred from non-continuous sampling and observations during drilling operations. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. The "Notes on Sample Descriptions" preceding the borehole and test pit logs form an integral part of this report and should be read in conjunction with this report.

A review of the borehole and test pit logs indicates the following subsurface conditions with depth and groundwater level measurements.

5.1 Fill

Fill was contacted surficially in all test holes. The fill extends to depths of 0.2 m to 1.8 m (Elevation 92.3 m to Elevation 89.9 m) and ranges from sand and gravel to silty clay. The fill contains cobbles, boulders and debris (such as a metal wire in Borehole No. 6 and metal debris in Test Pit No. 6). The fill material is in a very loose to loose state as indicated by the standard penetration test (SPT) N-values of 1 to 8. The moisture content and unit weight of the fill ranges from 15 percent to 35 percent and 17.5 kN/m³ to 20.8 kN/m³ respectively.

The results from the grain-size analysis conducted on two (2) samples of the fill are summarized in Table II. The grain-size distribution curves are shown in Figures 38 and 39.

Table II: Summary of Results from Grain-Size Analysis - Fill Samples								
Porobolo No. (PU)		Grain-Size Analysis (%)						
Sample No. (SS)	Depth (m)	Gravel	Sand	Fines (Silt and Clay)	Soil Classification (USCS)			
BH 7-SS1	0-0.6	3	58	39	Silty Sand (SM)			
BH 10-SS1	0-0.6	1	60	39	Silty Sand (SM)			

Based on a review of the results from the grain size analysis, the fill may be classified as a silty sand (SM) in accordance with the Unified Soil Classification System (USCS).

5.2 Buried Topsoil/Organic Soil

A topsoil and organic soil layer was contacted beneath the fill at depths of 0.2 m to 1.5 m (Elevation 92.3 m to Elevation 90.2 m) in Borehole No. 16 and in all of the test pits with the exception Test Pit Nos. 9 and 19. The buried organic soil ranges in thickness between 100 mm and 700 mm. In Test Pit Nos. 4 and 13, the buried topsoil layer is underlain by a further fill layer.

5.3 Silty Sand to Sandy Silt

A native sandy silt to silty sand with varying amounts of clay was contacted beneath the fill and buried organic soil in Borehole Nos. 4 and 12 and in Test Pit Nos. 2, 8 to 12, 17 and 19. The silty sand to sandy silt extends to depths ranging from 1.2 m to 3.0 m (Elevation 91.1 m to Elevation 88.6 m). The SPT N-values of the silty sand to sandy silt range from zero (hammer weight) to 7

indicating the soil is in a very loose to loose state. The natural moisture content and unit weight of the silty sand to sandy silt ranges from 13 percent to 50 percent and 17.9 kN/m³ to 18.3/m³ respectively.

Results from the grain-size analysis and Atterberg limit determination conducted on two (2) samples of the silty sand to sandy silt are summarized in Table III and grain-size distribution curves are shown in Figures 40 and 41.

Table III: Summary of Results from Grain-Size Analysis and Atterberg Limit Determination – Silty Sand/Sandy Silt Samples										
		Grain-Size Analysis (%)				Atterberg Limits (%)				
Borehole No. (BH) – Sample No. (SS)	Depth (m)	Gravel	Sand	Silt	Clay	Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	Soil Classification (USCS)
BH4-SS3	1.5- 2.1	0	46	28	26	20			N.P.	Sandy Silt (ML)
BH4-SS4	2.3- 2.9	0	50	33	17	21			N.P.	Sandy Silt (ML)

N.P = Non-Plastic

Based on a review of the results of the grain-size analysis, the tested soil may be classified as sandy silt (ML) to in accordance with the USCS.

5.4 Clayey Silt to Silty Clay to Clay

A clayey silt to silty clay to clay, with a varying amount of sand, was contacted below the fill, buried organic soil and silty sand to sandy silt in all the test holes with the exception of Test Pit Nos. 17 and 19. The clayey silt to silty clay to clay extends to depths of 1.4 m to 7.2 m (Elevation 90.7 m to Elevation 84.3 m). The silty clay in Borehole No. 11 is interrupted by a clayey sandy silt layer contacted at a 1.4 m depth (Elevation 90.3 m) and extends to a 2.2 m depth (Elevation 89.5 m). The clayey silt to silty clay to clay has a consistency of very soft to stiff as indicated by the SPT N-values which range from zero (hammer weight) to 13. The undrained shear strength of the clayey silt to silty clay to clay silty clay ranges from 38 kPa to 144 kPa indicating a firm to very stiff consistency. The natural moisture content and unit weight of the clayey silt to silty clay to clay ranges from 19 percent to 63 percent and 15.8 kN/m³ to 21.9 kN/m³ respectively.

The results from the grain-size analysis and Atterberg limits determination of eight (8) samples of the clayey silt to silty clay to clay are summarized in Table IV. The grain-size distribution curves are shown in Figures 42 to 49.



Table IV Summary of Results from Grain-Size Analysis and Atterberg Limit Determination – Silt Clay/Clayey Silt Samples										
Borehole No		Grain-Size Analy			vsis (%) A			Limits (%)		
(BH) – Sample No. (SS)	Depth (m)	Gravel	Sand	Silt	Clay	Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	Soil Classification (USCS)
BH 1-SS2	0.8-1.4	0	41	33	26	29	29	18	11	Sandy Clayey Silt of Low Plasticity (CL)
BH2-SS7	4.6-5.2	0	3	54	43	39	38	20	18	Silty Clay of Low Plasticity (CL)
BH3-SS2	0.8-1.4	2	30	47	21	28	28	16	13	Sandy Clayey Silt of Low Plasticity (CL)
BH4-ST8	6.1-6.7	0	2	49	49	51	46	21	26	Silty Clay of Low Plasticity (CL)
BH6-SS4	2.3-2.9	0	2	41	57	43	58	25	33	Clay of High Plasticity (CH)
BH7-ST5	3.0-3.6	0	0	42	58	63	56	24	32	Clay of High Plasticity (CH)
BH8-SS6	3.8-4.4	0	23	51	26	36	24	15	9	Clayey Silt with Sand of Low Plasticity (CL)
BH10- SS6	3.8-4.4	0	2	65	33	40	35	20	15	Clayey Silt of Low Plasticity (CL)

Based on a review of the laboratory test results, the soil may be classified as a ranging from a clayey silt of low plasticity (CL) to a silty clay of low plasticity (CL) to a clay of high plasticity (CH) in accordance with the USCS.

One-dimensional consolidation tests were conducted on two (2) samples of the silty clay. The soil parameters derived from the consolidation test results are summarized in Table V and the consolidation test result report is shown in Appendix A.

Table V Consolidation Test Results - Silty Clay Samples										
Borehole No.	Sample No. (Sample Depth), m	Natural Unit Weight (kN/m ³)	σ,	σνο΄	Cc	Cr	eo	OCR		
BH4	ST8 (6.1-6.7)	16.9	240	89	0.867	0.0183	1.416	2.7		
BH7	ST5(3.0-3.6)	15.8	270	54	0.741	0.0149	1.779	5.0		
NOTES:	NOTES:									
σ,,	- Apparent precon	solidation pressure	e (kPa)	σνο΄	- Calculated existing vertical effective stress (kPa)					
Cc	- Compression ind	ex		Cr	- Recompression	- Recompression index				
eo	- Initial void ratio			OCR	- Overconsolidation ratio					

5.5 Silty Sand

In Borehole No. 12, a silty sand was encountered underlying the clayey silt to silty clay at a 7.2 m depth (Elevation 84.3 m) and extending to an 8.7 m depth (Elevation 82.8). The SPT N-value of 3 indicates the silty sand is in a very loose state.

5.6 Glacial Till

The silty sand in Borehole No. 12 and the clayey silt to silty clay to clay in Borehole Nos. 1, 2, 5, 6 and 9 to 12 are underlain by a glacial till contacted at 3.6 m to 8.7 m depths (Elevation 88.2 m to Elevation 82.8 m). The glacial till contains varying amounts of gravel, sand, silt and clay as well as cobbles and boulders. Based on the SPT N-values of 6 to 64 the glacial till is in a loose to very dense state. High N-values for low sampler penetration, such as 50 for 50 mm of sampler penetration were recorded and may be a result of the sampler resting on a cobble or boulder within the glacial till. In Borehole No. 1 a low SPT N-value of 2 was recorded at sampler number 8 (SS8; 6.1 m to 6.7m depths). This low SPT N-value may be a result of disturbance to the glacial till at this sample depth by advancing the borehole below a 4.6 m depth under a column of water and by using drilling mud. Therefore, the low SPT N-value of 2 at SS8 is not considered to be representative of the actual state of the glacial till. The natural moisture content of the glacial till ranges from 6 percent to 39 percent.

The results from the grain-size analysis conducted on two (2) samples of the glacial are summarized in Table VI. The grain-size distribution curves are shown in Figures 50 and 51.

Table VI Summary of Results from Grain-Size Analysis – Glacial Till Samples									
			Grain-Size						
Borehole No. (BH) – Sample No. (SS)	Depth (m)	Gravel	Sand	Silt	Clay	Soil Classification (USCS)			
BH5-SS6	3.8-4.4	10	46	30	14	Silty Sand (SM)			
BH9-SS7	4.6-5.2	8	55	28	9	Silty Sand (SM)			

Based on a review of the laboratory test results, the glacial till may be classified as a silty sand (SM) in accordance with the USCS. The glacial till contains cobbles and boulders.

5.7 Inferred Boulders or Bedrock

Auger refusal was met in Borehole Nos. 1 and 12 at 11.7 m and 13.4 m depths (Elevation 79.9 m to 78.1 m) respectively. Auger refusal may have occurred on inferred cobbles, boulders or bedrock.



5.8 Groundwater Level Measurements

A summary of the groundwater level measurements taken in the boreholes equipped with standpipes and monitoring wells on August 22,2022 is shown in Table VII.

Table VII: Summary of Groundwater Level Measurements									
Borehole No. (BH)	Ground Surface Elevation (m)	Elapsed Time in Days from Date of Installation	Depth Below Ground Surface (Elevation), m						
BH-01	91.60	38 days	3.8 (87.8)						
BH-04	91.57	34 days	4.2 (87.4)						
BH-07	91.63	38 days	3.0 (88.6)						
BH-09	91.76	39 days	2.8 (89.0)						
BH-11	91.67	39 days	3.6 (88.1)						
BH-12	91.52	39 days	4.8 (86.7)						

The groundwater level ranges from 2.8 to 4.8 m depths (Elevation 89.0 m to Elevation 86.7 m).

All test pits remained dry during and upon completion of the excavation operation. The groundwater level was not contacted in all of the test pits excavated to 1.8 m to 2.4 m depths (Elevation 91.1 m to Elevation 88.9 m).

The groundwater levels were determined in the boreholes and test pits at the time and under the condition stated in this report. Note that fluctuations in the level of groundwater may occur due to a seasonal variation such as precipitation, snowmelt, rainfall activities, and other factors not evident at the time of measurement and therefore may be at a higher level during wet weather periods.

6. Site Classification for Seismic Site Response and Liquefaction Potential of Soils

6.1 Site Classification for Seismic Site Response

Based on a review of the borehole information and Table 4.1.8.4.A of the 2012 Ontario Building Code (OBC) as amended May 2, 2019, the site classification for seismic response is Class D. A higher (better) seismic site classification may be assigned to this site if a shear wave velocity sounding survey is conducted at the site.

6.2 Liquefaction Potential of Soils

Based on a review of the borehole information, the subsurface soils are not considered to be susceptible to liquefaction during a seismic event.



7. Grade Raise Restrictions

The design elevation for the floor slab of the proposed school building is Elevation 92.65 m. The ground surface elevations at the boreholes (including Borehole No. 12) located with the footprint of the proposed building range from Elevation 91.77 m to Elevation 91.48 m. Therefore, the site grade raise within the proposed building footprint will range from 0.9 m to 1.2 m.

The ground surface elevation of the boreholes and test pits located outside or beyond the proposed building footprint range from Elevation 92.86 m to Elevation 91.06 m. Based on the assumption that the final design grades in the remaining portion of the site beyond the proposed school building will be slightly below the design finished floor elevation of the proposed school building, the anticipated maximum site grade raise outside of the proposed building footprint will be approximately 1.5 m.

Based on a review of the test hole (boreholes and test pits) information, a maximum grade raise at the site of 1.5 m is considered to be acceptable from a geotechnical perspective. However, should the design grade raise exceed 1.5 m, EXP should be contacted to review the acceptability of the proposed new grade raise and to provide updated bearing pressure at serviceability limit state (SLS) and factored geotechnical resistance at ultimate limit state (ULS) for the building foundations.

8. Site Grading

The **stockpiles of soil fill** currently present on-site should be removed and disposed off-site. For budgeting purposes, the contractor should assume that all existing fill, surficial and buried topsoil (organic) layers and organic stained soils within the footprints of the proposed building, portable(s), play structure, sports field, parking lots and access roads would require removal and replacement with well-compacted fill as indicated below.

Site grading within the **proposed building footprint** should consist of the removal of all existing fill, surficial and buried topsoil (organic) layers and organic stained soils down to the native undisturbed material. The native subgrade should be examined by a geotechnician. Any loose/soft areas identified during the subgrade examination should be excavated, removed and replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to 98 percent standard Proctor maximum dry density (SPMDD). Once the subgrade has been approved, the grades may be raised to the design underside footing and floor slab elevation by the construction of an engineered fill pad constructed in accordance with Section 9 of this report.

Site grading within the **proposed portable area** should consist of the removal of all existing fill, surficial and buried topsoil (organic) layers and organic stained soils down to the native undisturbed material. The native subgrade should be examined by a geotechnician. Any loose/soft areas identified during the subgrade examination should be excavated, removed and replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to 98 percent standard Proctor maximum dry density (SPMDD). Once the subgrade has been approved, the grades may be raised to the design subgrade level by the construction of an engineered fill pad constructed in accordance with the procedure in Section 9 of this report.

Site grading within the **proposed play structure area** should consist of the removal of all existing fill, surficial and buried topsoil (organic) layers and organic stained soils down to the native undisturbed material. The native subgrade should be proofrolled in the full-time presence of a geotechnician. Any loose/soft areas identified during the proofrolling process should be excavated, removed and replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to 95 percent standard Proctor maximum dry density (SPMDD). Once the subgrade has been approved, the grades may be raised to the design subgrade level by the placement of engineered fill as discussed in Section 9 of this report. The engineered fill should be compacted to a minimum 95 percent SPMDD.

Site grading within the **proposed sports field, parking lot and access road areas** should consist of the removal of all existing fill, surficial and buried topsoil (organic) layers and organic stained soils down to the native undisturbed material. The native subgrade should be proofrolled in the presence of a geotechnician. Any loose/soft areas identified during the proofrolling process should be excavated, removed and replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II or OPSS Select Subgrade Material (SSM) compacted to 95 percent standard Proctor maximum dry density (SPMDD). Alternatively, portions of the excavated and removed existing fill that is free of debris, cobbles, boulders and topsoil (organic soils), may be reused to raise the site grades to the design subgrade level. The suitability of re-using the existing fill to raise the grades will have to be further assessed at time of construction by examining the fill material and conducting additional tests on the material.



9. Foundation Considerations

The design finished floor elevation of the proposed school building is Elevation 92.65 m. Based on a review of the borehole information, it is considered feasible to support the proposed building by spread and strip footings. It is our understanding that the design elevation of the underside of the footings will be Elevation 91.0 m. Based on a review of the boreholes located within the footprint of the proposed school building, the footings, at the design underside of footing elevation of Elevation 91.0 m, would be founded on the native sandy clayey silt, sandy silty clay and silty clay at Borehole Nos. 1, 2, 7 to 9 and 11 and on the existing fill in the remaining boreholes; Borehole Nos. 3 to 6 and 10. The topsoil (surficial and buried) and the existing fill are not suitable to support the footings and would have to be excavated, removed and replaced with an engineered fill pad. Therefore, the footings for the proposed school building, founded at Elevation 91.0 m, should be founded on the undisturbed native sandy clayey silt, sandy silty clay and 11 and on a minimum 600 mm thick engineered fill pad constructed on top of the undisturbed native soil in the remaining boreholes; Borehole Nos. 1,2, 7 to 9 and 11 and on a minimum 600 mm thick engineered fill pad

Square spread footings having a maximum width and length of 3.0 m and strip footings having a maximum width of 1.5 m founded at Elevation 91.0 m on the undisturbed native sandy clayey silt, sandy silty clay and silty clay and on a minimum 600 mm thick properly prepared engineered fill pad, constructed in accordance with the procedure in the paragraph below, may be designed for a bearing capacity at serviceability limit state (SLS) of 100 kPa and factored geotechnical resistance at ultimate limit state (ULS) of 150 kPa. The factored geotechnical resistance value at ULS includes a resistance factor of 0.5. The total and differential settlements of well designed and constructed footings placed in accordance with the above recommendations are expected to be less than 25 mm and 19 mm respectively. The SLS and factored ULS values are valid provided the site grade raise to a maximum of 1.5 m is respected.

If the founding depth for the proposed footings will be at a lower elevation than Elevation 91.0 m, EXP should be contacted to provide updated SLS and factored ULS values for the footings.

The construction of the engineered fill pad should consist of the removal of all existing fill, surficial and buried topsoil (organic) layers and organic stained soils down to the native undisturbed silt and clay material. The native subgrade should be examined by a geotechnician. Any loose/soft areas identified during the subgrade examination should be excavated, removed and replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to 98 percent standard Proctor maximum dry density (SPMDD). Once the subgrade has been approved, the grades may be raised to the design underside footing and floor slab elevation by the construction of an engineered fill pad. The excavation for the removal of fill and topsoil layers should extend to a sufficient distance beyond the limits of the proposed structure to accommodate a 1.0 m wide horizontal bench of engineered fill that extends beyond the perimeter of the proposed building on all sides, which should thereafter be sloped at an inclination of 1H to 1V down to the approved subgrade. The engineered fill should consist of OPSS Granular B Type II material that is placed in 300 mm thick lifts and each lift compacted to 100 percent SPMDD. The placement and compaction of the engineered fill can in this way be undertaken to the founding level of the footings. From the footing level to the underside of the floor slab, each lift of the Granular B Type II material should be compacted to 98 percent of SPMDD. The engineered fill should be placed under the full-time supervision of a geotechnician working under the direction of a geotechnical engineer. Inplace density tests should be undertaken on each lift of the engineered fill to ensure that it is properly compacted prior to placement of subsequent lift.

For footings founded directly on the native sandy clayey silt, sandy silty clay and silty clay and to prevent disturbance to the subgrade, the footing beds should be protected by covering the subgrade with a 50 mm thick concrete mud slab following examination and approval of the founding soil subgrade.

Since the native clay and silt subgrade are susceptible to disturbance due to the effects of weather and construction traffic, it is recommended that in the engineered fill pad areas, the approved native subgrade be covered within the same day of approval with at least one lift of the OPSS Granular B Type II engineered fill material.

All the footing beds should be examined by a geotechnical engineer to ensure that the founding surfaces are capable of supporting the design bearing pressure and that the footing beds have been properly prepared.

A minimum of 1.5 m of earth cover should be provided to the footings to protect them from damage due to frost penetration. The frost cover should be increased to 2.1 m for unheated structures if snow will not be removed from their vicinity. If snow will be removed from the vicinity of the unheated structures, the frost cover should be increased to 2.4 m. Rigid insulation thermally



equivalent to the required soil cover may be used instead of the soil cover. Alternatively, a combination of rigid insulation and soil cover may be used to achieve the required frost protection for the footings.

The recommended factored geotechnical resistance at ULS and bearing pressure at SLS have been calculated by EXP from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field monitoring provided by an experienced geotechnical engineer to validate the information for use during the construction stage.

10. Floor Slab and Drainage Requirements

The floor slab for the proposed building may be designed and constructed as a slab-on-grade placed on a 200 mm thick 19 mm sized clear stone bed placed on a minimum 300 mm thick engineered fill pad set on the approved native subgrade constructed in accordance with Section 9 of this report. The clear stone would minimize the capillary rise of moisture from the sub-soil to the floor slab. Alternatively, the floor slab may be cast on a 200 mm thick bed of OPSS Granular A overlain by a vapour barrier. Adequate saw cuts should be provided in the floor slabs to control cracking.

It is recommended that a perimeter drainage system should be provided around the proposed school building. Based on the design finished floor elevation of Elevation 92.65 m and the groundwater level at Elevation 89.0 m to Elevation 86.7 m, an underfloor drainage system is not required for the proposed school building.

The floor slab should be set at a minimum of 150 mm higher than the surrounding final exterior grade.

The final exterior grade surrounding the proposed building should be sloped away from the proposed building to prevent ponding of surface water close to the exterior walls of the proposed building.



11. Excavation and De-Watering Requirements

11.1 Excess Soil Management

Ontario Regulation 406/19 specifies protocols that are required for the management and disposal of excess soils. As set forth in the regulation, specific analytical testing protocols need to be implemented and followed based on the volume of soil to be managed and the requirements of the receiving site. The testing protocols are specific as to whether the soils are stockpiled or in situ. In either scenario, the testing protocols are far more onerous than have been historically carried out as part of standard industry practices. These decisions should be factored in and accounted for prior to the initiation of the project-defined scope of work. EXP would be pleased to assist with the implementation of a soil management and testing program that would satisfy the requirements of Ontario Regulation 406/19.

11.2 Excavation

Excavations for the construction of footings and the installation of underground services are anticipated to extend to a maximum depth of 3.0 m below the existing grade and is anticipated to extend through the fill, topsoil (organic) surficial and buried layers and into the native silty clay/clayey silt and silty sand/sandy silt and are anticipated to be at or above the groundwater level.

Excavations maybe undertaken by conventional heavy equipment capable of removing debris within the fill and cobbles and boulders within the fill.

Open cut excavation within the subsurface soils should comply with the most recent Occupational Health and Safety Act (OHSA), Ontario Regulations 213/91 (August 1, 1991). Based on the definitions contained in OHSA, the subsurface soils at the site are classified as Type 3 soil and as such the excavation sidewalls must be cut back at 1H:1V from the bottom of the excavation. Below the groundwater table, the excavation side slopes are expected to slough and will eventually stabilize at a slope of 2H:1V to 3H:1V.

If side slopes noted above for the construction of the proposed building cannot be achieved due to space restrictions on site, such as the proximity of open cut excavations to the property limits or existing infrastructure, the excavation for the new building construction would have to be undertaken within the confines of an engineered support system (shoring system). If space restrictions prevent open cut excavations, the underground services may be installed within the confines of a prefabricated support system (trench box) which is designed and installed in accordance with the above-noted regulations.

The need for a shoring system, the most appropriate type of shoring system and the design and installation of the shoring system should be determined by the contractors bidding on this project. The design of the shoring system should be undertaken by a professional engineer experienced in shoring design and the installation of the shoring system should be undertaken by a contractor experienced in the installation of shoring systems. The shoring system should be designed and installed in accordance with latest edition of Ontario Regulation 213/91 under the OHSA and the 2006 Fourth Edition of the Canadian Foundation Engineering Manual (CFEM). The shoring system as well as adjacent settlement sensitive structures (buildings) and infrastructure should be monitored for movement (deflection) on a periodic basis during construction operations.

Excavations that terminate within the native silty clay/clayey silt or within the sandy silt/silty sand above the groundwater table are not expected to experience a base-heave type failure. Open cut excavations which extend below the groundwater level within the silty sand/sandy silt are susceptible to instability of the base of the excavation in the form of piping or heave. Should the excavations extend below the groundwater table, EXP should be contacted prior to the start of excavation to provide comments and recommendations to minimize instability of the excavation base.

The native clay and silt subgrades are susceptible to disturbance due to movement of construction equipment and personnel on its surface. It is therefore recommended that the excavation at the site should be undertaken by construction equipment that does not travel on the excavated surface, such as a gradall or mechanical shovel.

Many geologic materials deteriorate rapidly upon exposure to meteorological elements. Unless otherwise specifically indicated in this report, walls and floors of excavations must be protected from moisture, desiccation, and frost action throughout the course of construction.

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11.3 De-Watering Requirements

Seepage of the surface and subsurface water into the excavations is anticipated. However, it should be possible to collect any water entering the excavations in perimeter ditches and to remove it by pumping from sumps. In areas of high infiltration or in areas where more permeable soil layers may exist, a higher seepage rate should be anticipated and will require high-capacity pumps to keep the excavation dry.

For construction dewatering, an Environmental Activity and Sector Registry (EASR) approval may be obtained for water takings greater than 50 m³ and less than 400 m³ per day. If more than 400 m³ per day of groundwater are generated for dewatering purposes, then a Category 3 Permit to Take Water (PTTW) must be obtained from the Ministry of the Environment, Conservation and Parks (MECP). A Category 3 PTTW would require a complete hydrogeological assessment and would take at least 90 days for the MECP to process once the application is submitted.

Although this investigation has estimated the groundwater levels at the time of the fieldwork, and commented on dewatering and general construction problems, conditions may be present which are difficult to establish from standard boring and excavating techniques and which may affect the type and nature of dewatering procedures used by the contractor in practice. These conditions include local and seasonal fluctuations in the groundwater table, erratic changes in the soil profile, thin layers of soil with large or small permeabilities compared with the soil mass, etc. Only carefully controlled tests using pumped wells and observation wells will yield the quantitative data on groundwater volumes and pressures that are necessary to adequately engineer construction dewatering systems.



12. Pipe Bedding Requirements

The depth at which municipal services will be installed is anticipated to be a maximum of 3.0 m depth below grade. Based on this, the subgrade for the underground service pipes is expected to be either clayey silt/silty clay or sandy silt/silty sand.

The bedding for the underground services including material specifications, thickness of cover material and compaction requirements conform to municipal requirements and/or Ontario Provincial Standard Specification and Drawings (OPSS and OPSD).

It is recommended that the pipe bedding be 300 mm thick and consist of OPSS Granular A. The bedding material should be placed along the sides and on top of the pipe to provide a minimum cover of 300 mm. The bedding should be compacted to at least 98 percent of the SPMDD.

The bedding thickness may be further increased in areas where the subgrade becomes disturbed. Trench base stabilization techniques, such as the removal of loose/soft material, placement of additional sub-bedding, consisting of Ontario Provincial Standard Specification (OPSS) Granular B Type II completely wrapped in a non-woven geotextile, may be used if trench base disturbance becomes a problem in wet or soft/loose areas.

To minimize settlement of the pavement structure over services trenches, the trench backfill material within the frost zone, to 1.8 m depth below final grade, should match the existing material along the trench walls to minimize differential frost heaving of the subgrade soil, provided this material is compactible. Otherwise, frost tapers may be required.

If the backfill in the service trenches will consist of granular fill, clay seals should be installed in the service trenches at select intervals (spacing) as per City of Ottawa Drawing No. S8. The seals should be 1 m wide, extend over the entire trench width and from the bottom of the trench to the underside of the pavement structure. The clay should be compacted to 95 percent SPMDD. The purpose of the clay seals is to prevent the permanent lowering of the groundwater level.

The municipal services should be installed in short open trench sections that are excavated and backfilled the same day.



13. Backfilling Requirements and Suitability of On-Site Soils for Backfilling Purposes

The on-site soils to be excavated are fill, surficial and buried topsoil (organic soil), silty clay/clayey silt/clay and silty sand/sandy silt. Portions of the existing fill (free of debris, topsoil (organic soil), cobbles and boulders) and native soils (free of cobbles and boulders) from above the groundwater table may be re-used as fill material to raise the grades at the site to the design subgrade level in areas of the proposed play structure, sports field, parking lots, access roads and landscaped areas, provided that their moisture content remains within +/- 2 percent of the optimum value as established by ASTM Method D698-12e1. These soils are susceptible to moisture absorption due to precipitation and therefore should be protected from the elements if stockpiled on site. The suitability of re-using these soils should be assessed during early stages of construction. The native soils below the groundwater table are expected to be too wet for adequate compaction and should be discarded. They may, however, be used for general grading purposes in the landscape areas if left in the sun to dry or mixed with drier material. The existing topsoil (surficial and buried)/organic soil are not considered suitable for use as backfill material.

It is anticipated that the majority of the material required for backfilling purposes in the interior and exterior of the proposed building and for trench backfill would have to be imported and should preferably conform to the following specifications:

- Engineered fill under footings for the proposed school building and for the portables OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 100 percent SPMDD,
- Engineered fill under the floor slab of the proposed school building OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 98 percent SPMDD,
- Backfill material for footing trenches and against foundation walls located outside the proposed school building OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 95 percent SPMDD,
- Trench backfill and subgrade fill should consist of OPSS 1010 Granular B Type II for the play structure and OPSS 1010 Select Subgrade Material (SSM) for the sports field, parking lot and access roads, placed in 300 mm thick lifts and each lift compacted to 95 percent SPMDD; and
- Fill for landscaped areas should be clean fill free of debris, topsoil (organic soil), cobbles and boulders placed in 300 mm thick lifts and each lift compacted to 92 percent SPMDD.



14. Access Roads and Parking Lots

The subgrade for the pavement structures is anticipated to consist of the native silts and clays, OPSS Granular B Type II material, OPSS Select Subgrade material (SSM) and approved on-site material. Pavement structure thicknesses required for the access roads and parking lots set on the anticipated approved subgrade materials were computed and are shown in Table VIII. The pavement structures assume a functional design life of 15 to 20 years. The proposed functional design life represents the number of years to the first rehabilitation, assuming regular maintenance is carried out.

Table VIII: Recommended Pavement Structure Thicknesses									
	Composion	Computed Pavement Structures							
Pavement Layer	Requirements	Light Duty Traffic (Cars Only)	Heavy Duty Traffic (Buses and Trucks)						
Asphaltic Concrete	92 percent to 97 percent MRD	65 mm HL3/SP12.5 mm/ Cat. B (PG 58-34)	50 mm HL3/SP12.5 Cat. B (PG 58-34) 60 mm HL8/SP 19 Cat. B (PG 58-34)						
OPSS 1010 Granular A Base (crushed limestone)	100% percent SPMDD	150 mm	150 mm						
OPSS 1010 Granular B Type II Sub-base	100% percent SPMDD	450 mm	600 mm						

Notes:

- 1. SPMDD denotes standard Proctor maximum dry density, ASTM, D-698-12e2.
- 2. MRD denotes Maximum Relative Density, ASTM D2041.
- 3. The upper 300 mm of the subgrade fill must be compacted to 98% SPMDD.
- 4. The approved subgrade should be covered with a woven geotextile prior to placement of granular sub-base of the pavement structure.

The foregoing design assumes that construction is carried out during dry periods and that the subgrade is stable under the load of construction equipment. If construction is carried out during wet weather and, heaving or rolling of the subgrade is experienced, additional thickness of granular material may be required in addition to the woven geotextile indicated in Table VIII.

Additional comments on the construction of the parking lots and access roads are as follows:

- As part of the subgrade preparation, the areas of the proposed parking area and access roads should be stripped of all existing fill, surficial and buried topsoil (organic) layers and organic stained soils down to the native undisturbed soil. The subgrade should be properly shaped, crowned, then proofrolled in the full-time presence of a representative of this office. Any soft or spongy subgrade areas detected should be sub excavated and properly replaced with suitable approved backfill compacted to 95 percent SPMDD (ASTM D698-12e2).
- 2. The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved. The need for adequate drainage cannot be over-emphasized. Subdrains should be installed on both sides of the access road(s). Subdrains must be installed in the proposed parking area at low points and should be continuous between catchbasins to intercept excess surface and subsurface moisture and to prevent subgrade softening. This will ensure no water collects in the granular course, which could result in pavement failure during the spring thaw. The location and extent of subdrains required within the paved areas should be reviewed by this office in conjunction with the proposed site grading.
- 3. To minimize the problems of differential movement between the pavement and catchbasins/manhole due to frost action, the backfill around the structures should consist of free-draining granular preferably conforming to OPSS



Granular B Type II material. Weep holes should be provided in the catchbasins/manholes to facilitate drainage of any water that may accumulate in the granular fill.

- 4. The most severe loading conditions on light-duty pavement areas and the subgrade may occur during construction. Consequently, special provisions such as restricted lanes, half-loads during paving, temporary construction roadways, etc., may be required, especially if construction is carried out during unfavorable weather.
- 5. The finished pavement surface should be free of depressions and should be sloped (preferably at a minimum cross fall of 2 percent) to provide effective surface drainage towards catch basins. Surface water should not be allowed to pond adjacent to the outside edges of paved areas.
- 6. Relatively weaker subgrade may develop over service trenches at subgrade level. These areas may require the use of thicker/coarser sub-base material and the use of a geotextile at the subgrade level. If this is the case, it is recommended that additional 150 mm thick granular sub-base, OPSS Granular B Type II, should be provided in these areas, in addition to the use of a geotextile at the subgrade level.
- 7. The granular materials used for pavement construction should conform to Ontario Provincial Standard Specifications (OPSS 1010) for Granular A and Granular B Type II and should be compacted to 100 percent of the SPMDD.

The asphaltic concrete used, and its placement should meet OPSS 1150 or 1151 requirements. It should be compacted from 92 percent to 97 percent of the MRD (ASTM D2041). Asphalt placement should be in accordance with OPSS 310 and OPSS 313.

It is recommended that EXP be retained to review the final pavement structure design and drainage plans prior to construction to ensure they are consistent with the recommendations of this report.



15. Corrosion Potential

Chemical tests limited to pH, sulphate, chloride and resistivity were undertaken on three (3) soil samples. A summary of the results is shown in Table IX. The laboratory certificate of analysis is shown in Appendix B.

Table IX: Corrosion Test Results on Soil Samples										
Borehole – Sample No.	Depth (m)	Soil Type	рН	Sulphate (%)	Chloride (%)	Resistivity (ohm-cm)				
BH 1 SS3	1.5 – 2.1	Silty Clay	7.72	0.0059	0.0009	6410				
BH 3 SS5	3.0 - 3.5	Sandy Clayey Silt	8.24	0.0048	0.0006	5350				
BH 8 SS7	4.6-5.0	Clayey Silt	8.23	0.0136	0.0004	3880				

The results indicate the soils have a negligible sulphate attack on subsurface concrete. The concrete should be designed in accordance with CSA A.23.1-14.

The results of the resistivity tests indicate that tested soils are mildly corrosive to bare steel as per the National Association of Corrosion Engineers (NACE). Appropriate measures should be taken to protect the buried bare steel from corrosion.

16. Tree Planting Restrictions

Based on the results of the Atterberg limits of the clayey soils and comparison of the results with the City of Ottawa 2005 Clay Soils Policy and 2017 Tree Planting in Sensitive Marine Clay Soils Guidelines (2017 Tree Planting Guidelines), the clayey soils at this site are considered to have a low/medium potential for soil volume change. Therefore, the requirements for tree planting should be in accordance with the 2017 City of Ottawa Tree Planting Guidelines.

A landscape architect should be consulted to ensure the tree planting restrictions and setbacks from the proposed school development at the site are in accordance with the applicable City of Ottawa guidelines.

17. Additional Comments

All earthwork activities from subgrade preparation to placement and compaction of engineered fill, fill in service trenches, placement and compaction of granular materials and asphaltic concrete, should be inspected by qualified geotechnicians to ensure that construction proceeds according to the project specifications.

All the footing beds should be examined by a geotechnical engineer to ensure that the founding surfaces are capable of supporting the design bearing pressure and that the footing beds have been properly prepared.



18. General Comments

The comments given in this report are intended only for the guidance of design engineers. The number of test holes (boreholes and test pits) required to determine the localized underground conditions between test holes affecting construction costs, techniques, sequencing, equipment, scheduling, etc., would be much greater than has been carried out for the design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual test hole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

The information contained in this report is not intended to reflect on environmental aspects of the soils. Should specific information be required, including for example, the presence of pollutants, contaminants or other hazards in the soil, additional testing may be required.

We trust that the information contained in this report will be satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Sincerely

Daniel Wall, M. Eng., P.Eng. Geotechnical Engineer Earth & Environment



Susan M. Potyondy, P.Eng. Senior Project Manager Earth & Environment

EXP Services Inc.

*exp.

Project Name: Proposed Riverside South Catholic Elementary School Brian Good Avenue and Solarium Avenue, Ottawa, Ontario OTT-22012013-A0 September 21, 2022

Figures





- SCHOOL BUILDING SITE PLAN
- **BH-1** (91.60m)
- **TP-1** (91.07m)
- (GROUND SURFACE ELEVATION) PROPOSED TEST PIT NO. & LOCATION
 - (GROUND SURFACE ELEVATION)

PROPOSED BOREHOLE NO. & LOCATION

- 1. THE BOUNDARIES AND SOIL TYPES HAVE BEEN ESTABLISHED ONLY AT BOREHOLE AND TEST PIT LOCATIONS. BETWEEN BOREHOLES AND TEST PITS THEY ARE ASSUMED AND MAY BE SUBJECT TO CONSIDERABLE ERROR.
- 2. SOIL SAMPLES WILL BE RETAINED IN STORAGE FOR THREE MONTHS AND THEN DESTROYED UNLESS THE CLIENT ADVISES THAT AN EXTENDED TIME PERIOD IS REQUIRED.
- 3. BOREHOLE AND TEST PIT ELEVATIONS SHOULD NOT BE USED TO DESIGN BUILDING(S)
- OR FLOOR SLABS OR PARKING LOT(S) GRADES.
 4. TOPSOIL QUANTITIES SHOULD NOT BE ESTABLISHED FROM THE INFORMATION AT THE BOREHOLE AND TEST PIT LOCATIONS.
 5. THIS DRAWING FORMS PART OF THE REPORT PROJECT NUMBER AS REFERENCED AND SHOULD BE USED ONLY IN CONJUNCTION WITH THIS REPORT.
 6. BASE DIAN OFTAINED FROM DRAWING NO. ALOCA DATED HILLS 4, 2022 (DEVISION 2)
- BASE PLAN OBTAINED FROM DRAWING NO. A100-A DATED JULY 4, 2022 (REVISION 3)
- 6. PREPARED BY PYE & RICHARDS - TEMPRANO & YOUNG ARCHITECTS INC.
- DESIGN IT/DW exp Services Inc. 100-2650 Queensview Drive DRAWN AS Ottawa, ON K2B 8H6 www.exp.com ÄŪGUST 2022 FILE NO OTT-22012013-A0

0 10m 20	m 40m
HORIZONTAL	1:1000
PROJECT NAME: PROPOSED NEW RIVERSIDE SOUTH	SCALE
CATHOLIC ELEMENTARY SCHOOL	1:1,000
PROJECT LOCATION: BRIAN GOOD AVENUE AND SOLARIUM AVENUE, OTTAWA, ON	SKETCH NO
TEST HOLE LOCATION PLAN	FIG 2

Notes On Sample Descriptions

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by **exp** Services Inc. also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

CLAY		SILT			SAND	6		GRAVE	EL		COBBLES	BOULDERS
-	FINE	MEDIUM	COARS	SE FINE	E MEDIU	JM COA	RSE FINE	MEDIU	M CO/	ARSE		
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				10			2000 	and a second second second				0

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE					
SILT (NONPLASTIC)		SAND		1	GRAVEL					
UNIFIED SOIL CLASSIFICATION										

- 2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.
- 3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Log	of	Boreho	le	BH-01
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Project No:	OTT-22012013-A0			- 0/10
Project:	Proposed New Riverside South Catholic Eleme		Figure No. <u>3</u>	
Location:	Brian Good Avenue and Solarium Avenue, Otta	awa, ON		Page. <u>1</u> 01 <u>2</u>
Date Drilled:	'July 15, 2022	Split Spoon Sample		Combustible Vapour Reading
Drill Type:	CME-75 Track Mounted Drill Rig	Auger Sample —— SPT (N) Value		Natural Moisture Content X Atterberg Limits ————————————————————————————————————
Datum:	Geodetic Elevation	Dynamic Cone Test Shelby Tube		Undrained Triaxial at \oplus % Strain at Failure
Logged by:	AN Checked by: DW	Shear Strength by Vane Test	+ s	Shear Strength by Penetrometer Test

		S		Geodetic	D	Standar	d Per	etration Te	st N Val	ue	Combus 24	stible Vapo	our Readin	g (ppm)	S A	Natural
	Ŵ	М В	SOIL DESCRIPTION	Elevation	p	20	4	0 60	8	30	Nat	ural Moist	ire Conter	nt %	P	Unit Wt.
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	R	\otimes	Silty clay, with topsoil inclusions and rootlets			2								÷	$ \rangle $	
		\otimes	brown moist (very loose)			P: : : : : : : : : : : : : : : : : : :	÷ : ·	*****	$2 \div 1 \Rightarrow$	+:::::	$\dot{\cdot}$	×····	\cdots	****	ΙXΙ	SS1
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			Low plasticity, brown, moist, (firm)													
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				90.2											\square	
		111	- <u>SILTY CLAY</u> -													
			Brown, wet, (very stiff)			3		:144 kF	Pa						$ \rangle $	662
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 NOTES:
 WATER LEVEL RECORDS

 1. Borehole data requires interpretation by EXP before use by others
 Date
 Water
 Hole Open

 2. A 32 mm diameter monitoring well installed as shown.
 Date
 Water
 Hole Open

 3. Field work supervised by an EXP representative.
 August 22, 2022
 3.8
 Open

 4. See Notes on Sample Descriptions
 5. Log to be read with EXP Report OTT-22012013-A0
 August 22, 2022
 3.8

Log of Borehole BH-01



Project: Proposed New Riverside South Catholic Elementary School

Project No: OTT-22012013-A0

Figure No.

Project. Proposed New Riverside South Catholic Elementary School Page. 2 of 2																		
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LOG OF BOREHOLE OTT-22012013-A0 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22 2. A 32 mm diameter monitoring well installed as shown 3. Field work supervised by an EXP representative.

4. See Notes on Sample Descriptions

5. Log to be read with EXP Report OTT-22012013-A0
| Log of | Borehole | <u>BH-02</u> |
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*exp.

Project No:	OTT-22012013-A0			CNP
Project:	Proposed New Riverside South Catholic Elementary	School	Figure No. <u>4</u>	I
Location:	Brian Good Avenue and Solarium Avenue, Ottawa, O	ON	rage. <u>1</u> 01 <u>1</u>	
Date Drilled:	'July 19, 2022	Split Spoon Sample	Combustible Vapour Reading	
Drill Type:	CME-75 Track Mounted Drill Rig	Auger Sample II SPT (N) Value O	Natural Moisture Content Atterberg Limits	× ⊢⊸
Datum:	Geodetic Elevation	Dynamic Cone Test Shelby Tube	Undrained Triaxial at % Strain at Failure	\oplus
Logged by:	AN Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test	

	_	S		Standard Penetration Test N Value Comb				Combu	ombustible Vapour Reading (ppm)				Natural								
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NOTES WATER LEVEL RECORDS CORE DRILLING RECORD 1.Borehole data requires interpretation by EXP before use by others Water Level (m) 3.0 Run No. Hole Open To (m) Open RQD % % Rec. Depth Date (m) 2. Borehole backfilled upon completion of drilling. Upon Completion 3. Field work supervised by an EXP representative. 4. See Notes on Sample Descriptions 5. Log to be read with EXP Report OTT-22012013-A0



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Project No:	OTT-22012013-A0		
Project:	Proposed New Riverside South Catholic Elementary	Figure No. <u> </u>	
Location:	Brian Good Avenue and Solarium Avenue, Ottawa, O	N	Page. I of I
Date Drilled:	'July 19, 2022	Split Spoon Sample	Combustible Vapour Reading
Drill Type:	CME-75 Track Mounted Drill Rig	Auger Sample SPT (N) Value O	Natural Moisture Content X Atterberg Limits
Datum:	Geodetic Elevation	Dynamic Cone Test	Undrained Triaxial at \oplus % Strain at Failure
Logged by:	AN Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test

		S Y		Geodetic	D	Standa	Ird Per	netration I	est N Val	ue	Combus 25	tible Vapo 0 5/	our Readin 00 75	g (ppm) i0	A	Natural
N L	<i>i</i>	M B O	SOIL DESCRIPTION	Elevation	p t	20 Shear Stre	4 ngth	0 6	0 8	30 kPa	Natu Atterbe	Iral Moisti arg Limits	ure Conten (% Dry W	it % eight)	P	Unit Wt.
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			FILL Clayey silt, with sand and rootlets, grey, noist, (loose)	_		4 ··· ·· O ··· ··	\$ {. }. \$ {. }. \$ {. }. \$ {. }.					×			X	SS1
			SANDY CLAYEY SILT	90.5	1	4 ••••••••••••••••••••••••••••••••••••										SS2
		_s	stiff)	_	2	4 		>120 kPa				«				SS3
				_	3	2		>120 kPa					×			SS4 17.4
				_	5	2) (. .) (. .) (. .) (. .) (. .) (. .) (. .) (. .	>120 kPa-				· · · · · · · · · · · · · · · · · · ·	X			SS5 17.1
		S	SILTY CLAY Grey to dark grey, wet, (firm to stiff)	87.8	4		96	Pa				······································			L L	ST6
8/31/22				_	5	-5	:s=6 Pa	5.7					×			SS7
OW OTTAWA.GDT				_	6	3 	.2						×			SS8
н				85.4	Ŭ	s=5.0									Ш	
2013-A0 LOGS AUGUST 25 2022.GPJ			Borehole Terminated at 6.2 m Depth													
-2201	OTE	S:		WATER	٦L	EVEL RECO) RDS				CO	RE DRII	LING RE	CORD		

-22(NOIES:	WAT	TER LEVEL RECOR	RDS		CORE DF	RILLING RECOR	D
Fo	use by others	Date	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %
OLE	2. Borehole backfilled upon completion of drilling.	Upon Completion	3.0	5.3				
REH	3. Field work supervised by an EXP representative.							
BO	4. See Notes on Sample Descriptions							
LOG OF	5. Log to be read with EXP Report OTT-22012013-A0							

			Log of	f Bo	r	ehole <u>BH</u> -	-04	***	exn
Pr	oject	No:	OTT-22012013-A0						
Pr	oject	:	Proposed New Riverside South Catholic I	I		I			
Lo	catio	n:	Brian Good Avenue and Solarium Avenue	e, Ottawa	, O	N		Page. I of I	
Date Drilled: 'July 19, 2022					Split Spoon Sample	3	Combustible Vapour Reading		
Dr	ill Typ	I Type: CME-75 Track Mounted Drill Rig				Auger Sample	0 C	Natural Moisture Content Atterberg Limits	× ──⊖
Da	tum:		Geodetic Elevation			Dynamic Cone Test	-	Undrained Triaxial at % Strain at Failure	\oplus
Lo	gged	by:	AN Checked by: DW			Shear Strength by – Vane Test S	+ s	Shear Strength by Penetrometer Test	
G W L	S Y M B O L		SOIL DESCRIPTION	Geodetic Elevation m 91.57	D e p t h	Standard Penetration Test N V 20 40 60 Shear Strength 50 100 150	alue 80 kPa 200	Combustible Vapour Reading (ppm) 250 500 750 Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	S M P Unit Wt. E S
		FILL Sand	ly silty clay, with rootlets, brown to grey,			3			

			_	6	6	· · · · · · · · · · · · · · · · · · ·		4	ST8 16.9
			-	5	0 		*	1	SS7
22	¥		87.37 87.1	4	4 2		*		SS6
		CLAYEY SILT With silty sand seams, grey, wet, (stiff)	- Ham 88.6	3	er weignt 	· · · · · · · · · · · · · · · · · · ·	×		SS4 SS5
		to loose)	-	2	2 2		*		SS3 18.3
			90.4	1	0 		*	X	SS2 17.5
		FILL Sandy silty clay, with rootlets, brown to grey, moist, (very loose)		0	0 3 0 0 0 0 0 0 0 0 0 0 0 0 0	· · · · · · · · · · · · · · · · · · ·	*	X	SS1

1. Borehole data requires interpretation by EXP before use by others Water Level (m) 2.4 Hole Open To (m) 6.1 Depth (m) Run No. % Rec. RQD % LOG OF BOREHOLE OTT Date 2. A 32 mm diameter monitoring well installed as shown. Upon Completion August 22, 2022 4.2 3. Field work supervised by an EXP representative. 4. See Notes on Sample Descriptions 5. Log to be read with EXP Report OTT-22012013-A0

Log of	f Borehole	<u>BH-05</u>
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Project No: <u>OTT-22012013-A0</u>

*exp.

Project:	Proposed New Riverside South Catholic Elementary	School		Figure No	I
Location:	Brian Good Avenue and Solarium Avenue, Ottawa, C		Page. <u>I</u> of <u>I</u>		
Date Drilled:	'July 14, 2022	Split Spoon Sample	\boxtimes	Combustible Vapour Reading	
Drill Type:	CME-75 Track Mounted Drill Rig	Auger Sample		Natural Moisture Content	×
Dim Type.		SPT (N) Value	0	Atterberg Limits	-O
Datum:	Geodetic Elevation	Dynamic Cone Test		Undrained Triaxial at	Φ
		Shelby Tube		% Strain at Failure	Ŷ
Logged by:	AN Checked by: DW	Shear Strength by Vane Test	+ s	Shear Strength by Penetrometer Test	

		S Y		Geodetic	D		Star	idard Pen	etration T	est N Vali	le	Combus 25	tible Vap 0 5	our Readin 00 75	g (ppm) 50	A	Natural
	ΨĮ	B	SOIL DESCRIPTION	Elevation	p	Cha	20	4	0 6	0 E	30 kDa	Natu	ral Moist	ure Conter	nt %	P	Unit Wt.
	٦	Ľ		m	h	She	ar 31 50	10	10 1	50 2	кга 00	20		0 6	o eiginit)	ĿΕσ	kN/m°
		\bigotimes	FILL Silty sand with roots, rootlets and topsoil inclusions, brown, moist, (loose)	_91.73	0	·· 8 · · ①						·····>	(V	SS1
				90.3	1	80 							*				SS2 19.0
			Brown to grey, moist, (very stiff)	_	2	4 			120 kPa					*			SS3
				_		2		106	kPa					*			SS4 17.7
				88.1	3	20		S	6.3				*				SS5
			GLACIAL TILL Silty sand with gravel, cobbles and boulders, – grey, wet, (loose to dense) -	-	4				-48 					č			SS6
5UI 8/31/22				_	5	6						×					SS7
W OI IAWA.0	128.921.924.51			85.8		7- ©						×					SS8
013-A0 LUGS AUGUST 25 2022.GPJ 1KU			Borehole Terminated at 5.9 m Depth														
Ξr		TES:															

F-220	NOTES:	TAW	TER LEVEL RECOR	RDS		CORE D	RILLING RECOR	D
P P	use by others	Date	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %
OLE	2. Borehole backfilled upon completion of drilling.	Upon Completion	3.4	Open				
H H H H H	3. Field work supervised by an EXP representative.							
BO	4. See Notes on Sample Descriptions							
-0G OF	5. Log to be read with EXP Report OTT-22012013-A0							

Log of Borehole <u>BH-06</u>

[%] exp.

Project No:	OTT-22012013-A0		
Project:	Proposed New Riverside South Catholic Elementary	/ School	Figure No. <u>8</u>
Location:	Brian Good Avenue and Solarium Avenue, Ottawa,	ON	Page. I of I
Date Drilled:	'July 18, 2022	Split Spoon Sample	Combustible Vapour Reading
Drill Type:	CME-75 Track Mounted Drill Rig	Auger Sample SPT (N) Value O	Natural Moisture Content X Atterberg Limits ————————————————————————————————————
Datum:	Geodetic Elevation	Dynamic Cone Test Shelby Tube	Undrained Triaxial at \oplus % Strain at Failure
Logged by:	AN Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test

		S Y		Geodetic	D	D	Standard P	enetration	Test N Val	ue	Combus 25	tible Vapo 0 50	ur Readir	ng (ppm) 50	A	Natural
N N	2	M B	SOIL DESCRIPTION	Elevation	p	p p	20 Chase Chase th	40	60 8	30 I-D-	Natu	Iral Moistu	ire Conte	nt %	P	Unit Wt.
1	·	0 L		m	h	ĥ	Snear Strength	100	150 2	кра	Allerb		(% Dry W	reigni)	Ę	kN/m°
	k	\propto	FILL	91.68	0	⁰╞										
	Ř	\times	Silty sand, trace to some clay, with roots and				3	+	• • • • • • •	ł			• • • • • • •	÷ • • • •	łV	004
	X	\otimes	rootlets, brown, moist, (very loose to loose)			ľ							· · · · · · · · · · ·		ΙΛ	551
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	Ŕ	\otimes	Metal wire fragment at 1.3 m depth			1									1	
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	Ø	///	CLAY			1	©					: X :::			Į Ņ	20.1
	V		High plasticity, brown to grey, moist, (very -	-	2	2	<u></u>	>120 kP							$\langle \rangle$	20.1
	V	$\langle \rangle \rangle$	stiff)			Ŧ	****	+++++		₽					ſ	
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	V	$//\lambda$				-		>120 kP	a							
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	V			-	3	3 -	****	+ : : : :	+ : : : :	<u> </u>	+ • • • • • •	· · · · · · · · · ·	· · · · · · ·	<u> </u>	\mathbb{H}	
	V	$//\lambda$				1	2,							÷	IV	995
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	V	$//\lambda$		-		ł	****	115 kPa		$+ \cdots + \cdots$			· • • • • •	<u> </u>	/ \ A	
	V	//		87.9		1									ŧЦ	
	K	49	GLACIAL TILL	-07.5		t	*****	. s-4.8		<u> </u>		· · · · · · · · · · · · · · · · · · ·			K	
	Ø	S S	Silty sand with gravel, cobbles and boulders.	-	4	4	****	5	5++++++	$+ \cdots$				<u> </u>	łV	000
	k	5/20	grey, wet, (compact to very dense)			1									ΙÅ	556
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ŝ	Z	(S)		85.8				+							/ \	
2			Borehole Terminated at 5.9 m Depth													
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1. Borehole data requires interpretation by EXP before use by others Water Level (m) Hole Open To (m) Run RQD % Depth % Rec. Date No. (m) 2. Borehole backfilled upon completion of drilling. Upon Completion Dry Open 3. Field work supervised by an EXP representative. 4. See Notes on Sample Descriptions 5. Log to be read with EXP Report OTT-22012013-A0

LOG OF BOREHOLE OTT-22013-40 LOGS AUGUST 25 2022.GPJ ТROW OTTAWA.GDT 8/31/22

	Log of	f Bo	r	ehole BH-	·07	÷.		xn
Project No:	OTT-22012013-A0				,			mγ.
Project:	Proposed New Riverside South Catholic I	Elementa	ry S	School	r	-igure No. <u>9</u>		I
Location:	Brian Good Avenue and Solarium Avenue	e, Ottawa	, O	N		1 age 01		
Date Drilled:	'July 15, 2022		-	Split Spoon Sample	3	Combustible Vapour Reading		
Drill Type:	CME-75 Track Mounted Drill Rig			Auger Sample	0	Natural Moisture Content		×
Datum:	Geodetic Elevation		_	Dynamic Cone Test	-	Undrained Triaxial at % Strain at Failure		⊕
Logged by:	ogged by: AN Checked by: DW		Shear Strength by + Vane Test S		■ - 3	Shear Strength by Penetrometer Test		
G Y M W B U O L	SOIL DESCRIPTION	Geodetic Elevation m	D e p t h	Standard Penetration Test N Va 20 40 60 Shear Strength 50 100 150	alue 80 kPa 200	Combustible Vapour Reading (ppm) 250 500 750 Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m ³
FILL Silty rootl	sand, trace to some clay, with roots and ets, brown, moist, (loose)	-		······································		×	Ň	SS1
- <u>SAN</u> With	IDY SILTY CLAY – n silt partings, brown, moist, (soft to stiff)	90.7	1	11 		*		SS2 19.2

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\$ 6. 1. 5

89.4

85.5

88.63 3

SILTY CLAY

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XX

2013-A0 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22

High plasticity, grey, wet, (firm to very stiff)

Borehole Terminated at 6.1 m Depth

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120 kPa

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-86 kPa

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72 kPa

s-6.0

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48 kPa

s=5.0

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SS3

SS4

17.1

ST5

15.8

SS6

SS7

SS8

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	NOTES:	WAT	ER LEVEL RECOP	RDS		CORE DF	RILLING RECORI	D
Fo	use by others	Date	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %
5	2.A 19 mm diameter standpipe installed as shown.	Upon Completion	Dry	Open				
핊	3. Field work supervised by an EXP representative.	August 22, 2022	3.0					
B	4. See Notes on Sample Descriptions							
LOG OF	5. Log to be read with EXP Report OTT-22012013-A0							

Log of Borehole <u>BH-08</u>

[%] exp.

Project No:	OTT-22012013-A0		
Project:	Proposed New Riverside South Catholic Elementary	/ School	Figure No. <u>10</u>
Location:	Brian Good Avenue and Solarium Avenue, Ottawa,	ON	Page or
Date Drilled:	'July 15, 2022	Split Spoon Sample	Combustible Vapour Reading
Drill Type:	CME-75 Track Mounted Drill Rig	Auger Sample II SPT (N) Value O	Natural Moisture Content X Atterberg Limits
Datum:	Geodetic Elevation	Dynamic Cone Test Shelby Tube	Undrained Triaxial at \oplus Strain at Failure
Logged by:	AN Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Arenetrometer Test

		s		Geodet			S	tandar	d Per	netrat	ion T	est N	Value	e	Co	mbus	stible V	apou	r Readir	ng (ppm)	S A	Notural
	G	Ň	SOIL DESCRIPTION	Elevatio	n p			20	4	0	6	0	80)		Nati	ural Mo	pistur	e Conter	50 nt %	P	Unit Wt.
	니	ŏ		m	it h	t [Shear	Streng	gth					kPa	A	tterb	erg Lir	nits ('	% Dry W	/eight)	E	kN/m ³
+	-		F IL 1	91.48	0	$\left \right $	··· ·· ·	50	10	20	15	50	20	0 • • • • • •	· · · · ·	2	0	-40	6	0 	s	
	k	$\times\!\!\times$	FILL Sandy silt, with gravel, trace clay and regulate				2:		(* 1 * (* 1 *						131				(+) (+) (+ (+) (+) (+)		1\/	
	K	>>>	brown moist (very loose)			k	⊙: ⊹ i ·:		÷ ! ·		$\cdot \cdot \cdot$	•••••		• • • • •	·	×		•	•••••	+++++	łΧ	SS1
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			With sand and shell fragments, low plasticity				2:								133	13		:::		X X I X	1\/	
			arey wet (firm to very stiff)			k	Q: :: ! :	: + : · :	$\dot{\cdot}$	• • • •	$\dot{\cdot}\dot{\cdot}$	•••••	: : †	• • • • •	· ÷ ÷	22	$ \cdot : \cdot : \cdot $	X	$\{\cdot\} \div \{\cdot\}$	+ ÷ ÷ ÷ ÷	ŧΧ	SS5
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	Γ		Borehole Terminated at 6.1 m Depth						:::	::	::		::			::		-	::::			
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1. Borehole data requires interpretation by EXP before use by others Water Level (m) Hole Open To (m) Run % Rec. RQD % Depth Date No. (m) 2. Borehole backfilled upon completion of drilling. Upon Completion 1.5 Open 3. Field work supervised by an EXP representative. 4. See Notes on Sample Descriptions 5. Log to be read with EXP Report OTT-22012013-A0

LOG OF BOREHOLE OTT-22012013-A0 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22

Log	of	Bo	re	ho	le	BH	-09
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Project No:	OTT-22012013-A0		-	UNP
Project:	Proposed New Riverside South Catholic Elementary	School	Figure No. <u>11</u>	I
Location:	Brian Good Avenue and Solarium Avenue, Ottawa, O	NC	Page. I of I	
Date Drilled:	'July 14, 2022	Split Spoon Sample	Combustible Vapour Reading	
Drill Type:	CME-75 Track Mounted Drill Rig	Auger Sample SPT (N) Value O	Natural Moisture Content Atterberg Limits	× —⊖
Datum:	Geodetic Elevation	Dynamic Cone Test	Undrained Triaxial at % Strain at Failure	\oplus
Logged by:	AN Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test	

	٦	S Y		Geodetic	D	Standard Penetration Te	est N Va	ue	Combustible Vapo 250 50	[,] ur Reading (ppm))0 750	A	Natural
	Ψ L	B	SOIL DESCRIPTION	Elevation	p t	20 40 60 Shear Strength)	80 kPa	Natural Moistu Atterberg Limits	ure Content % (% Dry Weight)	P	Unit Wt.
		Ľ		91.76	h 0	50 100 15	0 2	200	20 4	0 60	E S	KIN/III
		>>>	FILL Silty day with cand, restlete and tangoil	01 5	ľ	······································					://	
		XX	inclusions brown moist (loose)	91.5		÷Õ:			× :		ΞX	18.3
				-			<u></u>				-//	10.5
			With sand seams, brown, moist, (stiff to very									
			stiff)								1	1
			-		1				*		ΠX	SS2
											::://\	
				_							t	1
						3					±1//	553
										X	ΞÅ	17.1
				-	2	>120 kPa	<u> </u>		<u></u>		1	4
						· · · · · · · · · · · · · · · · · · ·	$\cdot \cdot \cdot \cdot \cdot \cdot$	+ • • • • • • •	· • • • • • • • • • • • • • •	r ••• •• •• •• •• ••	÷Ш	
						2	·• • • • •		· · · · · · · · · · · · · · · ·		\cdot	004
						96 kPa		÷ • • • • •		S	$\neg \land$	554
	۲			88.9								1
			- <u>SILTY CLAY</u>		3	s=5.7	·····		·····	· · · · · · · · · · · · · · · · · · ·		
			Grey, wet, (very soft)			2	$\begin{array}{c} \cdot \circ \circ \circ \circ \circ \circ \circ \circ \circ \circ \circ \circ \circ \circ \circ \circ \circ \circ $				ΞV	COF
							-> -> -> -> -> ->				ΞA	335
			-	88.2			• ••••••		· · · · · · · · · · · · · · · · · · ·	· • • • • • • • • • • • • • • • • •	:f	Ĭ
		M	GLACIAL TILL									
		SI A	arev wet (loose to compact)		4	15	· · · · · · · · · · · · · · · · · · ·		\div		1	1
			groy, wet, (loced to compact)		4	o o o	· · · · · · · · · · · · · · · · · · ·	÷ • • • • •	*		÷Х	SS6
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	H	¥]		-							-	1
ន្ត	H	L)									1	1
/31/						· · · · · · · · · · · · · · · · · · ·	• • • • • • • • • • • • • • • • • • • •	+	· × · · · · · ·		ΞX	SS7
≊[: ⊢l:		H	-		5						=//\	
5		Z										1
\mathbf{A}				_		17					-1//	
È	H					\odot			×		ΞŇ	SS8
≥⊧	ШĮ	LAX X		85.9			·····			· · · · · · · · · · · · · · · · · · ·	:/`	
別			Borehole Terminated at 5.9 m Depth				::::					
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123	NO	TES:		WATER	२ ।	EVEL RECORDS			CORF DRII			
Ë	1.	Boreh	ole data requires interpretation by EXP before		• -	Water Hole Ope	n	Run Depth % Rec. RQD %				

2	1 Borehole data requires interpretation by EXP before	WAI	ER LEVEL RECO	RDS		CORE DRILLING RECORD				
OT	use by others	Date	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %		
Ъ	2.A 19 mm diameter standpipe installed as shown.	Upon Completion	3.7	Open						
REH	3. Field work supervised by an EXP representative.	August 22, 2022	2.8							
BO	4. See Notes on Sample Descriptions									
LOG OF	5. Log to be read with EXP Report OTT-22012013-A0									

	Log of Bo	rehole BH-	-10		*e	nye
Project No:	OTT-22012013-A0			ura No. 12	C	\mathcal{M}
Project:	Proposed New Riverside South Catholic Elementary	School	––––––––––––––––––––––––––––––––––––––		4	1
Location:	Brian Good Avenue and Solarium Avenue, Ottawa,	ON		Page. <u>1</u> of _	1	
Date Drilled:	'July 14, 2022	Split Spoon Sample		ombustible Vapour Readi	ng	
Drill Type	CME-75 Track Mounted Drill Rig	Auger Sample	N	atural Moisture Content		X
Dim Type.		SPT (N) Value	D At	terberg Limits	⊢	$-\!$
Datum:	Geodetic Elevation	Dynamic Cone Test	- Ui	ndrained Triaxial at		\oplus
		Shelby Tube	70	Strain at Fallure		-
Logged by:	AN Checked by: DW	Shear Strength by Vane Test S	+ SI S Pe	near Strength by enetrometer Test		

		ş		Geodetic	D	5	Standard Penetration Test N Value		Combustible Vapour Reading (ppm)			SA	Natural				
V V	Š	MBO	SOIL DESCRIPTION	Elevation	e p t	Shea	20 ar Sti	renath	10 6	30 O	30 kPa	Nat Attert	tural Mois perg Limit	ture Conte s (% Drv V	nt % /eight)	М Р L	Unit Wt.
		Ĕ		91.77	h		50	1	00 1	50 2	00	2	20 .	40 6	50 50	ES	KIN/III
		\bigotimes	<u>FILL</u> Silty sand, with clay pockets, gravel, roots, rootlets, topsoil pockets, brown, moist, (very			3. 						****				X	SS1
			loose to loose)		1	9 • •	****						*				SS2 20.4
			SILTY CLAY Brown, moist, (very stiff)	90.3	2	4 Q			120 kPa				×				SS3
			– – – –	-		2			15 kPa					×			SS4 17.9
					3	3. 			s=6.0				*				SS5
			CLAYEY SILT _Low plasticity, grey, wet, (stiff)	88.1	4	3 O		72 kPa						X			SS6
DT 8/31/22	AN Y L VON			87.1	5		17 ©	s=7.5					*				SS7
<u>N OTTAWA.GI</u>	A VALLEY A VALLEY A			85.9					48			*					SS8
13-A0 LOGS AUGUST 25 2022.GPJ TROV	ŕ		Borehole Terminated at 5.9 m Depth														

[-220	NOTES:	WAT	TER LEVEL RECOR	RDS	CORE DRILLING RECORD				
Ы	use by others	Date	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %	
Ы	2. Borehole backfilled upon completion of drilling.	Upon Completion	4.3	Open					
핎	3. Field work supervised by an EXP representative.								
B	4. See Notes on Sample Descriptions								
-0G 0F	5. Log to be read with EXP Report OTT-22012013-A0								

			Log of	f Bo	r	ehole B	H-11	1		xn
Pro	oject	No:	OTT-22012013-A0					-i		
Pro	oject:	:	Proposed New Riverside South Catholic I	Elementa	ry	School	F			I
Lo	catio	n:	Brian Good Avenue and Solarium Avenue		Page. <u>1</u> of <u>1</u>					
Dat	te Dr	illed: '	July 14, 2022			Split Spoon Sample		Combustible Vapour Reading		
Dril	II Тур	e:	CME-75 Track Mounted Drill Rig			Auger Sample SPT (N) Value		Natural Moisture Content Atterberg Limits		× ⊸
Dat	tum:	(Geodetic Elevation			Dynamic Cone Test - Shelby Tube		Undrained Triaxial at % Strain at Failure		\oplus
Loę	gged	by:	AN Checked by: DW			Shear Strength by Vane Test	+ s	Shear Strength by Penetrometer Test		▲
G W L	S Y B O L		SOIL DESCRIPTION	Geodetic Elevation m 91 67	D e p t h	Standard Penetration Te 20 40 60 Shear Strength 50 100 150	st N Value 80 kPa 0 200	Combustible Vapour Reading (ppm) 250 500 750 Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m ³
	\bigotimes	FILL Silty sa brown	and, writh rootlets and brick fragments, , moist, (loose)		0	4 · · · · · · · · · · · · · · · · · · ·		·····	X	SS1

	Ĭ		91 67	h	50	100 150 2	200	20	40 60	ES	NIN/III
		FILL Silty sand, writh rootlets and brick fragn brown, moist, (loose)	nents,	0	4 · · · · · · · · · · · · · · · · · · ·			×			SS1
		- <u>SILTY CLAY</u> Brown, moist, (stiff)	90.8	1				*			SS2 21.9
		— <u>CLAYEY SANDY SILT</u> Brown grey, wet, (very loose) —	- 89.5	2	3. Q	>120 kPa		×			SS3
		SILTY CLAY Brown, moist, (very stiff)			.6 O	>120 kPa		×			SS4 17.9
			_	3	2	· · · · · · · · · · · · · · · · · · ·			×		SS5
		SILTY CLAY Grey, wet, (stiff)	88.0 ^{88.0} 	4	2	120 kra → 36 kPa →			*		SS6
5D1 8/31/22			- 86.4	5	2	s=5.1			*		SS7
W U I I AWA.G		GLACIAL TILL — Silty sand with gravel, cobbles and boul grey, wet, (dense)	ders, -			-33 		×			SS8
2013-A0 LOGS AUGUS I 25 2022.6PJ 1KU		Borehole Terminated at 5.9 m De	pth								
201	NOTES:] [WATI	FRI	EVEL RECO	RDS				D	
	1.Boreh	ole data requires interpretation by EXP before	Date Water Hole Open			Run Depth % Rec.			R	QD %	
2.A 32 mm diameter monitoring well installed as shown. Upon Completin				Date Level (m) To (m) No. (n Completion 4.3 Open I I			(m)				

 Upper Descriptions
 2.A 32 mm diameter monitoring well installed as shown.
 Upper Completion
 4.3
 Open

 3.Field work supervised by an EXP representative.
 4. See Notes on Sample Descriptions
 3.6
 Open

 5.Log to be read with EXP Report OTT-22012013-A0
 0
 0
 0
 0

	Log o	f Bo	r	ehole BH-12	2	[%] ڪ	n
Project No:	OTT-22012013-A0				_	Eiguro No. 1/	Y
Project:	Proposed New Riverside South Catholic	Elementa	ry \$	School		Base 1 of 2	1
Location:	Brian Good Avenue and Solarium Avenu	e, Ottawa	, O	DN		Page. I of Z	
Date Drilled:	'July 14, 2022			Split Spoon Sample		Combustible Vapour Reading	•
Drill Type: CME-75 Track Mounted Drill Rig Datum: Geodetic Elevation Logged by: AN Checked by: DW				SPT (N) Value		Atterberg Limits)
			Dynamic Cone Test		Undrained Triaxial at)	
				Shear Strength by + Vane Test S		Shear Strength by Penetrometer Test	
G M W B	SOIL DESCRIPTION	Geodetic Elevation	D e p t	Standard Penetration Test N Value 20 40 60 80 Shear Strength	kPa	Combustible Vapour Reading (ppm) S 250 500 750 M Natural Moisture Content % Atterberg Limits (% Dry Weight)	atural it Wt.
L Silty topsc (loos	sand with gravel, cobbles, boulders and bil inclusions, black to brown, moist e) DY SILT	91.52	1	50 100 150 200 • 9 • • • • • • • • • • • • • • • • • •		20 40 60 5	3S1
	e clay, brown, moist, (loose) - - Y CLAY	89.3	2	4 Ç. 		× 1	7.9 3S3
Grey	, moist to wet, (stiff to very stiff)	-	3	3 0 2 C C C 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2		× 1	\$S4 \$S5 7.0
	-		4	2			

>120 kPa

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38 kPa +

s=8.0

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85.8

84.3

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Hammer Weight

SS6

ST7

SS8

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4.4

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CLAYEY SILT Grey, wet, (firm)

SILTY SAND With gravel, trace clay, grey, wet, (very loose)

Continued Next Page		3 Q			*		SS9
NOTES:	WAT	ER LEVEL RECO	RDS		CORE D	RILLING RECOR	D
use by others	Date	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %
2.A 32 mm diameter monitoring well installed as shown.	Upon Completion	6.1	Open				
3. Field work supervised by an EXP representative.	August 22, 2022	4.8					
4. See Notes on Sample Descriptions							
5. Log to be read with EXP Report OTT-22012013-A0							

Log of Borehole <u>BH-12</u>



Project: Proposed New Riverside South Catholic Elementary School

Project No: OTT-22012013-A0

Figure No.

	ojeci	- Proposed New Alverside South Catholic		.ai y	001								-		I	Pag	e.	2	of	2		
	S		Quality	D	,	Star	ndard I	Pene	tration	n Te	st N V	/alue	•		Cor	nbus	tible Va	apour	r Readir	ng (ppm) S A	National
G W	M B	SOIL DESCRIPTION	Elevation	p p		20) ronath	40		60		80	kD.			25 Natu	u ral Mo	500 isture	e Conter	oU nt % (oight)	-M P	Unit Wt.
	L			ĥ		50))	100		150)	200)	a		2())	40	6	0	Ē	kN/m°
		SILTY SAND With gravel trace clay, grey, wet (very loose)										::									ŧΖ	,
		(continued)										4										
		_	82.8							÷ ·			••••						• • • •		-	
		GLACIAL TILL Silty and with gravel, aphles and bouldars																				
		grey, wet, (compact to dense)	-	9					:.::; :.:;	::	;;;;	*	<u>;;;</u> ;	;.	÷:::						:	
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			_	10						÷ŀ					÷				• • • • •			
		Silty sand heaving up into the augers from 7.6 m to 9.1 m denths							(* (* * * (* (* * *	::	> >	::	$\begin{array}{c} \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot$		*** ***					$\left \begin{array}{c} \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{array} \right $	÷	
															** ** ** **							
¦₿		Difficult augering from 9.8 m to 11.6 m	1																			
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		Difficult augering from 12.5 m to 13.4 m	-	13	3					÷		*		;	÷							
Ŀ.		depths	78.1						· · · · · · · · · · · · · · · · · · ·		} ↔ ; } ↔ ;				·· · ·				•••••		÷.	
		Auger Refusal at 13.4 m Depth												-								
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2201: M	DTES:		WAT	ERI	_EVF	EL REC	COR	DS								CO	RE DI	RILL	ING RF	COR)	
님 1	Boreho use by	ole data requires interpretation by EXP before others Γ	ate		Wa	iter		H	ole Ç	per			Run	Т	C)eptl	1		% Red	2.	R	QD %
끸 2	. A 32 m	nm diameter monitoring well installed as shown.	ompletion		Leve 6.	<u>ı (m)</u> 1			lo (r Ope	m) en	_		No.	+		(m)		-				
H 3	.Field w	vork supervised by an EXP representative.	22, 2022		4.	8			- 94													
HOg 4	See No	otes on Sample Descriptions																				
		he med with EVD Denest OTT 00040040 A0																1				
5	Log to	be read with EXP Report 011-22012013-A0									I											

	Log o	f Bo	rehole <u>BH-13</u>	<u>s</u> exn	
Project No:	OTT-22012013-A0				•
Project:	Proposed New Riverside South Catholic	Elementa	ry School		
Location:	Brian Good Avenue and Solarium Avenu	Page. <u>I</u> of <u>I</u>			
Date Drilled:	'July 19, 2022		Split Spoon Sample	Combustible Vapour Reading	
Drill Type:	CME-75 Track Mounted Drill Rig		Auger Sample	Natural Moisture Content X Atterberg Limits	
Datum:	Geodetic Elevation		Dynamic Cone Test	Undrained Triaxial at % Strain at Failure	
Logged by:	AN Checked by: DW		Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test	
G Y M W B L O L	SOIL DESCRIPTION	Geodetic Elevation m Q1 33	D p p t h Standard Penetration Test N Value 20 40 60 80 t h Shear Strength 50 100 150 200	Combustible Vapour Reading (ppm) 250 500 750 M Pa Atterberg Limits (% Dry Weight) 20 40 60 S	
FILI Silty mois	clay, some sand, with rootlets, grey, st (very loose)	Ham	0 mer Weight	SS1	
		UMI I D			

	 FILL Silty clay, some sand, with rootlets, gr moist (very loose) 	rey,	Hamm	er Weight				*			SS1
	<u>SILTY CLAY</u> Brown to grey, moist, (very stiff)		1	6		144 kPa		×			17.4 SS2
	CLAYEY SILT Shell fragments, grey, wet, (very stiff)	_	2	4		.120 kPa			*		SS3 16.9
	_	-		1				*			SS4
	-	_	3	1 0				> > > > > > > > > > > > >	¢		SS5
			4	2: O					*		SS6
2013-40 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22	Borehole Terminated at 4.6 m D	epth									
NOTES	: shole data requires interpretation by EXP before by others	WA Date		LEVEL REC	ORD	S Hole Open	Run	CORE D Depth	RILLING RECOR	DR	QD %
Hold2. BoreHold3. FieldHold4. SeeHold5. LogHold9	whole backfilled upon completion of drilling. d work supervised by an EXP representative. Notes on Sample Descriptions to be read with EXP Report OTT-22012013-A0	Upon Completion		<u>2.1</u>		Open		(11)			

	Log of	Bo	rehole B	H-14	↓	nyc
Project No:	OTT-22012013-A0				- <u> </u>	$\mathcal{N}\mathcal{P}$
Project:	Proposed New Riverside South Catholic Ele		Figure No. 10	I		
Location:	Brian Good Avenue and Solarium Avenue,	Ottawa,	ON			
Date Drilled:	'July 19, 2022		Split Spoon Sample		Combustible Vapour Reading	
Drill Type:	CME-75 Track Mounted Drill Rig		Auger Sample SPT (N) Value		Natural Moisture Content Atterberg Limits	× ⊸⊙
Datum:	Geodetic Elevation		Dynamic Cone Test Shelby Tube		Undrained Triaxial at % Strain at Failure	\oplus
Logged by:	AN Checked by: DW	_	Shear Strength by Vane Test	+ s	Shear Strength by Penetrometer Test	
G Y M	SOIL DESCRIPTION	Geodetic	D e 20 40 6	est N Value	Combustible Vapour Reading (ppm) 250 500 750 Natural Moisture Content %	S A M Natural

V	S M	SOIL DESCRIPTION	Elevation	e p	20	40	60	8	0	Z: Nati	ural Mois	ture Conter	50 nt %	P	Unit Wt.
	- P		m	h	Shear Streng	gth		-	kPa	Atterb	erg Limits	s (% Dry W	eight)	E	kN/m ³
			91.59	0	50	100	150	2	00	2	° • • • • • • • • • • • • • • • • • • •	40 6	0	s	
		Sandy silt with restlete brown moist /	(vor)		4			***** ****						1\/	
	- IXX		very		00000	÷:+÷	1.5	$\dot{\cdot}$		· · · · · · •	(\cdot,\cdot,\cdot)	$+ \cdots + \cdots$	\cdot	łΧ	SS1
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		SILTY CLAY				÷:+÷	::::	÷ ; ; ; ;		÷ : : : :		+	·	()	
		Brown to grey, moist, (very stiff)				:::t::	::::	:::::				10000		t	
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22		Borehole Terminated at 4.6 m De	pth					:::							
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2	1.Bore	hole data requires interpretation by EXP before	WATE	κL	LEVEL RECO					00				_	
5	use	by others	Date		Water		le Open		Run	Dept	.n	% Rec).	R	QD %

LOG OF BOREHOLE 2. Borehole 3. Field wo 4. See Note

NOTES:	TAW	ER LEVEL RECO	RDS		CORE DRILLING RECORD								
use by others	Date	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %						
2. Borehole backfilled upon completion of drilling.	Upon Completion	2.7	Open										
3. Field work supervised by an EXP representative.													
4. See Notes on Sample Descriptions													
5. Log to be read with EXP Report OTT-22012013-A0													

		Log of Borehole	BH-15
Project No:	OTT-22012013-A0	•	

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011-22012013-A0		F	-igure No17	
Proposed New Riverside South Catholic Elementary	School		- Page 1 of 1	
Brian Good Avenue and Solarium Avenue, Ottawa, O	NC			
'July 19, 2022	Split Spoon Sample		Combustible Vapour Reading	
CME-75 Track Mounted Drill Rig	Auger Sample		Natural Moisture Content	
	SPT (N) Value	0	Atterberg Limits	
Geodetic Elevation	Dynamic Cone Test	_	Undrained Triaxial at	
	Shelby Tube		% Strain at Failure	
AN Checked by: DW	Shear Strength by Vane Test	+ s	Shear Strength by Penetrometer Test	
	Proposed New Riverside South Catholic Elementary Brian Good Avenue and Solarium Avenue, Ottawa, C 'July 19, 2022 CME-75 Track Mounted Drill Rig Geodetic Elevation AN Checked by: DW	OTT-22012013-A0 Proposed New Riverside South Catholic Elementary School Brian Good Avenue and Solarium Avenue, Ottawa, ON 'July 19, 2022 Split Spoon Sample CME-75 Track Mounted Drill Rig SPT (N) Value Geodetic Elevation Dynamic Cone Test AN Checked by: DW Shear Strength by Vane Test	Proposed New Riverside South Catholic Elementary School F Brian Good Avenue and Solarium Avenue, Ottawa, ON Split Spoon Sample 'July 19, 2022 Split Spoon Sample CME-75 Track Mounted Drill Rig SPT (N) Value Geodetic Elevation Dynamic Cone Test AN Checked by: DW Shear Strength by + Shear Strength by +	Proposed New Riverside South Catholic Elementary School Figure No. 17 Brian Good Avenue and Solarium Avenue, Ottawa, ON Page. 1 of 1 'July 19, 2022 Split Spoon Sample Combustible Vapour Reading CME-75 Track Mounted Drill Rig SPT (N) Value Natural Moisture Content X Geodetic Elevation Dynamic Cone Test Undrained Triaxial at + AN Checked by: DW Shear Strength by Vane Test + Shear Strength by Penetrometer Test -

		ş		Geodetic	D			Sta	anda	rd P	ene	tration 1	Test	N Valu	le	Cor	nbus 24	stible Vap	our Rea	adino 75	g (ppm)	S	Natural
N N	/ {	Ř	SOIL DESCRIPTION	Elevation	e p			2	20		40	6	60	8	0		Nat	ural Moist	ture Cor	nten	t %	P	Unit Wt.
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F-220	NOTES:	TAW	TER LEVEL RECO	RDS	CORE DRILLING RECORD								
TO :	use by others	Date	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %					
OLE	2. Borehole backfilled upon completion of drilling.	Upon Completion	3.0	Open									
REH	3. Field work supervised by an EXP representative.												
BOI	4. See Notes on Sample Descriptions												
OG OF	5. Log to be read with EXP Report OTT-22012013-A0												

	Log o	f Bo) r	ehole <u>E</u>	<u>3H-</u>	<u>-16</u>			*e	Ç	xn
Project No:	OTT-22012013-A0							18			$\gamma \gamma$
Project:	Proposed New Riverside South Catholic	Elementa	ry	School		r	-igure No	10	4		1
Location:	Brian Good Avenue and Solarium Avenu	e, Ottawa	i, C	N			Page. 1	or -	<u> </u>		
Date Drilled:	'July 19, 2022	2022				3	Combustible Vapour	Read	ing		
Drill Type [.])rill Type: CME-75 Track Mounted Drill Rig			Auger Sample	۵	0	Natural Moisture Co		×		
Billi Type.			-	SPT (N) Value	(2	Atterberg Limits	H	— 0		
Datum:	Geodetic Elevation		-	Dynamic Cone Test		- I	Undrained Triaxial at % Strain at Failure				\oplus
Logged by: AN Checked by: DW				Shear Strength by Vane Test	-	+ 5	Shear Strength by Penetrometer Test				
G Y W B O L	SOIL DESCRIPTION	Geodetic Elevation m	D e p t h	Standard Penetration 20 40 Shear Strength 50 100	1 Test N V 60	alue 80 kPa	Combustible Vapour 250 500 Natural Moisture Atterberg Limits (%	Readin 75 Conter Dry W	g (ppm) 50 nt % eight)	SAMPLEO	Natural Unit Wt. kN/m ³
FILL Silty brow	sand, trace clay, with rootlets, dark n, moist, (loose)	_91.23	0	4 · · · · · · · · · · · · · · · · · · ·		200 	***			Ň	SS1
	SOIL ~ 200 mm thick YEY SILT	90.5 90.3	1	4		· · · · · · · · · · · · · · · · · · ·	*			M	SS2 20.1
		-		3.							SS3

	L		91.23	0		50	100 1	50 2	00	2	0 4	0 6	0	ร	
		FILL Silty sand, trace clay, with rootlets, dark brown, moist, (loose)	:		4 O					· · · · >	<pre></pre>			X	SS1
		<u>TOPSOIL</u> ~ 200 mm thick <u>CLAYEY SILT</u>	90.5	1	4 O		· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·		>	<pre></pre>		$\langle \rangle$	SS2 20.1
		Frace sand, brown, moist, (very soft to s		2	3 						*				SS3 18.3
		- <u>SILTY CLAY</u>		3	1						×				SS4
		Grey to dark grey, wet, (very soft) 	_		1 D D 						×			X	SS5
				4	2 O						*	· · · · · · · · · · · · · · · · · · ·		\mathbb{X}	SS6
2013-40 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22		Borehole Terminated at 4.6 m De	oth												
0N	TES:		WATE	RL	EVEL RI	ECORE	S			CC	RE DRI	LING RE	CORD		-
Ė 1.	Boreho use by	ole data requires interpretation by EXP before	Date		Water		Hole Op	en	Run	Dept	th	% Red		RG	2D %

LOG OF BOREHOLE 4. See Notes on Sample Descriptions

5. Log to be read with EXP Report OTT-22012013-A0

2. Borehole backfilled upon completion of drilling. 3. Field work supervised by an EXP representative.

WAT	TER LEVEL RECO	RDS		CORE DRILLING RECORD									
Date	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %							
Upon Completion	3.0	Open											

	Log	of Te	est Pit TP-01	***	eyn
Project No:	OTT-22012013-A0			5	CVD
Project:	Proposed New Riverside South Catholic	Elementa	ry School	Figure No. 19	I
Location:	Brian Good Avenue and Solarium Avenu	e, Ottawa,	, ON	Page. I of I	
Date Drilled:	'August 10, 2022		Split Spoon Sample	Combustible Vapour Reading	
Drill Type:	Excavator		Auger Sample	Natural Moisture Content	×
Datum:	Geodetic Elevation		Dynamic Cone Test	Undrained Triaxial at % Strain at Failure	€
Logged by:	GC Checked by: DW		Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test	A
G Y M W B L O L	SOIL DESCRIPTION	Geodetic Elevation M	D Standard Penetration Test N Value P 20 40 60 80 t Shear Strength kl b 50 100 150 200	Combustible Vapour Reading (ppm) 250 500 750 Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	A M P Unit Wt. E S
FILL Sand inclu	y silt, with gravel, cobbles, topsoil sions and rootlets, brown, moist	90.4			

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TROW OTTAWA GDT	
AD LOGS ALIGUST 25 2022 GPJ	
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OTT-220120	
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TOPSOIL ~ 200 mm thick

SANDY CLAYEY SILT

SILTY CLAY Brown to grey, moist

Test Pit Terminated at 2.2 m Depth

Brown, moist

1 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22	Test Pit Terminated at 2.2 m Dept	th						
3-A0 LOG								
1201	NOTES:				[
-220	1. Borehole/Test Pit data requires Interpretation by exp. before use by others	Flansed	Vater	KUS Hole Open	Run	CORE DF		
Fo	2. Testpit backfilled upon completion of excavation.	Time	Level (m)	To (m)	No.	(m)	/01100.	
Ħ	3. Field work supervised by an EXP representative.	Upon Completion	Dry					
EST	4. See Notes on Sample Descriptions							
LOG OF TI	5. This Figure is to read with exp. Services Inc. report OTT-22012013-A0							

	Log c	of Te	9	st Pit <u>TP-</u>	-02	÷.	2	xn		
Project No:	OTT-22012013-A0							$\gamma \gamma$		
Project:	Proposed New Riverside South Catholic I	Elementa	ry S	School				1		
Location:	Brian Good Avenue and Solarium Avenue	e, Ottawa,	, O	N		Page. <u>1</u> 01 <u>1</u>				
Date Drilled:	'August 10, 2022		-	Split Spoon Sample	\boxtimes	Combustible Vapour Reading				
Drill Type:	Excavator			Auger Sample		Natural Moisture Content		×		
Dim Type.			SPT (N) Value	0	Atterberg Limits		Ð			
Datum:	Geodetic Elevation			Dynamic Cone Test —		Undrained Triaxial at % Strain at Failure		\oplus		
Logged by:	GC Checked by: DW			Shear Strength by Vane Test	+ s	Shear Strength by Penetrometer Test		A		
S Y M B W L	SOIL DESCRIPTION	Geodetic Elevation	D e p t	Standard Penetration Test N 20 40 60 Shear Strength	I Value 80 kPa	Combustible Vapour Reading (ppm) 250 500 750 Natural Moisture Content % Atterberg Limits (% Dry Weight)	S A P L	Natural Unit Wt.		
		91.45	h 0 ·	50 100 150	200	20 40 60	Б S			
	d silt to silty sand, with rootlets, and les, brown, moist	91.1								

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TROW OTTAWA.GDT 8/31/22		
-A0 LOGS AUGUST 25 2022.GPJ		
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TT-22	b	efore
РІТ С	2.1 3.F	ield
EST	4.5	See N

LOG OF

1. Borehole/Test Pit data requires Interpretation by exp. before use by others 2. Testpit backfilled upon completion of excavation. 3. Field work supervised by an EXP representative. 4. See Notes on Sample Descriptions

5. This Figure is to read with exp. Services Inc. report OTT-22012013-A0

SILTY SAND

SILTY CLAY

12.

TOPSOIL ~ 400 mm thick

With rootlets, brown, moist

With sand, brown, moist

Test Pit Terminated at 2.1 m Depth

WA ⁻	TER LEVEL RECO	RDS		CORE DF	RILLING RECOR	D
Elapsed Time	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %
Upon Completion	Dry					

	Log o	f To	B {	st Pit TP-03		eyn
Project No:	OTT-22012013-A0				E imme Nie 21	CAP.
Project:	Proposed New Riverside South Catholic E	School	Figure No. 21	I		
Location:	Brian Good Avenue and Solarium Avenue,	N	Page. I of I			
Date Drilled:	'August 10, 2022			Split Spoon Sample	Combustible Vapour Reading	
Drill Type:	Excavator		4 - {	Auger Sample	Natural Moisture Content Atterberg Limits	× ⊢⊸⊖
Datum:	Geodetic Elevation		ן י ר	Dynamic Cone Test	Undrained Triaxial at % Strain at Failure	\oplus
Logged by: <u>GC</u> Checked by: <u>DW</u>			5	Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test	A
G Y M		Geodetic	D e	Standard Penetration Test N Value	Combustible Vapour Reading (ppm) 250 500 750	S A M Natural

[s Y		Geodetic	Geodetic D Standard Penetration Test N Value						alue	Combustible Vapour Reading (ppm) A 250 500 750 M Nat						Natural	
Ì		M B O	SOIL DESCRIPTION	Elevatior m	n p t	s	20 40 60 8 Shear Strength			80	80 Natural Mo kPa Atterberg Lin			bisture Content % nits (% Dry Weight)			Unit Wt. kN/m ³		
┢			FILL	91.06	0			50 	1 1 1	00 1	50 • • • • • • •	200		2 • • • • • •	20 	40	60 	Ī	
	k	\otimes	Sandy silt, with rootlets, brown, moist	90.7			· · · ·		↔ i ↔ i										
		<u></u>	– <u>TOPSOIL</u> ~ 400 mm thick	_					÷.										
	ŀ	<u>?.<u>*</u>*</u>	SANDY CLAYFY SILT	90.3					~ : ~ : 				•••••••••••••••••••••••••••••••••••••••						
			Grey, moist	-	1				::						×	+		m	GS1
				89.7					::: :::										
			– <u>SILTY CLAY</u> Brown, moist	-															-
																X			GS2
	ł		Test Pit Terminated at 2.1 m De		2				::										
0LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22																			
12013. 	10	TES:		I						····								· · · · · ·	ļ
1. Borehole/Test Pit data requires Interpretation by exp. before use by others Elapsed				Elapsed	ERL	_EVE Wa	EL R ater	ECOF	RDS	3 Hole Ope	en	F	Run	CC Dep	DRE DR	ILLING F	ECORE) F	QD %
6	2. Testpit backfilled upon completion of excavation.			Time	Level (m) To (m)				1	No. (m)									

Upon Completion

Dry

a. Field work supervised by an EXP representative.
a. See Notes on Sample Descriptions
b. This Figure is to read with exp. Services Inc. report OTT-22012013-A0

	Log o	f Te	est Pit TP-0)4	1	eyn					
Project No:	OTT-22012013-A0					CAP.					
Project:	Proposed New Riverside South Catholic E	Proposed New Riverside South Catholic Elementary School									
Location:	Brian Good Avenue and Solarium Avenue,		Page. I of I	-							
Date Drilled:	'August 10, 2022	3	Combustible Vapour Reading								
Drill Type:	Excavator		Auger Sample		Natural Moisture Content Atterberg Limits	× ⊢⊖					
Datum:	Geodetic Elevation		Dynamic Cone Test	-	Undrained Triaxial at % Strain at Failure	•					
Logged by: <u>GC</u> Checked by: <u>DW</u>		_	Shelby Tube Shear Strength by Vane Test S		Shear Strength by Penetrometer Test						
S Y		Geodetic	D Standard Penetration Test N Va	alue	Combustible Vapour Reading (pp 250 500 750	m) S A Natural					

		s			Standard Penetration Test N Value					е	Combustible Vapour Reading (ppm)				1) S					
V	G N	M	SOIL DESCRIPTION		Elevation	e p		2	20	4	40 6	60	80	80 Natu		250 500 750 Itural Moisture Content %		— Ń	Unit Wt.	
'	ᆝ	Ŭ L			m	h	Sh	hear S	Streng	,th ₁	00 1	50 4	20	kPa	Atte	berg Lim	its (% Dr	/Weight)	Ę	kN/m ³
		xx	FILL		91.41	0			5U 	<u></u>		50 	20			<u></u>	40			·
		\times	Sandy silt, with rootlets, brown, moist	_	91.1			•	ł	÷÷									ż	
		<u>× 1,</u>	TOPSOIL ~ 400 mm thick					• • • •	$\left\{ \cdot \right\}$	÷÷	•		• •	• • • • • • •			• • • • •	÷ .		
	ŀ	<u>1/ \ \ </u>	_	_	90.7			• • • •	÷:-;					• • • • • • •	· · · · · · ·			÷	÷.	
		\otimes	FILL											· · · · · · · · · · · · · · · · · · ·						
	k	XX	Sand silt, with gravel, cobbles, boulde	rs, –	90.4	1				<u></u>			4	• • • • • • • • •						
	Ì	<u>× '/</u>	rootlets and wood fragments, brown, r	noist /	00.1					÷.										
			TOPSOIL ~ 300 mm thick		90.1			· • • •	ł	÷							: <u> </u> : : : :		÷ –	
	F		_ <u>SILIYCLAY</u> With sand, brown, moist	-				·:÷		÷÷	+		+			X :::		++++	÷Ľ	GS1
	ŀ				89.7															
	ŧ		Brown moist						1											1 692
	ł	2022			89.3	2			1::											002
			Test Pit Terminated at 2.1 m De	epth						÷÷									:	
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Normalize WAT					WATE	ERL	EVE	LR	ECOF	RDS	6		L		CORE DRILLING RECOR			D		
Elapsed				apsed Water			Hole Open		Run No	n Depth			% Rec.		RQD %					
0 2. I estpit backfilled upon completion of excavation. Iffle Upon Completion Upon Completion				Level (m) ion Dry							F					+				

3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. repo OTT-22012013-A0 5. This Figure is to read with exp. Services Inc. report OTT-22012013-A0

	Log of Te	est Pit TP-05	**	avn
Project No:	OTT-22012013-A0		•	JVD.
Project:	Proposed New Riverside South Catholic Elementary	y School	Page. 1 of 1	I
Location:	Brian Good Avenue and Solarium Avenue, Ottawa,	ON	· · · · · · · · · · · · · · · · · · ·	
Date Drilled:	'August 10, 2022	Split Spoon Sample	Combustible Vapour Reading	
Drill Type:	Excavator	Auger Sample III	Natural Moisture Content Atterberg Limits	× —⊖
Datum:	Geodetic Elevation	Dynamic Cone Test	Undrained Triaxial at % Strain at Failure	Ð
Logged by:	GC Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test	A
s		Standard Penetration Test N Value	Combustible Vapour Reading (ppm)	Ş.

	G W	Ϋ́ Μ Β	SOIL DESCRIPTION	Elevation	c D e n p	Chu	20	0	4	0 6	0	80 250 kPa Atterberg			500 750 loisture Content % imits (% Dry Weight)			Natural Unit Wt.
	-	Ľ		m 01 11	ĥ	SILE	an 5 5(n engu D	11 11	0 1	50 2	кга 200	Allen	20	40 F	SO	Ē	kN/m°
			FILL Sandy silt to silty sand, with rootlets, co and boulders, brown, moist	obbles	0			· · · · · · · · · · · · · · · · · · ·										
			-	90.2								····						
			SILTY CLAY With sand, brown to grey, moist	90.0	1			••••										
			-	_										x				GS1
			-		2										X			GS2
3-40 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22			Test Pit Terminated at 2.2 m De	pth														
1201	NO	TES:]			 \ <i>(</i> _ -)		005					~					
1. Borehole/Test Pit data requires Interpretation by exp. before use by others Elap					WATER LEVEL RECORDS Water Hole Open				Run Depth % Rec.				R	QD %				
0	2. Te	estpit b	ackfilled upon completion of excavation.	Line Completion			(m) ,			10 (M)		INO.	(m	,				

LOG OF TEST PIT 3. Field work supervised by an EXP representative.

4. See Notes on Sample Descriptions

1 10	IER LEVEL RECO	103											
Elapsed Time	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %							
Upon Completion	Dry												

	Log of ⁻	Test Pit TP-06		ayn
Project No:	OTT-22012013-A0			$\sum P$
Project:	Proposed New Riverside South Catholic Element	ntary School		I
Location:	Brian Good Avenue and Solarium Avenue, Otta	awa, ON	Page. I of I	
Date Drilled:	'August 10, 2022	Split Spoon Sample	Combustible Vapour Reading	
Drill Type:	Excavator	Auger Sample	Natural Moisture Content	×
Datum:	Geodetic Elevation	Dynamic Cone Test	Undrained Triaxial at % Strain at Failure	Ð
Logged by:	GC Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test	
G Y W B	Geode SOIL DESCRIPTION Elevat	etic D Standard Penetration Test N Value	Combustible Vapour Reading (ppm) 250 500 750 Natural Moisture Content %	A M P Unit Wt.

	Ň	B	SOIL DESCRIPTION	Elevation	p	20 Shear Strend	40 6 ath	0	80 kPa	Natural M Atterberg Li	oisture Content % mits (% Dry Weight) L	Unit Wt.
		Ĕ			h o	50	100 15	50 2	200	20	40 60	É S	NIN/III
		\bigotimes	FILL	91.3				••••••					
		<u>×' //</u>	TOPSOIL ~ 400 mm thick	/				••••••					
		1/ 1		90.9									
		\bigotimes	FILL	a se al					+				
		>>>	metal debris brown moist	and	1				<u></u>			<u></u>	
		\bigotimes		90.3	·								
			SILTY CLAY				····	••••••		X		i i kun	GS1
			_With sand, brown, moist	_									
				89.7									
			SILTY SAND										
			With clay, brown, moist	-	2							<u></u>	_
				89.1							X		GS2
		• [• • • •	Test Pit Terminated at 2.4 m Dep	th									
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201	NOTES: 1. Borehole/Test Pit data requires Interpretation by exp.				WATER LEVEL RECORDS				CORE DRILLING RECORD				
Ë	2 Testnit backfilled upon completion of excevation				osed me		Hole Open To (m)		Run No.	Depth (m)	% Rec.		RQD %
\sim	<u>د</u> . ۱	Sorbit			_								

a. Sield work supervised by an EXP representative.
b. See Notes on Sample Descriptions
c. This Figure is to read with exp. Services Inc. repo OTT-22012013-A0 5. This Figure is to read with exp. Services Inc. report OTT-22012013-A0

			-								
WA ⁻	TER LEVEL RECO	RDS			CORE DRILLING RECORD						
Elapsed Time	Water Level (m)	Hole Open To (m)		Run No.	Depth (m)	% Rec.	RQ				
Upon Completion	Dry										

	Log d	of To	est Pit <u>TP-07</u>	*exp
Project No:	OTT-22012013-A0			Figure No. 25
Project:	Proposed New Riverside South Catholic	Elementa	ry School	
Location:	Brian Good Avenue and Solarium Avenue	e, Ottawa	, ON	Page or
Date Drilled: 'August 10, 2022			Split Spoon Sample	Combustible Vapour Reading
Drill Type: Excavator			Auger Sample	Natural Moisture Content
Datum: Geodetic Elevation			Dynamic Cone Test	Undrained Triaxial at
_ogged by: <u>GC</u> Checked by: <u>DW</u>			Shelby Tube Shear Strength by Vane Test S	Shear Strength by Penetrometer Test
G W L SY MB O L	SOIL DESCRIPTION	Geodetic Elevation m Q1 61	D Standard Penetration Test N Value P 20 40 60 80 It Shear Strength kPa 50 100 150 200	Combustible Vapour Reading (ppm) 250 500 750 M Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60
FILL Sand TOP Sand Sand Fragr Brow	y silt, brown, wet SOIL ~ 450 mm thick y silt with clay, rootlets and wood nents, brown, moist DY CLAYEY SILT m, moist	91.61 91.4 90.9 90.4	0	GS1

13-A0 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22			
0120	NOT 1.Bo	ES: oreho	le/Test Pit data requires Interpretation by exp.
T-22	be	efore ı	use by others
6	2. Te	estpit	backfilled upon completion of excavation.
FI	3.Fi	eld w	ork supervised by an EXP representative.
EST	4.Se	ee No	tes on Sample Descriptions

LOG OF

before use by others	Elapsed
2. Testpit backfilled upon completion of excavation.	Time
3. Field work supervised by an EXP representative.	Upon Comple
4. See Notes on Sample Descriptions	

5. This Figure is to read with exp. Services Inc. report OTT-22012013-A0

Test Pit Terminated at 2.3 m Depth

WAT	FER LEVEL RECO	RDS	CORE DRILLING RECORD								
Elapsed Time	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %					
Upon Completion	Dry										

	Log	of To	e	st Pi	t	TP	-08				**	2	xn
Project No:	OTT-22012013-A0									26			$\gamma \gamma$
Project:	Proposed New Riverside South Catholic	Elementa	ry	School) 	20	1		I
Location: Brian Good Avenue and Solarium Avenue			i, C	N				Page	e. <u>I</u>	_ 01 _	<u> </u>		
Date Drilled:	'August 08, 2022			Split Spoon S	\boxtimes	Combustible Vapour Reading							
Drill Type: Excavator			Auger Sample			Natural Mo	Natural Moisture Content						
Datum:	Geodetic Elevation		_	Dynamic Con Shelby Tube	e Test	_		Undrained % Strain a	Triaxial t Failure	at	•		⊕
Logged by:	GC Checked by: DW			Shear Strength by + Vane Test S				Shear Strength by Penetrometer Test					
G M BO	SOIL DESCRIPTION	Geodetic Elevation	D e p t h	Standard 20 Shear Streng	I Pene 40 th	ration Tes 60	st N Value 80 kł	Combustii 250 Natur Atterber	ble Vapou 500 al Moistur g Limits (ur Reading) 750 re Content % Dry We	(ppm)) % ight)	SA∑P_Luc	Natural Unit Wt. kN/m ³
FILL Silty	sand, brown, moist	92.33	0						40				
	SOIL ~ 100 mm thick	91.6 91.5				• • • • • • •							

90.6

90.3

X

X

sm.

r B GS2

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GS1

SILTY SAND

Brown, moist

SILTY CLAY With sand and gravel, grey, moist

2013-A0 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22	Test Pit Terminated at 2.0 m Dep	th						
T-2201	. Borehole/Test Pit data requires Interpretation by exp. before use by others	WAT Elapsed	ER LEVEL RECOR	RDS Hole Open	Run	CORE DF	RILLING RECOR % Rec.	D RQD %
OF TEST PIT OT 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	. Testpit backfilled upon completion of excavation. . Field work supervised by an EXP representative. . See Notes on Sample Descriptions . This Figure is to read with exp. Services Inc. report	ation. Upon Completion		<u>To (m)</u>	No.	(m)		
LOG								

	Log of T	est Pit TP-09	[%] eyn
Project No:	OTT-22012013-A0		
Project:	Proposed New Riverside South Catholic Elementa	ary School	
Location:	Brian Good Avenue and Solarium Avenue, Ottawa	a, ON	Page. I of I
Date Drilled:	'August 08, 2022	_ Split Spoon Sample 🛛 🛛	Combustible Vapour Reading
Drill Type:	Excavator	Auger Sample II	Natural Moisture Content X Atterberg Limits
Datum:	Geodetic Elevation	Dynamic Cone Test Shelby Tube	Undrained Triaxial at \oplus Strain at Failure
Logged by:	GC Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Area Penetrometer Test
s	Condation	Standard Penetration Test N Value	Combustible Vapour Reading (ppm) S

	G	Y M		Geodetic								0		2	50	50	00	750		Â	Natural	
	Ľ	B	SOIL DESCRIPTION	Elevation	p t	s	hea	r Str	ength	ŧU	00	0	kPa	1.	Nat Atter	tural N berg L	/loisti .imits	ure Cont (% Dry	ent % Weight	t)	Ľ	Vnit VVt.
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Γ	R	\otimes	FILL		0				··· · · · ·	• • • • • •						1.5.5						
	Į	\otimes	Silty sand, with gravel, rootlets and organics	5,			(* * /* *	::	1 · · · · · · · · · · · · · · · · · · ·			21			:-:::: :::::::::::::::::::::::::::::::	1:::	(•) ()					
	ß	\times	brown, moist				÷÷	÷ŀ	•••••	ł	·		• • • • • • •		(• ; ••	 ••••	÷		• • • •		.	
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	Ē		<u>SILTT SAND</u> With clay, brown, moist				÷		: -: : · :			:	• • • • • • •		· · · · ·	1	÷			· • • •		
	ŀ		With Clay, Drown, moist			12	:::	21	:::::::	12122		21			::::::::::::::::::::::::::::::::::::::	X	::::			::::	m2	GS1
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			With sand and gravel brown grey moist	_	2							-				1						
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				89.6			÷÷	÷	: ÷ ÷ ;		· • • • • •	÷	• • • • • • •			X	÷		• • • •		5	GS2
	F	•••+	Test Pit Terminated at 2.4 m Depth		1	1:	:::	:†				:				111	:::			::		
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T-2	be	efore u	ise by others	Elapsed		Wa	ater			Hole Op	en	f	Run		Dep	th	Τ	% R	ec.		R	2D %
5	2. Te	estpit k	Completion		<u>eve.</u>	<u>) (n</u> 0	n)	-	10 (m)	+	NO.		_(m)	+			-			
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LOG OF TEST PIT 3. Field work supervised by an EXP representative.

4. See Notes on Sample Descriptions

	Log of Te	est Pit TP-10	^{\$} eyn
Project No:	OTT-22012013-A0		
Project:	Proposed New Riverside South Catholic Elementar	ry School	
Location:	Brian Good Avenue and Solarium Avenue, Ottawa,	, ON	Page of _ I
Date Drilled:	'August 08, 2022	Split Spoon Sample	Combustible Vapour Reading
Drill Type:	Excavator	Auger Sample	Natural Moisture Content X Atterberg Limits
Datum:	Geodetic Elevation	Dynamic Cone Test Shelby Tube	Undrained Triaxial at % Strain at Failure
Logged by:	GC Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test
		Standard Penetration Test N Value	Combustible Vapour Reading (ppm) Ş

	G	S Y M			Geodeti	odetic D e				ren			ue	2	250	500	rteauir 75	50 50	Ă	Natural
	Ϋ́	BO	SOIL DESCRIPTION		Elevation	n p t	She	ar St) trength	41 h	0 6	0	kPa	Na Atter	tural Moi berg Lim	sture its (%	Conter Dry W	nt % /eight)	P	Unit Wt. kN/m ³
		Ĺ			92.64	0	. <u></u>) 	10	0 15	50 2	00		20	40	6	0	S	
	k	***	FILL Silty sand with gravel cobbles and roc	otlate	02.3				• • • • • • • • • • •	•		· · · · · · · · · · · · · · · · · · ·							::	
	K	<u></u>	brown. moist	//////////////////////////////////////	92.5				• • • • • •	•	· · · · · · · · ·	$\cdot \cdot $					1 · · · · · ·	· · · · · · · ·	::	
			TOPSOIL ~ 300 mm thick		92.0				<u></u>			<u></u>								
	ŀ		SILTY SAND						• • • • •	••••	\cdot	$\cdot \frac{1}{2} \div \frac{1}{2} \cdot \frac{1}{2}$	$+\cdots$		$\{\cdot\} \div \{\cdot\}$: + :·	1÷÷	$\dot{\cdot}$	•	
			With clay and gravel, brown, moist						• • • • •	••••	· · · · · · · ·		• • • • • •				• • •			
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	ŧ		CLAYEY SILT		51.0														::	
	k		With sand and gravel, brown grey, mo	ist	90.7					••••										
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F-22C	i.B be	orenol efore u	se by others	Elaps	ed		Wate	er		100	Hole Ope	n	Run	Der	oth	siller (% Rec		R	QD %
Fo	2. Te	estpit k	packfilled upon completion of excavation.	Tim	e	l	_evel ((m)			To (m)		No.	(m	ı)					

LOG OF TEST PIT $\ensuremath{\mathsf{3.Field}}$ work supervised by an EXP representative.

4. See Notes on Sample Descriptions

WA	FER LEVEL RECO	RDS		CORE DF	RILLING RECOR	D
Elapsed Time	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %
Upon Completion	Dry					

Pi	rojec	t No:	OTT-22012013-A0 Proposed New Riverside South Catholic	of To	st I	Pit	<u> </u>	<u>P-1</u>	<u>1</u>	Figure I	No.		29		е	хр	
l i	nojec	ו. מרי	Brian Good Avenue and Solarium Avenu							_	Pa	ge.	_1	_ of	1		
Da Dr Da Lc	ate D rill Ty atum oggeo	rilled: pe: : d by:	'August 09, 2022 Excavator Geodetic Elevation GC Checked by: DW	<u>e</u> , Ollawa	- - -	Split Spo Auger Sa SPT (N) ¹ Dynamic Shelby T Shear St Vane Tes	on San Imple Value Cone T ube rength I	nple Fest Dy			Combus Natural Atterber Undrain % Strair Shear S Penetro	stible ' Moistr g Lim ed Tria n at Fa trengt meter	Vapor ure C its axial a ailure th by Test	ur Reac ontent at	ling F		□ ×
G W L	S Y B O L		SOIL DESCRIPTION	Geodetic Elevation m 91.32	Dep tho	Sta 2 Shear S	ndard P 0 trength	enetration 40	Test N Val	ue 30 kPa	Combu 2 Na Atteri	stible \ 50 tural M berg Li	/apou 500 loisture mits (°	r Readir 7: e Conte % Dry W	ng (ppm) 50 nt % /eight)	SAZP-1ES	Natural Unit Wt. kN/m ³
		FILL Sand TOP SILT Brow -	ly silt, brown, wet <u>SOIL</u> ~ 300 mm thick <u>Y CLAY</u> n, moist <u>YEY SILT</u> sand and clay pockets, brown, moist	91.0	1							*					GS1
		-	est Pit Terminated at 2.3 m Depth	89.0	2							×					GS2

LOG OF TEST PIT OTT-22012013-40 LOGS AUGUST 25 2022. GPJ TROW OTTAWA.GDT 8/31/22

NOTES: 1.Borehole/Test Pit data requires Interpretation by exp.	TAW	ER LEVEL RECO	RDS		CORE DF	RILLING RECOR	D
before use by others	Elapsed	Water	Hole Open	Run	Depth	% Rec.	RQD %
Testpit backfilled upon completion of excavation.	lime	Level (m)	lo (m)	No.	(m)		
3. Field work supervised by an EXP representative.	Upon Completion	Dry					
4. See Notes on Sample Descriptions							
5. This Figure is to read with exp. Services Inc. report OTT-22012013-A0							

	Log	of Te	e:	st F	Pit	<u> </u>	<u>P-</u>	<u>12</u>				*	2	xn
Project No:	OTT-22012013-A0									lo	30			$\gamma \gamma$
Project:	Proposed New Riverside South Catholic	Elementa	ry (School					-igure i	NO	 1f	1		I
Location:	Brian Good Avenue and Solarium Avenu	e, Ottawa	, C	N					Pa	ge		<u> </u>		
Date Drilled:	'August 09, 2022		_	Split Spoo	on Sam	ple		\boxtimes	Combus	tible Vap	oour Rea	ding		
Drill Type:	Drill Type: Excavator			Auger Sa	mple				Natural I	Moisture	Content			×
Datum:	Datum: Geodetic Elevation		_	Dynamic Shelby Tu	Cone T	est	_		Undraine % Strain	ed Triaxia at Failu	al at re	ſ		•
Logged by:	logged by: <u>GC</u> Checked by: <u>DW</u>			Shear Str Vane Tes	ength b t	у		+ s	Shear S Penetroi	trength b meter Te	est			
G Y M B O L	SOIL DESCRIPTION	Geodetic Elevation m Q1 63	D e p t h	Star 20 Shear St 50	ndard Pe	netration 40 100	n Test N 60 150	Value 80 kPa 200	Combus 2: Nat Atterb	stible Vap 50 5 ural Moist erg Limits 0 4	our Read	ing (ppm) 750 ent % Weight) 60	SAZPLES	Natural Unit Wt. kN/m ³
Sand	y silt, brown, wet <u>SOIL</u> ~ 300 mm thick <u>DY SILT</u> clay, brown, moist	91.3 91.0	0											
	- DY CLAYEY SILT n, moist	90.4	1		•••••••					X				GS1

Ĺ		91.63	n	50	1	00 150) 2	200	2	0	40	50	Š	
	Sandy silt, brown, wet	91.3												
<u>, , , , , ,</u> , , , , , , , , , , , , , ,	TOPSOIL ~ 300 mm thick													
	SANDY SILT With clay, brown, moist	_	1											001
	SANDY CLAYEY SILT	90.4												GS1
	_ brown, moist	_												
	_	_	2										- m	652
	Test Pit Terminated at 2.2 m De	89.4 epth	_											002
3-A0 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22														
NOTES:	e/Test Pit data requires Interpretation by exp	WA	TERL	EVEL RECO	ORDS	;			СС	REDR	ILLING R	ECORE)	
before u	use by others	Elapsed Time	L	Water evel (m)		Hole Open To (m)	1	Run No.	Dep (m)	th	% Re	с.	R	2D %
3. Field wo	ork supervised by an EXP representative.	Upon Completion		Dry										
4. See Not	tes on Sample Descriptions													
OTT-220	jure is to read with exp. Services Inc. report 012013-A0													

	Log of ⁻	Test Pit TP-13		evn
Project No:	OTT-22012013-A0		Firme Na 21	CNP.
Project:	Proposed New Riverside South Catholic Eleme	entary School		I
Location:	Brian Good Avenue and Solarium Avenue, Otta	Page. I of I		
Date Drilled:	'August 10, 2022	Split Spoon Sample	Combustible Vapour Reading	
Drill Type:	Excavator	Auger Sample	Natural Moisture Content	×
Datum:	Geodetic Elevation	Dynamic Cone Test	Undrained Triaxial at % Strain at Failure	⊕
Logged by:	GC Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test	A
S	Geodr	etic D Standard Penetration Test N Value	Combustible Vapour Reading (ppm)	S A Natural

	G	Ϋ́			Geodetic	c D e							2	50	500 7	50	_ A	Natural
	Ŵ	B	SOIL DESCRIPTION		Elevation	י p	Shor	20	rongth	40 0	60	80 kPo	Na Attor	tural Moi	sture Conte	nt% (eight)	P	Unit Wt.
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0	2. Te	estpit b	packfilled upon completion of excavation.	Upon Con	nnletion	L	Drv)		10 (11)	/	INU.	(11)	/				

LOG OF TEST PIT

 $\ensuremath{\mathsf{3.Field}}$ work supervised by an EXP representative.

4. See Notes on Sample Descriptions

WA	TER LEVEL RECO	RDS			CORE DF	RILLING RECOR	D
Elapsed Time	Water Level (m)	Hole Open To (m)	R	Run No.	Depth (m)	% Rec.	RQD %
Upon Completion	Dry						

Project No:	OTT-22012013-A0	of To	e	st I	Ρ	it	<u> </u>	Ρ	-1	<u>4</u>							e	Э	хр
Project:	Proposed New Riverside South Catholic	Elementa	ry \$	School							Figu	re N	I O.		32				I
Location:	Brian Good Avenue and Solarium Avenu	ue, Ottawa	, O	N								Pa	ge.	_1	of	_1	<u> </u>		
Date Drilled:	'August 10, 2022			Split Spc	oon	Sam	ple				Com	າbus	tible	Vapo	our Rea	ding	1		
Drill Type:	Excavator		-	Auger Sa	amp	ple					Natu	ural I	Mois	ture C	Content	5			×
Datum:	Geodetic Elevation		-	Dynamic	vai c Co	ue one Te	est	_	0		Und	rberg	g Lin ed Tr	nits iaxial	at		F		т Ф
Logged by:	GC Checked by: DW		_	Shelby T Shear St Vane Te	Tube tren st	e igth by	y		+ s		% S She Pen	train ar Si etror	at F treng nete	allure oth by or Tes	e v it				A
G M		Geodetic	D e	Sta	anda	ard Pe	netratio	on Tes	st N Val	ue	Co	mbus 2	stible 50	Vapo 50	ur Read	ing (p 750	ppm)	S A M	Natural
	SOIL DESCRIPTION	Elevation m	p t h	Shear S	20 Strei 50	ngth 1	10 00	150	2	80 kPa	4	Nat tterb	ural N erg L o	Aoistu imits	ire Conte (% Dry \ າ	ent % Neig 60	í iht)	PLEQ	Unit Wt. kN/m ³
San	dy silt, with rootlets, brown, moist	90.8	0			·····									,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			•	
		90.4																	
U U U U U U U U U U U U U U U U U U U	N <u>YEY SILT</u> n sand, brown, moist		1										×	· · · · ·				renz	GS1
		90.7																	
Brow	TY CLAY	09.7															<u></u>		
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OTES: Borehole/Test Pit data requires Interpretation by exp.	WAT	FER LEVEL RECO	RDS		CORE DF	RILLING RECOR	ίD
before use by others	Elapsed	Water	Hole Open	Run	Depth	% Rec.	RQD %
Testpit backfilled upon completion of excavation.	lime	Level (m)	lo (m)	No.	(m)		
Field work supervised by an EXP representative.	Upon Completion	2.0					
See Notes on Sample Descriptions							
This Figure is to read with exp. Services Inc. report OTT-22012013-A0							
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	Logo	of Te	est Pit TP	-15		eyn
Project No:	OTT-22012013-A0					CAP.
Project:	Proposed New Riverside South Catholic E	Iementai	ry School		Figure No. <u>55</u> Page 1 of 1	. 1
Location:	Brian Good Avenue and Solarium Avenue	, Ottawa	, ON			
Date Drilled:	'August 10, 2022		Split Spoon Sample	\boxtimes	Combustible Vapour Reading	
Drill Type:	Excavator		Auger Sample SPT (N) Value		Natural Moisture Content Atterberg Limits	× ⊢⊸⊖
Datum:	Geodetic Elevation		Dynamic Cone Test –		Undrained Triaxial at % Strain at Failure	\oplus
Logged by:	GC Checked by: DW		Shear Strength by Vane Test	+ s	Shear Strength by Penetrometer Test	
S		Geodetic	D Standard Penetration Test	t N Value	Combustible Vapour Reading (ppn	1) S A Natural

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	Ϊ	B	SUIL DESCRIPTION	Elev	/ation	t	Sh	near	Stre	engti	40 h	0	00	,	0	kP	^v a	Atte	atural rberg	Limit	sture (its (%	Conter Dry W	nt % eight)	Ľ	kN/m ³
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	R	$\times\!\!\times$	Sandy silt to silty sand with rootlets brown	90.8				• • • •		÷.	• • •	• • • • •	5 de 1	÷÷	••••		·:	÷:-;-;		÷ ; . ;		• ÷ ÷ ·	$\dot{\cdot}$		
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	Ľ	<u>, 11</u>	TOPSOIL ~ 400 mm thick	90.4			-÷÷	• • • •		÷÷	• • •	• • • • •	\$÷	÷÷	••••	• • • • •	···	÷÷÷÷		÷÷÷	· · · · ·	\cdot	$\dot{\cdot}$	+	
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	NUT 1. Br	⊏ର: prehol	le/Test Pit data requires Interpretation by exp	on by exp. WATER LEVEL RECORDS CORE DRILLING RECORD						CORD															
	be	fore u	use by others	Elapsed Water Hole Open							Run Depth					% Rec. RQE				QD %					

Time Upon Completion Level (m) 1.7 To (m) No. (m) 2. Testpit backfilled upon completion of excavation. 3. Field work supervised by an EXP representative. 4. See Notes on Sample Descriptions 5. This Figure is to read with exp. Services Inc. report OTT-22012013-A0

LOG OF TEST PIT

	Log of Te	est Pit TP-16		eyn
Project No:	OTT-22012013-A0		Einen Na 24	CAP.
Project:	Proposed New Riverside South Catholic Elementary	y School	Figure No. <u>34</u>	- 1
Location:	Brian Good Avenue and Solarium Avenue, Ottawa,	ON	Fage 01	_
Date Drilled:	'August 10, 2022	Split Spoon Sample	Combustible Vapour Reading	
Drill Type:	Excavator	Auger Sample	Natural Moisture Content	×
Datum:	Geodetic Elevation	SPT (N) Value O Dynamic Cone Test Shelby Tube	Atterberg Limits Undrained Triaxial at % Strain at Failure	₽
Logged by:	GC Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test	

	G	S Y M	SOIL DESCRIPTION	Geodetic Elevation	D e p) a p		51a 2	anda 20		-en 4() 6	1es 60	tin va	iue 80		Con	25 Natu	iole v i0 iral Mo	50 bistu	0 7 re Conte	ng (ppm) 50 nt %	_ A _ M _ P	Natural Unit Wt.
	L	Ŭ L		m 91 75	h	1	She	ear S 5	Strei 50	ngth	10	0 1	150	2	200	kPa	At	terbe 20	erg Lin)	nits (40	(% Dry V)	Veight) 50	LES	kN/m ³
			FILL Sandy silt to silty sand, with gravel, rootlets and wood fragments, brown, moist	91.3	0	, [.							· · · · ·										· •	
		<u></u>	Dark brown, moist	90.6	1	1 1 1									·····					·····				
			SILTY CLAY With sand and rootlets, brown, moist	_															×				R.	GS1
			CLAYEY SILT With sand, roots/rootlets and organic	90.0	2	2													X				m	GS2
-40 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22			Test Pit Terminated at 2.2 m Depth																					
01201		TES:		WATE	RI	LE	VEI	. RF	ECC	DRF)S							co	RE D	RIL	LINGR	ECORD		
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ES: rehole/Test Pit data requires Interpretation by exp.	WA	TER LEVEL RECOR	RDS		CORE DF	RILLING RECOR	D
fore use by others	Elapsed	Water	Hole Open	Run	Depth	% Rec.	RQD %
stpit backfilled upon completion of excavation.	Time	Level (m)	To (m)	No.	(m)		
- +·· · · · · · · · · · · · · · · ·	Upon Completion	Drv					
eld work supervised by an EXP representative.	open completion	2.9					
e Notes on Sample Descriptions							
is Figure is to read with exp. Services Inc. report T-22012013-A0							

	Log of Te	st Pit TP-17		evn
Project No:	OTT-22012013-A0		Figure No. 35	CAP.
Project:	Proposed New Riverside South Catholic Elementary	/ School	Figure No. <u>33</u>	- 1
Location:	Brian Good Avenue and Solarium Avenue, Ottawa,	ON	Page1_ 01 _1_	_
Date Drilled:	'August 09, 2022	Split Spoon Sample	Combustible Vapour Reading	
Drill Type:	Excavator	Auger Sample	Natural Moisture Content	×
Datum:	Geodetic Elevation	Dynamic Cone Test	Undrained Triaxial at % Strain at Failure	•

Logged by: GC

Checked by: DW

Split Spoon Sample	\boxtimes	Combustible Vapor
Auger Sample		Natural Moisture C
SPT (N) Value	0	Atterberg Limits
Dynamic Cone Test		Undrained Triaxial
Shelby Tube		% Strain at Failure
Shear Strength by Vane Test	+ s	Shear Strength by Penetrometer Test

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йI	B	SOIL DESCRIPTION	Elevation	p	Shear	20 Strengt	4	0 6	0	80 kPa	N Atte	atural Mois	ture Conte	nt% (eight)	P	Unit Wt.
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TROW OTTAWA.GDT 8/31/22		
+A0 LOGS AUGUST 25 2022.GPJ		
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NOTES: 1. Borehole/Test Pit data requires Interpretation by exp.	WA	TER LEVEL RECO	RDS
before use by others	Elapsed	Water	Hole Open
2. Testpit backfilled upon completion of excavation.	Time	Level (m)	To (m)
	Upon Completion	Dry	
3. Field work supervised by an EXP representative.			
4. See Notes on Sample Descriptions			

		CORE DRILLING RECORD											
Open (m)	Run No.	Depth (m)	% Rec.	RQD %									

	Log of T	est Pit TP-18		avn						
Project No:	OTT-22012013-A0		•	CND.						
Project:	Proposed New Riverside South Catholic Elementa	Figure No. <u>30</u>	. 1							
Location:	n: Brian Good Avenue and Solarium Avenue, Ottawa, ON									
Date Drilled:	'August 09, 2022	_ Split Spoon Sample 🛛 🛛	Combustible Vapour Reading							
Drill Type:	Excavator	Auger Sample	Natural Moisture Content Atterberg Limits	× ⊢−⊃						
Datum:	Geodetic Elevation	Dynamic Cone Test	Undrained Triaxial at % Strain at Failure	•						
Logged by:	GC Checked by: DW	Shear Strength by + Vane Test S	Shear Strength by Penetrometer Test							
S.	Geodetic	D Standard Penetration Test N Value	Combustible Vapour Reading (ppn	n) S Natural						

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			Test Pit Terminated at 2.4 m Depth			:	:::	1:	:::		: :	:::	1:::	: :	:::	:::	: :	:::			
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1012	NOT 1.Bo	ES: rehol	e/Test Pit data requires Interpretation by exp.	WATE	RL	LEV	'EL RE	ECC	RDS						СС	DRE D	RILL	NG RE	ECORD		
7	be	fore ι	ise by others Elaps	sed		W	ater		1	Hole Op	ben		Run		Dep	th	1	% Re	C.	R	QD %

2. Testpit backfilled upon completion of excavation.

LOG OF TEST PIT 3. Field work supervised by an EXP representative.

4. See Notes on Sample Descriptions

WA [*]	TER LEVEL RECO	RDS	CORE DRILLING RECORD							
Elapsed Time	Water Level (m)	Hole Open To (m)	Run No.	Depth (m)	% Rec.	RQD %				
Upon Completion	Dry									

Log of '	Test Pit	TP-19
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Project No: OTT-22012013-A0

	*ex	p.
37		

RQD %

% Rec.

r toject No.	011-22012013-A0			Figure No. 37
Project:	Proposed New Riverside South Catholic Elementar	ry School		
Location:	Brian Good Avenue and Solarium Avenue, Ottawa,	ON		Page. 1 of 1
Date Drilled:	'August 08, 2022	Split Spoon Sample	\boxtimes	Combustible Vapour Reading
Drill Type:	Excavator	Auger Sample SPT (N) Value		Natural Moisture Content X Atterberg Limits
Datum:	Geodetic Elevation	Dynamic Cone Test – Shelby Tube	—	Undrained Triaxial at \oplus % Strain at Failure
Logged by:	GC Checked by: DW	Shear Strength by Vane Test	+ s	Shear Strength by Penetrometer Test

		S Y		Geodetic	D		Sta	ndard Po	enetration	Fest N Val	ue	Combu	stible Vapo 50 5'	our Readir 00 7	ng (ppm) 50	A	Natural
	Ψ L	B	SOIL DESCRIPTION	Elevation	p	She	20 ar S) trenath	40 (60 8	30 kPa	Nat Attert	ural Moist	ure Conte	nt % /eiaht)	P	Unit Wt.
		Ľ		92 86	h	0.10	5)	100 1	50 2	00	2	20 4	0 6	50	E S	KIN/ITI
			FILL Silty sand, with clay, gravel, cobbles and boulders, rootlets, organics and wood		0		· · · · · · · · · ·										
			⁻ fragments, brown, moist ⁻				••••		· · · · · · · · · · · · · · · · · · ·				×			Km3	GS1
			SANDY SILT With gravel and pockets of silty clay, brown, moist	91.9	1											•	
				91 1								. x				10g	GS2
2.40 LOGS AUGUST 25 2022.GPJ TROW OTTAWA.GDT 8/31/22			Test Pit Terminated at 1.8 m Depth	91.1													
20	NO	TEO															
21	INU.	IES:															

NOTES: 1. Borehole/Test Pit data requires Interpretation by exp. before use by others 2. Testpit backfilled upon completion of excavation WATER LEVEL RECORDS CORE DRILLING RECORD Water Level (m) Dry Hole Open To (m) Run Elapsed Time Depth No. (m) Upon Completion LOG OF TEST PIT 3. Field work supervised by an EXP representative. 4. See Notes on Sample Descriptions 5. This Figure is to read with exp. Services Inc. report OTT-22012013-A0



100-2650 Queensview Drive

Grain-Size Distribution Curve Method of Test For Sieve Analysis of Aggregate **ASTM C-136**

Ottawa, ON K2B 8H6

*exp



Unified Soil Classification System

EXP Project No.:	OTT-22012013-A0	Project Name :	roject Name : Proposed New Riverside South Catholic Elementary School								
Client :	OCSB	Project Location	ect Location : Brian Good & Solarium Ave, Ottawa								
Date Sampled :	July 15, 2022	Borehole No:		BH7	Sample	: S	S1	Depth (m) :	0-0.6		
Sample Composition :		Gravel (%)	3	Sand (%)	58	Silt & Clay (%)	39	Figure	20		
Sample Description : FILL: Silty Sand (SM)								Figure .	30		


100-2650 Queensview Drive

Grain-Size Distribution Curve Method of Test For Sieve Analysis of Aggregate **ASTM C-136**

Ottawa, ON K2B 8H6

*exp



Unified Soil Classification System

EXP Project No.:	OTT-22012013-A0	Project Name :	roject Name : Proposed New Riverside South Catholic Elementary School									
Client :	OCSB	Project Location	ject Location : Brian Good & Solarium Ave, Ottawa									
Date Sampled :	July 14, 2022	Borehole No:	rehole No: BH10 Sample: SS1 Depth (m) : 0-0.6									
Sample Composition :		Gravel (%)	1	Sand (%)	60	Silt & Clay (%)	39	Figure	20			
Sample Description :		FILL: S	FILL: Silty Sand (SM)									





EXP Project No.:	OTT-22012013-A0	Project Name :	Project Name : Proposed New Riverside South Catholic Elementary School									
Client :	OCSB	Project Location	n:	Brian Good & S	olarium	Ave, Ottawa,	ON					
Date Sampled :	July 19, 2022	Borehole No:	o: BH4 Sample No.: SS3 Depth (m) : 1.5-2.1									
Sample Description :		% Silt and Clay	% Silt and Clay 54 % Sand 46 % Gravel 0									
Sample Description :		San	Sandy Silt (ML)									





EXP Project No.:	OTT-22012013-A0	Project Name :	Proposed New Riverside South Catholic Elementary School									
Client :	OCSB	Project Location	:	Brian Good & Se	olarium	Ave, Ottawa,	ON					
Date Sampled :	July 19, 2022	Borehole No:		BH4 Sample No.: SS4 Depth (m) : 2.3-2.9								
Sample Description :		% Silt and Clay	% Silt and Clay 50 % Sand 50 % Gravel 0									
Sample Description :		San	Sandy Silt (ML)									





EXP Project No.:	OTT-22012013-A0	Project Name :	Project Name : Proposed Findlay Creek Catholic Elementary School									
Client :	OCSB	Project Location	ı:	Brian Good & S	olarium	Ave, Ottawa,	ON					
Date Sampled :	July 15, 2022	Borehole No:	ole No: BH1 Sample No.: SS2 Depth (m) : 0.8-1.4									
Sample Description :		% Silt and Clay	59	% Sand	41	% Gravel		0	Figuro :	42		
Sample Description :		Sandy Clayey Silt of Low Plasticity (CL)										





EXP Project No.:	OTT-22012013-A0	Project Name :	Proposed New Riverside South Catholic Elementary School									
Client :	OCSB	Project Location :		Brian Good & So	larium	Ave, Ottawa,	ON					
Date Sampled :	July 18, 2022	Borehole No:	orehole No: BH2 Sample No.: SS7 Depth (m) : 4.6-5.2									
Sample Description :		% Silt and Clay	97	% Sand	3	% Gravel		0	Figuro :	42		
Sample Description :		Silty Clay of L	Silty Clay of Low Plasticity (CL)									





EXP Project No.:	OTT-22012013-A0	Project Name :	roject Name : Proposed New Riverside South Catholic Elementary School									
Client :	OCSB	Project Location	ı:	Brian Good & So	olarium	Ave, Ottawa,	ON					
Date Sampled :	July 19, 2022	Borehole No:	BH3 Sample No.: SS2 Depth (m) : 0.8-1.4									
Sample Description :		% Silt and Clay	68	% Sand	30	% Gravel		2	Figuro :	44		
Sample Description :		Sandy Clayey Silt of Low Plasticity (CL)										





EXP Project No.:	OTT-22012013-A0	Project Name :	Project Name : Proposed New Riverside South Catholic Elementary School									
Client :	OCSB	Project Location	roject Location : Brian Good & Solarium Ave, Ottawa, ON									
Date Sampled :	July 19, 2022	Borehole No:	BH4 Sample No.: ST 8 Depth (m) : 6.1									
Sample Description :		% Silt and Clay	Silt and Clay 98 % Sand 2 % Gravel 0						Figure :	45		
Sample Description :		Silty Clay of	Silty Clay of Low Plasticity (CL)									





EXP Project No.:	OTT-22012013-A0	Project Name :	Project Name : Proposed New Riverside South Catholic Elementary School									
Client :	OCSB	Project Location	:	Brian Good & S	olarium	Ave, Ottawa,	ON					
Date Sampled :	July 18, 2022	Borehole No:		BH6 Sample No.: SS4 Depth (m) : 2.3-2.								
Sample Description :		% Silt and Clay	98	% Sand	2	% Gravel		0	Figuro :	46		
Sample Description :		Clay of Hi	Clay of High Plasticity (CH)									





EXP Project No.:	OTT-22012013-A0	Project Name :	Proposed New Riverside South Catholic Elementary School								
Client :	OCSB	Project Location	:	Brian Good & So	larium A	ve, Ottawa,	ON				
Date Sampled :	July 15, 2022	Borehole No:	orehole No: BH7 Sample No.: ST5 Depth (m) : 3.0-3.6								
Sample Description :		% Silt and Clay	100	% Sand	0	% Gravel		0	Figure :	47	
Sample Description :		Clay of Hi	Clay of High Plasticity (CH)								





EXP Project No.:	OTT-22012013-A0	Project Name :	Project Name : Proposed New Riverside South Catholic Elementary School									
Client :	OCSB	Project Location	:	Brian Good & So	olarium	Ave, Ottawa,	ON					
Date Sampled :	July 14, 2022	Borehole No:	BH8 Sample No.: SS6 Depth (m) : 3.8-4.4									
Sample Description :		% Silt and Clay	77	% Sand	23	% Gravel		0	Figuro :	10		
Sample Description :		Clayey Silt with Sand of Low Plasticity (CL)										





EXP Project No.:	OTT-22012013-A0	Project Name :	Project Name : Proposed New Riverside South Catholic Elementary School									
Client :	OCSB	Project Location	:	Brian Good & S	olarium	Ave, Ottawa,	ON					
Date Sampled :	July 14, 2022	Borehole No:	orehole No: BH10 Sample No.: SS6 Depth (m) : 3.8-4.4									
Sample Description :		% Silt and Clay	98	% Sand	2	% Gravel		0	Figuro :	40		
Sample Description :		Clayey Silt o	Clayey Silt of Low Plasticity (CL)									





EXP Project No.:	OTT-22012013-A0	Project Name :	Project Name : Proposed New Riverside South Catholic Elementary School										
Client :	OCSB	Project Location	:	Brian Good & S	olarium	Ave, Ottawa	, ON						
Date Sampled :	July 14, 2022	Borehole No:	le No: BH5 Sample No.: SS6 Depth (m) : 3.8-4.4										
Sample Description :		% Silt and Clay	44	% Sand	46	% Gravel		10	Figure :	50			
Sample Description :		Glacial Till	Glacial Till: Silty Sand (SM)										





EXP Project No.:	OTT-22012013-A0	Project Name :		Proposed New I	Riversid	e South Cath	nolic I	Element	ary School	
Client :	OCSB	Project Location :		Brian Good & S	olarium	Ave, Ottawa	, ON			
Date Sampled :	July 14, 2022	Borehole No:		BH9	San	nple No.:	SS	57	Depth (m) :	4.6-5.2
Sample Description :		% Silt and Clay	37	% Sand	55	% Gravel		8	Figuro :	51
Sample Description :		Glacial Till:	Silty	Sand (SM)					rigure .	51

EXP Services Inc.

Project Name: Proposed Riverside South Catholic Elementary School Brian Good Avenue and Solarium Avenue, Ottawa, Ontario OTT-22012013-A0 September 21, 2022

Appendix A – One-Dimensional Consolidation Test Results Report

*ехр.



Stantec Consulting Ltd. 400 - 1331 Clyde Avenue, Ottawa ON K2C 3G4

August 18, 2022 File: 121623683

Attention: Ismail Taki, M.Eng., P.Eng. Exp Services Inc 2650 Queensview Drive Suite 100 Ottawa, Ontario, Canada, K2B 8H6 Tel: 1-613-853-1350 E-mail: ismail.taki@exp.com

Dear Mr. Taki,

Reference: Consolidation Test Results: Proposed OCB School, 4720 Spratt Road, Ottawa, ON, Exp Services Inc., File # OTT-0022012013-A0

This letter presents the results of one-dimensional consolidation test carried out on two shelby tube samples in accordance with ASTM D2435/D2435M - 11(2020). The test results are provided in the attached tables and figures.

Summary of samples tested

Sample ID	Depth (ft)	Date sampled
BH 4 ST8	20-22	July 19, 2022
BH 7 ST5	10-12	July 15, 2022

This letter provides test results only and does not constitute any interpretation or engineering recommendations with respect to material suitability or specification compliance.

We trust the information presented herein meets your present requirements. Should you have any questions or require additional information, please do not hesitate to contact us.

Regards,

Stantec Consulting Ltd.

ann Charsen

Ramin Ghassemi Ph.D., P.Eng. Geotechnical Engineer Direct: 613 722-4420 Mobile: 437 775-7625 Ramin.ghassemi@stantec.com

v:\01216\active\laboratory_standing_offers\2022-laboratory standing offers\121623683 exp services inc\two consolidations, exp# 22012013\121623683_let_consolidation_bh4 st8 & bh7 st5_22012013.docx



One-Dimensional Consolidation Properties of Soils Using Incremental Loading ASTM D2435/D2435M - 11(2020)







One-Dimensional Consolidation Test using Incremental Loading ASTM D2435/D2435M - 11(2020)

Specimen Details	
Project Name	Exp, File# OTT-0022012013-A0
Project Location	4720 Spratt Road, Ottawa, ON
Borehole	BH 4
Sample No.	ST8
Depth	20-22 ft.
Sample Date	July 19, 2022
Test Number	One
Technician Name	Daniel Boateng

Soil Description & Classification

Lean clay, grey, friable, moist						
Specific Gravity of Solids	2.750					
Average water content of trimmings % 36.22						
Additional Notes (information source, occurer	nce and size of large isolated particles etc.)					
1. Loading schedule was provide	ed by the client, 2. Specific gravity of solids was assumed					

Initial Specimen Conditions

initial epeentien eenanten	•	
Height	mm	20.00
Diameter	mm	50.00
Area	mm ²	1963
Volume	mm ³	39270
Mass	g	67.63
Dry Mass	g	44.70
Density	Mg/m ³	1.722
Dry Density	Mg/m ³	1.138
Water Content	%	51.30
Degree of Saturation	%	99.6
Height of Solids	mm	8.28
Initial Void Ratio		1.416

Final Specimen Conditions

Water Content	%	34.05
Final Void Ratio		0.589
Final Height	mm	13.15



One-Dimensional Consolidation Test using Incremental Loading ASTM D2435/D2435M - 11(2020)

Specimen Details	
Project Name	Exp, File# OTT-0022012013-A0
Project Location	4720 Spratt Road, Ottawa, ON
Borehole	BH 4
Sample No.	ST8
Depth	20-22 ft.
Sample Date	July 19, 2022
Test Number	One
Technician Name	Daniel Boateng

Date Started		July 28, 2022	
Date Finished		August 15, 2022	
Machine Number		Frame C	
Cell Number		С	
Ring Number		С	
Trimming Procedure		Trimming turntable/Cutting ring	
Moisture Condition		Inundated	
Axial Stress at Inundation	kPa	5	
Water Used		De-aired tap water	
Test Method		A	
Interpretation Procedure for c _v		2	

Calculations

Load	Increment	Axial	Corrected	Specimen	Axial	Void
Increment	Duration	Stress	Deformation	Height	Strain	Ratio
		σ_{a}	ΔН	н	ε _a	е
	min	kPa	mm	mm	%	
Seating	0.0	0	0.0000	20.0000	0.00	1.416
1	1440.0	5	0.4639	19.5361	2.32	1.360
2	1440.0	10	0.5057	19.4943	2.53	1.355
3	1440.0	20	0.6012	19.3988	3.01	1.343
4	1440.0	40	0.7360	19.2640	3.68	1.327
5	1440.0	80	0.9491	19.0509	4.75	1.301
6	1440.0	20	0.8840	19.1160	4.42	1.309
7	1440.0	40	0.9069	19.0931	4.53	1.306
8	1440.0	80	0.9756	19.0244	4.88	1.298
9	1440.0	100	1.0353	18.9647	5.18	1.291
10	1440.0	120	1.1317	18.8683	5.66	1.279
11	1440.0	140	1.2029	18.7971	6.01	1.271
12	1440.0	160	1.2984	18.7016	6.49	1.259
13	1440.0	200	1.5105	18.4895	7.55	1.233
14	1440.0	240	1.7327	18.2673	8.66	1.207
15	1440.0	280	2.0537	17.9463	10.27	1.168
16	1440.0	320	2.2703	17.7297	11.35	1.142
17	1440.0	640	4.6891	15.3109	23.45	0.850
18	1440.0	1280	6.8455	13.1545	34.23	0.589

August 19, 2022 August 19, 2022

Date: Date:

D. Boateng R. Ghassemi



One-Dimensional Consolidation Test using Incremental Loading ASTM D2435/D2435M - 11(2020)

Specimen Details	
Job Ref.	Exp, File# OTT-0022012013-A0
Job Location	4720 Spratt Road, Ottawa, ON
Borehole	BH 4
Sample No.	ST8
Depth	20-22 ft.
Sample Date	July 19, 2022
Test Number	One
Technician Name	Daniel Boateng

Calculations

		Calculated using Interpretation Procedure 2				Interpretation	Procedure 1	Interpretation Procedure 2	
Load	Axial	Corrected	Specimen	Axial	Void	Time	Coeff.	Time	Coeff.
Increment	Stress	Deformation	Height	Strain	Ratio		Consol.		Consol.
	$\sigma_{a, average}$	ΔH_{50}	H ₅₀	ε _{a,50}	e ₅₀	t ₅₀	Cv	t ₉₀	Cv
	kPa	mm	mm	%		sec	mm²/s	sec	mm²/s
Seating	0								
1	3	0.1437	19.8563	0.72	1.399			33	2.53E+00
2	8	0.4783	19.5217	2.39	1.358			127	6.37E-01
3	15	0.5401	19.4599	2.70	1.351			82	9.74E-01
4	30	0.6539	19.3461	3.27	1.337			128	6.22E-01
5	60	0.8331	19.1669	4.17	1.315			137	5.69E-01
6	50	0.9161	19.0839	4.58	1.305				
7	30	0.8975	19.1025	4.49	1.308			46	1.70E+00
8	60	0.9398	19.0602	4.70	1.302			53	1.45E+00
9	90	0.9916	19.0084	4.96	1.296			152	5.05E-01
10	110	1.0614	18.9386	5.31	1.288			1607	4.73E-02
11	130	1.1452	18.8548	5.73	1.278			203	3.71E-01
12	150	1.2394	18.7606	6.20	1.266			237	3.15E-01
13	180	1.4035	18.5965	7.02	1.246			6579	1.11E-02
14	220	1.6231	18.3769	8.12	1.220			8851	8.09E-03
15	260	1.9108	18.0892	9.55	1.185			40580	1.71E-03
16	300	2.0906	17.9094	10.45	1.163			1816	3.75E-02
17	480	3.2347	16.7653	16.17	1.025			906	6.58E-02
18	960	5.6831	14.3169	28.42	0.729			1032	4.21E-02



Checked by: Approved by:

August 19, 2022 August 19, 2022

Date: Date:

D. Boateng R. Ghassemi

Filename:

Date:





One-Dimensional Consolidation Properties of Soils Using Incremental Loading ASTM D2435/D2435M - 11(2020)







One-Dimensional Consolidation Test using Incremental Loading ASTM D2435/D2435M - 11(2020)

Specimen Details	
Project Name	Exp, File# OTT-0022012013-A0
Project Location	4720 Spratt Road, Ottawa, ON
Borehole	BH 7
Sample No.	ST5
Depth	10-12 ft.
Sample Date	July 15, 2022
Test Number	Тwo
Technician Name	Daniel Boateng

Soil Description & Classification

Fat clay, brown, desiccated, very moist						
Specific Gravity of Solids	2.750					
Average water content of trimmings %	59.07					
Additional Notes (information source, occurence and size of large isolated particles etc.)						
1. Loading schedule was provided by the client, 2. Specific gravity of solids was assumed						

Initial Specimen Conditions

initial epeennen eenanten	•	
Height	mm	20.00
Diameter	mm	50.00
Area	mm ²	1963
Volume	mm ³	39270
Mass	g	63.22
Dry Mass	g	38.86
Density	Mg/m ³	1.610
Dry Density	Mg/m ³	0.990
Water Content	%	62.69
Degree of Saturation	%	96.9
Height of Solids	mm	7.20
Initial Void Ratio		1.779

Final Specimen Conditions

Water Content	%	37.34
Final Void Ratio		0.994
Final Height	mm	14.35



One-Dimensional Consolidation Test using Incremental Loading ASTM D2435/D2435M - 11(2020)

Specimen Details	
Project Name	Exp, File# OTT-0022012013-A0
Project Location	4720 Spratt Road, Ottawa, ON
Borehole	BH 7
Sample No.	ST5
Depth	10-12 ft.
Sample Date	July 15, 2022
Test Number	Тwo
Technician Name	Daniel Boateng

Date Started		July 28, 2022
Date Finished		August 15, 2022
Machine Number		Frame D
Cell Number		D
Ring Number		D
Trimming Procedure		Trimming turntable/Cutting ring
Moisture Condition		Inundated
Axial Stress at Inundation	kPa	5
Water Used		De-aired tap water
Test Method		A
Interpretation Procedure for c _v		2

Calculations

Load	Increment	Axial	Corrected	Specimen	Axial	Void
Increment	Duration	Stress	Deformation	Height	Strain	Ratio
		σ_{a}	ΔН	н	ε _a	е
	min	kPa	mm	mm	%	
Seating	0.0	0	0.0000	20.0000	0.00	1.779
1	1440.0	5	0.3530	19.6470	1.77	1.730
2	1440.0	10	0.5443	19.4557	2.72	1.703
3	1440.0	20	0.6932	19.3068	3.47	1.683
4	1440.0	40	0.8979	19.1021	4.49	1.654
5	1440.0	80	1.1324	18.8676	5.66	1.622
6	1440.0	20	1.0865	18.9135	5.43	1.628
7	1440.0	40	1.1033	18.8967	5.52	1.626
8	1440.0	80	1.1528	18.8472	5.76	1.619
9	1440.0	100	1.2132	18.7868	6.07	1.610
10	1440.0	120	1.2840	18.7160	6.42	1.601
11	1440.0	140	1.3665	18.6335	6.83	1.589
12	1440.0	160	1.4493	18.5507	7.25	1.578
13	1440.0	200	1.6171	18.3829	8.09	1.554
14	1440.0	240	1.7756	18.2244	8.88	1.532
15	1440.0	280	1.9413	18.0587	9.71	1.509
16	1440.0	320	2.1925	17.8075	10.96	1.474
17	1440.0	640	4.0444	15.9556	20.22	1.217
18	1440.0	1280	5.6486	14.3514	28.24	0.994

August 19, 2022

Filename: Date:

Date: Date:

D. Boateng R. Ghassemi

Approved by:

3



One-Dimensional Consolidation Test using Incremental Loading ASTM D2435/D2435M - 11(2020)

Specimen Details Job Ref. Job Location Borehole Sample No. Depth	
Job Ref.	Exp, File# OTT-0022012013-A0
Job Location	4720 Spratt Road, Ottawa, ON
Borehole	BH 7
Sample No.	ST5
Depth	10-12 ft.
Sample Date	July 15, 2022
Test Number	Тwo
Technician Name	Daniel Boateng

Calculations

		Calcu	lated using Inter	pretation Proce	dure 2	Interpretation	Procedure 1	Interpretation	n Procedure 2
Load	Axial	Corrected	Specimen	Axial	Void	Time	Coeff.	Time	Coeff.
Increment	Stress	Deformation	Height	Strain	Ratio		Consol.		Consol.
	$\sigma_{a, average}$	ΔH_{50}	H ₅₀	ε _{a,50}	e ₅₀	t ₅₀	Cv	t ₉₀	Cv
	kPa	mm	mm	%		sec	mm²/s	sec	mm²/s
Seating	0								
1	3	0.1677	19.8323	0.84	1.756			57	1.47E+00
2	8	0.4509	19.5491	2.25	1.716			56	1.45E+00
3	15	0.6091	19.3909	3.05	1.694			67	1.19E+00
4	30	0.7961	19.2039	3.98	1.668			130	6.02E-01
5	60	0.9938	19.0062	4.97	1.641			158	4.86E-01
6	50	1.1153	18.8847	5.58	1.624				
7	30	1.0946	18.9054	5.47	1.627			45	1.70E+00
8	60	1.1238	18.8762	5.62	1.623			43	1.76E+00
9	90	1.1619	18.8381	5.81	1.618			117	6.40E-01
10	110	1.2236	18.7764	6.12	1.609			59	1.27E+00
11	130	1.3106	18.6894	6.55	1.597			69	1.08E+00
12	150	1.3951	18.6049	6.98	1.585			62	1.18E+00
13	180	1.4922	18.5078	7.46	1.572			86	8.41E-01
14	220	1.6636	18.3364	8.32	1.548			94	7.62E-01
15	260	1.8287	18.1713	9.14	1.525			88	7.98E-01
16	300	2.0058	17.9942	10.03	1.500			111	6.16E-01
17	480	2.7598	17.2402	13.80	1.396			484	1.30E-01
18	960	4.6835	15.3165	23.42	1.128			356	1.40E-01



Checked by: Approved by:

Date: Date:

D. Boateng R. Ghassemi

August 19, 2022 August 19, 2022

Filename:

Date:

4



EXP Services Inc.

Project Name: Proposed Riverside South Catholic Elementary School Brian Good Avenue and Solarium Avenue, Ottawa, Ontario OTT-22012013-A0 September 21, 2022

Appendix B – Laboratory Certificate of Analysis Report

[%]exp.



CLIENT NAME: EXP SERVICES INC 2650 QUEENSVIEW DRIVE, UNIT 100 OTTAWA, ON K2B8H6 (613) 688-1899 **ATTENTION TO: Daniel Wall** PROJECT: OTT-22012013-AO AGAT WORK ORDER: 22Z929319 SOIL ANALYSIS REVIEWED BY: Jacky Zhu, Spectroscopy Technician DATE REPORTED: Aug 11, 2022 PAGES (INCLUDING COVER): 5 VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

<u>otes</u>	
claimer:	

- All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
- Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, warranties of merchantability, fitness for a particular purpose, or non-infringement. AGAT assumes no responsibility for any errors or omissions in the guidelines contained in this document.
- All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.

AGAT Laboratories (V1)

Nember of: Association of Professional Engineers and Geoscientists of Alberta
(APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

Page 1 of 5

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Certificate of Analysis

AGAT WORK ORDER: 22Z929319 PROJECT: OTT-22012013-AO 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: EXP SERVICES INC

SAMPLING SITE:4720 Spratt Rd, Ottawa

ATTENTION TO: Daniel Wall

SAMPLED BY:Exp

					guine onen		
DATE RECEIVED: 2022-08-05							DATE REPORTED: 2022-08-11
					BH 3 SS5	BH 8 SS7	
	SA	MPLE DES	CRIPTION:	BH 1 SS3 5-7'	10'-11.5'	15'-17.5'	
		SAM	PLE TYPE:	Soil	Soil	Soil	
		DATE	SAMPLED:	2022-07-15	2022-07-19	2022-07-14	
Parameter	Unit	G / S	RDL	4173084	4173089	4173091	
Chloride (2:1)	μg/g		2	9	6	4	
Sulphate (2:1)	μg/g		2	59	48	136	
pH (2:1)	pH Units		NA	7.72	8.24	8.23	
Electrical Conductivity (2:1)	mS/cm		0.005	0.156	0.187	0.258	
Resistivity (2:1) (Calculated)	ohm.cm		1	6410	5350	3880	

Inorganic Chemistry (Soil)

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

4173084-4173091 EC, pH, Chloride and Sulphate were determined on the extract obtained from the 2:1 leaching procedure (2 parts DI water: 1 part soil). Resistivity is a calculated parameter.

Redox potential measured on as received sample. Due to the potential for rapid change in sample equilibrium chemistry with exposure to oxidative/reduction conditions laboratory results may differ from field measured results.

Redox potential measurement in soil is quite variable and non reproducible due in part, to the general heterogeneity of a given soil. It is also related to the introduction of increased oxygen into the sample after extraction. The interpretation of soil redox potential should be considered in terms of its general range rather than as an absolute measurement.

Analysis performed at AGAT Toronto (unless marked by *)





5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

Quality Assurance

CLIENT NAME: EXP SERVICES INC

PROJECT: OTT-22012013-AO

SAMPLING SITE:4720 Spratt Rd, Ottawa

AGAT WORK ORDER: 22Z929319

ATTENTION TO: Daniel Wall

SAMPLED BY:Exp

	Soil Analysis														
RPT Date: Aug 11, 2022	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	IKE				
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Acceptable Limits		Recoverv	Acceptable Limits		Recoverv	Acce	eptable nits
		Ia					value	Lower	Upper]	Lower	Upper		Lower	Upper
Inorganic Chemistry (Soil)															
Chloride (2:1)	4166062		148	148	0.0%	< 2	100%	70%	130%	102%	80%	120%	106%	70%	130%
Sulphate (2:1)	4166062		18	18	0.0%	< 2	107%	70%	130%	102%	80%	120%	106%	70%	130%
pH (2:1)	4175866		7.23	7.43	2.7%	NA	100%	80%	120%						
Electrical Conductivity (2:1)	4176158		0.386	0.362	6.4%	0.014	102%	80%	120%						

Comments: NA signifies Not Applicable.

pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

Duplicate NA: results are under 5X the RDL and will not be calculated.





AGAT QUALITY ASSURANCE REPORT (V1)

Page 3 of 5

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation. RPDs calculated using raw data. The RPD may not be reflective of duplicate values shown, due to rounding of final results.



5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

Method Summary

CLIENT NAME: EXP SERVICES INC

PROJECT: OTT-22012013-AO

AGAT WORK ORDER: 22Z929319

ATTENTION TO: Daniel Wall

SAMPLING	SITE:4720	Spratt	Rd,	Ottawa	

SAMPLED BY:Exp

PARAMETER	AGAT S.O.P LITERATURE REFERENCE		ANALYTICAL TECHNIQUE
Soil Analysis	•		
Chloride (2:1)	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate (2:1)	INOR-93-6004	modified from SM 4110 B	ION CHROMATOGRAPH
pH (2:1)	INOR 93-6031	modified from EPA 9045D and MCKEAGUE 3.11	PH METER
Electrical Conductivity (2:1)	INOR-93-6075	modified from MSA PART 3, CH 14 and SM 2510 B	PC TITRATE
Resistivity (2:1) (Calculated)	INOR-93-6036	McKeague 4.12, SM 2510 B,SSA #5 Part 3	CALCULATION

Chain of Custody Record If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)							Work Order #: 222929319 Cooler Quantity: one page no code Arrival Temperatures: 23.2 23.1 23.2															
Report Information: Company: EXP Contact: Desired Wall				(Please	Regulatory Requirements: (Please check all applicable boxes) Regulation 153/04 Excess Soils R406 Regulation 153/04						LT I.2 I.2 Custody Seal Intact: Yes No N/A Notes:											
Contact: Daniel Wall Address: 7650 Queensv: ew Dr: Je Suite 100 Phone: 613-68% -1899 Reports to be sent to: 1. Email: 2. Email: Daniel. Wall @ Exp. Com				Image: Constraint of the second state of the second sta					Turnaround Time (TAT) Required: Regular TAT (Most Analysis) Model 5 to 7 Business Days Rush TAT (Rush Surcharges Apply) 3 Business 2 Business Days Next Business Days 0R Date Required (Rush Surcharges May Apply):													
Project Information: Project: OTT-22012013-A0 Site Location: 4720 Spraff Rd, Offawa Sampled By: Exp		- Is Red	Is this submission for a Record of Site Condition ? Yes No			Report Guideline on Certificate of Analysis					Please provide prior notification for rush TAT *TAT is exclusive of weekends and statutory holidays For 'Same Day' analysis, please contact your AGAT CPM											
AGAT ID #:	PO:Bi	ie billed full price for a	s 🗶 No 🗆	B GW O P S SD SW	mple Matrix Legend Biota Ground Water Oil Paint Soil Sediment Surface Water	Field Filtered - Metals, Hg, CrVI, DOC	& Inorganics	CrVI, DHg, DHWSB	1-F4 PHCs F4G if required TYes DNo		Bs 🗆 Aroclor	Dismosal Characterization TCI P	wei 🗆 vocs 🗆 ABNs 🗆 B(a)P 🗆 PCBs 🛛		Soils Characterization Package MS Metals, BTEX, F1-F4	;/SAR		halas areas	istivity	0	States in the sec	y Hazardous or High Concentration (Y/N
Sample Identification	Date	Time	# of Containers	Sample	Comments/	Y/N	Metals	Metals	3TEX, F Analyze	AHs	Fotal P(/OC	CLP: D	SPLP:	Excess .	Salt - E(HA	Sul,	5			otential
RH 1 553 5-7' RH 3 555 10'-11.5' BH 8 557 15'-17.5'	Jaly 15/22 Jaly 19/22 Jaly 19/22	AM PM AM PM AM PM AM PM	ł																			
		AM PM AM PM AM PM AM PM AM AM																				
Samples Relinquished By (Print Name and Sign): Samples Relinquished By (Print Name and Sign): Samples Relinquished By (Print Name and Sign):	Al	Date Date	2 Time 022 Time 16 Time	:00pm	Samples Received By (Print Name and Sign): Samples Received By (Print Name and Sign): Samples Received By (Print Name and Sign):				A	JG.	Date Date Date	5 2	0 22	Time OS Time 10 Time	h03 30		J∘: T	Page	.49	_ ur		

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Project Name: Proposed Riverside South Catholic Elementary School Brian Good Avenue and Solarium Avenue, Ottawa, Ontario OTT-22012013-A0 September 21, 2022

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EXP Services Inc.

Project Name: Proposed Riverside South Catholic Elementary School Brian Good Avenue and Solarium Avenue, Ottawa, Ontario OTT-22012013-A0 September 21, 2022

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