Interim Geotechnical Investigation and Phase II Environmental Site Assessment

Proposed New Riverside South Secondary School
675 Borbridge Avenue
Ottawa, Ontario

Client:
Conseil des écoles catholiques du Centre-Est (CECCE)
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Executive Summary

Introduction

EXP Services Inc. (EXP) is pleased to present the results of the interim geotechnical investigation completed for the proposed New Riverside South Secondary School to be located at 675 Borbridge Avenue, Ottawa, ON (Figure 1). The terms and conditions of this assignment were outlined in EXP's proposal number: OTT-24010349-A0 dated June 12,2024 and authorized by the Conseil des écoles catholiques du Centre-Est (CECCE) on June 26, 2024.

In conjunction with this interim geotechnical investigation, EXP has carried out a Phase II Environmental Site Assessment (Phase II ESA) and retained Kilgour & Associates Ltd. (KAL) to carry out an Environmental Impact Study (EIS) and a Tree Conservation Report (TCR). The results of the Phase II ESA have been included in this report. The EIS and TCR will be provided in separate reports. EXP previously completed a Phase I Environmental Site Assessment (Phase I ESA) of the site, dated August 26, 2022, and the results are provided in a separate report. EXP is also undertaking civil design for this project and the design will be provided in separate documents.

Due to the dense tree cover across the site, tree clearing was required and limited to providing access to the borehole locations at the proposed building location. Further, additional boreholes and test pits are to be carried out in the remaining portion of the site at a later date. Therefore, this geotechnical report is to be considered an interim geotechnical report, to be updated when further subsurface information is available from the additional boreholes and/or test pits.

The proposed school building will be two (2) storeys with no basement. Based a proposed site plan provided by GRC Architects, Option 1, the proposed school development will include the school building located in the northwest corner of the site next to the Brian Good Avenue and Borbridge Avenue intersection. The development will also include future portables to the south of the school building, an outdoor sports field in the east portion of the site, bus loop south of the proposed school building, a bus loading and unloading area north of the proposed school building and an access road and parking lot in the northeast portion of the site. The development will be serviced by municipal underground services. The proposed Finished Floor Elevation for the proposed school building will be Elevation 91.5 m resulting in a maximum design site grade raise of 1.0 m for the proposed school building.

Proposed Development

west

a car drop-off temporary parking
north of the site

The proposed school building will be two (2) storeys with no basement. Based a proposed site plan provided by GRC Architects, Option 1, the proposed school development will include the school building located in the northwest corner of the site next to the Brian Good Avenue and Borbridge Avenue intersection. The development will also include future portables to the south of the school building, an outdoor sports field in the east portion of the site, ~~bus loop south of the proposed school building~~, a bus loading and unloading area ~~north~~ of the proposed school building and an access road and parking lot in the northeast portion of the site. The development will be serviced by municipal underground services. The proposed Finished Floor Elevation for the proposed school building will be Elevation 91.5 m resulting in a maximum design site grade raise of 1.0 m for the proposed school building.

Borehole Fieldwork Program

The fieldwork for this geotechnical investigation was undertaken between December 3 and 6, 2024 and consists of fourteen (14) boreholes (Borehole Nos. 24-1 to 24-4 and Nos. 24-6 to 24-15) advanced to auger refusal, cone refusal and termination depths ranging from 4.9 m to 10.9 m depths below existing grade. Borehole 24-5 was not drilled. Monitoring wells and piezometers were installed in selected boreholes for long-term monitoring of the groundwater table.

Subsurface Conditions

The borehole information indicates the subsurface conditions consist of a surficial topsoil layer underlain by very loose to compact sandy silt, firm to very stiff silty clay and loose to very dense glacial till. Refusal to auger and DCPT cone refusal were encountered in 4.9 m to 10.9 m depths (Elevation 86.2 m to Elevation 80.7 m) on inferred cobbles or boulders within the glacial

till or on bedrock. The groundwater level was found to range from 4.5 m to 5.1 m depths (Elevation 86.6 m to Elevation 86.3 m) based on the January 9,2025 measurement.

Phase II Environmental comments and Recommendations

Three environmental samples and one duplicate sample were submitted to a certified laboratory for analysis of petroleum hydrocarbons (PHC), volatile organic compounds (VOC) inorganics (pH, electrical conductivity (EC), sodium adsorption ratio (SAR)) and metals.

For the purpose of this investigation, analytical results obtained from the soil samples were assessed against the generic Excess Soil Quality Standards (ESQS) as established under the Environmental Protection Act and regulated under O. Reg 406/19.

Based on the laboratory results of the three samples that were analyzed, all parameter concentrations were found to meet MECP Table 1 SCS for all land uses with the exception of BH24-14-SS4 and its duplicate (DUP), which exceeded MECP Table 1 SCS for barium, chromium and vanadium.

The laboratory results of the three samples which were analyzed, all parameter concentrations were found to meet MECP Tables 2.1 for residential/parkland/institutional and industrial/commercial/community land uses with the exception of BH24-14-SS4 and its duplicate (DUP), which exceeds MECP Table 2.1 ESQS for vanadium.

The laboratory results of the three samples which were analyzed, all parameter concentrations were found to meet MECP Table 3.1 for residential/parkland/institutional and industrial/commercial/community land uses with the exception of BH24-14-SS4 and its duplicate (DUP), which exceeds MECP Table 3.1 ESQS for vanadium.

According to Section 49.1 of O. Reg 153/04, if a contaminant exceeds the applicable SCS but does not exceed the naturally occurring range of that contaminant in that area, then the contaminant is considered to meet the applicable SCS. Native soils consisting of Champlain Sea Deposits can have higher concentrations of barium, chromium and vanadium. The Site is located within an area consisting of Champlain Sea Deposits and the exceedances of barium, chromium and vanadium do not exceed the naturally occurring range. Therefore, these parameters are not considered to exceed and meet the applicable SCS and ESQS.

Based on the Section 2.(3).15. of the “Rules for Soil Management and Excess Soil Quality Standards” (MECP 2019) document, a minimum of three samples must be analyzed if less than 600 cubic metres of soil will be excavated. Three samples were collected and submitted to be analyzed as part of this investigation, therefore up to 600 cubic metres of soil can be excavated and disposed of without restrictions. If additional soil is to be removed from the Site then additional soil samples will need to be collected and submitted for laboratory analysis.

Geotechnical Engineering Comments and Recommendations

A seismic shear wave velocity sounding survey (seismic shear wave survey) was conducted by GPR on December 5, 2024, and the results are shown in Appendix A. The results of the seismic shear wave velocity sounding survey indicates an average seismic shear wave velocity was 479 m/s. Table 4.1.8.4.A of the 2012 Ontario Buildings Code (as amended January 2022) indicates that for a seismic shear velocity value of 479 m/s, the site classification for seismic site response is **Class C**. The subsurface soils are not susceptible to liquefaction during a seismic event.

Based on a review of the borehole information and the consolidation test results and to maintain settlements within normally tolerable limits, it is considered that the maximum permissible site grade raise using soil fill is 1.0 m in conjunction with the footings designed in accordance with Section 10 of the attached interim report.

Based on a review of the borehole information, it is considered feasible to support the proposed school building by footings founded on an engineered fill pad constructed on the silty clay. The sandy silt will have to be excavated and removed from within the proposed building area. The engineered fill pad should be constructed in accordance with the procedure below. Strip footings having a maximum width of 1.5 m and square pad footings having a maximum width and length of 3.0 m founded at a maximum depth of 1.5 m below existing grade on the properly constructed engineered fill pad constructed on the native silty clay may be designed for a bearing pressure at serviceability limit state (SLS) of 120 kPa and factored geotechnical resistance at ultimate limit state (ULS) of 180 kPa. The factored ULS value includes a geotechnical resistance value of 0.5. The SLS and factored ULS values

are valid provided the maximum permissible site grade raise of 1.0 m using approved soil fill is respected. The settlement of the proposed school building designed for the above SLS value and properly constructed are expected to be within the normally tolerable limits of 25 mm total settlement and 19 mm differential settlement.

The ground floor of the proposed school building may be designed as a slab-on-grade placed on a well packed 200 mm thick 19 mm sized clear stone bed placed on a minimum 300 mm thick engineered fill pad set on the approved silty clay subgrade constructed in accordance with Sections 9 and 10 of the attached interim geotechnical report. The proposed school building should have a perimeter drainage system. Underfloor drainage is not required.

Excavations for the construction of the foundations and installation the underground services for the proposed school development are expected to extend to a maximum depth of 3.0 m below the existing grade into the sandy silt and silty clay. Based on groundwater level measurements from January 9,2025 excavations are anticipated to be above the groundwater level.

The excavations may be undertaken by conventional heavy equipment capable of removing cobbles and boulders.

All excavations must be undertaken in accordance with the Occupational Health and Safety Act (OHSA), Ontario Reg. 213/91. Based on the definitions provided in OHSA, the subsurface soils on site are considered to be Type 3 and as such must be cut back at 1H:1V from the bottom of the excavation. Within zones of seepage, the excavation side slopes are expected to slough and eventually stabilize at 2H:1V to 3H:1V from the bottom of the excavation. Seepage of surface and subsurface water into the excavations is anticipated and it should be possible to remove any water entering the excavations by pumping from sumps. In areas of high infiltration or in areas where more permeable soil layers may exist, a higher seepage rate should be anticipated requiring high-capacity pumps to keep the excavation dry.

It is anticipated that the majority of the material required for engineered fill construction and backfilling purposes will have to be imported and should preferably conform to the specifications stated in the attached interim report.

Pavement structure for light duty traffic areas should consist of 65 mm thick asphaltic concrete, 150 mm thick OPSS Granular A base and 300 mm thick OPSS Granular B Type II subbase. Pavement structure for heavy duty traffic areas should consist of 110 mm thick asphaltic concrete, 150 mm thick OPSS Granular A base and 450 mm thick OPSS Granular B Type II subbase.

The site is underlain by marine silty clay. The Atterberg limit test results of the silty clay were compared with the document titled, *Tree Planting in Sensitive Marine Clay Soils – 2017 City of Ottawa Guidelines (2017 Guidelines)* and indicate the silty clay has a low/medium potential for soil volume change

The comments and recommendations given in the attached report are based on the above design concept and are considered interim in nature. These interim comments and recommendations must be verified by a more detailed geotechnical and environmental investigation consisting of additional boreholes and test pits.

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

This executive summary is a brief synopsis of the attached interim geotechnical report and should not be read in lieu of reading the attached interim report in tis entirety.

1. Introduction

EXP Services Inc. (EXP) is pleased to present the results of the interim geotechnical investigation completed for the proposed New Riverside South Secondary School to be located at 675 Borbridge Avenue, Ottawa, ON (Figure 1). The terms and conditions of this assignment were outlined in EXP's proposal number: OTT-24010349-A0 dated June 12,2024 and authorized by the Conseil des écoles catholiques du Centre-Est (CECCE) on June 26, 2024.

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Due to the dense tree cover across the site, tree clearing was required and limited to providing access to the borehole locations at the proposed building location. Further, additional boreholes and test pits are to be carried out in the remaining portion of the site at a later date. Therefore, this geotechnical report is to be considered an interim geotechnical report, to be updated when further subsurface information is available from the additional boreholes and/or test pits.

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The interim geotechnical investigation was undertaken to:

a) Establish the subsurface soil and groundwater conditions at fourteen (14) boreholes located on the site,

b) Classify the site for seismic site response in accordance with the requirements of the 2012 Ontario Building Code (as amended January 1, 2022) and assess the potential for liquefaction of the subsurface soils during a seismic event,

c) Carry out a Phase II Environmental Site Assessment concurrent to the geotechnical investigation,

d) Comment on grade-raise restrictions,

e) Make recommendations regarding the most suitable type of foundations, founding depth and bearing pressure at serviceability limit state (SLS) and factored geotechnical resistance at ultimate limit state (ULS) of the founding strata and comment on the anticipated total and differential settlements of the recommended foundation type,

f) Provide comments regarding slab-on-grade construction and the requirement for perimeter and underfloor drainage systems,

g) Comment on excavation conditions and de-watering requirements during construction,

h) Provide pipe bedding requirements for underground services,

i) Discuss backfilling requirements and suitability of on-site soils for backfilling purposes,

j) Recommend pavement structure thicknesses for the access road, parking lot, bus loading and unloading area and bus loop; and

k) Comment on subsurface concrete requirements and corrosion potential of subsurface soils to buried metal structures/members.

The comments and recommendations given in this report are based on the above design concept and are considered interim in nature. These interim comments and recommendations are to be verified by a more detailed geotechnical investigation consisting of additional boreholes and test pits.

2. Site Description

6.007

The site is located in the southeast corner of the Brian Good Avenue and Borbridge Avenue intersection at the municipal address of 675 Borbridge Avenue, Ottawa, Ontario. The site is approximately square in shape with an approximate area of 5.8 hectares. The site is bounded to the south and to the west by residential developments. At the time of this interim geotechnical investigation, the majority of the site was covered with dense trees.

The EXP Phase 1 ESA identified that small stockpiles of soil and granular material are present on the site, generated from residential construction activities.

A black ash tree cluster to be preserved was also identified by KAL and the location is shown on Figure 2.

The ground surface elevation of the boreholes drilled within the proposed building footprint range from Elevation 91.64 m to Elevation 90.84 m.

3. Geology of the Site

3.1 Surficial Geology Map

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

Image 1 – Surficial Geology

3.2 Bedrock Geology Map

The bedrock geology was reviewed via the Google Earth application using the map published by the Ontario Ministry of Energy, Northern Development and Mines available via http://www.geologyontario.mndm.gov.on.ca/mines/data/google/MRD219/geology/doc.kml and publish in 2007. The map indicates the site is underlain by dolostone with minor shale and sandstone of the Beekmantown Group, Oxford formation. The bedrock geology is show in Image 2 below.

Image 2 – Bedrock Geology

4. Procedure

4.1 Fieldwork

The fieldwork for this geotechnical investigation was undertaken from December 3 to 6, 2024 and consists of fourteen (14) boreholes (Borehole Nos. 24-1 to 24-4 and Nos. 24-6 to 24-15) advanced to auger refusal, cone refusal and termination depths ranging from 4.9 m to 10.9 m depths below existing grade. Borehole 24-5 was not drilled. The fieldwork was supervised on a full-time basis by EXP.

The boreholes were drilled using a CME-55 track-mounted drill rig equipped with continuous flight hollow-stem auger equipment operated by a drilling contractor subcontracted to EXP. Standard penetration tests (SPTs) were performed in all the boreholes at 0.75 m to 1.5 m depth intervals and soil samples were retrieved by the split-spoon sampler. Relatively undisturbed Shelby tube samples were retrieved from two (2) boreholes. The undrained shear strength of the silty clay was measured by conducting in-situ vane tests at selected depths in the boreholes. Dynamic cone penetration tests (DCPT) were conducted in Borehole Nos. 24-3, 24-10 and 24-12.

Fifty (50) mm diameter monitoring wells and nineteen (19) mm standpipes were installed in selected boreholes for long-term monitoring of the groundwater table. The monitoring the wells were also used for sampling of the groundwater as part of the Phase II ESA. The monitoring wells and standpipes were installed in accordance with EXP standard practice, and the installation configuration is documented on the respective borehole log. The boreholes were backfilled upon completion of drilling and installation of the monitoring wells.

4.2 Geotechnical Laboratory Testing Program

On completion of the borehole fieldwork, the soil samples were transported to the EXP laboratory in Ottawa and borehole logs prepared. The soils are classified by their main constituents in accordance with the Unified Soil Classification System (USCS) using the soil group name and symbol and by the modified Burmister soil classification method for the classification of the minor constituents using adjectives and modifiers such as trace and some.

A summary of the laboratory testing program for the soil samples is shown in Table I.

Table I: Summary of Laboratory Testing Program

Type of Test	Number of Tests Completed
Moisture Content Determination	127
Unit Weight Determination	7
Grain Size Analysis	6
Atterberg Limit Determination	6
Consolidation Test	1
Corrosion Analysis (pH, sulphate, chloride and resistivity)	2

4.3 Seismic Shear Wave Velocity Sounding Survey

A seismic shear wave velocity sounding survey was conducted at the site on December 5, 2024, by Geophysics GPR International Inc. (GPR). The survey line is located along Brian Good Avenue to the southwest of the site as shown in Figure 2. The survey was

undertaken using the multi-channel analysis of surface waves (MASW), spatial auto correlation (SPAC) and seismic refraction methods. The seismic shear wave velocity sounding survey report is shown in Appendix A.

4.4 Environmental Procedure

A total of three representative soil samples and one duplicate sample were collected from three boreholes (Borehole Nos. 24-1, 24-4 and 24-14) and were submitted to a certified laboratory for analysis of petroleum hydrocarbons (PHC), volatile organic compounds (VOC) inorganics (pH, electrical conductivity (EC), sodium adsorption ratio (SAR)) and metals.

5. Subsurface Conditions and Groundwater Levels

A detailed description of the subsurface conditions and groundwater levels from the boreholes are given on the attached Borehole Logs, Figure Nos. 3 to 16. 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 also may result in changes in the conditions interpreted to exist at the locations where sampling was conducted.

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

Reference is made to Section 6 of this interim report and to the Phase I ESA reports regarding the environmental condition of the subsurface soils and groundwater.

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

5.1 Topsoil

A 150 mm to 400 mm thick surficial topsoil layer was encountered in all the boreholes.

5.2 Sandy Silt

A sandy silt was encountered beneath the topsoil in all the boreholes and extends to depths ranging from 1.4 m to 2.6 m (Elevation 89.6 m to Elevation 88.4 m). The sandy silt contains silty clay seams. The SPT N-values of the sandy silt range from 3 to 26 indicating the sandy silt is in a very loose to compact state. The natural moisture content and unit weight of the sandy silt is 11 percent to 40 percent and 18.7 kN/m^3 to 20.2 kN/m^3, respectively.

The results from the grain-size analysis and Atterberg limit determination conducted on two (2) samples of the soil are summarized in Table II. The grain-size distribution curves are shown in Figures 17 and 18.

Table II: Summary of Results from Grain-Size Analysis and Atterberg Limit Determination
Sandy Silt

Borehole No. (BH) – Sample No. (SS)	Depth (m)	Grain-Size Analysis (%) and Atterberg Limit Determination (%)							
		Gravel	Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	Soil Classification
BH24-1 SS3	1.5 - 2.1	0	21	43	36	28	15	13	Clayey Sandy Silt (ML) with Silty Clay Seams of Low Plasticity
BH24-14 SS3	1.5 - 2.1	0	45	37	18	Non-Plastic			Sandy Silt (ML) - Some Clay

Based on a review of the results of the grain-size analysis, the soil may be classified as a clayey sandy silt (ML) with silty clay seams of low plasticity to a non-plastic sandy silt (ML) with some clay.

5.3 Silty Clay

The sandy silt is underlain by a sensitive marine silty clay contacted in all boreholes that extends to depths ranging from 4.1 m to 6.5 m (Elevation 87.5 m to Elevation 84.5 m). The undrained shear strength of the silty clay ranges from 38 kPa to greater than 120 kPa indicating a firm to very stiff consistency. The natural moisture content and unit weight of the silty clay is 20 percent to 68 percent and 15.9 kN/m3 to 16.5 kN/m3, respectively.

The results from the grain-size analysis and Atterberg limit determination conducted on three (3) selected samples of the silty clay are summarized in Table III. The grain-size distribution curves are shown in Figures 19 to 21.

Table III: Summary of Results from Grain-Size Analysis and Atterberg Limit Determination Silty Clay

Borehole No. (BH) – Sample No. (SS)	Depth (m)	Grain-Size Analysis (%) and Atterberg Limit Determination (%)							
		Gravel	Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	Soil Classification
BH24-1 SS6	3.8 - 4.4	2	7	45	46	35	16	19	Silty Clay of Medium Plasticity (CI) - Trace Sand, Trace Gravel
BH24-3 SS5	3.8 - 4.4	1	5	61	33	31	14	17	Silty Clay of Medium Plasticity (CI) - Trace Sand, Trace Gravel
BH24-15 SS4	3.0 - 3.6	0	1	41	58	53	14	39	Silty Clay of High Plasticity (CH) – Trace Sand

Based on a review of the results of the grain-size analysis and Atterberg limits, the soil may be classified as a silty clay of medium to high plasticity (CI to CH) with trace sand and trace gravel.

A consolidation test was performed on one (1) Shelby tube sample of the silty clay. The test results and estimated soil parameters are summarized in Table IV. The consolidation test results are shown in Appendix B.

Table IV: Consolidation Test Results

Borehole No. (BH)-Sample No. (ST)	Sample Depth (Elevation) (m)	σ'_{v0} (kPa)	W_c (%)	γ (kN/m^3)	σ'_p (kPa)	e_o	C_r	C_c	OCR
BH24-12 - ST1	3.8 - 4.4 (87.0 - 86.4)	69	62.5	15.9	96	1.757	0.049	0.844	1.4

σ'_{v0} = calculated effective overburden pressure (kPa); W_c: natural moisture content (%), γ: estimated natural unit weight σ'_p = pre-consolidation pressure (kPa), e_o = initial void ratio; C_r = re-compression index; C_c = compression index; OCR - Over-Consolidation Ratio

Based on a review of the consolidation test result, the pre-consolidation pressure of the silty clay sample is 96 kPa and the silty clay is slightly over-consolidated with an over-consolidation ratio of 1.4 indicating the silty clay is over-consolidated by 27 kPa.

5.4 Glacial Till

A glacial till was contacted beneath the silty clay at depths of 4.1 m to 6.5 m (Elevation 87.5 m to Elevation 84.5) The glacial till contains varying amounts of gravel, sand, silt and clay within the soil matrix as well as cobbles and boulders. The standard penetration test (SPT) N-values of the glacial till ranges from 5 to 54 indicating the glacial till is in a loose to very dense state. A high N value with low sampler penetration such as N equal to 50 for 25 mm sampler penetration is likely a result of the sampler making contact with a cobble or boulder within the glacial till. The moisture content of the glacial till is 4 percent to 35 percent.

The results from the grain-size analysis conducted on one (1) sample of the glacial till are summarized in Table V. The grain-size distribution curves are shown in Figure 22.

Table V: Summary of Results from Grain-Size Analysis and Atterberg Limit Determination Glacial Till							
Borehole No. (BH No. – Sample (SS) No.	Depth (m)	Grain-Size Analysis (%) and Atterberg Limit Determination (%)					
		Gravel	Sand	Silt	Clay	Plasticity Index	Soil Classification
BH24-2 SS6	4.6-5.1	22	50	24	4	Non-Plastic	Gravelly Silty Sand (SM) - Trace Clay

Based on a review of the results of the grain-size analysis and Atterberg limits, the glacial till is a gravelly silty sand (SM) with trace clay. The glacial till contains cobbles and boulders.

5.5 Inferred Bedrock

Auger refusal and dynamic cone penetration test (DCPT) cone refusal were encountered in Borehole Nos. 24-1 to 24-3, 24-10 and 24-12 at a 4.9 m to 10.9 m depths (Elevation 86.2 m to Elevation 80.7 m) on inferred cobbles or boulders within the glacial till or on bedrock.

In Borehole No. 24-3 auger refusal was encountered at a 7.4 m depth (Elevation 84.1 m) on inferred cobbles or boulders within the glacial till.

5.6 Groundwater Level Measurements

A summary of the groundwater level measurements taken in the boreholes equipped with monitoring wells and standpipes are shown in Table VI.

Table VI: Summary of Groundwater level Measurements				
Borehole (BH)	Ground Surface Elevation (m)	Screened Material	Date of Measurement (Elapsed Time in Days from Date of Installation)	Groundwater Depth Below Ground Surface (Elevation), m
BH24-02	91.44	Silty Clay/ Glacial Till	January 9, 2025 (37 days)	5.1 (86.3)
BH24-03	91.46	Silty Clay/ Glacial Till	January 9, 2025 (37 days)	5.0 (86.5)
BH24-08	91.52	Silty Clay/ Glacial Till	January 9, 2025 (36 days)	5.1 (86.4)
BH24-13	91.14	Sandy Silt/ Silty Clay	January 9, 2025 (35 days)	4.5 (86.6)

The groundwater level was found to range from 4.5 m to 5.1 m depths (Elevation 86.6 m to Elevation 86.3 m).

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

6. Phase II Environmental Site Assessment

6.1 Environmental Site Condition Standards

For the purpose of this investigation, analytical results obtained from the soil samples were assessed against the generic Excess Soil Quality Standards (ESQS) as established under the Environmental Protection Act and regulated under O. Reg 406/19, as well as the Agricultural land use standards made under the Canadian Council of Ministers of the Environment (CCME) as per the request of the client. Table 1 provides the "Full Depth Background Site Condition Standards" and contains the same standards as provided in Table 1 of the Soil, Ground Water and Sediment Standards made under Part XV.1 of the EPA and referred to in O. Reg. 153/04 as the full depth background site condition standards ("Soil, Ground Water and Sediment Standards") but has been modified by noting when leachate analysis is required and if the standard is based on the analytical reporting limit or not.

Tabulated background ESQS (Table 1) applicable to environmentally sensitive sites and effects based generic ESQS (Tables 2.1 to 9.1) applicable to non-environmentally sensitive sites are provided in the accompanying "Rules for Soil Management and Excess Soil Quality Standards" (MECP 2019) document. The effects-based ESQS (Tables 2.1 to 9.1) are protective of human health and the environment for different groundwater conditions (potable and non-potable), land use scenarios (residential, parkland, institutional, commercial, industrial, community and agricultural/other), and restoration depth (full or stratified).

Tables 1 and 2.1 to 9.1 of MECP (2019) are summarized as follows:

- Table 1 – Applicable to sites where background concentrations must be met (full depth), such as sensitive sites where site-specific criteria have not been derived;
- Table 2.1 – Applicable to sites with potable groundwater and full depth restoration;
- Table 3.1 – Applicable to sites with non-potable groundwater and full depth restoration;
- Table 4.1 – Applicable to sites with potable groundwater and stratified restoration;
- Table 5.1 – Applicable to sites with non-potable groundwater and stratified restoration;
- Table 6.1 – Applicable to sites with potable groundwater and shallow soils;
- Table 7.1 – Applicable to sites with non-potable groundwater and shallow soils;
- Table 8.1 – Applicable to sites with potable groundwater and that are within 30 m of a water body; and,
- Table 9.1 – Applicable to sites with non-potable groundwater and that are within 30 m of a water body.

Application of the generic or background ESQS to a specific site is based on a consideration of site conditions related to soil pH (i.e., surface and subsurface soil), thickness and extent of overburden material, (i.e., shallow soil conditions), and proximity to an area of environmental sensitivity or of natural significance.

As development is planned for the Site, it is anticipated that excess soil will be generated. The applicable SCS depend on the quantity of soil being disposed of and the applicable SCS to the receiving property. In accordance with Regulation 406/19, excess soil that meets the MECP Table 1 to Table 9 SCS may be disposed of at a property where less than 350 m3 of soil are required, while excess soil that meets the MECP Table 1 or Table 2.1 to 9.1 ESQS may be disposed of at a property where more than 350 m3 of soil are required. The volume of soil to be generated at the site is unknown at this time.

The soil quality was compared to the MECP Table 1 SCS, which are based on background concentrations. Soil with concentrations less than MECP Table 1 can be disposed of without restrictions.

Analytical results were also compared to Table 2.1, which allows for evaluation to any off-site properties that are not municipally serviced with drinking water, and Table 3.1 for off-site properties that are municipally serviced with drinking water. If Tables 4.1 to 9.1 are applicable to the receiving site, then the data should be compared to the receiving site applicable ESQS, at the direction of the receiving site Qualified Person.

The laboratory certificates of analysis for the report are in Appendix C. The analytical results are included in Appendix D.

6.2 Environmental Results

The results and findings of the soil characterization investigation are summarized as follows:

- A total of three (3) representative samples and one duplicate sample were collected and were submitted to a certified laboratory for analysis of petroleum hydrocarbons (PHC), volatile organic compounds (VOC) inorganics (pH, electrical conductivity (EC), sodium adsorption ratio (SAR)) and metals. Refer to the analytical summary Tables 1 to 4 in Appendix D. Laboratory certificates of analysis can be found in Appendix C.
- The soil sample collected from BH24-04 (1.5-2.1 mbgs) consisted of brown, moist, sandy silt with clay. The soil samples collected from BH24-01 and BH24-14 (3.0-3.6 and 2.3-2.9 mbgs, respectively). Fill material was not identified on the Site in the borehole drilling program.
- The MECP SCS criteria are applicable if soil pH is in the range of 5 to 9 for surface soil (less than 1.5 m below soil surface) and 5 to 11 for subsurface soil (greater than 1.5 m below soil surface). The pH across the samples was found to be in an acceptable range (7.13 - 7.66).
- Based on the laboratory results of the three (3) samples that were analyzed, all parameter concentrations were found to meet MECP Table 1 SCS for all land uses with the exception of BH24-14 SS4 and its duplicate (DUP), which exceeded MECP Table 1 SCS for barium, chromium and vanadium.
- Based on the laboratory results of the three (3) samples were analyzed all parameter concentrations were found to meet MECP Tables 2.1 for residential/parkland/institutional and industrial/commercial/community land uses with the exception of BH24-14-SS4 and its duplicate (DUP), which exceeds MECP Table 2.1 ESQS for vanadium.
- Based on the laboratory results of the three (3) samples were analyzed all parameter concentrations were found to meet MECP Table 3.1 for residential/parkland/institutional and industrial/commercial/community land uses with the exception of BH24-14-SS4 and its duplicate (DUP), which exceeds MECP Table 3.1 ESQS for vanadium.

6.3 Environmental Recommendations

According to Section 49.1 of O.Reg 153/04, if a contaminant exceeds the applicable SCS but does not exceed the naturally occurring range of that contaminant in that area, then the contaminant is considered to meet the applicable SCS. Native soils consisting of Champlain Sea Deposits can have higher concentrations of barium, chromium and vanadium. The Site is located within an area consisting of Champlain Sea Deposits and the exceedances of barium, chromium and vanadium do not exceed the naturally occurring range. Therefore, these parameters are not considered to exceed and meet the applicable SCS and ESQS.

Based on the Section 2.(3).15. of the “Rules for Soil Management and Excess Soil Quality Standards” (MECP 2019) document, a minimum of three samples must be analyzed if less than 600 cubic metres of soil will be excavated. Three samples were collected and submitted to be analyzed as part of this investigation, therefore up to 600 cubic metres of soil can be excavated and disposed of without restrictions. If additional soil is to be removed from the Site then additional soil samples will need to be collected and submitted for laboratory analysis.

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

7.1 Site Classification for Seismic Site Response

A seismic shear wave velocity sounding survey (seismic shear wave survey) was conducted by GPR on December 5, 2024, and the results are shown in Appendix A. The results of the seismic shear wave velocity sounding survey indicates an average seismic shear wave velocity was 479 m/s. Table 4.1.8.4.A of the 2012 Ontario Buildings Code (as amended January 2022) indicates that for a seismic shear velocity value of 479 m/s, the site classification for seismic site response is **Class C**.

7.2 Liquefaction Potential of Soils

The subsurface soils are not susceptible to liquefaction during a seismic event.

8. Grade Raise Restrictions

The results of the boreholes revealed that the site is underlain by a sensitive marine silty clay that is slightly over-consolidated and prone to consolidation settlement that will exceed normally tolerable limits if overstressed by a combination of the following loads imposed on the silty clay:

- Placement of fill on the site to raise the grades at the site,
- Footing loads applied to the silty clay by the proposed buildings; and
- Post construction permanent lowering of the groundwater table.

For the proposed development, the load stress imposed on the silty clay will include a combination of the first two (2) types of loads listed above. Long-term lowering of the groundwater table is not anticipated since the groundwater level measurements indicate the groundwater level is below the depth of excavation and construction anticipated for the proposed development. The total combined load stress applied to the silty clay should be below the preconsolidation pressure of the silty clay in order to keep consolidation settlement of the proposed school building within normally tolerable limits.

Based on a review of the borehole information and consolidation test results and to maintain settlements within normally tolerable limits, it is considered that the maximum permissible site grade raise using soil fill is 1.0 m in conjunction with the footings designed in accordance with Section 9 of this interim report.

9. Site Grading

Site grading within the **proposed school building footprint area** should consist of the removal of the surficial topsoil, organic stained soils and the sandy silt down to the silty clay. The exposed silty clay should be examined by a geotechnician. Once the subgrade has been approved, the grades may be raised to the underside of footing elevation and design elevation of the ground floor by the construction of an engineered fill pad in accordance with the procedure outlined in Section 10 of this interim report.

Site grading within the **proposed portable areas** should consist of the removal of the surficial topsoil layer and organic stained soils down to the sandy silt. The exposed sandy silt should be examined by a geotechnician. Once the exposed sandy silt has been approved, the grades may be raised to the design elevation of the underside of the portables by the construction of an engineered fill pad in accordance with the procedure outlined in Section 10 of this interim report

Site grading within the **proposed sports field, access road**, **parking lot, bus loading and unloading area and the bus loop** should consist of the removal of the surficial topsoil layer and organic stained soils down to the native sandy silt. The exposed sandy silt should be examined by a geotechnician. Once the exposed subgrade has been approved, the grades may be raised to the design elevation of the subgrade of the sports field, access road, parking lot, bus loading and unloading area and bus loop by the placement of fill material consisting of Ontario Provincial Standard Specification (OPSS) Select Subgrade Material (SSM) or approved non-organic on-site material that is free of debris, cobbles and boulders compacted to 95 percent standard Proctor maximum dry density (SPMDD). In-place density tests should be undertaken on each lift of the fill material to ensure the material is properly compacted prior to the placement of subsequent lifts.

The above site grading geotechnical comments and recommendations regarding the proposed portables and proposed sports field, access road, parking lot, bus loading and unloading area and the bus loop are to be confirmed once additional boreholes and/or test pits have been carried out within these areas.

10. Foundation Considerations - Proposed School Building

The design finished floor elevation of the proposed school building is Elevation 91.50 m. Based on a review of the borehole information, it is considered feasible to support the proposed school building by footings founded on an engineered fill pad constructed on the silty clay. The sandy silt will have to be excavated and removed from within the proposed building area. The engineered fill pad should be constructed in accordance with the procedure below. Strip footings having a maximum width of 1.5 m and square pad footings having a maximum width and length of 3.0 m founded at a maximum depth of 1.5 m below existing grade on the properly constructed engineered fill pad constructed on the native silty clay may be designed for a bearing pressure at serviceability limit state (SLS) of 120 kPa and factored geotechnical resistance at ultimate limit state (ULS) of 180 kPa. The factored ULS value includes a geotechnical resistance value of 0.5. The SLS and factored ULS values are valid provided the maximum permissible site grade raise of 1.0 m using approved soil fill is respected. The settlement of the proposed school building designed for the above SLS value and properly constructed are expected to be within the normally tolerable limits of 25 mm total settlement and 19 mm differential settlement.

The construction of engineered fill pad for the proposed school building should consist of the excavation and removal of the surficial topsoil, organic stained soils and sandy silt down to the silty clay. The exposed subgrade should be examined by a geotechnician. Once the subgrade has been approved, the grades may be raised to the design underside footing and floor slab elevations by the construction of an engineered fill pad. The excavation for the proposed school building should extend to a sufficient distance beyond the limits of the proposed school building to accommodate a 1.0 m wide horizontal bench of engineered fill that extends beyond the perimeter of the proposed building on all sides, which should thereafter be sloped at an inclination of 1H to 1V down to the approved subgrade. The engineered fill should consist of OPSS Granular B Type II material that is placed in 300 mm thick lifts and each lift compacted to 100 percent SPMDD. The placement and compaction of the engineered fill can in this way be undertaken to the founding level of the footings. From the footing level to the underside of the floor slab, each lift of the Granular B Type II material should be compacted to 98 percent of SPMDD. The engineered fill should be placed under the full-time supervision of a geotechnician working under the direction of a geotechnical engineer. 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 subsequent lift.

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

The first lift of compacted engineered fill should be placed on the approved subgrade within the same day of approval to protect the approved soi subgrade from disturbance.

A minimum of 1.5 m of earth cover should be provided to the footings to protect them from damage due to frost penetration. The frost cover should be increased to 2.1 m for unheated structures if snow will not be removed from their vicinity. If snow will be removed from the vicinity of the unheated structures, the frost cover should be increased to 2.4 m. Rigid insulation thermally equivalent to the required soil cover may be used instead of the soil cover. Alternatively, a combination of rigid insulation and soil cover may be used to achieve the required frost protection for the footings.

The recommended bearing pressure at SLS and factored geotechnical resistance at ULS have been calculated by EXP from the borehole information for the interim design stage only.

The recommendations regarding the engineered fill pad for the portables should be confirmed once additional boreholes and/or test pits have been carried out within the proposed portable footprint area.

11. Floor Slab and Drainage Requirements

The ground floor of the proposed school building may be designed as a slab-on-grade placed on a well packed 200 mm thick 19 mm sized clear stone bed placed on a minimum 300 mm thick engineered fill pad set on the approved silty clay subgrade constructed in accordance with Sections 9 and 10 of this interim geotechnical report. The clear stone would minimize the capillary rise of moisture from the sub-soil to the floor slab. Alternatively, the clear stone may be replaced with a 200 mm thick bed of OPSS Granular A compacted to 98 percent overlain by a vapour barrier. Adequate saw cuts should be provided in the floor slabs to control cracking.

The proposed school building should have a perimeter drainage system. An underfloor drainage system is not required.

The finished floor slab should be set at least 150 mm higher than the finished exterior grade.

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

12. Excavation and De-Watering Requirements

The geotechnical comments and recommendations regarding the excavation and de-watering requirements discussed in the following sections of this report should be updated once additional boreholes and/or test pits have been carried out in the remaining areas of the site.

12.1 Excavation

Excavations for the construction of the foundations and installation the underground services for the proposed school development are expected to extend to a maximum depth of 3.0 m below the existing grade into the sandy silt and silty clay. Based on groundwater level measurements from January 9,2025 excavations are anticipated to be above the groundwater level.

The excavations may be undertaken by conventional heavy equipment.

All excavations must be undertaken in accordance with the Occupational Health and Safety Act (OHSA), Ontario Reg. 213/91. Based on the definitions provided in OHSA, the subsurface soils on site are considered to be Type 3 and as such must be cut back at 1H:1V from the bottom of the excavation. Within zones of seepage, the excavation side slopes are expected to slough and eventually stabilize at 2H:1V to 3H:1V from the bottom of the excavation.

If side slopes cannot be achieved due to space restrictions on site such as the proximity of open cut excavations to the property limits, existing infrastructure or to foundations of adjacent existing building(s), the new building construction would have to be undertaken within the confines of an engineered support system (shoring system). The dewatered excavation for the installation of the municipal underground services may be undertaken within the confines of a prefabricated support system (trench box) designed and installed in accordance with OHSA.

The need for a shoring system, the most appropriate type of shoring system and the design and installation of the shoring system should be determined by the contractors bidding on this project. The design of the shoring system should be undertaken by a professional engineer experienced in shoring design and the installation of the shoring system should be undertaken by a contractor experienced in the installation of shoring systems. The shoring system should be designed and installed in accordance with latest edition of Ontario Regulation 213/91 under the OHSA and the 2023 Fifth Edition of the Canadian Foundation Engineering Manual (CFEM).

It is recommended that a pre-construction condition survey of adjacent buildings and infrastructure be undertaken prior to the start of construction activities and that vibration monitoring be conducted during construction activities.

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.

12.2 De-Watering Requirements

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

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

Although this investigation has estimated the groundwater levels at the time of the fieldwork, and commented on dewatering and general construction problems, conditions may be present which are difficult to establish from standard boring and excavating techniques and which may affect the type and nature of dewatering procedures used by the contractor in practice. These conditions include local and seasonal fluctuations in the groundwater table, erratic changes in the soil profile, thin layers

of soil with large or small permeabilities compared with the soil mass, etc. Only carefully controlled tests using pumped wells and observation wells will yield the quantitative data on groundwater volumes and pressures that are necessary to adequately engineer construction dewatering systems.

13. Pipe Bedding Requirements

For site servicing, it is anticipated that the subgrade for the proposed underground services will consist of sandy silt and silty clay.

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

It is recommended that the pipe bedding should be 300 mm thick and consist of OPSS Granular A. The bedding material should be placed along the sides and on top of the pipe to provide a minimum cover of 300 mm. The bedding should be compacted to at least 98 percent of the SPMDD. The bedding thickness may be further increased in areas where the subgrade becomes disturbed or in areas where the subgrade consists of the very loose to loose sandy silt. loose zone of the sandy silt.

Should paved surfaces be located over service trenches, it is recommended that the trench backfill material within the frost zone (up to 1.8 m below finished grade), should match the existing material in the roadway to minimize differential frost heaving of the subgrade. Otherwise, frost tapers will be required. The trench backfill should be placed in 300 mm thick lifts and each lift should be compacted to 95 percent SPMDD.

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

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

The pipe bedding requirements are to be confirmed once additional boreholes and/or test pits have been carried out in the remaining areas of the site.

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

The materials to be excavated from the site will comprise of topsoil, sandy silt and silty clay. From a geotechnical perspective, the topsoil is not considered suitable for reuse as backfill material in the interior or exterior of the buildings and should be discarded. Portions of the sandy silt and silty clay, free of organics, cobbles and boulders, and above the groundwater level may be re-used as fill in locations away from the proposed building as backfill in service trenches and subgrade fill in paved, outdoor sports field and landscaped areas, subject to further geotechnical examination and testing during construction. These soils are subject to moisture absorption due to precipitation and must be protected at all times from the elements.

Therefore, it is anticipated that the majority of the material required for backfilling purposes in the interior and exterior of the proposed school building, at locations of the portables, outdoor sports field, access road, parking lot, bus loading and unloading area, the bus loop and in the underground service trenches will need to be imported and should preferably conform to the following specifications:

- Engineered fill under slab-on-grade and footings for the proposed school building and portables – OPSS Granular B Type II placed in 300 mm thick lifts and each lift compacted to 98 percent SPMDD beneath the floor slab and 100 percent SPMDD beneath footings,
- Backfill material against foundation walls outside the proposed school building – OPSS Granular B Type II placed in 300 mm thick lifts and each lift compacted to 95 percent SPMDD,
- Trench backfill and subgrade fill for access road, parking lot, bus loading and unloading area, bus loop and outdoor sports fields - OPSS Granular B Type I, Type II or Select Subgrade Material (SSM) or approved on site non-organic material (free of organics, debris, cobbles and boulders) placed in 300 mm thick lifts and each lift compacted to 95 percent SPMDD; and
- Landscaped areas - clean fill that is free of organics and deleterious material, debris, cobbles and boulders and is placed in 300 mm thick lifts with each lift compacted to 92 percent of the SPMDD.

The backfilling requirements will be updated once boreholes or testpits have been carried out throughout the site.

15. Pavement Structures

Pavement structures for the access road, parking lot, bus loading and unloading area and the bus loop are given on Table VII for the subgrade anticipated to consist of existing fill, sandy silt, silty clay, OPSS Granular B Type II or Select Subgrade Material (SSM). The pavement structures are based upon the assumption that the subgrade will be properly prepared and assumes a 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.

The pavement structure recommendations are to be confirmed once additional boreholes and test pits have been carried out within the proposed paved areas.

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

Notes:

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

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

Additional comments on the construction of the parking lot, access road, bus unloading and loading area and the bus loop are as follows:

1. As part of the subgrade preparation, the proposed parking area, bus loading area and bus loop should be stripped of topsoil, fill and other obviously unsuitable material. The subgrade should be properly shaped, crowned, then proofrolled 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 95 percent SPMDD (ASTM D698-12e2). Alternatively, crusher-run material (100 mm minus) may be used in the lower level of the subgrade fill for the proposed access road, parking lot, bus loading and unloading area and bus loop for the purposed of stabilizing the clayey subgrade in addition to using a geotextile (separation membrane) over the crusher-run material.
2. The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density

conditions are achieved. The need for adequate drainage cannot be over-emphasized. Subdrains should be installed on both sides of the bus loop. Subdrains must be installed in the proposed parking area at low points and should be continuous between catchbasins to intercept excess surface and subsurface moisture and to prevent subgrade softening. This will ensure no water collects in the granular course, which could result in pavement failure during the spring thaw. The location and extent of subdrains required within the paved areas should be reviewed by this office in conjunction with the proposed site grading.

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

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

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

16. Corrosion Potential

Chemical tests limited to pH, sulphate, chloride and resistivity were undertaken on two (2) soil samples. The tests are currently in progress and the test results will be provided in the final geotechnical report.

17. Tree Planting Restrictions

The site is underlain by marine silty clay. The Atterberg limit test results of the silty clay were compared with the document titled, *Tree Planting in Sensitive Marine Clay Soils – 2017 City of Ottawa Guidelines (2017 Guidelines)* and indicate the silty clay has a low/medium potential for soil volume change. For soils that have a low/medium potential for soil volume change, the 2017 Guidelines indicate that the tree to foundation setback distance and tree planting restrictions should be in accordance with the 2017 guidelines.

A landscape architect should be consulted to ensure the setbacks and tree planting restrictions are in accordance with the 2017 Guidelines.

The recommendations and findings for tree planting restrictions should be confirmed when the additional boreholes and/or test pits have been completed.

18. Additional Geotechnical Investigation and Environmental Assessment

The interim geotechnical and environmental comments and recommendations provided in this interim report are to be verified by a more detailed geotechnical investigation and environmental assessment consisting of additional boreholes and/or test pits.

19. General Comments

The comments and recommendations given in this report are considered interim in nature and must be verified by a more detailed geotechnical investigation and environmental assessment consisting of additional boreholes and/or test pits.

Reference is made the Phase II ESA section of this report and the Phase I ESA regarding the environmental condition of the subsurface soils and groundwater.

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

Sincerely

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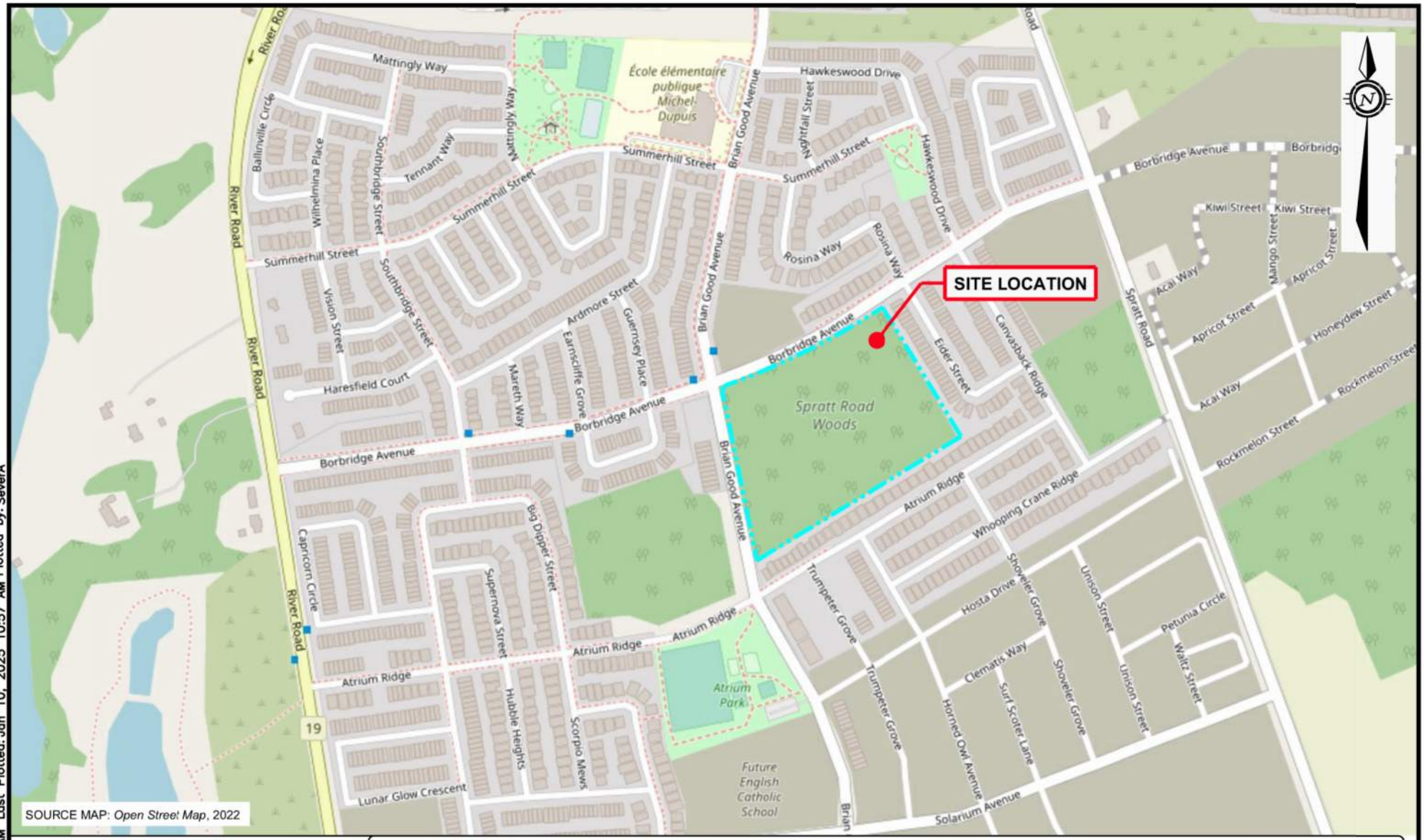
Figures



SOURCE MAP: *Open Street Map*, 2022

LEGEND

PROPERTY BOUNDARY

ORIGINAL SHEET SIZE = 11" X 8.5"

0 50m 100m 300m

HORIZONTAL 1:7,500

EXP Services Inc. www.exp.com
t: +1.613.688.1899 | f: +1.613.225.7337
2650 Queensview Drive, Suite 100
Ottawa, ON K2B 8H6, Canada

DATE: JANUARY 2025	CLIENT: CONSEIL DES ÉCOLES CATHOLIQUES DU CENTRE-EST (CECCE)		project no. OTT-24010349-A0
DESIGN: DW / CHECKED: IT	RIVERSIDE SOUTH CATHOLIC SECONDARY SCHOOL - INTERM GEOTECHNICAL INVESTIGATION 675 BORBRIDGE AVENUE, OTTAWA, ONTARIO		scale 1:7,500
DRAWN BY: AS	TITLE: SITE LOCATION PLAN		FIG 1

BORBRIDGE AVENUE

PROPOSED NEW SCHOOL BUILDING OPTION 1

Proposed Bus Loading/Unloading Area

Proposed Parking Lot

BRIAN GOOD AVENUE

rue Elder St.

Black Ash Cluster

Proposed Portables

Proposed Bus Loop

Proposed Sports Field

TREE AREA TO BE PRESERVED

DÉBARCADÈRE AUTOBUS
PLAZA
STATIONNEMENT (57 PLACES)
VÉLOS
BLOC ACADÉMIQUE
BLOC SPORTIF
TERRAIN DE SOCCER
ZONE NON CONSTRUITE
6 PORTABLES (FUTURE)
6 PORTABLES (FUTURE)
BOUCLE D'AUTOBUS (OPTION)

BH24-1 (91.05m) [AR = 4.9 m (86.2m)]
BH24-2 (91.44m) [AR = 5.2 m (86.2m)]
BH24-3 (91.46m) [CR - 10.9 m (80.6 m)]
BH24-4 (91.64m)
BH24-5 (91.02m)
BH24-6 (91.12m)
BH24-7 (91.27m)
BH24-8 (91.52m)
BH24-9 (90.98m)
BH24-10 (91.04m) [CR = 10.3 m (80.7m)]
BH24-11 (91.26m)
BH24-12 (90.84m) [CR - 8.8 m (82.0 m)]
BH24-13 (91.14m)
BH24-14 EMPLOYES (91.22m)
BH24-15 (91.03m)

560 795 552 540 542 546 548 1000 901 919 921 923 925 927 929 931 933 935 937 939 941 943 945 947 949 951 953 955 106

AERIAL PHOTOGRAPH SOURCE: *geoOttawa*, 2022

BASE SITE PLAN PROVIDED BY: *GRC ARCHITECTS* (OPTION 1), DATE RECEIVED: SEPTEMBER 9, 2024

NOTES:

1. THE BOUNDARIES AND SOIL TYPES HAVE BEEN ESTABLISHED ONLY AT BOREHOLE LOCATIONS. BETWEEN BOREHOLES THEY ARE ASSUMED AND MAY BE SUBJECT TO CONSIDERABLE ERROR.
2. SOIL SAMPLES WILL BE RETAINED IN STORAGE FOR THREE MONTHS AND THEN DESTROYED UNLESS THE CLIENT ADVISES THAT AN EXTENDED TIME PERIOD IS REQUIRED.
3. TOPSOIL QUANTITIES SHOULD NOT BE ESTABLISHED FROM THE INFORMATION PROVIDED AT THE BOREHOLE LOCATIONS.
4. BOREHOLE ELEVATIONS SHOULD NOT BE USED TO DESIGN BUILDING(S) OR 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.

LEGEND

- PROPERTY BOUNDARY
- BH24-01 — BOREHOLE NO. AND LOCATION (DRILLED)
- (91.05m) — GROUND SURFACE ELEVATION (m)
- [AR = 4.9 m (86.2m)] — AUGER REFUSAL DEPTH (ELEVATION) (m)
- [CR - 10.9 m (80.6 m)] — DCPT CONE REFUSAL DEPTH (ELEVATION) (m)
- BH24-05 — NOT DRILLED - FUTURE BOREHOLE
- BLACK ASH CLUSTER TO BE PRESERVED (HIGHLIGHTED BY: *KILGOUR & ASSOCIATES*)
- SHEAR WAVE VELOCITY SOUNDING AT 906 BRIAN GOOD AVENUE APPROXIMATE LOCATION

TO BE REVIEWED - See CAD drawings sent on 2025-01-20

ORIGINAL SHEET SIZE = 17" X 11"

0 10m 20m 50m

HORIZONTAL 1:1250

EXP Services Inc. www.exp.com
t: +1.613.688.1899 | f: +1.613.225.7337
2650 Queensview Drive, Suite 100
Ottawa, ON K2B 8H6, Canada

DATE: JANUARY 2025	CLIENT: CONSEIL DES ÉCOLES CATHOLIQUES DU CENTRE-EST (CECCE)		project no. OTT-24010349-A0
DESIGN: DW / CHECKED: IT	RIVERSIDE SOUTH CATHOLIC SECONDARY SCHOOL - INTERM GEOTECHNICAL INVESTIGATION 675 BORBRIDGE AVENUE, OTTAWA, ONTARIO		scale 1:1,250
DRAWN BY: AS	TITLE: BOREHOLE LOCATION PLAN		FIG 2

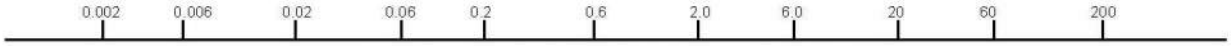
Filename: E:\OTT\OTT-24010349-A0\60 Execution\65 Drawings\OTT-24010349-A0_Geo_Jan-2025.dwg
Last Saved: Jan 10, 2025 12:09 PM Last Plotted: Jan 10, 2025 12:10 PM Plotted by: SeverA

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 BH24-1

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 6, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

Figure No. 3

Page. 1 of 1

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 Elevation 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 thick	91.05	0				
		90.9						
		CLAYEY SANDY SILT Wiith some silty clay seams of low plasticity, brown, moist, (loose to compact)			10		SS1	
				1	22		SS2	
					7		SS3	
			88.9	2				
		SILTY CLAY Medium plasticity, trace sand, trace gravel, grey, wet, (very stiff)			5		SS4	
				3	Hammer Weight >120		SS5	
				4	3		SS6	
			86.6					
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (very dense) Augers grinding from 4.6 m to auger refusal depth			21, 34 then 50/50 mm		SS7	
			86.2					

Auger Refusal at 4.9 m Depth

Note
1- Sample SS5 submitted for environmental laboratory testing

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
Completion	Dry	4.6

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-2

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 3, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

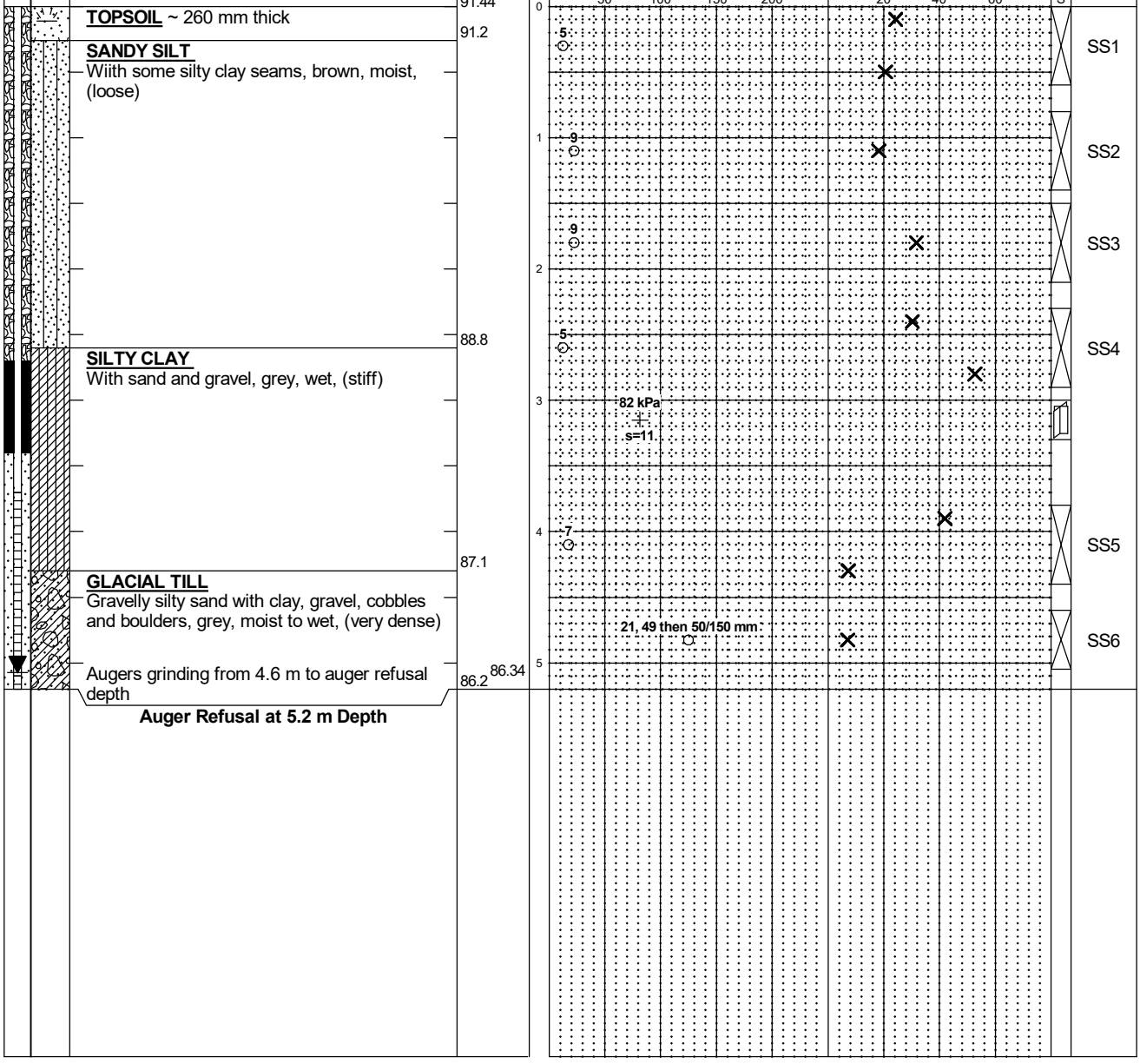
Figure No. 4

Page. 1 of 1

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 Elevation m	Depth
		TOPSOIL ~ 260 mm thick	91.44	0
		SANDY SILT Wiith some silty clay seams, brown, moist, (loose)	91.2	
		SILTY CLAY With sand and gravel, grey, wet, (stiff)	88.8	3
		GLACIAL TILL Gravelly silty sand with clay, gravel, cobbles and boulders, grey, moist to wet, (very dense)	87.1	4
		Augers grinding from 4.6 m to auger refusal depth	86.2	5
		Auger Refusal at 5.2 m Depth	86.34	

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



Natural Unit Wt. kN/m³

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm slotted standpipe was installed in the borehole upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	5.2
'January 9. 2024	5.1	

CORE DRILLING RECORD

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-3

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 3, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

Figure No. 5

Page. 1 of 2

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 Elevation 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 thick	91.46	0				
		SANDY SILT Wiith some silty clay seams, brown, moist, (loose to compact)	91.2		5		SS1	
				1	10		SS2	
					5		SS3	
			89.3	2				
		SILTY CLAY Medium plasticity, trace sand, trace gravel, grey, wet, (stiff)			4		SS4	
				3	58 kPa, s=6			
					3		SS5	
			87.0	4				
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (loose)	86.46	5	9		SS6	
					8		SS7	
		Augers grinding from 4.6 m to auger refusal depth		6	5		SS8	
			84.1	7				
		Dynamic Cone Penetration Test (DCPT) conducted from 7.4 m to 10.9 m depths.		8				

Continued Next Page

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 50 mm monitoring well was installed in the borehole upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	7.4
'January 9. 2024	5.0	

CORE DRILLING RECORD

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-3

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Figure No. 5

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		Dynamic Cone Penetration Test (DCPT) conducted from 7.4 m to 10.9 m depths. *(continued)*	83.46	8				
				9				
				10				
			80.6					
		Cone Refusal at 10.9 m depth Note: 1) Auger Refusal at 7.4 m Depth 2) Dynamic Cone Penetration Test (DCPT) conducted adjacent to BH-3 from 1.5 m depth to the cone refusal depth. 3) Sample SS3 submitted for environmental laboratory testing						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 50 mm monitoring well was installed in the borehole upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	7.4
'January 9. 2024	5.0	

CORE DRILLING RECORD

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

Log of Borehole BH24-4

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Figure No. 6

Page. 1 of 1

Date Drilled: 'December 4, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

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 Elevation m	Depth
		TOPSOIL ~ 400 mm thick	91.64	0
		SANDY SILT Wiith some silty clay seams, brown, moist, (loose)	91.2	
		SILTY CLAY With sand, grey, moist, (stiff)	89.2	3
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (loose to dense)	87.5	4
		Augers grinding from 5.3 m to termination depth	84.9	6
		Borehole Terminated at 6.7 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

Depth	N	Shear Strength	Sample	Unit Wt.
0	5		SS1	
1	8		SS2	
2	5		SS3	
3	3	86 kPa, s=12	SS4	
4	6		SS5	
5	37		SS6	
6	16		SS7	
6	25		SS8	

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	5.6

CORE DRILLING RECORD

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-6

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 5, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

Figure No. 7

Page. 1 of 1

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 Elevation m	Depth
		TOPSOIL ~ 200 mm thick	91.12	0
		SANDY SILT Wiith some silty clay seams, brown, moist, (very loose to compact)	90.9	
		SILTY CLAY Grey, wet, (stiff to very stiff)	88.8	3
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (loose to dense)	86.7	4
		Augers grinding from 4.6 m to termination refusal depth	84.8	6
		Borehole Terminated at 6.3 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

Depth	Standard Penetration Test N Value	Shear Strength kPa	Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
0	6			SS1	
1	9			SS2	
2	4			SS3	
3	2	110 kPa, s=15		SS4	16.5
4		62 kPa, s=13			
5	5			SS5	
6	46			SS6	
	14 then 50/25 mm			SS7	

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
Completion	Dry	5.5

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-7

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 4, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

Figure No. 8

Page. 1 of 1

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 Elevation 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 thick	91.27	0				
		SANDY SILT Wiith some silty clay seams, brown, moist, (very loose to compact)	91.0		7		SS1	
				1	26		SS2	
					7		SS3	20.1
			89.2	2				
		SILTY CLAY Grey, wet, (stiff to very stiff)			110 kPa s=12			
				3	1		SS4	
				4	53 kPa s=7			
		Clayey silt below 5 m depth			1		SS5	
			86.0	5				
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, moist, (dense to very dense)			52		SS6	
		Wet below 6.0 m depth		6				
					35		SS7	
			84.6					
		Borehole Terminated at 6.7 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	5.9

CORE DRILLING RECORD

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-8

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Figure No. 9

Page. 1 of 1

Date Drilled: 'December 4, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

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 Elevation m	Depth
		TOPSOIL ~ 350 mm thick	91.52	0
		SANDY SILT Wiith some silty clay seams, brown, moist, (very loose to loose)	91.2	
		SILTY CLAY Light brown to grey, moist to wet, (stiff to very stiff)	89.3	2
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (compact)	86.0	5
		Borehole Terminated at 6.7 m Depth	84.8	6

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

5 — SS1

7 — SS2

4 — SS3

2 — SS4

82 kPa, s=11

Hammer Weight — SS5

>120 kPa — SS6

11 — SS7

12 — SS8

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm slotted standpipe was installed in the borehole upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	6.7
'January 9. 2024	5.1	

CORE DRILLING RECORD

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-9

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 5, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

Figure No. 10

Page. 1 of 1

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 Elevation 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 ~ 260 mm thick	90.98	0				
		SANDY SILT Wiith some silty clay seams and layers, brown, moist, (loose to compact)	90.7		15 ○; 192 kPa ▲	×	SS1	
				1	18 ○	×	SS2	20.1
				2	9 ○	×	SS3	
			88.8					
		SILTY CLAY Grey, wet, (stiff)			4 ○	×	SS4	
				3	53 kPa ⊥ s=7			
				4	3 ○	×	SS5	
					82 kPa ⊥ s=11			
			85.6	5				
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (very dense)			1, 35, then 50/50 mm ○	×	SS6	
				6	50/125 mm ○	×	SS7	
			84.8					
		Borehole Terminated at 6.2 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	5.8

CORE DRILLING RECORD

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-10

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 6, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

Figure No. 11

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 Elevation 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 ~ 280 mm thick	91.04	0				
		SANDY SILT Wiith some silty clay seams, brown, moist, (loose)	90.8		5		SS1	
				1	8		SS2	20.2
		SILTY CLAY With sand, grey, moist, (stiff)	89.6		5		SS3	
				2	4		SS4	
				3	58 kPa s=12			
				4	2		SS5	
					58 kPa s=6			
				5				
					3		SS6	
				6				
					1		SS7	
			84.5	7				
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet	84.4					
		Dynamic Cone Penetration Test (DCPT) conducted from 6.6 m to 10.3 m depths.		8				

Continued Next Page

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
Completion	Dry	5.6

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-10

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Figure No. 11

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		Dynamic Cone Penetration Test (DCPT) conducted from 6.6 m to 10.3 m depths. *(continued)*	83.04	8				
				9				
				10				
			80.7					
		Cone Refusal at 10.3 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	5.6

CORE DRILLING RECORD

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-11

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 5, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

Figure No. 12

Page. 1 of 1

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 Elevation m	Depth
		TOPSOIL ~ 280 mm thick	91.26	0
		SANDY SILT Wiith some silty clay seams, brown, moist, (very loose to loose)	91.0	
		SILTY CLAY Grey, wet, (stiff to very stiff)	89.1	2
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (compact to dense)	86.2	5
		Borehole Terminated at 6.7 m Depth	84.6	6

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
SS1	
SS2	
SS3	
SS4	
SS5	
SS6	
SS7	

Depth 0: 6 ○ | × ×

Depth 1: 8 ○ | ×

Depth 2: 4 ○ | ×

Depth 3: 2 ○ | ×

72 kPa +S s=30

Depth 4: 2 ○ | ×

110 kPa +S s=4

Depth 5: 9 ○ | ×

Depth 6: 34 ○ | ×

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	5.8

CORE DRILLING RECORD

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-12

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 6, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

Figure No. 13

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 Elevation m	Depth
		TOPSOIL ~ 280 mm thick	90.84	0
		SANDY SILT Wiith some silty clay seams, brown, moist, (loose to compact)	90.6	
		SILTY CLAY Grey, wet, (firm to stiff)	88.4	3
▼			85.04	
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (loose to dense)	84.8	6

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

Depth	SPT N	Shear Strength	Moisture / Atterberg	Sample	Natural Unit Wt. kN/m³
0	7			SS1	
1	18			SS2	18.7
2	12			SS3	
2	4			SS4	
3		48 kPa, s=20			
4				ST1	15.9
5		62 kPa, s=7			
5	6			SS5	
6	49			SS6	
8	9			SS7	

Continued Next Page

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	5.8	6.4

CORE DRILLING RECORD

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

Log of Borehole BH24-12

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Figure No. 13

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth m	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
			82.84	0	20 40 60 80 / 50 100 150 200	250 500 750 / 20 40 60		
		Dynamic Cone Penetration Test (DCPT) conducted from 8.2 m to 8.8 m depths.	82.6					
		Cone Refusal at 8.8 m depth	82.0	8				

Note:
1) On completion of augering to 7.6 m depth, sand heaving up into the augers to 6.4 m depth.
2) Dynamic Cone Penetration Test (DCPT) extened bborehole to cone refusal depth at 8.8 m.

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	5.8	6.4

CORE DRILLING RECORD

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

Log of Borehole BH24-13

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 5, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

Figure No. 14

Page. 1 of 1

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 Elevation m	Depth
		TOPSOIL ~ 300 mm thick	91.14	0
		SANDY SILT Wiith some silty clay seams, brown, moist, (loose to compact)	90.8	
		SILTY CLAY Grey, wet, (firm to stiff)	88.9	2
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (very dense)	85.2	6
		Borehole Terminated at 6.7 m Depth	84.4	

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)

8 at 0; 16 at 1; 9 at 2; 2 at 3; 38 kPa, s=16 at 4; 3 at 5; 72 kPa, s=8 at 5; 53 at 6

SAMPLES	Natural Unit Wt. kN/m³
SS1	
SS2	
SS3	18.9
SS4	
ST1	
SS5	
SS6	

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 50 mm monitoring well was installed in the borehole upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	--
'January 9. 2024	4.5	

CORE DRILLING RECORD

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-14

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 4, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

Figure No. 15

Page. 1 of 1

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 Elevation 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 thick	91.22	0				
		SANDY SILT Wiith some silty clay seams, brown, moist, (loose to compact)	90.9		5		SS1	
				1	10		SS2	
					6		SS3	
			89.0	2				
		SILTY CLAY Grey, wet, (firm)			2		SS4	
				3	48 kPa s=20			
				4	1		SS5	
					48 kPa s=20			
				5				
					3		SS6	
			85.4					
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet	84.9	6	16 then 50/75 mm		SS7	
		Borehole Terminated at 6.3 m Depth						

Note:
1- Sample SS4 and duplicate sample submitted for environmental laboratory testing

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	6.1

CORE DRILLING RECORD

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

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

Log of Borehole BH24-15

Project No: OTT-24010349-A0

Project: Proposed New Riverside South Secondary School

Location: 675 Borbridge Avenue, Ottawa, ON

Date Drilled: 'December 4, 2024

Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: M.Z. Checked by: D.W.

Figure No. 16

Page. 1 of 1

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 Elevation m	Depth	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~ 320 mm thick	91.03	0	SS1	
		SANDY SILT Wiith some silty clay seams, brown, moist, (loose to compact)	90.7			
				1	SS2	
		SILTY CLAY HIgh plasticity, with sand seams, grey, moist, (firm to stiff)	89.6		SS3	
				2		
				3	SS4	
		With gravel below 4.5 m depth		4		
				5	SS5	
					SS6	
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (very dense)	85.1	6	SS7	
			84.3			
		Borehole Terminated at 6.7 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

8 | 15 | 6 | 58 kPa s=6 | 2 | 38 kPa s=16 | 4 | 1 | 54

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. The borehole was backfilled upon completion.
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-24010349-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Completion	Dry	5.2

CORE DRILLING RECORD

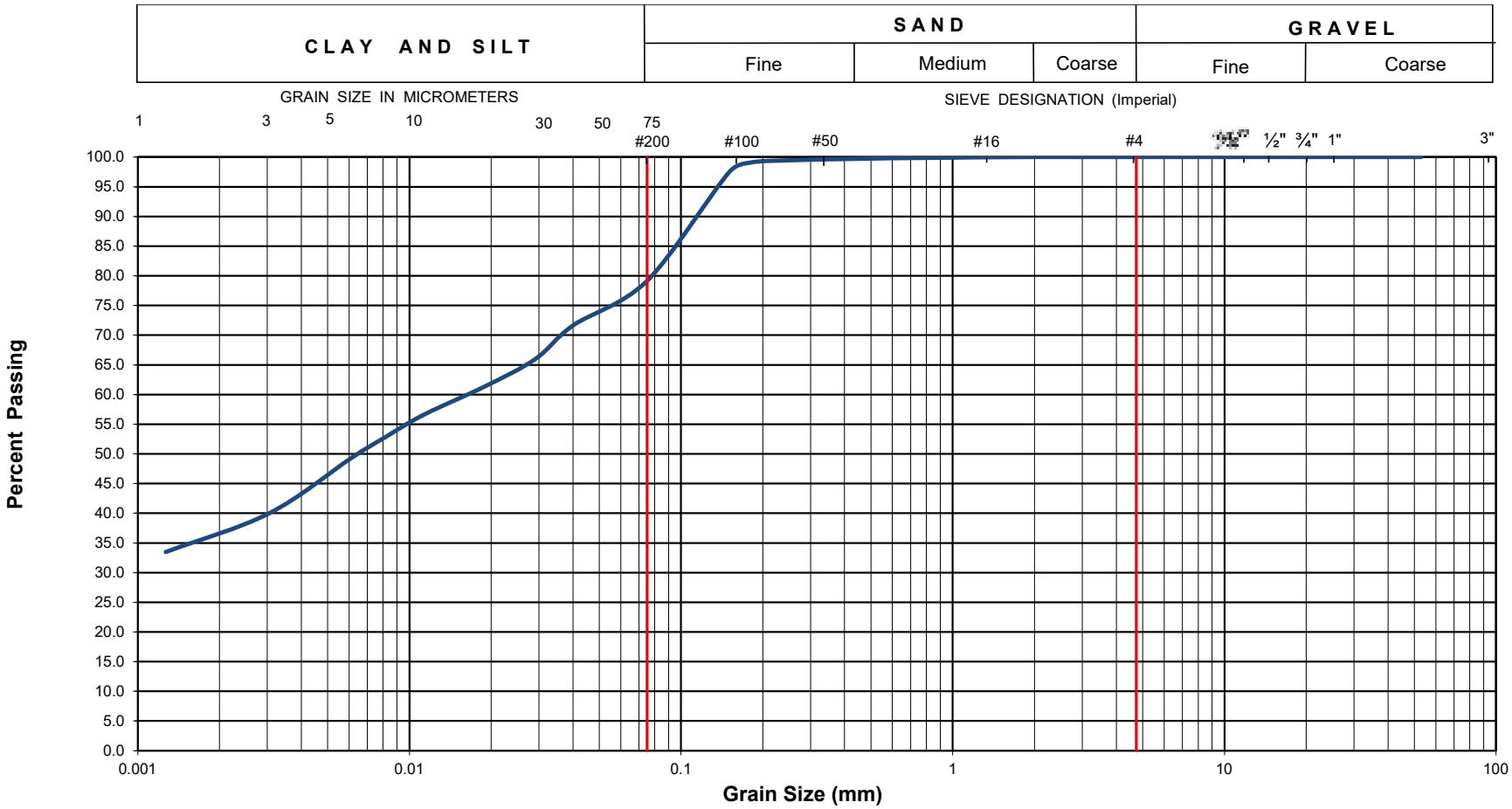
Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE GINT LOGS 12.27.2024.GPJ TROW OTTAWA.GDT 1/17/25

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 D422

Unified Soil Classification System



EXP Project No.:	**OTT-24010349-A0**	**Project Name :**	**Proposed New Riverside South Secondary School**						
Client :	**CECCE**	**Project Location :**	**675 Borbridge Avenue, Ottawa, Ontario**						
Date Sampled :	**December 6, 2024**	**Borehole No:**	**24-1**		**Sample No.:**	**SS3**		**Depth (m) :**	**1.5 - 2.1**
Sample Description :		**% Silt and Clay**	**79**	**% Sand**	**21**	**% Gravel**	**0**	**Figure :**	**17**
Sample Description :		**Clayey Sandy Silt (ML) with Silty Clay Seams of Low Plasticity**							

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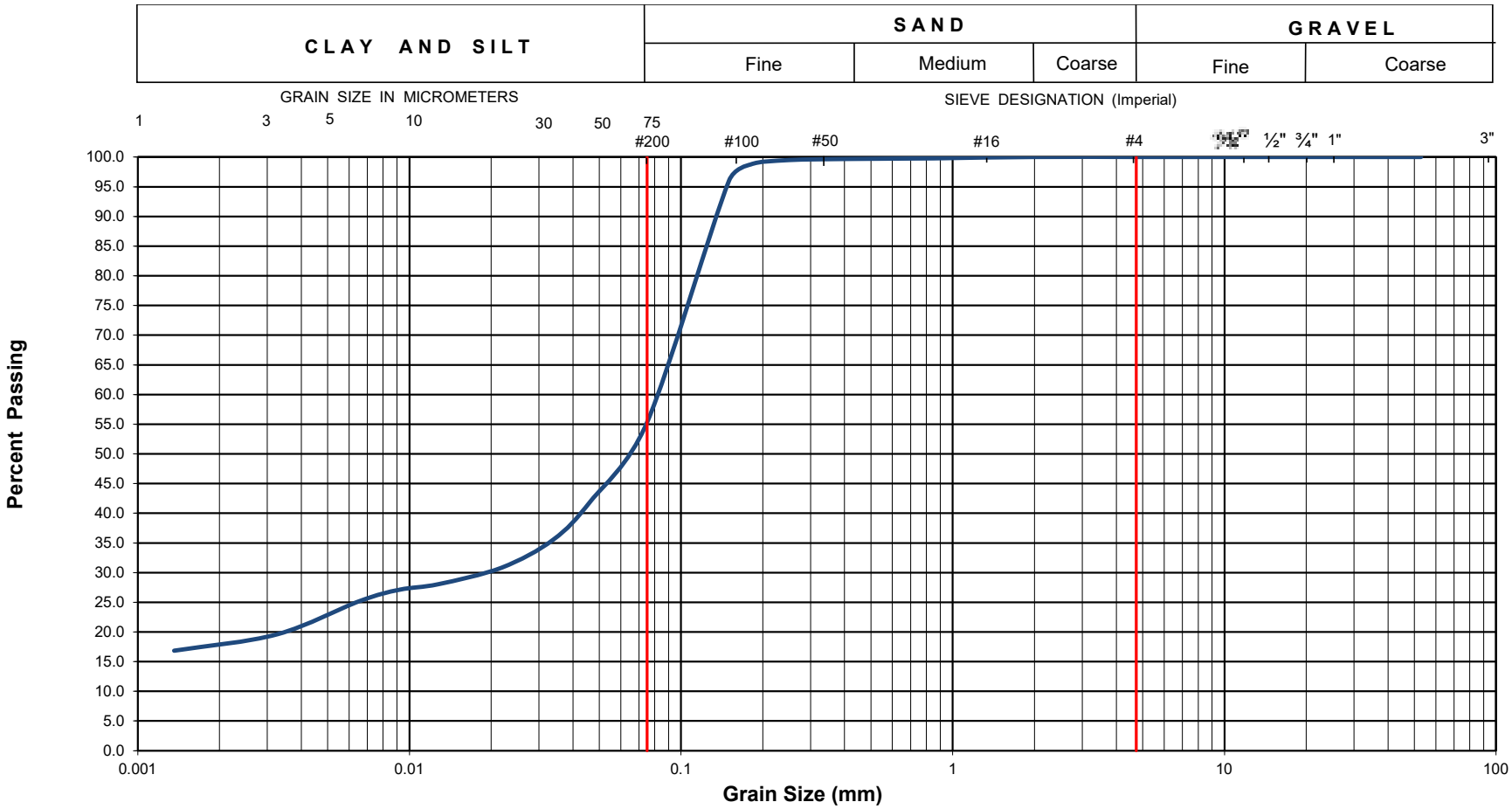

EXP Project No.:	**OTT-24010349-A0**	**Project Name :**	**Proposed New Riverside South Secondary School**						
Client :	**CECCE**	**Project Location :**	**675 Borbridge Avenue, Ottawa, Ontario**						
Date Sampled :	**December 4, 2024**	**Borehole No:**	**24-14**	**Sample No.:**	**SS3**	**Depth (m) :**	**1.5-2.1**		
Sample Description :		**% Silt and Clay**	**55**	**% Sand**	**45**	**% Gravel**	**0**	**Figure :**	**18**
Sample Description :		**Sandy Silt (ML) - Some Clay**							

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Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
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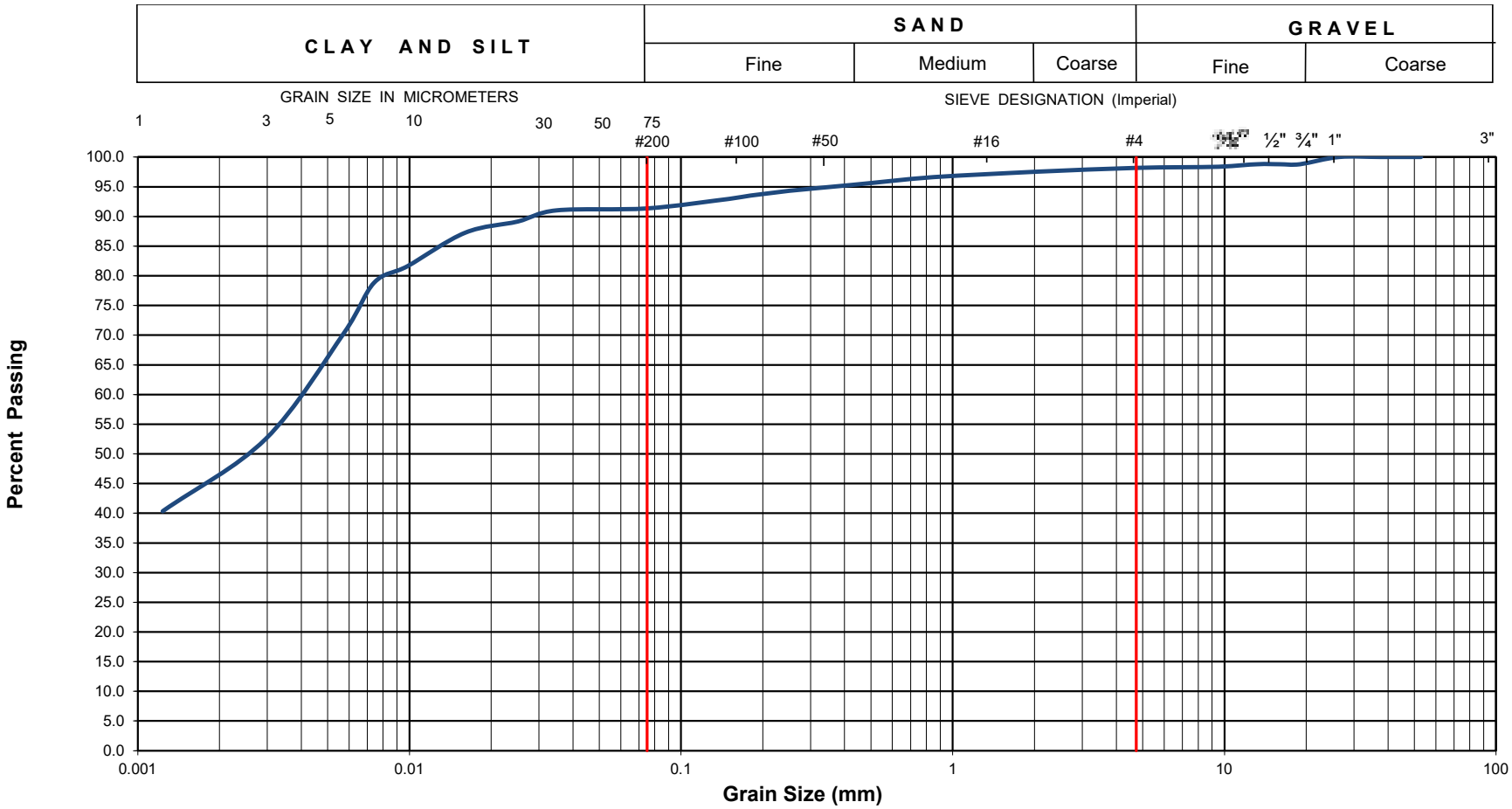

EXP Project No.:	**OTT-24010349-A0**	**Project Name :**	**Proposed New Riverside South Secondary School**						
Client :	**CECCE**	**Project Location :**	**675 Borbridge Avenue, Ottawa, Ontario**						
Date Sampled :	**December 6, 2024**	**Borehole No:**	**24-1**		**Sample No.:**	**SS6**		**Depth (m) :**	**3.8 - 4.4**
Sample Description :		**% Silt and Clay**	**91**	**% Sand**	**7**	**% Gravel**	**2**	**Figure :**	**19**
Sample Description :		**Silty Clay of Medium Plasticity (CI) - Trace Sand, Trace Gravel**							

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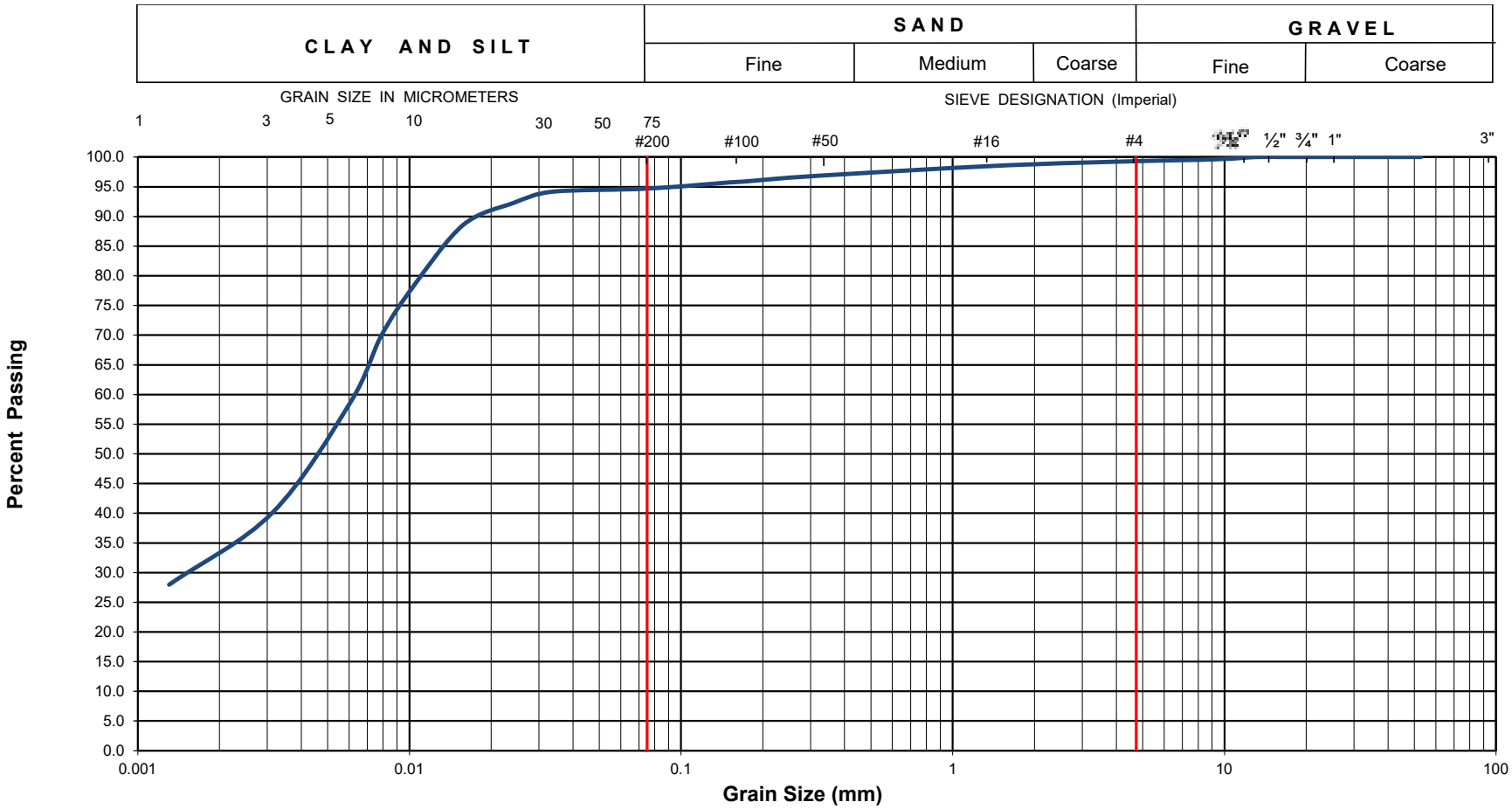
Ottawa, ON K2B 8H6

Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422

Unified Soil Classification System



EXP Project No.:	**OTT-24010349-A0**	**Project Name :**	**Proposed New Riverside South Secondary School**						
Client :	**CECCE**	**Project Location :**	**675 Borbridge Avenue, Ottawa, Ontario**						
Date Sampled :	**December 3, 2024**	**Borehole No:**	**24-3**	**Sample No.:**	**SS5**	**Depth (m) :**	**3.8-4.4**		
Sample Description :		**% Silt and Clay**	**94**	**% Sand**	**5**	**% Gravel**	**1**	**Figure :**	**20**
Sample Description :		**Silty Clay of Medium Plasticity (CI) - Trace Sand, Trace Gravel**							

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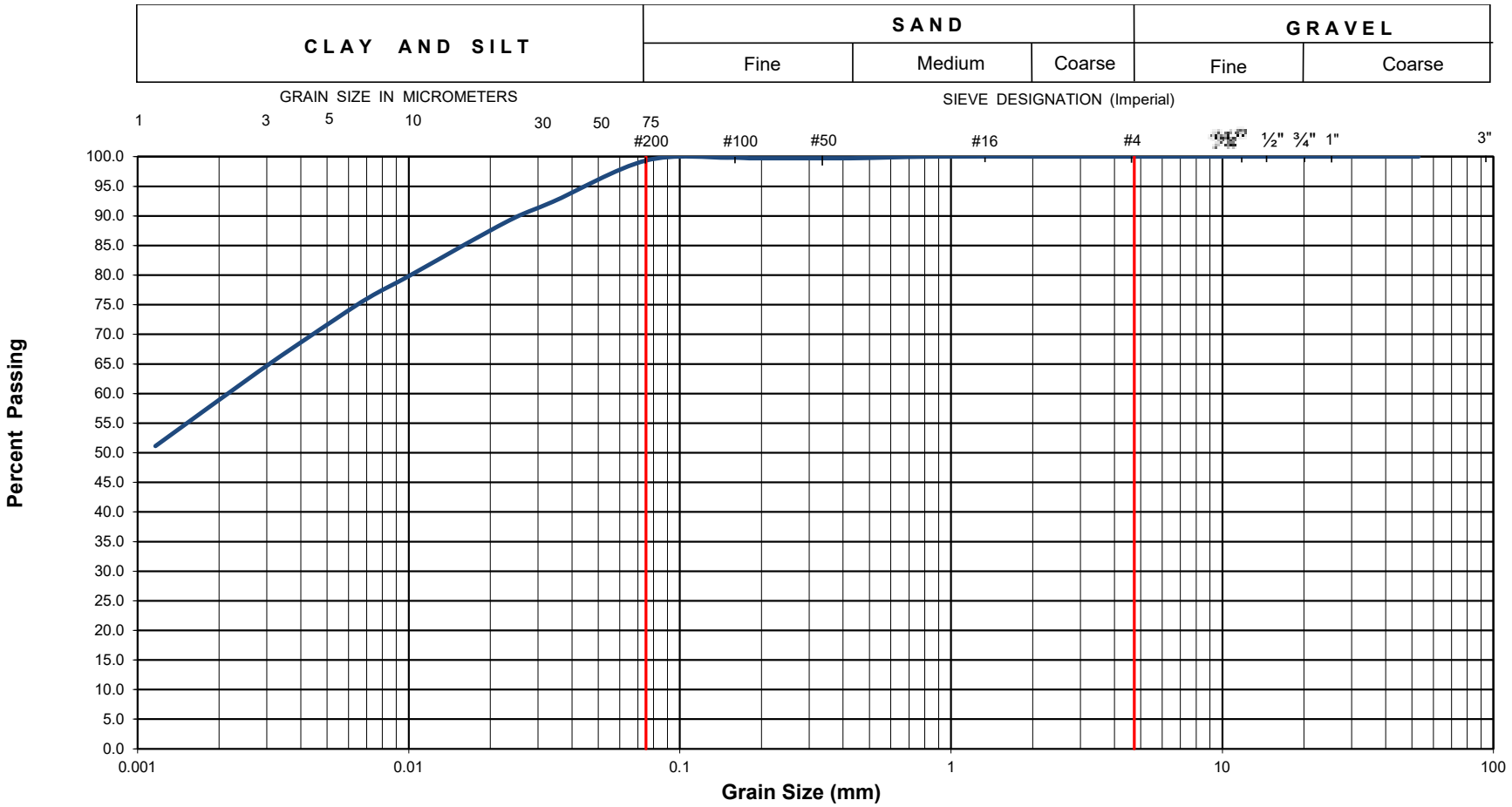
Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422

Unified Soil Classification System



EXP Project No.:	**OTT-24010349-A0**	**Project Name :**	**Proposed New Riverside South Secondary School**						
Client :	**CECCE**	**Project Location :**	**675 Borbridge Avenue, Ottawa, Ontario**						
Date Sampled :	**December 4, 2024**	**Borehole No:**	**24-15**		**Sample No.:**	**SS4**		**Depth (m) :**	**3.0-3.6**
Sample Description :		**% Silt and Clay**	**99**	**% Sand**	**1**	**% Gravel**	**0**	**Figure :**	**21**
Sample Description :		**Silty Clay of High Plasticity (CH) - Trace Sand**							

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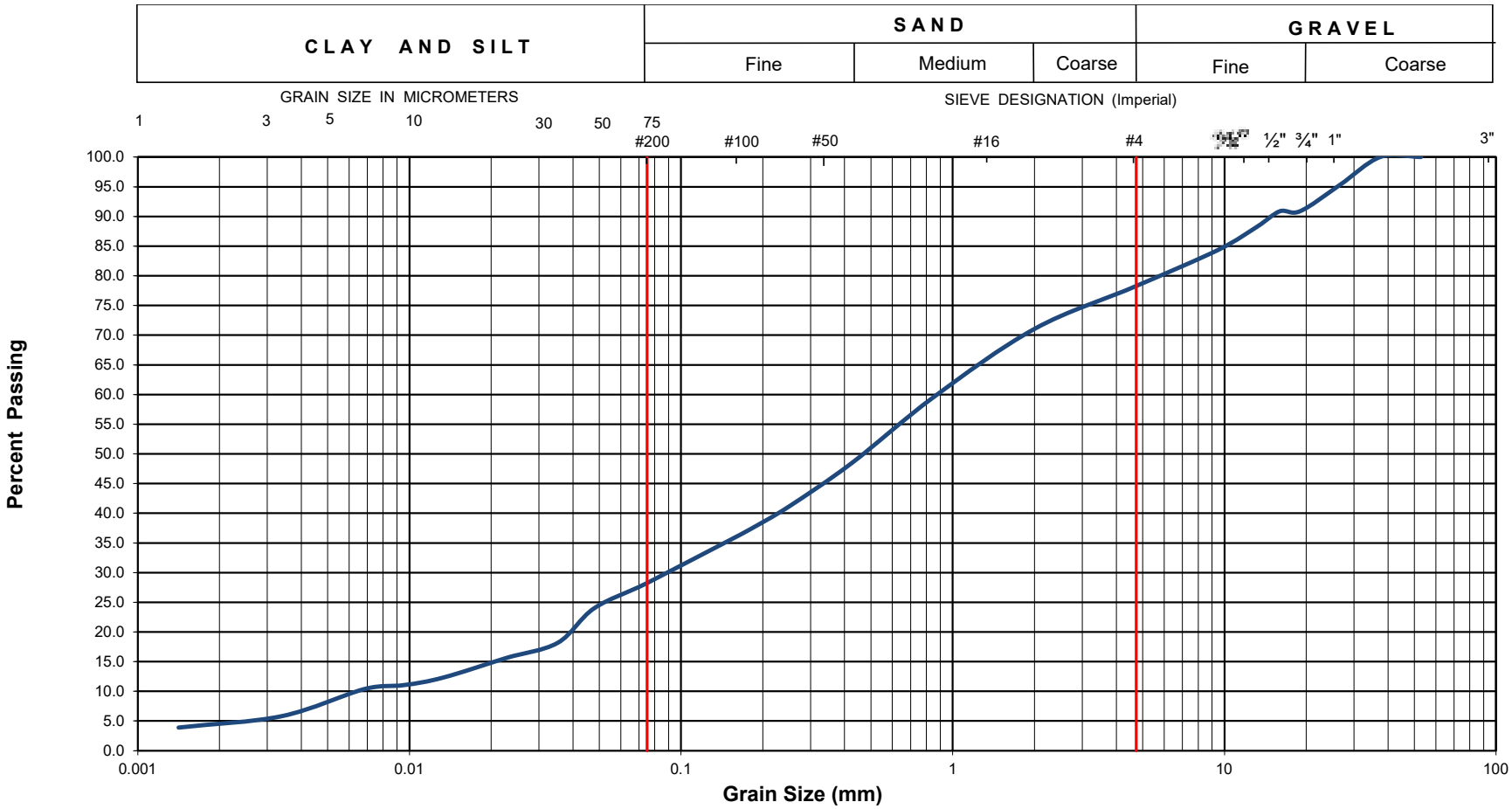
Ottawa, ON K2B 8H6

Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422

Unified Soil Classification System



EXP Project No.:	**OTT-24010349-A0**	**Project Name :**	**Proposed New Riverside South Secondary School**						
Client :	**CECCE**	**Project Location :**	**675 Borbridge Avenue, Ottawa, Ontario**						
Date Sampled :	**December 3, 2024**	**Borehole No:**	**24-2**		**Sample No.:**	**SS6**		**Depth (m) :**	**4.6-5.1**
Sample Description :		**% Silt and Clay**	**28**	**% Sand**	**50**	**% Gravel**	**22**	**Figure :**	**22**
Sample Description :		**Glacial Till - Gravelly Silty Sand (SM) - Trace Clay**							

Appendix A – Seismic Shear Wave Velocity Sounding Survey Report by GPR

GEOPHYSICS GPR INTERNATIONAL INC.

January 15th, 2025

Transmitted by email : daniel.wall@exp.com
c.c. : ismail.taki@exp.com

Our ref : GPR24-05886-d

Mr. Daniel Wall, P.Eng.
Intermediate Geotechnical Engineer
exp Services inc.
100 - 2650 Queensview Drive
Ottawa ON K2B 8H6

Subject: **Shear Wave Velocity Sounding for the Site Class Determination**
906 Brian Good Avenue, Ottawa (ON)

[Project: OTT-23012778-I0]

Dear Mr. Wall,

Geophysics GPR International inc. has been mandated by **exp** Services inc. to carry out seismic surveys at 960 Brian Good Avenue, Riverside South, in Ottawa (ON). The geophysical investigation used the Multi-channel Analysis of Surface Waves (MASW) with the Spatial AutoCorrelation (SPAC), and the seismic refraction and reflection methods. From the subsequent results, the seismic shear wave velocity values were calculated for the soils and the rock, to determine the Site Class.

The surveys were conducted on December 5th, 2024, by Mrs. Karyne Faguy, B.Sc. geophysics and Mr. Félix Bergeron, EIT (QC). Figure 1 shows the regional location of the site and Figure 2 illustrates the location of the seismic spread. Both figures are presented in the Appendix.

The following paragraphs briefly describe the survey design, the principles of the testing methods, and the results presented in table and graph.

MASW Principle

The *Multi-channel Analysis of Surface Waves* (MASW) and the *SPatial AutoCorrelation* (SPAC or MAM for *Microtremors Array Method*) are seismic methods used to evaluate the shear wave velocities of subsurface materials through the analysis of the dispersion properties of the Rayleigh surface wave. The MASW is considered an "active" method, as the seismic signal is induced at known location and time in the geophones' spread axis. Conversely, the SPAC is considered a "passive" method, using the low frequency "signals" produced far away. The method can also be used with "active" seismic source records. The SPAC method generally allows deeper V_S soundings. Its dispersion curve can then be merged with the one of higher frequency from the MASW to calculate a more complete inversion. The dispersion properties are expressed as a change of velocities with respect to frequencies. Surface wave energy will decay exponentially with depth. Lower frequency surface waves will travel deeper and thus be more influenced by deeper velocity layering than the shallow higher frequency waves. The inversion of the Rayleigh wave dispersion curve yields a shear wave (V_S) velocity depth profile (sounding).

Figure 3 schematically outlines the basic operating procedure for the MASW method. Figure 4 illustrates an example of one of the MASW/SPAC records, a corresponding spectrogram analysis and resulting 1D V_S model.

INTERPRETATION

The main processing sequence involved data inspection and edition when required; spectral analysis (from MASW and SPAC); picking the fundamental mode; and 1D inversion of the MASW and SPAC shot records using the SeisImagerSW™ software. The data inversions used a nonlinear least squares algorithm.

In theory, all the shot records for a given seismic spread should produce a similar shear-wave velocity profile. In practice, however, differences can arise due to energy dissipation, local surface seismic velocities variations, and/or dipping of overburden layers or rock. In general, the precision of the calculated seismic shear wave velocities (V_S) is around 15% or better.

More detailed descriptions of these methods are presented in *Shear Wave Velocity Measurement Guidelines for Canadian Seismic Site Characterization in Soil and Rock*, Hunter, J.A., Crow, H.L., et al., Geological Surveys of Canada, General Information Product 110, 2015.

SURVEY DESIGN

The seismic spreads were laid out north-west of the intersection of Brian Good Ave and Atrium Ridge (Figure 2). The geophone spacing was 3.0 metres for the main spread, using 24 geophones. A shorter seismic spread, with geophone spacing of 1.0 metre, was dedicated to the near surface materials. The seismic records were produced with a seismograph Terraloc PRO2 (from ABEM Instrument), and the geophones were 4.5 Hz.

The seismic records counted 4096 data, sampled at 1000 µs for the MASW surveys, and at 50 µs for the seismic refraction. The records included a pre-trigged portion of 10 ms. A 5 kg sledgehammer was used as the energy source, with impacts being recorded off both ends of the seismic spreads. A stacking procedure was also used to improve the Signal / Noise ratio for the seismic records.

The shear wave depth sounding can be considered as the average of the bulk area within the geophone spread, especially for its central half-length.

RESULTS

From seismic reflection (NMO) a reflector associated to the rock was calculated between 33.5 and 37 metres deep. This parameter was used for the initial geophysical models, prior to the modelling and inversion of the MASW results.

The MASW calculated V_S results are illustrated at Figure 5.

The $\overline{V}_{S30}$ value results from the harmonic mean of the shear wave velocities, from the surface to 30 metres deep. It is calculated by dividing the total depth of interest (30 metres) by the sum of the time spent in each velocity layer from the surface down to 30 metres, as:

$$\bar{V}_{S30} = \frac{\sum_{i=1}^{N} H_i}{\sum_{i=1}^{N} {H_i}/{V_i}} \quad | \quad \sum_{i=1}^{N} H_i = 30 \text{ m}$$

(N: number of layers; H_i : thickness of layer "*i*" ; V_i : V_S of layer "*i*")

Thus, the $\overline{V}_{S30}$ value represents the seismic shear wave velocity of an equivalent homogeneous single layer response, between the surface and 30 metres deep.

The calculated $\overline{V}_{S30}$ value of the actual site is 478.9 m/s (Table 1), corresponding to the Site Class "C".

CONCLUSION

Geophysical surveys were carried out to identify the Site Class at 960 Brian Good Avenue, Riverside South, in Ottawa (ON). The seismic surveys used the MASW and the SPAC analysis to calculate the $\overline{V}_{S30}$ value. Its calculation is presented at Table 1.

The $\overline{V}_{S30}$ value of the actual site is 479 m/s, corresponding to the Site Class "C" ($360 < \overline{V}_{S30} \leq 760$ m/s), as determined through the MASW and SPAC methods, Table 4.1.8.4.-A of the NBC (2015), and the Building Code, O. Reg. 332/12.

It must be noted that other geotechnical information gleaned on site; including the presence of liquefiable soils, very soft clays, high moisture content etc. (cf. Table 4.1.8.4.-A of the NBC 2015) can supersede the Site classification provided in this report based on the $\overline{V}_{S30}$ value.

The V_S values calculated are representative of the in situ materials and are not corrected for the total and effective stresses.

Hoping the whole to your satisfaction, we remain yours truly,

Jean-Luc Arsenault, M.A.Sc., P.Eng.
Senior Project Manager

LICENSED PROFESSIONAL ENGINEER
J.-L. ARSENAULT
100148122
PROVINCE OF ONTARIO
2025-01-15

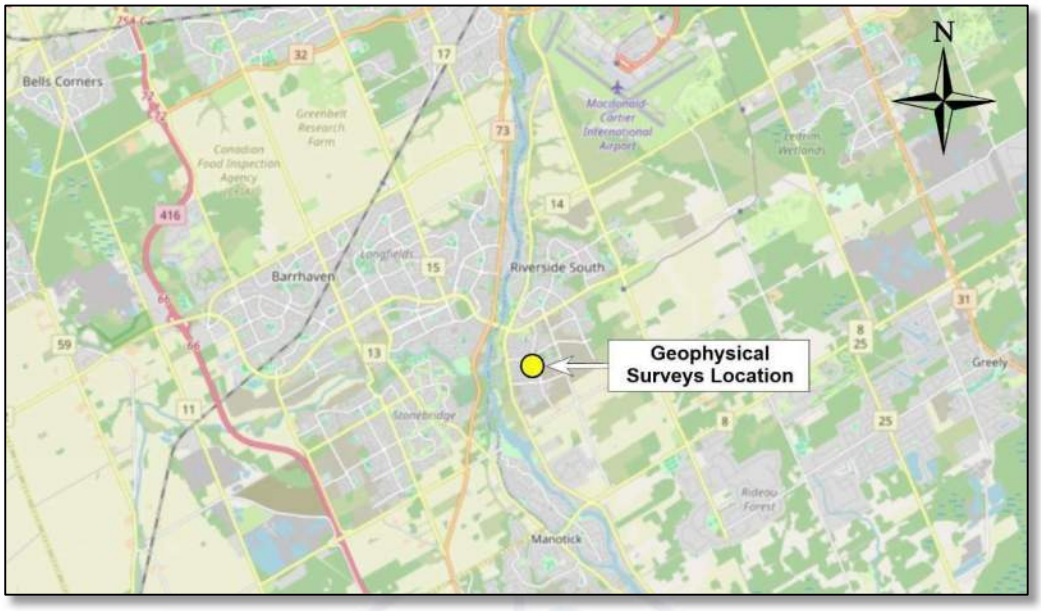


Figure 1: Regional location of the Site
(Source : OpenStreetMap©)

Figure 2: Location of the seismic spread
(source: *Google Earth™*)

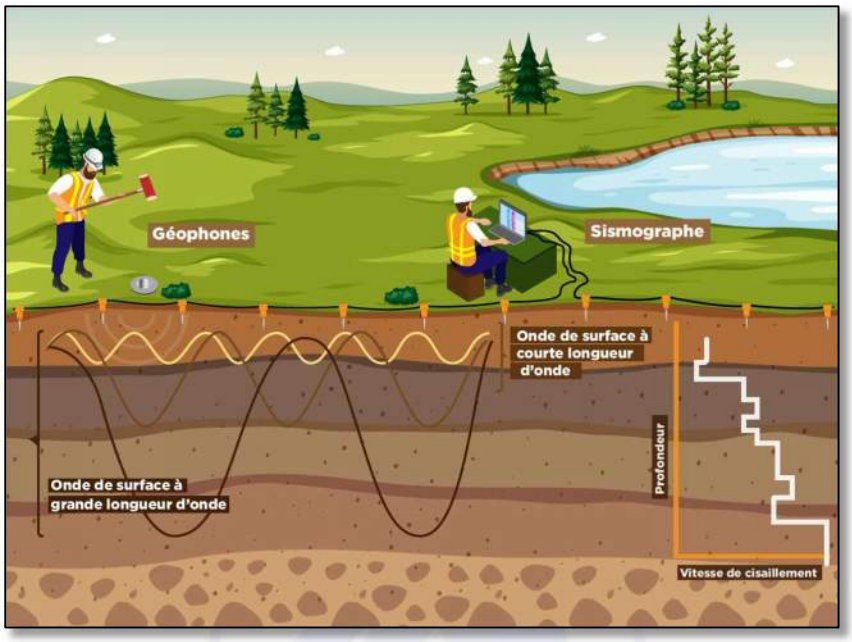


Figure 3: MASW Operating Principle

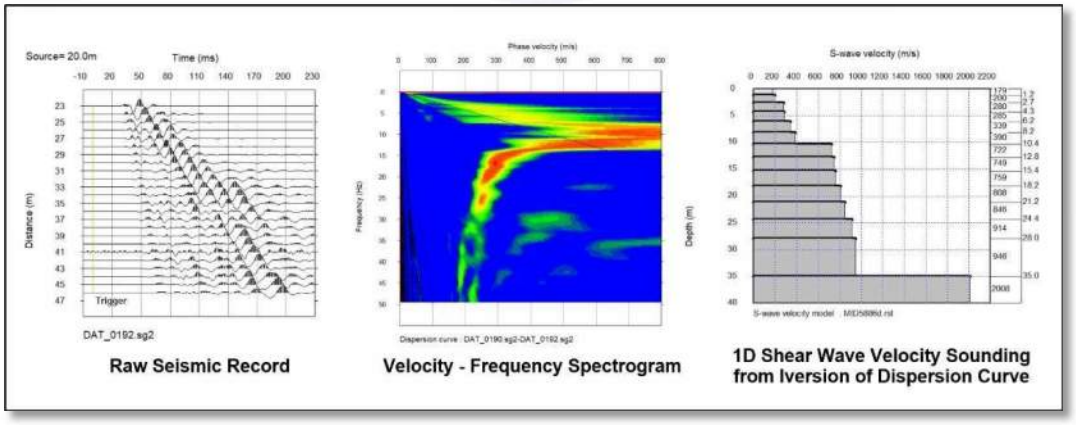


Figure 4: Example of a MASW/SPAC record, Phase Velocity - Frequency curve of the Rayleigh wave and resulting 1D Shear Wave Velocity Model

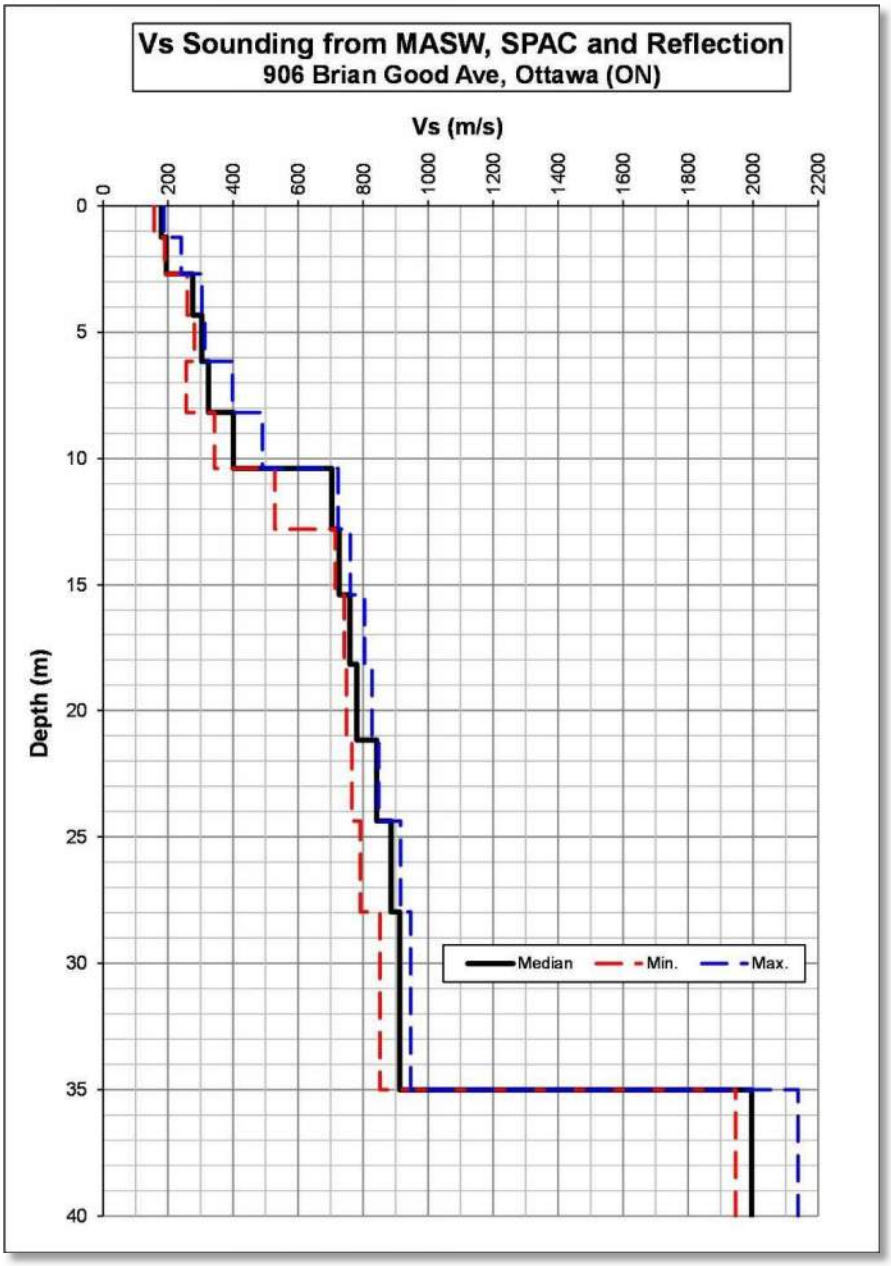


Figure 5: MASW Shear-Wave Velocity Sounding

TABLE 1

$\bar{V}_{S30}$ Calculation for the Site Class (actual site)

Depth	Vs			Thickness	Cumulative Thickness	Delay for med. Vs	Cumulative Delay	Vs at given Depth
	Min.	Median	Max.					
(m)	(m/s)	(m/s)	(m/s)	(m)	(m)	(s)	(s)	(m/s)
0	157.8	179.3	187.2	**Grade Level (December 5th, 2024)**				
1.25	189.4	194.5	240.7	1.25	1.25	0.006973	0.006973	179.3
2.69	259.1	275.7	303.9	1.44	2.69	0.007415	0.014388	187.1
4.33	281.3	303.7	313.4	1.63	4.33	0.005929	0.020317	213.0
6.15	256.0	324.7	398.1	1.83	6.15	0.006016	0.026333	233.7
8.17	343.1	401.2	490.0	2.02	8.17	0.006218	0.032551	251.1
10.38	528.5	703.7	723.0	2.21	10.38	0.005513	0.038064	272.8
12.79	714.6	726.4	760.6	2.40	12.79	0.003416	0.041480	308.3
15.38	742.3	759.6	804.5	2.60	15.38	0.003574	0.045054	341.5
18.17	749.0	780.9	827.4	2.79	18.17	0.003671	0.048725	373.0
21.17	765.4	842.3	848.3	3.00	21.17	0.003842	0.052566	402.8
24.37	791.6	886.2	915.0	3.20	24.37	0.003799	0.056366	432.4
27.97	852.1	912.2	946.8	3.60	27.97	0.004062	0.060428	462.9
30				2.03	30.00	0.002222	0.062650	478.9

V_{S30} (m/s)	**478.9**
Class	**C**

Appendix B – Consolidation Test Results

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

January 17, 2025
File: 121624678

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

Dear Mr. Taki,

Reference: Consolidation Test Results: Proposed OCDSB Riverside South Elementary School, 675 Borbridge, Ottawa, ON. Exp Services Inc., File # OTT-24010349-A0

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

Summary of samples tested.

Sample ID	Depth (ft)	Date sampled
BH 24-12, ST1	12.5-14.5	December 6, 2024

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

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

Regards,

Stantec Consulting Ltd.

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

v:\01216\active\laboratory_standing_offers\2024 laboratory standing offers\121625890 exp services inc\1 consol, exp # ott-24010349-a0\121624678_let_consolidation_bh24-12, st1_revised.docx

CONSOLIDATION TEST SUMMARY

SAMPLE IDENTIFICATION

Borehole No. :	BH24-12	Sample No. :	ST1
		Sample Depth (ft) :	12.5-14.5

TEST CONDITIONS

Test Type :	ASTM D2435/D2435M	Date Started :	24-Dec-24
Load Duration (hr) :	24	Date Completed :	9-Jan-25

SAMPLE DIMENSIONS AND PROPERTIES _ INITIAL

Sample Height (mm) :	20.50	Unit Weight (kN/m^3) :	15.89
Sample Diameter (mm) :	50.00	Dry Unit Weight (kN/m^3) :	9.78
Area (cm^2) :	19.63	Specific Gravity : (Assumed)	2.75
Volume (cm^3) :	40.25	Solid Height (mm) :	7.44
Water Content (%) :	62.47	Volume of Solids (cm^3) :	14.60
Wet Mass (g) :	65.23	Volume of Voids (cm^3) :	25.65
Dry Mass (g) :	40.15	Degree of Saturation (%) :	97.77

TEST COMPUTATIONS

Axial Stress (kPa)	Height (H) (mm)	Corrected Deformation (ΔH) (mm)	Axial Strain (ε_a) (%)	Void Ratio e	t_{90} (sec)	C_v (cm^2/s)	m_v (m^2/kN)	k (m/s)
0	20.5000	0.0000	0.00	1.757				
5	20.2906	0.2094	1.02	1.729	280.66	3.14E-03	2.04E-03	6.29E-09
10	20.1425	0.3575	1.74	1.709	210.90	4.11E-03	1.44E-03	5.83E-09
20	19.7985	0.7015	3.42	1.663	445.04	1.91E-03	1.68E-03	3.14E-09
40	19.3321	1.1679	5.70	1.600	446.42	1.83E-03	1.14E-03	2.04E-09
80	18.7516	1.7484	8.53	1.522	382.91	2.02E-03	7.08E-04	1.40E-09
160	17.2892	3.2108	15.66	1.325	973.52	7.21E-04	8.92E-04	6.31E-10
320	15.6111	4.8889	23.85	1.099	665.45	8.88E-04	5.12E-04	4.46E-10
480	14.7798	5.7202	27.90	0.988	1733.87	2.85E-04	2.53E-04	7.09E-11
160	14.8427	5.6573	27.60	0.996				
40	15.0683	5.4317	26.50	1.026				
160	14.9356	5.5644	27.14	1.009	125.84	3.79E-03	5.39E-05	2.01E-10
480	14.5697	5.9303	28.93	0.959	132.08	3.50E-03	5.58E-05	1.92E-10
720	14.0359	6.4641	31.53	0.888	492.72	8.94E-04	1.08E-04	9.52E-11
960	13.5449	6.9551	33.93	0.822	1994.30	2.04E-04	9.98E-05	2.00E-11
1920	12.5916	7.9084	38.58	0.693	263.84	1.39E-03	4.84E-05	6.60E-11

SAMPLE DIMENSIONS AND PROPERTIES _ FINAL

Sample Height (mm) :	12.59	Unit Weight (kN/m^3) :	20.73
Sample Diameter (mm) :	50.00	Dry Unit Weight (kN/m^3) :	15.93
Area (cm^2) :	19.63	Specific Gravity (Assumed) :	2.75
Volume (cm^3) :	24.72	Solid Height (mm) :	7.44
Water Content (%) :	30.16	Volume of Solids (cm^3) :	14.60
Wet Mass (g) :	52.26	Volume of Voids (cm^3) :	10.12
Dry Mass (g) :	40.15		

Project No. :	121624678	Prepared By :	DB
Date :	17-Jan-25	Checked By :	RG

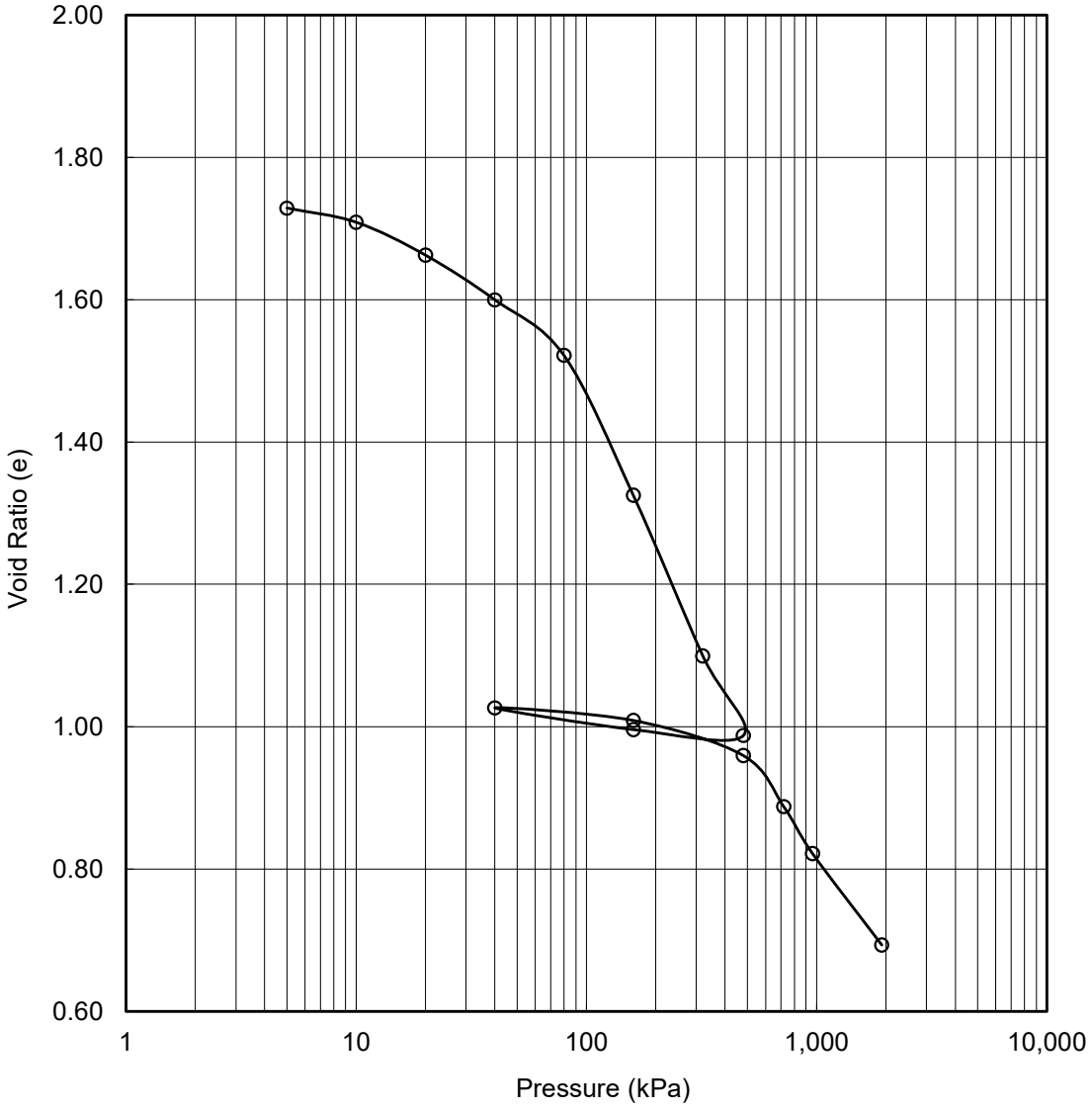
Stantec

CONSOLIDATION TEST	FIGURE 1

CECCE Riverside South Elementary School, Exp# OTT-24010349-A0

BH24-12, ST1

Void Ratio vs Pressure



Soil Type : *Silty clay, grey, very moist*

e_o =	1.757	w_L =	N/A	σ_{v0}' =	kPa
w =	62.5%	w_P =	N/A	σ_P' =	kPa
γ =	15.9 kN/m^3	PI =	N/A		
Gs =	2.75				

Project No. : 121624678
Date : 17-Jan-25

Stantec

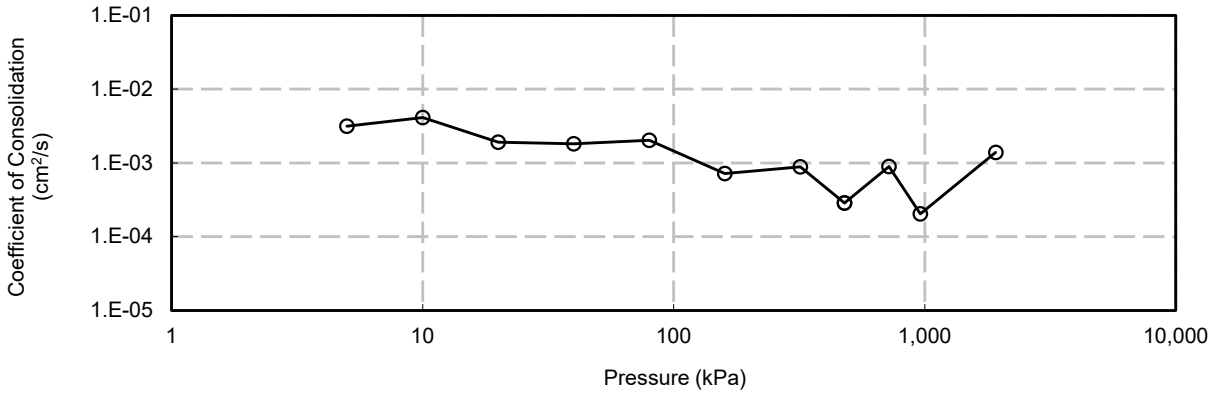
Prepared By : DB
Checked By : RG

CONSOLIDATION TEST	FIGURES 2, 3 & 4

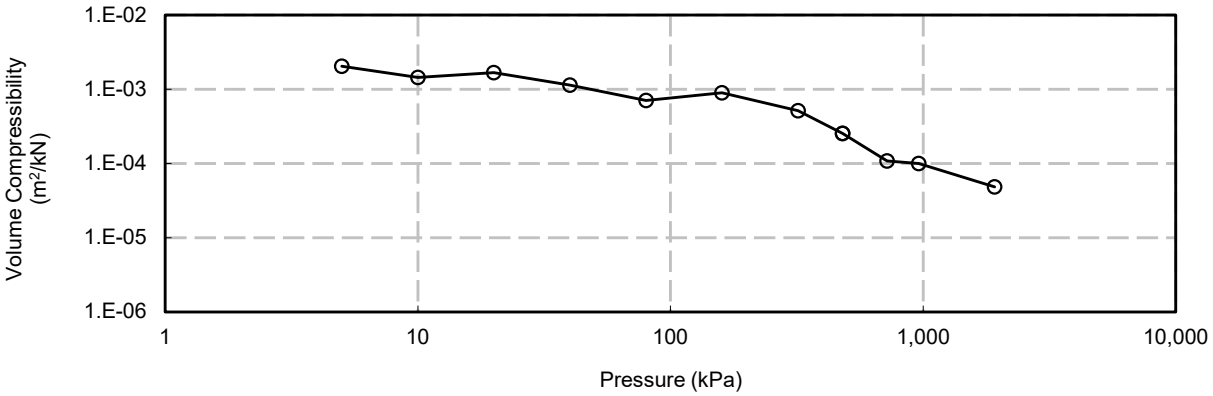
CECCE Riverside South Elementary School, Exp# OTT-24010349-A0

BH24-12, ST1

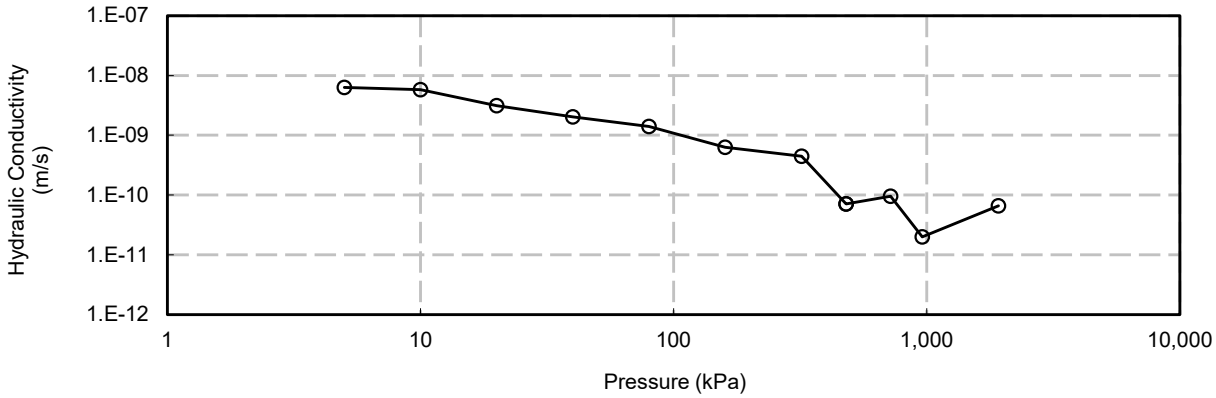
Cv vs Pressure



mv vs Pressure



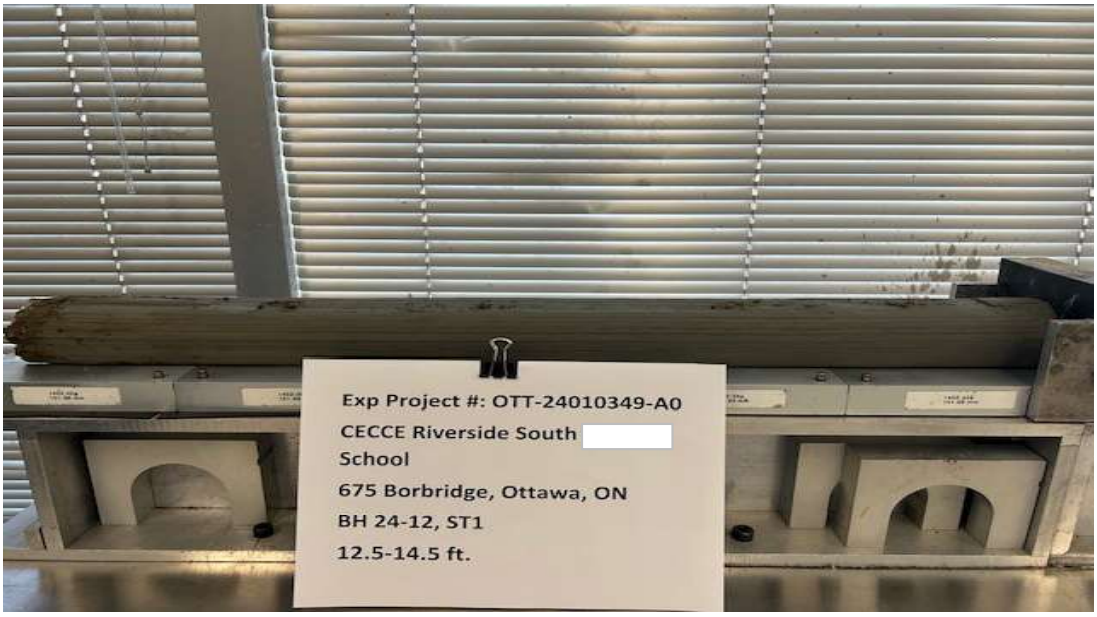
k vs Pressure



Project No. :	121624678	Prepared By :	DB
Date :	17-Jan-25	Checked By :	RG

CECCE Riverside South Elementary School, Exp# OTT-24010349-A0

Silty clay, grey, very moist



BH24-12, ST1

BH24-12, ST1

Appendix C – Environmental Laboratory Certificates of Analysis

Your Project #: OTT-24010349-A0
Site Location: BARRHAVEN, 675 BORBRIDGE AVE.
Your C.O.C. #: N/A

Attention: Chris Kimmerly

exp Services Inc
Ottawa Branch
100-2650 Queensview Drive
Ottawa, ON
CANADA K2B 8H6

Report Date: 2024/12/13
Report #: R8445437
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4BB424
Received: 2024/12/09, 14:48

Sample Matrix: Soil
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hot Water Extractable Boron (1)	3	2024/12/12	2024/12/12	CAM SOP-00408	R153 Ana. Prot. 2011
Hot Water Extractable Boron (1)	1	2024/12/12	2024/12/13	CAM SOP-00408	R153 Ana. Prot. 2011
1,3-Dichloropropene Sum (1)	4	N/A	2024/12/12		EPA 8260C m
Free (WAD) Cyanide (1)	4	2024/12/12	2024/12/12	CAM SOP-00457	OMOE E3015 m
Conductivity (1)	4	2024/12/12	2024/12/12	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1, 2)	4	2024/12/12	2024/12/12	CAM SOP-00436	EPA 3060A/7199 m
Petroleum Hydrocarbons F2-F4 in Soil (1, 3)	1	2024/12/12	2024/12/12	CAM SOP-00316	CCME CWS m
Petroleum Hydrocarbons F2-F4 in Soil (1, 3)	3	2024/12/12	2024/12/13	CAM SOP-00316	CCME CWS m
Acid Extractable Metals by ICPMS (1)	4	2024/12/12	2024/12/12	CAM SOP-00447	EPA 6020B m
Moisture (1)	4	N/A	2024/12/11	CAM SOP-00445	Carter 2nd ed 70.2 m
pH CaCl2 EXTRACT (1)	4	2024/12/12	2024/12/12	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR) (1)	4	N/A	2024/12/12	CAM SOP-00102	EPA 6010C
Volatile Organic Compounds and F1 PHCs (1)	4	N/A	2024/12/12	CAM SOP-00230	EPA 8260C m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Your Project #: OTT-24010349-A0
Site Location: BARRHAVEN, 675 BORBRIDGE AVE.
Your C.O.C. #: N/A

Attention: Chris Kimmerly

exp Services Inc
Ottawa Branch
100-2650 Queensview Drive
Ottawa, ON
CANADA K2B 8H6

Report Date: 2024/12/13
Report #: R8445437
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C4BB424

Received: 2024/12/09, 14:48

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Bureau Veritas Mississauga, 6740 Campobello Rd , Mississauga, ON, L5N 2L8

(2) Soils are reported on a dry weight basis unless otherwise specified.

(3) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Katherine Szozda, Project Manager
Email: Katherine.Szozda@bureauveritas.com
Phone# (613)274-0573 Ext:7063633

==========

This report has been generated and distributed using a secure automated process.
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID		ALGO15			ALGO15			ALGO16		
Sampling Date		2024/12/06 13:00			2024/12/06 13:00			2024/12/04 09:00		
COC Number		N/A			N/A			N/A		
	UNITS	**BH 24-01 , SS5**	**RDL**	**QC Batch**	**BH 24-01 , SS5 Lab-Dup**	**RDL**	**QC Batch**	**BH24-04,SS3**	**RDL**	**QC Batch**
Calculated Parameters										
Sodium Adsorption Ratio	N/A	0.27 (1)		9820300				0.38 (1)		9820300
Inorganics										
Conductivity	mS/cm	0.16	0.002	9822989				0.085	0.002	9822989
Available (CaCl2) pH	pH	7.66		9823309				7.13		9823309
WAD Cyanide (Free)	ug/g	<0.01	0.01	9822211				<0.01	0.01	9822211
Chromium (VI)	ug/g	<0.18	0.18	9822456				0.24	0.18	9822456
Metals										
Hot Water Ext. Boron (B)	ug/g	<0.050	0.050	9822615				<0.050	0.050	9822615
Acid Extractable Antimony (Sb)	ug/g	<0.20	0.20	9822953	<0.20	0.20	9822953	<0.20	0.20	9822630
Acid Extractable Arsenic (As)	ug/g	<1.0	1.0	9822953	<1.0	1.0	9822953	2.1	1.0	9822630
Acid Extractable Barium (Ba)	ug/g	200	0.50	9822953	190	0.50	9822953	130	0.50	9822630
Acid Extractable Beryllium (Be)	ug/g	0.56	0.20	9822953	0.52	0.20	9822953	0.46	0.20	9822630
Acid Extractable Boron (B)	ug/g	<5.0	5.0	9822953	<5.0	5.0	9822953	<5.0	5.0	9822630
Acid Extractable Cadmium (Cd)	ug/g	<0.10	0.10	9822953	<0.10	0.10	9822953	<0.10	0.10	9822630
Acid Extractable Chromium (Cr)	ug/g	42	1.0	9822953	40	1.0	9822953	28	1.0	9822630
Acid Extractable Cobalt (Co)	ug/g	11	0.10	9822953	11	0.10	9822953	8.3	0.10	9822630
Acid Extractable Copper (Cu)	ug/g	26	0.50	9822953	24	0.50	9822953	18	0.50	9822630
Acid Extractable Lead (Pb)	ug/g	5.1	1.0	9822953	5.0	1.0	9822953	4.7	1.0	9822630
Acid Extractable Molybdenum (Mo)	ug/g	0.61	0.50	9822953	0.66	0.50	9822953	<0.50	0.50	9822630
Acid Extractable Nickel (Ni)	ug/g	24	0.50	9822953	23	0.50	9822953	17	0.50	9822630
Acid Extractable Selenium (Se)	ug/g	<0.50	0.50	9822953	<0.50	0.50	9822953	<0.50	0.50	9822630
Acid Extractable Silver (Ag)	ug/g	<0.20	0.20	9822953	<0.20	0.20	9822953	<0.20	0.20	9822630
Acid Extractable Thallium (Tl)	ug/g	0.24	0.050	9822953	0.24	0.050	9822953	0.15	0.050	9822630
Acid Extractable Uranium (U)	ug/g	0.67	0.050	9822953	0.66	0.050	9822953	0.54	0.050	9822630
Acid Extractable Vanadium (V)	ug/g	67	5.0	9822953	63	5.0	9822953	42	5.0	9822630
Acid Extractable Zinc (Zn)	ug/g	68	5.0	9822953	67	5.0	9822953	46	5.0	9822630
Acid Extractable Mercury (Hg)	ug/g	<0.050	0.050	9822953	<0.050	0.050	9822953	<0.050	0.050	9822630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
(1) Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

O.REG 153 METALS & INORGANICS PKG (SOIL)

Bureau Veritas ID		ALGO17		ALGO18		
Sampling Date		2024/12/04 13:30		2024/12/04		
COC Number		N/A		N/A		
	UNITS	**BH24-14,SS4**	**QC Batch**	**DUP**	**RDL**	**QC Batch**
Calculated Parameters						
Sodium Adsorption Ratio	N/A	0.25	9820300	0.25		9820300
Inorganics						
Conductivity	mS/cm	0.22	9822989	0.23	0.002	9822989
Available (CaCl2) pH	pH	7.63	9823309	7.64		9822993
WAD Cyanide (Free)	ug/g	<0.01	9822210	<0.01	0.01	9822210
Chromium (VI)	ug/g	<0.36	9822456	<0.36	0.36	9822456
Metals						
Hot Water Ext. Boron (B)	ug/g	<0.050	9822615	<0.050	0.050	9822600
Acid Extractable Antimony (Sb)	ug/g	<0.20	9822630	<0.20	0.20	9822630
Acid Extractable Arsenic (As)	ug/g	1.0	9822630	<1.0	1.0	9822630
Acid Extractable Barium (Ba)	ug/g	390	9822630	340	0.50	9822630
Acid Extractable Beryllium (Be)	ug/g	0.77	9822630	0.71	0.20	9822630
Acid Extractable Boron (B)	ug/g	<5.0	9822630	<5.0	5.0	9822630
Acid Extractable Cadmium (Cd)	ug/g	<0.10	9822630	<0.10	0.10	9822630
Acid Extractable Chromium (Cr)	ug/g	89	9822630	89	1.0	9822630
Acid Extractable Cobalt (Co)	ug/g	21	9822630	21	0.10	9822630
Acid Extractable Copper (Cu)	ug/g	40	9822630	38	0.50	9822630
Acid Extractable Lead (Pb)	ug/g	6.1	9822630	5.8	1.0	9822630
Acid Extractable Molybdenum (Mo)	ug/g	0.66	9822630	0.59	0.50	9822630
Acid Extractable Nickel (Ni)	ug/g	50	9822630	51	0.50	9822630
Acid Extractable Selenium (Se)	ug/g	<0.50	9822630	<0.50	0.50	9822630
Acid Extractable Silver (Ag)	ug/g	<0.20	9822630	<0.20	0.20	9822630
Acid Extractable Thallium (Tl)	ug/g	0.43	9822630	0.38	0.050	9822630
Acid Extractable Uranium (U)	ug/g	0.66	9822630	0.68	0.050	9822630
Acid Extractable Vanadium (V)	ug/g	100	9822630	98	5.0	9822630
Acid Extractable Zinc (Zn)	ug/g	130	9822630	120	5.0	9822630
Acid Extractable Mercury (Hg)	ug/g	<0.050	9822630	<0.050	0.050	9822630

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

Bureau Veritas ID		ALGO15	ALGO16		ALGO17		ALGO18		
Sampling Date		2024/12/06 13:00	2024/12/04 09:00		2024/12/04 13:30		2024/12/04		
COC Number		N/A	N/A		N/A		N/A		
	UNITS	**BH 24-01 , SS5**	**BH24-04,SS3**	**RDL**	**BH24-14,SS4**	**RDL**	**DUP**	**RDL**	**QC Batch**
Calculated Parameters									
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	0.050	<0.050	0.050	<0.050	0.050	9819530
Volatile Organics									
Acetone (2-Propanone)	ug/g	<0.49	<0.49	0.49	<0.49	0.49	<0.49	0.49	9820755
Benzene	ug/g	<0.0060	<0.0060	0.0060	<0.0060	0.0060	<0.0060	0.0060	9820755
Bromodichloromethane	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Bromoform	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Bromomethane	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Carbon Tetrachloride	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Chlorobenzene	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Chloroform	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Dibromochloromethane	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
1,2-Dichlorobenzene	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
1,3-Dichlorobenzene	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
1,4-Dichlorobenzene	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Dichlorodifluoromethane (FREON 12)	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
1,1-Dichloroethane	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
1,2-Dichloroethane	ug/g	<0.049	<0.049	0.049	<0.049	0.049	<0.049	0.049	9820755
1,1-Dichloroethylene	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
cis-1,2-Dichloroethylene	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
trans-1,2-Dichloroethylene	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
1,2-Dichloropropane	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	0.030	<0.030	0.030	<0.030	0.030	9820755
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Ethylbenzene	ug/g	<0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	9820755
Ethylene Dibromide	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Hexane	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Methylene Chloride(Dichloromethane)	ug/g	<0.049	<0.049	0.049	<0.049	0.049	<0.049	0.049	9820755
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.40	<0.40	0.40	<0.40	0.40	<0.40	0.40	9820755
Methyl Isobutyl Ketone	ug/g	<0.40	<0.40	0.40	<0.40	0.40	<0.40	0.40	9820755
Methyl t-butyl ether (MTBE)	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Styrene	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
1,1,1,2-Tetrachloroethane	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
1,1,2,2-Tetrachloroethane	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 VOCS BY HS & F1-F4 (SOIL)

Bureau Veritas ID		ALGO15	ALGO16		ALGO17		ALGO18		
Sampling Date		2024/12/06 13:00	2024/12/04 09:00		2024/12/04 13:30		2024/12/04		
COC Number		N/A	N/A		N/A		N/A		
	UNITS	**BH 24-01 , SS5**	**BH24-04,SS3**	**RDL**	**BH24-14,SS4**	**RDL**	**DUP**	**RDL**	**QC Batch**
Tetrachloroethylene	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Toluene	ug/g	<0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	9820755
1,1,1-Trichloroethane	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
1,1,2-Trichloroethane	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Trichloroethylene	ug/g	<0.010	<0.010	0.010	<0.010	0.010	<0.010	0.010	9820755
Trichlorofluoromethane (FREON 11)	ug/g	<0.040	<0.040	0.040	<0.040	0.040	<0.040	0.040	9820755
Vinyl Chloride	ug/g	<0.019	<0.019	0.019	<0.019	0.019	<0.019	0.019	9820755
p+m-Xylene	ug/g	<0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	9820755
o-Xylene	ug/g	<0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	9820755
Total Xylenes	ug/g	<0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	9820755
F1 (C6-C10)	ug/g	<10	<10	10	<10	10	<10	10	9820755
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	<10	10	<10	10	9820755
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	<7.0	<7.0	7.0	<14	14	7.1	7.0	9822204
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	50	<100	100	<50	50	9822204
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	50	<100	100	<50	50	9822204
Reached Baseline at C50	ug/g	Yes	Yes		Yes		Yes		9822204
Surrogate Recovery (%)									
o-Terphenyl	%	96	104		98		100		9822204
4-Bromofluorobenzene	%	94	96		95		95		9820755
D10-o-Xylene	%	86	88		83		81		9820755
D4-1,2-Dichloroethane	%	123	124		121		123		9820755
D8-Toluene	%	90	90		91		92		9820755

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Job #: C4BB424
Report Date: 2024/12/13

exp Services Inc
Client Project #: OTT-24010349-A0
Site Location: BARRHAVEN, 675 BORBRIDGE AVE.
Sampler Initials: MB

RESULTS OF ANALYSES OF SOIL

Bureau Veritas ID		ALGO15	ALGO16	ALGO17	ALGO18		
Sampling Date		2024/12/06 13:00	2024/12/04 09:00	2024/12/04 13:30	2024/12/04		
COC Number		N/A	N/A	N/A	N/A		
	UNITS	**BH 24-01 , SS5**	**BH24-04,SS3**	**BH24-14,SS4**	**DUP**	**RDL**	**QC Batch**
Inorganics							
Moisture	%	30	22	40	36	1.0	9821321

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

TEST SUMMARY

Bureau Veritas ID: ALGO15 **Collected:** 2024/12/06
Sample ID: BH 24-01 , SS5 **Shipped:**
Matrix: Soil **Received:** 2024/12/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	9822615	2024/12/12	2024/12/12	Aswathy Neduveli Suresh
1,3-Dichloropropene Sum	CALC	9819530	N/A	2024/12/12	Automated Statchk
Free (WAD) Cyanide	TECH	9822211	2024/12/12	2024/12/12	Prgya Panchal
Conductivity	AT	9822989	2024/12/12	2024/12/12	Gurparteek KAUR
Hexavalent Chromium in Soil by IC	IC/SPEC	9822456	2024/12/12	2024/12/12	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	9822204	2024/12/12	2024/12/12	(Kent) Maolin Li
Acid Extractable Metals by ICPMS	ICP/MS	9822953	2024/12/12	2024/12/12	Daniel Teclu
Moisture	BAL	9821321	N/A	2024/12/11	Muhammad Chhaidan
pH CaCl2 EXTRACT	AT	9823309	2024/12/12	2024/12/12	Kien Tran
Sodium Adsorption Ratio (SAR)	CALC/MET	9820300	N/A	2024/12/12	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	9820755	N/A	2024/12/12	Xueming Jiang

Bureau Veritas ID: ALGO15 Dup **Collected:** 2024/12/06
Sample ID: BH 24-01 , SS5 **Shipped:**
Matrix: Soil **Received:** 2024/12/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Acid Extractable Metals by ICPMS	ICP/MS	9822953	2024/12/12	2024/12/12	Daniel Teclu

Bureau Veritas ID: ALGO16 **Collected:** 2024/12/04
Sample ID: BH24-04,SS3 **Shipped:**
Matrix: Soil **Received:** 2024/12/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	9822615	2024/12/12	2024/12/12	Aswathy Neduveli Suresh
1,3-Dichloropropene Sum	CALC	9819530	N/A	2024/12/12	Automated Statchk
Free (WAD) Cyanide	TECH	9822211	2024/12/12	2024/12/12	Prgya Panchal
Conductivity	AT	9822989	2024/12/12	2024/12/12	Gurparteek KAUR
Hexavalent Chromium in Soil by IC	IC/SPEC	9822456	2024/12/12	2024/12/12	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	9822204	2024/12/12	2024/12/13	(Kent) Maolin Li
Acid Extractable Metals by ICPMS	ICP/MS	9822630	2024/12/12	2024/12/12	Daniel Teclu
Moisture	BAL	9821321	N/A	2024/12/11	Muhammad Chhaidan
pH CaCl2 EXTRACT	AT	9823309	2024/12/12	2024/12/12	Kien Tran
Sodium Adsorption Ratio (SAR)	CALC/MET	9820300	N/A	2024/12/12	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	9820755	N/A	2024/12/12	Xueming Jiang

Bureau Veritas ID: ALGO17 **Collected:** 2024/12/04
Sample ID: BH24-14,SS4 **Shipped:**
Matrix: Soil **Received:** 2024/12/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	9822615	2024/12/12	2024/12/12	Aswathy Neduveli Suresh
1,3-Dichloropropene Sum	CALC	9819530	N/A	2024/12/12	Automated Statchk
Free (WAD) Cyanide	TECH	9822210	2024/12/12	2024/12/12	Prgya Panchal
Conductivity	AT	9822989	2024/12/12	2024/12/12	Gurparteek KAUR

Bureau Veritas Job #: C4BB424
Report Date: 2024/12/13

exp Services Inc
Client Project #: OTT-24010349-A0
Site Location: BARRHAVEN, 675 BORBRIDGE AVE.
Sampler Initials: MB

TEST SUMMARY

Bureau Veritas ID: ALGO17
Sample ID: BH24-14,SS4
Matrix: Soil

Collected: 2024/12/04
Shipped:
Received: 2024/12/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hexavalent Chromium in Soil by IC	IC/SPEC	9822456	2024/12/12	2024/12/12	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	9822204	2024/12/12	2024/12/13	(Kent) Maolin Li
Acid Extractable Metals by ICPMS	ICP/MS	9822630	2024/12/12	2024/12/12	Daniel Teclu
Moisture	BAL	9821321	N/A	2024/12/11	Muhammad Chhaidan
pH CaCl2 EXTRACT	AT	9823309	2024/12/12	2024/12/12	Kien Tran
Sodium Adsorption Ratio (SAR)	CALC/MET	9820300	N/A	2024/12/12	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	9820755	N/A	2024/12/12	Xueming Jiang

Bureau Veritas ID: ALGO18
Sample ID: DUP
Matrix: Soil

Collected: 2024/12/04
Shipped:
Received: 2024/12/09

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	9822600	2024/12/12	2024/12/13	Aswathy Neduveli Suresh
1,3-Dichloropropene Sum	CALC	9819530	N/A	2024/12/12	Automated Statchk
Free (WAD) Cyanide	TECH	9822210	2024/12/12	2024/12/12	Prgya Panchal
Conductivity	AT	9822989	2024/12/12	2024/12/12	Gurparteek KAUR
Hexavalent Chromium in Soil by IC	IC/SPEC	9822456	2024/12/12	2024/12/12	Violeta Porcila
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	9822204	2024/12/12	2024/12/13	(Kent) Maolin Li
Acid Extractable Metals by ICPMS	ICP/MS	9822630	2024/12/12	2024/12/12	Daniel Teclu
Moisture	BAL	9821321	N/A	2024/12/11	Muhammad Chhaidan
pH CaCl2 EXTRACT	AT	9822993	2024/12/12	2024/12/12	Kien Tran
Sodium Adsorption Ratio (SAR)	CALC/MET	9820300	N/A	2024/12/12	Automated Statchk
Volatile Organic Compounds and F1 PHCs	GC/MSFD	9820755	N/A	2024/12/12	Xueming Jiang

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.0°C

Sample ALGO17 [BH24-14,SS4] : F2-F4 Analysis: Detection limits were adjusted for high moisture content.

Hexavalent Chromium: Detection Limits were raised due to high moisture content.

Sample ALGO18 [DUP] : Hexavalent Chromium: Detection Limits were raised due to high moisture content.

Results relate only to the items tested.

Bureau Veritas Job #: C4BB424
Report Date: 2024/12/13

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-24010349-A0
Site Location: BARRHAVEN, 675 BORBRIDGE AVE.
Sampler Initials: MB

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9820755	4-Bromofluorobenzene	2024/12/12	101	60 - 140	104	60 - 140	95	%		
9820755	D10-o-Xylene	2024/12/12	100	60 - 130	89	60 - 130	84	%		
9820755	D4-1,2-Dichloroethane	2024/12/12	112	60 - 140	120	60 - 140	124	%		
9820755	D8-Toluene	2024/12/12	101	60 - 140	105	60 - 140	90	%		
9822204	o-Terphenyl	2024/12/12	112	60 - 140	85	60 - 140	91	%		
9820755	1,1,1,2-Tetrachloroethane	2024/12/12	109	60 - 140	117	60 - 130	<0.040	ug/g	NC	50
9820755	1,1,1-Trichloroethane	2024/12/12	109	60 - 140	109	60 - 130	<0.040	ug/g	NC	50
9820755	1,1,2,2-Tetrachloroethane	2024/12/12	89	60 - 140	103	60 - 130	<0.040	ug/g	NC	50
9820755	1,1,2-Trichloroethane	2024/12/12	97	60 - 140	107	60 - 130	<0.040	ug/g	NC	50
9820755	1,1-Dichloroethane	2024/12/12	101	60 - 140	97	60 - 130	<0.040	ug/g	NC	50
9820755	1,1-Dichloroethylene	2024/12/12	103	60 - 140	101	60 - 130	<0.040	ug/g	NC	50
9820755	1,2-Dichlorobenzene	2024/12/12	95	60 - 140	94	60 - 130	<0.040	ug/g	NC	50
9820755	1,2-Dichloroethane	2024/12/12	109	60 - 140	115	60 - 130	<0.049	ug/g	NC	50
9820755	1,2-Dichloropropane	2024/12/12	99	60 - 140	100	60 - 130	<0.040	ug/g	NC	50
9820755	1,3-Dichlorobenzene	2024/12/12	97	60 - 140	94	60 - 130	<0.040	ug/g	NC	50
9820755	1,4-Dichlorobenzene	2024/12/12	97	60 - 140	90	60 - 130	<0.040	ug/g	NC	50
9820755	Acetone (2-Propanone)	2024/12/12	104	60 - 140	109	60 - 140	<0.49	ug/g	NC	50
9820755	Benzene	2024/12/12	101	60 - 140	100	60 - 130	<0.0060	ug/g	NC	50
9820755	Bromodichloromethane	2024/12/12	104	60 - 140	106	60 - 130	<0.040	ug/g	NC	50
9820755	Bromoform	2024/12/12	93	60 - 140	104	60 - 130	<0.040	ug/g	NC	50
9820755	Bromomethane	2024/12/12	104	60 - 140	104	60 - 140	<0.040	ug/g	NC	50
9820755	Carbon Tetrachloride	2024/12/12	119	60 - 140	118	60 - 130	<0.040	ug/g	NC	50
9820755	Chlorobenzene	2024/12/12	87	60 - 140	87	60 - 130	<0.040	ug/g	NC	50
9820755	Chloroform	2024/12/12	107	60 - 140	100	60 - 130	<0.040	ug/g	NC	50
9820755	cis-1,2-Dichloroethylene	2024/12/12	101	60 - 140	103	60 - 130	<0.040	ug/g	NC	50
9820755	cis-1,3-Dichloropropene	2024/12/12	86	60 - 140	82	60 - 130	<0.030	ug/g	NC	50
9820755	Dibromochloromethane	2024/12/12	100	60 - 140	109	60 - 130	<0.040	ug/g	NC	50
9820755	Dichlorodifluoromethane (FREON 12)	2024/12/12	133	60 - 140	126	60 - 140	<0.040	ug/g	NC	50
9820755	Ethylbenzene	2024/12/12	90	60 - 140	85	60 - 130	<0.010	ug/g	NC	50
9820755	Ethylene Dibromide	2024/12/12	92	60 - 140	100	60 - 130	<0.040	ug/g	NC	50
9820755	F1 (C6-C10) - BTEX	2024/12/12					<10	ug/g	2.8	30
9820755	F1 (C6-C10)	2024/12/12	65	60 - 140	91	80 - 120	<10	ug/g	2.8	30

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9820755	Hexane	2024/12/12	104	60 - 140	107	60 - 130	<0.040	ug/g	NC	50
9820755	Methyl Ethyl Ketone (2-Butanone)	2024/12/12	98	60 - 140	105	60 - 140	<0.40	ug/g	NC	50
9820755	Methyl Isobutyl Ketone	2024/12/12	92	60 - 140	94	60 - 130	<0.40	ug/g	NC	50
9820755	Methyl t-butyl ether (MTBE)	2024/12/12	91	60 - 140	93	60 - 130	<0.040	ug/g	NC	50
9820755	Methylene Chloride(Dichloromethane)	2024/12/12	103	60 - 140	106	60 - 130	<0.049	ug/g	NC	50
9820755	o-Xylene	2024/12/12	95	60 - 140	91	60 - 130	<0.020	ug/g	NC	50
9820755	p+m-Xylene	2024/12/12	87	60 - 140	83	60 - 130	<0.020	ug/g	NC	50
9820755	Styrene	2024/12/12	87	60 - 140	83	60 - 130	<0.040	ug/g	NC	50
9820755	Tetrachloroethylene	2024/12/12	98	60 - 140	95	60 - 130	<0.040	ug/g	NC	50
9820755	Toluene	2024/12/12	96	60 - 140	98	60 - 130	<0.020	ug/g	NC	50
9820755	Total Xylenes	2024/12/12					<0.020	ug/g	NC	50
9820755	trans-1,2-Dichloroethylene	2024/12/12	104	60 - 140	102	60 - 130	<0.040	ug/g	NC	50
9820755	trans-1,3-Dichloropropene	2024/12/12	94	60 - 140	97	60 - 130	<0.040	ug/g	NC	50
9820755	Trichloroethylene	2024/12/12	98	60 - 140	96	60 - 130	<0.010	ug/g	NC	50
9820755	Trichlorofluoromethane (FREON 11)	2024/12/12	112	60 - 140	110	60 - 130	<0.040	ug/g	NC	50
9820755	Vinyl Chloride	2024/12/12	112	60 - 140	111	60 - 130	<0.019	ug/g	NC	50
9821321	Moisture	2024/12/11							1.9	20
9822204	F2 (C10-C16 Hydrocarbons)	2024/12/12	107	60 - 140	82	80 - 120	<7.0	ug/g	NC	30
9822204	F3 (C16-C34 Hydrocarbons)	2024/12/12	110	60 - 140	84	80 - 120	<50	ug/g	NC	30
9822204	F4 (C34-C50 Hydrocarbons)	2024/12/12	108	60 - 140	82	80 - 120	<50	ug/g	NC	30
9822210	WAD Cyanide (Free)	2024/12/12	101	75 - 125	111	80 - 120	<0.01	ug/g	NC	35
9822211	WAD Cyanide (Free)	2024/12/12	92	75 - 125	106	80 - 120	<0.01	ug/g	NC	35
9822456	Chromium (VI)	2024/12/12	39 (1)	70 - 130	93	80 - 120	<0.18	ug/g	NC	35
9822600	Hot Water Ext. Boron (B)	2024/12/13	106	75 - 125	91	75 - 125	<0.050	ug/g	6.2	40
9822615	Hot Water Ext. Boron (B)	2024/12/12	103	75 - 125	106	75 - 125	<0.050	ug/g	NC	40
9822630	Acid Extractable Antimony (Sb)	2024/12/12	115	75 - 125	111	80 - 120	<0.20	ug/g	4.6	30
9822630	Acid Extractable Arsenic (As)	2024/12/12	109	75 - 125	98	80 - 120	<1.0	ug/g	5.1	30
9822630	Acid Extractable Barium (Ba)	2024/12/12	NC	75 - 125	92	80 - 120	<0.50	ug/g	3.3	30
9822630	Acid Extractable Beryllium (Be)	2024/12/12	107	75 - 125	90	80 - 120	<0.20	ug/g	0.032	30
9822630	Acid Extractable Boron (B)	2024/12/12	97	75 - 125	91	80 - 120	<5.0	ug/g	1.5	30
9822630	Acid Extractable Cadmium (Cd)	2024/12/12	110	75 - 125	92	80 - 120	<0.10	ug/g	NC	30
9822630	Acid Extractable Chromium (Cr)	2024/12/12	110	75 - 125	96	80 - 120	<1.0	ug/g	4.3	30

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9822630	Acid Extractable Cobalt (Co)	2024/12/12	107	75 - 125	96	80 - 120	<0.10	ug/g	3.6	30
9822630	Acid Extractable Copper (Cu)	2024/12/12	NC	75 - 125	95	80 - 120	<0.50	ug/g	0.71	30
9822630	Acid Extractable Lead (Pb)	2024/12/12	111	75 - 125	95	80 - 120	<1.0	ug/g	1.3	30
9822630	Acid Extractable Mercury (Hg)	2024/12/12	118	75 - 125	101	80 - 120	<0.050	ug/g		
9822630	Acid Extractable Molybdenum (Mo)	2024/12/12	109	75 - 125	90	80 - 120	<0.50	ug/g	NC	30
9822630	Acid Extractable Nickel (Ni)	2024/12/12	NC	75 - 125	96	80 - 120	<0.50	ug/g	1.9	30
9822630	Acid Extractable Selenium (Se)	2024/12/12	105	75 - 125	94	80 - 120	<0.50	ug/g	NC	30
9822630	Acid Extractable Silver (Ag)	2024/12/12	109	75 - 125	92	80 - 120	<0.20	ug/g	NC	30
9822630	Acid Extractable Thallium (Tl)	2024/12/12	112	75 - 125	96	80 - 120	<0.050	ug/g	7.0	30
9822630	Acid Extractable Uranium (U)	2024/12/12	117	75 - 125	99	80 - 120	<0.050	ug/g	2.8	30
9822630	Acid Extractable Vanadium (V)	2024/12/12	NC	75 - 125	97	80 - 120	<5.0	ug/g	3.8	30
9822630	Acid Extractable Zinc (Zn)	2024/12/12	NC	75 - 125	98	80 - 120	<5.0	ug/g	1.5	30
9822953	Acid Extractable Antimony (Sb)	2024/12/12	107	75 - 125	112	80 - 120	<0.20	ug/g	NC	30
9822953	Acid Extractable Arsenic (As)	2024/12/12	104	75 - 125	101	80 - 120	<1.0	ug/g	NC	30
9822953	Acid Extractable Barium (Ba)	2024/12/12	NC	75 - 125	94	80 - 120	<0.50	ug/g	2.0	30
9822953	Acid Extractable Beryllium (Be)	2024/12/12	101	75 - 125	92	80 - 120	<0.20	ug/g	6.5	30
9822953	Acid Extractable Boron (B)	2024/12/12	95	75 - 125	90	80 - 120	<5.0	ug/g	NC	30
9822953	Acid Extractable Cadmium (Cd)	2024/12/12	102	75 - 125	96	80 - 120	<0.10	ug/g	NC	30
9822953	Acid Extractable Chromium (Cr)	2024/12/12	NC	75 - 125	100	80 - 120	<1.0	ug/g	5.7	30
9822953	Acid Extractable Cobalt (Co)	2024/12/12	105	75 - 125	100	80 - 120	<0.10	ug/g	4.4	30
9822953	Acid Extractable Copper (Cu)	2024/12/12	NC	75 - 125	98	80 - 120	<0.50	ug/g	6.1	30
9822953	Acid Extractable Lead (Pb)	2024/12/12	104	75 - 125	98	80 - 120	<1.0	ug/g	2.0	30
9822953	Acid Extractable Mercury (Hg)	2024/12/12	110	75 - 125	107	80 - 120	<0.050	ug/g	NC	30
9822953	Acid Extractable Molybdenum (Mo)	2024/12/12	102	75 - 125	95	80 - 120	<0.50	ug/g	6.5	30
9822953	Acid Extractable Nickel (Ni)	2024/12/12	109	75 - 125	102	80 - 120	<0.50	ug/g	4.1	30
9822953	Acid Extractable Selenium (Se)	2024/12/12	102	75 - 125	98	80 - 120	<0.50	ug/g	NC	30
9822953	Acid Extractable Silver (Ag)	2024/12/12	100	75 - 125	96	80 - 120	<0.20	ug/g	NC	30
9822953	Acid Extractable Thallium (Tl)	2024/12/12	105	75 - 125	99	80 - 120	<0.050	ug/g	1.0	30
9822953	Acid Extractable Uranium (U)	2024/12/12	110	75 - 125	103	80 - 120	<0.050	ug/g	1.4	30
9822953	Acid Extractable Vanadium (V)	2024/12/12	NC	75 - 125	100	80 - 120	<5.0	ug/g	6.2	30
9822953	Acid Extractable Zinc (Zn)	2024/12/12	NC	75 - 125	102	80 - 120	<5.0	ug/g	2.1	30
9822989	Conductivity	2024/12/12			104	90 - 110	<0.002	mS/cm	3.6	10

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
9822993	Available (CaCl2) pH	2024/12/12			100	97 - 103			0.20	N/A
9823309	Available (CaCl2) pH	2024/12/12			100	97 - 103			0.90	N/A

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The sample was reanalyzed with the same results.

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Louise Harding, Scientific Specialist

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas 100 – 36 Antares Dr. Nepean, ON, K2E 7W5 Phone: 613-274-0573 Website: www.bvna.com

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CHAIN OF CUSTODY RECORD

ENV COC - 00014v6

Page _____ of _____

CLBB424
NONT-2024-12-1766

Invoice Information	Invoice to (requires report) ☐	Report Information (if differs from invoice)		Project Information	
Company:	EXP Services Inc.	Company:		Quotation #:	
Contact Name:	Chris Kimmerly	Contact Name:		P.O. #/ AFE#:	
Street Address:	2650 Queensview Dr. Suite 100	Street Address:		Project #:	OTT-24010349-A0
City:	Ottawa Prov: ON Postal Code: K2B8K1	City: Prov: Postal Code:		Site #:	
Phone:	613-863-1891	Phone:		Site Location:	Barrhaven, 675 Borbridge Ave.
Email:	Chris.Kimmerly@EXP.com	Email:		Site Location Province:	ON.
Copies:	Matthew.Zammit@EXP.com	Copies:		Sampled By:	Matt Zammit

Regulatory Criteria

REG 153: ☑ Table 1 ☐ Table 2 ☐ Table 3 ☐ Table _____ | ☑ Res/Park ☐ Ind/Comm ☐ Agri/other | ☐ Med/Fine ☑ Coarse ☐ For RSC

OTHER: ☐ CCME ☐ Reg 406, Table: _____ ☐ Reg 558* ☐ Sanitary Sewer Bylaw *min 3 day TAT ☐ Storm Sewer Bylaw ☐ MISA Municipality _____ ☐ PWQO ☐ Other:

Include Criteria on Certificate of Analysis (check if yes): ☐

SAMPLES MUST BE KEPT COOL (<10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

Regular Turnaround Time (TAT)
☑ 5 to 7 Day ☐ 10 Day

Rush Turnaround Time (TAT) Surcharges apply
☐ Same Day ☐ 1 Day ☐ 2 Day ☐ 3 Day ☐ 4 Day

Date Required: YYYY MM DD

	Sample Identification (Please print or Type)	Date Sampled YYYY	MM	DD	Time (24hr) HH	MM	Matrix	1 FIELD FILTERED	2 FIELD PRESERVED	3 LAB FILTRATION REQUIRED	4 BTEX/ F1	5 ~~PHCs~~ F1 - F4	6 VOCs	7 Reg 153 metals and inorganics	8 Reg 153 ICPMS metals	9 Reg 153 metals (Hg, Cr VI, ICPMS metals, HWS - B)	10	11	12	13	14	15	16	17	18	19	20	21 # OF CONTAINERS SUBMITTED	22 HOLD - DO NOT ANALYZE	Comments
1	BH 24-01, SS5	2024	12	06	13	00	Soil					✓	✓	✓														5		
2	BH 24-04, SS3	2024	12	04	09	00	"					✓	✓	✓														5		
3	BH 24-14, SS4	2024	12	04	13	30	"					✓	✓	✓														5		
4	DUP	2024	12	04			"					✓	✓	✓														4		
5																														
6																														
7																														
8																														
9																														
10																														
11																														
12																														

Received in Ottawa

*UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS AND CONDITIONS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/TERMS-AND-CONDITIONS OR BY CALLING THE LABORATORY LISTED ABOVE TO OBTAIN A COPY

LAB USE ONLY	Yes	No	°C	1	2	3
Seal present		✓				
Seal intact		✓				
Cooling media present		✓		2	2	2

LAB USE ONLY	Yes	No	°C	1	2	3
Seal present	✓					
Seal intact	✓					
Cooling media present	✓			2	3	3

LAB USE ONLY	Yes	No	°C	1	2	3
Seal present						
Seal intact						
Cooling media present						

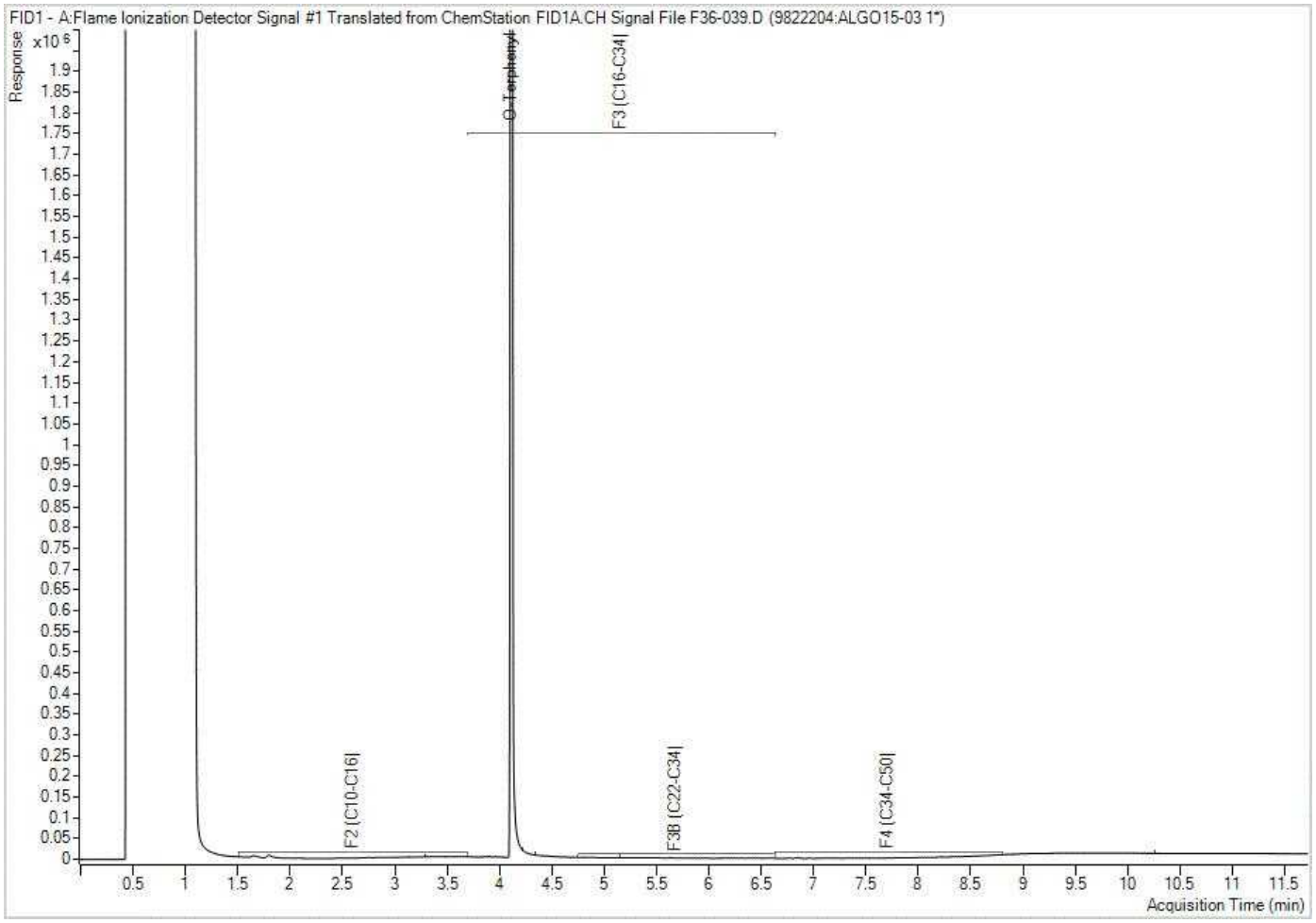
Temperature reading by: 1 2 3

Relinquished by: (Signature/ Print)	Date YYYY	MM	DD	Time HH	MM	Received by: (Signature/ Print)	Date YYYY	MM	DD	Time HH	MM	Special instructions
1						Angelica Santiago ABT	2024	12	09	14	48	
2						2	2024	12	10	08	30	

Bureau Veritas Job #: C4BB424
Report Date: 2024/12/13
Bureau Veritas Sample: ALGO15

exp Services Inc
Client Project #: OTT-24010349-A0
Project name: BARRHAVEN, 675 BORBRIDGE AVE.
Client ID: BH 24-01 , SS5

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

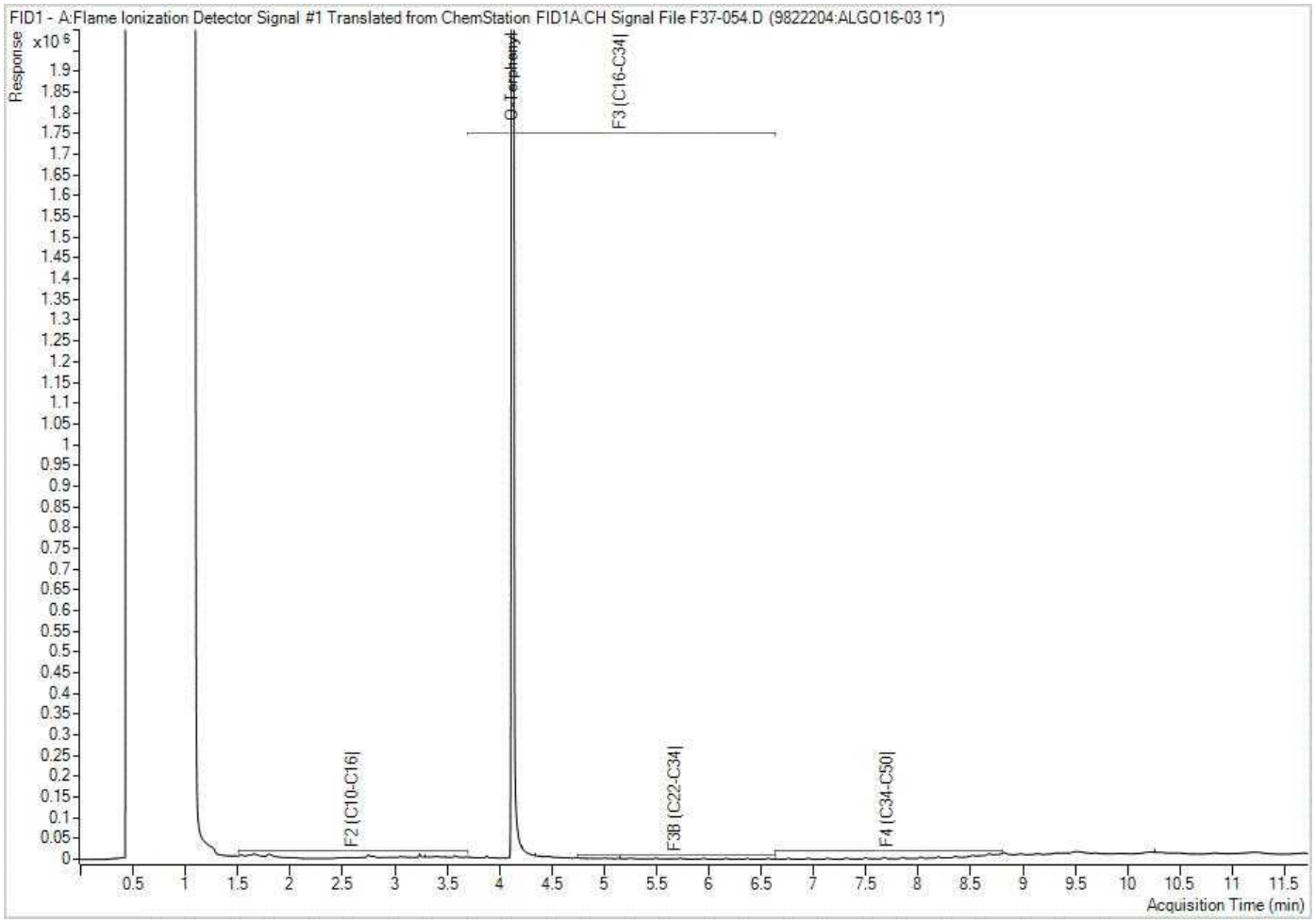


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C4BB424
Report Date: 2024/12/13
Bureau Veritas Sample: ALGO16

exp Services Inc
Client Project #: OTT-24010349-A0
Project name: BARRHAVEN, 675 BORBRIDGE AVE.
Client ID: BH24-04,SS3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

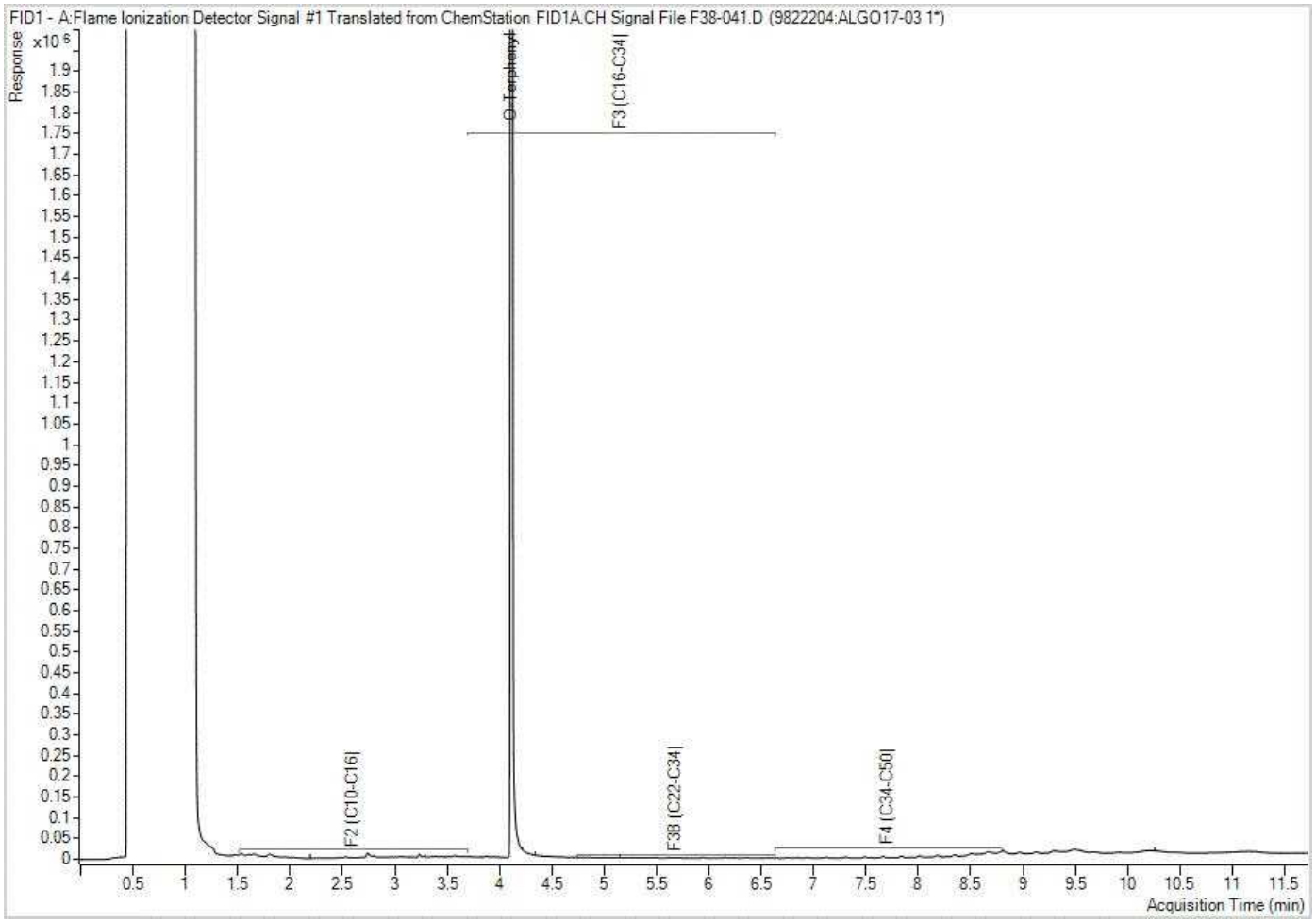


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C4BB424
Report Date: 2024/12/13
Bureau Veritas Sample: ALGO17

exp Services Inc
Client Project #: OTT-24010349-A0
Project name: BARRHAVEN, 675 BORBRIDGE AVE.
Client ID: BH24-14,SS4

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

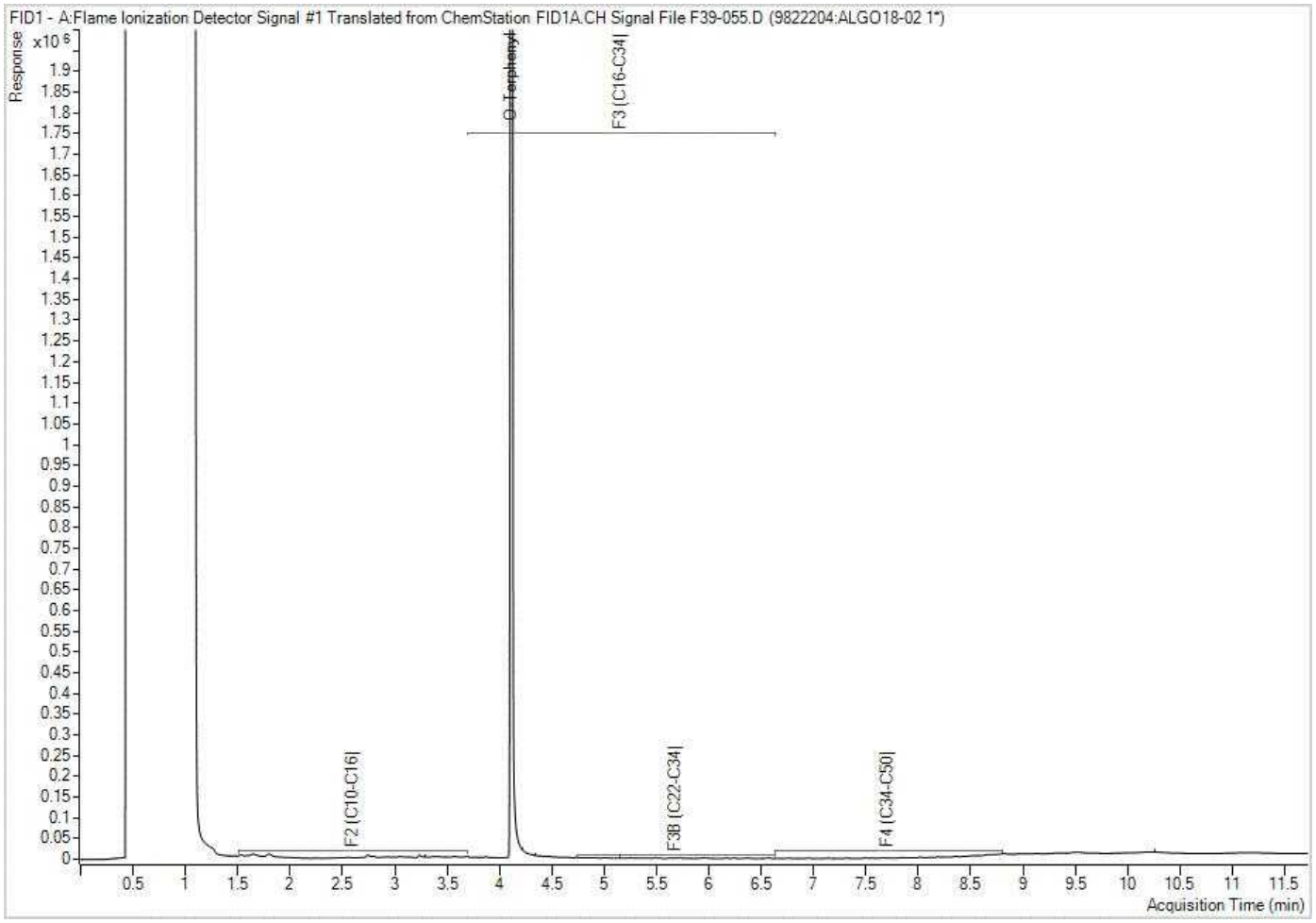


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C4BB424
Report Date: 2024/12/13
Bureau Veritas Sample: ALGO18

exp Services Inc
Client Project #: OTT-24010349-A0
Project name: BARRHAVEN, 675 BORBRIDGE AVE.
Client ID: DUP

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Appendix D – Environmental Soil Analytical Tables

Table 1 - Soil Analytical Results - Residential/Parkland/Institutional - Metals & Inorganics
Proposed New Riverside South Elemntary School, 675 Borbridge Avenue, Ottawa, ON
OTT-24010349-A0

Sample ID	RDL	MECP Table 1[1]	MECP Table 2.1 Residential/Parkland/ Institutional [2]	MECP Table 3.1 Residential/Parkland/ Institutional [3]	BH24-01 SS5	BH24-04-SS3	BH24-14-SS4	DUP (duplicate of BH24-14-SS4)
Sampling Date					**2024-12-06**	**2024-12-04**	**2024-12-04**	
Sample Depth		**Bold**	**Underline**	**Underline**	**3 to 3.6**	**1.5 to 2.1**	**2.25 - 2.85**	
Metals								
Antimony	0.2	1.3	7.5	7.5	<0.20	<0.20	<0.20	<0.20
Arsenic	1	18	18	18	<1.0	2.1	1	<1.0
Barium	0.5	220	390	390	200	130	**390**	**340**
Beryllium	0.2	2.5	4	4	0.56	0.46	0.77	0.71
Boron (Total)	5	36	120	120	<5.0	<5.0	<5.0	<5.0
Boron (Hot Water Soluble)	0.05	NV	1.5	1.5	<0.050	<0.050	<0.050	<0.050
Cadmium	0.1	1.2	1.2	1.2	<0.10	<0.10	<0.10	<0.10
Chromium	1	70	160	160	42	28	**89**	**89**
Chromium VI	0.36	0.66	8	8	<0.18	0.24	<0.36	<0.36
Cobalt	0.1	21	22	22	11	8.3	21	21
Copper	0.5	92	140	140	26	18	40	38
Lead	1	120	120	120	5.1	4.7	6.1	5.8
Mercury	0.05	0.27	0.27	0.27	<0.050	<0.050	<0.050	<0.050
Molybdenum	0.5	2	6.9	6.9	0.61	<0.50	0.66	0.59
Nickel	0.5	82	100	100	24	17	50	51
Selenium	0.5	1.5	2.4	2.4	<0.50	<0.50	<0.50	<0.50
Silver	0.2	0.5	20	20	<0.20	<0.20	<0.20	<0.20
Thallium	0.05	1	1	1	0.24	0.15	0.43	0.38
Uranium	0.05	2.5	23	23	0.67	0.54	0.66	0.68
Vanadium	5	86	86	86	67	63	**100**	**98**
Zinc	5	290	340	340	68	67	130	120
Inorganics								
pH (pH Units)	N/A	NV	NV	NV	7.66	7.13	7.63	7.64
Conductivity (mS/cm)	0.001	0.57	0.7	0.7	0.16	0.085	0.22	0.23
Cyanide, Free	0.01	0.051	0.051	0.051	<0.01	<0.01	<0.01	<0.01
Sodium Adsroption Ratio (no units)	N/A	2.4	5	5	0.27	0.38	0.25	0.25

Notes

1	Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 1 Full Depth Background Site Condition Standards (SCS) for residential/parkland/institutional/industrial/commercial/community property use.
2	Ontario Ministry of Environment, Conservation and Parks (MECP),O.Reg 406/19 On-Site and Excess Soil Management, December 2019, Rules for Soil Management and Excess Soil Quality Standards, Table 2.1 Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition for residential/parkland/institutional property use.
3	Ontario Ministry of Environment, Conservation and Parks (MECP),O.Reg 406/19 On-Site and Excess Soil Management, December 2019, Rules for Soil Management and Excess Soil Quality Standards, Table 3.1 Full Depth Excess Soil Quality Standards in a Non-Potable Ground Water Condition for residential/parkland/institutional property use.
<(RDL)	Non-detectable results are shown as "< (RDL)" where RDL represents the reporting detection limit.
NV	No Value
m bgs	Metres below ground surface
	All values are in ppm (ug/g) unless shown in brackets beside parameter name. Dry weight basis.
Bold	Indicates soil exceedance of MECP Table 1 SCS
Underline	Indicates soil exceedance of MECP Table 2.1 ESQS
Underline	Indicates soil exceedance of MECP Table 3.1 ESQS

Table 2 - Soil Analytical Results - Residential/Parkland/Institutional - VOC & PHC
Proposed New Riverside South Elemntary School, 675 Borbridge Avenue, Ottawa, ON
OTT-24010349-A0

Sample ID	RDL	MECP Table 1[1]	MECP Table 2.1 Residential/Parkland/ Institutional [2]	MECP Table 3.1 Residential/Parkland/ Institutional [3]	BH24-01 SS5	BH24-04-SS3	BH24-14-SS4	DUP (duplicate of BH24-14-SS4)
Sampling Date					2024-12-06	2024-12-04	2024-12-04	
Sample Depth		Bold	Underline	Underline	3 to 3.6	1.5 to 2.1	2.25 - 2.85	
Volatile Organic Compounds (VOC)								
Acetone	0.49	0.5	0.5	1.8	<0.49	<0.49	<0.49	<0.49
Benzene	0.006	0.02	0.02	0.02	<0.0060	<0.0060	<0.0060	<0.0060
Bromodichloromethane	0.04	0.05	0.05	5.8	<0.040	<0.040	<0.040	<0.040
Bromoform	0.04	0.05	0.05	2.5	<0.040	<0.040	<0.040	<0.040
Bromomethane	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Carbon Tetrachloride	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Chlorobenzene	0.04	0.05	0.083	0.28	<0.040	<0.040	<0.040	<0.040
Chloroform	0.04	0.05	0.05	0.08	<0.040	<0.040	<0.040	<0.040
Dibromochloromethane	0.04	0.05	0.05	5.5	<0.040	<0.040	<0.040	<0.040
1,2-Dichlorobenzene	0.04	0.05	3.4	3.4	<0.040	<0.040	<0.040	<0.040
1,3-Dichlorobenzene	0.04	0.05	0.26	4.8	<0.040	<0.040	<0.040	<0.040
1,4-Dichlorobenzene	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
1,1-Dichloroethane	0.04	0.05	0.05	0.14	<0.040	<0.040	<0.040	<0.040
1,2-Dichloroethane	0.049	0.05	0.05	0.05	<0.049	<0.049	<0.049	<0.049
1,1-Dichloroethylene	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Cis-1,2-Dichloroethylene	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Trans-1,2-Dichloroethylene	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
1,2-Dichloropropane	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Cis-1,3-Dichloropropylene	0.03	NV	NV	NV	<0.030	<0.030	<0.030	<0.030
Trans-1,3-Dichloropropylene	0.04	NV	NV	NV	<0.040	<0.040	<0.040	<0.040
Ethylbenzene	0.01	0.05	0.05	1.9	<0.010	<0.010	<0.010	<0.010
Ethylene Dibromide	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Methyl Ethyl Ketone	0.4	0.5	0.5	14	<0.40	<0.40	<0.40	<0.40
Methylene Chloride	0.049	0.05	0.05	0.06	<0.049	<0.049	<0.049	<0.049
Methyl Isobutyl Ketone	0.4	0.5	0.5	0.89	<0.40	<0.40	<0.40	<0.40
Methyl-t-Butyl Ether	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Styrene	0.04	0.05	0.05	0.5	<0.040	<0.040	<0.040	<0.040
1,1,1,2-Tetrachloroethane	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
1,1,2,2-Tetrachloroethane	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Toluene	0.02	0.2	0.2	0.99	<0.020	<0.020	<0.020	<0.020
Tetrachloroethylene	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
1,1,1-Trichloroethane	0.04	0.05	0.11	0.11	<0.040	<0.040	<0.040	<0.040
1,1,2-Trichloroethane	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Trichloroethylene	0.01	0.05	0.05	0.05	<0.010	<0.010	<0.010	<0.010
Vinyl Chloride	0.019	0.02	0.02	0.02	<0.019	<0.019	<0.019	<0.019
m-Xylene & p-Xylene	0.02	NV	NV	NV	<0.020	<0.020	<0.020	<0.020
o-Xylene	0.02	NV	NV	NV	<0.020	<0.020	<0.020	<0.020
Total Xylenes	0.02	0.05	0.091	0.9	<0.020	<0.020	<0.020	<0.020
Dichlorodifluoromethane	0.04	0.05	1.5	1.8	<0.040	<0.040	<0.040	<0.040
Hexane(n)	0.04	0.05	2.5	2.5	<0.040	<0.040	<0.040	<0.040
Trichlorofluoromethane	0.04	0.25	0.25	0.46	<0.040	<0.040	<0.040	<0.040
1,3-Dichloropropene (cis + trans)	0.05	0.05	0.05	0.05	<0.050	<0.050	<0.050	<0.050
Petroleum Hydrocarbons (PHC)								
PHC F1 (C6-C10)	10	25	25	25	<10	<10	<10	<10
PHC F2 (>C10-C16)	7	10	10	10	<7	<7	<14	7.1
PHC F3 (>C16-C34)	50	240	240	300	<50	<50	<100	<50
PHC F4 (>C34-C50)	50	120	2800	2800	<50	<50	<100	<50

Notes

1	Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 1 Full Depth Background Site Condition Standards (SCS) for residential/parkland/institutional/industrial/commercial/community property use.
2	Ontario Ministry of Environment, Conservation and Parks (MECP),O.Reg 406/19 On-Site and Excess Soil Management, December 2019, Rules for Soil Management and Excess Soil Quality Standards, Table 2.1 Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition for residential/parkland/institutional property use.
3	Ontario Ministry of Environment, Conservation and Parks (MECP),O.Reg 406/19 On-Site and Excess Soil Management, December 2019, Rules for Soil Management and Excess Soil Quality Standards, Table 3.1 Full Depth Excess Soil Quality Standards in a Non-Potable Ground Water Condition for residential/parkland/institutional property use.
<(RDL)	Non-detectable results are shown as "< (RDL)" where RDL represents the reporting detection limit.
NV	No Value
m bgs	Metres below ground surface
	All values are in ppm (ug/g) unless shown in brackets beside parameter name. Dry weight basis.
Bold	Indicates soil exceedance of MECP Table 1 SCS
Underline	Indicates soil exceedance of MECP Table 2.1 ESQS
Underline	Indicates soil exceedance of MECP Table 3.1 ESQS

Table 3 - Soil Analytical Results - Industrial/Commercial/Community - Metals & Inorganics
Proposed New Riverside South Elemntary School, 675 Borbridge Avenue, Ottawa, ON
OTT-24010349-A0

Sample ID	RDL	MECP Table 1[1]	MECP Table 2.1 Industrial/Commercial/Community [2]	MECP Table 3.1 Industrial/Commercial/Community [3]	BH24-01 SS5	BH24-04-SS3	BH24-14-SS4	DUP (duplicate of BH24-14-SS4)
Sampling Date					**2024-12-06**	**2024-12-04**	**2024-12-04**	
Sample Depth		**Bold**	**Underline**	**Underline**	**3 to 3.6**	**1.5 to 2.1**	**2.25 - 2.85**	
Metals								
Antimony	0.2	1.3	40	40	<0.20	<0.20	<0.20	<0.20
Arsenic	1	18	18	18	<1.0	2.1	1	<1.0
Barium	0.5	220	670	670	200	130	**390**	**340**
Beryllium	0.2	2.5	8	8	0.56	0.46	0.77	0.71
Boron (Total)	5	36	120	120	<5.0	<5.0	<5.0	<5.0
Boron (Hot Water Soluble)	0.05	NV	2	2	<0.050	<0.050	<0.050	<0.050
Cadmium	0.1	1.2	1.9	1.9	<0.10	<0.10	<0.10	<0.10
Chromium	1	70	160	160	42	28	**89**	**89**
Chromium VI	0.36	0.66	8	8	<0.18	0.24	<0.36	<0.36
Cobalt	0.1	21	80	80	11	8.3	21	21
Copper	0.5	92	230	230	26.00	18	40.00	38.00
Lead	1	120	120	120	5.1	4.7	6.1	5.8
Mercury	0.05	0.27	0.27	0.27	<0.050	<0.050	<0.050	<0.050
Molybdenum	0.5	2	40	40	0.61	<0.50	0.66	0.59
Nickel	0.5	82	270	270	24.00	17.00	50.00	51.00
Selenium	0.5	1.5	5.5	5.5	<0.50	<0.50	<0.50	<0.50
Silver	0.2	0.5	40	40	<0.20	<0.20	<0.20	<0.20
Thallium	0.05	1	3.3	3.3	0.24	0.15	0.43	0.38
Uranium	0.05	2.5	33	33	0.67	0.54	0.66	0.68
Vanadium	5	86	86	86	67	63	**100**	**98**
Zinc	5	290	340	340	68	67	130	120
Inorganics								
pH (pH Units)	N/A	NV	NV	NV	7.66	7.13	7.63	7.64
Conductivity (mS/cm)	0.001	0.57	1.4	1.4	0.16	0.085	0.22	0.23
Cyanide, Free	0.01	0.051	0.051	0.051	<0.01	<0.01	<0.01	<0.01
Sodium Adsroption Ratio (no units)	N/A	2.4	12	12	0.27	0.38	0.25	0.25

Notes

1	Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 1 Full Depth Background Site Condition Standards (SCS) for residential/parkland/institutional/industrial/commercial/community property use.
2	Ontario Ministry of Environment, Conservation and Parks (MECP),O.Reg 406/19 On-Site and Excess Soil Management, December 2019, Rules for Soil Management and Excess Soil Quality Standards, Table 2.1 Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition for residential/parkland/institutional property use.
3	Ontario Ministry of Environment, Conservation and Parks (MECP),O.Reg 406/19 On-Site and Excess Soil Management, December 2019, Rules for Soil Management and Excess Soil Quality Standards, Table 3.1 Full Depth Excess Soil Quality Standards in a Non-Potable Ground Water Condition for residential/parkland/institutional property use.
<(RDL)	Non-detectable results are shown as "< (RDL)" where RDL represents the reporting detection limit.
NV	No Value
m bgs	Metres below ground surface
	All values are in ppm (ug/g) unless shown in brackets beside parameter name. Dry weight basis.
Bold	Indicates soil exceedance of MECP Table 1 SCS
Underline	Indicates soil exceedance of MECP Table 2.1 ESQS
Underline	Indicates soil exceedance of MECP Table 3.1 ESQS

Table 4 - Soil Analytical Results - Industrical/Commercial/Community - VOC & PHC
Proposed New Riverside South Elemntary School, 675 Borbridge Avenue, Ottawa, ON
OTT-24010349-A0

Sample ID	RDL	MECP Table 1[1]	MECP Table 2.1 Industrial/Commercial/Community [2]	MECP Table 3.1 Industrial Commercial Community [3]	BH24-01 SS5	BH24-04-SS3	BH24-14-SS4	DUP (duplicate of BH24-14-SS4)
Sampling Date					2024-12-06	2024-12-04	2024-12-04	
Sample Depth		Bold	Underline	Underline	3 to 3.6	1.5 to 2.1	2.25 - 2.85	
Volatile Organic Compounds (VOC)								
Acetone	0.49	0.5	0.5	1.8	<0.49	<0.49	<0.49	<0.49
Benzene	0.006	0.02	0.02	0.034	<0.0060	<0.0060	<0.0060	<0.0060
Bromodichloromethane	0.04	0.05	0.05	5.8	<0.040	<0.040	<0.040	<0.040
Bromoform	0.04	0.05	0.05	2.5	<0.040	<0.040	<0.040	<0.040
Bromomethane	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Carbon Tetrachloride	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Chlorobenzene	0.04	0.05	0.083	0.28	<0.040	<0.040	<0.040	<0.040
Chloroform	0.04	0.05	0.05	0.26	<0.040	<0.040	<0.040	<0.040
Dibromochloromethane	0.04	0.05	0.05	5.5	<0.040	<0.040	<0.040	<0.040
1,2-Dichlorobenzene	0.04	0.05	6.8	6.8	<0.040	<0.040	<0.040	<0.040
1,3-Dichlorobenzene	0.04	0.05	0.26	6.8	<0.040	<0.040	<0.040	<0.040
1,4-Dichlorobenzene	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
1,1-Dichloroethane	0.04	0.05	0.05	0.57	<0.040	<0.040	<0.040	<0.040
1,2-Dichloroethane	0.049	0.05	0.05	0.05	<0.049	<0.049	<0.049	<0.049
1,1-Dichloroethylene	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Cis-1,2-Dichloroethylene	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Trans-1,2-Dichloroethylene	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
1,2-Dichloropropane	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Cis-1,3-Dichloropropylene	0.03	0.05	NV	NV	<0.030	<0.030	<0.030	<0.030
Trans-1,3-Dichloropropylene	0.04	0.05	NV	NV	<0.040	<0.040	<0.040	<0.040
Ethylbenzene	0.01	0.05	0.05	1.9	<0.010	<0.010	<0.010	<0.010
Ethylene Dibromide	0.04	NV	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Methyl Ethyl Ketone	0.4	NV	0.5	26	<0.40	<0.40	<0.40	<0.40
Methylene Chloride	0.049	0.05	0.05	0.2	<0.049	<0.049	<0.049	<0.049
Methyl Isobutyl Ketone	0.4	0.05	0.5	17	<0.40	<0.40	<0.40	<0.40
Methyl-t-Butyl Ether	0.04	0.5	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Styrene	0.04	0.5	0.05	6.8	<0.040	<0.040	<0.040	<0.040
1,1,1,2-Tetrachloroethane	0.04	0.1	0.05	0.05	<0.040	<0.040	<0.040	<0.040
1,1,2,2-Tetrachloroethane	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Toluene	0.02	0.05	0.2	7.8	<0.020	<0.020	<0.020	<0.020
Tetrachloroethylene	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
1,1,1-Trichloroethane	0.04	0.05	0.12	0.4	<0.040	<0.040	<0.040	<0.040
1,1,2-Trichloroethane	0.04	0.05	0.05	0.05	<0.040	<0.040	<0.040	<0.040
Trichloroethylene	0.01	0.2	0.05	0.05	<0.010	<0.010	<0.010	<0.010
Vinyl Chloride	0.019	0.05	0.02	0.02	<0.019	<0.019	<0.019	<0.019
m-Xylene & p-Xylene	0.02	0.05	NV	NV	<0.020	<0.020	<0.020	<0.020
o-Xylene	0.02	0.05	NV	NV	<0.020	<0.020	<0.020	<0.020
Total Xylenes	0.02	0.25	0.091	3	<0.020	<0.020	<0.020	<0.020
Dichlorodifluoromethane	0.04	0.02	1.5	1.8	<0.040	<0.040	<0.040	<0.040
Hexane(n)	0.04	NV	2.5	2.5	<0.040	<0.040	<0.040	<0.040
Trichlorofluoromethane	0.04	NV	0.25	0.46	<0.040	<0.040	<0.040	<0.040
1,3-Dichloropropene (cis + trans)	0.05	0.05	0.05	0.05	<0.050	<0.050	<0.050	<0.050
Petroleum Hydrocarbons (PHC)								
PHC F1 (C6-C10)	10	25	25	25	<10	<10	<10	<10
PHC F2 (>C10-C16)	7	10	26	26	<7	<7	<14	7.1
PHC F3 (>C16-C34)	50	240	240	1700	<50	<50	<100	<50
PHC F4 (>C34-C50)	50	120	3300	3300	<50	<50	<100	<50

Notes

1	Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 1 Full Depth Background Site Condition Standards (SCS) for residential/parkland/institutional/industrial/commercial/community property use.
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Bold	Indicates soil exceedance of MECP Table 1 ESQS
Underline	Indicates soil exceedance of MECP Table 2.1 ESQS
Underline	Indicates soil exceedance of MECP Table 3.1 ESQS

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