Geotechnical Investigation

Proposed Addition -AY Jackson High School, 150 Abbey Hill Drive, Ottawa, ON OCDSB EXP SOA # 24-008

Client:
Ottawa Carleton District School Board
1224 Stittsville Main Street.
Stittsville, ON K2S 0E2

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Introduction

EXP Services Inc. (EXP) is pleased to present the results of the geotechnical investigation completed for the proposed addition to the AY Jackson High School, located at 150 Abbey Hill Drive, Ottawa, ON (Figure 1). The terms and conditions of this assignment were outlined in EXP's proposal number: OTT-23012778-D0 dated April 25, 2024, and authorized by the Ottawa-Carleton District School Board (OCDSB) by PO 333240056958, dated May 10, 2024. This report supersedes the final report submitted on December 18, 2024.

Proposed Development

A review of architectural drawing A202, titled "Life Safety Plan" and drawing A008, titled "Site Demolition Plan", each dated February 17, 2025, by Edward J. Cuhaci and Associates Architects Inc. (EJC) indicate the proposed addition will be a two-storey structure with no basement and a proposed building footprint of 2,313 m^2, to be constructed to the east of the existing building. The finished floor elevation (FFE) of the addition will be at Elevation 106.20 m, the same as the existing building. A review of structural drawing S300, titled "Sections", issued March 28, 2025, by Cunliffe & Associates Inc (C&A) indicates that the footing of the proposed addition will be set a minimum depth of 1.5 m below the proposed FFE, at or below Elevation 104.7 m. A preliminary topographical survey of the site by Farley, Smith & Denis Surveying Ltd. (FSD), on April 29, 2024, was also provided to EXP.

Portables and basketball courts currently located within the proposed addition footprint will have to relocated to allow for the construction of the proposed addition.

Borehole Fieldwork Program

The fieldwork for this geotechnical investigation was undertaken between June 27 to July 4, 2024, and consists of the drilling of fifteen (15) boreholes (Borehole Nos. 1 to 15) to auger refusal and termination depths ranging from 3.4 m to 7.2 m below the existing grade and the excavation of one test pit (Test Pit No. 1) to a depth of 1.85 m below the existing grade. The borehole and test pit fieldwork were supervised on a full-time basis by EXP. The locations of the testholes were established by EXP and surveyed as part of the FSD topographical survey. The locations and geodetic elevations are shown on the borehole location plan, Figure 2.

Subsurface Conditions

The borehole information indicates the subsurface conditions consist of a surficial topsoil or asphaltic concrete layer underlain by fill. A buried topsoil/organics layer was present in two of the boreholes. The fill or buried topsoil/organic layer was underlain by silty clay which extends to extends to 2.1 m to 4.0 m depths (Elevation 104.0 m to 100.2 m). In some of the boreholes a layer of silty sand was present between the fill and the silty clay. A layer of glacial till was present underlying the silty clay and was present to the depth of auger refusal, met at 2.9 m to 7.2 m depths (Elevation 103.3 m to Elevation 97.9 m). Two of the boreholes were extended past the depth of auger refusal and sandstone bedrock was proven to be present at 3.3 m and 4.4 m (Elevation 102.9 m and 101.3 m). The groundwater level within the standpipes ranges from 1.2 m to 1.9 m depths (Elevation 104.4 m to Elevation 103.9 m).

A test pit (Test Pit No. 1) was excavated at the eastern extend of the existing building for the purpose of exposing the existing foundations and assessing the founding type and founding conditions. The test pit revealed that the existing school building at the location of the test pit is supported by strip footing at a depth of 1.7 m (Elevation 105.1) set on a concrete mud slab placed on native silty clay at 1.85 m depth (Elevation 105.0). The test pit was dry upon completion of excavation. Details of the findings in the test pit is presented in Figure 4.

Geotechnical Comments and Recommendations

Seismic shear wave survey conducted at the site indicates a site classification for seismic response of **Class C.** The subsurface soils are not considered to be liquefiable during a seismic event.

A grade raise of up to 1.0 m is considered to be permissible from a geotechnical point of view.

Footings founded on the native silty clay or on an engineered fill pad constructed on the native silty clay at or below Elevation 105.0 m may be designed for a bearing capacity at serviceability limit state (SLS) of 80 kPa and factored geotechnical resistance at ultimate limit state (ULS) of 130 kPa. The total and differential settlements of well designed and constructed footings placed in accordance with the above recommendations are expected to be less than 25 mm and 19 mm respectively. The SLS and factored ULS values are valid provided the site grade raise discussed in Section 9 is respected. It should be noted that according to the boreholes data, fill or loose silty sand may be present at the proposed underside of footing in certain locations. If this the case, all fill and loose silty sand should be removed down the native silty clay and the area raised using engineered fill placed and compacted as described in the main body of the report.

It is recommended that the footings of the addition that are immediately adjacent to the footings of the existing school building be set at the same level as the existing footings to eliminate the need for underpinning. Based on the results of the test pit investigation, the mud slab supporting the underside of the exposed footing was determined to be at 1.85 m depth (Elevation 105.0 m). This is subject to confirmation that the founding soil at the same level as the existing footings is capable of supporting the recommended SLS and factored ULS values noted above. If deeper excavation is required for new footings located adjacent to existing footings, underpinning of the existing footings may be required.

A perimeter drainage system should be provided around the proposed addition. An underfloor drainage system will not be required for the proposed school addition.

Excavations in overburden may be undertaken by conventional heavy mechanical equipment and should comply with the most recent Occupational Health and Safety Act (OHSA), Ontario Regulations 213/91 (August 1, 1991). Excavation for the construction of footings and the installation of underground services are anticipated to extend to a maximum depth of 3.0 m below the existing grade and will extend through the topsoil, fill and silty sand into the native silty clay or glacial till. The groundwater level ranges from 1.2 m to 1.9 m depths (Elevation 104.4 m to Elevation 103.9 m) at the standpipe locations. Excavations for footings at the same elevation as the existing footings and mud slabs, at approximately Elevation 105.0 m are anticipated to be above groundwater level. Excavations for underground services are anticipated to be below the groundwater level.

It is anticipated that the majority of the material required for backfilling purposes in the interior and exterior of the proposed building and for trench backfill would have to be imported and should preferably conform to Ontario Provincial Standard Specification (OPSS) 1010 Granular B Type II and OPSS 1010 Select Subgrade Material (SSM) specifications. Portions of the existing granular fill (free of debris, topsoil (organic soil), cobbles and boulders) from above the groundwater table may be able to be re-used as a SSM material. The suitability of re-using these soils should be assessed during early stages of construction.

Pavement structure for light duty traffic areas should consist of 65 mm thick asphaltic concrete, 150 mm thick OPSS Granular A base and 450 mm thick OPSS Granular B Type II subbase. Pavement structure for heavy duty traffic areas should consist of 110 mm thick asphaltic concrete, 150 mm thick OPSS Granular A base and 600 mm thick OPSS Granular B Type II subbase. Concrete sidewalks should be designed and constructed in accordance with OPSS specification OPSS.MUNI 351. The recommended granular structure beneath the concrete sidewalks should consist of 150 mm thick OPSS Granular A overlying 300 mm thick OPSS Granular B Type II placed on competent subgrade. Concrete should consist of 32 MPa air entrained concrete with a welded wire mech and a minimum thickness of 150 mm.

A landscape architect should be consulted for the design of the new sport facility.

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

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

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1. Introduction

EXP Services Inc. (EXP) is pleased to present the results of the geotechnical investigation completed for the proposed addition to the AY Jackson High School, located at 150 Abbey Hill Drive, Ottawa, ON (Figure 1). The terms and conditions of this assignment were outlined in EXP's proposal number: OTT-23012778-D0 dated April 25, 2024, and authorized by the Ottawa-Carleton District School Board (OCDSB) by PO 333240056958, dated May 10, 2024. This report supersedes the final report submitted on December 18, 2024.

A review of architectural drawing A202, titled "Life Safety Plan" and drawing A008, titled "Site Demolition Plan", each dated February 17, 2025, by Edward J. Cuhaci and Associates Architects Inc. (EJC) indicate the proposed addition will be a two-storey structure with no basement and a proposed building footprint of 2,313 m^2, to be constructed to the east of the existing building. The finished floor elevation (FFE) of the addition will be at Elevation 106.20 m, the same as the existing building. A review of structural drawing S300, titled "Sections", issued March 28, 2025, by Cunliffe & Associates Inc (C&A) indicates that the footing of the proposed addition will be set a minimum depth of 1.5 m below the proposed FFE, at or below Elevation 104.7 m. A preliminary topographical survey of the site by Farley, Smith & Denis Surveying Ltd. (FSD), on April 29, 2024, was also provided to EXP.

Portables and basketball courts currently located within the proposed addition footprint will have to relocated to allow for the construction of the proposed addition.

The geotechnical investigation was undertaken to:

a) Establish the subsurface soil and groundwater conditions at fifteen (15) borehole locations,

b) Establish the details regarding the existing foundations at one (1) test pit location,

c) 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,

d) Comment on grade-raise restrictions and provide site grading requirements,

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 access roads and parking lots, and

k) Recommend concrete pavement structure thicknesses for sidewalks and plaza, and

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

2. Site Description

The AY Jackson High School is bounded to the west by Abbey Hill Drive and to the north, south and east by residential developments. The existing building consists of a two-storey structure with no basement and has a Finished Floor Elevation (FFE) of Elevation 106.20 m.

To the east of the existing school building are two rows of portables. An asphaltic concrete parking lot is present to the south of the existing building. The remainer school property is occupied by grass covered areas, sports fields and an oval shaped track.

The elevations of the boreholes on the site range from Elevation 106.17 m to Elevation 103.87 m and based on the FSD topographical survey the grade of the site generally slopes downwards from the northwest to the southeast.

3. Background Information

A drawing from John D. Patterson and Associated Ltd. (Patterson), titled "Borehole Information", drawing number 0-412, dated January 29, 1975, was provided as background material. The drawing contained a borehole location plan as well as graphical borehole information for the boreholes drilled during the geotechnical investigation for the existing school building. A total of nine (9) boreholes were drilled (Borehole Nos. 1 to 3, 5 to 7 and 9 to 11) with borehole elevations ranging from Elevation 106.1 m to Elevation 105.6 m. Using the provided scale, the thickness of the subsurface layers encountered in the boreholes were measured. Where referenced in this report, the prefix "75-" has been added to the borehole number.

Borehole Nos. 75-3, 75-6 and 75-9 are within or near the proposed addition footprint. The following is a summary of the relevant borehole logs:

- A layer of fill, 0.2 m to 0.3 m thick, was present at the surface and was underlain by native silty clay
- The silty clay extended to 2.0 m depth (Elevation 104.1 m to Elevation 103.6 m)
- Glacial till was encountered underlying the silty clay and extended to the depth of auger refusal, encountered at 3.7 m to 4.3 m depths (Elevation 102.0 m to Elevation 101.3 m)

4. Geology of the Site

4.1 Surficial Geology Map

The surficial geology was reviewed via the Google Earth applications published by the Ontario Ministry of Energy, Northern Development and Mines available via www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth/surficial-geology and was last modified on May 23, 2017. The map indicates that beneath any fill the site is underlain by fine-textured glaciomarine deposits consisting of silt and clay with minor sand and gravel. Stone poor sandy silt to silty sand textured glacial till on Paleozoic terrain is expected to underly the silty clay. The surficial deposits are shown in Image 1 below.

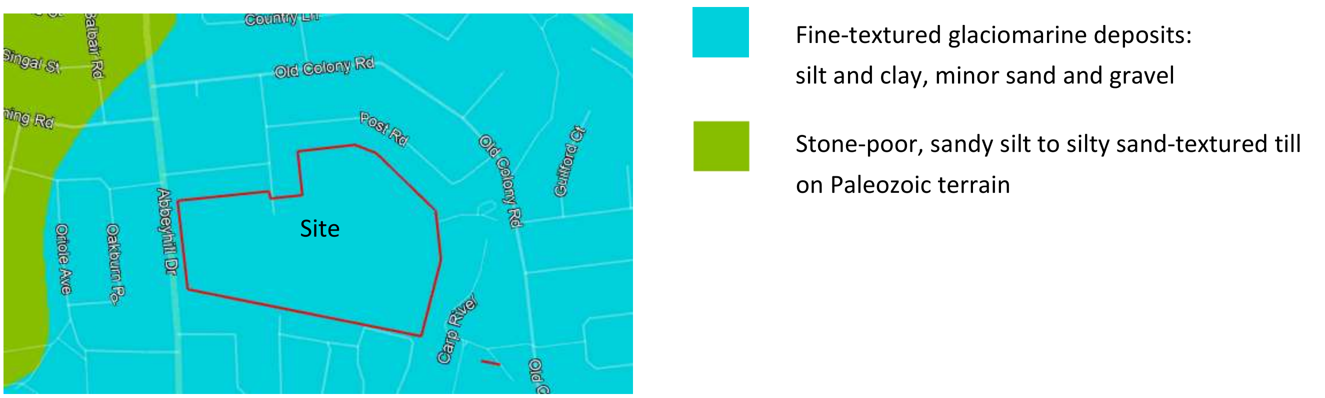


Image 1 – Surficial Geology

4.2 Bedrock Geology Map

The bedrock geology was reviewed via the Google Earth applications 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 that the bedrock at the site is expected to be sandstone and minor conglomerate of the Nepean formation. Sandstone, dolomitic sandstone and dolostone of the March formation and limestone and shale of the Verulam Formation are present near the site.

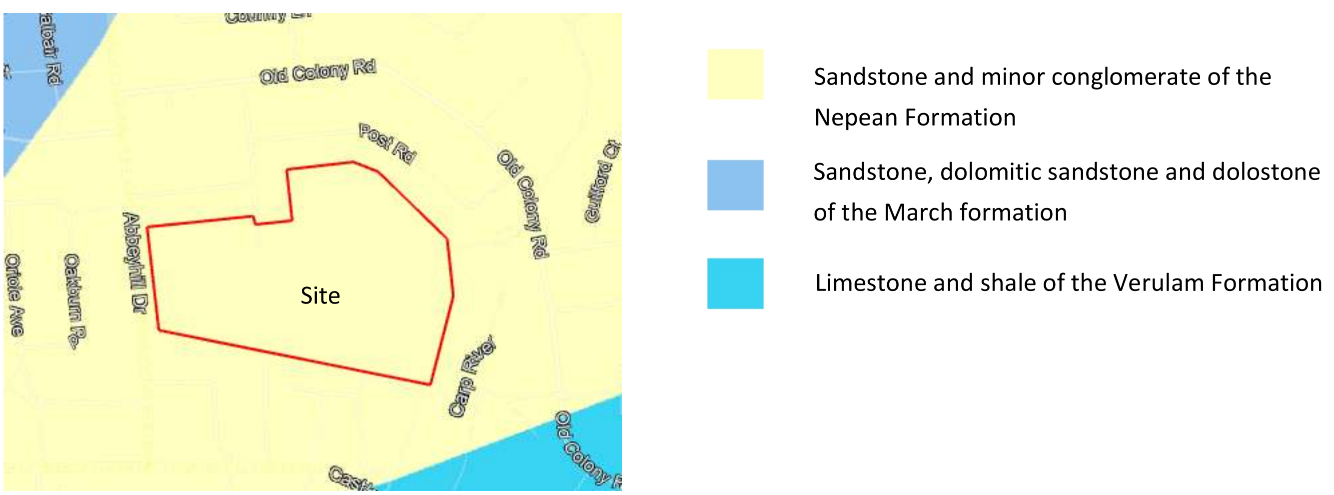


Image 2 – Bedrock Geology

5. Procedure

5.1 Test Hole Fieldwork

The fieldwork for this geotechnical investigation was undertaken between June 27 to July 4, 2024, and consists of fifteen (15) boreholes (Borehole Nos. 1 to 15) to auger refusal and termination depths ranging from 3.4 m to 7.2 m below the existing grade and the excavation of a test pit (Test Pit No. 1) to a depth of 1.85 m below the existing grade. The fieldwork was supervised on a full-time basis by EXP.

Borehole Nos. 1 to 8 are located within the proposed addition footprint, Borehole No. 9 is located on the laneway north of the proposed addition, Boreholes Nos. 10 to 12 are located in the proposed parking area and Borehole Nos. 14 and 15 are located within the proposed baseball diamond.

The locations of the test holes were established by EXP. The geodetic elevations of the boreholes were surveyed by FSD as part of the topographical survey. The borehole locations and ground surface elevations are shown on the borehole location plan, Figure 2.

The boreholes were drilled using a CME-55 truck-mounted drill rig or a CME 55LC rubber track-mounted drill rig, each equipped with continuous flight hollow-stem auger equipment and rock coring capabilities and operated by a drilling contractor subcontracted to EXP. Standard penetration tests (SPTs) were performed in all the boreholes at 0.6 m to 1.5 m depth intervals and soil samples were retrieved by the split-spoon sampler. The undrained shear strengths of the clayey cohesive soils were measured by conducting in-situ vane tests and selected samples were also tested with a penetrometer. Dynamic cone penetration tests (DCPT) were conducted next to Borehole Nos. 2, 4, 7 and 8 and encountered cone refusal at depths of 2.7 m to 7.2 m below the existing grade. Two (2) boreholes were advanced beyond the depth of refusal to augers by conventional coring techniques using the N-size core barrel. A field record of wash water return, colour of wash water and any sudden drops of the drill rods were kept during rock coring operations. The subsurface soil conditions in each borehole were logged with each soil sample placed in labelled plastic bags. Similarly, the rock cores were visually examined, placed in core boxes, identified, and logged.

Nineteen (19) mm diameter standpipes were installed in selected boreholes for long-term monitoring of the groundwater table. The 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 completion of the installation of the standpipes.

The test pit was excavated using a CAT 420F rubber tire backhoe to a depth of 1.85 m in order to expose the existing foundation and confirm the founding material. Samples of the soils exposed in the test pit were collected at selected depth intervals. The test pit was backfilled upon completion of excavating operations and the backfill was nominally packed in place using the backhoe bucket.

5.2 Laboratory Testing Program

On completion of the borehole fieldwork, the soil and rock 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. The rock cores were visually examined by the geotechnical engineer and logged in general accordance with the 2023 Canadian Foundation Engineering Manual (CFEM) Fifth Edition. Photographs were taken of the bedrock cores and are presented in Appendix B.

A summary of the soil sample and rock core laboratory testing program is shown in Table I.

Table I: Summary of Laboratory Testing Program	
Type of Test	Number of Tests Completed
Soil Samples	
Moisture Content Determination	76
Grain Size Analysis	4
Atterberg Limit Determination	4
Corrosion Analysis (pH, sulphate, chloride and resistivity)	2
Rock Samples	
Unconfined Compressive Strength and Unit Weight Determination	2

5.3 Seismic Shear Wave Velocity Survey

A seismic shear wave velocity survey consisting of one (1) survey line was conducted at the site on July 11,2024 by Geophysics GPR International Inc. (GPR). The purpose of the seismic shear wave survey was to determine the shear wave velocity of the site and based on the shear wave velocity provide the site classification for seismic site response. The seismic shear wave velocity survey report prepared by GPR is shown in Appendix A.

6. 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, Figures 5 to 19. The borehole logs and related information depict subsurface conditions only at the specific locations and at the times indicated. Subsurface conditions and water levels at other locations may differ from conditions at the locations where sampling was conducted. The passage of time also may result in changes in the conditions interpreted to exist at the locations where sampling was conducted.

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

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

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

6.1 Topsoil

A 180 mm to 300 mm thick surficial topsoil layer was encountered in Borehole Nos. 4, 5, 7 and 11 to 15.

6.2 Asphaltic Concrete and Granular Fill

A 50 mm to 100 mm thick asphaltic concrete layer was encountered in Borehole Nos. 1, 3, 6, 8 and 9. The asphaltic concrete underlain by granular fill consisting of sand with crushed gravel and extended to depths ranging from 500 mm to 900 mm (Elevation 105.5 m to Elevation 105.1 m) and is underlain by a geotextile. Granular fill was also encountered at the surface in Borehole No. 2 and extended to a depth of 250 mm below the existing ground surface (Elevation 105.5 m). The granular fill is in a loose to dense state based on standard penetration tests (SPT) N-values ranging from 6 to 30. The moisture content ranges from 2 to 6 percent.

6.3 Fill

Fill was contacted underlying the ground surface in Borehole No. 10 and underlying the topsoil or granular fill in Borehole Nos. 2, 4, 5, 7, 9, 11 and 13 to 15. The fill extends to 0.25 m to 0.9 m depths (Elevation 105.5 m to Elevation 103.3 m). The fill consists of silty clay with sand. The fill in a loose to compact state based on standard penetration tests (SPT) N-values ranging from 6 to 13. The moisture content ranges from 14 to 26 percent.

Fill was not encountered in Borehole No. 12.

6.4 Buried Topsoil/Organics

In Borehole Nos. 2 and 10 a buried layer of topsoil or an organic layer was encountered at 0.25 m depth (Elevation 105.5 m and Elevation 105.0 m) and was 150 mm and 350 mm thick in Borehole Nos. 2 and 10, respectively. In Borehole No. 2 a further layer of fill, extending to 0.9 m depth (Elevation 104.8 m) was encountered underlying the topsoil/organics.

6.5 Silty Sand

Silty sand was contacted in Borehole Nos. 4, 10 and 12 underlying the fill or topsoil and extends to 0.6 m to 1.2 m depths (Elevation 104.4 m to Elevation 104.0 m). The of silty sand contains varying amounts of gravel. The silty sand is in a loose state based on standard penetration tests (SPT) N-values ranging from 6 to 8. The moisture content of the silty sand ranges from 20 percent to 24 percent.

6.6 Silty Clay

A silty clay layer was contacted below the fill or the silty sand in all the boreholes and extends to 2.1 m to 4.0 depths (Elevation 104.0 m to 100.2 m). The undrained shear strength of the silty clay generally ranges from 72 kPa to 250 kPa, indicating a stiff to hard consistency. In Borehole Nos. 11 and 15, the silty clay below 3.0 m and 3.1 m depths (Elevation 101.7 m and Elevation 101.3 m), respectively, had undrained shear strengths of 38 kPa and 43 kPa, respectively, indicating a firm consistency. The natural moisture content ranges from 20 percent to 64 percent.

Borehole Nos. 11, 12, 14 and 15 terminated within the silty clay at 3.4 m to 4.0 m depth (Elevation 101.0 m to Elevation 100.2 m)

Results from grain-size analysis and Atterberg limit determination conducted on two (2) samples of the silty clay are summarized in Table II. The grain-size distribution curves are shown in Figures 20 and 21.

Table II: 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 Limits							
		Gravel	Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	Soil Classification (USCS)
BH1-SS3	1.5 - 2.1	0	1	56	43	41	17	24	Silty Clay of Medium Plasticity (CI), trace sand
BH7 - SS4	2.3 - 2.9	0	2	38	60	52	19	33	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 plasticity (CI) to a silty clay of high plasticity (CH), each with trace sand.

6.7 Silty Sand Glacial Till

The silty clay was underlain by glacial till in Borehole Nos. 1 to 10 and 13, encountered at 2.1 m to 3.0 m depths (Elevation 104.0 m to Elevation 102.1 m). The glacial till contains varying amounts of gravel, sand, silt and clay within the soil matrix as well as cobbles and boulders. Based on the SPT N-values of the weight of the SPT hammer to 31 the till is in a very loose to dense state. The moisture content of the glacial till is 4 percent to 36 percent.

The results from the grain-size analysis and Atterberg limit determination conducted on two (2) samples of the glacial till are summarized in Table III. The grain-size distribution curves are shown in Figures Nos. 22 and 23.

Table III: Summary of Results from Grain-Size Analysis and Atterberg Limit Determination – Glacial Till

Borehole No. (BH) – Sample No. (SS)	Depth (m)	Grain-Size Analysis (%) and Atterberg Limits					
		Gravel	Sand	Silt	Clay	Plasticity Index	Soil Classification (USCS)
BH4 - SS5	3.0 - 3.6	7	47	35	11	Non-plastic	Silty Sand (SM), some clay and trace gravel
BH8 - SS6	4.6 - 5.2	10	51	33	6	Non-plastic	Silty Sand (SM), trace clay and trace to some gravel

Based on a review of the laboratory test results, the glacial till may be classified as a silty sand (SM) with trace to some clay and gravel.

6.8 Auger and DCPT Cone Refusal and Bedrock

Auger refusal was met at 2.9 m to 7.2 m depths (Elevation 103.3 m to Elevation 97.9 m) in Borehole Nos. 1 to 9 and 75-3, 75-6 and 75-9. DCPT refusal was met at 2.7 m to 7.2 m depths (Elevation 104.4 m to Elevation 97.9 m) in Borehole Nos. 1, 4, 7 and 8.

Auger and DCPT refusal may indicate cobble/boulder within the glacial till or the bedrock surface.

A summary of the auger and DCPT refusal depths as well as the depth of bedrock confirmed by coring are shown in Table IV.

Table IV: Summary of Auger and DCPT Refusal and Bedrock Depths (Elevations) in Boreholes

Borehole (BH) No.	Ground Surface Elevation (m)	Refusal Depth (m) (Elevation(m))	Depth (Elevation) of Proven Bedrock (m)	Comment wrt to Depth (Elevation) of Bedrock Surface
BH24-01	106.09	3.8 (102.3)	--	Auger Refusal at 3.8 m depth
BH24-02	105.72	Auger - 4.4 (101.3) DCPT - 4.5 (101.2)	4.4 (101.3)	Auger Refusal at 4.4 m depth. DCPT Refusal at 4.5 m depth. 1.8 m of bedrock cored below 4.4 m depth
BH24-03	105.99	4.0 (102.0)	--	Auger Refusal at 4.0 m depth
BH24-04	105.59	DCPT - 2.7 (102.9) Auger - 3.4 (102.2)	--	DCPT Refusal at 2.7 m depth Auger Refusal at 3.4 m depth
BH24-05	105.73	3.4 (102.3)	--	Auger Refusal at 3.4 m depth
BH24-06	106.01	6.3 (99.7)	--	Auger Refusal at 6.3 m depth
BH24-07	105.10	7.2 (97.9)	--	Auger and DCPT Refusal at 7.2 m depth
BH24-08	105.63	DCPT - 4.9 (100.7) Auger - 5.3 (100.3)	--	DCPT Refusal at 4.9 m depth Auger Refusal at 5.3 m depth
BH24-09	106.17	2.9 (103.3)	3.3 (102.9)	Auger Refusal at 2.9 m depth. Cobbles and boulders from 2.9 m to 3.3 m depth. 0.7 m of bedrock cored below 3.3 m depth
BH24-10	105.20	--	--	Borehole Terminated at 3.7 m. No refusal
BH24-11	104.72	--	--	Borehole Terminated at 4.0 m. No refusal
BH24-12	104.62	--	--	Borehole Terminated at 3.7 m. No refusal
BH24-13	105.15	--	--	Borehole Terminated at 3.7 m. No refusal
BH24-14	103.87	--	--	Borehole Terminated at 3.7 m. No refusal
BH24-15	104.42	--	--	Borehole Terminated at 3.4 m. No refusal
BH 75-3	105.6	4.3 (101.3)	--	Auger Refusal at 4.3 m depth
BH 75-6	105.7	3.7 (102.0)	--	Auger Refusal at 3.7 m depth
BH 75-9	106.1	4.2 (101.9)	--	Auger Refusal at 4.2 m depth

Borehole Nos. 2 and 9 were advanced beyond the depth of auger refusal by conventional coring techniques using the N-size core barrel. A review borehole logs indicates that refusal depth in Borehole Nos. 9 at 2.9 m depth (Elevation 103.3 m) indicated cobbles or boulders within the glacial till. Sandstone bedrock of the Nepean Formation was encountered at 3.3 m depth (Elevation 102.9 m) in Borehole No. 9 and 4.4 m depth (Elevation 101.3 m), the depth of auger refusal, in Borehole No. 2.

In Borehole No. 2, Run 2 and Borehole No. 9, Run 1, the total core recovery (TCR) ranges between 79 percent and 97 percent and the rock quality designation (RQD) ranges between 56 percent and 96 percent indicating a sandstone bedrock of a fair to excellent quality. The initial coring run in Borehole No. 2, from 4.4 m to 4.6 m depth (Elevation 101.3 m to Elevation 101.1 m), had a total recovery of 100% and an RQD of 0, indicating a bedrock of vey poor rock quality.

Photographs of the bedrock cores are included in Appendix B.

Unit weight determination and unconfined compressive strength tests were conducted on two (2) rock core samples. The test results are summarized in Table V.

Table V: Summary of Unconfined Compressive Strength Test Results – Bedrock Cores				
Borehole (BH) No. – Run No.	Depth (m)	Unit Weight (kN/m^3)	Unconfined Compressive Strength (MPa)	Classification of Rock with respect to Strength
BH2 Run2	5.0-5.2	25.1	192.5	Very Strong R5
BH9 Run1	3.4-3.5	25.0	90.7	Strong R4

A review of the test results in Table V indicates the strength of the rock may be classified as very strong (R5) to strong (R4) in accordance with the Canadian Foundation Engineering Manual (CFEM), Fifth Edition, 2023.

6.9 Groundwater Level Measurements

The groundwater level was measured in each borehole upon completion of drilling and ranges from 1.2 m to 3.9 m depths (Elevation 104.4 m to Elevation 101.0 m). Borehole Nos. 5 and 11 to 14 were found to be dry to 3.4 m to 4.0 m depths (Elevation 102.3 m to Elevation 100.7 m).

A summary of the groundwater level measurements taken in the boreholes equipped with standpipes is shown in Table VI.

Table VI: Summary of Groundwater Level Measurements				
Borehole No. (BH)	Ground Surface Elevation (m)	Date of Measurement (Elapsed Time in Days from Date of Installation)	Screened Material	Depth Below Ground Surface (Elevation), m
BH-1	106.09	June 17, 2024 (14 Days)	Glacial Till	1.9 (104.2)
BH-4	105.59	June 17, 2024 (15 Days)	Silty Clay	1.2 (104.4)
BH-8	105.63	June 17, 2024 (15 Days)	Glacial Till	1.7 (103.9)

The groundwater level within the standpipes ranges from 1.2 m to 1.9 m depths (Elevation 104.4 m to Elevation 103.9 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.

7. Test Pit Investigation of Existing Founding Conditions

A test pit (Test Pit No. 1) was excavated at the eastern extent of the existing building for the purpose of exposing the existing foundations and assessing the founding type and founding conditions. The following observations were made:

- The foundation wall is a cast in place concrete wall
- The footing has a thickness of 200 mm and has an underside of footing (USF) elevation of Elevation 105.1 m
- The footing is founded on a mud slab, 150 mm in thickness, is founded on native silty clay at Elevation 105.0 m
- No perimeter drainage was noted
- The existing foundation wall was noted as not having any damp proofing or a drainage board.
- The test pit was dry upon completion of excavation

Detail of the findings in the test pit are presented in Figure 4.

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

8.1 Site Classification for Seismic Site Response

The results of the seismic shear wave survey conducted at the site are provided in the report attached in Appendix A. The survey indicates a shear wave velocity of 769.6 m/s. For footings placed on silty clay at similar depth to the existing footings, Table 4.1.8.4.A of the 2012 Ontario Building Code (as amended January 1, 2022) indicates a site classification for seismic response of **Class C.**

8.2 Liquefaction Potential of Soils

The borehole investigation revealed the subsurface conditions within the area of the proposed addition generally comprises of fill overlain by stiff to hard clay over very loose to dense till in turn underlain by sandstone bedrock contacted at depths of 3.4 m to 7.2 m. The MASW conducted within the proposed addition revealed a shear wave velocity of 200 m/s or higher within the overburden deposit.

Based on a review of the borehole information and the seismic survey, it can be concluded that the subsurface soils are not considered to be susceptible to liquefaction during a seismic event.

9. Grade Raise Restrictions

The FFE of the proposed addition is Elevation 106.20 m. Based on the borehole elevations within the proposed addition footprint, this will result in a grade raise of 0.1 m to 1.1 m.

From a geotechnical perspective, a grade raise of up to 1.2 m is considered to be permissible in conjunction with the footings designed in accordance with Section 11 of this report.

10. Site Grading

Borehole No. 2, located within the building footprint and Borehole No. 10, located within the proposed parking lot encountered a buried topsoil/organic layer which extend up to 0.6 m below the existing grade. This buried topsoil layer may exits in other areas of the site.

Site grading within the **proposed building addition footprint** should consist of the removal of all existing fill, surficial and buried topsoil (organic) layers and organic stained soils down to the native undisturbed material. The native subgrade should be examined and proofrolled if directed by a geotechnician. Any loose/soft areas identified during the subgrade examination should be excavated, removed and replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to 98 percent standard Proctor maximum dry density (SPMDD). Once the subgrade has been approved, the grades may be raised to the design underside footing and floor slab elevation by the construction of an engineered fill pad constructed in accordance with Section 11 of this report.

Site grading within the **proposed portable areas** should consist of the removal of all existing fill, surficial and buried topsoil (organic) layers and organic stained soils down to the native undisturbed material. The native subgrade should be examined and proof rolled in the presence of a geotechnician. Any loose/soft areas identified during the subgrade examination should be excavated, removed and replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to 98 percent standard Proctor maximum dry density (SPMDD). Once the subgrade has been approved, the grades may be raised to the design subgrade level by the construction of an engineered fill pad constructed in accordance with the procedure in Section 11 of this report.

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

In place density tests should be performed on each lift of placed material to ensure that it has been compacted to the project specifications.

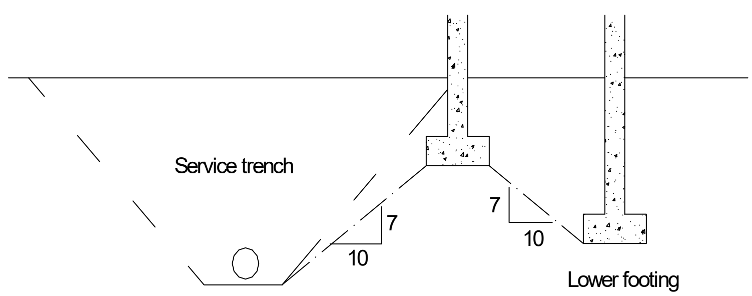
11. Foundation Considerations

Borehole Nos. 1 to 8 and 75-6 are located within the proposed building footprint. Based on a review of the logs of the borehole within the building addition footprint, footings for the proposed addition can be founded on the native silty clay contacted at depths of 0.5 m to 1.2 m depths (Elevation 105.5 m to Elevation 104.3 m), or on engineered fill founded on the native silty clay. The existing topsoil, fill and loose silty sand (as encountered in Borehole No. 4 and other areas) are not considered as a suitable founding medium for the footings and where present should be removed and area backfilled with engineered fill to underside of footing. Engineered fill should comprise of OPSS Granular B Type II Placed in 300 mm lift and each lift compacted to 100 % of SPMDD.

Footings founded on the native silty clay or on an engineered fill pad founded on native silty clay may be designed for a bearing capacity at serviceability limit state (SLS) of 80 kPa and factored geotechnical resistance at ultimate limit state (ULS) of 130 kPa. The total and differential settlements of well designed and constructed footings placed in accordance with the above recommendations are expected to be less than 25 mm and 19 mm respectively. The SLS and factored ULS values are valid provided the site grade raise discussed in Section 9 is respected.

It is recommended that the footings of the addition that are located immediately adjacent to the existing footings of the existing school building should be founded at the same level as the existing footings to eliminate the need for underpinning. Based on the results of the test pit investigation, the mud slab for the existing footing was determined to be 1.85 m depth (Elevation 105.0). This is subject to confirmation that the founding soil at the same level as the existing footings is capable of supporting the recommended SLS and factored ULS values noted above. If deeper excavation is required for new footings located adjacent to existing footings, underpinning of the existing footings may be required.

Footings founded in soils at different elevations should be located such that the higher footings are set below a line drawn up at 10 horizontal to 7 vertical (10H:7V) from the near edge of the lower footing, as shown below. This concept should also be applied to service excavation, etc. to ensure that undermining is not a problem.



FOOTINGS NEAR SERVICE TRENCHES OR AT DIFFERENT ELEVATIONS

All footing beds should be examined by a geotechnical engineer to ensure that the founding surfaces are capable of supporting the design bearing pressure at SLS and that the footing beds have been properly prepared. A 50 mm concrete mud slab is recommended to be place on the surface of the approved silty clay to prevent disturbance of the founding soils.

Once the native subgrade has been approved and if required, the grade may be raised to the design underside footing and floor slab elevation by the construction of an engineered fill pad. The excavation for the removal of fill, topsoil/organic layer and silty sand should extend to a sufficient distance beyond the limits of the proposed structure to accommodate a 1.0 m wide horizontal bench of engineered fill that extends beyond the perimeter of the proposed building on all sides, which should thereafter be sloped at an inclination of 1H to 1V down to the approved subgrade. The engineered fill should consist of OPSS Granular B Type II 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 should consist of Granular B Type II or an approved material and 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.

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

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

12. Floor Slab and Drainage Requirements

The ground slab for the proposed building addition may be designed and constructed as a slab-on-grade placed on a 200 mm thick layer of 19 mm sized clear stone bed itself placed on a minimum 300 mm thick engineered fill pad set on the approved native subgrade constructed in accordance with Section 11 of this report. The clear stone would minimize the capillary rise of moisture from the sub-soil to the floor slab. Alternatively, the floor slab may be cast on a 200 mm thick bed of OPSS Granular A overlain by a vapour barrier. Adequate saw cuts should be provided in the floor slabs to control cracking.

It is recommended that a perimeter drainage system should be provided around the proposed addition. An underfloor drainage system will not be required.

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

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

13. Excavation and De-Watering Requirements

13.1 Excess Soil Management

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

13.2 Excavations

This section of the report discusses excavation requirements for the construction of the building addition, the construction of the underground services (see Section 14) and the new surface parking lot (see Section 15).

Excavation for the construction of footings and the installation of underground services are anticipated to extend to a maximum depth of 3.0 m below the existing grade and will extend through the topsoil, fill, silty sand and into the native silty clay or glacial till. The groundwater level ranges from 1.2 m to 1.9 m depths (Elevation 104.4 m to Elevation 103.9 m). Excavations for footings at approximately Elevation 104.7 m are anticipated to be above groundwater level. Excavations for underground services are anticipated to be below the groundwater level.

The excavations may be undertaken by conventional heavy equipment capable of removing debris within the fill and cobbles and boulders within the glacial till.

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 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, provided the excavation is properly dewatered.

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.

Based on the confirmed bedrock depth, it has been assumed that excavations will not extend beyond the bedrock surface. This assumption should be revised once the proposed proposed pipe inverts are available.

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.

13.3 De-Watering Requirements

It is anticipated that excavations may extend up to 1.8 m below the recorded groundwater level and seepage of the surface and subsurface water into the excavations is anticipated. However, it should be possible to remove any water entering the excavation by collecting water in the perimeter of the excavation or pumping from sumps. In areas of high infiltration or in areas where more permeable soil layers may exist, a higher seepage rate should be anticipated and will require high-capacity pumps to keep the excavation dry.

For construction dewatering, an Environmental Activity and Sector Registry (EASR) approval may be obtained for water takings greater than 50 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.

14. Pipe Bedding Requirements

The maximum depth at which municipal services will be installed is anticipated/assumed to be at a 3.0 m depth below the existing grade. Therefore, the subgrade for the underground service pipes is expected to be within the silty clay or glacial till.

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

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

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

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

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

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

The on-site soils to be excavated are fill, silty sand, silty clay and glacial till.

The materials to be excavated from the site will comprise of topsoil, fill, silty sand, silty clay and glacial till. 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 non-organic fill (free of organics, debris, cobbles and boulders), silty sand and silty clay and glacial till, 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. Subject to additional examination and testing during construction, portions of the non-organic fill (free of organics, debris, cobbles and boulders), silty sand to sandy silt, silty clay and glacial till, free of organics, cobbles and boulders and below 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 and landscaped areas, but will likely require air-drying to reduce the moisture content to compact the materials to the specified degree of compaction. Air-drying may be problematic (difficult) since it is weather dependent, may take time and that the soils are subject to moisture absorption from 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 building, trench backfill and parking lot subgrade would have to be imported and should preferably conform to the following specifications: on-site excavated soils may be used for grading purposes in the landscaped areas

- 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 for footing trenches and against foundation walls located outside the proposed school building – OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 95 percent SPMDD,
- Trench backfill and subgrade fill for access roads, parking lots, 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.

Portions of the existing granular fill (free of debris, topsoil (organic soil), cobbles and boulders) from above the groundwater table may be able to be re-used a SSM material. The suitability of re-using these soils should be assessed during early stages of construction.

16. Pavement Structures and Concrete Sidewalks

16.1 Pavement Structures

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

Table VII: Recommended Pavement Structure Thicknesses

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

Notes:

1. SPMDD denotes standard Proctor maximum dry density, ASTM, D-698-12e2.
2. MRD denotes Maximum Relative Density, ASTM D2041.
3. The upper 300 mm of the subgrade fill must be compacted to 98 percent 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 and access roads are as follows:

1. As part of the subgrade preparation, the proposed parking area and access roads should be stripped of all existing fill, surficial and buried topsoil (organic) layers, organic stained soils 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).
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. Permanent subdrains should be installed on both sides of the access road(s). Permanent subdrains must be installed in the proposed parking area at low points and should be continuous between catchbasins to intercept excess surface and subsurface moisture and to prevent subgrade softening. This will ensure no water collects in the granular course, which could result in pavement

failure during the spring thaw. The location and extent of subdrains required within the paved areas should be reviewed by this office in conjunction with the proposed site grading.

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

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

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

16.2 Concrete Sidewalks and Plazas

The concrete sidewalks and concrete plazas should be designed and constructed in accordance with OPSS specification OPSS.MUNI 351. Additional comments on the construction of the concrete sidewalks are as follows:

- The subgrade is anticipated to consist of fill. The subgrade should be properly shaped, crowned and proofrolled in the full-time presence of a representative from this office. Any soft or spongy subgrade areas detected should be excavated and replaced with suitable approved backfill material compacted to 98 percent SPMDD.
- A filter cloth may be required to be placed at subgrade if directed by the geotechnical engineer
- The recommended granular structure beneath the concrete sidewalks should consist of 150 mm thick OPSS Granular A overlying 300 mm thick OPSS Granular B placed on competent subgrade. The Granular A and Granular B should be compacted to 100 percent SPMDD.
- Concrete should consist of 32 MPa air entrained (5 to 8 %) concrete with a welded wire mech
- The concrete should have a minimum thickness of 150 mm.

17. Corrosion Potential

Chemical tests limited to pH, sulphate, chloride and resistivity were undertaken on two (2) soil samples. A summary of the results is shown in Table VIII. The laboratory certificate of analysis is shown in Appendix C.

Table VIII: Corrosion Test Results on Soil Samples

Borehole – Sample No.	Depth (m)	Soil Type	pH	Sulphate (%)	Chloride (%)	Resistivity (ohm-cm)
BH1 SS4	2.3 - 2.9	Glacial Till	8.52	0.016	0.0076	2,970
BH7 SS4	2.3 - 2.9	Silty Clay	8.31	0.006	0.0035	5,150

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

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

18. New Sports Field Installation

A landscape architect should be consulted for the design of the new sport field installation (baseball diamond).

19. Tree Planting Restrictions

The guidelines indicate that for street trees in the road right-of-way, where sensitive marine clays have been identified, the trees are to have a setback equal to or greater than the full mature height of the tree. This setback can be reduced to 4.5 m for small (mature tree height up to 7.5m) and medium (mature tree height 7.5 m to 14.0 m) sized trees if a total of six conditions are met. Two of the six requirements, listed below, require comment from a geotechnical perspective.

- The modified plasticity index of the soil between the underside of footing (USF) and a depth of 3.5m generally does not exceed 40%. This corresponds to soils with low/medium potential for soil volume change.
- The foundation walls are to be reinforced at least nominally (minimum of two upper and two lower 15M bars in the foundation wall) to provide ductility as described in the Geotechnical Report

The silty clay which extends to 2.1 m to 4.0 depths (Elevation 104.0 m to 100.2 m) is considered to have a medium potential for soil volume change based on the modified plasticity index values ranging from 24 percent to 34 percent. For foundations walls which are reinforced at least nominally (minimum of two upper and two lower 15M bars in the foundation wall), the geotechnical conditions for a reduced setback have been met.

It should be noted that the following conditions below must also be met in order for the reduced setback to apply:

- The USF is 2.1m or greater below the lowest finished grade. Note: this footing level must be satisfied for footings within 10m of the tree, as measured from the centre of the tree trunk, and verified by means of the Grading Plan as indicated in the Procedural Changes below.
- A small size tree must be provided with a minimum of 25m3 of available soil volume, as determined by a Landscape Architect. A medium size tree must be provided with a minimum of 30m3 of available soil volume, as determined by a Landscape Architect. The developer will ensure the soil is generally uncompacted when backfilling in street tree planting locations.
- The tree species must be small to medium size, as confirmed by a Landscape Architect in the Landscape Plan
- Grading surrounding the tree must promote draining to the tree root zone (in such a manner as not to be detrimental to the tree), as noted on the subdivision Grading Plan.

Therefore, a reduced setback is applicable at this site for small size tree with a minimum of 25 m^3 of available soil volume and medium size trees with a minimum of 30 m^3 of available soil volume, as determined by a Landscape Architect.

this report supersedes

20. Additional Comments

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

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

21. General Comments

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

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

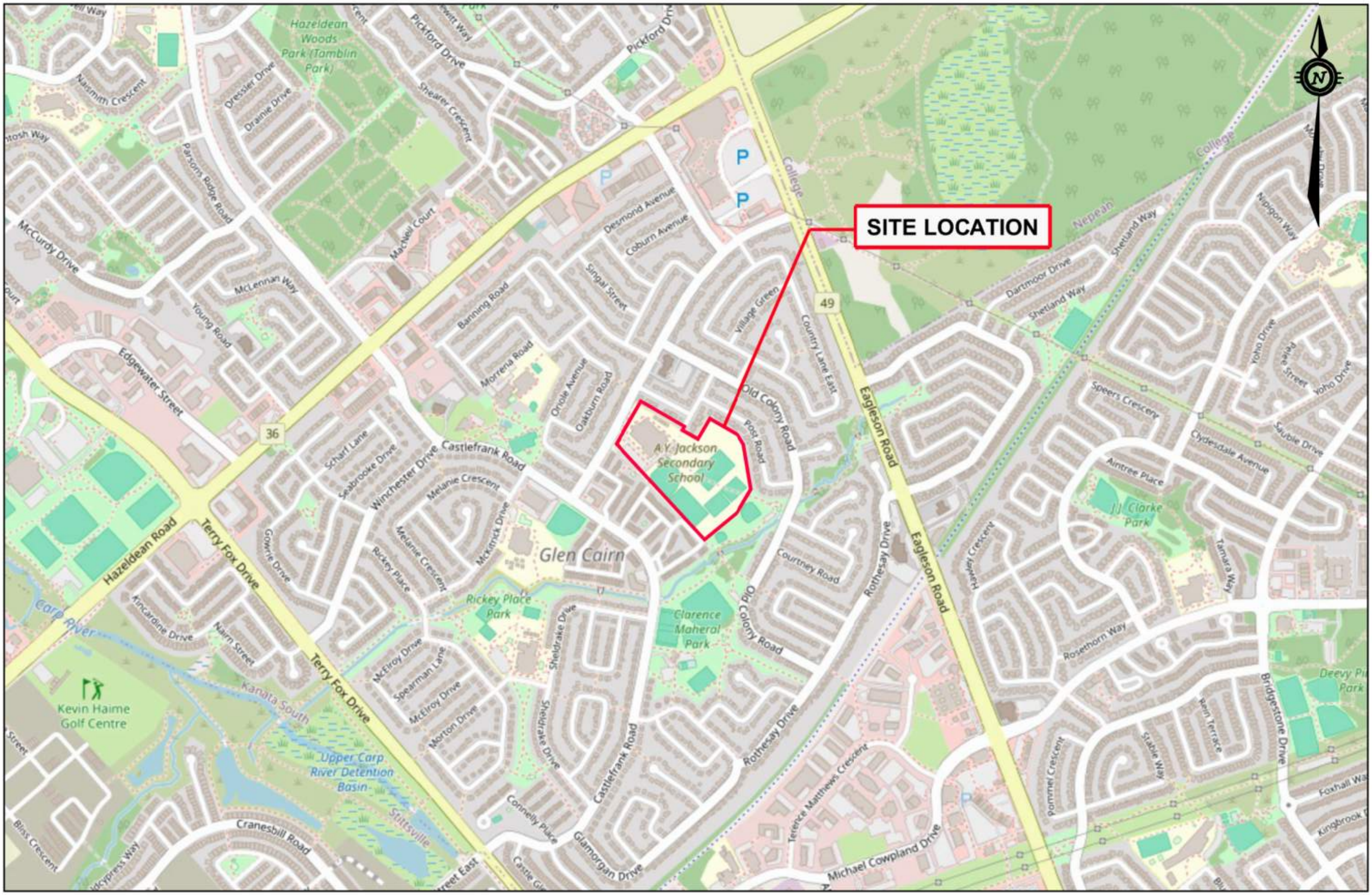
We trust that the information contained in this report will be satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Sincerely

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

Ismail Taki, M. Eng., P.Eng.
Senior Manager, Eastern Region
Earth & Environment

Figures



ORIGINAL SHEET SIZE = 11"x8.5"

0 150m 300m 600m

HORIZONTAL 1:15,000

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DESIGN IT/MZ	PRELIMINARY GEOTECHNICAL INVESTIGATION AY JACKSON SECONDARY SCHOOL 150 ABBEYHILL DRIVE, OTTAWA, ON		SCALE 1:15,000
DRAWN AS			SKETCH NO
DATE JUNE 2024	SITE LOCATION PLAN		FIG 1
FILE NO OTT-23012778-D0			

Filename: E:\OTT\OTT-23012778-D0\60 Execution\65 Drawings\OTT-23012778-D0_AY-Jackson-School_Geo.dwg
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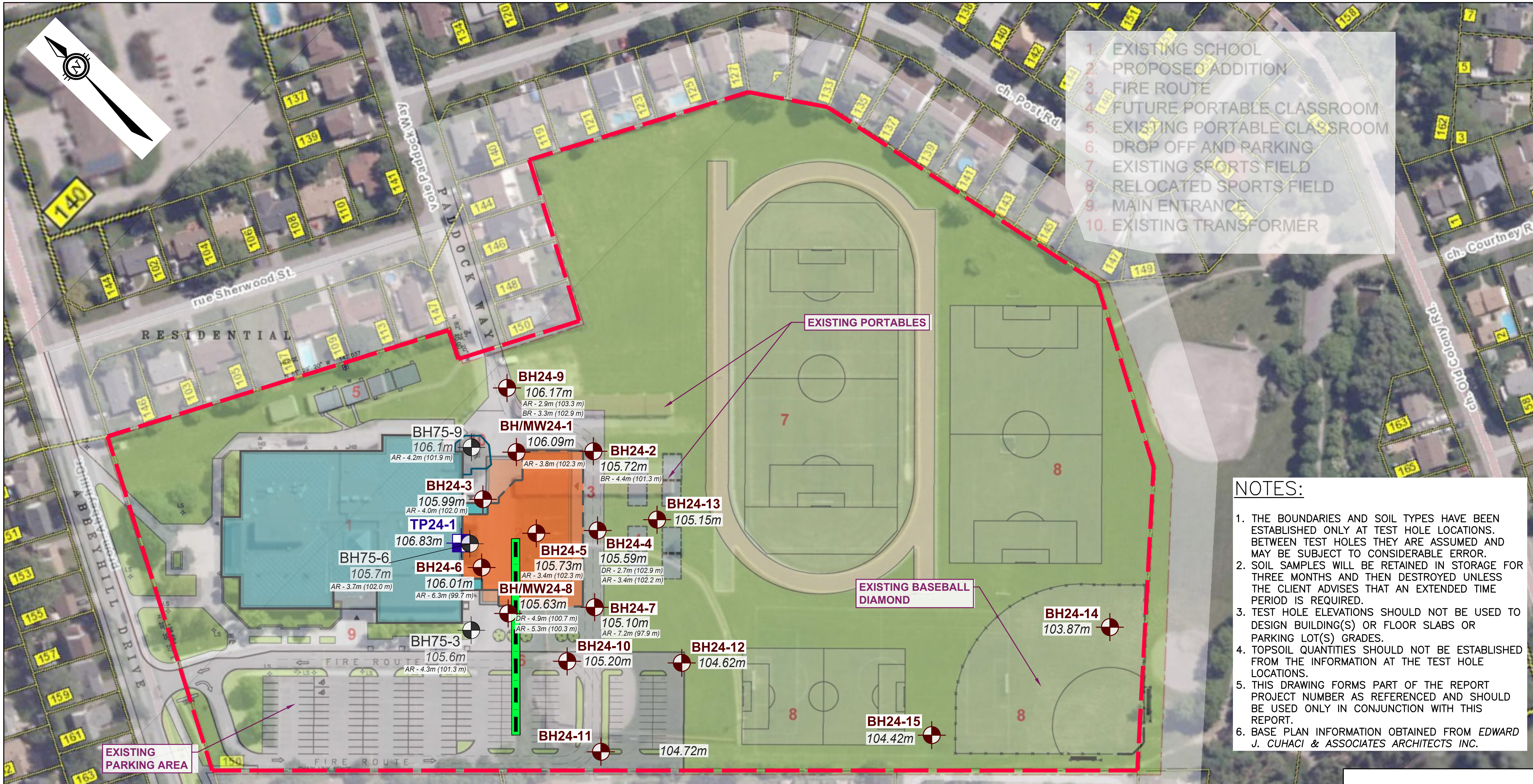

NOTES:

1. THE BOUNDARIES AND SOIL TYPES HAVE BEEN ESTABLISHED ONLY AT TEST HOLE LOCATIONS. BETWEEN TEST HOLES 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. TEST HOLE ELEVATIONS SHOULD NOT BE USED TO DESIGN BUILDING(S) OR FLOOR SLABS OR PARKING LOT(S) GRADES.
4. TOPSOIL QUANTITIES SHOULD NOT BE ESTABLISHED FROM THE INFORMATION AT THE TEST HOLE LOCATIONS.
5. THIS DRAWING FORMS PART OF THE REPORT PROJECT NUMBER AS REFERENCED AND SHOULD BE USED ONLY IN CONJUNCTION WITH THIS REPORT.
6. BASE PLAN INFORMATION OBTAINED FROM *EDWARD J. CUHACI & ASSOCIATES ARCHITECTS INC.*

ORIGINAL SHEET SIZE = 17"x11"

0 15m 30m 60m

HORIZONTAL 1:1500

LEGEND

- PROPERTY LINE
- EXISTING BUILDING
- PROPOSED NEW ADDITION
- APPROXIMATE MASW STUDY AREA
- BH24-1 BOREHOLE / MONITORING WELL NO. & LOCATION
- TP24-1 TEST PIT NO. & LOCATION
- BH75-3 BOREHOLE NO. & LOCATION (*PATTERSON GROUP*, 1975)

106.09m GROUND SURFACE ELEVATION (m)
3.8m (102.3m) AR – AUGER REFUSAL DEPTH (ELEVATION), m
2.7m (102.9m) CR – CONE REFUSAL DEPTH (ELEVATION), m
4.4m (101.3m) BR – BEDROCK REFUSAL DEPTH (ELEVATION),m PROVEN BY CORING

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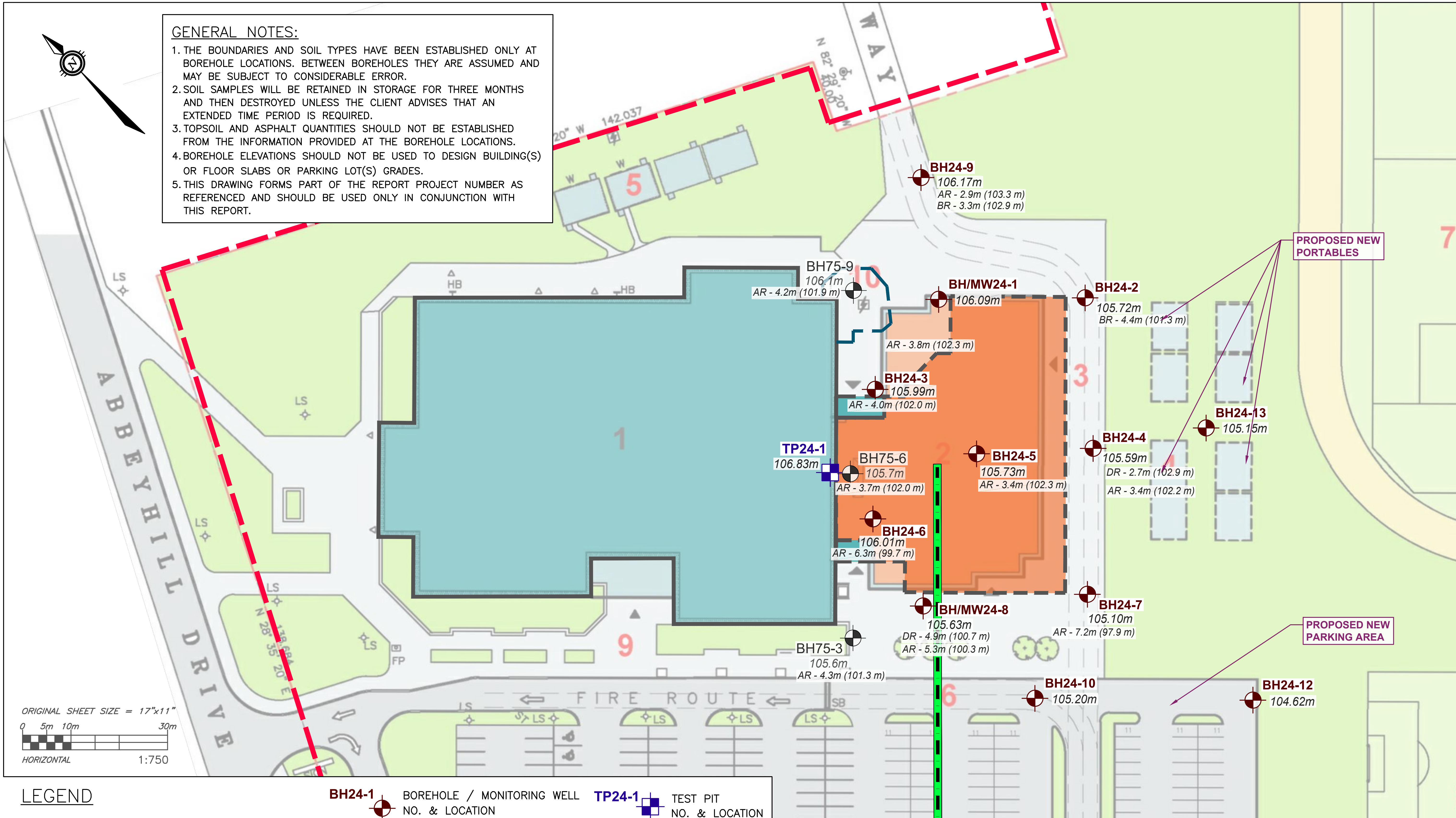
DESIGN IT/DW	PRELIMINARY GEOTECHNICAL INVESTIGATION AY JACKSON SECONDARY SCHOOL 150 ABBEYHILL DRIVE, OTTAWA, ON	SCALE 1:1,500
DRAWN AS		SKETCH NO
DATE JULY 2024	TEST HOLE LOCATION PLAN	FIG 2
FILE NO OTT-23012778-D0		

Filename: \\exp\data\OTT\OTT-23012778-D0\60 Execution\65 Drawings\OTT-23012778-D0_AY-Jackson-School_Geo.dwg
Last Saved: Dec 18, 2024 7:17 PM Last Plotted: Dec 18, 2024 8:54 PM Plotted by: WallD

GENERAL 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 AND ASPHALT 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 LINE

EXISTING BUILDING

PROPOSED NEW ADDITION

APPROXIMATE MASW STUDY AREA

BH24-1 BOREHOLE / MONITORING WELL NO. & LOCATION

BH75-3 BOREHOLE NO. & LOCATION (*PATTERSON GROUP*, 1975)

TP24-1 TEST PIT NO. & LOCATION

106.09m GROUND SURFACE ELEVATION (m)

3.8m (102.3m) AR – AUGER REFUSAL DEPTH (ELEVATION), m

4.4m (101.3m) BR – BEDROCK REFUSAL DEPTH (ELEVATION),m PROVEN BY CORING

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DESIGN	IT/DW
DRAWN	AS
DATE	JULY 2024
FILE NO	OTT-23012778-D0
SCALE	1:750
SKETCH NO	FIG 3

PRELIMINARY GEOTECHNICAL INVESTIGATION
AY JACKSON SECONDARY SCHOOL
150 ABBEYHILL DRIVE, OTTAWA, ON

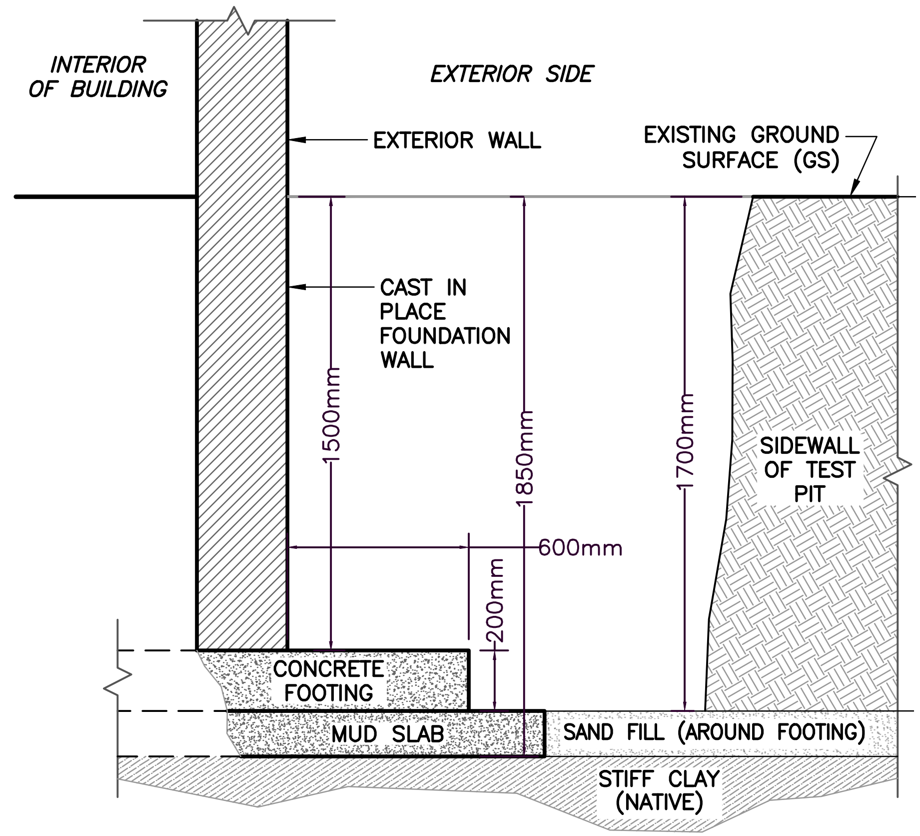
TEST HOLE LOCATION PLAN (NEW ADDITION ZOOM–IN)

Filename: \\exp\data\OTT\OTT-23012778-D0\60 Execution\65 Drawings\OTT-23012778-D0_AY-Jackson-School_Geo.dwg
Last Saved: Dec 18, 2024 7:17 PM Last Plotted: Dec 18, 2024 8:55 PM Plotted by: WalID

NOTES:

1) NO PERIMETER DRAINAGE SYSTEM (WEEPING TILE) PRESENT IN TEST PIT
2) NO DAMPPROOFING AND NO DRAINAGE BOARD ON VERTICAL FACE OF FOUNDATION WALL
3) GROUNDWATER WAS NOT ENCOUNTERED BELOW GROUND SURFACE IN THE TEST PIT UPON COMPLETION OF EXCAVATION
4) TEST PIT BACKFILLED UPON COMPLETION WITH BACKFILL NOMINALLY PACKED IN PLACE WITH BACKHOE BUCKET

TEST PIT TP24-1
PHOTOGRAPH



TEST PIT TP24-1
PROFILE / CROSS-SECTION
(SCALE – 1:25)

LEGEND/DEFINITION:

TOF = Top of Footing
USF = Underside of Footing

ORIGINAL SHEET SIZE = 11"x8.5"

0 0.2m 0.4m 1m

HORIZONTAL 1:25

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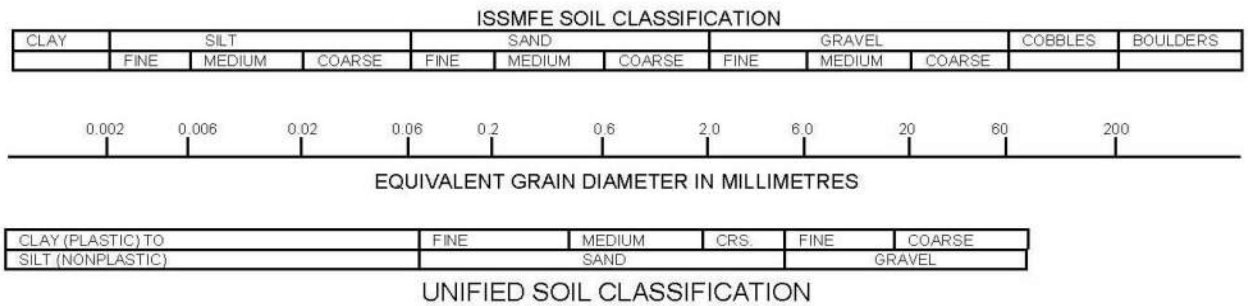
DESIGN IT/MZ	PRELIMINARY GEOTECHNICAL INVESTIGATION AY JACKSON SECONDARY SCHOOL 150 ABBEYHILL DRIVE, OTTAWA, ON	SCALE 1:25	
DRAWN AS		SKETCH NO	
DATE JULY 2024	TEST PIT TP24–1 PROFILE OF EXISTING FOOTING	FIG 4	
FILE NO OTT–23012778–D0			

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.



2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Log of Borehole BH-1

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Date Drilled: 'June 28, 2024

Drill Type: CME 55LC Rubber Track-Mounted Drill Rig

Datum: Geodetic Elevation

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

Figure No. 5

Page. 1 of 1

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

Depth (m)	Geodetic Elevation (m)	Soil Description	SPT N Value	Natural Moisture Content %	Samples
0	106.09	**ASPHALT** ~100 mm thick			
	106.0	**GRANULAR FILL** Crushed gravel and sand, grey, moist, (dense)	30	×	SS1
	105.3	Geotextile at 0.8 m depth **SILTY CLAY** Brown, moist, (stiff)	11	×	SS2
	104.19		8 ; Shear Strength by Penetrometer 96 kPa	× (with Atterberg Limits)	SS3
	104.0	**GLACIAL TILL** Silty sand with clay, gravel, cobbles and boulders, grey, (compact) Augers grinding below 2.2 m depth	11	×	SS4
			21	×	SS5
3.8	102.3	**Auger Refusal at 3.8 m Depth**			

Column headings: GWL; SYMBOL; SOIL DESCRIPTION; Geodetic Elevation 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

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm diameter standpipe was installed as shown.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
July 12, 2024	1.9	

CORE DRILLING RECORD

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

Log of Borehole BH-2

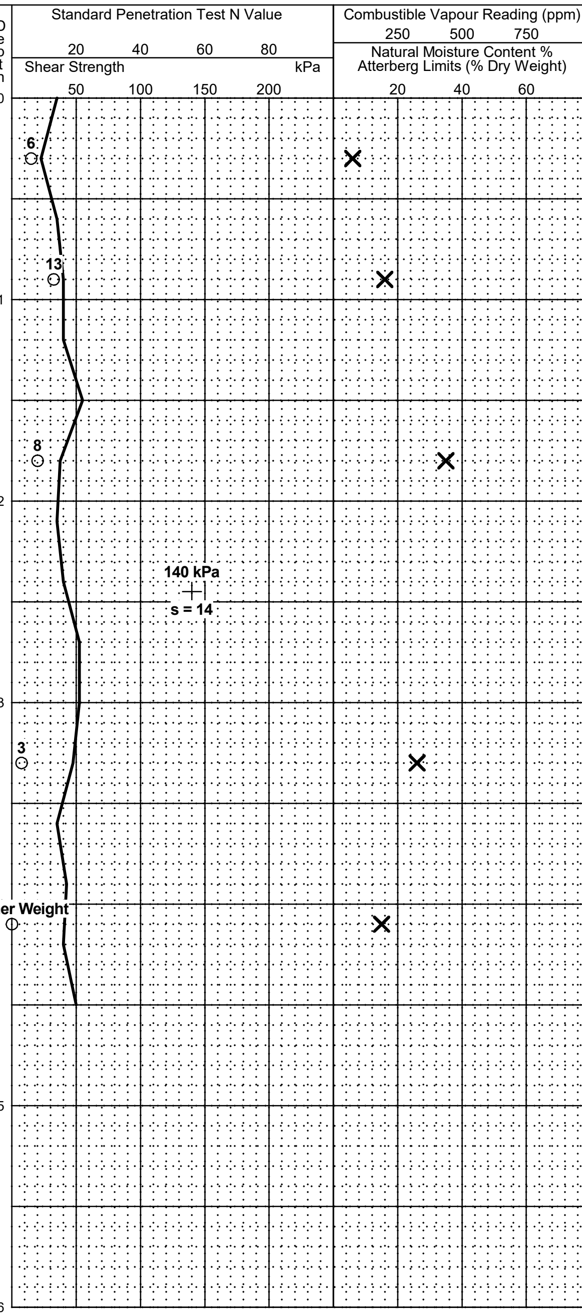
Project No:	OTT-23012778-D0
Project:	OCDSB A.Y. Jackson Secondary School Addition
Location:	150 Abbeyhill Drive, Ottawa, ON
Date Drilled:	'June 28, 2024
Drill Type:	CME 55LC Rubber Track-Mounted Drill Rig
Datum:	Geodetic Elevation
Logged by:	M.Z.
Checked by:	I.T.

Figure No. 6

Page. 1 of 2

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Samples	Natural Unit Wt. kN/m³
			105.72	0		
		GRANULAR FILL ~ 250 mm thick Crushed sand and gravel with topsoil inclusions, brown, moist, (loose) Geotextile at 0.25 m depth	105.5		SS1	
		TOPSOIL ~150 mm thick	105.3			
		FILL Sandy silty clay with sand pockets, brown, moist, (compact)	104.8		SS2	
		SILTY CLAY Light brown, moist, (very stiff)		1		
				2	SS3	
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (very loose)	103.0	3	SS4	
					SS5	
		SANDSTONE BEDROCK Grey	101.3		Run 1	
				5	Run 2	25.1
		Return water lost while coring at 5.5 m depth		6		



Continued Next Page

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Prior to Coring	3.0	Open to 6.2 m

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	4.4 - 4.6	100	0
2	4.6 - 6.2	97	96

Log of Borehole BH-2

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Figure No. 6

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
			99.72	6				
			99.5					
		Borehole Terminated at 6.2 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Prior to Coring	3.0	Open to 6.2 m

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	4.4 - 4.6	100	0
2	4.6 - 6.2	97	96

LOG OF BOREHOLE AY JACKSON SCHOOL ADDITION - JULY 12, 2024.GPJ TROW OTTAWA.GDT 8/22/24

Log of Borehole BH-3

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Figure No. 7

Page. 1 of 1

Date Drilled: 'July 2, 2024

Drill Type: CME 55 Truck-Mounted Drill Rig

Datum: Geodetic Elevation

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

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

Column headings: GWL; SYMBOL; SOIL DESCRIPTION; Geodetic Elevation 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/m^3

Soil Description	Geodetic Elevation (m)	Depth (m)	SPT N / Shear Strength	Sample
	105.99	0		
ASPHALT ~80 mm thick	105.9			
GRANULAR FILL ~370 mm thick Crushed sand and gravel, brown, moist, (compact) Geotextile at 0.45 m depth	105.5		13	SS1
FILL Sandy clayey silt, brown, moist	105.4		12	SS2
SILTY CLAY Light brown, moist, (very stiff)		1	7; 108 kPa; 170 kPa, s = 5.7	SS3
GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (very loose to loose)	103.3	3	5; Hammer Weight	SS4, SS5
Auger Refusal at 4.0 m Depth	102.0	4		

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Upon Completion	3.9	Open to 4.0 m

CORE DRILLING RECORD

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

Log of Borehole BH-4

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Figure No. 8

Page. 1 of 1

Date Drilled: 'June 27, 2024

Drill Type: CME 55LC Rubber Track-Mounted Drill Rig

Datum: Geodetic Elevation

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

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

SOIL DESCRIPTION	Geodetic Elevation m	Depth (m)	SPT N Value / Shear Strength	Natural Moisture Content %	Samples
	105.59	0			
TOPSOIL ~ 180 mm thick	105.4				
FILL Silty clay, light brown, moist, (loose)	105.0		9; 72 kPa		SS1
SILTY SAND With gravel, brown, moist, (loose)	104.4	1	8		SS2
SILTY CLAY Interbedded with silty sand layers, brown, wet, (firm)	103.3	2	5		SS3
SILTY CLAY Light brown, moist	102.9		1		SS4
GLACIAL TILL Silty sand with with clay, gravel, cobbles and boulders, grey, wet, (very loose to loose)	102.2	3	4		SS5
Auger Refusal at 3.4 m Depth					

Water level: 104.39

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/m^3

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm diameter stand pipe installed as shown.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
July 12, 2024	1.2	

CORE DRILLING RECORD

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

Log of Borehole BH-5

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Figure No. 9

Page. 1 of 1

Date Drilled: 'June 27, 2024

Drill Type: CME 55LC Rubber Track-Mounted Drill Rig

Datum: Geodetic Elevation

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

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

GWL	Symbol	Soil Description	Geodetic Elevation (m)	Depth (m)	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
		TOPSOIL ~ 200 mm thick	105.73	0				
		FILL Silty clay, trace sand, with topsoil inclusions, brown, moist, (loose)	105.5		6	×	SS1	
		SILTY CLAY Interbedded with silty sand, brown, wet, (stiff)	104.9	1	7	×	SS2	
				2	6; 96 kPa	×	SS3	
					Hammer Weight; 96 kPa; >250 kPa	×	SS4	
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (loose)	102.7	3	2, 2 / 75 mm then bouncing	×	SS5	
		Auger Refusal at 3.4 m Depth	102.3					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Upon Completion	Dry to 3.4 m	Open to 3.4 m

CORE DRILLING RECORD

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

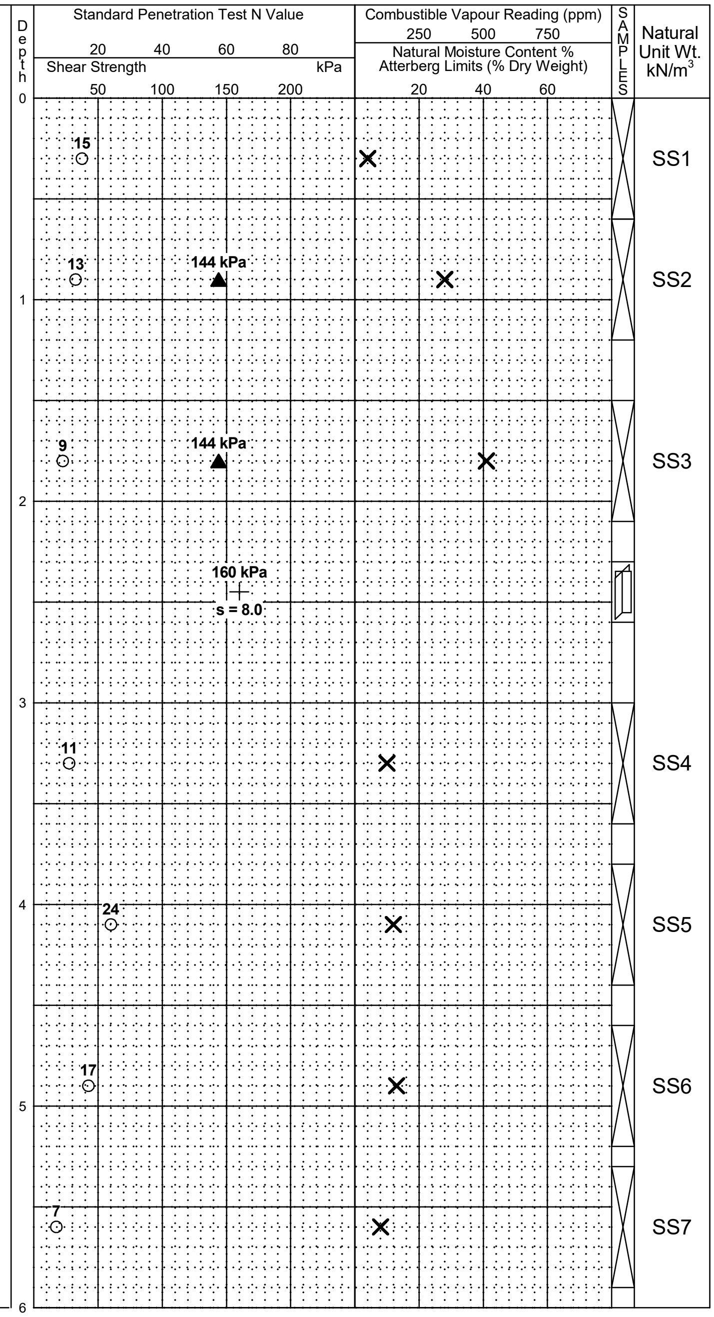
Log of Borehole BH-6

Project No:	OTT-23012778-D0
Project:	OCDSB A.Y. Jackson Secondary School Addition
Location:	150 Abbeyhill Drive, Ottawa, ON
Date Drilled:	'June 27, 2024
Drill Type:	CME 55LC Rubber Track-Mounted Drill Rig
Datum:	Geodetic Elevation
Logged by:	M.Z.
Checked by:	I.T.

Figure No. 10

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
			106.01	0
		ASPHALT ~80 mm thick	105.9	
		GRANULAR FILL ~420 mm thick Crushed sand and gravel, brown, moist, (compact) Geotextile at 0.5 m depth	105.5	
		SILTY CLAY Light brown, moist, (very stiff)	103.2	
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (loose to compact)		6



Continued Next Page

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Upon Completion	3.3	5.5

CORE DRILLING RECORD

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

Log of Borehole BH-6

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Figure No. 10

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
			100.01	6	5 / 125 mm then bouncing		SS8	
			99.7					
		Auger Refusal at 6.3 m Depth						

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Upon Completion	3.3	5.5

CORE DRILLING RECORD

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

Log of Borehole BH-7

Project No: OTT-23012778-D0

Figure No. 11

Page. 1 of 2

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Date Drilled: 'June 27, 2024

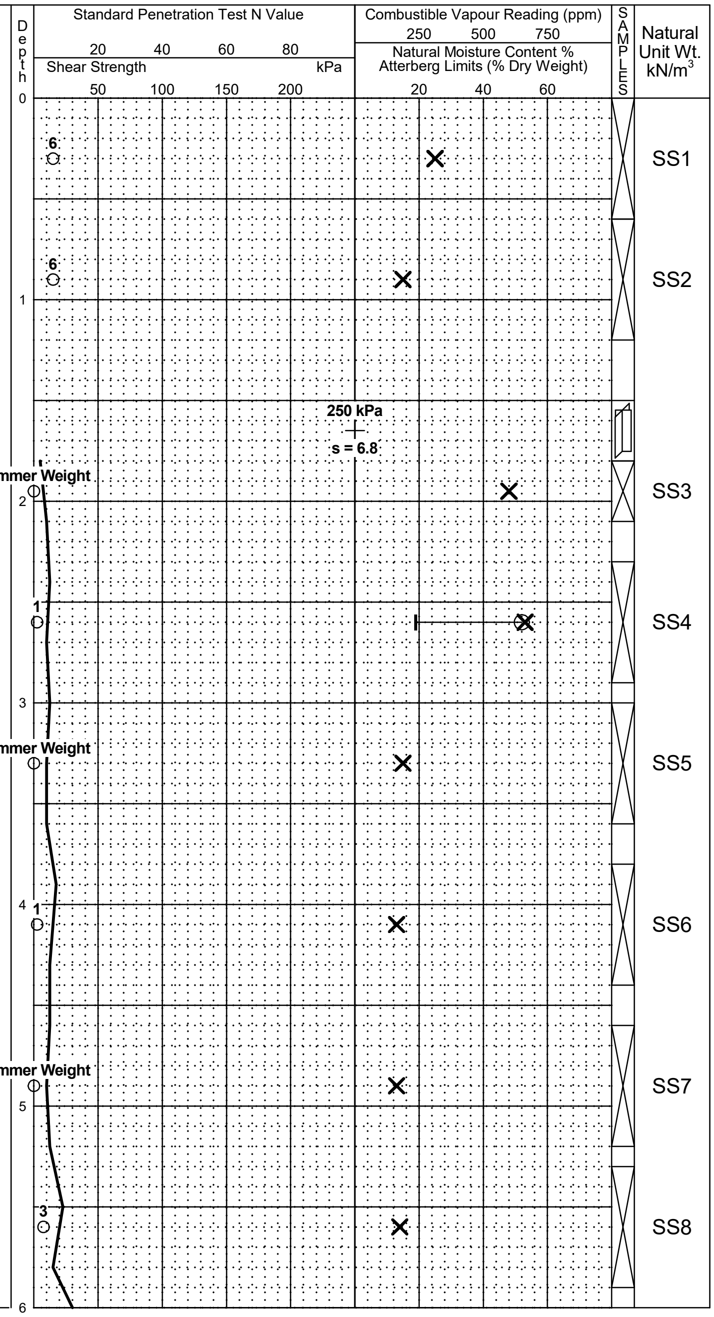
Drill Type: CME 55LC Rubber Track-Mounted Drill Rig

Datum: Geodetic Elevation

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
			105.1	0
		TOPSOIL ~200 mm thick	104.9	
		FILL Silty sand, some clay, topsoil inclusions, brown, damp, (loose)	104.3	
		SILTY CLAY Light brown, moist, (hard)		1
		With sand seams to 1.5 m depth		2
			102.1	3
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (very loose to dense)		4, 5, 6



Continued Next Page

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Upon Completion	3.0	5.5

CORE DRILLING RECORD

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

Log of Borehole BH-7

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Figure No. 11

Page. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		GLACIAL TILL Silty sand with clay, gravel, cobbles and boulders, grey, wet, (very loose to dense) *(continued)*	99.1	6	31			SS9
				7				
			97.9					
		Auger Refusal at 7.2 m Depth						

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Upon Completion	3.0	5.5

CORE DRILLING RECORD

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

Log of Borehole BH-8

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Figure No. 12

Page. 1 of 1

Date Drilled: 'June 27, 2024

Drill Type: CME 55LC Rubber Track-Mounted Drill Rig

Datum: Geodetic Elevation

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

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

Depth (m)	Geodetic Elevation (m)	Soil Description	SPT N Value	Shear Strength (kPa)	Natural Moisture Content %	Sample
0	105.63 / 105.6	**ASPHALT** ~50 mm thick				
0.05–0.5		**GRANULAR FILL** ~450 mm thick. Crushed sand and gravel, brown, damp, (compact). Geotextile at 0.5 m depth	26			SS1
0.5	105.1	**SILTY CLAY** Light brown, moist, (stiff to very stiff)	12	96 kPa		SS2
	103.93		6			SS3
				150 kPa, s = 7.5		
3.0	102.6	**GLACIAL TILL** Silty sand with clay, gravel, cobbles and boulders, grey, wet, (very loose to compact)	1			SS4
			13			SS5
			18			SS6
5.3	100.3	**Auger Refusal at 5.3 m Depth**				

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm diameter Standpipe was installed as shown.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
July 12, 2024	1.7	

CORE DRILLING RECORD

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

Log of Borehole BH-9

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Figure No. 13

Page. 1 of 1

Date Drilled: 'July 2, 2024

Drill Type: CME 55 Truck-Mounted Drill Rig

Datum: Geodetic Elevation

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

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

SOIL DESCRIPTION	Geodetic Elevation m	Depth (m)	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
	106.17	0				
ASPHALT ~100 mm thick	106.1					
GRANULAR FILL ~400 mm thick Crushed limestone, grey, damp, (compact) Geotextile at 0.5 m depth	105.7		23			SS1
FILL Clayey silty sand, brown, moist, (compact)	105.3		10			SS2
SILTY CLAY Light brown, moist, (stiff)		1	7; 72 kPa			SS3
GLACIAL TILL Sandy silt with clay, gravel, cobbles and boulders, light brown, moist to wet, (loose)	103.9	2	4			SS4
SANDSTONE BEDROCK Grey	102.9	3				Run 1 25.0
Borehole Terminated at 4.0 m Depth	102.2	4				

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.9 - 4	79	56

Log of Borehole BH-10

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Figure No. 14

Page. 1 of 1

Date Drilled: 'June 27, 2024

Drill Type: CME 55LC Rubber Track-Mounted Drill Rig

Datum: Geodetic Elevation

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

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

Geodetic Elevation (m)	Depth (m)	Soil Description	SPT N Value	Shear Strength (kPa)	Natural Moisture Content %	Samples
105.2	0	**GRANULAR FILL** ~ 250 mm thick Sand and fine gravel, crushed, light brown, moist, (loose)				
105.0		**TOPSOIL** ~ 300 mm thick	7		×	SS1
104.6		**SILTY SAND** Brown, moist				
104.3		**SILTY CLAY** Light brown, moist, (very stiff)	10		×	SS2
	1		4		×	SS3
	2			170 kPa, s = 8.5		Shelby Tube
102.2	3	**GLACIAL TILL** Silty sand with clay, gravel, cobbles and boulders, grey, wet, (very loose)	2		×	SS4
101.5		**Borehole Terminated at 3.7 m Depth**				

Column headings: GWL; SYMBOL; SOIL DESCRIPTION; Geodetic Elevation 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/m^3

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Upon Completion	2.7	Open to 3.7 m

CORE DRILLING RECORD

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

Log of Borehole BH-11

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Figure No. 15

Page. 1 of 1

Date Drilled: 'July 2, 2024

Drill Type: CME 55 Truck-Mounted Drill Rig

Datum: Geodetic Elevation

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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/m^3
			104.72	0				
		TOPSOIL ~ 220 mm thick	104.5					
		FILL Silty clay, some sand, brown, moist, (compact)	104.1		11	×	SS1	
		SILTY CLAY Brown, moist, (very stiff)			10	×	SS2	
		Some sand from 0.6 m to to 1.2 m depth		1				
					6	×	SS3	
				2				
					180 kPa, s = 9.0			
		SILTY CLAY Grey, wet, (firm)	101.7	3	2	×	SS4	
					38 kPa, s = 7.6			
		Borehole Terminated at 4.0 m Depth	100.7	4				

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Upon Completion	no water	Open to 4.0 m

CORE DRILLING RECORD

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

Log of Borehole BH-12

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Figure No. 16

Page. 1 of 1

Date Drilled: 'June 27, 2024

Drill Type: CME 55LC Rubber Track-Mounted Drill Rig

Datum: Geodetic Elevation

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		TOPSOIL ~ 300 mm thick	104.62	0				
		SILTY SAND Brown, moist, (loose)	104.3		N = 6		⊠	SS1
		SILTY CLAY Brown, moist, (stiff to very stiff)	104.0		N = 8; 120 kPa (▲)		⊠	SS2
				1				
					N = 3		⊠	SS3
				2	86 kPa (+), s = 7.2			
		SILTY CLAY Grey, wet	101.9					
				3	Hammer Weight		⊠	SS4
		Borehole Terminated at 3.7 m Depth	100.9					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Upon Completion	Dry to 3.7 m	Open to 3.7 m

CORE DRILLING RECORD

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

Log of Borehole BH-13

exp.

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Figure No. 17

Page. 1 of 1

Date Drilled: 'July 2, 2024

Drill Type: CME 55 Truck-Mounted Drill Rig

Datum: Geodetic Elevation

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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/m^3
		TOPSOIL ~ 300 mm thick	105.15	0				
		FILL Sandy silty clay, brown, moist, (loose)	104.9		8	X	⊠	SS1
		SILTY CLAY Light brown, moist, (stiff to very stiff)	104.6		7; 96 kPa ▲	X	⊠	SS2
				1				
					190 kPa + s = 7.6			
				2				
		GLACIAL TILL Silty clay with sand, gravel, cobbles and boulders, grey, wet, (very loose)	102.9		2	X	⊠	SS3
				3	3	X	⊠	SS4
		Borehole Terminated at 3.7 m Depth	101.5					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Upon Completion	Dry to 3.7 m	Open to 3.7 m

CORE DRILLING RECORD

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

Log of Borehole BH-14

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Figure No. 18

Page. 1 of 1

Date Drilled: 'June 28, 2024

Drill Type: CME 55LC Rubber Track-Mounted Drill Rig

Datum: Geodetic Elevation

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		TOPSOIL ~ 300 mm thick	103.87	0				
		FILL Silty clay, trace sand, brown, moist, (loose)	103.6		8	✕	SS1	
		SILTY CLAY Brown, moist, (very stiff)	103.3		7	✕	SS2	
		With sand seams from 0.6 m to 1.2 m depth		1				
					8	✕	SS3	
				2	115 kPa + s = 4.6			
		SILTY CLAY Grey, wet, (firm)	100.9	3	Hammer Weight	✕	SS4	
		Borehole Terminated at 3.7 m Depth	100.2					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Upon Completion	2.9	Open to 3.7 m

CORE DRILLING RECORD

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

Log of Borehole BH-15

Project No: OTT-23012778-D0

Project: OCDSB A.Y. Jackson Secondary School Addition

Location: 150 Abbeyhill Drive, Ottawa, ON

Figure No. 19

Page. 1 of 1

Date Drilled: 'June 28, 2024

Drill Type: CME 55LC Rubber Track-Mounted Drill Rig

Datum: Geodetic Elevation

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

Legend: Split Spoon Sample; Auger Sample; SPT (N) Value; Dynamic Cone Test; Shelby Tube; Shear Strength by Vane Test; Combustible Vapour Reading; Natural Moisture Content; Atterberg Limits; Undrained Triaxial at % Strain at Failure; Shear Strength by Penetrometer Test

Column headings: GWL | SYMBOL | SOIL DESCRIPTION | Geodetic Elevation 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/m^3

Geodetic Elevation (m)	Soil Description
104.42	**TOPSOIL** ~ 300 mm thick
104.1	**FILL** Silty clay, brown, moist, (loose)
103.8	**SILTY CLAY** Brown, moist, (stiff)
103.0	**SILTY CLAY** Grey, wet, (firm)
101.0	**Borehole Terminated at 3.4 m Depth**

Sample	SPT N	Shear Strength
SS1	6	
SS2	8	96 kPa (penetrometer)
SS3	3	36 kPa (penetrometer)
SS4	1	
Shelby Tube		43 kPa (vane), s = 9.0

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-23012778-D0

WATER LEVEL RECORDS

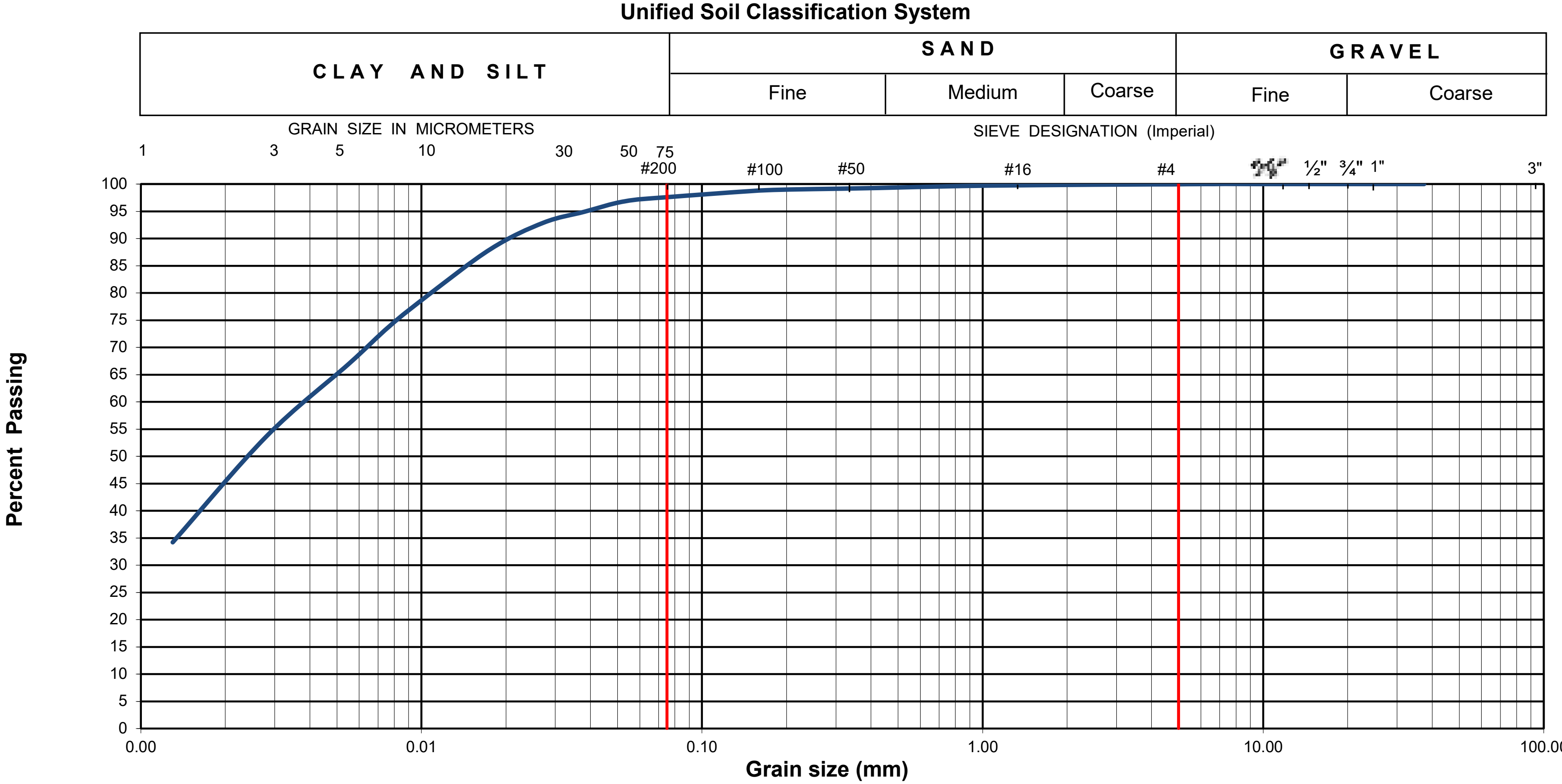
Date	Water Level (m)	Hole Open To (m)
Upon Completion	2.9	Open to 3.4 m

CORE DRILLING RECORD

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

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

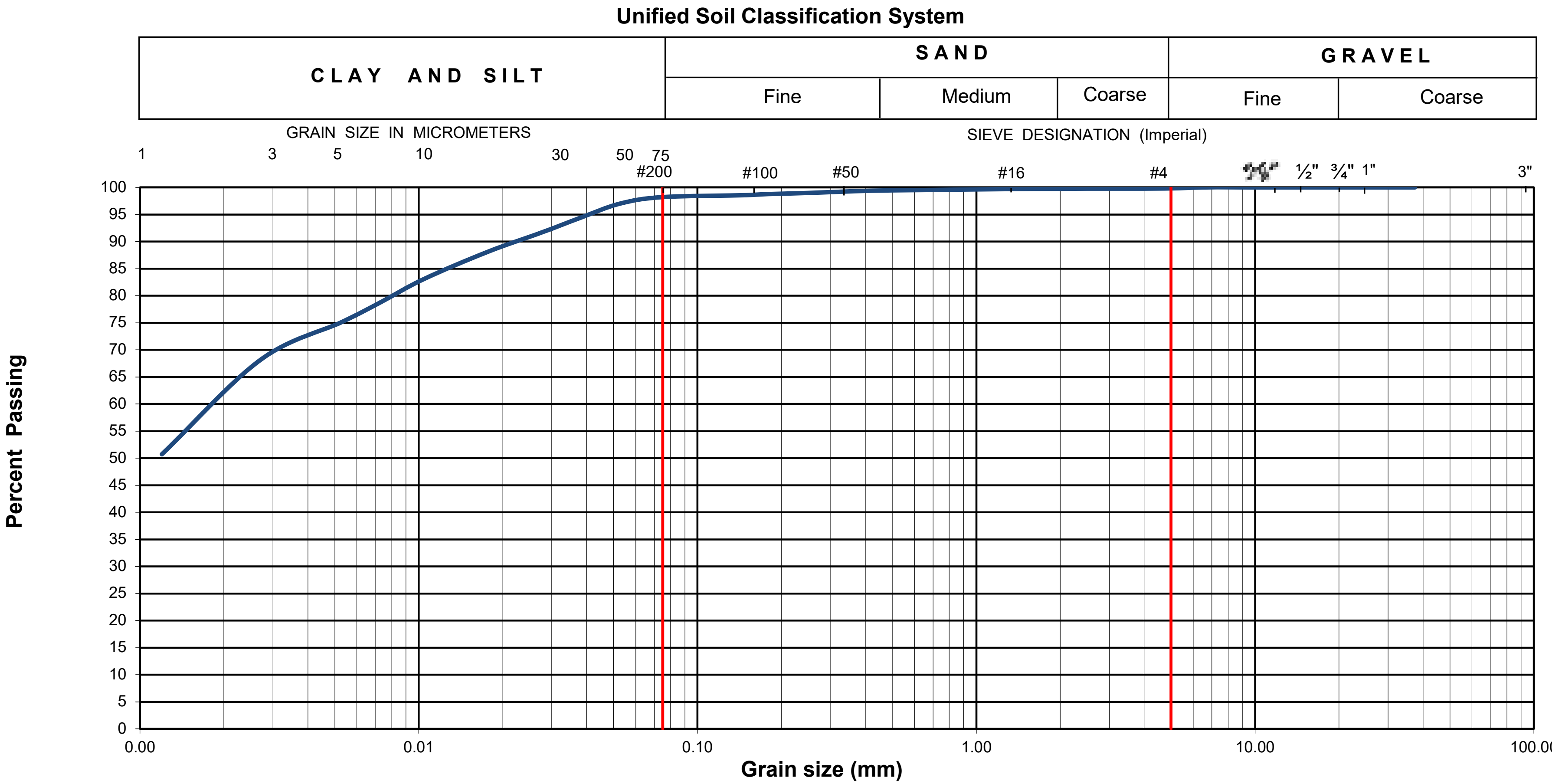
Grain-Size Distribution Curve
Method of Test For Sieve Analysis of Aggregate
ASTM C-136



EXP Project No.:	OTT-23012778-D0	Project Name :	Geotechnical Investigation - Proposed Residential Development.						
Client :	Ottawa Carleton District School Board	Project Location :	50 Abbey Hill Drive,, Kanata Ottawa						
Date Sampled :	June 28, 2024	Borehole No:	BH 1		Sample:	3		Depth (m) :	1.5 - 2.1 m
Sample Composition :		Gravel (%)	0	Sand (%)	1	Silt & Clay (%)	98	Figure :	20
Sample Description :	Silty Clay of Medium Plasticity (CI), trace sand								

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

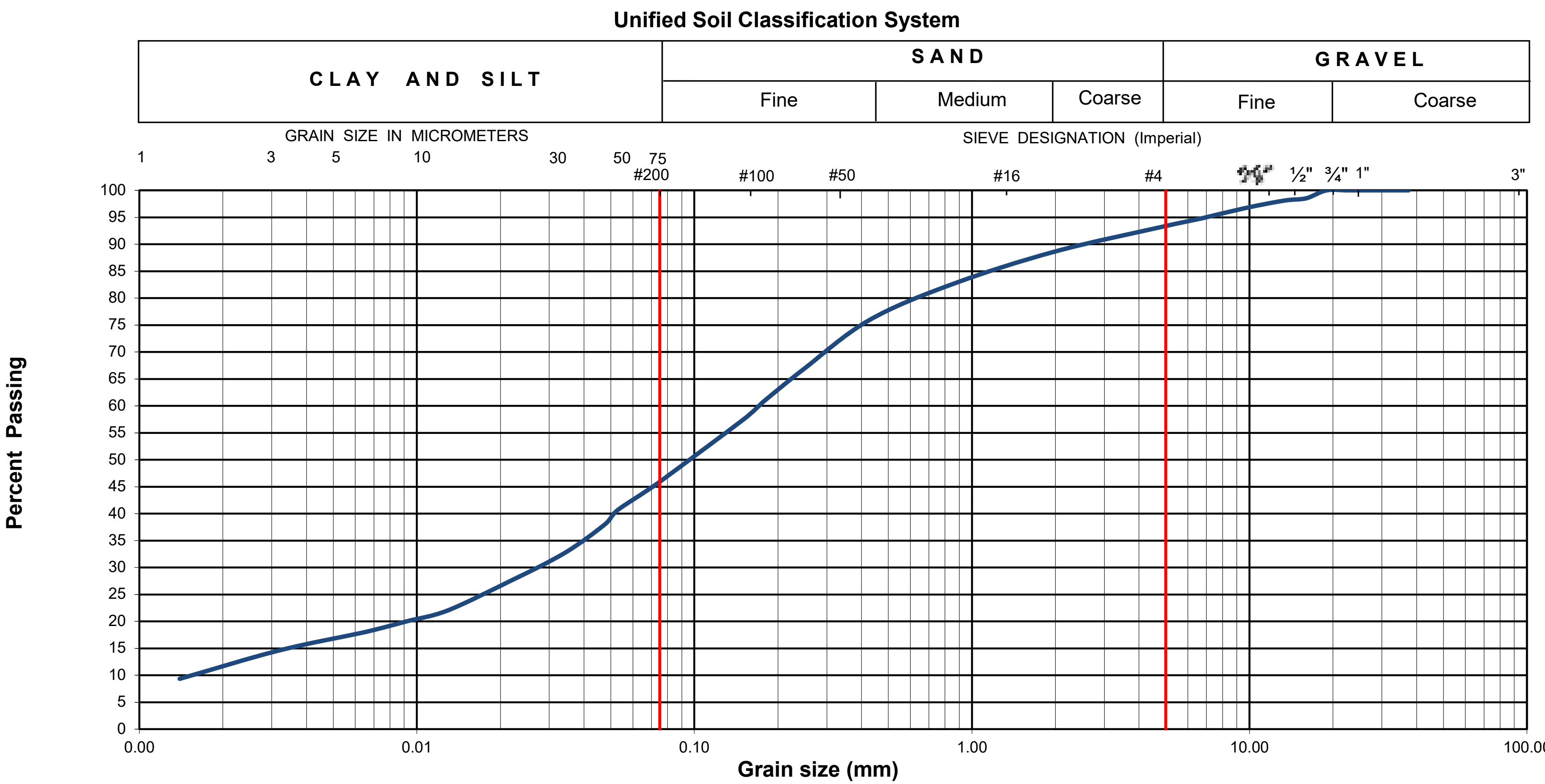
Grain-Size Distribution Curve
Method of Test For Sieve Analysis of Aggregate
ASTM C-136



EXP Project No.:	OTT-23012778-D0	Project Name :	Geotechnical Investigation - Proposed Addition						
Client :	Ottawa Carleton District School Board	Project Location :	50 Abbey Hill Drive,, Kanata Ottawa						
Date Sampled :	June 27, 2024	Borehole No:	BH 7	Sample:	4			Depth (m) :	2.3-2.9m
Sample Composition :		Gravel (%)	0	Sand (%)	1	Silt & Clay (%)	98	Figure :	21
Sample Description :	Silty Clay of High Plasticity (CH), trace sand								

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

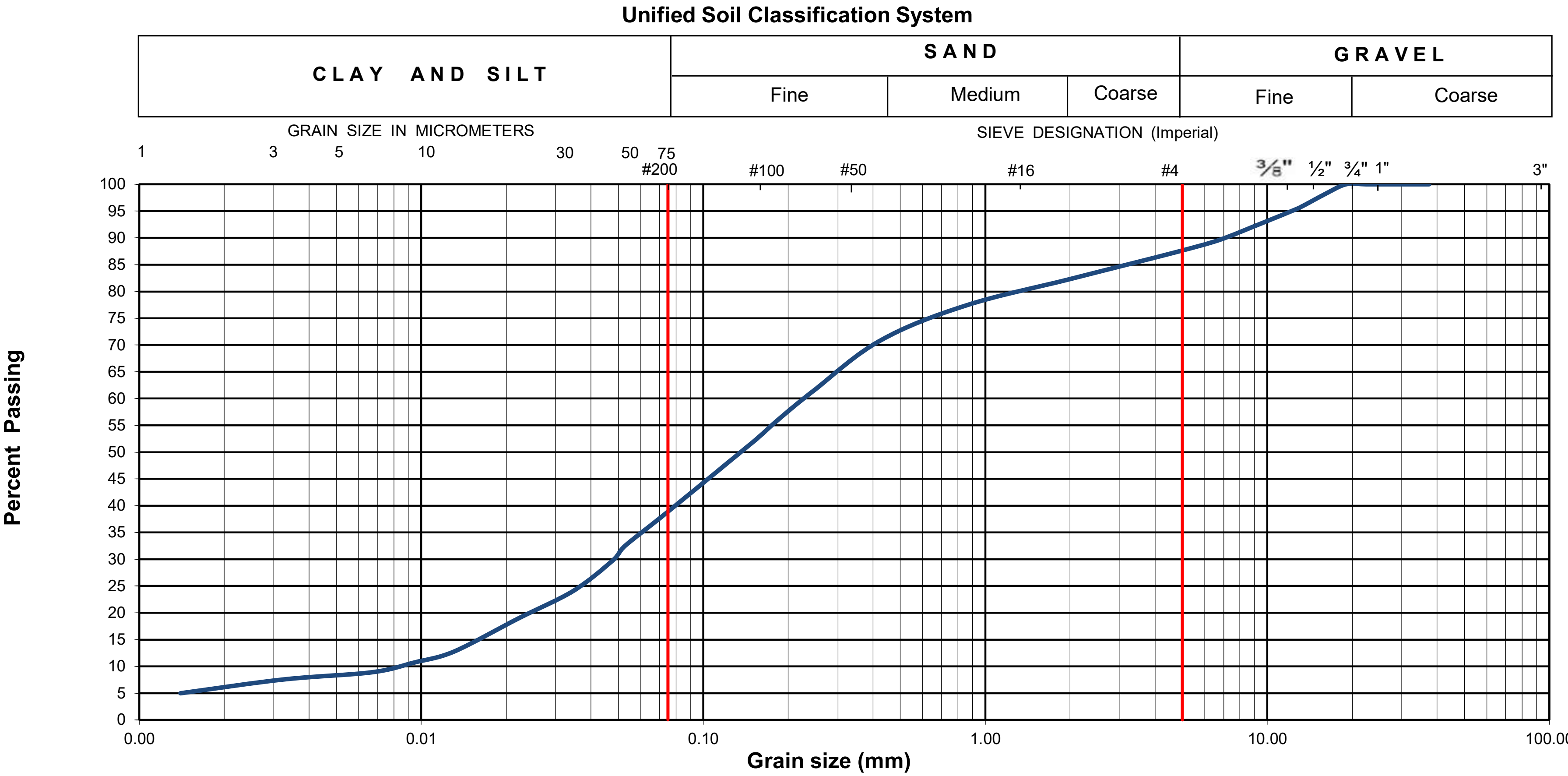
Grain-Size Distribution Curve
Method of Test For Sieve Analysis of Aggregate
ASTM C-136



EXP Project No.: OTT-23012778-D0	Project Name : Geotechnical Investigation - Proposed Addition						
Client : Ottawa Carleton District School Board	Project Location : 50 Abbey Hill Drive,, Kanata Ottawa						
Date Sampled : June 27, 2024	Borehole No:	BH 4	Sample:	5		Depth (m) :	3.0 - 3.6
Sample Composition :	Gravel (%)	7	Sand (%)	47	Silt & Clay (%) 46	Figure :	22
Sample Description :	Glacial Till - Silty Sand (SM), some clay and trace gravel						

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

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



EXP Project No.:	**OTT-23012778-D0**	**Project Name :**	**Geotechnical Investigation - Proposed Addition**				
Client :	**Ottawa Carleton District School Board**	**Project Location :**	**50 Abbey Hill Drive,, Kanata Ottawa**				
Date Sampled :	**June 27, 2024**	**Borehole No:**	**BH 8**	**Sample:**	**6**	**Depth (m) :**	**4.6 - 5.2 m**
Sample Composition :		**Gravel (%)**	**10**	**Sand (%)**	**51**	**Silt & Clay (%)**	**69**
Sample Description :	**Glacial Till - Silty Sand (SM), some gravel, trace clay**					**Figure :**	**23**

Appendix A – MASW Seismic Survey

July 11th, 2024

Transmitted by email : ismail.taki@exp.com
Our ref : GPR24-05486-e

Mr. Ismail Taki, M.Eng., P.Eng.
Senior Manager, Earth & Environment, Eastern Region
exp Services inc.
100 - 2650 Queensview Drive
Ottawa ON K2B 8H6

Subject: Shear Wave Velocity Sounding for the Site Class Determination
150 Abbeyhill Drive, Kanata, Ottawa (ON)

[Project: OTT-23012778-D0]

Dear Mr. Taki,

Geophysics GPR International inc. has been mandated by **exp** Services inc. to carry out seismic surveys at the AY Jackson Secondary School, located at 150 Abbeyhill Drive, Kanata, in Ottawa (ON). The geophysical investigation used the Multi-channel Analysis of Surface Waves (MASW), the Spatial AutoCorrelation (SPAC), and the seismic refraction method. 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 May 15th, 2024, by Mrs. Karyne Faguy, B.Sc. geophysics and Mr. Charles Trottier, M.Sc. physics. 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 south of the actual building (Figure 2). The geophone spacing was 3.0 metres for the main spread, using 24 geophones, and 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 MK6 (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. An 8 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 refraction (V_P) the rock was calculated between 4.5 and 7.4 metres deep (± 1 metre). Its rock seismic velocity (V_S) was calculated at 1860 m/s. These parameters were used for the geophysical models prior to the MASW results inversions.

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:

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

(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 769.6 m/s (Table 1), corresponding to the Site Class "B". However, the Site Classes A and B are not to be used if there is 3 metres or more of unconsolidated material between the rock and the bottom of the spread footing or mat foundation.

In the case there would be 1.0 metre or less of soil between the rock and the bottom of the foundation, the $\overline{V}_{S30}$ * value would be greater than 1500 m/s, corresponding to the Site Class A.

CONCLUSION

Geophysical surveys were carried out at the AY Jackson Secondary School, located at 150 Abbeyhill Drive, Kanata, in Ottawa (ON). The seismic surveys used the MASW and SPAC analysis, and the seismic refraction to calculate the $\overline{V}_{S30}$ value.

The $\overline{V}_{S30}$ value of the actual site is 770 m/s, corresponding to the Site Class "B" ($760 < \overline{V}_{S30} \leq 1500$ 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 the Site Classes A and B are not to be used if there is 3 metres or more of unconsolidated material between the rock and the bottom of the spread footing or mat foundation.

In the case there would be 1.0 metre or less of soil between the rock and the bottom of the foundation, the $\overline{V}_{S30}$* value would be greater than 1500 m/s, corresponding to the Site Class A.

It must also 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,

P.Eng.

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

LICENSED PROFESSIONAL ENGINEER
J.-L. ARSENAULT
100148122
PROVINCE OF ONTARIO
2024-07-11

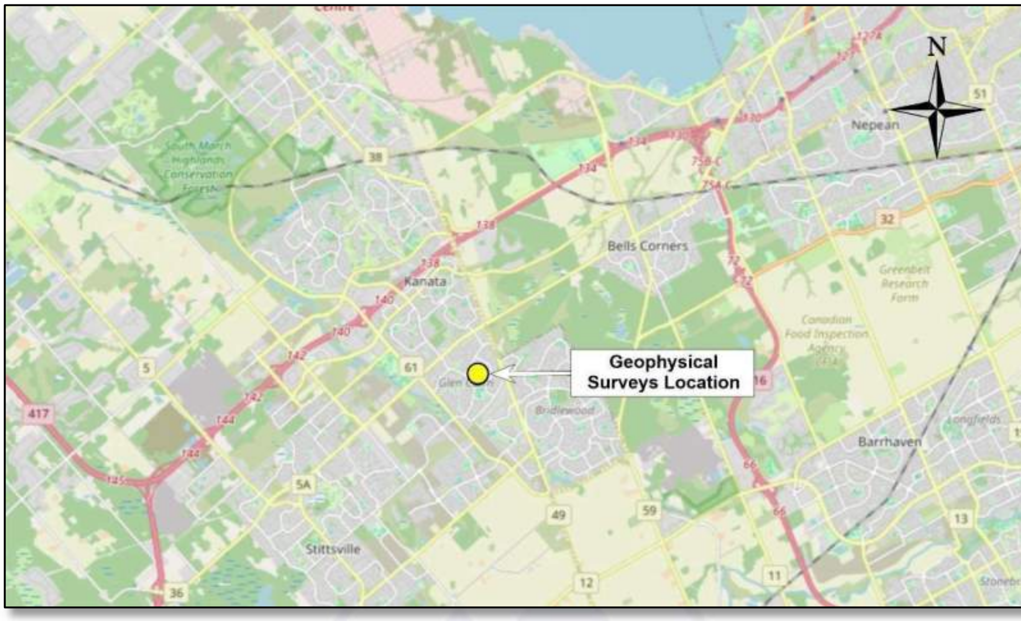


Figure 1: Regional location of the Site
(Source : OpenStreetMap©)

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

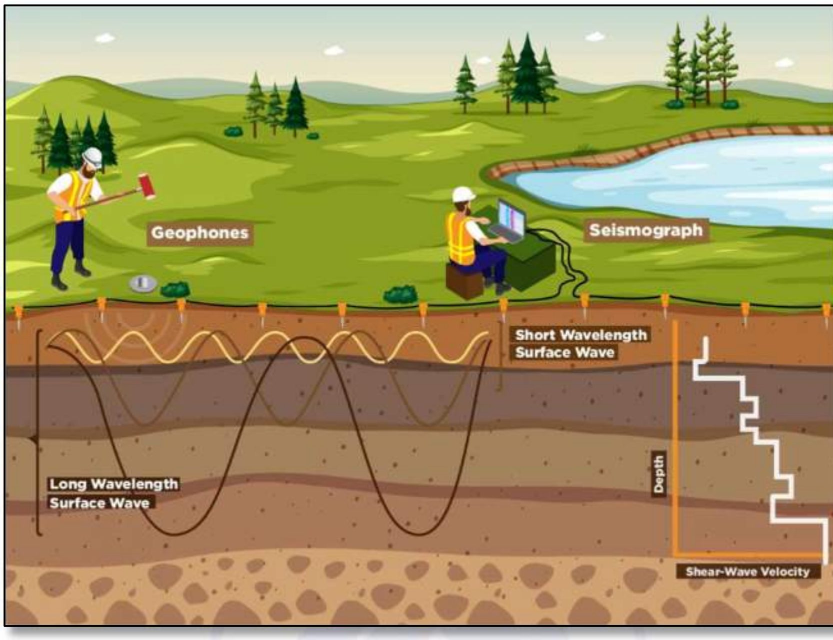


Figure 3: MASW Operating Principle

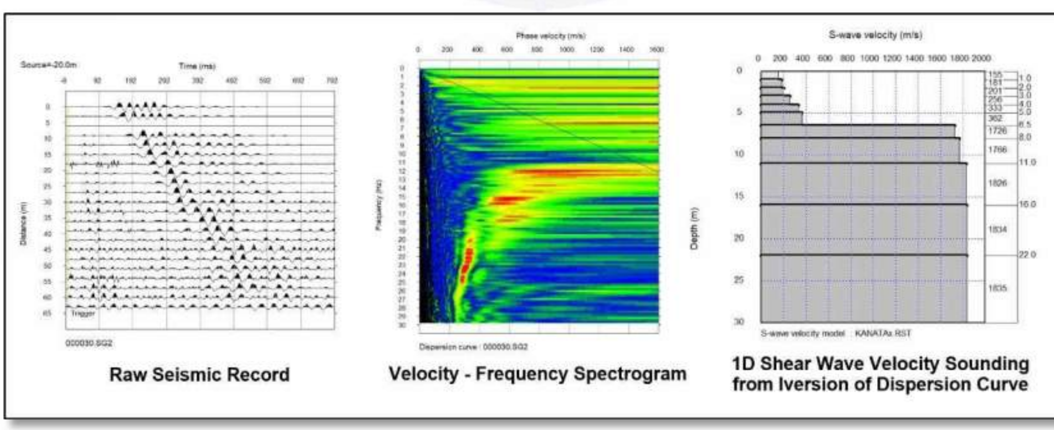


Figure 4: Example of a MASW/SPAC record, Phase Velocity - Frequency curve of the Rayleigh wave and resulting 1D Shear Wave Velocity Model

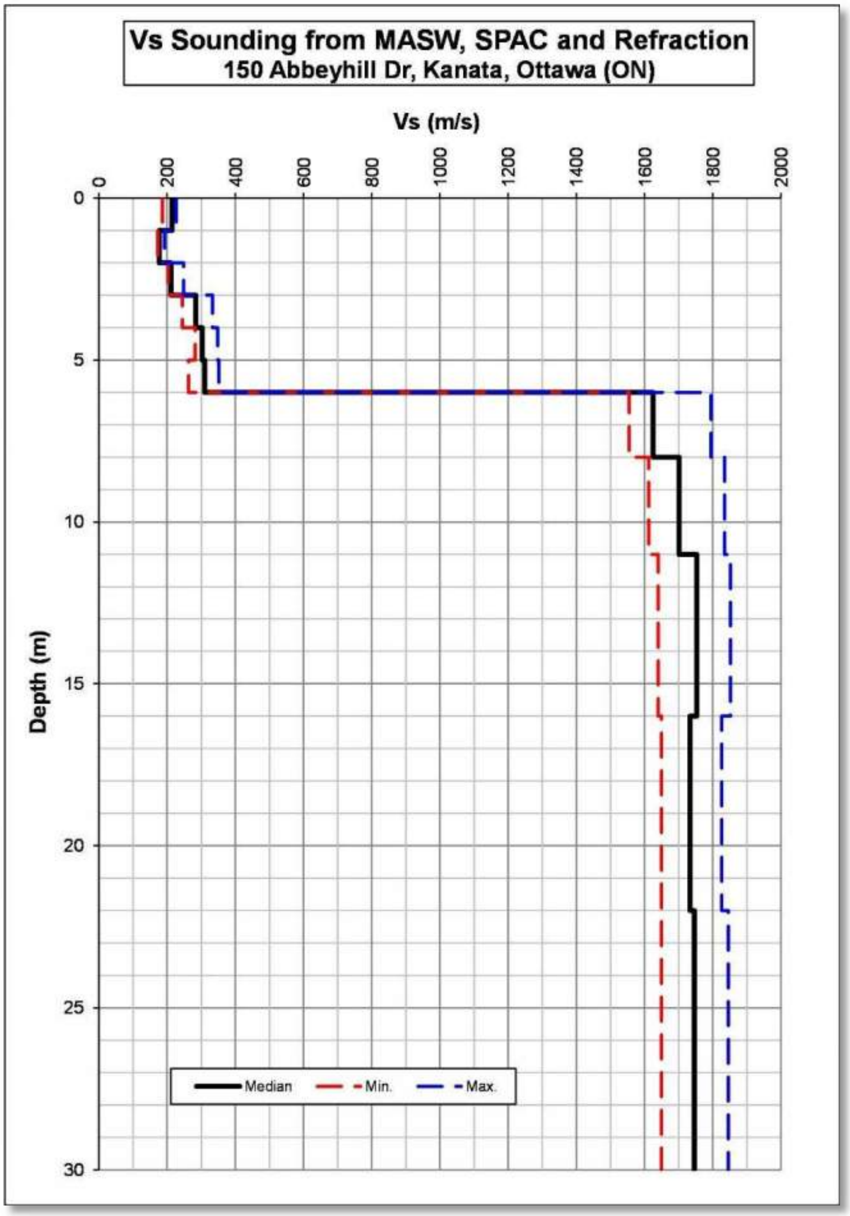


Figure 5: MASW Shear-Wave Velocity Soundings

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	186.3	214.8	226.9	**Grade Level (May 15th, 2024)**				
1.0	172.1	177.2	192.3	1.00	1.00	0.004654	0.004654	214.8
2.0	202.2	210.9	248.6	1.00	2.00	0.005643	0.010297	194.2
3.0	245.0	283.9	333.4	1.00	3.00	0.004741	0.015038	199.5
4.0	282.6	302.9	347.9	1.00	4.00	0.003523	0.018561	215.5
5.0	262.8	309.9	352.0	1.00	5.00	0.003302	0.021863	228.7
6.0	1554.8	1624.6	1795.0	1.00	6.00	0.003227	0.025090	239.1
8.0	1612.0	1700.8	1834.5	2.00	8.00	0.001231	0.026321	303.9
11.0	1640.2	1753.2	1851.6	3.00	11.00	0.001764	0.028085	391.7
16.0	1649.8	1733.0	1825.9	5.00	16.00	0.002852	0.030937	517.2
22.0	1649.8	1746.0	1845.3	6.00	22.00	0.003462	0.034399	639.6
30				8.00	30.00	0.004582	0.038981	769.6

V_{S30} (m/s)	**769.6**
Class	**B (1)**

(1) The Site Classes A and B are not to be used if there is 3 metres or more of unconsolidated material between the rock surface and the bottom of the spread footing or mat foundation.

TABLE 2

Limit for the Site Class A

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	186.3	214.8	226.9	**Limit for the Site Class A (1.0 metre of soil)**				
1.0	172.1	177.2	192.3					
2.0	202.2	210.9	248.6					
3.0	245.0	283.9	333.4					
4.0	282.6	302.9	347.9					
5.0	262.8	309.9	352.0					
6.0	1554.8	1624.6	1795.0	1.00	1.00	0.003227	0.003227	309.9
8.0	1612.0	1700.8	1834.5	2.00	3.00	0.001231	0.004458	672.9
11.0	1640.2	1753.2	1851.6	3.00	6.00	0.001764	0.006222	964.3
16.0	1649.8	1733.0	1825.9	5.00	11.00	0.002852	0.009074	1212.3
22.0	1649.8	1746.0	1845.3	6.00	17.00	0.003462	0.012536	1356.1
35.0				13.00	30.00	0.007446	0.019982	1501.4

V_{S30}* (m/s)	**1501.4**
Class	**A**

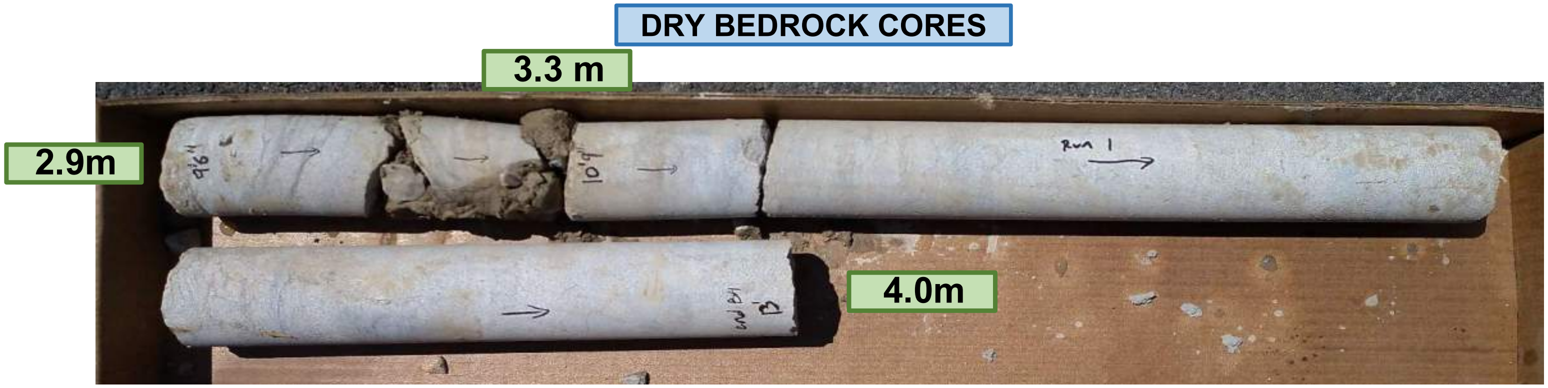
Appendix B – Bedrock Core Photographs

DRY BEDROCK CORES

WET BEDROCK CORES

exp.
Unit 180, 1407 John Counter Boulevard
K7K 6A9 Kingston, Ontario
(T)613-542-1253 (F)613-547-3767
www.exp.com

Borehole No:	Core Runs	project	Project N0:
BH-2	Run 1: 4.4 m - 4.6 m Run 2: 4.6 m - 6.2 m	Geotechnical Investigation A.Y. Jackson Secondary School - Proposed Addition	OTT-23012778-D0
Date Cored Jun 28, 2024		Rock Core Photographs	B-1



exp.
Unit 180, 1407 John Counter Boulevard
K7K 6A9 Kingston, Ontario
(T)613-542-1253 (F)613-547-3767
www.exp.com

Borehole No:	Core Runs	project	Project N0:
BH-9	Run 1: 2.9 m - 4.0 m	Geotechnical Investigation A.Y. Jackson Secondary School - Proposed Addition	OTT-23012778-D0
Date Cored Jul 09, 2024		Rock Core Photographs	B-2

Appendix C – Laboratory Certificate of Analysis Report

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

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

ATTENTION TO: Matthew Zammit

PROJECT: OTT-23012778-D0

AGAT WORK ORDER: 24Z169861

SOIL ANALYSIS REVIEWED BY: Sukhwinder Randhawa, Inorganic Team Lead

DATE REPORTED: Jul 12, 2024

PAGES (INCLUDING COVER): 5

VERSION*: 1

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

Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
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- *All reportable information is available on request from AGAT Laboratories, in accordance with ISO/IEC 17025:2017, ISO/IEC 17025:2005 (Quebec), DR-12-PALA and/or NELAP Standards.*
- *This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.*
- *For environmental samples in the Province of Quebec: The analysis is performed on and results apply to samples as received. A temperature above 6°C upon receipt, as indicated in the Sample Reception Notification (SRN), could indicate the integrity of the samples has been compromised if the delay between sampling and submission to the laboratory could not be minimized.*

Certificate of Analysis

AGAT WORK ORDER: 24Z169861
PROJECT: OTT-23012778-D0

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

CLIENT NAME: EXP SERVICES INC | **ATTENTION TO: Matthew Zammit**
SAMPLING SITE: | **SAMPLED BY:**

(Soil) Inorganic Chemistry

DATE RECEIVED: 2024-07-03 | **DATE REPORTED: 2024-07-12**

			SAMPLE DESCRIPTION:	BH1 SS4 (7. 5'-9.5')	BH7 SS4 (7. 5'-9.5')
			SAMPLE TYPE:	Soil	Soil
			DATE SAMPLED:	2024-06-28	2024-06-27
Parameter	**Unit**	**G / S**	**RDL**	**5980858**	**5980859**
Chloride (2:1)	µg/g		2	76	35
Sulphate (2:1)	µg/g		2	163	57
pH (2:1)	pH Units		NA	8.52	8.31
Electrical Conductivity (2:1)	mS/cm		0.005	0.337	0.194
Resistivity (2:1) (Calculated)	ohm.cm		1	2970	5150

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

5980858-5980859 EC, pH, Chloride and Sulphate were determined on the extract obtained from the 2:1 leaching procedure (2 parts DI water: 1 part soil). Resistivity is a calculated parameter.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

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

Quality Assurance

CLIENT NAME: EXP SERVICES INC | **AGAT WORK ORDER: 24Z169861**

PROJECT: OTT-23012778-D0 | **ATTENTION TO: Matthew Zammit**

SAMPLING SITE: | **SAMPLED BY:**

Soil Analysis

RPT Date: Jul 12, 2024			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper	Recovery	Acceptable Limits Lower	Acceptable Limits Upper
(Soil) Inorganic Chemistry															
Chloride (2:1)	5980859	5980859	35	36	2.8%	< 2	97%	70%	130%	100%	80%	120%	97%	70%	130%
Sulphate (2:1)	5980859	5980859	57	57	0.0%	< 2	96%	70%	130%	100%	80%	120%	99%	70%	130%
pH (2:1)	5980035		7.54	7.77	3.0%	NA	93%	80%	120%						
Electrical Conductivity (2:1)	5980035		0.271	0.224	19.0%	< 0.005	103%	80%	120%						

Comments: NA signifies Not Applicable.
pH duplicates QA acceptance criteria was met relative as stated in Table 5-15 of Analytical Protocol document.

CHARTERED CHEMIST

Certified By:

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

Method Summary

CLIENT NAME: EXP SERVICES INC **AGAT WORK ORDER: 24Z169861**
PROJECT: OTT-23012778-D0 **ATTENTION TO: Matthew Zammit**
SAMPLING SITE: **SAMPLED BY:**

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

AGAT Laboratories

Have feedback? Scan here for a quick survey!

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

Laboratory Use Only

Work Order #: 24Z169861

Cooler Quantity: n/a - no ice packs
Arrival Temperatures: 25.9 | 25.6 | 25.8
Depot Temperatures: 6.1 | 5.9 | 5.3
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes: bagged ice

Chain of Custody Record

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

Report Information:

Company: EXP Services Inc
Contact: Matthew Zammit
Address: 2650 Queensview Drive, Suite 100
Ottawa, Ontario. K2B 8H6
Phone: 613-688-1899 Fax:
Reports to be sent to:
1. Email: Matthew.Zammit@exp.com
2. Email: ryan.digiuseppe@exp.com

Regulatory Requirements:

(Please check all applicable boxes)

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

☐ Regulation 406
Table ____ *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture
☐ Regulation 558
☐ CCME

☐ Sewer Use
☐ Sanitary ☐ Storm
Region
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
Indicate One

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

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

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

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

OR Date Required (Rush Surcharges May Apply):

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

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

Project Information:

Project: OTT-23012778-D0
Site Location: AY Jackson School
Sampled By: EXP
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis

Legal Sample ☐

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

GW	Ground Water	SD	Sediment
O	Oil	SW	Surface Water
P	Paint	R	Rock/Shale
S	Soil		

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs	VOC	PAHs	PCBs: Aroclors ☐	O. Reg 406: Regulation 406 Characterization Package pH, Metals, BTEX, F1-F4	O. Reg 406: EC, SAR	O. Reg 406: Regulation 406 SPLP Rainwater Leach mSPLP: ☐ Metals ☐ VOCs ☐ SVOCs ☐ DOC	O. Reg 558: Landfill Disposal Characterization TCLP: TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Corrosivity: ☐ Moisture ☐ Sulphide	pH	Sulphate	Chlorides	Electro Resivity			Potentially Hazardous or High Concentration (Y/N)
~~1. BH1 SS4 (7.5'-9.5')~~	~~June 28~~	AM PM	1															☑	☑	☑	☑			
2. BH7 SS4 (7.5'-9.5')	June 27	AM PM	1															☑	☑	☑	☑			
3.		AM PM																						
4.		AM PM																						
5.		AM PM																						
6.		AM PM																						
7.		AM PM																						
8.		AM PM																						
9.		AM PM																						
10.		AM PM																						
11.		AM PM																						

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time	
			C. Griffith	07/03/24	16h10	
C. to Duuo	07/03/24	15h00	Anmol B	7.3.24	9:15am	Page ____ of ____
						N°:

Pink Copy - Client | Yellow Copy - AGAT | White Copy - AGAT

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This report was prepared by EXP Services for the account of Ottawa Carleton District School Board.

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