Ottawa-Carleton District School Board (OCDSB)

Geotechnical Investigation

Type of Document
Final

Project Name
Proposed New Stittsville High School
Robert Grant Drive and Cope Drive, Ottawa, ON

Project Number
OTT-00245378-E1

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Date Submitted
August 1, 2019

Ottawa-Carleton District School Board

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Attention: David Lacelle

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Executive Summary

EXP Services Inc. (EXP) is pleased to present the results of the detailed geotechnical investigation completed for the proposed new Stittsville High School to be located at the southwest corner of the Robert Grant Avenue and Cope Drive intersection in the Stittsville area of the City of Ottawa, Ontario (Figure 1). This work was authorized by Mr. David Lacelle of the OCDSB under SOA Number 18-007.

The proposed school building will be a three to four storey building without a basement. Associated underground services, fire route, bus loop and surface parking facility as well as basketball courts, soccer field/running track and landscaped areas are also to be constructed as part of the proposed school development. The finished floor slab of the proposed school building will be set at Elevation 108.16 m, resulting in a grade raise at the site by up to 2.5 m.

The fieldwork for the geotechnical investigation was completed in two stages and comprised the drilling of thirty-one (31) boreholes (Borehole Nos. 01 to 31) to depths ranging between 1.5 m and 7.3 m below the existing ground surface (Elevation 105.5 m to 100.2 m). Washboring and core drilling techniques were used to advance some of the boreholes beyond the auger refusal depths.

The boreholes revealed the subsurface soil conditions to comprise of surficial layers of topsoil/sand fill underlain by silty sand / sandy silt and glacial till extending to the maximum depth investigated or to the surface of the bedrock contacted at 2.0 m to 5.2 m depths (Elevation 103.8 m to 103.0 m). Washboring and core drilling techniques used to advance some of the boreholes below auger refusal depths revealed that refusal to auger was met on strong to very strong limestone bedrock in the cored boreholes.

Latest groundwater measurements taken on July 29, 2019 revealed that the groundwater table at the site ranges between the depths of 2.6 m and 4.1 m (Elevation 105.6 m to 103.0 m). The groundwater table is subject to seasonal fluctuations and may be at higher levels during wet weather conditions.

The site grading plan provided to EXP indicates that the grades at the site will be raised by up to 2.5 m from the original grades. Based on a review of the borehole log information, it is considered that the proposed grade raise of up to 2.5 m is feasible at the subject site from a geotechnical point of view.

The geotechnical conditions at the site are considered suitable to found the proposed multi-storey building on spread and strip footings set on the glacial till or on engineered fill pad comprising of OPSS 1010 Granular Type II prepared as described in the main body of the report. Footings designed to bear on glacial till or on engineered fill pad may be designed for a bearing pressure at Serviceability Limit State (SLS) of 200 kPa and factored geotechnical resistance at Ultimate Limit State (ULS) of 300 kPa. Settlements of the footings designed according to the recommendations of this report and properly constructed are expected to be within the normally tolerated limits of 25 mm total and 19 mm differential movements.

Alternatively, the footings may be designed for higher SLS and factored ULS values of 250 kPa and 375 kPa respectively provided that they are set in the dense zone of the glacial contacted at a depth of 0.9 m below the surface of the glacial till in some of the boreholes or an engineered fill pad constructed on top of the dense zone of the glacial till and prepared as per the details provided in the main body of the report.

The lowest level floor of the proposed structure may be constructed as a slab-on-grade provided it is set on engineered fill prepared as per the recommendation stated in the report. Perimeter and underfloor drainage systems will not be required. The lowest finished floor slab should be set at least 150 mm higher than the finished exterior grade.

The subsurface conditions at this site has been examined in relation to Section 4.1.8.4 of the 2012 Ontario Building Code (OBC). Based on a review of the borehole information, the site is classified as **Class C** for seismic site response in accordance with Section 4.1.8.4 of the 2012 OBC. It is also noted that a Multi-channel Analysis of Surface Waves (MASW) seismic shear wave survey is currently being undertaken for the site. Depending on the results of the survey, the site may have a higher seismic site class, provided that the criteria of the maximum thickness of overburden soil under the footings is met as per the OBC 2012 requirement. The results of the survey will be reported under separate cover as soon as they become available. The on-site soils are not considered to be susceptible to liquefaction during a seismic event.

Excavations must comply with the most recent Occupational Health and Safety Act (OHSA) Ontario Regulations 213/91 (August 1, 1991). In accordance with the definitions provided in OHSA, the soils to be excavated are considered to be Type 3 and the excavation side slopes must be cut back at 1H:1V from the bottom of the excavation. Within zones of persistent seepage and below the groundwater level in the soils, the excavation side slopes are expected to slough and eventually stabilize at a slope of 2H:1V to 3H:1V. If the above side slopes cannot be achieved due to space restrictions on site, the excavation would have to be undertaken within the confines of an engineered support system (shoring system). The engineered support system should be designed and installed in accordance with the OHSA and the 2006 Canadian Foundation Engineering Manual (Fourth Edition).

Seepage of the surface and subsurface water into the excavations is anticipated in localized areas. However, it should be possible to collect any water entering the excavations in perimeter ditches or low points and to remove it by pumping from sumps. In areas of high infiltration or in areas where more permeable soil layers may exist, higher water seepage should be anticipated. Therefore, the need of high capacity pumps to keep the excavation dry should not be overlooked.

It is anticipated that the majority of the fill required for engineered fill construction to raise site grades and to backfill footing trenches, service trenches and against the subsurface walls would have to be imported and should preferably conform to the Ontario Provincial Standard Specification (OPSS 1010) requirements for Granular A and Granular B Type II.

The access road and fire route at the site should consist of 110 mm of asphaltic concrete underlain by 150 mm of OPSS 1010 Granular A base and 450 mm of OPSS 1010 Granular B Type II sub-base. The pavement structure for light-duty parking areas should consist of 65 mm of asphaltic concrete underlain by 150 mm of Granular A base and 300 mm of Granular B sub-base. The basketball courts and pathways should be provided with 50 mm of asphaltic concrete underlain by 150 mm of Granular A and 200 mm of Granular B Type II material.

General Use (GU) Portland cement may be used in the sub-surface concrete at this site.

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

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1 Introduction

A detailed geotechnical investigation was undertaken at the site of the proposed New Stittsville High School to be located at the southwest corner of the Robert Grant Avenue and Cope Drive intersection in the Stittsville area of the City of Ottawa, Ontario (Figure 1). This work was authorized by Mr. David Lacelle of the OCDSB under SOA Number 18-007.

The proposed school building will be a three to four storey building without a basement. Associated underground services, fire route, bus loop and surface parking facility as well as basketball courts, soccer field/running track and landscaped areas are also to be constructed as part of the proposed school development. The finished floor slab of the proposed school building will be set at Elevation 108.16 m, resulting in a grade raise at the site of up to 2.5 m.

It is noted that EXP Services Inc. (EXP) conducted a preliminary geotechnical investigation at the site under report number OTT-00245378-E0 dated June 20, 2018 for the OCDSB. As part of the preliminary investigation, EXP drilled five (5) boreholes throughout the site. The five (5) boreholes (Borehole Nos. 01 to 05) drilled as part of the preliminary investigation have been added to this report and discussed along with the twenty-six (26) boreholes (Borehole Nos. 05 to 31) drilled for this detailed geotechnical investigation.

This detailed geotechnical investigation was undertaken to:

a) Establish the subsurface soil, bedrock and groundwater conditions at the borehole locations on site;

b) Classify the site for seismic design in accordance with requirements of the 2012 Ontario Building Code (OBC) and assess the liquefication potential of the on-site soils during a seismic event;

c) Comment on grade-raise restrictions for the site;

d) Make recommendations on 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) for the proposed school building as well as anticipated total and differential settlements;

e) Comment on slab-on-grade construction and permanent drainage requirements;

f) Discuss excavation conditions and dewatering requirements during construction;

g) Provide pipe bedding requirements;

h) Comment on backfilling requirements and suitability of the on-site soils for backfilling purposes;

i) Recommend pavement structure thickness for access roads, parking areas, paving stones and basketball courts;

j) Provide recommendations for the construction of the soccer field and running track; and

k) Comment on subsurface concrete requirements and the corrosion potential of the subsurface soils to buried steel structures.

The comments and recommendations given in this report are based on the assumption that the above-described design concept 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.

2 Site Description

The subject site is a 6.56 ha vacant parcel of land situated at the southwest corner of the Robert Grant Avenue and Cope Drive intersection in the Stittsville area of the City of Ottawa, Ontario. The surrounding areas are currently under development with new infrastructure and housing developments under construction north and east of the site.

Large stockpiles of excavated material (silty sand, gravel, cobbles and boulders) can be seen at the front of the site along Cope Drive. The site consists primarily of grass with some tree lines and old barb wire fences throughout the site. Cobbles and boulders in the areas of the tree lines are also frequent throughout the site.

The site slopes gently in the north and east directions with the ground surface elevation at the borehole locations ranging from 105.8 m to 109.1 m.

3 Procedure

The fieldwork for this investigation was undertaken on May 24 and 25, 2018 for the preliminary investigation and continued for the detailed investigation between July 12 and July 18, 2019. The two (2) geotechnical investigations comprise of the drilling of thirty-one (31) boreholes across the site to depths ranging between 1.5 m and 7.3 m below existing grade (Elevation 105.5 m to 100.2 m). The fieldwork was supervised on a full-time basis by an engineer from EXP.

The locations of the boreholes were established by the client and surveyed on site by a crew from Farley, Smith and Denis Surveying Ltd. Prior to drilling the boreholes, their locations were cleared of any public and private underground services by a local contractor. The borehole locations are shown in the Borehole Location Plan, Figure 2.

The fieldwork for this investigation was undertaken using a CME-55 track-mounted drill rig equipped with continuous flight hollow-stem augers and rock coring capabilities. Standard penetration tests (ASTM 1586) were performed in all the boreholes at regular depth intervals and soil samples retrieved by the split-barrel sampler. The presence of the bedrock was proven by coring techniques using NQ-size core barrel in five (5) boreholes. During core drilling of the bedrock, a record was kept of any sudden drops of the drill rods, colour of wash water and wash water return.

Water levels were measured in the open boreholes on completion of drilling. In addition, long-term groundwater monitoring installation consisting of 19 mm diameter polyvinyl chloride (PVC) standpipes with slotted section were placed in nine (9) of the boreholes, i.e. Borehole Nos. 1 to 4, 15, 18, 21, 26 and 31. The standpipes were installed in accordance with EXP standard practice and their installation configuration is documented on the respective borehole log. The remaining boreholes were backfilled upon completion of the fieldwork.

All the soil samples were visually examined in the field for textural classification, logged, preserved in plastic bags and identified. Similarly, all the rock cores were visually examined, placed in core boxes, identified and logged. On completion of the fieldwork, all the soil samples and rock cores were transported to the EXP laboratory in the City of Ottawa where they were visually examined in the laboratory by a geotechnical engineer and borehole logs prepared. The engineer also assigned the laboratory testing, which consisted of performing the following tests on selected soil samples and rock cores in accordance with the American Society for Testing and Materials (ASTM). The test procedures for the corrosion analysis are shown in Appendix A.

Tests on Selected Soil Samples:

Natural Moisture Content	138 tests
Natural Unit Weight	44 tests
Grain-size Analysis	9 tests
Atterberg Limits Determination	2 tests
Corrosion Analysis (pH, Sulphate, Chloride and Electrical Resistivity Analyses)	4 tests

Tests on Selected Rock Cores:

Unit Weight and Unconfined Compressive Strength Tests ..... 9 tests

pH, Sulphate, Chloride and Electrical Resistivity Analyses..... 1 test

4 Subsurface Soil and Groundwater Conditions

A detailed description of the subsurface soil, bedrock and groundwater conditions encountered in the boreholes is given on the borehole logs, Figures 3 to 33 inclusive. The borehole 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 may also result in changes in the conditions interpreted to exist at the locations where sampling was conducted.

It should be noted that the soil and rock boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. 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 logs forms an integral part of this report and should be read in conjunction with this report.

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

4.1 Topsoil

A 50 mm and 350 mm thick layer of topsoil was encountered at ground surface in Borehole Nos. 1 to 5, 11 to 17 and 20 to 31.

4.2 Fill

A thin layer of fill was encountered directly at the surface and below the topsoil in thirteen (13) boreholes (i.e. Borehole Nos. 6-12, 18, 19, 21, 25, 30 and 31). The fill extends to depths ranging from 0.3 m to 0.8 m below the ground surface (Elevation 108.3 m to 105.0 m). The fill generally consists of sand with some gravel to gravelly and occasional traces of silt. It also contains occasional topsoil and organics. Cobbles and boulders can also be observed at the surface in the vicinity of some of the fill areas and are likely present throughout the fill. The SPT N-values of 4 to 28 indicate that the fill is in a loose to compact state. The natural moisture content of the fill is 8 percent to 21 percent.

4.3 Silty Sand / Sandy Silt

A silty sand to sandy silt layer was encountered below the topsoil at Borehole Nos.1, 2, 4, 13 to 17, 20, 23, 24 and 26-29. The silty sand to sandy silt extends to depths ranging from 0.4 m to 1.3 m (Elevation 108.4 m to 105.5 m). Based on the N-values from the standard penetration test (SPT) of 3 to 10, the silty sand is in a very loose to compact state. The natural moisture content of the silty sand to sandy silt is 5 percent to 28 percent.

4.4 Glacial Till (Silty Sand to Sandy Silt)

The topsoil, fill and silty sandy / sandy silt are underlain by glacial till. The SPT N-values of 6 to 120 indicate that the till is in a loose to very dense state. The natural moisture content of the till is 3 percent to 14 percent and its natural unit weight is 22.0 kN/m^3 to 24.1 kN/m^3.

The glacial till extends to the entire depth investigated of 1.5 m to 4.6 m (Elevation 105.5 m to 103.8 m) below ground surface in Borehole Nos. 11, 12, 14 to 17 and 29. In the remaining boreholes the till extends to a depth ranging between 2.0 m and 5.3 m (Elevation 104.8 m to 102.9 m)

The results of the grain size analysis conducted on nine (9) samples of the glacial till are summarized in Table I below. The grain size distribution curves are shown in Figures 34 to 42.

Table I: Summary of Results from Grain-Size Analysis – Glacial Till

Borehole No.	Sample	Depth (m)	Clay (%)	Silt (%)	Sand (%)	Gravel (%)
BH-02	SS3	1.5 – 2.1	6	43	50	1
BH-04	SS6	3.8 – 4.4	13	58	27	2
BH-05	SS4	2.3 – 2.9	6	47	39	8
BH-07	SS2	0.8 – 1.4	8	25	45	22
BH-13	SS3	1.5 – 2.1	6	39	48	7
BH-18	SS2	0.8 – 1.4	6	49	43	2
BH-21	SS4	2.3 – 2.9	6	31	54	9
BH-22	SS5	3.0 – 3.6	6	39	35	20
BH-30	SS3	0.8 – 1.4	5	50	43	2

Atterberg limit tests were conducted on two of the above samples of the till (BH-2 SS3 and BH-4 SS6) and revealed that the glacial till is non-plastic.

Based on a review of the results of the grain size analysis and Atterberg limit tests, the glacial till may be classified as varying from a silty sand to sandy silt with trace to some clay and gravel. The till contains cobbles and boulders as indicated on the borehole logs.

4.5 Cobbles and Boulders or Weathered Bedrock

Significant grinding of the augers was encountered at the location of Borehole Nos. 9, 10, 18 to 21, 23, 25, 26 and 28 prior to auger refusal indicating a material such as weathered bedrock or cobbles and boulders. This layer ranges in thickness between 200 mm and 900 mm and extends to auger refusal at a depth ranging between 2.5 m and 4.3 m (Elevation 104.6 m to 103.3 m).

4.6 Auger Refusal

Auger refusal was met in all the boreholes (with the exception of Borehole Nos. 11, 12, 14 to 17 and 29) at 2.0 m to 5.3 m depths (Elevation 104.7 m to 103.0 m) on inferred boulders or bedrock. Based on coring results, cobbles and boulders were confirmed to be present within the glacial till in Borehole No. 1 from 3.5 m to 5.2 m depths (Elevation 104.7 m to 103.0 m) and in Borehole No. 31 from 1.7 m to 2.0 m depths (Elevation 104.1 m to 103.8 m). A summary of the auger refusal depths and elevations is presented in Table II.

Table II: Summary of Auger Refusal Depths and Elevations in Boreholes

Borehole No.	Ground Surface Elevation (m)	Refusal Depth (m)	Refusal Elevation (m)
BH-01	108.2	5.2*	103.0*
BH-02	107.1	3.4*	103.7*
BH-03	107.5	4.3*	103.2
BH-04	109.1	5.3	103.8
BH-05	108.2	5.2	103.0
BH-06	107.4	3.4	104.0
BH-07	108.6	3.9	104.7
BH-08	108.2	4.4	103.8
BH-09	107.1	3.3	103.8
BH-10	106.1	2.6	103.5
BH-11	105.8	NE	NE
BH-12	106.8	NE	NE
BH-13	108.4	4.1	104.3
BH-14	108.3	NE	NE
BH-15	108.7	NE	NE
BH-16	108.4	NE	NE
BH-17	107.3	NE	NE
BH-18	107.7	4.3	103.4
BH-19	107.2	3.7	103.5
BH-20	106.1	2.6	103.5
BH-21	106.2	2.8*	103.4*
BH-22	107.9	4.8	103.1
BH-23	107.2	3.5	103.7
BH-24	106.3	2.5	103.8
BH-25	105.8	2.5	103.3
BH-26	107.8	3.2	104.6
BH-27	107.2	3.2	104.0

Table II: Summary of Auger Refusal Depths and Elevations in Boreholes			
Borehole No.	**Ground Surface Elevation (m)**	**Refusal Depth (m)**	**Refusal Elevation (m)**
BH-28	106.5	2.7	103.8
BH-29	107.6	NE	NE
BH-30	106.8	2.5	104.3
BH-31	105.8	2.0*	103.8*
*Indicates that bedrock was proven at refusal depth by rock coring techniques NE – Refusal not encountered			

4.7 Limestone Bedrock

The presence of bedrock was proven in Borehole Nos. 1 to 3, 21 and 31 by coring operations. The bedrock was contacted at 2.0 m to 5.2 m depths (Elevation 103.8 m to 103.0 m) and cored to depths extending between 3.6 and 7.3 m (Elevation 102.2 m to 100.2 m).

A review of the recovered bedrock cores and published geology maps indicate that the bedrock is limestone of the Ottawa formation. The limestone is described as containing thin shaley beds, is aphanitic to fine grained with laminated to very thinly bedded and close to moderate joint spacing.

The bedrock core information indicates a Total Core Recovery (TCR) of 95 percent and 100 percent and a Rock Quality Designation (RQD) of 29 percent to 94 percent. On this basis, the bedrock quality may be described as poor to excellent.

The results of the unit weight determination and unconfined compressive strength tests performed on nine (9) rock cores are summarized in Table III. A review of the test results indicates a bedrock with compressive strength ranging between 71.8 MPa and 210.5 MPa. Based on these values, the rock may be classified, with respect to intact strength as “strong” to “very strong” (Canadian Foundation Engineering Manual, 4th Edition, 2006). The unit weight of the bedrock ranges between 2645 kN/m^3 and 2704 kN/m^3.

Table III: Unit Weight and Unconfined Compressive Strength Test Results - Bedrock			
Borehole No.	**Depth of Rock Core (m)**	**Unconfined Compressive Strength (MPa)**	**Unit Weight (kg/m^3)**
BH-01	5.4 – 5.6	146.5	2671
BH-02	3.8 – 3.9	71.8	2645
BH-02	4.2 – 4.4	118.0	2656
BH-03	4.4 – 4.5	145.1	2672
BH-03	4.7 – 4.8	188.0	2679
BH-21	2.8 – 3.0	210.5	2689

Table III: Unit Weight and Unconfined Compressive Strength Test Results - Bedrock			
Borehole No.	**Depth of Rock Core (m)**	**Unconfined Compressive Strength (MPa)**	**Unit Weight (kg/m^3)**
BH-21	4.1 – 4.3	104.8	2682
BH-31	2.2 – 2.4	140.2	2679
BH-31	3.2 – 3.4	141.0	2704

Photographs of the bedrock cores are presented in Figures 43 to 47.

4.8 Groundwater Level

Groundwater level observations were made in the boreholes during drilling and in standpipes installed in selected boreholes subsequent to the completion of drilling. The groundwater level observations made in the boreholes equipped with standpipes are shown in Table IV.

Table IV: Summary of Groundwater Levels in Boreholes					
Borehole No.	**Ground Surface Elevation (m)**	**Drill Date**	**Date of Groundwater Level Measurement**	**Depth of Groundwater Below Existing Ground Surface (m)**	**Groundwater Elevation (m)**
BH-01	108.2	May 25, 2018	July 29, 2019	3.8	104.4
BH-02	107.1	May 25, 2018	July 29, 2019	Dry	N/A
BH-03	107.5	May 25, 2018	July 29, 2019	3.0	104.5
BH-04	109.1	May 24, 2018	July 29, 2019	3.5	105.6
BH-15	108.7	July 15, 2019	July 29, 2019	3.5	105.2
BH-18	107.7	July 16, 2019	July 29, 2019	4.1	103.6
BH-21	106.2	July 18, 2019	July 29, 2019	2.6	103.6
BH-26	107.8	July 15, 2019	July 29, 2019	Dry	N/A
BH-31	105.8	July 18, 2019	July 29, 2019	2.8	103.0

Water levels were determined in the boreholes at the times and under the conditions stated in the scope of services. 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.

5 Liquefaction Potential and Seismic Site Classification

5.1 Liquefaction Potential

The investigation has revealed the subsurface conditions at the site comprise primarily of compact to very dense glacial till which is not considered susceptible to liquefaction during a seismic event.

5.2 Seismic Classification

The subsurface conditions at this site has been examined in relation to Section 4.1.8.4 of the 2012 Ontario Building Code (OBC). The subsurface soils consist primarily of a compact to very dense glacial till underlain by limestone bedrock contacted at 2.0 m to 5.2 m depths (Elevation 103.8 m to 103.0 m). Based on a review of the borehole information, the site is classified as **Class C** for seismic site response in accordance with Section 4.1.8.4 of the 2012 OBC.

It is also noted that a Multi-channel Analysis of Surface Waves (MASW) seismic shear wave survey is currently being undertaken for the site. Depending on the results of the survey, the site may have a higher seismic site class, provided that the criteria of the maximum thickness of overburden under the footing is met as per the OBC 2012 requirement. The results of the survey will be reported under separate cover as soon as they become available.

6 Grade Raise Restriction

Since the subsurface soils consist of cohesionless sandy soils that are not susceptible to consolidation settlement, there is no restriction to raising the grades at the site from a consolidation settlement perspective.

7 Site Grading

The site of the proposed school development comprises of a 6.56 hectare parcel of land.

Site grading within the footprint of the proposed building, parking areas, access roads, portables, soccer field, basketball court, soccer field etc. should consist of the removal of all topsoil, organic material and fill down to the surface of native silty sand / sandy and/or glacial till whichever is contacted first. Following approval, the exposed subgrade should be proof rolled with a vibratory roller 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 fill as per the requirement of Section 12.

Allowance should be made in the contract in the event that some of the subgrade materials (upper fill) require removal from under the above elements.

7.1 Engineered Pad for Future Portables

It is understood that portable classrooms will be built at the site in the future. The portable classrooms may be supported by a reinforced thickened concrete mat placed on an engineered fill pad. Excavation in the area of the engineered fill pad for the portable classrooms would consist of removing all topsoil, fill, silty any other unsuitable materials down to the native silty sand/glacial till. The exposed subgrade should then be proofrolled and approved by a geotechnician. The construction of the engineered fill pad may then proceed as per the requirements provided in Section 12.

EXP can provide the bearing pressure at Serviceability Limit State (SLS) and factored geotechnical resistance at Ultimate Limit State (ULS) once additional details regarding the portables are available.

8 Foundation Considerations

Preliminary design plans indicate that the finished floor slab will be set at Elevation 108.16 m. Within the proposed building envelope, the site grade raise will range from approximately 0.3 m to 2.4 m. Review of the borehole logs within the building envelope indicates that the subsurface conditions consists of topsoil and fill underlain by native silty sand / sandy and glacial till overlying limestone bedrock. The groundwater level ranges from 2.6 m to 4.1 m depths (Elevation 105.6 m to 103.0 m). The glacial till within the proposed building footprint was contacted at approximately 0.3 m to 1.2 m depths below the existing ground surface (Elevation 107.4 m to 105.0 m).

Based on a review of the borehole information, the existing fill and native silty sand/sandy silt are not considered suitable to support footings. Therefore, it is considered feasible to support the proposed building on strip and spread footings founded on the glacial till and on an engineered fill pad constructed on the glacial till. As part of the preparation for the footings for the building footprint, the topsoil, fill, silty sand and any unsuitable material should be removed from the areas of the footings and excavated down to the native glacial till. The excavation should extend a sufficient distance beyond the perimeter of the building to accommodate a 1.0 m wide bench of engineered fill, which is thereafter sloped at an inclination of 1H:1V down to the native glacial till.

As part of the construction of the engineered fill pad for the footings, the surface of the exposed native glacial till subgrade should be reviewed by a geotechnician. Any soft or spongy subgrade areas detected should be sub excavated and properly replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to 100 percent of the Standard Proctor Maximum Dry Density (SPMDD). The engineered fill should be placed under the full-time supervision of a geotechnician working under the direction of a geotechnical engineer. In-place density tests should be undertaken on each lift of the engineered fill to ensure that it is properly compacted prior to placement of the subsequent lift.

The footings designed to bear on the native silty sand / sandy silt till and on the engineered fill pad constructed as noted above may be designed for a bearing pressure at Serviceability Limit State (SLS) of 200 kPa and factored geotechnical resistance at Ultimate Limit State (ULS) of 300 kPa. The factored geotechnical resistance at ULS includes a geotechnical resistance factor of 0.5.

Alternatively, the footings may be designed for a higher SLS and factored ULS values of 250 kPa and 375 kPa respectively, provided that they are set in the dense zone of the glacial till contacted at a depth of 0.9 m below the surface of the glacial till in some of the boreholes or on an engineered fill pad constructed on top of the dense glacial till and prepared as per the details above.

Settlements of the footings designed for the SLS bearing pressure recommended above and properly constructed are expected to be within the normally tolerated limits of 25 mm total and 19 mm differential movements.

Following construction of the footings, granular fill comprising of OPSS 1010 Granular B Type II should be used as backfill in the interior and exterior of the building and compacted to 98 percent of SPMDD and to 95 percent SPMDD respectively.

All footings bed should be examined by a geotechnical engineer to ensure 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. In areas where earth cover will be les than required, rigid insulation may be used to protect the footings. Alternatively, a combination of earth cover and rigid insulation may also be used to protect the footings from frost action.

The recommended bearing pressure at SLS and factored geotechnical resistances at ULS 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.

9 Floor Slab and Drainage Requirements

The lowest level floor slab of the proposed building may be constructed as a slab-on-grade provided it is cast on a bed of well-compacted 19 mm clear stone at least 200 mm thick placed on a minimum 300 mm thick engineered fill pad constructed on the compacted silty sand and/or on the glacial till. It is noted that the silty sand contacted above the till under the floor is generally loose and will need to be compacted in the presence of a geotechnician prior to placement of any engineered fill under the floor. Any soft areas detected within the silty and should be excavated and replaced with well compacted engineered fill.

The engineered fill beneath the floor slab should be compacted to 98 percent SPMDD.

The clear stone would minimize the capillary rise of moisture from the sub-soil to the floor slab. Adequate saw cuts should be provided in the floor slab to control cracking. Alternatively, the floor slab may be cast on a bed of OPSS 1010 Granular A overlain by a vapour barrier.

Perimeter and underfloor drainage systems are not required. The finished floor slab however should be set at least 150 mm higher than the finished exterior grade.

The finished exterior grade should be sloped away from the building at an inclination of 2 percent to prevent ponding of surface water close to the exterior walls.

10 Excavations and De-Watering Requirements

10.1 Excavations

Excavations for the construction of the foundations for the proposed school building and installation of the underground services are expected to extend to a maximum depth of 4.5 m below the existing grade. These excavations will be undertaken through the fill, silty sand / sandy silt, and into the glacial till and into the limestone bedrock in localised areas. The excavations are anticipated to be approximately 0.4 m to 1.9 m below the groundwater level.

The excavations in the soil may be undertaken by conventional equipment capable of removing cobbles and boulders in the glacial till. Large boulders may need to be hoe-rammed into smaller pieces prior to removal from the site.

Excavations must comply with the most recent Occupational Health and Safety Act (OHSA) Ontario Regulations 213/91 (August 1, 1991). In accordance with the definitions provided in OHSA, the soils to be excavated are considered to be Type 3 and the excavation side slopes must be cut back at 1H:1V from the bottom of the excavation. Within zones of persistent seepage and below the groundwater level in the soils, the excavation side slopes are expected to slough and eventually stabilize at a slope of 2H:1V to 3H:1V. If the above side slopes cannot be achieved due to space restrictions on site, the excavation would have to be undertaken within the confines of an engineered support system (shoring system). The engineered support system should be designed and installed in accordance with the OHSA and the 2006 Canadian Foundation Engineering Manual (Fourth Edition).

In areas where removal of the limestone bedrock will be required for the installation of underground services, hoe ramming may be used for the removal of small quantity of bedrock; however, this process is expected to be very slow. Should larger quantities of bedrock require removal, line drilling and blasting techniques may be required. The bedrock may be excavated with near vertical faces. The most suitable method required for the removal of small or large volume of bedrock should be best established by the contractor undertaking the work. In addition, it is recommended that a pre-construction survey of adjacent building(s), roads, sidewalks, wells and underground services be undertaken prior to any earth and rock excavation work and vibration monitoring be conducted during construction operations.

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.

10.2 De-Watering Requirements

Seepage of the surface and subsurface water into the excavations is anticipated in localized areas. However, it should be possible to collect any water entering the excavations in perimeter ditches or low points and to remove it by pumping from sumps. In areas of high infiltration or in areas where more permeable soil layers may exist, higher water seepage should be anticipated. Therefore, the need of high capacity pumps to keep the excavation dry should not be overlooked.

It is noteworthy to mention that new legislation came into force in Ontario on March 29, 2016 to regulate groundwater takings for construction dewatering purposes. Prior to March 29, 2016, a Category 2 Permit to Take Water (PTTW) was required from the Ontario Ministry of the Environment and Climate Change (MOECC) for groundwater takings related to construction dewatering, where taking volumes in excess of 50 m^3/day, but less than 400 m^3/day, and the taking duration was no more than 30 consecutive days. The new legislation replaces the Category 2 PTTW for construction dewatering with a new process under the Environmental Activity and Sector Registry (EASR). The EASR is an on-line registry, which allows persons engaged in prescribed activities, such as water takings, to register with the MOECC instead of applying for a PTTW.

To be eligible for the new EASR process, the construction dewatering taking must be less than 400 m^3/day under normal conditions. The water taking can be groundwater, storm water, or a combination of both. It should be noted that the 30-consecutive day limit on the water taking under the old Category 2 PTTW process has been removed in the new EASR process. Also, it should be noted that the EASR process requires two technical studies be prepared by a Qualified Person, prior to any water taking. These studies include a Water Taking Report, which provides assurance that the taking will not cause any unacceptable impacts, and a Discharge Plan, which provides assurance that the discharge will not result in any adverse impacts to the environment. A significant advantage of the new EASR process over the former Category 2 PTTW process, is that the groundwater taking may begin immediately after completing the on-line registration of the taking and paying the applicable fee, assuming the accompanying technical studies have been completed. The former PTTW process typically took more than 90 days, which had the potential to impact construction schedules. EXP can provide assistance during the EASR/PTTW process, if required.

Although this investigation has estimated the groundwater levels at the time of the field work, and commented on de-watering and general construction problems, conditions may be present that are difficult to establish from standard boring and excavating techniques. These conditions may affect the type and nature of de-watering procedures used by the contractor. 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 de-watering systems.

11 Pipe Bedding Requirements

Based on a review of the site servicing plan, it is anticipated that the services would be founded primarily in the glacial till overburden and possibly in the limestone bedrock in localized areas of the site.

It is recommended that the bedding for underground services including material specifications, thickness of cover material and compaction requirements conform to City of Ottawa requirements and/or Ontario Provincial Standard Specifications and Drawings (OPSS and OPSD).

It is recommended that a 300 mm thick well graded, crushed stone, such as OPSS Granular A be used as pipe bedding. The bedding thickness can be reduced to 150 mm if the subgrade consists of bedrock. The bedding material should also be placed along the sides and on top of the pipe to provide a minimum cover of 300 mm. The bedding and surround material should be compacted to at least 95 percent of the SPMDD.

In areas where the services will be founded partly in bedrock and partly in soil, a transition zone should be provided by the sub-excavation of the bedrock for a sufficient distance and backfilling the excavation with OPSS 1010 Granular A compacted to 100 percent of the SPMDD. EXP can provide additional recommendation in this regard, if required.

12 Backfilling Requirements and Suitability of On-Site Soils for Backfilling Purposes

Material to be excavated from the site as part of the proposed development would comprise of topsoil, fill, native silty sand / sandy silt and glacial till and possibly limestone bedrock. From a geotechnical perspective, these soils and the bedrock are not considered suitable for reuse as backfill material. Therefore, it is anticipated that the majority of material required for backfilling purposes and subgrade preparation would have to be imported and should conform to the following specifications. Portions of the above noted soils may be reused as fill in the landscaped areas of the proposed development.

- Engineered fill under footings for the building and mat foundation for the portables – OPSS 1010 Granular B Type II for the interior of the building compacted to 100 percent SPMDD.
- Underfloor fill and backfill of footing trenches (building interior and exterior) – OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 98 percent of the SPMDD in the interior of the building and to 95 percent of the SPMDD in the exterior of the building;
- Trench backfill and subgrade fill in recreation areas, parking areas and access roadways – OPSS 1010 Select Subgrade Material (SSM) placed in 300 mm thick lifts and each lift compacted to 95 percent of the SPMDD; and
- Landscaped area - Clean fill free of organic and deleterious material placed in 300 mm thick lifts and each lift to compacted to 92 percent of the SPMDD.

To minimize settlement of the pavement structure over services trenches, the trench backfill material within the frost zone 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.

13 Access Roads and Parking Areas

The subgrade for the proposed parking areas, access roadways and other hard surfaces at the site will comprise of sand fill, silty sand / sandy silt, glacial till or select subgrade material used to raise the grades to the proposed subgrade levels. Pavement structure thicknesses required for the light duty and heavy-duty roadways (bus route and fire route) as well as for pathways, paving stones and basketball courts were computed and are shown on Table V. The thicknesses are based upon an estimate of the subgrade soil properties determined from visual examination, textural classification of the soil samples and functional design life of 15 to 18 years. The proposed functional design life represents the number of years to the first rehabilitation, assuming regular maintenance is carried out.

Table V: Recommended Pavement Structure Thicknesses

Pavement Layer	Compaction Requirements	Paving Stones	Pathways / Basketball Courts	Light Duty (Cars and Parking)	Heavy Duty (Fire and Bus Routes)
Asphaltic Concrete (PG 58-34)	92 - 97% MRD	Paving Stones over 25 mm stone dust	50 mm HL3F	65 mm HL3 or SP12.5 Cat B	50 mm HL3 or SP12.5 Cat B 60 mm HL8 or SP19 Cat B
OPSS 1010 Granular'A Base (crushed limestone)	100% SPMDD*	150 mm	150 mm	150 mm	150 mm
OPSS 1010 Granular B Type II Sub-base	100% SPMDD*	200 mm	200 mm	300 mm	450 mm
	Competent Subgrade OR Engineered Fill				

Notes:
MRD denotes Maximum Relative Density – ASTM D-2041
SPMDD denotes Standard Proctor Maximum Dry Density, ASTM-D698-12e2,
Asphaltic concrete in accordance with OPSS 1150 (Marshall Mixes) or OPSS 1151 (Superpave Mixes)

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 and/or geotextile may be required.

Additional comments on the construction of the pavement structure areas are as follows:

1. As part of the subgrade preparation, the proposed parking area, access roadways, basketball courts and paving stone areas should be stripped of topsoil and other obviously unsuitable material. In areas where existing fill is present, the fill may be left in place, however it should be compacted

and proof rolled in the presence of a geotechnician and approved before placement of the granular materials for the pavement structure (or granular materials for the grade raise).

2. Fill required to raise the grades to design elevations should conform to requirement as per Section 12 which should be placed and compacted to 95 percent of the SPMDD. The subgrade should be properly shaped, crowned, then proof rolled with a heavy vibratory roller 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 98 percent SPMDD.

3. 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. Sub-drains must be installed on both sides of the access roads, in the proposed parking area, soccer field, basketball courts and any other paved surfaces or paving stone surfaces. The sub-drains should be installed at low points and should be continuous between catch basins 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.

4. To minimize the problems of differential movement between the pavement and catch basins/ manhole due to frost action, the backfill around the structures should consist of free-draining granular preferably conforming to OPSS 1010 Granular B Type II material. Weep holes should be provided in the catch basins/manholes to facilitate drainage of the granular fill.

5. The most severe loading conditions on pavement areas and the subgrade may occur during construction. Consequently, special provisions such as restricted lanes, half-loads during paving, etc., may be required, especially if construction is carried out during unfavorable weather.

6. 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.

7. Relatively weaker subgrade may develop over service trenches at subgrade level if wet soils is used to backfill of the service trenches. Therefore, only dry and compactible material should be used to backfill service trenches as recommended in Section 12 of the report.

8. The granular materials used for pavement structure should conform to OPSS 1010 for Granular A and Granular B Type II and should be compacted to 100 percent of the SPMDD.

9. The asphaltic concrete used and its placement should meet OPSS 1150 or 1151 requirements. It should be compacted from 92 to 97 percent of the Maximum Relative Density (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 that they are consistent with the recommendations of this report.

14 Soccer Field and Running Track

The soccer field should be provided with 150 mm of topsoil underlain by 150 mm of growing medium and 300 mm of OPSS Granular B Type II base. The running track surrounding the soccer field should be constructed with 100 mm of stone dust underlain by 300 mm thick OPSS 1010 Granular B Type II base. A landscaped architect should be consulted for the final design of the soccer field.

The subgrade or subgrade fill underlying the granular base for the soccer field and running track as well as the installation of sub-drains should be prepared as per the recommendations stated in Section 13 of the report. The base and sub-base materials should be compacted to at least 95 percent of SPMDD.

15 Subsurface Concrete Requirements and Corrosion Potential of Subsurface Soil to Buried Steel

Chemical tests limited to pH, sulphate, chloride and electrical resistivity were undertaken on four (4) selected soil samples and one (1) rock sample and the results are shown in Table VI. The laboratory certificate of analysis for the chemical tests is shown in Appendix A.

Table VI: Results of pH, Chloride, Sulphate and Resistivity Tests on Selected Soil and Bedrock Samples

Borehole No. - Sample No.	Soil / Rock	Depth (m)	pH	Sulphate (%)	Chloride (%)	Resistivity (ohm.cm)
Threshold Values			**<5**	**>0.1**	**>0.04**	**<1500 ohm.cm Corrosive**
BH-01 – SS3	Silty Sand Till	1.5 – 2.1	7.71	0.0004	0.0004	9710
BH-03 – SS4	Sandy Silt Till	2.3 – 2.9	7.75	0.0003	0.0003	12800
BH-21 – SS3	Silty Sand Till	1.5 – 2.1	7.91	0.0002	< 0.0002	12200
BH-22 – SS4	Silt & Sand Till	2.3 – 2.5	7.80	0.0013	0.0011	7410
BH-31 – Run 2	Limestone	2.1 – 2.2	7.92	0.0078	0.0063	2650

The results indicate a soil and bedrock with sulphate and chloride content of less than 0.1 percent and 0.04 percent respectively. These concentrations of sulphate and chloride would have a negligible potential of sulphate and chloride attack on subsurface concrete. The concrete should be in accordance with Table Nos. 3 and 6 of CSA A.23.1-14. However, the concrete should be dense, well compacted and cured.

The results of the resistivity tests indicate that the soil is mildly to slightly corrosive while the bedrock is moderately corrosive to underground bare steel structures. It is recommended that a corrosion expert should be consulted to determine if any special measures are required if exposed steel is to be buried below ground surface.

16 Additional Comments

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 borehole locations when construction is underway. The interpretation between the boreholes, as well as the recommendations of this report, must, therefore, be checked through field inspections provided by EXP to validate the information for use during the construction stage.

All earthwork activities from placement and compaction of fill in the service trenches to subgrade preparation, placement and compaction of granular materials and asphaltic concrete should be inspected by qualified geotechnicians to ensure that all constructions of the services and pavement structures proceed according to the specifications. All the footing beds should also be examined by a geotechnical engineer to ensure that the design bearing pressure is available at the founding level and that the footing beds have been properly cleaned.

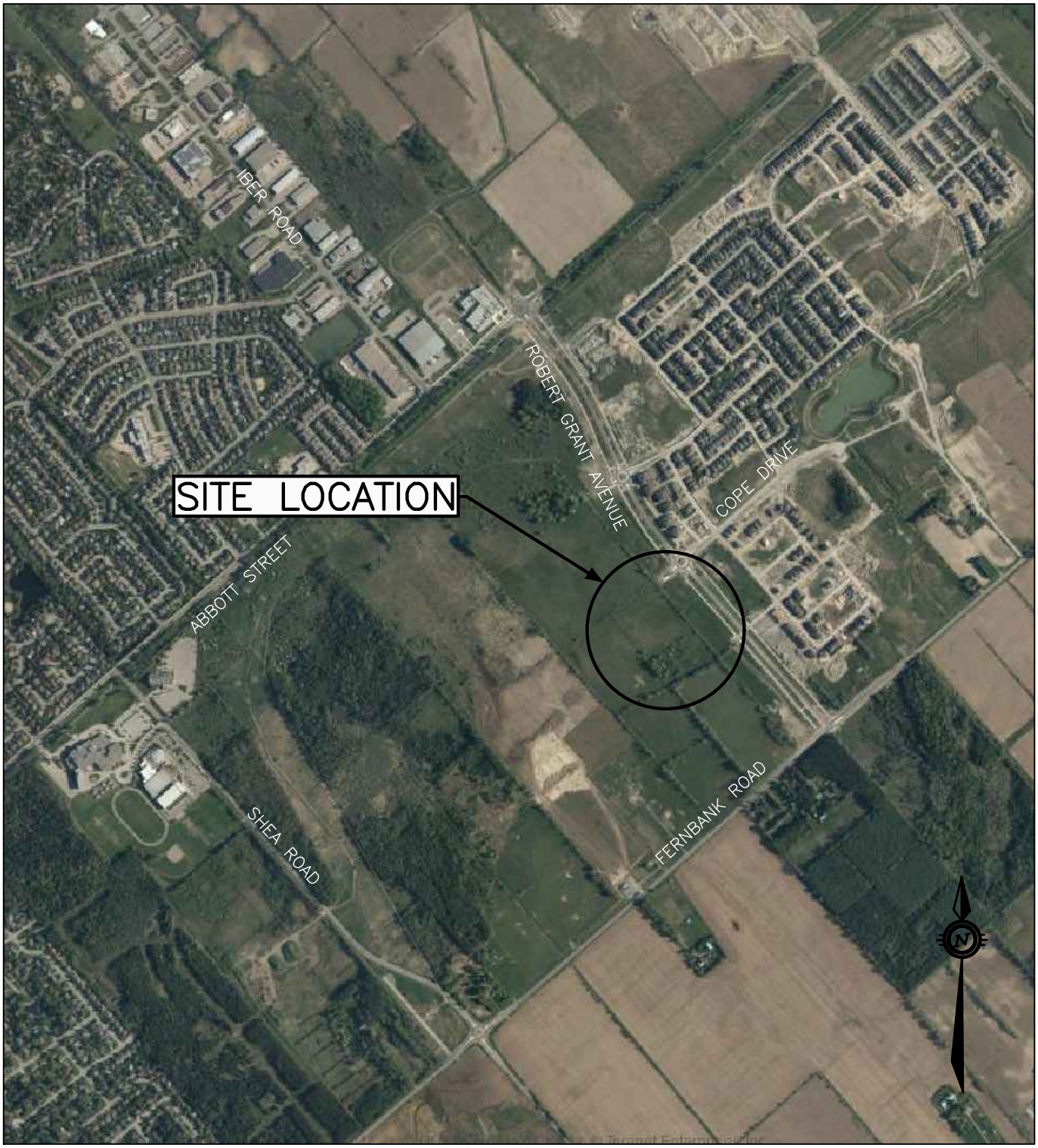
17 General Closure

The comments given in this report are intended only for the guidance of design engineers. The number of boreholes required to determine the localized underground conditions, between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc., would be much greater than has been carried out for 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 borehole 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.

FIGURES



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DESIGN	EXP
DRAWN	MNP
DATE	AUG 2019
FILE NO	OTT-245378-E1

GEOTECHNICAL INVESTIGATION
PROPOSED NEW STITTSVILLE
HIGH SCHOOL

SITE LOCATION PLAN

SCALE 1:25,000

SKETCH NO FIG 1

Filename: P:\Projects\GeoTechnical\240000\245000\245378 E1- Detailed Geo Inv Stittsville HS OSDSB\0 - DRAWING\OLD Report 245378 - BH-Fernbank.dwg
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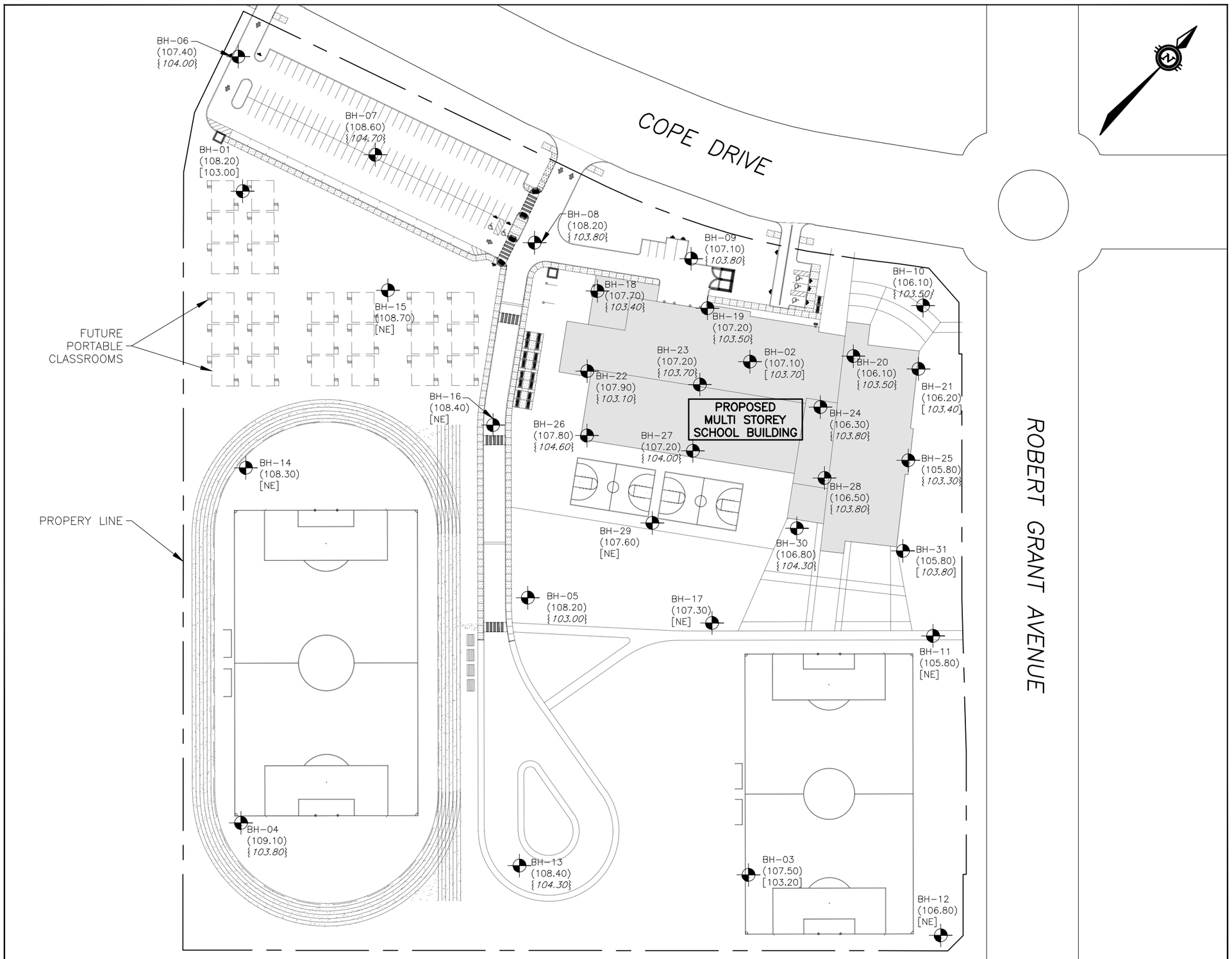

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LEGEND

BH–06 BOREHOLE NO. & LOCATION
(99.99) (GROUND ELEVATION)
[99.99] [BEDROCK ELEVATION]
{99.99} {AUGER REFUSAL ELEVATION}
[NE] [AUGER REFUSAL NOT ENCOUNTERED]

NOTES:
1. THE BOUNDARIES, SOIL AND ROCK TYPES HAVE BEEN ESTABLISHED ONLY AT BOREHOLE LOCATIONS. BETWEEN BOREHOLES THEY ARE ASSUMED AND MAY BE SUBJECT TO CONSIDERABLE ERROR.
2. SOIL SAMPLES AND ROCK CORES WILL BE RETAINED IN STORAGE FOR THREE MONTHS AND THEN DESTROYED UNLESS THE CLIENT ADVISES THAT AN EXTENDED TIME PERIOD IS REQUIRED.
3. TOPSOIL QUANTITIES SHOULD NOT BE ESTABLISHED FROM THE INFORMATION PROVIDED AT THE BOREHOLE LOCATIONS.
4. BOREHOLE ELEVATIONS SHOULD NOT BE USED TO DESIGN BUILDINGS(S), FLOOR SLABS OR PARKING LOT(S) GRADES.
5. THIS DRAWING FORMS PART OF THE REPORT PROJECT NUMBER AS REFERENCED AND SHOULD BE USED ONLY IN CONJUNCTION WITH THIS REPORT.
6. BASE PLAN OBTAINED FROM OTTAWA–CARLETON DISTRICT SCHOOL BOARD.

SCALE
0 10m 20m 50m
HORIZONTAL 1:1250

CLIENT
OTTAWA–CARLETON DISTRICT SCHOOL BOARD
1224 STITTSVILLE MAIN STREET
OTTAWA, ON. K2S 0E3

PROJECT
GEOTECHNICAL INVESTIGATION
PROPOSED NEW STITTSVILLE HIGH SCHOOL

TITLE
BOREHOLE LOCATION PLAN

date: AUG 2019	project no: OTT–245378–E1
design by: EXP	drawing no.
prepared by: MNP	FIG 2
reviewed by: ML	

Filename: p:\projects\geotechnical\240000\245000\245378 e1- detailed geo inv stittsville hs osdsb\o - drawing\old report 245378 - bh-fernbank.dwg
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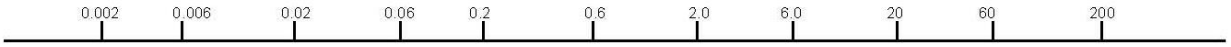
Pen Table:: exp-64.ctb

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 Societv 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.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		



EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			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 Borehole BH-01

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 3

Page. 1 of 1

Date Drilled: 'May 25, 2018

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test —— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○⊣ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth
		TOPSOIL ~200 mm	108.2	0
		SILTY SAND TO SANDY SILT Brown, moist, (loose)	108.0	
		SILTY SAND TILL Some gravel, trace clay, cobbles and boulders, brown to grey-brown, moist, (compact to very dense)	107.5	1
				2
			104.4	3
				4
			103.0	5
		LIMESTONE BEDROCK Some thin shaly beds, aphanitic to fine grained, laminated to very thinly bedded, close joint spacing, grey, (poor to good quality)		6
			100.9	7
		Borehole Terminated at 7.3 m Depth		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

SPT values: 4, 17, 32, 57, 50 for 100 mm

SAMPLES	Natural Unit Wt. kN/m³
	23.2
	22.9
Run 1	
Run 2	
Run 3	
Run 4	

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed 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-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	N/A	4.3
July 29, 2019	3.8	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3.5 - 4.5	33	0
2	4.5 - 5.2	41	0
3	5.2 - 5.8	100	29
4	5.8 - 7.3	95	81

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-02

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 4

Page. 1 of 1

Date Drilled: 'May 25, 2018

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength (kPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~150 mm	107.1	0				
		SILTY SAND Brown, moist, (loose)	107.0		7			
		SILT AND SAND TILL Trace gravel and clay, cobbles and boulders, brownish grey to grey, moist, (compact to dense)	106.4	1	29			
				2	40			23.9
				3	47 50 for 75 mm			
		LIMESTONE BEDROCK Some thin shaly beds, aphanitic to fine grained, laminated to very thinly bedded, close joint spacing, grey, (poor to good quality)	103.7	4			Run 1	
				5			Run 2	
			101.0	6				
		Borehole Terminated at 6.1 m Depth						

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed 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-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	N/A	6.1
July 29, 2019	Dry	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3.4 - 4.6	100	41
2	4.6 - 6.1	100	77

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-03

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 5

Page. 1 of 1

Date Drilled: 'May 25, 2018

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~200 mm	107.5	0				
		SANDY SILT TILL Trace to some gravel, cobbles and boulders, grey-brown to grey, moist, (compact to very dense)	107.3		12			
				1	24			23.6
				2	58			22.8
					35			
			104.5	3	57			
				4	50 for 50 mm			23.4
		LIMESTONE BEDROCK Some thin shaly beds, aphanitic to fine grained, laminated to very thinly bedded, close to moderate joint spacing, grey, (excellent quality)	103.2	5				Run 1
				6				
				7				Run 1
			100.2					
		Borehole Terminated at 7.3 m Depth						

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed 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-00245378-E1

WATER LEVEL RECORDS		
Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	N/A	4.2
July 29, 2019	3.0	

CORE DRILLING RECORD			
Run No.	Depth (m)	% Rec.	RQD %
1	4.3 - 5.8	100	90
2	5.8 - 7.3	100	94

Log of Borehole BH-04

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 6

Page. 1 of 1

Date Drilled: 'May 24, 2018

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test —— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~150 mm	109.1	0				
		SILTY SAND TO SANDY SILT Brown, moist, (loose)	109.0					
		SANDY SILT TILL Trace gravel, some clay, cobbles and boulders, brownish grey to grey, moist, (compact to dense)	108.4	1	5, 24			24.1
				2	45			
				3	40, 46			
▽			105.6	4	45			22.6
				5	50 for 100 mm			
			103.8					
		Auger Refusal at 5.3 m Depth						

Standard Penetration Test N Value: 20 40 60 80; Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750; Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed 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-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	5.2
July 29, 2019	3.5	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-05

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 7

Page. 1 of 1

Date Drilled: 'May 24, 2018

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~200 mm	108.2	0				
		SILT AND SAND TILL	108.0					
		Trace clay and gravel, cobbles and boulders, grey, moist to wet, (loose to dense)			6	×		
				1	22	×		23.5
					26	×		
				2	39	×		22.6
				3	45	×		
				4	56	×		
				5	50 for 100 mm	×		
			103.0					
		Auger Refusal at 5.2 m Depth						

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.6	4.9

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-06

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 8

Page. 1 of 1

Date Drilled: 'July 12, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Sand and gravel, trace silt, some organics, brown, moist, (compact)	107.4	0	18	×		21.5
			106.9					
		SILTY SAND TILL Some gravel to gravelly, trace clay, cobbles and boulders, grey with some brown, moist to wet, (dense)		1	34	×		
					50 for 25 mm	×		
				2	30	×		
				3	50 for 25 mm	×		23.9
			104.0					
		Auger Refusal at 3.4 m Depth						

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS		
Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	3.0

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

Log of Borehole BH-07

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 9

Page. 1 of 1

Date Drilled: 'July 12, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits |—○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Sand, some gravel, brown, moist, (loose)	108.6	0	9	×		
		SILTY SAND TILL Some gravel to gravelly, trace clay, cobbles and boulders, grey-brown to grey, moist, (compact to very dense)	108.3	1	25	×		
				2	72	×		
				3	80	×		22.9
					70	×		
			104.7		50 for 50 mm	×		
		Auger Refusal at 3.9 m Depth						

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	3.5

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-08

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 10

Page. 1 of 1

Date Drilled: 'July 15, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits |—○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Sand, some gravel, trace silt, some organics in upper 150 mm, brown, moist, (compact)	108.2	0	18	×		22.0
		SANDY SILT TILL Some gravel, trace to some clay, cobbles and boulders, brownish grey to grey, moist, (dense to very dense)	107.5	1	50 for 25 mm	×		
				2	37	×		23.0
				3	32	×		23.6
					32	×		
				4	69	×		
		Auger Refusal at 4.4 m Depth	103.8					

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	4.4

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-09

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 11

Page. 1 of 1

Date Drilled: 'July 16, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa (20 40 60 80 / 50 100 150 200)	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		FILL Sand, trace gravel and silt, brown, moist, (loose)	107.1	0	8	×		21.4
			106.5					
		SILT AND SAND TILL Some gravel, trace clay, cobbles and boulders, brownish grey to grey, moist, (compact to dense)		1	24	×		22.8
				2	48	×		23.0
			104.1	3				
		COBBLES AND BOULDERS OR WEATHERED BEDROCK	103.8					
		Auger Refusal at 3.3 m Depth						

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS		
Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	3.0

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

Log of Borehole BH-10

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 12

Page. 1 of 1

Date Drilled: 'July 17, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test —— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○⊣ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Sand and gravel, trace silt, some organics, brown, moist, (compact)	106.1	0	11			
			105.5					
		SILTY SAND TILL Trace clay and gravel, cobbles and boulders, brownish grey to grey, moist		1	50 for 75 mm			23.2
					50 for 25 mm			
			103.8	2	50 for 25 mm			
		COBBLES AND BOULDERS OR WEATHERED BEDROCK	103.5					
		Auger Refusal at 2.6 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	2.1

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-11

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 13

Page. 1 of 1

Date Drilled: 'July 17, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test ——— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength (kPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~250 mm	105.8	0				
		FILL Sand and gravel, some topsoil and organics, brown, moist, (loose)	105.6		5	×		
			105.2		23	×		22.8
		SANDY SILT TILL Some gravel to gravelly, trace clay, brownish grey to grey, moist, (compact to dense)		1	50 / Refusal	×		
			104.3					
		Borehole Terminated at 1.5 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	1.2

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-12

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 14

Page. 1 of 1

Date Drilled: 'July 17, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~75 mm	106.8	0				
		FILL Gravel and sand, brown, moist, (compact)	106.7					
		SILTY SAND TILL Some gravel, trace clay, brownish grey to grey, moist, (dense)	106.3		28	×		
				1	39	×		22.6
					50 for 50 mm	×		
			105.2					
		Borehole Terminated at 1.6 m Depth						

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	1.2

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-13

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 15

Page. 1 of 1

Date Drilled: 'July 12, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test ——— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits |—○—| | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~150 mm	108.4	0				
		SILTY SAND TO SANDY SILT Brown, moist, (loose)	108.3		7			23.3
		SAND AND SILT TILL Trace clay and gravel, cobbles and boulders, brownish grey to grey, moist, (compact to very dense)	108.0	1	27			
				2	39			
					42			22.6
				3	69			
				4	50 for 50 mm			
			104.3					
		Auger Refusal at 4.1 m Depth						

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	3.8

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-14

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 16

Page. 1 of 1

Date Drilled: 'July 12, 2019

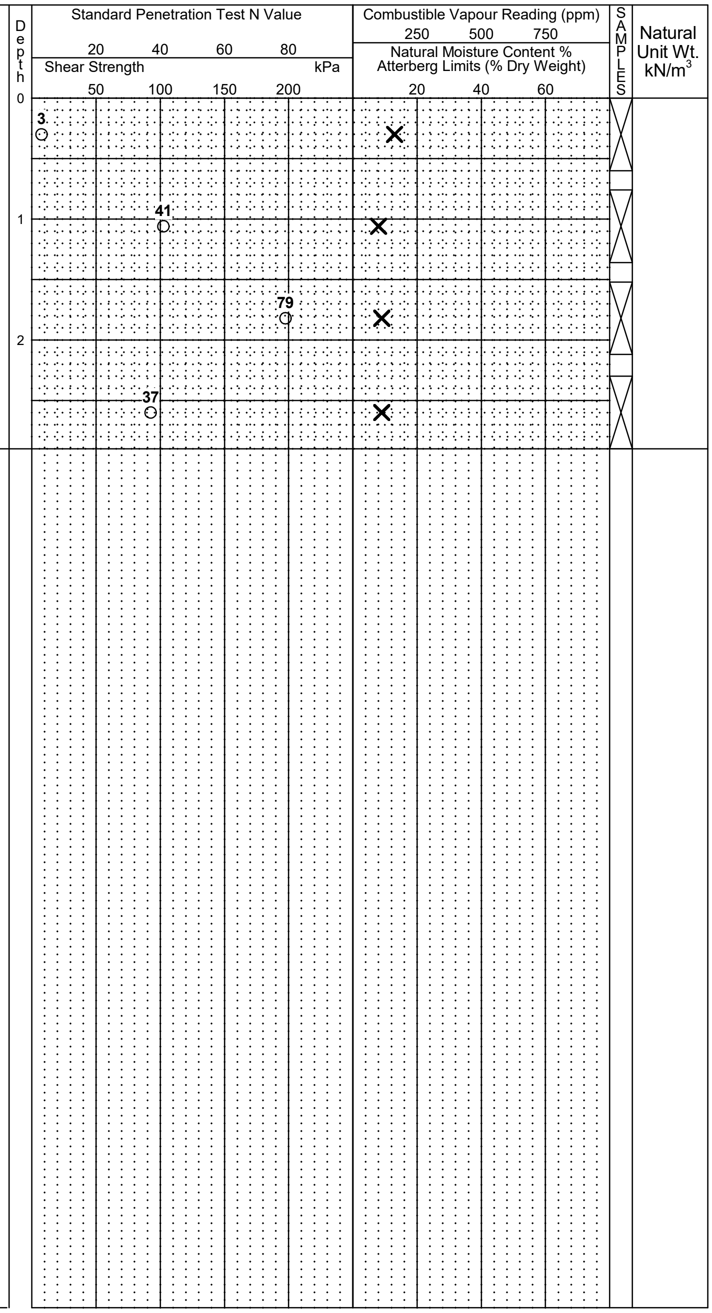
Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Legend	Symbol
Split Spoon Sample	⊠
Auger Sample	◧
SPT (N) Value	○
Dynamic Cone Test	—
Shelby Tube	■
Shear Strength by Vane Test	+ S
Combustible Vapour Reading	□
Natural Moisture Content	×
Atterberg Limits	├─○
Undrained Triaxial at % Strain at Failure	⊕
Shear Strength by Penetrometer Test	▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth
			108.3	0
		TOPSOIL ~200 mm	108.1	
		SILTY SAND Brown, moist, (very loose)	107.8	
		SILT AND SAND TILL Some gravel, trace clay, cobbles and boulders, brownish grey to grey, moist, (dense to very dense)		1, 2
			105.4	
		Borehole Terminated at 2.9 m Depth		



LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	1.6

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH-15

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 17

Page. 1 of 1

Date Drilled: 'July 15, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength (kPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~100 mm	108.7	0	8			
		SILTY SAND Brown, moist, (loose)	108.6					
		SILT AND SAND TILL Some gravel, trace clay, cobbles and boulders, brownish grey to grey, moist, (dense)	108.2	1	35			24.0
				2	45			
				3	50 for 100 mm			
			105.2	4	34			23.2
		Borehole Terminated at 4.4 m Depth	104.3					

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed 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-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	4.4
July 29, 2019	3.5	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-16

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 18

Page. 1 of 1

Date Drilled: 'July 15, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~200 mm	108.4	0				
		SILTY SAND Brown, moist, (loose)	108.2		8			
		SILT AND SAND TILL Some gravel, trace clay, cobbles and boulders, brownish grey to grey, moist, (dense to very dense)	107.9	1	32			22.9
				2	60			
				3	39			22.6
				4	50 for 125 mm			
		Borehole Terminated at 4.6 m Depth	103.8					

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	4.6

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-17

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 19

Page. 1 of 1

Date Drilled: 'July 12, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test —— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth
			107.3	0
		TOPSOIL ~200 mm	107.1	
		SILTY SAND Brown, moist, (loose)	106.8	
		SILT AND SAND TILL Trace clay and gravel, cobbles and boulders, brownish grey to grey, moist, (dense to very)		1
				2
			104.5	
		Borehole Terminated at 2.8 m Depth		

Standard Penetration Test N Value: 20 40 60 80; Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750; Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES | Natural Unit Wt. kN/m³

5 | 34 | 65 | 120

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	1.6

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-18

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 20

Page. 1 of 1

Date Drilled: 'July 16, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Sand, some gravel, trace silt, some organics, brown, moist	107.7 / 107.4	0	17			
		SILT AND SAND TILL Trace clay and gravel, cobbles and boulders, brownish grey to grey, moist, (compact to very dense)		1	25			22.3
				2	48			22.8
					50 for 125 mm			
				3	50 for 50 mm			
		COBBLES AND BOULDERS OR WEATHERED BEDROCK	103.8 / 103.6 / 103.4	4				
		Auger Refusal at 4.3 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed 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-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	4.2
July 29, 2019	4.1	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-19

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 21

Page. 1 of 1

Date Drilled: 'July 16, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Sand, some gravel and topsoil, some cobbles and boulders, brown, moist, (loose)	107.2	0	8			
			106.6					
		SILT AND SAND TILL Some gravel, trace clay, cobbles and boulders, brownish grey to grey, moist, (compact to dense)		1	22			22.2
				2	35			22.2
				3	50 for 75 mm			
			103.9					
		COBBLES AND BOULDERS OR WEATHERED BEDROCK	103.5					
		Auger Refusal at 3.7 m Depth						

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	3.0

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-20

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 22

Page. 1 of 1

Date Drilled: 'July 17, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth
			106.1	0
		TOPSOIL ~225 mm	105.9	
		SILTY SAND Brown, moist, (compact)	105.5	
		SILTY SAND TILL Trace clay and gravel, cobbles and boulders, brownish grey to grey, moist, (compact to very dense)		1
			104.0	2
		COBBLES AND BOULDERS OR WEATHERED BEDROCK	103.5	
		Auger Refusal at 2.6 m Depth		

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60
SAMPLES
Natural Unit Wt. kN/m³

12
28
50 for 125 mm

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	2.4

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-21

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 23

Page. 1 of 1

Date Drilled: 'July 18, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~50 mm	106.2	0				
		FILL Gravelly sand, trace silt, occasional organics, brown, moist, (compact)	106.1 105.6		15			
		SILTY SAND TILL Trace clay and gravel, cobbles and boulders, brownish grey to grey, moist, (compact)		1	27			
				2	23			
			103.6		50 for 75 mm			
		COBBLES AND BOULDERS	103.4					
		LIMESTONE BEDROCK Some thin shaly beds, several fractures in upper 400 mm, aphanitic to fine grained, laminated to very thinly bedded, close joint spacing, grey, (fair to good quality) -30mm mud seam at 3.9 m depth -40 mm mud seam at 4.4 m depth		3			Run 1	
				4			Run 2	
			101.2	5				
		Borehole Terminated at 5.0 m Depth						

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed 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-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	N/A
July 29, 2019	2.6	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.8 - 4	100	52
2	4 - 5	100	79

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-22

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 24

Page. 1 of 1

Date Drilled: 'July 16, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~100 mm	107.9	0				
		SILT AND SAND TILL	107.8					
		Some gravel, trace clay, cobbles and boulders, brownish grey to grey, moist, (dense to very dense)		1	31			22.5
					50 for 100 mm			
				2	50 for 75 mm			22.0
				3	82			22.8
				4	50 for 100 mm			
			103.1					
		Auger Refusal at 4.8 m Depth						

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	4.2

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-23

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 25

Page. 1 of 1

Date Drilled: 'July 16, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test ——— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○⊣ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~300 mm	107.2	0				
		SILTY SAND Brown, moist, (loose)	106.9		5	×		
		SILT AND SAND TILL Some gravel, trace clay, cobbles and boulders, brownish grey to grey, moist, (compact to dense)	106.5	1	18	×		
				2	37	×		22.2
					48	×		22.1
			104.0	3	50 for 50 mm	×		
		COBBLES AND BOULDERS OR WEATHERED BEDROCK	103.7					
		Auger Refusal at 3.5 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	3.0

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-24

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 26

Page. 1 of 1

Date Drilled: 'July 17, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test ——— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength (kPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~275 mm	106.3	0				
		SILTY SAND Brown, moist, (loose)	106.0		8	×		21.1
		SILTY SAND TILL Trace clay and gravel, cobbles and boulders, brownish grey to grey, moist, (compact to dense)	105.7	1	19	×		
				2	41	×		22.2
			103.8		50 for 50 mm	×		
		Auger Refusal at 2.5 m Depth						

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	2.5

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-25

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 27

Page. 1 of 1

Date Drilled: 'July 18, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth
		TOPSOIL ~300 mm	105.8	0
		FILL	105.5	
		Sand and gravel, brown, moist	105.1	
		SANDY SILT TILL Trace clay and gravel, cobbles and boulders, brownish grey to grey, moist, (compact to dense)		1
			103.5	2
		COBBLES AND BOULDERS OR WEATHERED BEDROCK	103.3	
		Auger Refusal at 2.5 m Depth		

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60
SAMPLES
Natural Unit Wt. kN/m³

20
50 for 50 mm
50 for 50 mm

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	2.1

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-26

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 28

Page. 1 of 1

Date Drilled: 'July 15, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test —— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth
		TOPSOIL ~175 mm	107.8	0
		SILTY SAND Occasional organics, brown to grey, moist, (loose to compact)	107.6	
		SILT AND SAND TILL Some gravel, trace to some clay, some gravel layers, cobbles and boulders, brownish grey to grey, moist, (compact to very dense)	106.7	1
				2
			104.8	3
		COBBLES AND BOULDERS OR WEATHERED BEDROCK	104.6	
		Auger Refusal at 3.2 m Depth		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES

Natural Unit Wt. kN/m³

4 (○) | 19 (○) | 54 (○) | 50 for 75 mm (○)

22.6

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed 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-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	3.2
July 29, 2019	Dry	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH-27

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 29

Page. 1 of 1

Date Drilled: 'July 15, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test ——— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○⊣ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength (kPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~250 mm	107.2	0				
		SILTY SAND Brown to grey, moist, (loose to compact)	107.0		7	×		
				1	12	×		20.7
		SILT AND SAND TILL Some gravel, trace to some clay, cobbles and boulders, brownish grey to grey, moist	106.0		50 for 100 mm	×		22.7
				2	50 for 75 mm	×		
				3				
		Auger Refusal at 3.2 m Depth	104.0					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	3.0

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-28

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 30

Page. 1 of 1

Date Drilled: 7/17/19

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test ——— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○⊣ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth
		TOPSOIL ~350 mm	106.5	0
		SILTY SAND Brown, moist, (compact)	106.2	
		SANDY SILT TILL Trace clay, cobbles and boulders, brownish grey to grey, moist, (compact to dense)	105.9	1
				2
		COBBLES AND BOULDERS OR WEATHERED BEDROCK	104.2	
		Auger Refusal at 2.7 m Depth	103.8	

Standard Penetration Test N Value: 20 40 60 80 — Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750 — Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES | Natural Unit Wt. kN/m³

10 | 20 | 34 | 50 for 50 mm

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	2.5

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-29

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 31

Page. 1 of 1

Date Drilled: 'July 15, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test —— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength (kPa)	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~225 mm	107.6	0				
		SILTY SAND Trace gravel, occasional organics, brown to grey, moist, (loose to compact)	107.4		4	×		
				1	16	×		
		SILT AND SAND TILL Trace to some clay and gravel, some gravel layers, brownish grey to grey, moist, (very dense)	106.3		53	×		22.2
		Borehole Terminated at 2.1 m Depth	105.5	2				

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	2.1

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-30

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 32

Page. 1 of 1

Date Drilled: 'July 18, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠ | Auger Sample ◧ | SPT (N) Value ○ | Dynamic Cone Test —— | Shelby Tube ■ | Shear Strength by Vane Test +S

Combustible Vapour Reading □ | Natural Moisture Content × | Atterberg Limits ⊢○ | Undrained Triaxial at % Strain at Failure ⊕ | Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~350 mm	106.8	0	6 (○)	×		
		FILL	106.5					
		Sand, some gravel, brown, moist, (loose)	106.2		15 (○)	×		23.4
		SILT AND SAND TILL		1				
		Trace clay and gravel, cobbles and boulders, brownish grey to grey, moist, (compact to dense)			48 (○)	×		
				2	50 for 75 mm (○)	×		
			104.3					
		Auger Refusal at 2.5 m Depth						

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed 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-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	2.4

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

Log of Borehole BH-31

Project No: OTT-00245378-E1

Project: Geotechnical Investigation - Proposed New Stittsville High School

Location: Robert Grant Avenue and Cope Drive, City of Ottawa, Ontario

Figure No. 33

Page. 1 of 1

Date Drilled: 'July 18, 2019

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~350 mm	105.8	0	6	×		
		FILL Sand, some gravel, trace silt, occasional organics, brown, moist, (loose)	105.5					
		SANDY SILT TILL Trace clay and gravel, cobbles and boulders between 1.7 m and 2.0 m depth, brownish grey to grey, moist, (compact)	105.0	1	16	×		
					50 for 10 mm	×		Run 1
		LIMESTONE BEDROCK Some thin shaly beds, several fractures in upper 400 mm, aphanitic to fine grained, laminated to very thinly bedded, close joint spacing, grey, (fair quality)	103.8	2				Run 2
			103	3				
			102.2					
		Borehole Terminated at 3.6 m Depth						

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245378-E1

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	N/A
July 29, 2019	2.8	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	1.7 - 2.1	100	0
2	2.1 - 3.6	100	73

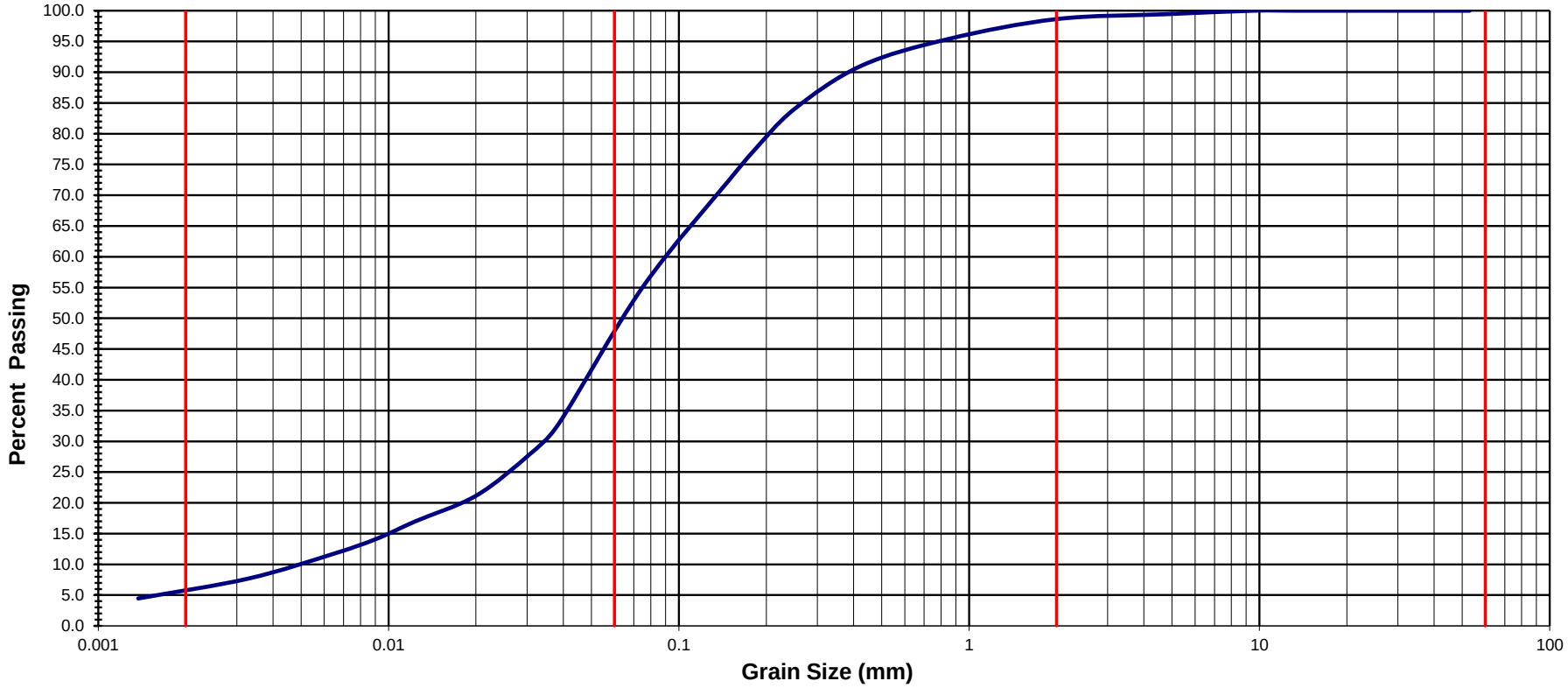
LOG OF BOREHOLE BH LOGS - 245378-E0.GPJ TROW OTTAWA.GDT 8/1/19

EXP Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6

Grain-Size Distribution Curve
Method of Test for Particle Size Analysis of Soil
ASTM C-136/ASTM D-422

Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL			
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	



EXP Project No.:	**OTT-00245378-E1**			**Project Name :**	**Geotechnical Investigation - Proposed New Stittsville High School**				
Client :	**OCDSB**			**Project Location :**	**Robert Grant Drive & Cope Drive, Ottawa, ON**				
Date Sampled :	**May 24, 2018**			**Borehole No:**	**BH-02**		**Sample No.:**	**SS3**	**Depth (m) :** **1.5-2.1**
Sample Composition:	**% Clay:**	**6**		**% Silt:**	**43**	**% Sand:**	**50**	**% Gravel:**	**1**	**Figure :** **34**
Sample Description :	**Sand & Silt, trace Clay & Gravel**								

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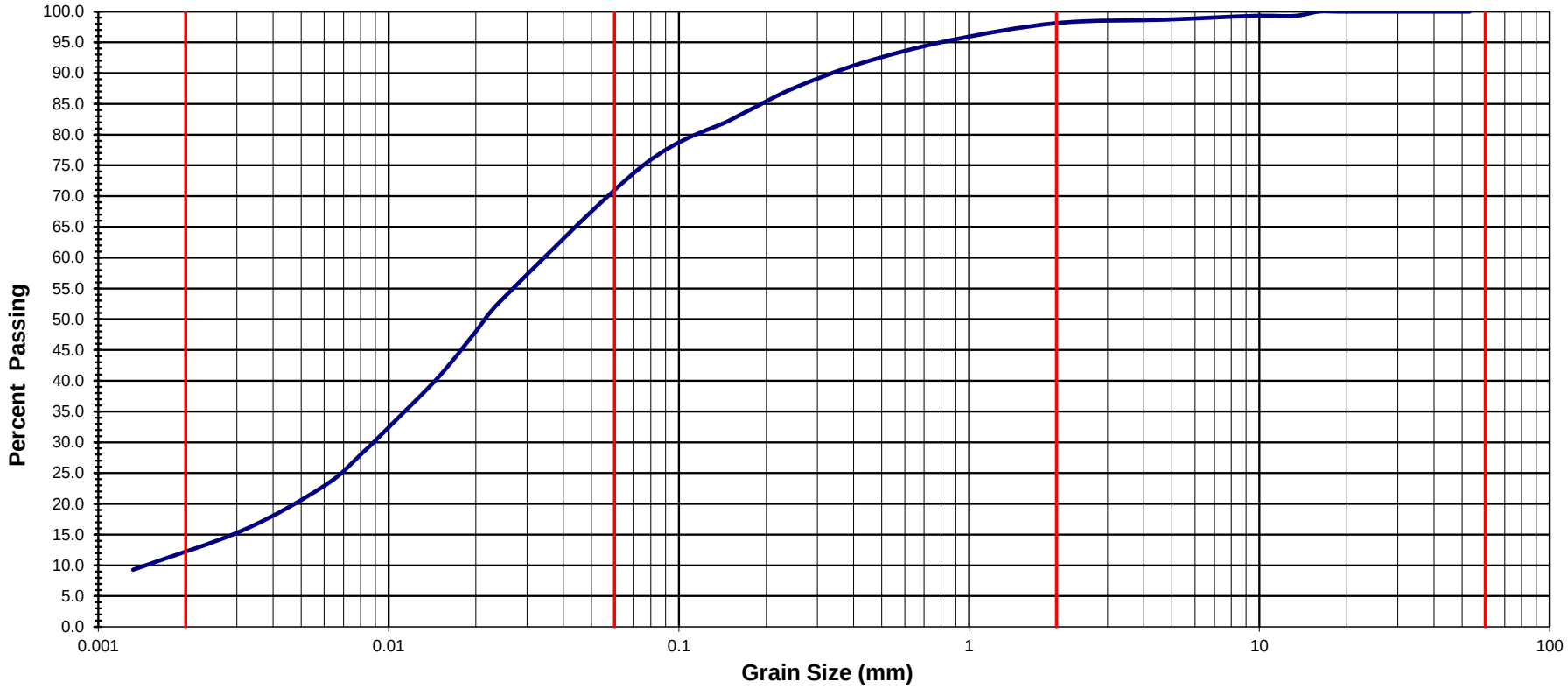
Grain-Size Distribution Curve
Method of Test for Particle Size Analysis of Soil
ASTM C-136/ASTM D-422

Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL			
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	



EXP Project No.:	**OTT-00245378-E1**		**Project Name :**	**Geotechnical Investigation - Proposed New Stittsville High School**					
Client :	**OCDSB**		**Project Location :**	**Robert Grant Drive & Cope Drive, Ottawa, ON**					
Date Sampled :	**May 24, 2018**		**Borehole No:**	**BH-04**		**Sample No.:**	**SS6**	**Depth (m) :**	**3.8-4.4**
Sample Composition:	**% Clay:**	**13**	**% Silt:**	**58**	**% Sand:**	**27**	**% Gravel:**	**2**	**Figure :** **35**
Sample Description :	**Sandy Silt, some Clay, trace Gravel**								

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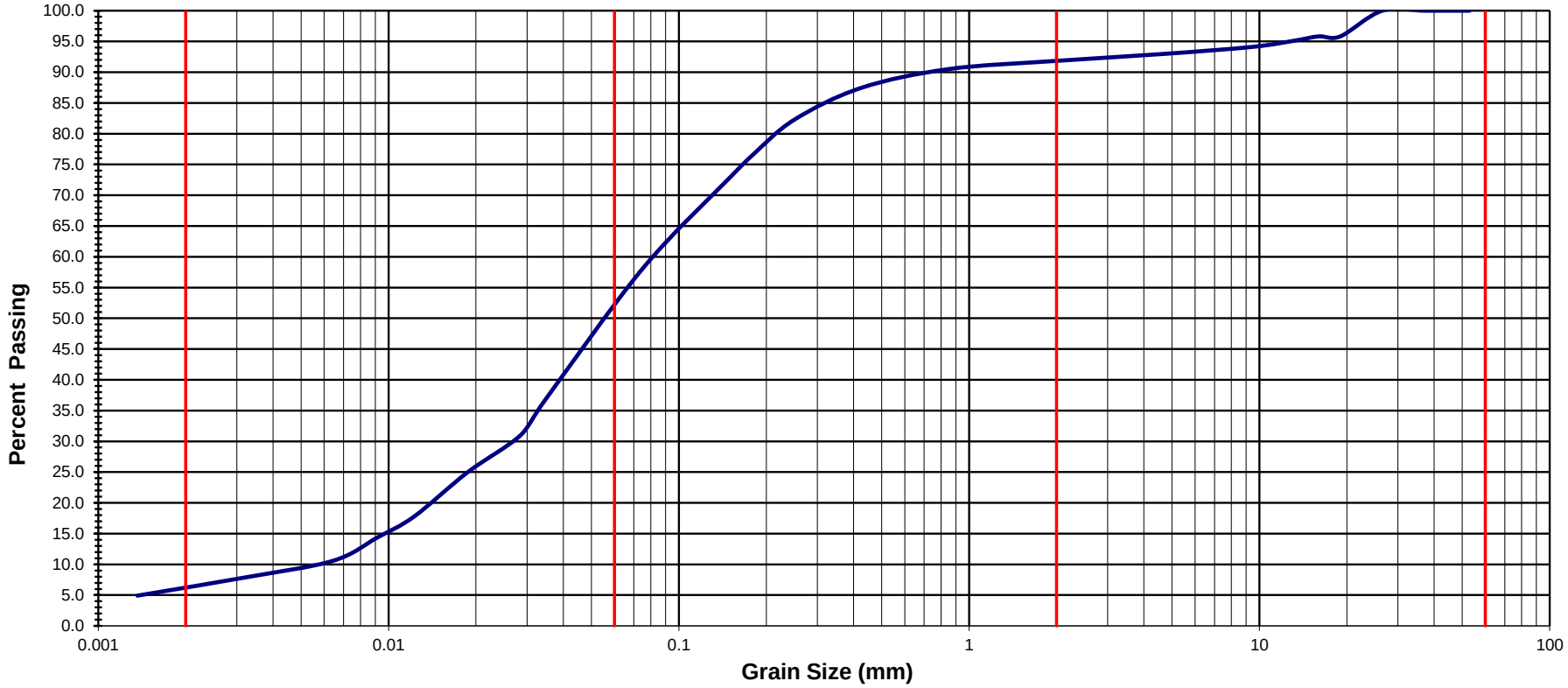
Grain-Size Distribution Curve
Method of Test for Particle Size Analysis of Soil
ASTM C-136/ASTM D-422

Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL			
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	



EXP Project No.:	**OTT-00245378-E1**		**Project Name :**	**Geotechnical Investigation - Proposed New Stittsville High School**				
Client :	**OCDSB**		**Project Location :**	**Robert Grant Drive & Cope Drive, Ottawa, ON**				
Date Sampled :	**May 24, 2018**		**Borehole No:**	**BH-05**	**Sample No.:**	**SS4**	**Depth (m) :**	**2.3-2.9**
Sample Composition:	**% Clay:**	**6**	**% Silt:**	**47**	**% Sand:**	**39**	**% Gravel:**	**8**
Sample Description :	**Silt & Sand, trace Gravel & Clay**						**Figure :**	**36**

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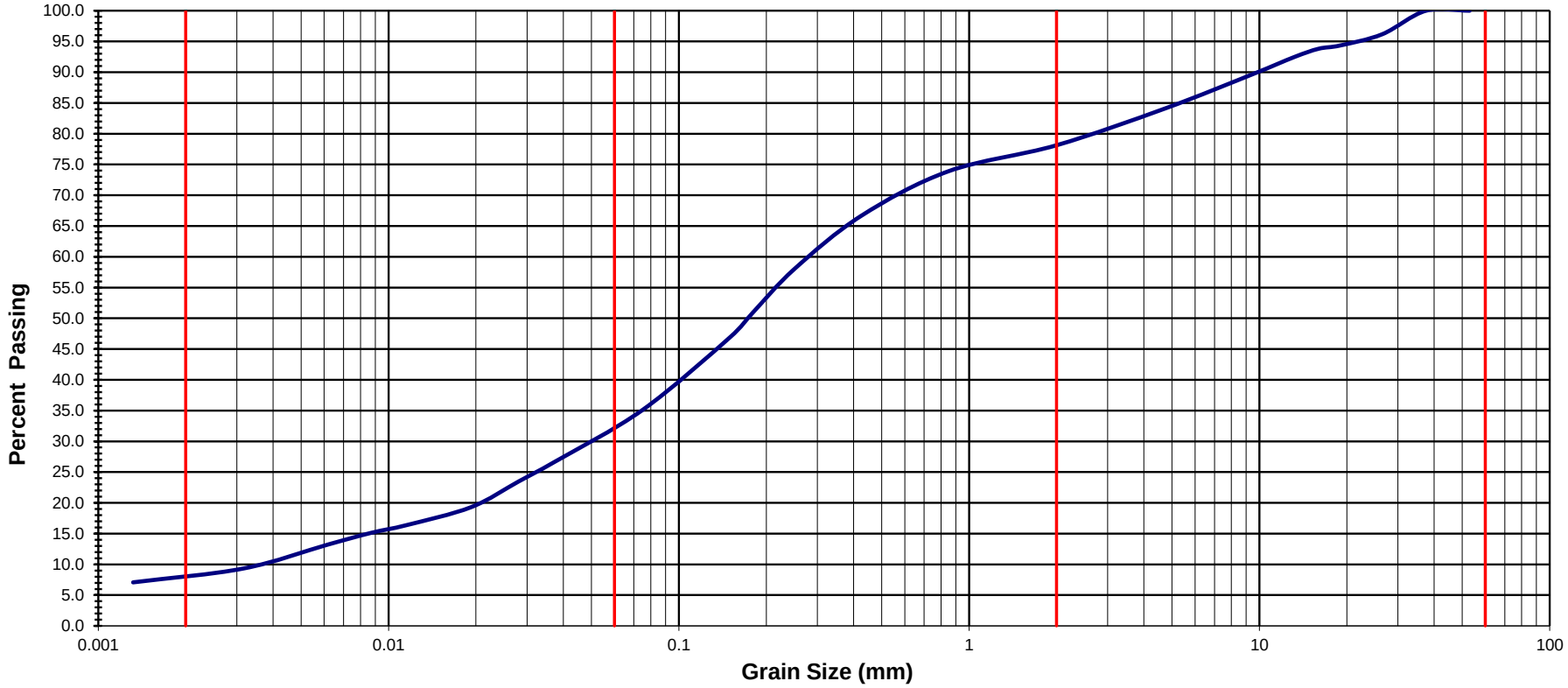
Grain-Size Distribution Curve
Method of Test for Particle Size Analysis of Soil
ASTM C-136/ASTM D-422

Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL		
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse



EXP Project No.:	**OTT-00245378-E1**			**Project Name :**	**Geotechnical Investigation - Proposed New Stittsville High School**				
Client :	**OCDSB**			**Project Location :**	**Robert Grant Drive & Cope Drive, Ottawa, ON**				
Date Sampled :	**July 12, 2019**			**Borehole No:**	**BH-07**		**Sample No.:**	**SS2**	**Depth (m) :** **0.8-1.4**
Sample Composition:		**% Clay:**	**8**	**% Silt:**	**25**	**% Sand:**	**45**	**% Gravel:**	**22**
Sample Description :	**Silty Sand, Some Gravel, Trace Clay**								**Figure :** **37**

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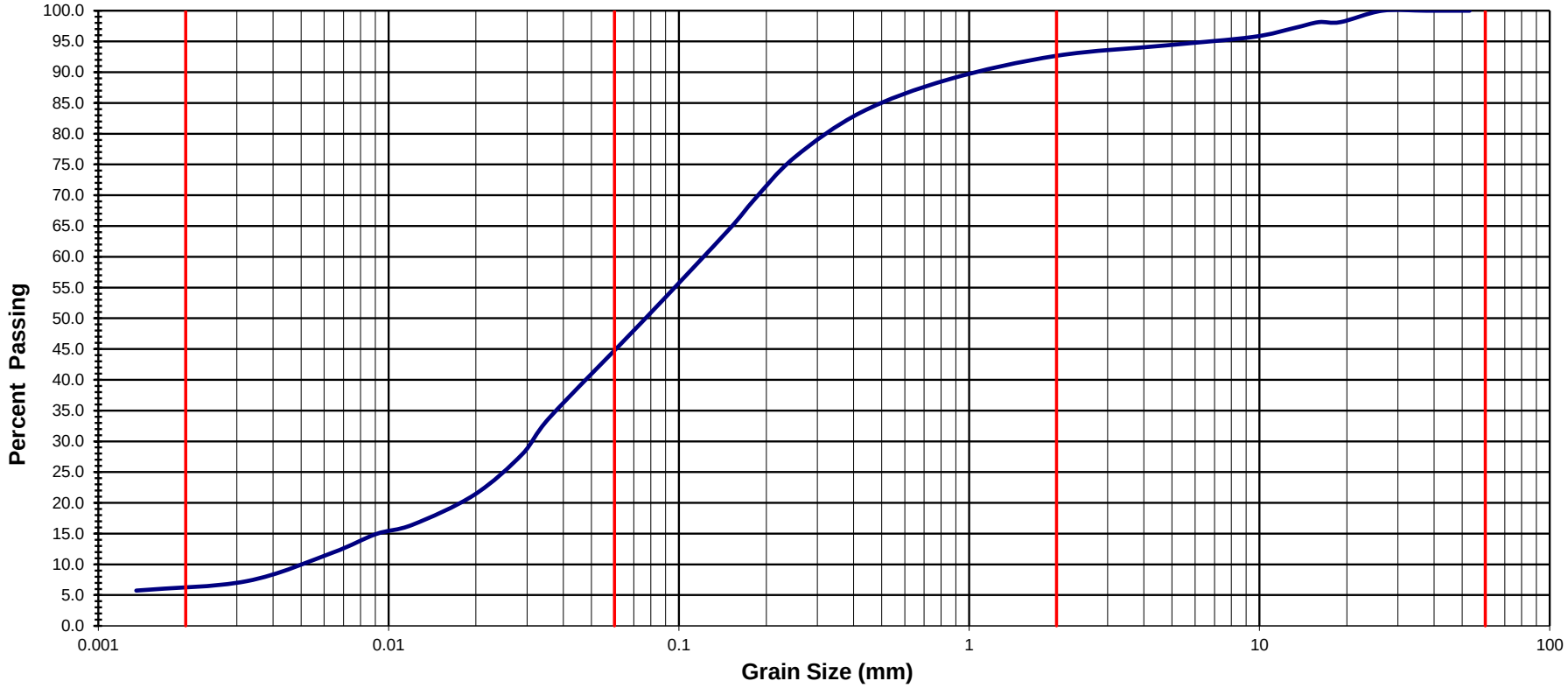
Grain-Size Distribution Curve
Method of Test for Particle Size Analysis of Soil
ASTM C-136/ASTM D-422

Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL			
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	



EXP Project No.:	**OTT-00245378-E1**			**Project Name :**	**Geotechnical Investigation - Proposed New Stittsville High School**				
Client :	**OCDSB**			**Project Location :**	**Robert Grant Drive & Cope Drive, Ottawa, ON**				
Date Sampled :	**July 12, 2019**			**Borehole No:**	**BH-13**	**Sample No.:**	**SS3**	**Depth (m) :**	**1.5 - 2.1**
Sample Composition:	**% Clay:**	**6**		**% Silt:**	**39**	**% Sand:**	**48**	**% Gravel:**	**7**
Sample Description :	**Sand & Silt, Trace Gravel & Clay**							**Figure :**	**38**

EXP Services Inc.
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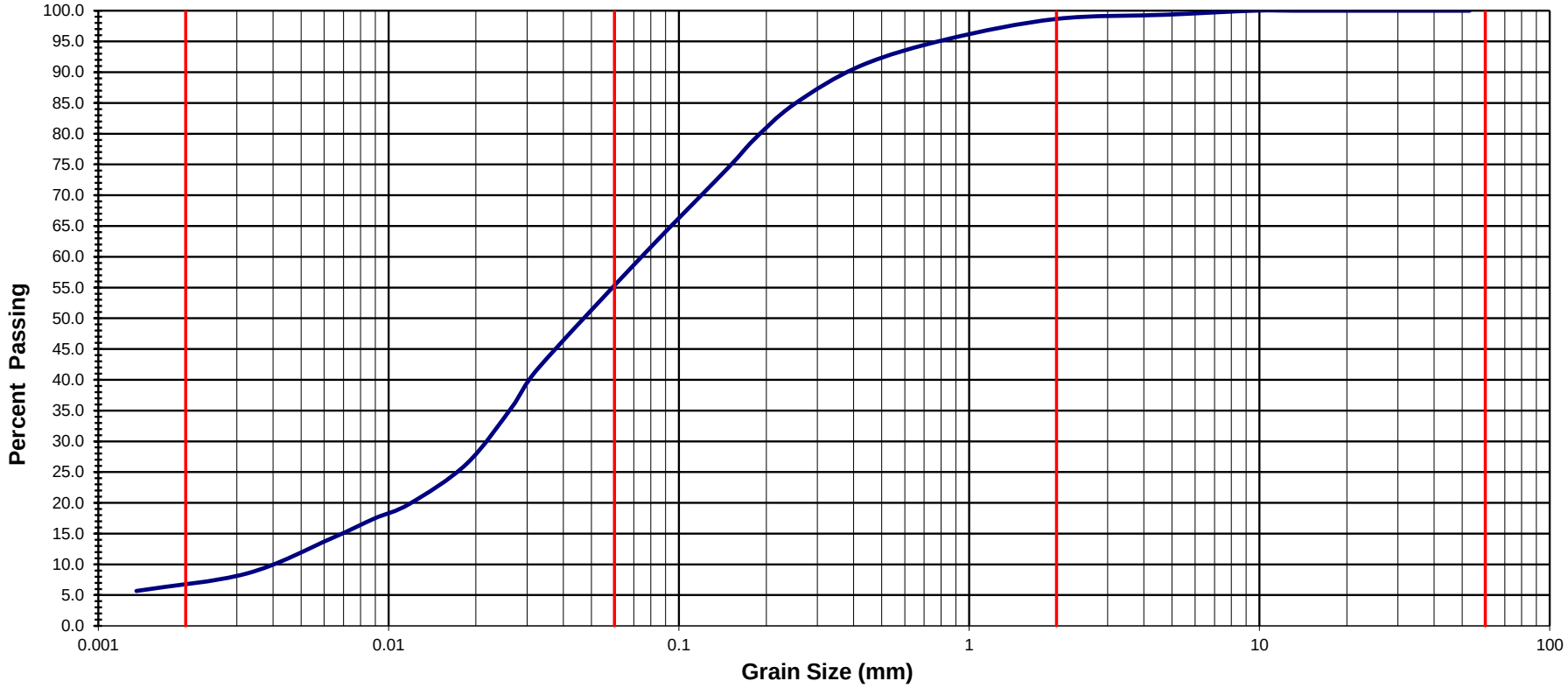
Grain-Size Distribution Curve
Method of Test for Particle Size Analysis of Soil
ASTM C-136/ASTM D-422

Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL		
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse



EXP Project No.:	**OTT-00245378-E1**		**Project Name :**	**Geotechnical Investigation - Proposed New Stittsville High School**				
Client :	**OCDSB**		**Project Location :**	**Robert Grant Drive & Cope Drive, Ottawa, ON**				
Date Sampled :	**July 16, 2019**		**Borehole No:**	**BH-18**		**Sample No.:**	**SS2**	**Depth (m) :** **0.8-1.4**
Sample Composition:	**% Clay:**	**6**	**% Silt:**	**49**	**% Sand:**	**43**	**% Gravel:** **2**	**Figure :** **39**
Sample Description :	**Silt and Sand, trace Clay and Gravel**							

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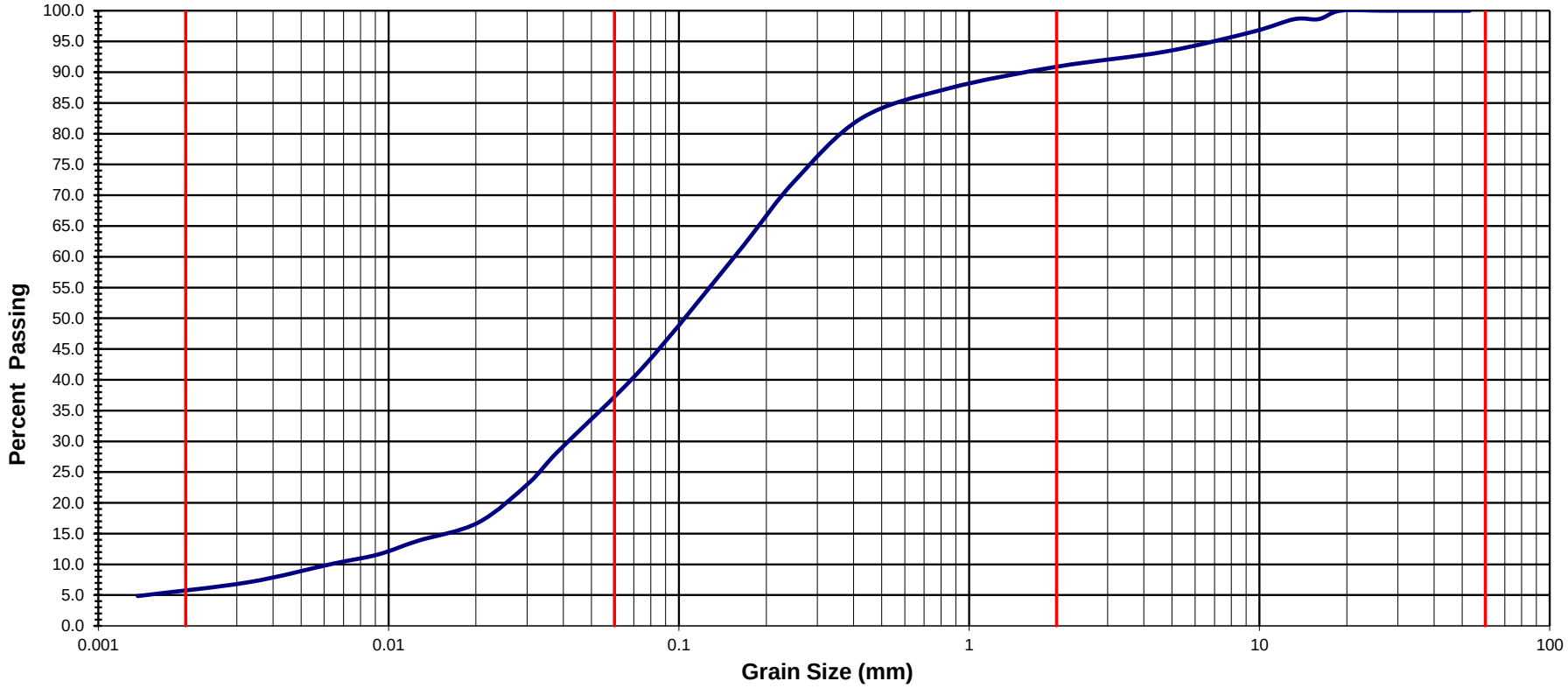
Grain-Size Distribution Curve
Method of Test for Particle Size Analysis of Soil
ASTM C-136/ASTM D-422

Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL			
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	



EXP Project No.:	**OTT-00245378-E1**		**Project Name :**	**Geotechnical Investigation - Proposed New Stittsville High School**					
Client :	**OCDSB**		**Project Location :**	**Robert Grant Drive & Cope Drive, Ottawa, ON**					
Date Sampled :	**July 17, 2019**		**Borehole No:**	**BH-21**		**Sample No.:**	**SS4**	**Depth (m) :**	**2.3-2.5**
Sample Composition:	**% Clay:**	**6**	**% Silt:**	**31**	**% Sand:**	**54**	**% Gravel:**	**9**	**Figure :** **40**
Sample Description :	**Silty Sand, trace Clay and Gravel**								

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Grain-Size Distribution Curve
Method of Test for Particle Size Analysis of Soil
ASTM C-136/ASTM D-422

Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL			
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

EXP Project No.:	**OTT-00245378-E1**		**Project Name :**	**Geotechnical Investigation - Proposed New Stittsville High School**				
Client :	**OCDSB**		**Project Location :**	**Robert Grant Drive & Cope Drive, Ottawa, ON**				
Date Sampled :	**July 16, 2019**		**Borehole No:**	**BH-22**	**Sample No.:**	**SS5**	**Depth (m) :**	**3.0-3.7**
Sample Composition:	**% Clay:**	**6**	**% Silt:**	**39**	**% Sand:**	**35**	**% Gravel:**	**20**
Sample Description :	**Silt and Sand, some Gravel, trace Clay**						**Figure :**	**41**

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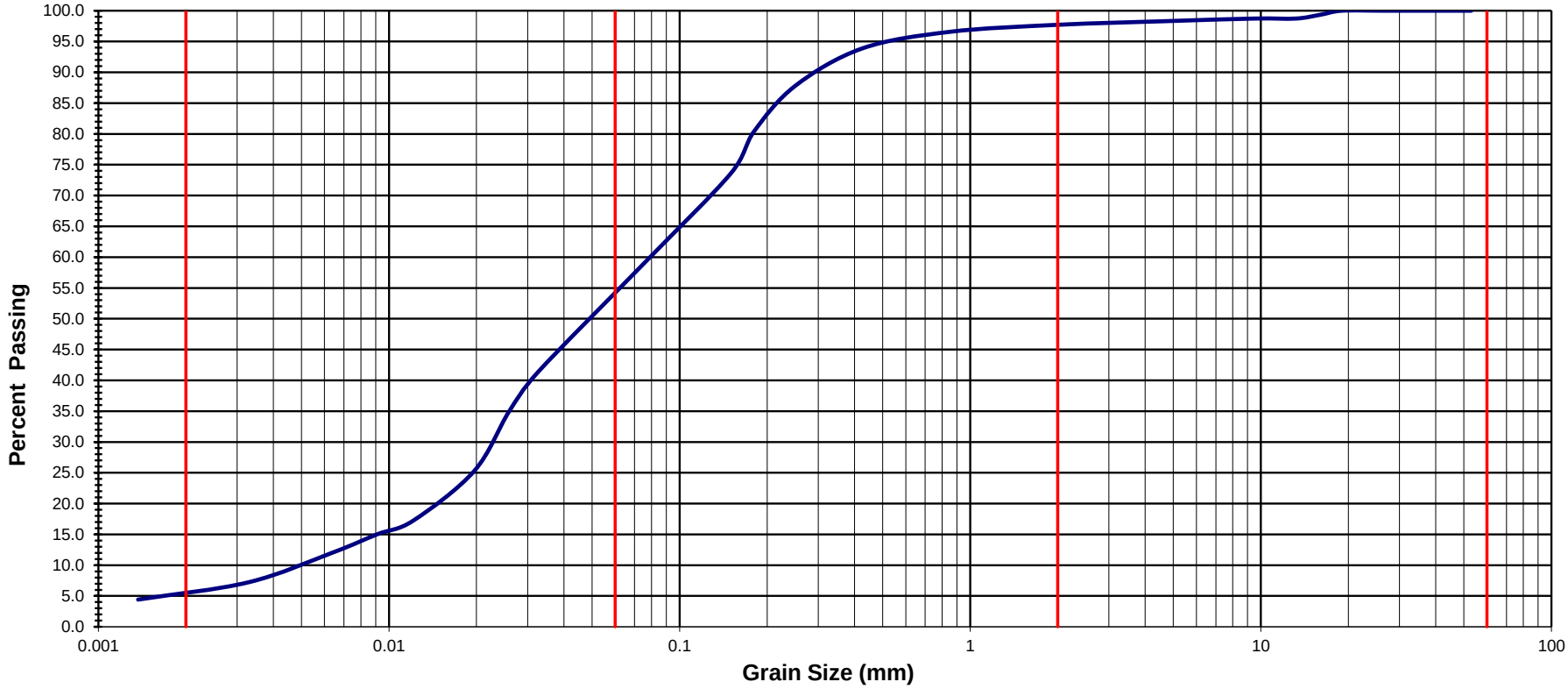
Grain-Size Distribution Curve
Method of Test for Particle Size Analysis of Soil
ASTM C-136/ASTM D-422

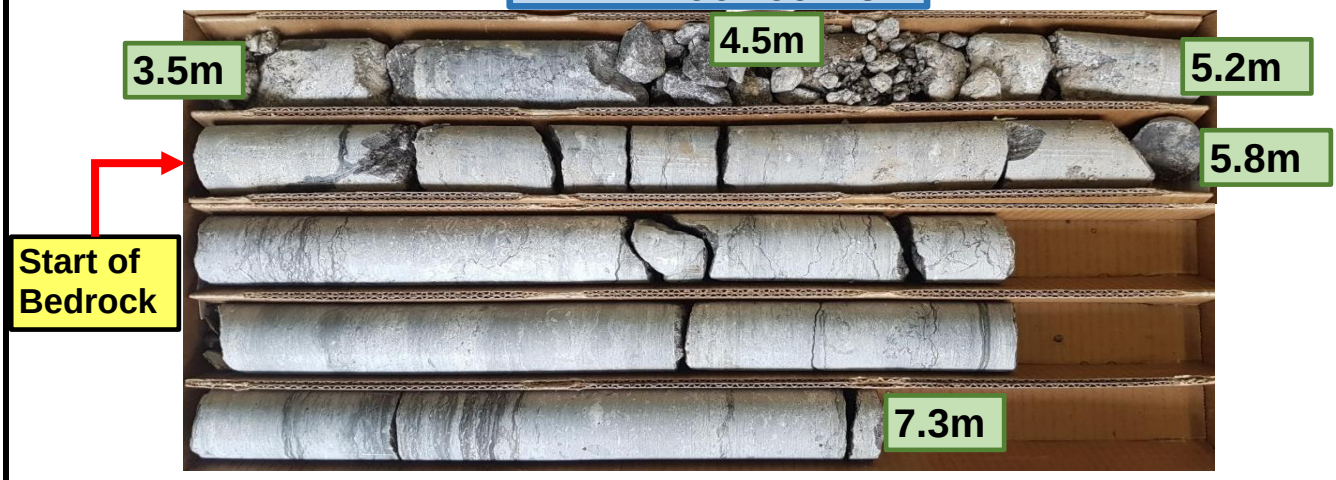
Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL			
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

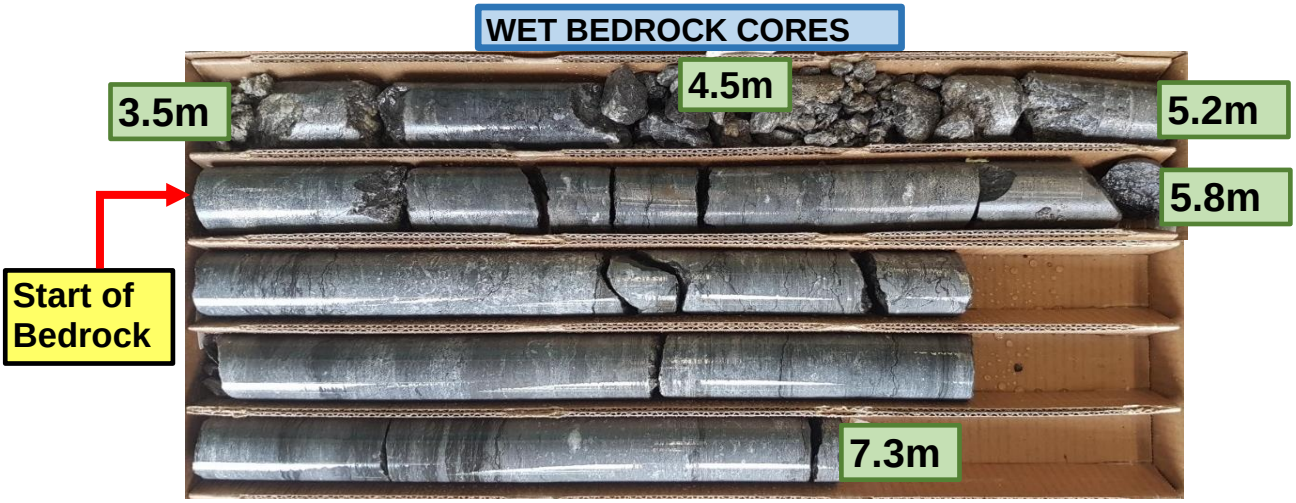


EXP Project No.:	**OTT-00245378-E1**			**Project Name :**	**Geotechnical Investigation - Proposed New Stittsville High School**				
Client :	**OCDSB**			**Project Location :**	**Robert Grant Drive & Cope Drive, Ottawa, ON**				
Date Sampled :	**July 18, 2019**			**Borehole No:**	**BH-30**	**Sample No.:**	**SS3**	**Depth (m) :**	**1.5 - 2.1**
Sample Composition:	**% Clay:**	**5**		**% Silt:**	**50**	**% Sand:**	**43**	**% Gravel:**	**2**
Sample Description :	**Silt and Sand, trace Clay & Gravel**							**Figure :**	**42**

DRY BEDROCK CORES



WET BEDROCK CORES



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Ottawa, ON K2B 8H6
Canada
www.exp.com

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• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

borehole no.	core runs	PROJECT	project no.
BH-01	Run 1: 3.5m-4.5m Run 2: 4.5m-5.2m Run 3: 5.2m-5.8m Run 4: 5.8m-7.3m	Geotechnical Investigation Proposed New Stittsville High School	OTT-00245378-E1
date cored May 25, 2018		Rock Core Photographs	FIG 43

DRY BEDROCK CORES

WET BEDROCK CORES

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borehole no.	core runs	PROJECT	project no.
BH-02	Run 1: 3.4m-4.6m Run 2: 4.6m-6.1m	Geotechnical Investigation Proposed New Stittsville High School	OTT-00245378-E1
date cored May 25, 2018		Rock Core Photographs	FIG 44

DRY BEDROCK CORES

WET BEDROCK CORES

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borehole no.	core runs	PROJECT	project no.
BH-03	Run 1: 4.3m-5.8m Run 2: 5.8m-7.3m	Geotechnical Investigation Proposed New Stittsville High School	OTT-00245378-E1
date cored May 25, 2018		Rock Core Photographs	FIG 45

DRY BEDROCK CORES

WET BEDROCK CORES

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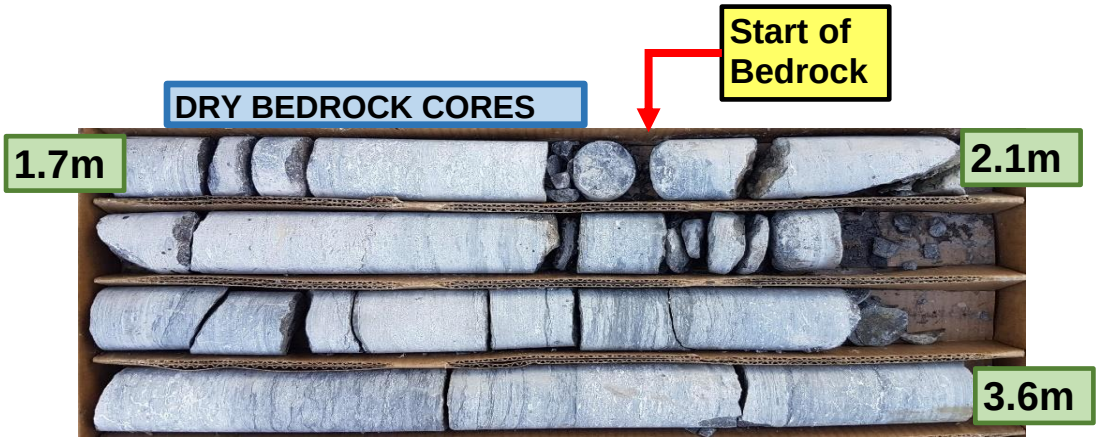
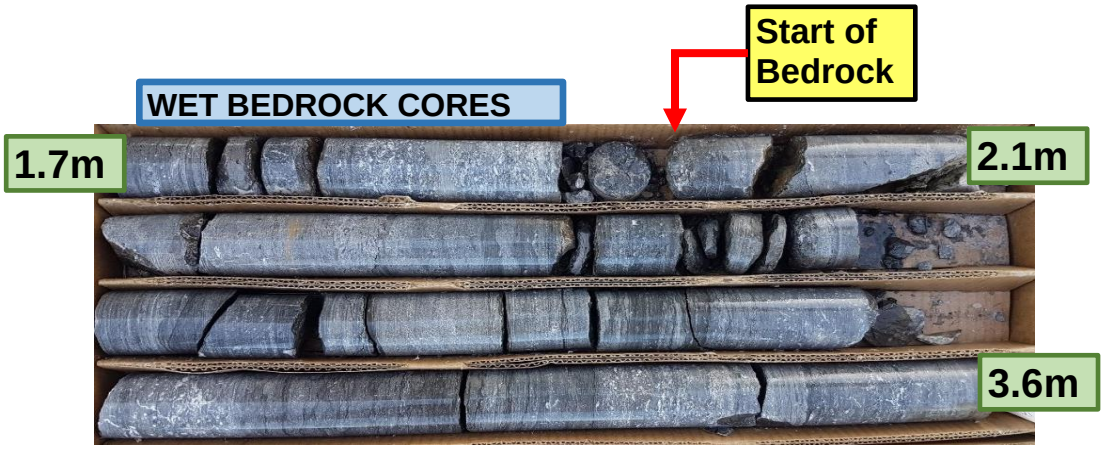
borehole no.	core runs	PROJECT	project no.
BH-21	Run 1: 2.8m - 4.0m Run 2: 4.0m - 5.0m	Geotechnical Investigation Proposed New Stittsville High School	OTT-00245378-E1
date cored May 25, 2018		Rock Core Photographs	FIG 46





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borehole no.	core runs	PROJECT	project no.
BH-31	Run 1: 1.7m - 2.1m Run 2: 2.1m - 3.6m	Geotechnical Investigation Proposed New Stittsville High School	OTT-00245378-E1
date cored Jul 18, 2019		Rock Core Photographs	FIG 47

APPENDIX A:
AGAT Laboratories Certificate of Analysis

AGAT Laboratories

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
2650 QUEENSVIEW DRIVE, UNIT 100
OTTAWA, ON K2B8H6
(613) 688-1899

ATTENTION TO: Maxime Leroux

PROJECT: OTT-245378-EO

AGAT WORK ORDER: 18Z343984

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

DATE REPORTED: Jun 05, 2018

PAGES (INCLUDING COVER): 5

VERSION*: 1

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

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 18Z343984

PROJECT: OTT-245378-EO

CLIENT NAME: EXP SERVICES INC

ATTENTION TO: Maxime Leroux

SAMPLING SITE:Proposed Stittsville Secondary School - Robert Grant Dr & Cope Dr

SAMPLED BY:exp

Inorganic Chemistry (Soil)

DATE RECEIVED: 2018-05-29

DATE REPORTED: 2018-06-05

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: BH1 SS3 5'-7' / SAMPLE TYPE: Soil / DATE SAMPLED: 2018-05-24 / 9278100	SAMPLE DESCRIPTION: BH3 SS4 7'6"-9'6" / SAMPLE TYPE: Soil / DATE SAMPLED: 2018-05-24 / 9278104
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.71	7.75
Resistivity (2:1)	ohm.cm		1	9710	12800
Chloride (2:1)	µg/g		2	4	3
Sulphate (2:1)	µg/g		2	4	3

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

9278100-9278104 EC/Resistivity, Chloride and Sulphate were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By: Amanjot Bhela

AGAT Laboratories

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Quality Assurance

CLIENT NAME: EXP SERVICES INC

AGAT WORK ORDER: 18Z343984

PROJECT: OTT-245378-EO

ATTENTION TO: Maxime Leroux

SAMPLING SITE:Proposed Stittsville Secondary School - Robert Grant Dr & Cope Dr

SAMPLED BY:exp

Soil Analysis

RPT Date: Jun 05, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Inorganic Chemistry (Soil)															
pH, 2:1 CaCl2 Extraction	9284475		7.20	7.18	0.3%	NA	101%	80%	120%	NA			NA		
Chloride (2:1)	9278100	9278100	4	4	NA	< 2	101%	70%	130%	95%	70%	130%	89%	70%	130%
Sulphate (2:1)	9278100	9278100	4	4	NA	< 2	92%	70%	130%	99%	70%	130%	86%	70%	130%

Comments: NA signifies Not Applicable.
Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL

Certified By: Amanjot Bhela

AGAT Laboratories

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Method Summary

CLIENT NAME: EXP SERVICES INC **AGAT WORK ORDER: 18Z343984**

PROJECT: OTT-245378-EO **ATTENTION TO: Maxime Leroux**

SAMPLING SITE:Proposed Stittsville Secondary School - Robert Grant Dr & Cope Dr **SAMPLED BY:exp**

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER
Resistivity (2:1)	INOR-93-6036	McKeague 4.12, SM 2510 B,SSA #5 Part 3	EC METER
Chloride (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
Sulphate (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH

AGAT Laboratories

1 med blue

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 1873439 84

Cooler Quantity: one on ice

Arrival Temperatures: 17.0 | 17.0 | 17.0
LT - 9.6 | 8.9 | 9.4

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes:

Report Information:

Company: Exp Services
Contact: Maxime Leroux
Address: 100-2650 Queensview Drive
Ottawa Ontario K2B 8H6
Phone: 613-686-1899 Fax:
Reports to be sent to:
1. Email: Maxime.Leroux@exp.com
2. Email:

Regulatory Requirements:

☐ No Regulatory Requirement

(Please check all applicable boxes)

☐ Regulation 153/04
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (Check One) ☐ Coarse ☐ Fine

☐ Sewer Use
☐ Sanitary ☐ Storm
Region (Indicate One) ☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
(Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: OTT-245378-E0
Site Location: Proposed Stittsville Secondary School @ Robert Grant drive & Cope drive
~~Sampled By:~~
~~AGAT Quote #:~~ Sample By: exp PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☒ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI Y/N	O. Reg 153: Metals and Inorganics ☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals ☐ 153 Metals (Incl. Hydrides)	ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ Cr^{6+} ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2	Volatiles: ☐ VOC ☐ BTEX ☐ THM	PHCs F1 - F4	ABNs	PAHs	PCBs: ☐ Total ☐ Aroclors	Organochlorine Pesticides	TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Sewer Use	pH	Sulphate	Chloride	Electro Resistivity		
BH 1 SS3 5'-7'	May 24/18																			✓	✓	✓	✓			
BH 3 SS4 7'6"-9'6"	May 24/18																			✓	✓	✓	✓			

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Ryan Dickinson	May 24/18	6:30pm	Courtney / [illegible]	18-05-29	8h30
Samples Relinquished By (Print Name and Sign): FedEx	Date 18-05-29	Time 16h00	Samples Received By (Print Name and Sign):	Date	Time
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign): Shenmin	Date May 30/18 9:25a	Time

Page 1 of 1

Nº: T 063310

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http://www.agatlabs.com

CLIENT NAME: EXP SERVICES INC
2650 QUEENSVIEW DRIVE, UNIT 100
OTTAWA, ON K2B8H6
(613) 688-1899

ATTENTION TO: Maxime Leroux

PROJECT: OTT-245378-E1

AGAT WORK ORDER: 19Z495978

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Supervisor

DATE REPORTED: Jul 26, 2019

PAGES (INCLUDING COVER): 5

VERSION*: 1

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

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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

Certificate of Analysis

AGAT WORK ORDER: 19Z495978

PROJECT: OTT-245378-E1

CLIENT NAME: EXP SERVICES INC

ATTENTION TO: Maxime Leroux

SAMPLING SITE:Robert Grant Drive & Cope drive, Stittsville

SAMPLED BY:

Inorganic Chemistry (Soil)

DATE RECEIVED: 2019-07-22

DATE REPORTED: 2019-07-26

				BH 31 Run 2 2.		BH 22 SS4
		SAMPLE DESCRIPTION:		1-2.2m	BH 21 SS3 5'-7'	7'6"-8'1"
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2019-07-18	2019-07-17	2019-07-16
Parameter	Unit	G / S	RDL	371577	371579	371580
Chloride (2:1)	µg/g		2	63	<2	11
Sulphate (2:1)	µg/g		2	78	2	13
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.92	7.91	7.80
Resistivity (2:1) (Calculated)	ohm.cm		1	2650	12200	7410

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

371577-371580 pH was determined on the 0.01M CaCl2 extract obtained from 2:1 leaching procedure (2 parts extraction fluid:1 part wet soil). Chloride and Sulphate were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil).

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

AGAT Laboratories

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CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: EXP SERVICES INC

AGAT WORK ORDER: 19Z495978

PROJECT: OTT-245378-E1

ATTENTION TO: Maxime Leroux

SAMPLING SITE:Robert Grant Drive & Cope drive, Stittsville

SAMPLED BY:

Soil Analysis

RPT Date: Jul 26, 2019			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Inorganic Chemistry (Soil)															
Chloride (2:1)	371577	371577	63	69	9.1%	< 2	97%	70%	130%	105%	70%	130%	105%	70%	130%
Sulphate (2:1)	371577	371577	78	79	1.3%	< 2	102%	70%	130%	109%	70%	130%	107%	70%	130%
pH, 2:1 CaCl2 Extraction	371580	371580	7.80	7.79	0.1%	NA	100%	90%	110%	NA			NA		

Comments: NA signifies Not Applicable.
Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

Certified By:

Amanjot Bhela

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO CHARTERED AMANJOT BHELA CHEMIST

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

AGAT WORK ORDER: 19Z495978

PROJECT: OTT-245378-E1

ATTENTION TO: Maxime Leroux

SAMPLING SITE:Robert Grant Drive & Cope drive, Stittsville

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Chloride (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
Sulphate (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	pH METER
Resistivity (2:1) (Calculated)	INOR-93-6036	McKeague 4.12, SM 2510 B,SSA #5 Part 3	EC METER

AGAT Laboratories

1 large c

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 19249597 8

Cooler Quantity: 1

Arrival Temperatures: 22.1 | 22.1 | 22.1
21.4 | 20.10 | 22.3

Custody Seal Intact: ☐ Yes ☐ No ☒ N/A

Notes: no ice

Report Information:

Company: Exp Services
Contact: Maxime Leroux
Address: 2650 Queensview Drive Suite 100
Ottawa ON K2B 8H6
Phone: 613-688-1899 Fax:
Reports to be sent to:
1. Email: Maxime.Leroux@exp.com
2. Email:

Regulatory Requirements:

☐ No Regulatory Requirement

(Please check all applicable boxes)

☐ Regulation 153/04
Table (Indicate One) ☐ Ind/Com ☐ Res/Park ☐ Agriculture
Soil Texture (Check One) ☐ Coarse ☐ Fine

☐ Sewer Use
☐ Sanitary ☐ Storm
Region (Indicate One) ☐ MISA

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
(Indicate One)

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: OTT-245378-E1
Site Location: Robert Grant Drive & Cope drive, Stittsville
Sampled By: exp
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Invoice Information:

Bill To Same: Yes ☒ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	O. Reg 153: Metals and Inorganics; All Metals ☐ 153 Metals (excl. Hydrides); Hydride Metals ☐ 153 Metals (incl. Hydrides)	ORPs: ☐ B-HWS ☐ Cl ☐ CN⁻ ☐ Cr^{6+} ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2	Volatiles: ☐ VOC ☐ BTEX ☐ THM	PHCs F1 - F4	ABNs	PAHs	PCBs: ☐ Total ☐ Aroclors	Organochlorine Pesticides	TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Sewer Use	pH	Sulphate	Chloride	Electro Resistivity
BH 31 Run 2 2.1-2.2m	July 18/19																			✓	✓	✓	✓
BH 21 ss3 5'-7'	July 17/19																			✓	✓	✓	✓
BH 22 ss4 7'6"-8'1"	July 16/19																			✓	✓	✓	✓

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Ryan DiGiuseppe	July 20/19	3:00 pm	Jeff Jones	22 Jul 19	0750
			Abdul	July 23 2019	10:08

Page 1 of 1

N°: T078059

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Daniel Bradley, Ottawa-Carleton District School Board, daniel.bradley@ocdsb.ca

Rick Cunliffe, Cunliffe & Associates, rcunliffe@cunliffe.ca

Jim Johnston, WSP, James.Johnston@wsp.com