



Preliminary Geotechnical Investigation Report
Proposed High-Rise Commercial and Residential
Development
Orleans Town Centre
530 Brisebois Crescent
Part of 265 Centrum Boulevard (Forum Lands)
Ottawa, Ontario

Client:

Forum Asset Management, c/o EP Real Estate Development Ltd. c/o OTCP (Orleans Project)
East Podium 2nd Floor
181 Bay Street
Toronto, Ontario
M5J 2T3

Type of Document:

Final Report

Project Number:

OTT-22022218-A0

Prepared By:

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

Date Submitted:

December 2, 2025

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Executive Summary

Introduction

EXP Services Inc. (EXP) is pleased to present the results of the preliminary geotechnical investigation completed for the proposed new high-rise commercial and residential development to be located at 530 Brisebois Crescent, Part of 265 Centrum Boulevard (Forum Lands), Ottawa, Ontario (Figure 1). The development of approximately 1,500 purposed-built rental units and 6,000 square feet of retail is part of ongoing P3 partnership between Forum and the City of Ottawa. Authorization to proceed with this preliminary geotechnical investigation was provided by Forum Asset Management, c/o EP Real Estate Development Ltd. c/o OTCP (Orleans) Project.

Phase One and Two Environmental Site Assessments (ESAs) and a hydrogeological assessment of the site for the proposed development were also conducted by EXP in conjunction with this preliminary geotechnical investigation. The results of the Phase One and Two ESAs and hydrogeological assessment are provided in separate reports.

Proposed Development

The proposed development will be located on two (2) vacant parcels of land identified as the North Parcel located on the north side of Brisebois Crescent between Brisebois Crescent and Regional Road No. 174 and the South Parcel located adjacent to the Orleans Town Centre in the northwest corner of the intersection of Centrum Boulevard and the east leg of Brisebois Crescent.

For the North Parcel, development plans call for the design and construction of three (3) high rise towers of 30 (Tower A), 35 (Tower B) and 40 (Tower C) storeys constructed on top of a 2 to 3 storey podium with a one level underground parking garage extending beneath the entire footprint of the towers and podium.

For the South Parcel, development plans call for the design and construction of three (3) buildings on the site consisting of a three (3) storey Community Centre, 30 storey tower (Tower D) with two (2) to three (3) storey podium and a six (6) storey mid-rise building (Building E) with one-level underground parking garage extending beneath the entire footprint of all buildings and podium. It is our understanding that the parking garage floor next to Centrum Boulevard will be approximately 4.0 m below Centrum Boulevard and next to Brisebois Crescent will be 3.5 m below Brisebois Crescent.

The design elevation of the underground parking garage floor for the proposed towers and buildings and site grade raise were not available at the time of this preliminary geotechnical investigation.

Test Hole Fieldwork Program

The test hole fieldwork was undertaken on August 13 to 15, 20 to 22 and September 15 to 19 and 22, 2025 and consists of twenty-three (23) test holes comprising of thirteen (13) boreholes (Borehole Nos. 25-01, 25-01A, 25-02 to 25-04, 25-04A, 25-05, 25-05A, 25-06, 25-06A and 25-07 to 25-09) and ten (10) test pits (Test Pit Nos. 25-01 to 25-10). Borehole Nos. 25-01, 25-01A, 25-02 to 25-04, 25-04A, 25-05, 25-05A and Test Pit Nos. 25-01 to 25-06 are located on the parcel of land north of Brisebois Crescent and identified as the North Parcel. Borehole Nos. 25-06, 25-06A, 25-07 to 25-09 and Test Pit Nos. 25-07 to 25-10 are located on the parcel of land in the northwest corner of the Centrum Boulevard and Brisebois Crescent intersection and identified as the South Parcel. Borehole Nos. 25-01A, 25-05A and 25-06A are located next to Borehole Nos. 25-01, 25-05 and 25-06 respectively. Borehole No. 25-04A is located next to Test Pit No. 25-04.

The boreholes were advanced to cone refusal and termination depths ranging from 9.4 m to 42.1 m below existing grade. The bedrock was cored in some boreholes. The test pits were advanced to termination depths ranging from

3.0 m to 4.0 m below existing grade. The test hole fieldwork was supervised on a full-time basis by a representative from EXP.

A seismic shear wave velocity sounding survey was conducted at the site by Geophysics GPR International Inc. (GPR).

Subsurface Conditions

The subsurface conditions consist of fill underlain by a deep sensitive marine silty clay and limestone bedrock.

At the North Parcel the depth to bedrock is at a 40.7 m depth (Elevation 23.1) at Borehole No. 25-01A located in the northeast portion of the site and at a 24.0 m depth (Elevation 41.0 m) in the northwest portion of the site at Borehole No. 25-05A.

At the South Parcel the depth to bedrock is at a 33.0 m depth (Elevation 33.0 m) in the northeast corner of the site at Borehole No. 25-06A and with highly weathered limestone bedrock at a 14.6 m depth (Elevation 54.1 m) at the southeast corner of the site at Borehole No. 25-07 and at a 2.3 m depth (Elevation 67.2 m) at the southwest corner of the site at Borehole No. 25-08.

At the North Parcel, the groundwater level ranges from 3.8 to 4.3 m depths (Elevation 61.5 m and Elevation 60.0 m).

At the South Parcel, the groundwater level is at 3.5 m and 5.8 m depths (Elevation 63.7 m and Elevation 62.5 m).

Geotechnical Engineering Comments and Recommendations

A seismic shear wave velocity sounding survey was conducted for the North and South Parcels on September 25, 2025 by Geophysics GPR International Inc. (GPR). The survey was undertaken using the multi-channel analysis of surface waves (MASW), spatial auto correlation (SPAC) and seismic refraction methods.

The results of the survey indicate that the average seismic shear wave velocity (V_{s30}) over a 30 m depth is 205 m/s. For the North and South Parcels, based on a comparison of V_{s30} equal to 205 m/s with Sentence (2) in Section 4.1.8.4 of the 2024 Ontario Building Code (OBC), the site designation for seismic design is X_{205} which also corresponds to a Site Class D.

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

North Parcel

Development plans call for the design and construction of three (3) high rise towers of 30 (Tower A), 35 (Tower B) and 40 (Tower C) storeys constructed on top of a 2 to 3 storey podium with a one level underground parking garage extending beneath the entire footprint of the towers and podium.

The test hole information indicates that the north parcel is underlain by a deep sensitive marine silty clay deposit that is prone to consolidation settlement if overstressed by loads imposed on it by site grade raise, foundations and by the permanent lowering of the groundwater level. Overstressing of the clay will result in its consolidation and subsequent settlement of foundations, which may exceed the tolerable limits of structures (buildings) resulting in cracking of the structures.

Based on a review of the proposed development and the anticipated high building loads and that the site is underlain by a deep sensitive silty clay, the silty clay is not considered capable of supporting loads imposed by 30 to 40 storey buildings with podium and underground parking garage. Therefore, the proposed three (3) towers (A, B and C) with a podium and one-level underground parking garage will need to be supported by pile foundation driven to refusal in the limestone bedrock. The allowable load carrying capacity for various pile sections is provided in the attached

preliminary geotechnical report. The floor slab of the parking garage may be designed as a slab-on-grade placed on an engineered fill pad constructed on the silty clay. The existing fill is not suitable to support the slab-on-grade.

For the proposed buildings with underground parking garage supported by pile foundation driven to refusal in the limestone bedrock, the maximum permissible site grade raise at the North Parcel is 2.0 m. The maximum permissible site grade raise of 2.0 m takes into consideration a permanent 1.0 m groundwater lowering for the underground parking garage designed as a drained structure.

South Parcel

Development plans call for the design and construction of three (3) buildings on the site consisting of a three (3) storey Community Centre, 30 storey tower (Tower D) with two (2) to three (3) storey podium and a six (6) storey mid-rise building (Building E) and one-level underground parking garage extending beneath the entire footprint of all buildings and podium. It is our understanding that the parking garage floor next to Centrum Boulevard will be approximately 4.0 m below Centrum Boulevard and next to Brisebois Crescent will be 3.5 m below Brisebois Crescent.

The test hole information indicates the site is underlain by shallow unweathered limestone bedrock at a 2.6 m depth (Elevation 66.9 m) in the southwest corner of the site near Building No. E (Borehole No. 25-08). From Building No. E, the unweathered limestone bedrock slopes down in the east direction to a 15.0 m depth (Elevation 53.7 m) in the southeast corner of the site near Tower D (Borehole No. 25-07) and in a northeast direction to the northeast corner of the site near the Community Centre (Borehole No. 25-06A) to a 33.0 m depth (Elevation 33.0 m).

With the exception of the shallow bedrock in the southwest corner of the site, the parcel of land is also underlain by a deep sensitive marine silty clay deposit that is prone to consolidation settlement if overstressed by loads imposed on it by site grade raise, foundations, and by the permanent lowering of the groundwater level. Overstressing of the silty clay will result in its consolidation and subsequent settlement of foundations, which may exceed the tolerable limits of structures (buildings) resulting in cracking of the structures.

Based on a review of the proposed development and anticipated high building loads for Tower D and lower building loads for the Community Centre and the mid-rise Building No. E, the silty clay is also not considered capable of supporting loads imposed by a 30 storey building with podium and underground parking garage. Therefore, the proposed 30 storey tower with a podium and one-level underground parking garage beneath the tower will need to be supported by pile foundation driven to refusal in the limestone bedrock. For the anticipated lower building loads of the three (3) storey Community Centre and six (6) storey mid-rise Building No. E, it is considered feasible to support the Community Centre with one-level underground parking garage by strip and spread footings founded on the silty clay or on an engineered fill pad constructed on the silty clay. The Building No. E may also be supported by strip and spread footings founded on the silty clay, engineered fill pad constructed on the silty clay and on the shallow limestone bedrock. The allowable load carrying capacity of various pile sections and the bearing pressure at serviceability limit state (SLS) and factored geotechnical resistance at ultimate limit state (ULS) are provided in the attached preliminary geotechnical report. The parking garage floor slab may be designed as a slab-on-grade placed on an engineered fill pad constructed on the silty clay or unweathered limestone bedrock. The existing fill is not suitable to support the footings and slab-on-grade.

In conjunction with the recommended footing foundation and pile foundation, the maximum permissible grade raise at the South Parcel is 1.0 m and takes into consideration a permanent 1.0 m groundwater lowering for the parking garage designed as a drained structure.

Since a portion of the underground parking garage at the South Parcel will be supported by a combination of footing foundation and pile foundation, a control joint between the pile foundation and the footing foundation may be required to prevent differential settlement. The need for a joint, type and location of the joint required and design details regarding the joint should be provided by the structural engineer.

The lowest floor for the proposed towers and buildings at the North and South Parcels may be designed and constructed as a slab-on-grade set on a minimum 300 mm thick engineered fill pad constructed on the silty clay or unweathered limestone bedrock. The existing topsoil, fill and buried organic-type soil are not considered suitable to support the slab-on-grade and should be excavated and removed down to the silty clay or competent bedrock. At the North and South Parcels, permanent perimeter and underfloor drainage systems are required for the proposed towers and buildings having a one-level underground parking garage. The need for an underfloor drainage system should be confirmed once the design elevation of the parking garage floor slab is available and compared with the groundwater level (elevation).

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

Some of the excavations at the South Parcel are anticipated to extend into the bedrock. Excavations within the weathered zone of the bedrock and for shallow excavations into the competent sound bedrock may be excavated using a hoe ram for the removal of small quantities of the bedrock; however, this process is expected to be very slow. The excavation of the competent sound limestone bedrock to extensive depths below the bedrock surface will likely require line drilling and blasting techniques. Contractors bidding on this project should decide on their own the most preferred rock removal method; hoe ramming or line drilling and blasting. The excavation side slopes in the weathered limestone bedrock may be cut back at a 1H:1V gradient from the bottom of the weathered bedrock zone. Excavations within the sound bedrock may be undertaken with near vertical sides subject to review by a geotechnical engineer. The rock face of the excavation may require support in the form of shotcreting, wire mesh and/or rock bolts. The need for and type of rock support is best determined during on-site examination of the bedrock during excavation operations.

At the North and South parcels, excavations above and below the groundwater may be dewatered by conventional sump pumping techniques. Reference is made to the EXP Hydrogeological Assessment report regarding Environmental Activity and Sector Registry (EASR) and Permit to Take Water (PTTW) requirements.

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

Additional Geotechnical Investigation

To better delineate the depth (elevation) to the limestone bedrock within the building footprints of the towers and buildings at the North and South Parcels, it is recommended that an additional geotechnical investigation consisting of boreholes that extend into the bedrock should be conducted at both parcels to confirm the depth (elevation) of

the bedrock for detailed footing and pile design. Depending on the findings from the additional boreholes and final design plans for the proposed development including design site grade raise, the preliminary geotechnical engineering comments and recommendations provided in this preliminary geotechnical report regarding footing and pile foundations and other items may need to be updated.

Closure

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

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

1. Introduction

EXP Services Inc. (EXP) is pleased to present the results of the preliminary geotechnical investigation completed for the proposed new high-rise commercial and residential development to be located at 530 Brisebois Crescent, Part of 265 Centrum Boulevard (Forum Lands), Ottawa, Ontario (Figure 1). The development of approximately 1,500 purposed-built rental units and 6,000 square feet of retail is part of ongoing P3 partnership between Forum and the City of Ottawa. Authorization to proceed with this preliminary geotechnical investigation was provided by Forum Asset Management, c/o EP Real Estate Development Ltd. c/o OTCP (Orleans) Project.

Phase One and Two Environmental Site Assessments (ESAs) and a hydrogeological assessment of the site for the proposed development were also conducted by EXP in conjunction with this preliminary geotechnical investigation. The results of the Phase One and Two ESAs and hydrogeological assessment are provided in separate reports.

The proposed development will be located on two (2) vacant parcels of land identified as the North Parcel located on the north side of Brisebois Crescent between Brisebois Crescent and Regional Road No. 174 and the South Parcel located adjacent to the Orleans Town Centre in the northwest corner of the intersection of Centrum Boulevard and the east leg of Brisebois Crescent.

For the North Parcel, development plans call for the design and construction of three (3) high rise towers of 30 (Tower A), 35 (Tower B) and 40 (Tower C) stories constructed on top of a 2 to 3 story podium with a one level underground parking garage extending beneath the entire footprint of the towers and podium.

For the South Parcel, development plans call for the design and construction of three (3) buildings on the site consisting of a three (3) storey Community Centre, 30 storey tower (Tower D) with two (2) to three (3) storey podium and a six (6) storey mid-rise building (Building E) with one-level underground parking garage extending beneath the entire footprint of all buildings and podium. It is our understanding that the parking garage floor next to Centrum Boulevard will be approximately 4.0 m below Centrum Boulevard and next to Brisebois Crescent will be 3.5 m below Brisebois Crescent.

The design elevation of the underground parking garage floor for the proposed towers and buildings and site grade raise were not available at the time of this preliminary geotechnical investigation.

This preliminary geotechnical investigation was undertaken to:

- a) Establish the subsurface soil and groundwater conditions at twenty-three (23) test holes (13 boreholes and 10 test pits) located on the site,
- b) Provide the site classification and site designation for seismic design in accordance with the 2024 Ontario Building Code (OBC) and assess the potential for liquefaction of the subsurface soils during a seismic event,
- c) Comment on grade-raise restrictions and site grading requirements,
- d) Make recommendations regarding the most suitable type of foundations, founding depth and bearing pressure at serviceability limit state (SLS) and factored geotechnical resistance at ultimate limit state (ULS) of the founding strata for the proposed new towers and buildings and comment on the anticipated total and differential settlements of the recommended foundation type,
- e) Provide comments regarding slab-on-grade construction and the requirements for perimeter and underfloor drainage systems,
- f) Provide soil parameters for lateral earth pressure (static and seismic conditions) against basement walls,

- g) Comment on excavation conditions and de-watering requirements during construction,
- h) Provide pipe bedding requirements,
- i) Discuss backfilling requirements and suitability of on-site soils for backfilling purposes,
- j) Provide pavement structure for access roads and parking lots,
- k) Comment on the corrosion potential of the subsurface soils to buried concrete and steel; and
- l) Discuss tree planting restrictions.

The comments and recommendations given in this geotechnical report are preliminary in nature and 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 preliminary recommendations, or it may require additional field or laboratory work to check whether the changes are acceptable from a geotechnical viewpoint.

2. Site Description

At the time of this preliminary geotechnical investigation, the site for the proposed development consists of two (2) vacant parcels of land identified as the North Parcel located on the north side of Brisebois Crescent between Brisebois Crescent and Regional Road No. 174 and the South Parcel located adjacent to the Orleans Town Centre in the northwest corner of the intersection of Centrum Boulevard and the east leg of Brisebois Crescent in Ottawa, Ontario. The two (2) parcels of land are grass covered with trees. The site is bounded to the north by Regional Road No. 174 and to the south, east and west by existing buildings, parking lots and roadways.

Based on the ground surface elevation at the test holes (boreholes and test pits), the topography of the North Parcel slopes down in a northeasterly direction from Elevation 65.70 m to Elevation 63.78 m. The topography of the South Parcel also slopes down in a northeasterly direction from Elevation 69.52 m to Elevation 65.68 m.

3. Procedure

3.1 Test Hole Fieldwork

The test hole fieldwork was undertaken on August 13 to 15, 20 to 22 and September 15 to 19 and 22, 2025 and consists of twenty-three (23) test holes comprising of thirteen (13) boreholes (Borehole Nos. 25-01, 25-01A, 25-02 to 25-04, 25-04A, 25-05, 25-05A, 25-06, 25-06A and 25-07 to 25-09) and ten (10) test pits (Test Pit Nos. 25-01 to 25-10). Borehole Nos. 25-01, 25-01A, 25-02 to 25-04, 25-04A, 25-05, 25-05A and Test Pit Nos. 25-01 to 25-06 are located on the parcel of land north of Brisebois Crescent and identified as the North Parcel. Borehole Nos. 25-06, 25-06A, 25-07 to 25-09 and Test Pit Nos. 25-07 to 25-10 are located on the parcel of land in the northwest corner of the Centrum Boulevard and Brisebois Crescent intersection and identified as the South Parcel. Borehole Nos. 25-01A, 25-05A and 25-06A are located next to Borehole Nos. 25-01, 25-05 and 25-06 respectively. Borehole No. 25-04A is located next to Test Pit No. 25-04.

The boreholes were advanced to cone refusal and termination depths ranging from 9.4 m to 42.1 m below existing grade. The test pits were advanced to termination depths ranging from 3.0 m to 4.0 m below existing grade. The test hole fieldwork was supervised on a full-time basis by a representative from EXP.

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

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

The boreholes were drilled using a CME-55LC track-mounted drill rig equipped with continuous flight hollow stem augers and soil sampling and bedrock coring capabilities. Standard penetration tests (SPTs) were performed in all the boreholes on a continuous basis to 2.0 m depth interval with soil samples retrieved by the split-barrel sampler. Relatively undisturbed tube sample (Shelby tube) of the clayey soil were obtained from some of the boreholes at selected depth intervals. Dynamic cone penetration tests (DCPT; unsampled) were conducted below the sampling depth to cone refusal depth in some of the boreholes. Borehole Nos. 25-01A, 25-04A, 25-05A and 25-06A were advanced by power augering technique (no sampling) to the bedrock surface. Following power augering to a 1.8 m depth, Borehole No. 25-04A was advanced by conducting a dynamic cone penetration test (DCPT) from 1.8 m to cone refusal depth. The undrained shear strength of the clayey cohesive soils was measured by conducting in-situ vane tests at selected depth intervals. The bedrock was cored in selected boreholes by conventional rock coring method. A careful record of any sudden drops in the core barrel, colour of wash water and percentage of wash water return were recorded during the bedrock coring operation.

All the soil samples were examined in the field for textural classification, logged and preserved in labelled and identified plastic bags. Shelby tube samples were labelled and identified. Similarly, the bedrock cores were placed in labelled and identified bedrock core boxes and visually examined and logged in the field.

Nineteen (19) mm diameter standpipe and forty-five (45) mm diameter monitoring wells with screened sections were installed in selected boreholes for long-term monitoring of the groundwater levels and for sampling of the groundwater as part of the Phase Two ESA. The standpipes and monitoring wells were installed in accordance with EXP standard practice, and the installation configuration is documented on the respective borehole log. The boreholes were backfilled upon completion of drilling and the installation of the standpipes and monitoring wells.

Test pits were excavated using a KX080 Excavator. Soil samples (grab samples) of the different soil types exposed in the test pits were retrieved on a continuous basis and the soil conditions from the test pits were logged with each soil sample placed in a labeled and identified plastic bag. The test pits were backfilled upon completion of excavating.

On completion of the test hole fieldwork, the soil samples were transported to the EXP laboratory in Ottawa. The soil samples were visually examined in the laboratory by a geotechnical engineer. Soil classification consisted of classifying the main constituents of the soils in accordance with the Unified Soil Classification System (USCS) using the soil group name and symbol and by the modified Burmister Soil to classify the minor constituents of the soil using modifiers and adjectives such as trace and some.

3.2 Laboratory Testing Program

The laboratory testing program for the soil samples and bedrock cores is summarized in Table I.

Table I: Summary of Laboratory Testing Program	
Type of Test	Number of Tests Completed
Soil Samples	
Moisture Content Determination	92
Grain Size Analysis	11
Atterberg Limit Determination	11
Corrosion Analysis (pH, sulphate, chloride and resistivity)	3
Bedrock Core Sections	
Unit Weight Determination	5
Unconfined Compressive Strength Test	5
Corrosion Analysis (pH, sulphate, chloride and resistivity)	1

3.3 Seismic Shear Wave Velocity Sounding Survey

A seismic shear wave velocity sounding survey was conducted at the site on September 25, 2025 by Geophysics GPR International Inc. (GPR). The GPR seismic shear wave velocity sounding survey report is shown in Appendix A. As indicated in the GPR report, the survey was undertaken using the multi-channel analysis of surface waves (MASW), spatial auto correlation (SPAC) and seismic refraction methods. The location of the survey line is shown in Figure 2 of the GPR report and on the Test Hole Location Plan, Figure 2, in this preliminary geotechnical report.

4. Subsurface Conditions and Groundwater Levels

A detailed description of the subsurface conditions and groundwater levels from the test holes (boreholes and test pits) are given on the attached borehole and test pit logs, Figures 3 to 21. The test hole logs and related information depict subsurface conditions only at the specific locations and times indicated. Subsurface conditions and groundwater 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.

The test holes were to provide representation of subsurface conditions as part of a geotechnical exploration program and are not intended to provide evidence of potential environmental conditions. Reference is made to the EXP Phase One and Two ESA reports regarding the environmental condition of the soils and groundwater.

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

Borehole Nos. 25-01, 25-01A, 25-02 to 25-04, 25-04A, 25-05, 25-05A and Test Pit Nos. 25-01 to 25-06 are located in the parcel of land north of Brisebois Crescent and identified as the North Parcel. Borehole Nos. 25-06, 25-06A, 25-07 to 25-09 and Test Pit Nos. 25-07 to 25-10 are located on the parcel of land in the northwest corner of the Centrum Boulevard and Brisebois Crescent intersection and identified as the South Parcel. Borehole Nos. 25-01A, 25-05A and 25-06A are located next to Borehole Nos. 25-01, 25-05 and 25-06 respectively. Borehole No. 25-04A is located next to Test Pit No. 25-04.

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

4.1 Topsoil

A surficial 50 mm to 200 mm thick topsoil layer was contacted in all test holes except Borehole Nos. 25-01, 25-02, 25-05.

4.2 Fill

Fill was encountered at the existing ground surface in Borehole Nos. 25-01, 25-02 and 25-05 and beneath the topsoil layer in the remaining boreholes and test pits. The fill extends to depths of 1.5 m to 6.0 m (Elevation 67.2 m to Elevation 61.6 m). The deepest fill is in Borehole No. 25-07 to a 6.0 m depth (Elevation 62.7 m). The fill consists of a heterogeneous mixture of gravel, sand, silt and clay of varying percentages. In some boreholes and test pits, the fill contains cobbles and boulders, rock fragments, shale fragments, roots, rootlets and black organic-type stains. The fill contains debris in the form of geotextile fabric fragments in Borehole No. 25-02, wood fragments in Borehole No. 25-07, asphalt pieces in Test Pit No. 25-07, blast shattered rock pieces and brick, concrete, steel reinforcing bar pieces in Test Pit No. 25-08 and asphalt, brick and snow fence pieces in Test Pit No. 25-10. Based on the standard penetration test (SPT) N-values of 9 to 60 in the boreholes, the fill is in a loose to very dense state. At some depths within the fill, the SPT N-value is a high value for low sampler penetration. For example, an N-value of 50 for 125 mm sampler penetration. This may be a result of the sampler contacting a cobble, boulder or debris within the fill. The moisture content of the fill ranges from 2 percent to 44 percent.

4.3 Buried Organic-Type Soil

In Borehole No. 25-02 and 25-04, the fill is underlain by an approximate 400 mm and 800 mm thick organic-type silty sand and silty clay that extends to a 2.6 m depth (Elevation 62.6 m) in Borehole No. 25-02 and 3.0 m depth (Elevation 62.5 m) in Borehole No. 25-04. The moisture content of the organic-type soil is 25 percent and 39 percent.

4.4 Silty Clay

A deep sensitive marine silty clay was contacted below the fill and buried organic-type soil in all of the boreholes and test pits, except in Borehole No. 25-08 and Test Pit No. 25-08. The silty clay was contacted at 1.5 m to 6.0 m depths (Elevation 67.7 m to Elevation 61.5 m) and extends to inferred depths of 24.0 m to 36.7 m (Elevation 41.0 m to Elevation 27.1 m) in Borehole Nos. 25-01A, 25-05A, 25-06A and 25-07. The remaining boreholes and test pits terminated within the silty clay at 3.0 m to 15.8 m depths (Elevation 65.2 m to Elevation 49.4 m).

The sensitive marine silty clay consists of an upper desiccated brown clay crust that exhibits good strength properties underlain by an un-desiccated weaker grey silty clay. The upper and lower portions of the silty clay are discussed in the following sections of this preliminary geotechnical report.

4.4.1 Upper Brown Silty Clay Crust

The upper desiccated brown silty clay crust was encountered in all of the test holes except in Borehole No. 25-08, Test Pit No. 25-01 and 25-08 at 0.5 m to 6.0 m depths (Elevation 69.2 m to Elevation 61.5 m). The upper brown silty clay extends to depths ranging from 1.0 m to 8.6 m (Elevation 64.7 m to Elevation 58.5 m). The deepest contact depth of the top of the brown silty clay is at 6.0 m (Elevation 62.7 m) in Borehole No. 25-07. Test Pit Nos. 25-02, 25-04, 25-09 and 25-10 terminated within the brown silty clay at 3.0 m and 4.0 m depths (Elevation 66.3 m to Elevation 61.5 m). The undrained shear strength of the brown silty clay crust ranges from 50 kPa to greater than 250 kPa indicating the brown silty clay crust has a stiff to hard consistency. The natural moisture content of the brown silty clay crust ranges from 18 percent to 64 percent.

The results from the grain-size analysis and Atterberg limits determination of six (6) samples of the upper brown silty clay are summarized in Table II. The grain-size distribution curves are shown in Figure 22 to 27.

Borehole No. (BH): Sample No. (SS)	Depth (m)	Grain-Size Analysis (%)				Atterberg Limits (%)				Soil Classification
		Gravel	Sand	Silt	Clay	Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	
BH 25-01: SS5	3.0-3.6	0	1	28	71	37	61	21	40	Silty Clay of High Plasticity (CH) – Trace Sand
BH 25-02: SS7	4.6-5.2	0	0	82	18	51	68	27	41	Silty Clay of High Plasticity (CH)
BH 25-05: SS5	3.0-3.6	0	1	39	60	32	73	27	46	Silty Clay of High Plasticity (CH): Trace Sand
BH 25-06: SS7	4.6-5.2	0	0	22	78	24	71	23	48	Silty Clay of High Plasticity (CH)
BH 25-07: SS11	7.6-8.2	0	0	21	79	64	79	29	50	Silty Clay of High Plasticity (CH)
BH 25-09: SS5	3.0-3.6	0	8	42	50	26	53	22	31	Silty Clay of High Plasticity (CH): Trace Sand

A review of the test results indicates the soil may be classified as a silty clay of high plasticity (CH) with trace sand.

4.4.2 Lower Grey Silty Clay

The grey silty clay was contacted below the brown silty clay crust in all test holes except Test Pit No. 25-01 where the grey silty clay was contacted beneath the fill. The grey silty clay was not present in Test Pit Nos. 25-02, 25-04 and 25-08 to 25-10. The grey silty clay was contacted at 1.0 m to 8.6 m depths (Elevation 64.7 m to Elevation 58.5 m). The grey silty clay extends to a 14.6 m depth (Elevation 54.1 m) in Borehole No. 25-07 and based on observations during power augering extends to inferred depths of 24.0 m to 36.7 m (Elevation 41.0 m to Elevation 27.1 m) in Borehole Nos. 25-01A, 25-05A and 25-06A. The sampled portion of Borehole Nos. 25-01 to 25-06 and 25-09 and Test Pit Nos. 25-01, 25-03 and Test Pit Nos. 25-05 to 25-07 terminated within the grey silty clay at 3.0 m to 15.8 m depths (Elevation 62.7 m to Elevation 49.4 m). Based on undrained shear strength measurements of 36 kPa to 86 kPa, the grey clay has a firm to stiff consistency. Locally, in Borehole No. 25-02, the grey silty clay has a soft zone at a 6.7 m to 6.9 m depths as indicated by an undrained shear strength measurement of 24 kPa. Locally, in Borehole No. 25-07, the grey silty clay has a very stiff zone at 7.5 m to 7.6 m and at 12.2 m to 12.5 m depths, as indicated by undrained shear strength of 120 kPa and 130 kPa. The natural moisture content of the grey silty clay is 33 percent to 70 percent.

The results from the grain-size analysis and Atterberg limits determination of five (5) samples of the grey silty clay are summarized in Table III. The grain-size distribution curves are shown in Figures 28 to 32.

Table III: Summary of Grain-Size Analysis and Atterberg Limit Determination – Lower Grey Silty Clay										
Borehole No. (BH) : SampleNo. (SS)	Depth (m)	Grain-Size Analysis (%)				Atterberg Limits (%)				Soil Classification
		Gravel	Sand	Silt	Clay	Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index	
BH 25-01: SS12	9.1-9.7	0	0	65	35	33	33	20	13	Silty Clay of Medium Plasticity (CI)
BH 25-02: SS10	6.9-7.5	0	0	22	78	65	64	25	39	Silty Clay of High Plasticity (CH)
BH 25-02: SS12	12.2-12.8	0	1	25	74	73	59	27	32	Silty Clay of High Plasticity (CH): Trace Sand
BH 25-05: SS9	8.4-9.0	0	0	25	75	68	59	29	30	Silty Clay of High Plasticity (CH)
BH 25-06: SS9	9.1-9.7	0	0	53	47	42	33	20	13	Silty Clay of Medium Plasticity (CI)

Based on a review of the laboratory test results, the soil may be classified as a silty clay of medium to high plasticity (CI-CH) with trace of sand.

4.5 Inferred Glacial Till

In Borehole Nos. 25-01A and 25-06A, based on observations during power augering, glacial till was inferred to have been contacted at 31.1 m and 36.7 m depths (Elevation 34.9 m and Elevation 27.1 m) and extends to depths of 33.0 m and 40.7 m (Elevation 33.0 m and Elevation 23.1 m).

4.6 Inferred and Actual Bedrock

Based on auger and cone refusal criteria, cobbles, boulders or bedrock are inferred at 23.6 m to 41.0 m depths (Elevation 42.5 m to Elevation 24.2 m) in Borehole Nos. 25-01, 25-02, 25-06 and 25-09.

The presence of the bedrock was proven by coring the bedrock in Borehole Nos. 25-01A, 25-05A, 25-06A, 25-07 and 25-08. Borehole Nos. 25-01A, 25-05A and 25-06A are located next to Borehole Nos. 25-01, 25-05 and 25-06 respectively.

A summary of inferred bedrock and actual bedrock depths (elevations) is summarized in Table IV.

Table IV: Summary of Inferred and Actual Bedrock Depths (Elevations)			
Borehole No. (BH)	Ground Surface Elevation (m)	Inferred Bedrock Depth (Elevation), m	Actual Bedrock Depth (Elevation), m
North Parcel Site Located North of Brisebois Crescent			
25-01/25-01A	63.78	38.9 (24.9)	40.7 (23.1)
25-02	65.16	41.1(24.1)	-
BH 25-04A	64.54	34.7 (29.8)	-
25-05A	64.99	-	24.0 (41.0)
South Parcel Site Located in Northwest Corner of Centrum Boulevard and East Leg of Brisebois Crescent Intersection			
25-06/25-06A	65.95	31.2 (34.8)	33.0 (33.0)
25-07	68.69	-	14.6-15.0 (54.1-53.7) - Highly Weathered Limestone Bedrock 15.0 (53.7) – Unweathered Limestone Bedrock
25-08	69.52	-	2.3-2.6 (67.2-66.9) – Highly Weathered Limestone Bedrock 2.6 (66.9) – Unweathered Limestone Bedrock
25-09	66.12	23.6 (42.5)	-

Table IV indicates that at the North Parcel the depth to bedrock is at a 40.7 m depth (Elevation 23.1) at Borehole No. 25-01A located in the northeast portion of the site and at a 24.0 m depth (Elevation 41.0 m) in the northwest portion of the site at Borehole No. 25-05A.

Table IV indicates that at the South Parcel the depth to bedrock is at a 33.0 m depth (Elevation 33.0 m) in the northeast corner of the site at Borehole No. 25-06A and with highly weathered limestone bedrock at a 14.6 m depth (Elevation 54.1 m) at the southeast corner of the site at Borehole No. 25-07 and at a 2.3 m depth (Elevation 67.2 m) at the southwest corner of the site at Borehole No. 25-08.

A review of published geology maps indicates the limestone bedrock is of the Ottawa formation.

Based on a review of the bedrock coring information, the total core recovery (TCR) is 100 percent and the rock quality designation (RQD) ranges from 78 percent and 100 percent indicating the bedrock is of a good to excellent quality. The photographs of the bedrock cores are shown in Appendix B.

The unit weight and unconfined compressive strength of the selected core sections of the bedrock are summarized in Table V.

Table V: Summary of Unconfined Compressive Strength Test Results – Bedrock Cores				
Borehole (BH) No.: Run No.	Depth (Elevation), m	Unit Weight (kN/m ³)	Unconfined Compressive Strength (MPa)	Classification of Rock with respect to Strength
North Parcel				
BH 25-01A: Run1	41.0-41.1 (22.8-22.7)	27.7	95.5	Strong (R4)
BH-25-05A: Run 1	24.5-24.6 (40.5-40.4)	28.6	158.4	Very Strong (R5)
South Parcel				
BH 25-06A: Run 2	33.6-33.8 (32.4-32.2)	27.4	155.7	Very Strong (R5)
BH 25-08: Run 2	3.4-3.5 (66.1-66.0)	26.4	175.8	Very Strong (R5)
BH 25-08: Run 3	5.5-5.6 (64.0-63.9)	26.1	154.9	Very Strong (R5)

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

4.7 Groundwater Level Measurements

A summary of the groundwater level measurements taken on September 26, 2025 in the boreholes equipped with standpipes and monitoring wells is summarized in Table VI.

Table VI: Summary of Groundwater Level Measurements			
Borehole No. (BH)	Ground Surface Elevation (m)	Elapsed Time in Days from Date of Installation	Depth Below Ground Surface (Elevation), m
North Parcel			
BH 25-01	63.78	36 days	3.8 (60.0)
BH 25-02	65.16	37 days	3.8 (61.4)
BH 25-03	65.70	36 days	4.2 (61.5)
BH 25-04	65.50	35 days	4.3 (61.2)
BH 25-05	64.99	35 days	4.0 (61.0)
South Parcel			
BH 25-06	65.95	43 days	3.5 (62.5)
BH 25-08	69.52	43 days	5.8 (63.7)

At the North Parcel, the groundwater level ranges from 3.8 to 4.3 m depths (Elevation 61.5 m and Elevation 60.0 m).

At the South Parcel, the groundwater level is at 3.5 m and 5.8 m depths (Elevation 63.7 m and Elevation 62.5 m).

The groundwater levels were determined in the boreholes at the time and under the condition stated in this preliminary geotechnical 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.

5. Site Classification and Designation for Seismic Design and Liquefaction Potential of Soils

5.1 Site Classification and Designation for Seismic Design

A seismic shear wave velocity sounding survey was conducted for the North and South Parcels on September 25, 2025 by Geophysics GPR International Inc. (GPR). The survey was undertaken using the multi-channel analysis of surface waves (MASW), spatial auto correlation (SPAC) and seismic refraction methods. The GPR seismic shear wave velocity sounding survey report is shown in Appendix A and the location of the survey line is shown in Figure 2 of the GPR report and on the Test Hole Location Plan, Figure 2, of this preliminary geotechnical report.

The results of the survey indicate that the average seismic shear wave velocity (V_{s30}) over a 30 m depth is 205 m/s. Based on a comparison of V_{s30} equal to 205 m/s with Sentence (2) in Section 4.1.8.4 of the 2024 Ontario Building Code (OBC), the site designation for seismic design is X_{205} which also corresponds to a Site Class D.

5.2 Liquefaction Potential of Soils

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

6. Grade Raise Restrictions

Borehole Nos. 25-01, 25-01A, 25-02 to 25-04, 25-04A, 25-05, 25-05A and Test Pit Nos. 25-01 to 25-06 are located in the parcel of land north of Brisebois Crescent and identified as the North Parcel. Borehole Nos. 25-06, 25-06A, 25-07 to 25-09 and Test Pit Nos. 25-07 to 25-10 are located on the parcel of land in the northwest corner of the Centrum Boulevard and Brisebois Crescent intersection and identified as the South Parcel

6.1 North Parcel

Development plans call for the design and construction of three (3) high rise towers of 30 (Tower A), 35 (Tower B) and 40 (Tower C) stories constructed on top of a 2 to 3 story podium with a one level underground parking garage extending beneath the entire footprint of the towers and podium.

The test hole information indicates that the north parcel is underlain by a deep sensitive marine silty clay deposit that is prone to consolidation settlement if overstressed by loads imposed on it by site grade raise, foundations and by the permanent lowering of the groundwater level. Overstressing of the clay will result in its consolidation and subsequent settlement of foundations, which may exceed the tolerable limits of structures (buildings) resulting in cracking of the structures.

Based on a review of the proposed development and the anticipated high building loads and that the site is underlain by a deep sensitive silty clay, the silty clay is not considered capable of supporting loads imposed by 30 to 40 storey buildings with podium and underground parking garage. Therefore, the proposed three (3) towers (A, B and C) with a podium and one-level underground parking garage will need to be supported by pile foundation driven to refusal in the limestone bedrock. The floor slab of the parking garage may be designed as a slab-on-grade placed on an engineered fill pad constructed on the silty clay. The existing fill is not suitable to support the slab-on-grade.

For the proposed buildings with underground parking garage supported by pile foundation driven to refusal in the limestone bedrock, the maximum permissible site grade raise at the North Parcel is 2.0 m. The maximum permissible site grade raise of 2.0 m takes into consideration a permanent 1.0 m groundwater lowering for the underground parking garage designed as a drained structure.

6.2 South Parcel

Development plans call for the design and construction of three (3) buildings on the site consisting of a three (3) storey Community Centre, 30 storey tower (Tower D) with two (2) to three (3) storey podium and a six (6) storey mid-rise building (Building E) and one-level underground parking garage extending beneath the entire footprint of all buildings and podium. It is our understanding that the parking garage floor next to Centrum Boulevard will be approximately 4.0 m below Centrum Boulevard and next to Brisebois Crescent will be 3.5 m below Brisebois Crescent.

The test hole information indicates the site is underlain by shallow unweathered limestone bedrock at a 2.6 m depth (Elevation 66.9 m) in the southwest corner of the site near Building No. E (Borehole No. 25-08). From Building No. E, the unweathered limestone bedrock slopes down in the east direction to a 15.0 m depth (Elevation 53.7 m) in the southeast corner of the site near Tower D (Borehole No. 25-07) and in a northeast direction to the northeast corner of the site near the Community Centre (Borehole No. 25-06A) to a 33.0 m depth (Elevation 33.0 m).

With the exception of the shallow bedrock in the southwest corner of the site, the parcel of land is also underlain by a deep sensitive marine silty clay deposit that is prone to consolidation settlement if overstressed by loads imposed on it by site grade raise, foundations, and by the permanent lowering of the groundwater level. Overstressing of the

silty clay will result in its consolidation and subsequent settlement of foundations, which may exceed the tolerable limits of structures (buildings) resulting in cracking of the structures.

Based on a review of the proposed development and anticipated high building loads for Tower D and lower building loads for the Community Centre and the mid-rise Building No. E, the silty clay is also not considered capable of supporting loads imposed by a 30 storey building with podium and underground parking garage. Therefore, the proposed 30 storey tower with a podium and one-level underground parking garage beneath the tower will need to be supported by pile foundation driven to refusal in the limestone bedrock. For the anticipated lower building loads of the three (3) storey Community Centre and six (6) storey mid-rise Building No. E, it is considered feasible to support the Community Centre with one-level underground parking garage by strip and spread footings founded on the silty clay or on an engineered fill pad constructed on the silty clay. The Building No. E may also be supported by strip and spread footings founded on the silty clay, engineered fill pad constructed on the silty clay and on the shallow limestone bedrock. The parking garage floor slab may be designed as a slab-on-grade placed on an engineered fill pad constructed on the silty clay or unweathered limestone bedrock. The existing fill is not suitable to support the footings and slab-on-grade.

In conjunction with the recommended footing foundation and pile foundation, the maximum permissible grade raise at the South Parcel is 1.0 m and takes into consideration a permanent 1.0 m groundwater lowering for the parking garage designed as a drained structure.

6.3 Additional Comments

If the design site grade raise will be greater or less than the maximum permissible site grade raise recommended in this preliminary geotechnical report for both the north and south parcels, EXP should be contacted to review and determine the suitability of the new site grade raise and to determine the updated bearing pressure values for footings and allowable design loads for the pile foundation.

Cay seals should be installed in the service trenches to minimize the permanent lowering of the groundwater level at the site as discussed in Section 13 of this preliminary geotechnical report.

7. Site Grading

Site grading within the **proposed building footprints** should consist of the removal of all topsoil, fill, buried organic-type soil and organic stained soils down to the silty clay. The exposed silty clay should be examined by a geotechnician. Once the subgrade has been approved, the grades may be raised to the design elevation of the underside of the footing (South Parcel) and to the design elevation of the floor slab (North and South Parcels) by the construction of an engineered fill pad in accordance with the procedure outlined in Section 8 of this preliminary geotechnical report.

Site grading within the **proposed access road and parking lot areas** should consist of the excavation and removal of the surficial topsoil layer and fill down to the design subgrade level of the pavement structure for the access roads and parking lots. The exposed fill should be proofrolled with a heavy roller in the full-time presence of a geotechnician. Any soft or spongy subgrade areas detected should be subexcavated and properly replaced with suitable approved backfill such as Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to 95 per cent standard Proctor maximum dry density (SPMDD).

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

8. Foundation Considerations

Borehole Nos. 25-01, 25-01A, 25-02 to 25-04, 25-04A, 25-05, 25-05A and Test Pit Nos. 25-01 to 25-06 are located in the parcel of land north of Brisebois Crescent and identified as the North Parcel.

Borehole Nos. 25-06, 25-06A, 25-07 to 25-09 and Test Pit Nos. 25-07 to 25-10 are located on the parcel of land in the northwest corner of the Centrum Boulevard and Brisebois Crescent intersection and identified as the South Parcel. Borehole Nos. 25-01A, 25-05A and 25-06A are located next to Borehole Nos. 25-01, 25-05 and 25-06 respectively. Borehole No. 25-04A is located next to Test Pit No. 25-04 in the North Parcel.

8.1 North Parcel

Development plans call for the design and construction of three (3) high rise towers of 30 (Tower A), 35 (Tower B) and 40 (Tower C) storeys placed on top of a 2 to 3 storey podium with a one level underground parking garage extending beneath the entire footprint of the towers and podium.

Based on a review of the proposed development and the anticipated high building loads and that the site is underlain by a deep sensitive silty clay, the silty clay is not considered capable of supporting loads imposed by 30 to 40 storey buildings with podium and underground parking garage. Therefore, the proposed three (3) towers (A, B and C) with a podium and one-level underground parking garage beneath the towers will need to be supported by pile foundation driven to refusal in the limestone bedrock. The floor slab of the parking garage may be designed as a slab-on-grade placed on an engineered fill pad constructed on the silty clay. The existing fill is not suitable to support the slab-on-grade.

8.2 South Parcel

Development plans call for the design and construction of three (3) buildings on the site consisting of a three (3) storey Community Centre, 30 storey tower (Tower D) with two (2) to three (3) storey podium and a six (6) storey mid-rise building (Building E) and one-level underground parking garage extending beneath the entire footprint of all buildings and podium. It is our understanding that the parking garage floor next to Centrum Boulevard will be approximately 4.0 m below Centrum Boulevard and next to Brisebois Crescent will be 3.5 m below Brisebois Crescent.

The test hole information indicates the site is underlain by shallow unweathered limestone bedrock at a 2.6 m depth (Elevation 66.9 m) in the southwest corner of the site near Building No. E (Borehole No. 25-08). From Building No. E, the unweathered limestone bedrock slopes downward in the east direction to a 15.0 m depth (Elevation 53.7 m) in the southeast corner of the site near Tower D (Borehole No. 25-07) and in a northeast direction to the northeast corner of the site near the Community Centre (Borehole No. 25-06A) to a 33.0 m depth (Elevation 33.0 m). With the exception of the shallow bedrock in the southwest corner of the site, the parcel of land is also underlain by a deep sensitive marine silty clay.

Based on a review of the proposed development and anticipated high building loads for Tower D and lower building loads for the Community Centre and the mid-rise Building No. E, the silty clay is also not considered capable of supporting loads imposed by a 30 storey building with podium and underground parking garage. Therefore, the proposed 30 storey tower with a podium and one-level underground parking garage beneath the tower will need to be supported by pile foundation driven to refusal in the limestone bedrock. For the anticipated lower building loads of the three (3) storey Community Centre and six (6) storey mid-rise Building No. E, it is considered feasible to support the Community Centre with one-level underground parking garage by strip and spread footings founded on the silty clay or on an engineered fill pad constructed on the silty clay. The Building No. E may also be supported by

strip and spread footings founded on the silty clay, engineered fill pad constructed on the silty clay and on the shallow limestone bedrock. The parking garage floor slab may be designed as a slab-on-grade placed on an engineered fill pad constructed on the silty clay or unweathered limestone bedrock. The existing fill is not suitable to support the footings and slab-on-grade.

Since a portion of the underground parking garage at the South Parcel will be supported by a combination of footing foundation and pile foundation, a control joint between the pile foundation and the footing foundation may be required to prevent differential settlement. The need for a joint, type and location of the joint required and design details regarding the joint should be provided by the structural engineer.

Geotechnical comments and recommendations regarding footings and pile foundation are discussed in the following sections of this preliminary geotechnical report.

8.3 Footings – South Parcel

Based on a review of the test hole information and laboratory test results, the proposed Building No. E and the portion of the underground parking garage beneath Building No. E may be supported by spread and strip footings designed to bear on the silty clay, a minimum 300 mm thick engineered fill pad constructed on the silty clay or on the shallow competent sound limestone bedrock. The competent bedrock surface should not contain weathered zones of the bedrock, loose material (soil and bedrock pieces) and soft seams. The proposed Community Centre may be supported by strip and spread footings founded on the silty clay or engineered fill pad constructed on the silty clay.

Strip footings having a maximum width of 1.5 m and square pad footings having a maximum width and length of 3.0 m founded to a maximum 4.5 m depth below existing grade on the silty clay or engineered fill pad constructed on the silty clay may be designed for a bearing pressure at serviceability limit state (SLS) of 150 kPa and factored geotechnical resistance at ultimate limit state (ULS) of 225 kPa. The factored ULS value includes a geotechnical resistance factor of 0.5. The SLS and factored ULS values are valid provided the maximum 1.0 m site grade raise is respected.

Strip and spread footings founded on the competent sound limestone bedrock that is free of weathered zones, loose material (soil and bedrock pieces) and soft seams may be designed for a factored geotechnical resistance at ULS of 2000 kPa. The factored ULS value includes a geotechnical resistance factor of 0.5. The Serviceability Limit State (SLS) bearing pressure of the competent bedrock, required to produce 25 mm settlement of the structure will be much larger than the recommended values for the factored geotechnical resistance at ULS. Therefore, for footing founded on competent bedrock the factored geotechnical resistance at ULS will govern the design.

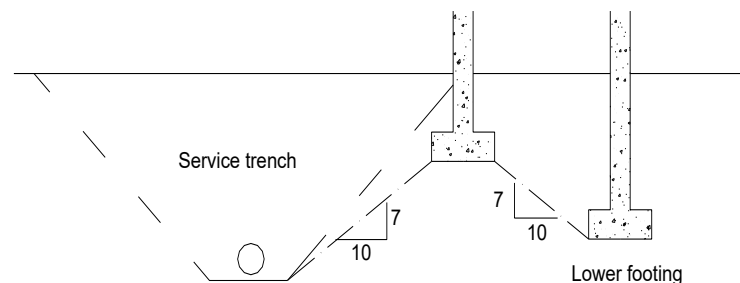
The preparation of the site for engineered fill pad construction requires all topsoil, organic stained soils, buried organic soil and fill be excavated and removed down to the silty clay or competent bedrock. The excavation should extend a sufficient distance beyond the limits of the footprint of the proposed building to accommodate a 1.0 m wide bench of engineered fill around the perimeter of the structure, which is thereafter sloped at an inclination of 1H:1V down to the approved silty clay or competent bedrock. The exposed native soil subgrade should be proofrolled and examined by a geotechnical engineer. Any loose/soft areas identified during proofrolling operations should be excavated and replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II compacted to 100 percent standard Proctor maximum dry density (SPMDD). The exposed bedrock subgrade should be examined by a geotechnical engineer to ensure the founding surface of the bedrock is competent and free of weathered zones of the bedrock, loose material (soil and rock pieces) and soft seams.

Following approval of the subgrade for the engineered fill pad, the excavation may be backfilled with the engineered fill consisting of free draining Ontario Provincial Standard Specification (OPSS) 1010 Granular B Type II material

placed in 300 mm thick lifts and each lift compacted to 100 percent of the SPMDD under the footings and to 98 percent of the SPMDD under the floor slab area. The engineered fill should be placed under the full-time supervision of a geotechnician working under the direction of a geotechnical engineer. In-place density tests should be undertaken on each lift of the engineered fill to ensure that it is properly compacted prior to placement of the subsequent lift.

The total and differential settlements of footings designed in accordance with the recommendations of this preliminary geotechnical report and with careful attention to construction detail are expected to be less than 25 mm and 19 mm respectively.

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

Footings at different elevations in competent sound bedrock should be located such that the higher footing is located 6V:1H from the limit of the footing excavation in the sound bedrock.

Where a footing may be founded partly on soil and partly on competent sound bedrock, it is recommended that a gradual transition zone of 4H:1V be created from footings on bedrock to soil and vice versa. The transition zone should be filled with Ontario Provincial Standard Specification (OPSS) Granular A or B Type II compacted to 100 percent standard Proctor maximum dry density (SPMDD). The SLS and factored ULS values for the bearing soil type should be used in the footing design.

All footing beds should be examined by a geotechnical engineer to ensure that the founding soil is capable of supporting the bearing pressure at SLS and that the footing beds have been properly prepared.

The bedrock subgrade for all footings should be thoroughly examined by a geotechnical engineer to ensure that the bedrock is competent and capable of supporting the factored ULS value. Where weathered zones of the bedrock, loose material (soil and bedrock pieces) and soft seams are encountered at the founding surface of the exposed bedrock, sub-excavation may be undertaken to the underlying more competent bedrock. Any sub-excavated areas to sound bedrock must be backfilled with 25 MPa concrete to the proposed design elevation of the underside of footing.

It should be noted that the exposed silty clay subgrade surface is susceptible to disturbance due to movement of workers and construction traffic and the prevailing weather conditions during construction. To prevent disturbance to the soil subgrade, the approved footing beds should be covered or protected with a 50 mm thick concrete mud slab within the same day of approval.

A minimum of 1.5 m of earth cover should be provided to the exterior foundations on soil of heated structures 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 and to 2.4 m if snow will be removed from the vicinity of the structure. When earth cover is less than the minimum required, an equivalent thermal combination of earth cover and rigid insulation or rigid insulation alone should be provided. EXP can provide additional comments in this regard, if required.

For footings founded on the competent sound bedrock, frost protection for the footings is not required.

8.4 Pile Foundation – North and South Parcels

The proposed new Towers A, B and C to be located in the north parcel and Tower D located in the south parcel and the one-level underground parking garage that will extend beneath the towers will need to be supported by pile foundations consisting steel H or concrete filled steel pipe piles designed in end-bearing and driven to practical refusal into the underlying limestone bedrock.

At the North Parcel the depth to bedrock is at a 40.7 m depth (Elevation 23.1) at Borehole No. 1A located in the northeast portion of the site and at a 24.0 m depth (Elevation 41.0 m) in the northwest portion of the site at Borehole No. 25-05A.

At the South Parcel the depth to bedrock is at a 33.0 m depth (Elevation 33.0 m) in the northeast corner of the site at Borehole No. 25-06A and with highly weathered limestone bedrock at a 14.6 m depth (Elevation 54.1 m) at the southeast corner of the site at Borehole No. 25-07 and at a 2.3 m depth (Elevation 67.2 m) at the southwest corner of the site at Borehole No. 25-08. At Borehole No. 25-09, cone refusal was met on inferred bedrock at a 23.6 m depth (Elevation 42.5 m).

To better delineate the depth (elevation) to the limestone bedrock within the building footprints of the proposed towers and buildings at the North and South Parcels, it is recommended that an additional geotechnical investigation consisting of boreholes that extend into the bedrock should be conducted at both parcels to confirm the depth (elevation) of the bedrock for detailed pile design as well as footing design (South Parcel). Depending on the findings from the additional boreholes and final design plans for the proposed development including design site grade raise, the preliminary geotechnical engineering comments and recommendations provided in this preliminary geotechnical report regarding footing and pile foundations and other items may need to be updated.

The factored geotechnical resistance and structural capacity for various pile sections for the North and South Parcels are shown in Tables VII and VIII. The factored geotechnical capacity of the piles is based on the Hiley dynamic formula and includes a geotechnical resistance factor of 0.4. The factored structural capacity of the piles are based on steel piles with a yield strength of 350 MPa and concrete compressive strength of 35 MPa.

It is noted that the piles at both parcels will be subjected to down-drag forces (negative skin friction) due to consolidation of the marine silty clay as a result of the maximum permissible grade raise of 2.0 m at the North Parcel and 1.0 m at the South Parcel and an assumed 1.0 m permanent groundwater lowering for both parcels. The negative skin friction that the piles would be subjected to is also listed in Tables VII and VIII. The allowable load on a pile is based on comparing the difference between the factored structural capacity of the pile and estimated skin friction with the factored geotechnical resistance of the pile. The lower of the two (2) values will govern the design and will be the allowable load carrying capacity of the pile to be used in the pile design.

Table VII: Preliminary Allowable Load Carrying Capacity of Steel Pipe and H-Piles -North Parcel						
Pile Section	Description	Factored Geotechnical Resistance at ULS (kN)	Factored Structural Capacity of Piles (kN)	Estimated Negative Skin Friction (kN)	Difference Between the Factored Structural Capacity of the Pile and the Estimated Negative Skin Friction (kN)	Allowable Load Carrying Capacity of Pile (kN)
Steel Pipe Section	245 mm O.D. by 10 mm wall thickness	1320	1782	921	861	861
	245 mm O.D. by 12 mm wall thickness	1490	2030	921	1109	1109
	324 mm O.D. by 12 mm wall thickness	2000	2910	1218	1692	1692
HP Section	HP 310 x 110	2400	2640	1479	1161	1161
	HP 310 x 125	2700	2980	1494	1486	1486

*Notes for Pile Foundations at the North Parcel:

- 1) At the North Parcel the depth to bedrock is at a 40.7 m depth (Elevation 23.1) at Borehole No. 1A located in the northeast portion of the site and at a 24.0 m depth (Elevation 41.0 m) in the northwest portion of the site at Borehole No. 25-05A.
- 2) Maximum Permissible Site Grade raise is 2.0 m.
- 3) Assumed permanent groundwater lowering is 1.0 m.

Table VIII: Preliminary Allowable Load Carrying Capacity of Steel Pipe and H-Piles -South Parcel						
Pile Section	Description	Factored Geotechnical Resistance at ULS (kN)	Factored Structural Capacity of Piles (kN)	Estimated Negative Skin Friction (kN)	Difference Between the Factored Structural Capacity of the Pile and the Estimated Negative Skin Friction (kN)	Allowable Load Carrying Capacity of Pile (kN)
Steel Pipe Section	245 mm O.D. by 10 mm wall thickness	1320	1782	351	1431	1320
	245 mm O.D. by 12 mm wall thickness	1490	2030	351	1679	1490
	324 mm O.D. by 12 mm wall thickness	2000	2910	464	2446	2000
HP Section	HP 310 x 110	2400	2640	564	2076	2076
	HP 310 x 125	2700	2980	569	2411	2411

Notes for Pile Foundation at the South Parcel:

- 1) At the South Parcel the depth to bedrock is at a 33.0 m depth (Elevation 33.0 m) in the northeast corner of the site at Borehole No. 25-06A and with highly weathered limestone bedrock at a 14.6 m depth (Elevation 54.1 m) at the southeast corner of the site at Borehole No. 25-07 and at a 2.3 m depth (Elevation 67.2 m) at the southwest corner of the site at Borehole No. 25-08.
- 2) Maximum Permissible Site Grade Raise is 1.0 m.
- 3) Assumed permanent groundwater lowering of 1.0 m.

Since a portion of the underground parking garage at the South Parcel will be supported by a combination of footing foundation and pile foundation, a control joint between the pile foundation and the footing foundation may be required to prevent differential settlement. The need for a joint, type and location of joint required and design details regarding the joint should be provided by the structural engineer.

As previously indicated, the estimated negative skin friction and allowable load carrying capacity of the piles can be updated once the design site grade raise of the site is available and depth (elevation) of bedrock is better delineated from the additional geotechnical investigation.

Total and differential settlement of the piles are expected to be less than 10 mm.

For load combinations imposed on the piles, the 2023 Canadian Foundation Engineering Manual (CFEM) indicates that drag load (negative skin friction) and transient live load should not be combined and that two (2) separate loading cases should be considered in the design of the piles to determine which loading case will govern the design. The first loading case to consider is permanent load plus drag load (negative skin friction) but no transient live load. The second loading case to consider is permanent load and transient live load but no drag (negative skin friction) load.

To achieve the capacity given previously, the pile-driving hammer must seat the pile in the overburden without overstressing the pile material. For guidance purposes, it is estimated that a hammer with rated energy of 54 kJ to 70 kJ (40,000 to 52,000 ft. lbs.) per blow would be required to drive the piles to practical refusal. Practical refusal is considered to have been achieved at a set of 5 blows for 6 mm or less of pile penetration. However, the driving criteria for a particular hammer-pile system must be established at the beginning of the project using the Pile Driving Analyzer.

The site is underlain by possible glacial till with cobbles and boulders in the lower levels. It is therefore recommended that the piles should be equipped with a driving shoe to protect them from damage during driving as per Ontario Provincial Standard Drawing (OPSD) 3001.100, Type II, Revision No. 2 dated November 2017.

A number of test piles (5 percent of the total number of piles) should be monitored with the Pile Driving Analyzer during the initial driving and re-striking at the beginning of the project. This monitoring will allow for the evaluation of transferred energy into the pile from the hammer, determination of driving criteria and an evaluation of the ultimate bearing capacity of the piles. Depending on the results of the pile driving analysis, the pile capacity may have to be proven by at least one pile load test for each pile type before production piling begins. If necessary, the pile load test should be performed in accordance with the American Society for Testing and Materials (ASTM) D 1143.

Closed end pipe piles tend to displace a relatively large volume of soil. When driven in a cluster or group, they may tend to jack up the adjacent piles in the group. Consequently, the elevation and the location of the top of each pile in a group should be monitored immediately after driving and after all the piles in the group have been driven. This

is to ensure that the piles are not heaving or being displaced. Any piles found to heave more than 3 mm should be re-tapped.

Piles driven at the site may be subject to relaxation (loss of set with time). It is therefore recommended that all the piles should be re-tapped at least 24 hours after initially driving and at 24-hour intervals thereafter until it can be proven that relaxation is no longer a problem.

The installation of the piles at the site should be monitored on a full-time basis by a geotechnician working under the direction and supervision of a qualified geotechnical engineer to verify that the piles are driven in accordance with the project specifications.

The concrete grade beams and pile caps for heated structures should be protected from frost action by providing the beams and caps with 1.5 m of earth cover. For non-heated structures, pile caps and beams should be provided with 2.4 m of earth cover in areas where the snow will be removed and 2.1 m of earth cover where the snow will not be removed. Alternatively, frost protection may be provided by rigid insulation or a combination of rigid insulation and earth cover.

A 50 mm thick concrete mud slab is recommended to be installed under the grade beams and pile caps immediately upon excavation and approval of the subgrade to protect the surface of the silty clay from disturbance from water, the effects from the weather and foot traffic from construction workers.

Temporary granular roads and mats (at least 900 mm thick) will be required to provide access to the pile driving rig. The actual thickness required for the granular roads and mats will have to be established by the piling contractor, based on the type of piling rig that will be used on site and subsurface condition.

8.5 Additional Comment for Foundations

The recommended bearing pressure at SLS and factored geotechnical resistances at ULS for the foundations 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 test holes, when foundation construction is underway. The interpretation between test holes and the recommendations of this report must therefore be checked through field monitoring provided by an experienced geotechnical engineer to validate the information for use during the construction stage.

9. Floor Slab and Drainage Requirements

The lowest floor for the proposed towers and buildings at the North and South Parcels may be designed and constructed as a slab-on-grade set on a minimum 300 mm thick engineered fill pad constructed on the silty clay or unweathered limestone bedrock. The existing topsoil, fill and buried organic-type soil are not considered suitable to support the slab-on-grade and should be excavated and removed down to the silty clay or competent bedrock.

The exposed silty clay subgrade should be examined by a geotechnical engineer and any loose/soft areas should be excavated, removed and replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to 95 percent standard Proctor maximum dry density (SPMDD).

The exposed limestone bedrock subgrade surface should be examined by a geotechnical engineer and any weathered zones of the bedrock, loose material (soil and bedrock pieces) and soft seams should be removed from the exposed bedrock subgrade within the floor slab area.

A transition zone treatment should be provided in areas where the subgrade for the slab-on-grade changes from silty clay to limestone bedrock and vice versa. In areas where the surface of the bedrock slopes at a steeper gradient than 3H:1V, the bedrock should be excavated and additional bedding material placed to create a 3H:1V transition zone and compacted to 98 percent SPMDD.

The slab-on-grade for the proposed buildings may be set on a bed of well compacted 19 mm sized clear stone at least 200 mm thick placed on a minimum 300 mm thick engineered fill pad placed on the approved silty clay or bedrock subgrade. The engineered fill pad should consist of Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to a minimum of 98 percent standard Proctor maximum dry density (SPMDD). The clear stone would minimize the capillary rise of moisture from the sub-soil to the floor slab. As an alternative for the clear stone layer only, the floor slab may be cast on a 200 mm thick bed of Ontario Provincial Standard Specification (OPSS) Granular A compacted to 98 percent SPMDD and placed on the engineered fill pad and overlain by a vapour barrier. Adequate saw cuts should be provided in the floor slabs to control cracking.

At the North and South Parcels, permanent perimeter and underfloor drainage systems are required for the proposed towers and buildings having a one-level underground parking garage. The need for an underfloor drainage system should be confirmed once the design elevation of the parking garage floor slab is available and compared with the groundwater level (elevation).

The finished exterior grade around the proposed buildings at the North and South Parcels should be sloped away from the buildings to prevent ponding of surface water close to the exterior walls of the buildings.

10. Lateral Earth Pressure Against Subsurface (Basement) Walls

The subsurface basement walls at the north parcel are anticipated to be within the silty clay. The subsurface basement walls at the south parcel are anticipated to be within the silty clay and limestone bedrock.

The subsurface basement walls of the proposed buildings will be subjected to lateral static earth pressure as well as lateral dynamic earth pressure during a seismic event. The lateral static earth pressure that the subsurface walls would be subjected to may be computed from equations (i) and (ii) and the lateral seismic (dynamic) earth force from equation (iii) given below. It is recommended that the basement walls of the proposed buildings be backfilled with free-draining material such as Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to 95 percent standard Proctor maximum dry density (SPMDD) and the basement walls be equipped with a permanent perimeter drainage system.

The equations given below assume that the backfill against the subsurface walls will be free-draining granular material and that a perimeter drainage system will be provided to prevent build-up of hydrostatic pressure behind the wall. Equation (i) will be applicable to the portion of the subsurface wall located within the overburden (soil). Equation (ii) will be applicable to the portion of the subsurface wall located in the bedrock where the earth pressure will be considerably reduced due to the narrow backfill between the subsurface wall and the rock face resulting in an arching effect (Spangler & Handy, 1984).

For design purposes, the lateral static earth pressure against the subsurface wall above the bedrock may be computed from the following equation:

$$p = K_0 (\gamma h + q) \text{ ----- (i)}$$

where p = lateral static earth pressure, kPa

K_0 = lateral earth pressure coefficient for 'at rest' condition = 0.50

γ = unit weight of free draining granular backfill; Granular B Type II = 22 kN/m³

h = depth of point of interest below top of backfill, m

q = any surcharge acting at ground surface, kPa

Lateral static earth pressure (σ_n) at depth z from the top of the bedrock surface, due to narrow earth backfill between subsurface wall and rock at depth z , may be computed from the following equation:

$$\sigma_n = \frac{\gamma B}{2 \tan \delta} \left(1 - e^{-2K_0 \frac{z}{B} \tan \delta} \right) + K_0 q \text{ ----- (ii)}$$

where σ_n = lateral static earth pressure, kPa

γ = unit weight of free draining granular backfill; Granular B Type II = 22 kN/m³

B = Backfill width (m)

z = depth from top of bedrock surface (m)

δ = friction angle between the backfill and wall and bedrock (assumed to be equal) = 17 degrees

K_0 = lateral earth pressure coefficient for 'at rest' condition = 0.50

q = surcharge pressure including pressures from overburden soil, traffic load at ground surface and foundations from existing adjacent buildings (kPa)

The lateral seismic (dynamic) thrust may be computed from the equation given below:

$$\Delta_{pe} = \gamma H^2 \frac{a_h}{g} F_b \text{ ----- (iii)}$$

where Δ_{pe} = dynamic thrust in kN/m of wall

H = height of wall, m

γ = unit weight of backfill material = 22 kN/m³

$\frac{a_h}{g}$ = seismic coefficient = 0.385g for site designation X₂₀₅ (2020 National Building Code of Canada Seismic Hazard Tool)

F_b = thrust factor = 1.0

The dynamic thrust does not take into account the surcharge load. The resultant force of the dynamic thrust acts approximately at 0.63H above the base of the wall.

For basement walls cast directly against the bedrock, a vertical drainage membrane or board such as Terradrain 200 or equivalent should be installed on the face of the bedrock that leads to a solid discharge pipe connecting to a sump inside the building. The top of the drainage board should be covered with a fabric filter to prevent the loss of the overlying soil into the drainage board.

All subsurface walls should be properly waterproofed.

11. Excavation and De-Watering Requirements

11.1 Excess Soil Management

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

Reference is made to the EXP Phase One and Two ESA reports regarding the environmental condition of the soils and groundwater.

11.2 Soil Excavation

Excavations for the construction of the proposed towers and buildings at the North and South Parcels are anticipated to extend to approximate depth of 4.5 m below existing grade. These excavations will be undertaken through the existing topsoil, fill and into the silty clay at the North Parcel and through the existing topsoil, fill and into the silty clay and limestone bedrock at the South Parcel. The excavations are anticipated to extend below the groundwater.

Excavation of the soils may be undertaken using heavy equipment capable of removing cobbles, boulders and debris within the fill.

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 persistent seepage and below the groundwater level in the soils, the excavation side slopes are expected to slough and eventually stabilize at a slope of 2H:1V to 3H:1V. For properly dewatered excavations, 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.

If the required gradient of the side slopes of the walls of the excavation cannot be satisfied due to the proximity of the excavation to existing buildings, infrastructure or roadways, the excavation would need to be undertaken within the confines of a shoring system. 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 OHSA and the 2023 Fifth Edition CFEM (Canadian Foundation Engineering Manual).

The shoring system as well as adjacent settlement sensitive structures and infrastructure should be monitored for movement (deflection) on a periodic basis during construction operations.

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

11.3 Bedrock Excavation

The excavations at the South Parcel are anticipated to extend into the bedrock. Excavations within the weathered zone of the bedrock and for shallow excavations into the competent sound bedrock may be excavated using a hoe ram for the removal of small quantities of the bedrock; however, this process is expected to be very slow. The excavation of the competent sound limestone bedrock to extensive depths below the bedrock surface will likely require line drilling and blasting techniques. Contractors bidding on this project should decide on their own the most preferred rock removal method; hoe ramming or line drilling and blasting.

The excavation side slopes in the weathered limestone bedrock may be cut back at a 1H:1V gradient from the bottom of the weathered bedrock zone.

Excavations within the sound bedrock may be undertaken with near vertical sides subject to review by a geotechnical engineer. The rock face of the excavation may require support in the form of shotcreting, wire mesh and/or rock bolts. The need for and type of rock support is best determined during on-site examination of the bedrock during excavation operations.

It is recommended that a pre-construction condition survey of the nearby buildings and the surrounding infrastructure located within the construction zone of influence be undertaken prior to any earth (soil) and rock excavation work as well as vibration monitoring during excavation, blasting and construction operations. Prior to the commencement of blasting, a detailed blast methodology should be submitted by the Contractor.

Vibration monitors should be installed in critical areas of adjacent buildings and infrastructure located within the construction zone of influence to monitor the vibration levels and set up to provide automated “alert” and “stop work” notifications if the permissible vibration levels are exceeded. The vibration limits should comply with City of Ottawa Special Provisions No. F-1201 (Use of Explosives) requirements.

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

11.4 De-Watering Requirements

Excavations above the groundwater may be dewatered by conventional sump pumping techniques. The dewatering of unshored and shored excavations below the groundwater level may also be removed by collecting the water at low points within the unshored and shored excavations and pumping from sumps. In areas of high infiltration, a higher seepage rate should be anticipated and high-capacity pumps may be required to keep the excavation dry.

Reference is made to the EXP Hydrogeological Assessment report regarding Environmental Activity and Sector Registry (EASR) and Permit to Take Water (PTTW) requirements.

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

12. Impact on Adjacent Existing Structures and Infrastructure

Based on the assumption that the surrounding existing building foundations and infrastructure are supported by the firm to hard silty clay or limestone bedrock, the lowering of the groundwater level over the short-term excavation period and over the long-term for the proposed new development at the North and South Parcels is not anticipated to negatively impact existing adjacent surrounding structures. Section 13 of this preliminary geotechnical report recommends that clay seals be installed in service trenches to prevent the permanent lowering of the groundwater level.

13. Pipe Bedding Requirements

The municipal services are anticipated to extend into the fill, silty clay and limestone bedrock.

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

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

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

To minimize the potential for bending stresses within the pipe, a transition zone treatment should be provided in areas where the pipe subgrade changes from overburden to bedrock and vice versa. In areas where the surface of the bedrock slopes at a steeper gradient than 3H:1V, the bedrock should be excavated and additional bedding material placed to create a 3H:1V transition zone.

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

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

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

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

The materials to be excavated from the site will comprise of topsoil, fill, buried organic soil, silty clay and limestone bedrock. From a geotechnical perspective, the topsoil and buried organic-type soil are not considered suitable for reuse as backfill material in the interior or exterior of the proposed buildings and should be discarded. Portions of the non-organic parts of the fill (free of organics, debris, cobbles and boulders) and silty clay free of organic stains and above the groundwater level may be re-used as fill in locations away from the proposed buildings as backfill in service trenches and subgrade fill in paved 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) and silty clay free of organic stains and below the groundwater level, may be re-used as fill in locations away from the proposed buildings 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 engineered fill pad construction, backfilling purposes in the interior and exterior of the proposed buildings parking lot, access roads and in the underground service trenches will need to be imported and should preferably conform to the following specifications:

- Engineered fill under slab-on-grade and footings for the proposed buildings – OPSS Granular B Type II placed in 300 mm thick lifts and each lift compacted to 98 percent SPMD below the floor slab and 100 percent SPMD below footings,
- Backfill material against foundation walls outside the proposed buildings – OPSS Granular B Type II placed in 300 mm thick lifts and each lift compacted to 95 percent SPMD,
- Trench backfill and subgrade fill for access roads, parking lot 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 SPMD; 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 SPMD.

15. Pavement Structure for Parking Lot and Access Roads

The subgrade for the pavement structures is anticipated to consist of fill, silty clay, OPSS Granular B Type II material, OPSS Select Subgrade Material (SSM) and approved on-site non-organic material. Pavement structure thicknesses required for the access roads and parking lot set on the anticipated approved subgrade materials were computed and are shown in Table IX. 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 IX: 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 to 97 percent MRD	65 mm HL3/SP12.5 mm/ Cat. B (PG 58-34)	50 mm HL3/SP12.5 Cat. B (PG 58-34) 60 mm HL8/SP 19 Cat. B (PG 58-34)
OPSS 1010 Granular A Base (crushed limestone)	100 percent SPMDD	150 mm	150 mm
OPSS 1010 Granular B Type II Sub-base	100 percent SPMDD	450 mm	600 mm

Notes:

1. SPMDD denotes standard Proctor maximum dry density
2. MRD denotes Maximum Relative Density
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 IX.

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 the existing fill down to the design subgrade level for the parking area and access roads. 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.
2. The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved. The need for adequate drainage cannot be over-emphasized. Subdrains should be installed on both sides of the access road(s). Subdrains should 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.

16. Subsurface Concrete and Steel Requirements

Chemical tests limited to pH, sulphate, chloride and resistivity were undertaken on three (3) selected soil samples and one (1) bedrock core section. A summary of the test results is shown in Table X. The laboratory certificate of analysis is shown in Appendix C.

Table X: Corrosion Test Results on Silty Clay and Limestone Bedrock						
Borehole No.: Sample No./Run No.	Depth (m)	Soil/Bedrock Type	pH	Sulphate (%)	Chloride (%)	Resistivity (ohm-cm)
Soil Samples						
BH 25-01: SS6	3.8-4.4	Grey Silty Clay	7.98	0.0357	0.0018	1810
BH 25-06: SS12	13.7-14.3	Grey Silty Clay	9.43	0.0151	0.0222	1050
BH 25-09: SS11-	9.1-9.7	Grey Silty Clay	8.96	0.0120	0.0017	3250
Bedrock Core Section						
BH 25-08: Run 1	2.6-2.7	Limestone Bedrock	9.11	0.0021	0.0038	6370

The test results indicate the grey silty clay and limestone bedrock have a negligible sulphate attack on subsurface concrete. The concrete should be designed in accordance with CSA A.23.1:24/CSA A23.2:24.

The results of the resistivity tests indicate that the grey silty clay is corrosive to moderately corrosive to bare steel and the limestone bedrock is mildly corrosive to bare steel as per the National Association of Corrosion Engineers (NACE). Appropriate measures should be taken to protect the bare buried steel from corrosion.

17. Tree Planting Restrictions

The site of the proposed buildings at the North and South Parcels is underlain by sensitive marine clay. The laboratory test results of the marine clay were compared with the document titled, “Tree Planting in Sensitive Marine Clay Soils – 2017 City of Ottawa Guidelines (2017 Guidelines)” and indicate the clay has a high potential for soil volume change. For soils that have a high potential for soil volume change, reference is made to the City of Ottawa 2005 Clay Soils Policy for tree planting restrictions and setbacks.

A landscape architect should be consulted to ensure the setbacks and tree planting restrictions are in accordance with the City of Ottawa 2005 Clay Soils Policy.

18. Additional Geotechnical Investigation

To better delineate the depth (elevation) to the limestone bedrock within the building footprints of the towers and buildings at the North and South Parcels, it is recommended that an additional geotechnical investigation consisting of boreholes that extend into the bedrock should be conducted at both parcels to confirm the depth (elevation) of the bedrock for detailed footing and pile design. Depending on the findings from the additional boreholes and final design plans for the proposed development including design site grade raise, the preliminary geotechnical engineering comments and recommendations provided in this preliminary geotechnical report regarding footing and pile foundations and other items may need to be updated.

19. Additional Comments

All earthwork activities from subgrade preparation to placement and compaction of engineered fill and backfill material should be inspected and tested by qualified geotechnicians to ensure that construction proceeds according to the project specifications.

The installation of the piles at the site should be monitored on a full-time basis by a geotechnician working under the direction and supervision of a qualified geotechnical engineer to verify that the piles are driven in accordance with the project specifications.

20. General Comments

The comments and recommendations given in this geotechnical report are preliminary in nature and 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.

The comments given in this preliminary geotechnical report are intended only for the guidance design engineers. The number of boreholes and test pits required to determine the localized underground conditions between boreholes and test pits 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 borehole and test pit results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

The information contained in this preliminary geotechnical report is not intended to reflect on environmental aspects of the soils. Reference is made to the Phase One and Two ESA reports regarding the environmental condition of the soil and groundwater.

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

Sincerely,



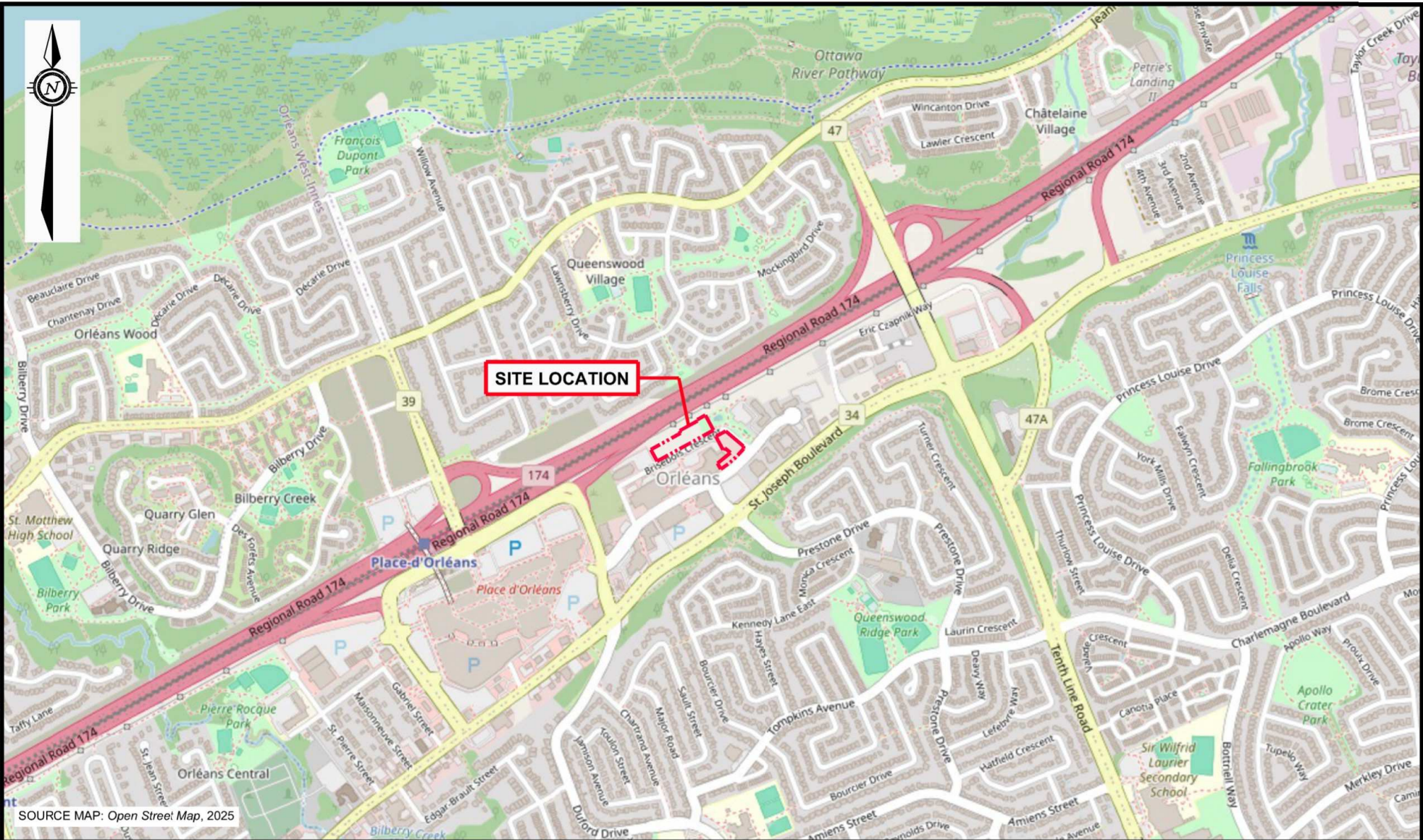
Susan M. Potyondy, P.Eng.
Senior Geotechnical Engineer
Earth & Environment



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

Figures

File name: E:\OTT\22022218-A0_60_Execution\65 Drawings\OTT-2202218-A0_Geo_265-Centrum-Bldv.dwg
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 Last Plotted: Dec 2, 2025 12:35 PM
 Plotted by: Severa



LEGEND

--- APPROXIMATE PROPERTY BOUNDARY

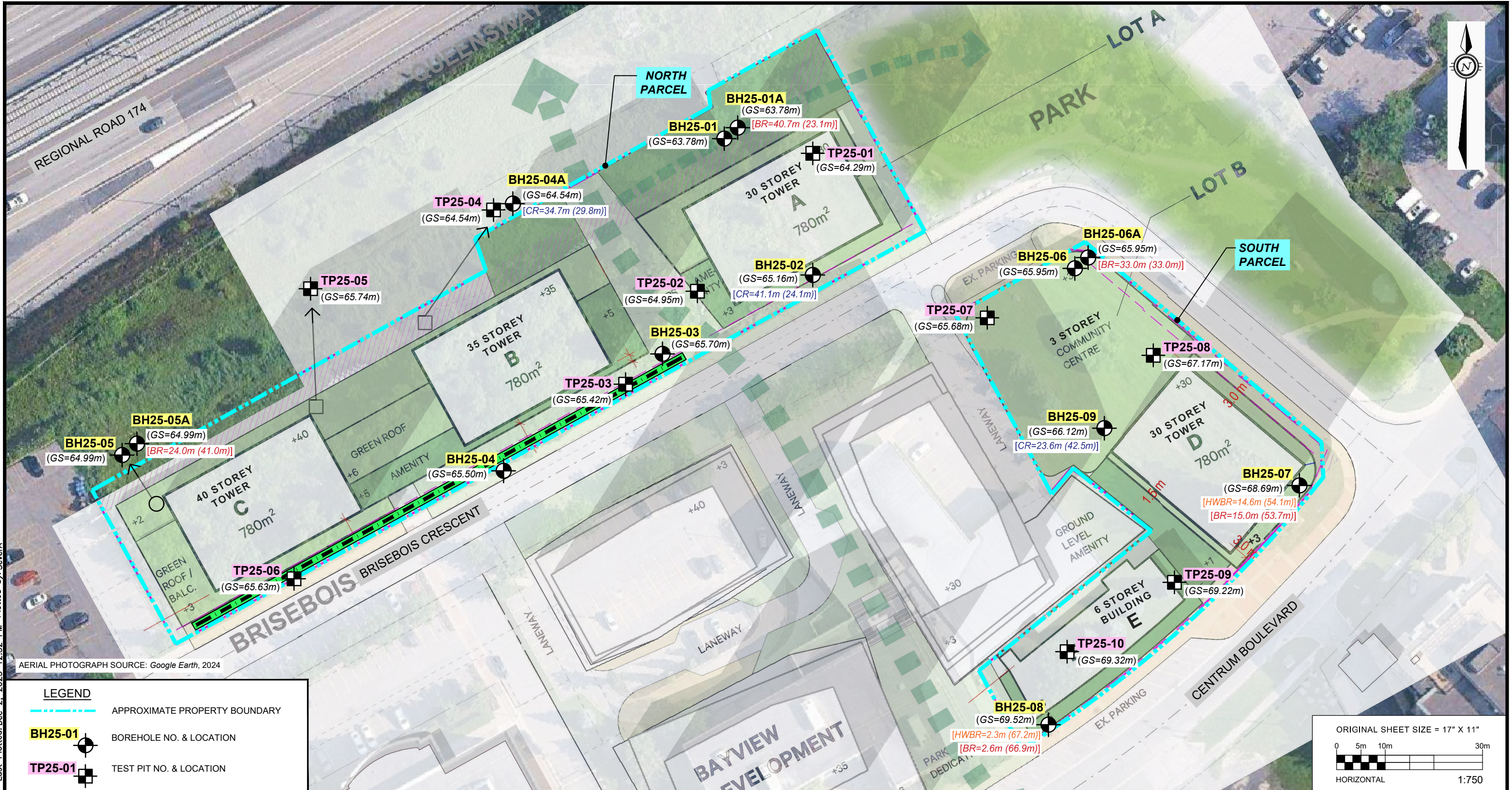
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0 150m 300m 600m

HORIZONTAL 1:15,000

		EXP Services Inc. www.exp.com t: +1.613.688.1899 f: +1.613.225.7337 2650 Queensview Drive, Suite 100 Ottawa, ON K2B 8H6, Canada	
		DATE DECEMBER 2025	PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION
DESIGN IT / SP	CHECKED IT	TITLE: SITE LOCATION PLAN	scale 1:15,000
DRAWN BY AS			FIG 1

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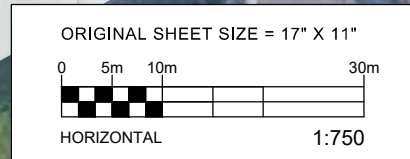
AERIAL PHOTOGRAPH SOURCE: Google Earth, 2024

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- BOREHOLE NO. & LOCATION
- TEST PIT NO. & LOCATION
- (GS=63.78m) TEST HOLE GROUND SURFACE ELEVATION (m)
- [CR=41.1m (24.1m)] CONE REFUSAL DEPTH (ELEVATION) (m) ON INFERRED BEDROCK
- [HWBR=2.3m (67.2m)] HIGHLY WEATHERED BEDROCK DEPTH (ELEVATION) (m)
- [BR=2.6m (66.9m)] BEDROCK DEPTH (ELEVATION) (m)
- PROPOSED BUILDINGS (TOWERS)
- SEISMIC SHEAR WAVE VELOCITY SOUNDING SURVEY LINE BY GPR

NOTES:

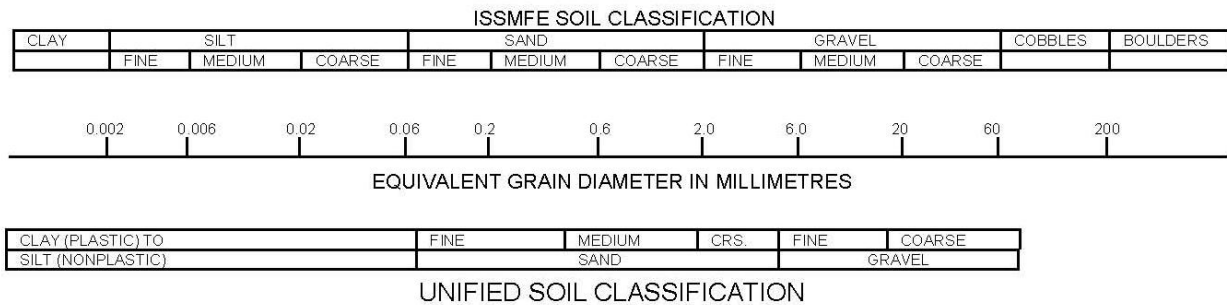
1. THE BOUNDARIES, SOIL AND ROCK TYPES HAVE BEEN ESTABLISHED ONLY AT TEST HOLE LOCATIONS. BETWEEN TEST HOLES THEY ARE ASSUMED AND MAY BE SUBJECT TO CONSIDERABLE ERROR.
2. SOIL SAMPLES AND ROCK CORES WILL BE RETAINED IN STORAGE FOR THREE MONTHS AND THEN DESTROYED UNLESS THE CLIENT ADVISES THAT AN EXTENDED TIME PERIOD IS REQUIRED.
3. TOPSOIL QUANTITIES SHOULD NOT BE ESTABLISHED FROM THE INFORMATION PROVIDED AT THE TEST HOLE LOCATIONS.
4. TEST HOLE 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.
6. BASE SITE PLAN PRODUCED BY: SVN ARCHITECTS+PLANNERS, LOADING & PHASING DISCUSSION VER2, DATED: 2025.07.17



		EXP Services Inc. www.exp.com t: +1.613.688.1899 f: +1.613.225.7337 2650 Queensview Drive, Suite 100 Ottawa, ON K2B 8H6, Canada	
		DATE DECEMBER 2025	PROJECT: PRELIMINARY GEOTECHNICAL INVESTIGATION
DESIGN IT / SP	CHECKED IT	TITLE: TEST HOLE LOCATION PLAN	
DRAWN BY AS	scale 1:750		
FIG 2			

Notes On Sample Descriptions

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



- 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.
- 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 25-01



Project No: OTT-2202218-A0

Figure No. 3

Project: High-Rise Commercial And Residential Development

Page. 1 of 3

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 21, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

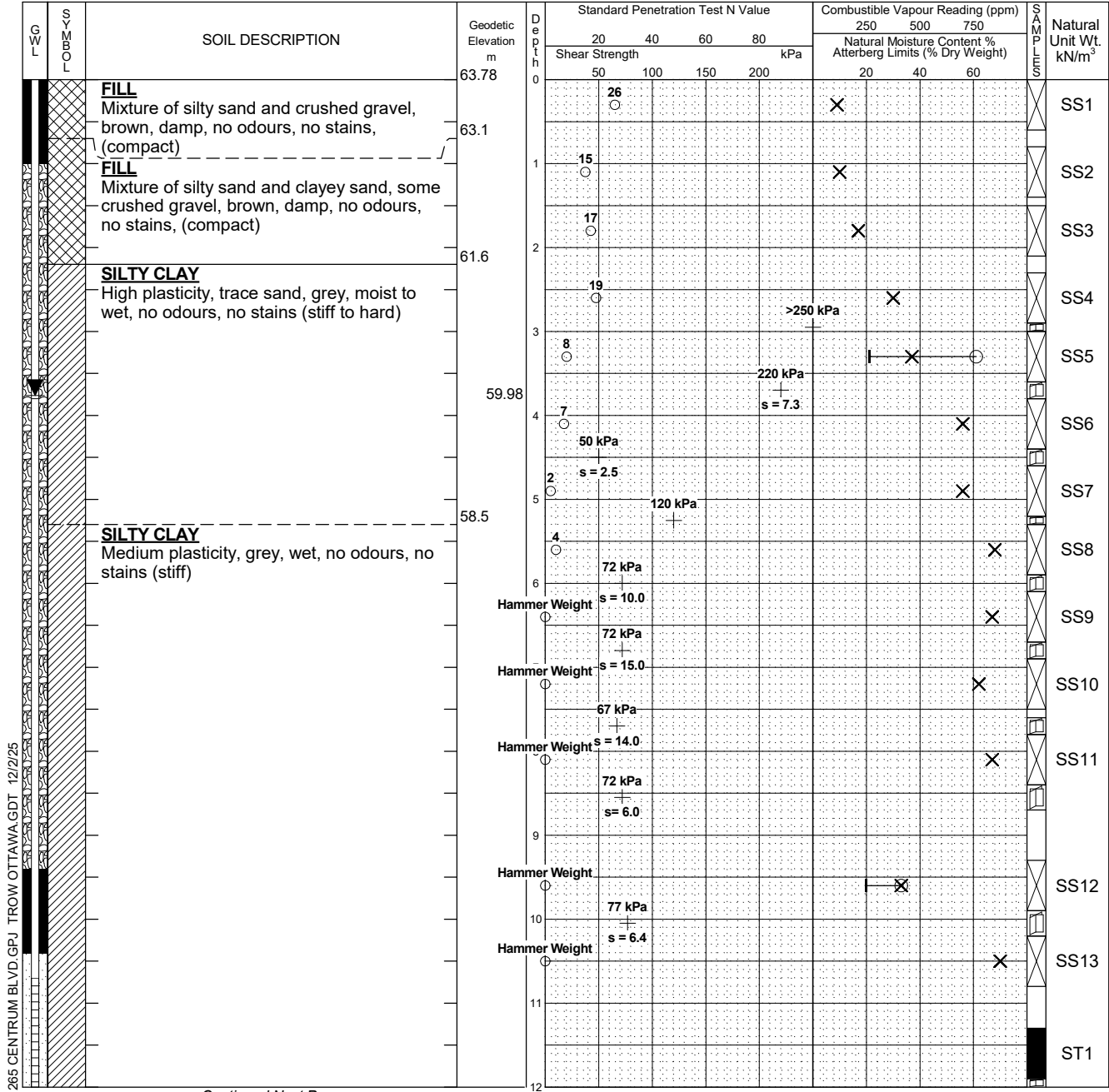
Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test



LOG OF BOREHOLE - 265 CENTRUM BLVD. GPJ TROW OTTAWA GDT 12/2/25

Continued Next Page

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - A 19 mm diameter standpipe was installed installed to 38.9 m
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-2202218-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
September 26, 2025	3.8	

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

Log of Borehole BH 25-01 A



Project No: OTT-22022218-A0

Figure No. 3A

Project: High-Rise Commercial And Residential Development

Page. 1 of 2

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: September 17 and 18, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at

Shelby Tube

% Strain at Failure

Logged by: SA Checked by: SMP

Shear Strength by

Shear Strength by

Vane Test

G W L	S O I L	SOIL DESCRIPTION	Geodetic Elevation m	D e p t h	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			N a t u r a l U n i t W t. kN/m ³
					20	40	60	80	250	500	750	
					Shear Strength kPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)			
		INFERED FILL	63.78	0								
		INFERED SILTY CLAY	61.4	1								
				2								
				3								
				4								
				5								
				6								
				7								
				8								
				9								
				10								
				11								
				12								
				13								
				14								
				15								
				16								
				17								
				18								
				19								
				20								

Continued Next Page

NOTES:

- Borehole data requires interpretation by EXP before use by others
- Borehole backfilled upon completion
- Field work was supervised by an EXP representative.
- See Notes on Sample Descriptions
- Log to be read with EXP Report OTT-22022218-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	40.7 - 42.1	91	71

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

Log of Borehole BH 25-01 A



Project No: OTT-2202218-A0

Figure No. 3A

Project: High-Rise Commercial And Residential Development

Page. 2 of 2

SOIL TYPE	SOIL DESCRIPTION	Geodetic Elevation m	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			Natural Unit Wt. kN/m ³
			20	40	60	80	250	500	750	
			Shear Strength kPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)			
Depth	50	100	150	200	20	40	60			
	INFFERED SILTY CLAY (continued)	43.78								
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
	INFFERED GLACIAL TILL With cobbles and boulders	27.1								
37										
38										
39										
40										
	LIMESTONE BEDROCK With shale partings, gre, fair quality	23.1								
41										
42										
	Borehole Terminated at 42.1 m Depth NOTE: 1. Borehole advanced by power augering technique (no soil sampling) from ground surface to bedrock surface at 40.7 m depth.	21.7								
										RUN1

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD. GPJ TROW OTTAWA GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Borehole backfilled upon completion
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-2202218-A0

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

CORE DRILLING RECORD			
Run No.	Depth (m)	% Rec.	RQD %
1	40.7 - 42.1	91	71

Log of Borehole BH 25-02



Project No: OTT-2202218-A0

Figure No. 4

Project: High-Rise Commercial And Residential Development

Page. 1 of 4

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 20 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

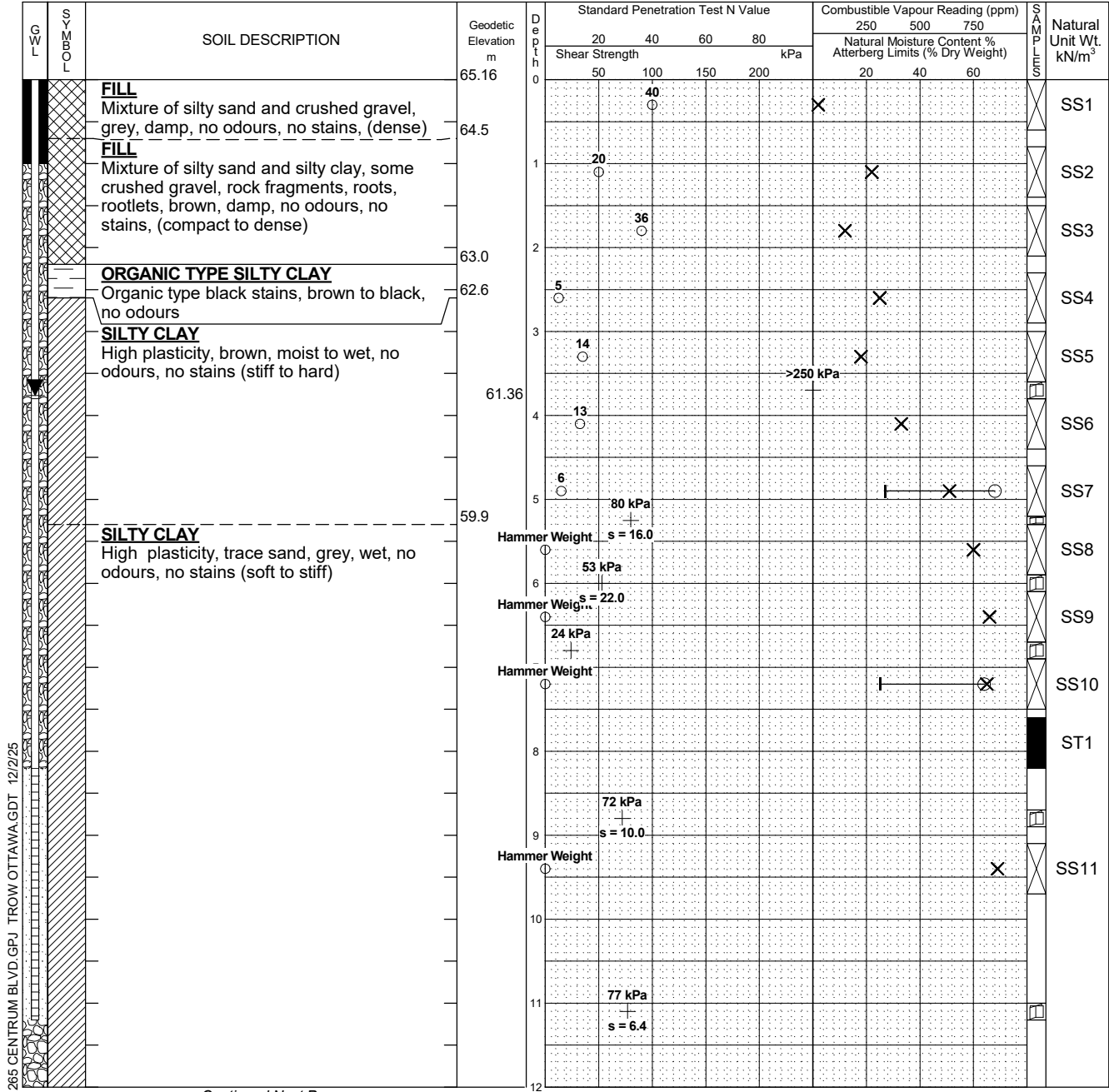
Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: SA Checked by: SMP

Shear Strength by Vane Test



LOG OF BOREHOLE - 265 CENTRUM BLVD.GPJ TROW OTTAWA GDT 12/2/25

Continued Next Page

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - A 45 mm diameter monitoring well was installed installed to 41.1 m
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-2202218-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
September 26, 2025	3.8	

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

Log of Borehole BH 25-02



Project No: OTT-22022218-A0

Figure No. 4

Project: High-Rise Commercial And Residential Development

Page. 4 of 4

G W L	S Y M B O L	SOIL DESCRIPTION	Geodetic Elevation m	D e p t h	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			S A M P L E S	Natural Unit Wt. kN/m ³
					20	40	60	80	250	500	750		
					Shear Strength kPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)				
			24.36		50	100	150	200	20	40	60		
		Cone Refusal at 41.1 m Depth	24.1	41									

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - A 45 mm diameter monitoring well was installed installed to 41.1 m
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-22022218-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
September 26, 2025	3.8	

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

Log of Borehole BH 25-03



Project No: OTT-2202218-A0

Figure No. 5

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 21, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

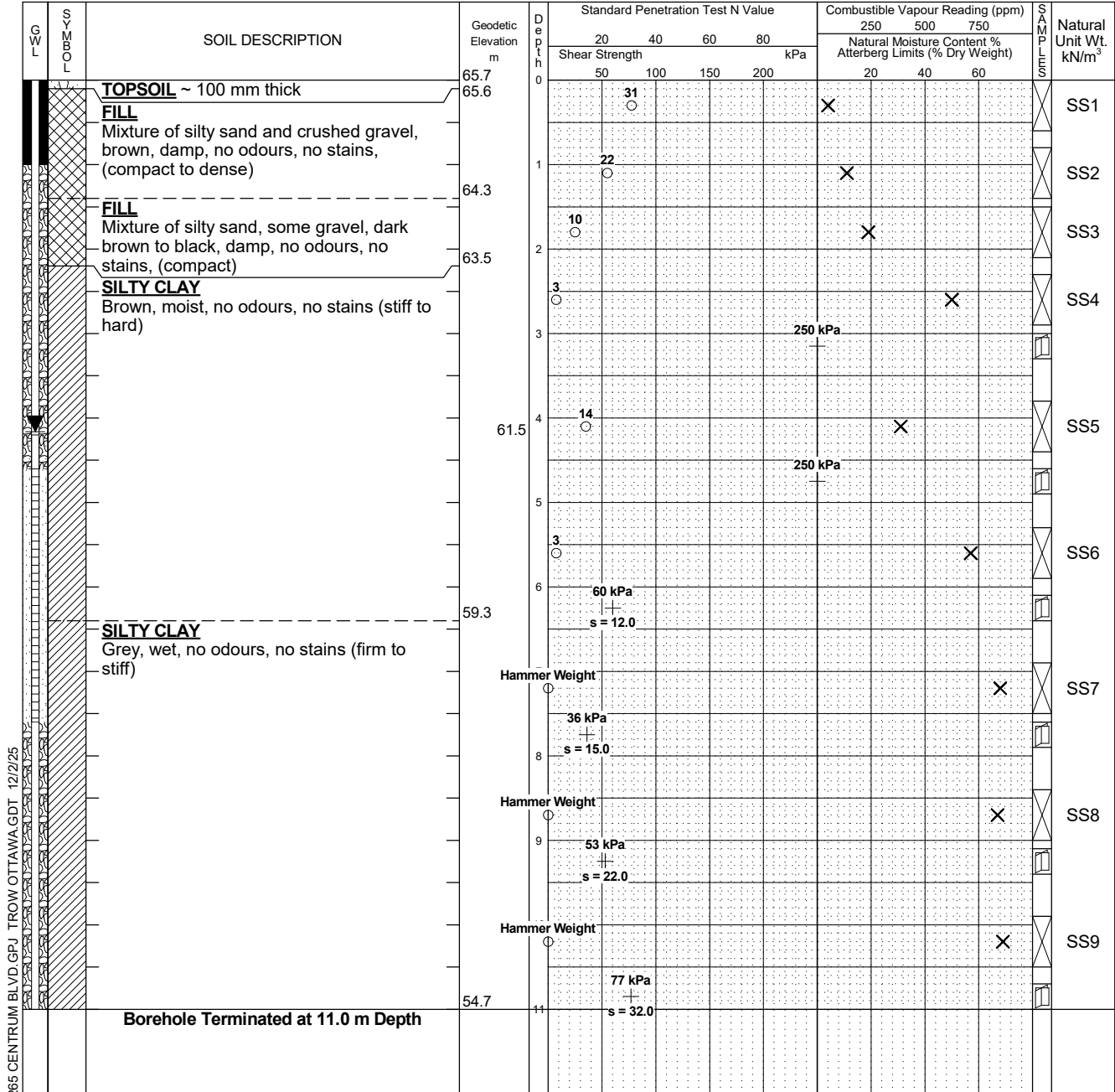
Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test



LOG OF BOREHOLE - 265 CENTRUM BLVD. GPJ TROW OTTAWA GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - A 45 mm diameter monitoring well was installed installed to 11.0 m.
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-2202218-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
September 26, 2025	4.2	

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

Log of Borehole BH 25-04



Project No: OTT-2202218-A0

Figure No. 6

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: 'August 22, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

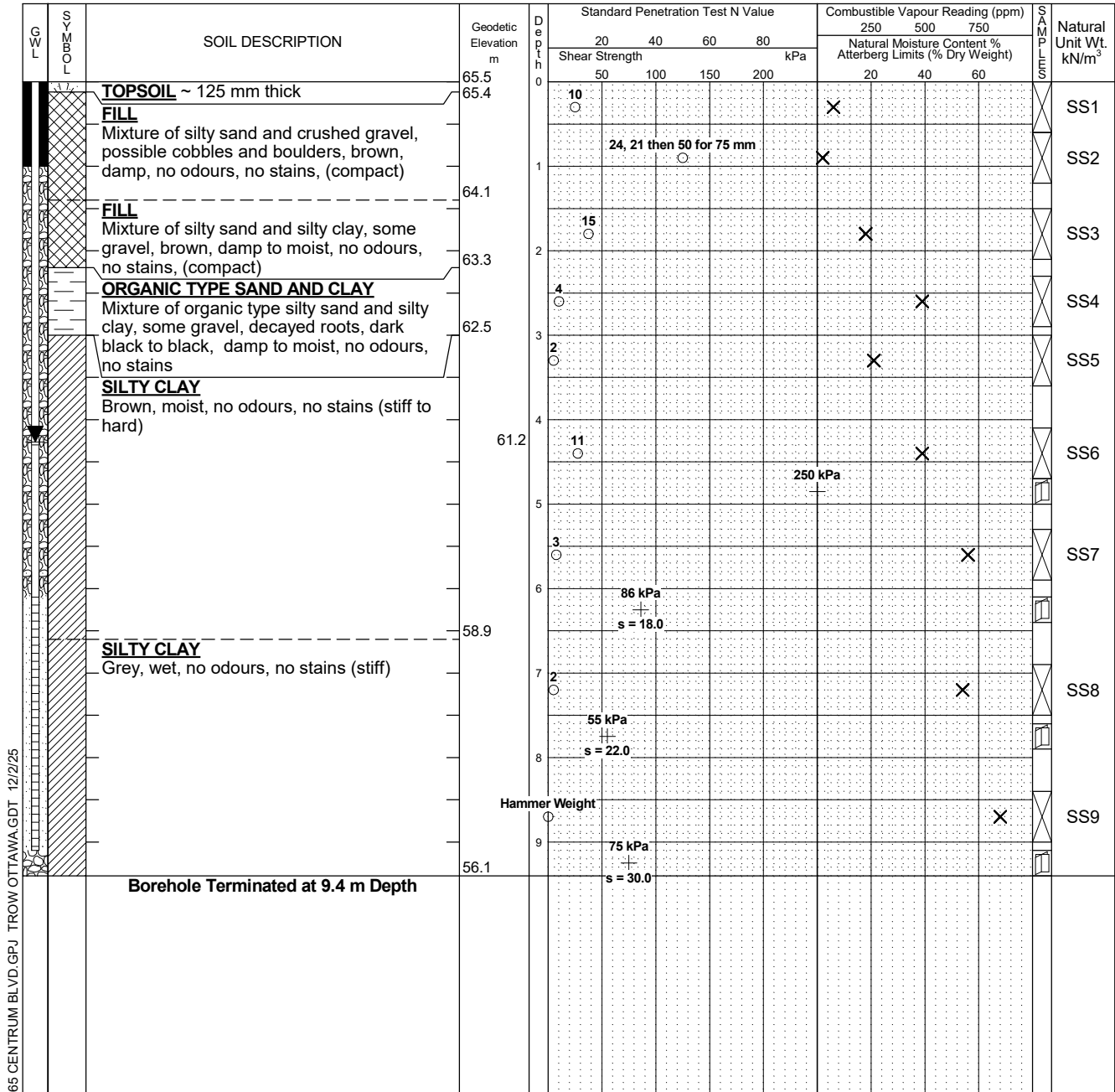
Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test



LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - A 45 mm diameter monitoring well was installed to 9.4 m.
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-2202218-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
September 26, 2025	4.3	

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

Log of Borehole BH 25-04 A



Project No: OTT-22022218-A0

Figure No. 15A

Project: High-Rise Commercial And Residential Development

Page. 1 of 2

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: September 22, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at

Shelby Tube

% Strain at Failure

Logged by: SA Checked by: SMP

Shear Strength by

Shear Strength by

Vane Test

G W L	S O B O L	SOIL DESCRIPTION	Geodetic Elevation m	D e p t h m	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			N a t u r a l U n i t W t. kN/m ³
					20	40	60	80	250	500	750	
					Shear Strength kPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)			
			64.54	0	50	100	150	200	20	40	60	
		Dynamic Cone Penetration Test (DCPT) conducted next to Test Pit No 25 -04. DCPT extends from 1.8 m to cone refusal at 34.7 m depth.		1								
		NOTE: 1. Borehole advanced by power augering technique (no soil sampling) from ground surface to 1.8 m depth.		2								
				3								
				4								
				5								
				6								
				7								
				8								
				9								
				10								
				11								
				12								
				13								
				14								
				15								
				16								
				17								
				18								
				19								
				20								

Continued Next Page

NOTES:

- Borehole data requires interpretation by EXP before use by others
- Borehole backfilled upon completion
- Field work was supervised by an EXP representative.
- See Notes on Sample Descriptions
- Log to be read with EXP Report OTT-22022218-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

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

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

Log of Borehole BH 25-04 A



Project No: OTT-22022218-A0

Figure No. 15A

Project: High-Rise Commercial And Residential Development

Page. 2 of 2

G W L	S O B Y L	SOIL DESCRIPTION	Geodetic Elevation m	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			Natural Unit Wt. kN/m ³								
				Shear Strength kPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)											
				20	40	60	80	250	500	750									
		Dynamic Cone Penetration Test (DCPT) conducted next to Test Pit No 25 -04. DCPT extends from 1.8 m to cone refusal at 34.7 m depth. NOTE: 1. Borehole advanced by power augering technique (no soil sampling) from ground surface to 1.8 m depth. <i>(continued)</i>	44.54	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	
		Cone Refusal at 34.7 m Depth	29.8																

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Borehole backfilled upon completion
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-22022218-A0

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

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

Log of Borehole BH 25-05



Project No: OTT-2202218-A0

Figure No. 7

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 22, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

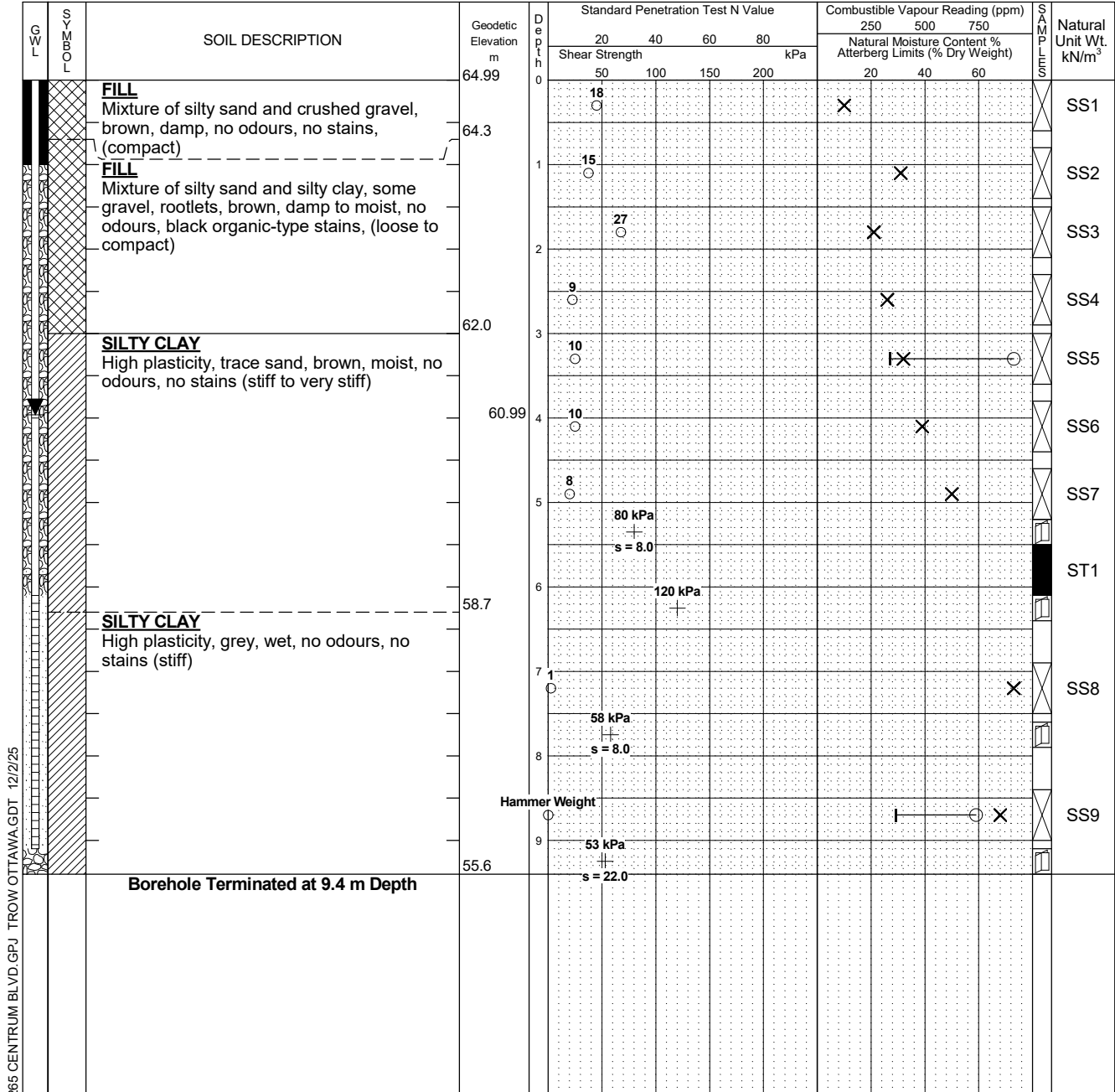
Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test



LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - A 45 mm diameter monitoring well was installed to 9.4 m.
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-2202218-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
September 26, 2025	4.0	

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

Log of Borehole BH 25-05 A



Project No: OTT-22022218-A0

Figure No. 7A

Project: High-Rise Commercial And Residential Development

Page. 1 of 2

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: September 19 and 22, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at

Shelby Tube

% Strain at Failure

Logged by: SA Checked by: SMP

Shear Strength by

Shear Strength by

Vane Test

G W L	S O I L	SOIL DESCRIPTION	Geodetic Elevation m	D e p t h	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			N a t u r a l U n i t W t. kN/m ³
					20	40	60	80	250	500	750	
					Shear Strength kPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)			
		INFERRED FILL	64.99									
		INFERRED SILTY CLAY	63.3									
				1								
				2								
				3								
				4								
				5								
				6								
				7								
				8								
				9								
				10								
				11								
				12								
				13								
				14								
				15								
				16								
				17								
				18								
				19								
				20								

Continued Next Page

NOTES:

- Borehole data requires interpretation by EXP before use by others
- Borehole backfilled upon completion
- Field work was supervised by an EXP representative.
- See Notes on Sample Descriptions
- Log to be read with EXP Report OTT-22022218-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	24 - 25.6	100	56

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

Log of Borehole BH 25-06



Project No: OTT-2202218-A0

Figure No. 8

Project: High-Rise Commercial And Residential Development

Page. 1 of 3

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: 'August 14, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

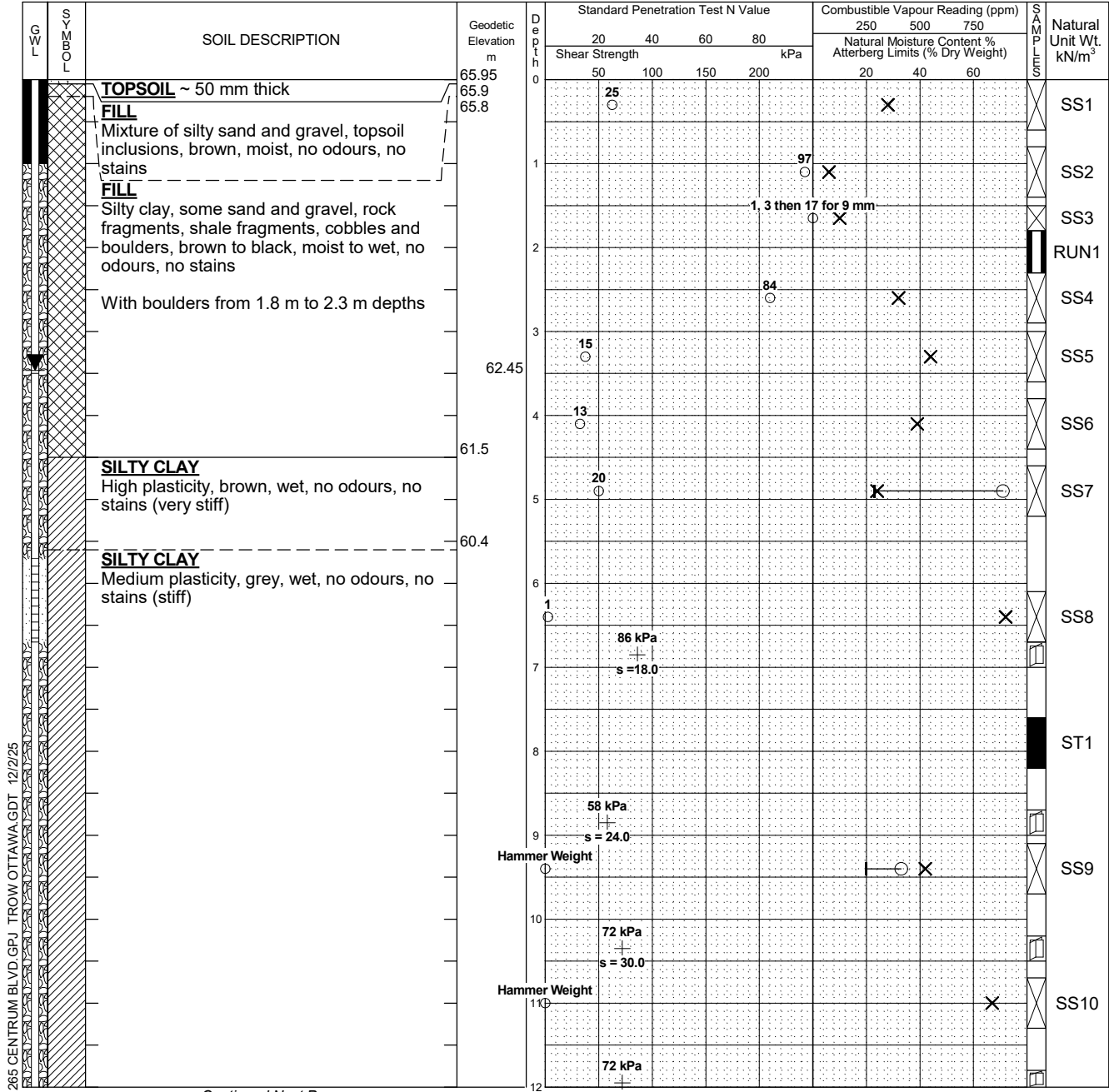
Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: SA Checked by: SMP

Shear Strength by Vane Test



LOG OF BOREHOLE - 265 CENTRUM BLVD.GPJ TROW OTTAWA GDT 12/2/25

NOTES:

- Borehole data requires interpretation by EXP before use by others
- A 45 mm diameter monitoring well was installed to 31.2 m.
- Field work was supervised by an EXP representative.
- See Notes on Sample Descriptions
- Log to be read with EXP Report OTT-2202218-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
September 26, 2025	3.5	

CORE DRILLING RECORD			
Run No.	Depth (m)	% Rec.	RQD %
1	1.8 - 2.3	0	0

Continued Next Page

Log of Borehole BH 25-06

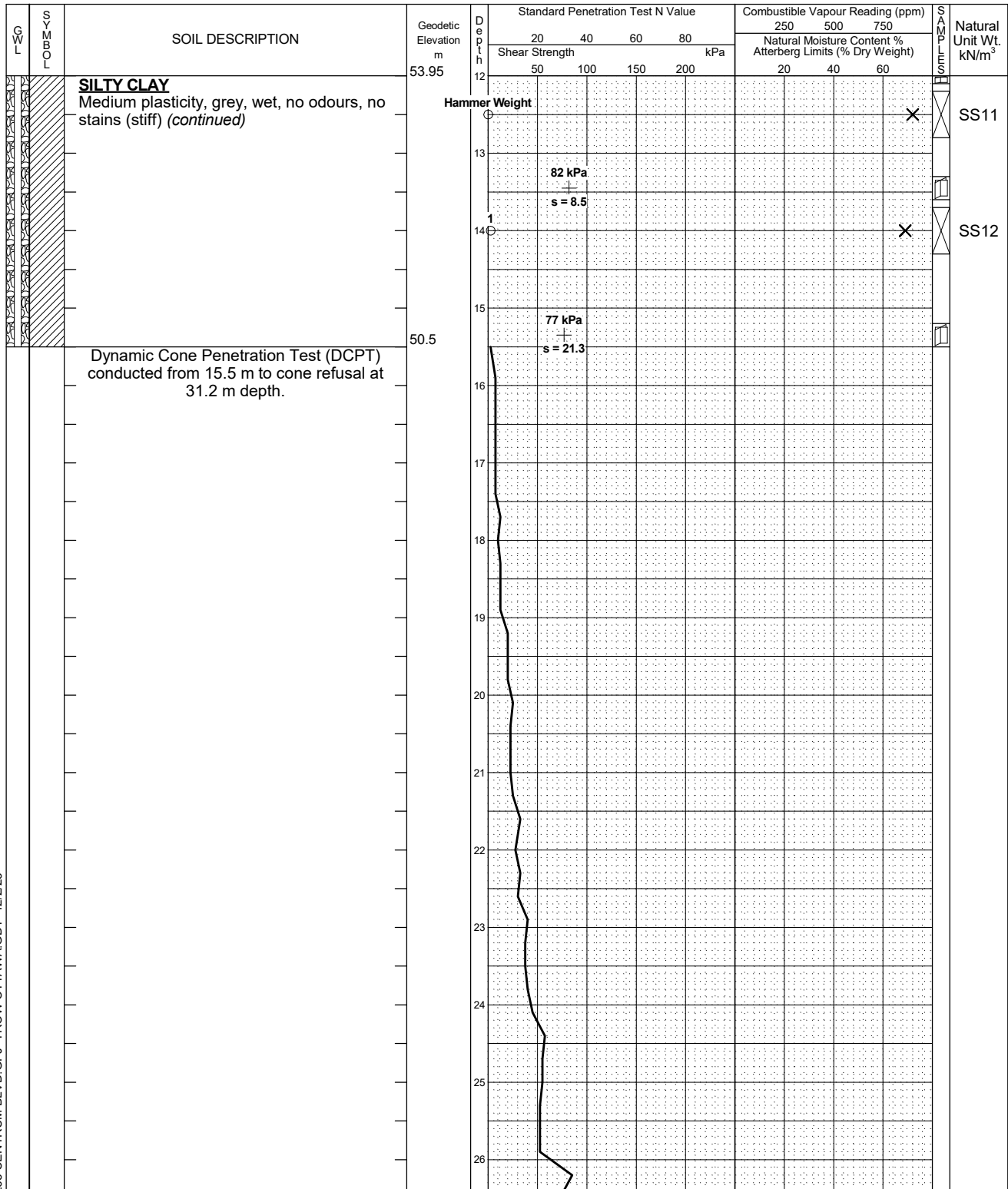


Project No: OTT-2202218-A0

Figure No. 8

Project: High-Rise Commercial And Residential Development

Page. 2 of 3



Continued Next Page

NOTES:

- Borehole data requires interpretation by EXP before use by others
- A 45 mm diameter monitoring well was installed to 31.2 m.
- Field work was supervised by an EXP representative.
- See Notes on Sample Descriptions
- Log to be read with EXP Report OTT-2202218-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
September 26, 2025	3.5	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	1.8 - 2.3	0	0

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

Log of Borehole BH 25-06 A



Project No: OTT-22022218-A0

Figure No. 8A

Project: High-Rise Commercial And Residential Development

Page. 1 of 2

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: September 15, 16 and 17, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at

Shelby Tube

% Strain at Failure

Logged by: SA Checked by: SMP

Shear Strength by

Shear Strength by

Vane Test

G W L	S O I L	SOIL DESCRIPTION	Geodetic Elevation m	D e p t h	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			N a t u r a l U n i t W t. kN/m ³
					20	40	60	80	250	500	750	
					Shear Strength kPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)			
		INFERRED FILL	65.95	0								
		INFERRED SILTY CLAY	63.9	1								
				2								
				3								
				4								
				5								
				6								
				7								
				8								
				9								
				10								
				11								
				12								
				13								
				14								
				15								
				16								
				17								
				18								
				19								
				20								

Continued Next Page

NOTES:

- Borehole data requires interpretation by EXP before use by others
- Borehole backfilled upon completion
- Field work was supervised by an EXP representative.
- See Notes on Sample Descriptions
- Log to be read with EXP Report OTT-22022218-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	31.4 - 33	0	0
2	33 - 34.4	95	74

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

Log of Borehole BH 25-07



Project No: OTT-2202218-A0

Figure No. 9

Project: High-Rise Commercial And Residential Development

Page. 1 of 2

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 13, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

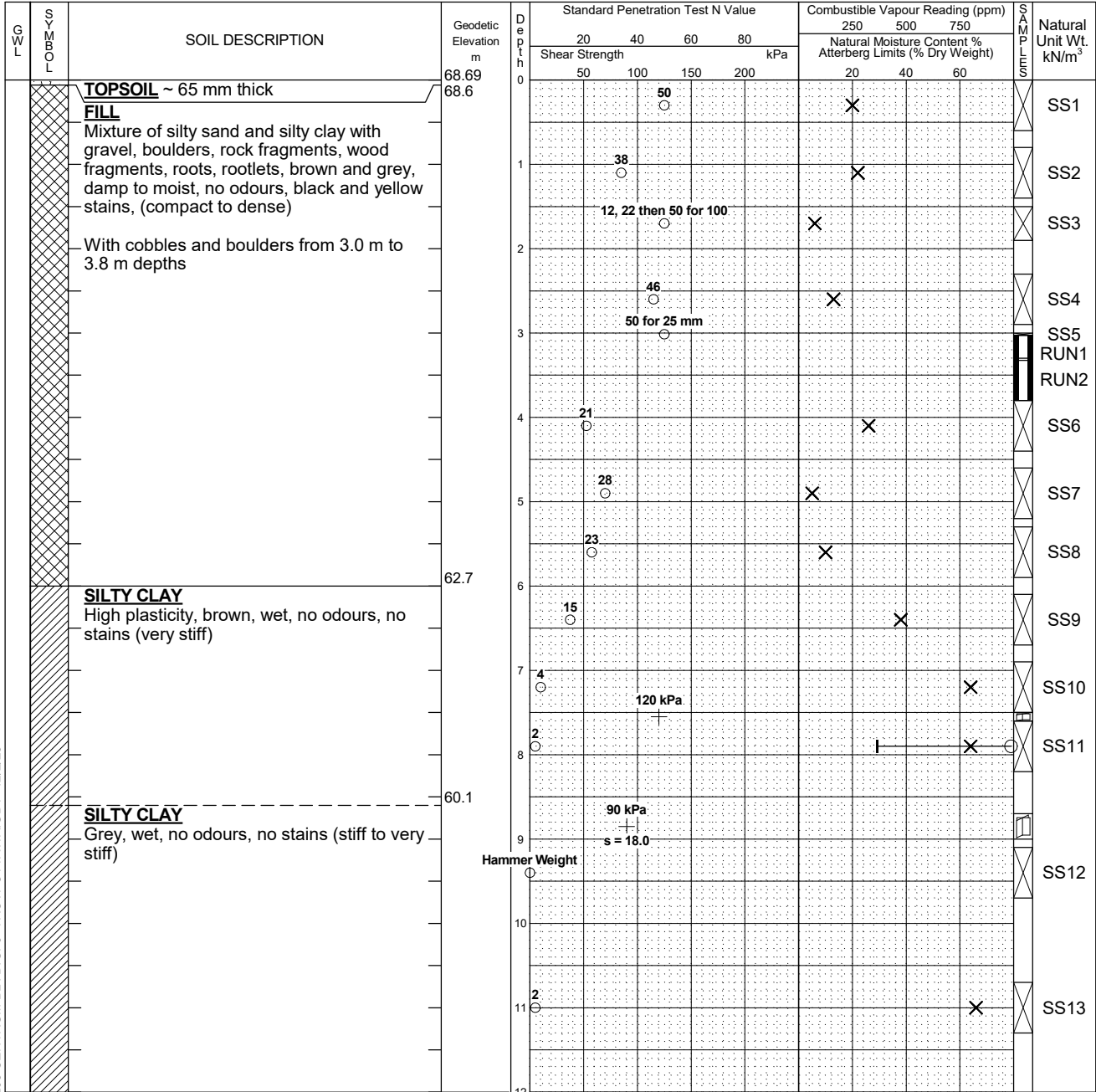
Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: SA, MZ Checked by: SMP

Shear Strength by Vane Test



LOG OF BOREHOLE - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

Continued Next Page

NOTES:

- Borehole data requires interpretation by EXP before use by others
- Borehole backfilled upon completion
- Field work was supervised by an EXP representative.
- See Notes on Sample Descriptions
- Log to be read with EXP Report OTT-2202218-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3 - 3.3	0	0
2	3.3 - 3.8	0	0
3	14.6 - 16.3	100	65

Log of Borehole BH 25-08



Project No: OTT-22022218-A0

Figure No. 10

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 14, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: MZ Checked by: SMP

Shear Strength by Vane Test

G W L	S O B Y S	SOIL DESCRIPTION	Geodetic Elevation m	D e p t h	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			Natural Unit Wt. kN/m ³	
					Shear Strength kPa				250	500	750		
					20	40	60	80	Natural Moisture Content % Atterberg Limits (% Dry Weight)				
		TOPSOIL ~ 50 mm thick	69.52	0									
		FILL Mixture of silty sand and gravel, cobbles and boulders, trace clay, brown and grey, damp, no odours, no stains, (compact to very dense)	69.5										
		Auger grinding on possible cobbles and boulders from ground surface to 2.3 m depth	67.2										
		HIGHLY WEATHERED LIMESTONE BEDROCK Grey	66.9										
		LIMESTONE BEDROCK With shale partings, grey, fair to excellent quality											
		With clay seams from 3.0 m to 4.5 m depths											
			63.72										
			63.3										
		Borehole Terminated at 6.2 m Depth											

LOG OF BOREHOLE - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - A 19 mm diameter standpipe was installed to 6.2 m.
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-22022218-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
September 26, 2025	5.8	

CORE DRILLING RECORD			
Run No.	Depth (m)	% Rec.	RQD %
1	2.6 - 3	93	93
2	3 - 4.5	85	56
3	4.5 - 6.2	95	70

Log of Borehole BH 25-09



Project No: OTT-2202218-A0

Figure No. 11

Project: High-Rise Commercial And Residential Development

Page. 1 of 2

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 15, 2025

Split Spoon Sample

Combustible Vapour Reading

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

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

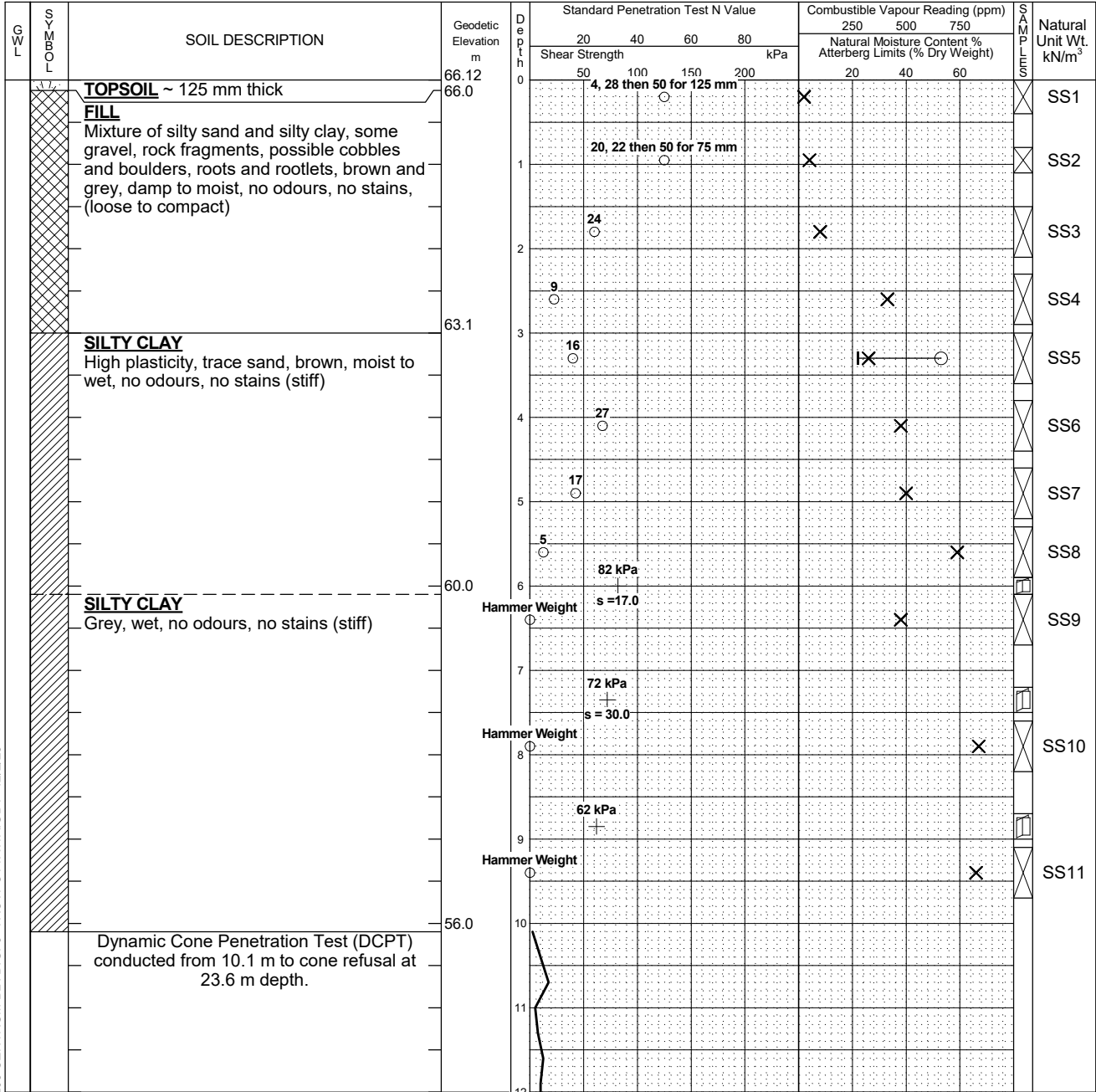
Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: SA Checked by: SMP

Shear Strength by Vane Test



LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

Continued Next Page

NOTES:

- Borehole data requires interpretation by EXP before use by others
- Borehole backfilled upon completion
- Field work was supervised by an EXP representative.
- See Notes on Sample Descriptions
- Log to be read with EXP Report OTT-2202218-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
September 26, 2025		

CORE DRILLING RECORD

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

Log of Borehole BH 25-09



Project No: OTT-22022218-A0

Figure No. 11

Project: High-Rise Commercial And Residential Development

Page. 2 of 2

G W L	S O B Y L	SOIL DESCRIPTION	Geodetic Elevation m	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			S A M P L E S	Natural Unit Wt. kN/m ³
				20	40	60	80	250	500	750		
				Shear Strength kPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)				
		Dynamic Cone Penetration Test (DCPT) conducted from 10.1 m to cone refusal at 23.6 m depth. <i>(continued)</i>	54.12	12								
				13								
				14								
				15								
				16								
				17								
				18								
				19								
				20								
				21								
				22								
				23								
		Cone Refusal at 23.6 m Depth	42.5									

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Borehole backfilled upon completion
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-22022218-A0

WATER LEVEL RECORDS		
Date	Water Level (m)	Hole Open To (m)
September 26, 2025		

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

Log of Borehole TP 25-01



Project No: OTT-22022218-A0

Figure No. 12

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 20, 2025

Split Spoon Sample

Combustible Vapour Reading

Drill Type: KX080 Excavator

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test

GWL	SOIL LOG	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			Natural Unit Wt. kN/m ³	
					Shear Strength kPa				250	500	750		
					20	40	60	80	Natural Moisture Content % Atterberg Limits (% Dry Weight)				
		TOPSOIL ~ 180 mm thick	64.29	0									
		FILL Silty sand and crushed gravel, brown, damp, no odours, no stains	64.1										GS1
		FILL Silty sand, some gravel, brown, damp, no odours, no stains	63.8							45			GS2
		FILL Silty sand, some gravel, brown, damp, no odours, no stains	62.8	1						50			GS3
		SILTY CLAY Grey, moist, no odours, no stains		2						20			GS4
				3									GS5
													GS6
													GS7
		Test Pit Terminated at 3.5 m Depth	60.8										

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Test Pit backfilled on completion of excavation
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-22022218-A0

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

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

Log of Borehole TP 25-02



Project No: OTT-22022218-A0

Figure No. 13

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: 'August 20, 2025

Split Spoon Sample

Combustible Vapour Reading

Drill Type: KX080 Excavator

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			Natural Unit Wt. kN/m ³
					Shear Strength kPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)			
					20	40	60	80	250	500	750	
		TOPSOIL ~ 150 mm thick	64.95 64.8	0								GS1
		FILL Mixture of silty sand, clayey sand and gravel with cobbles, brown, damp, no odours, no stains		1								GS2
												GS3
		SILTY CLAY Brown, moist, no odours, no stains	63.5	2								GS4
												GS5
												GS6
		Test Pit Terminated at 3.0 m Depth	62.0	3								

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Test Pit backfilled on completion of excavation
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-22022218-A0

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

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

Log of Borehole TP 25-03



Project No: OTT-2202218-A0

Figure No. 14

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: 'August 20, 2025

Split Spoon Sample

Combustible Vapour Reading

Drill Type: KX080 Excavator

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test

G W L	S O I L	SOIL DESCRIPTION	Geodetic Elevation m	D e p t h	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			S A M P L E S	Natural Unit Wt. kN/m ³	
					Shear Strength				Natural Moisture Content % Atterberg Limits (% Dry Weight)					
					20	40	60	80	250	500	750			
		TOPSOIL ~ 150 mm thick	65.42	0										
		FILL Silty sand and gravel, brown, damp, no odours, no stains	65.3											GS1
		FILL Clayey sand and gravel, brown, damp, no odours, no stains	64.4	1										GS2
														GS3
														GS4
														GS5
		SILTY CLAY Brown, moist, no odours, no stains	62.9											GS6
		SILTY CLAY Grey, moist, no odours, no stains	62.4	3										GS7
		Test Pit Terminated at 3.5 m Depth	61.9											

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Test Pit backfilled on completion of excavation
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-2202218-A0

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

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

Log of Borehole TP 25-04



Project No: OTT-22022218-A0

Figure No. 15

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 20, 2025

Split Spoon Sample

Combustible Vapour Reading

Drill Type: KX080 Excavator

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test

GWL	SOIL LOG	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			Natural Unit Wt. kN/m ³
					Shear Strength kPa				250	500	750	
					20	40	60	80	Natural Moisture Content % Atterberg Limits (% Dry Weight)			
		TOPSOIL ~ 150 mm thick	64.54	0								
		FILL Silty sand, brown, damp, no odours, no stains	64.4									GS1
		SILTY CLAY Brown, damp to moist, no odours, no stains	63.5	1								GS2
												GS3
												GS4
				2								GS5
												GS6
		Test Pit Terminated at 3.0 m Depth	61.5	3								

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Test Pit backfilled on completion of excavation
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-22022218-A0

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

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

Log of Borehole TP 25-05



Project No: OTT-2202218-A0

Figure No. 16

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 20, 2025

Split Spoon Sample

Combustible Vapour Reading

Drill Type: KX080 Excavator

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test

GWL	SOIL SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			Natural Unit Wt. kN/m ³
					Shear Strength kPa				250	500	750	
					20	40	60	80	Natural Moisture Content % Atterberg Limits (% Dry Weight)			
		TOPSOIL ~ 200 mm thick	65.74	0								
		FILL Silty sand, brown, damp, no odours, no stains	65.5									GS1
		SILTY CLAY Some sand, brown, damp, no odours, no stains	65.2									GS2
		SILTY CLAY Grey, moist, no odours, no stains	64.7	1								GS3
												GS4
												GS5
												GS6
		Test Pit Terminated at 3.0 m Depth	62.7	3								

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Test Pit backfilled on completion of excavation
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-2202218-A0

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

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

Log of Borehole TP 25-06



Project No: OTT-2202218-A0

Figure No. 17

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 20, 2025

Split Spoon Sample

Combustible Vapour Reading

Drill Type: KX080 Excavator

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at

Shelby Tube

% Strain at Failure

Logged by: JE Checked by: SMP

Shear Strength by Vane Test

Shear Strength by Penetrometer Test

GWL	SOIL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			Natural Unit Wt. kN/m ³
					Shear Strength kPa				250	500	750	
					20	40	60	80	Natural Moisture Content % Atterberg Limits (% Dry Weight)			
		TOPSOIL ~ 125 mm thick	65.63	0								
		FILL Silty sand and gravel, brown, damp, no odours, no stains	65.5									GS1
		FILL Clayey sand and gravel, brown, damp, no odours, no stains	65.1									GS2
				1								GS3
				2								GS4
		SILTY CLAY Brown, moist, no odours, no stains	63.6									GS5
		SILTY CLAY Grey, moist to wet, no odours, no stains	63.1									GS6
				3								GS7
		Test Pit Terminated at 3.5 m Depth	62.1									

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Test Pit backfilled on completion of excavation
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-2202218-A0

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

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

Log of Borehole TP 25-07



Project No: OTT-22022218-A0

Figure No. 18

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 20, 2025

Split Spoon Sample

Combustible Vapour Reading

Drill Type: KX080 Excavator

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at

Shelby Tube

% Strain at Failure

Logged by: JE Checked by: SMP

Shear Strength by

Shear Strength by

Vane Test

GWL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			Natural Unit Wt. kN/m ³
				Shear Strength kPa				250	500	750	
				20	40	60	80	Natural Moisture Content % Atterberg Limits (% Dry Weight)			
	TOPSOIL ~ 125 mm thick	65.68	0								
	FILL	65.6									GS1
	Silty sand and gravel with cobbles and boulders, brown, damp, no odours, no stains	65.2									GS2
	FILL	64.7	1								GS3
	Clayey sand, trace gravel, cobbles and boulders, brown, damp, no odours, no stains	63.7									GS4
	FILL	63.2	2								GS5
	Silty clay, trace gravel, brown to grey, damp, no odours, no stains	63.2									GS6
	Asphalt pieces and boulders at 2.0 m depth	62.2	3								GS7
	SILTY CLAY										
	Brown, moist, no odours, no stains										
	SILTY CLAY										
	Grey, moist to wet, no odours, no stains										
	Test Pit Terminated at 3.5 m Depth										

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Test Pit backfilled on completion of excavation
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-22022218-A0

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

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

Log of Borehole TP 25-08



Project No: OTT-22022218-A0

Figure No. 19

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 20, 2025

Split Spoon Sample

Combustible Vapour Reading

Drill Type: KX080 Excavator

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test

G W L	S Y M B O L	SOIL DESCRIPTION	Geodetic Elevation m	D e p t h m	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			S A M P L E S	Natural Unit Wt. kN/m ³	
					Shear Strength kPa				250	500	750			
					20	40	60	80	Natural Moisture Content % Atterberg Limits (% Dry Weight)					
		TOPSOIL ~ 125 mm thick	67.17	0										
		FILL Mixture of silty sand, silty clay and gravel, cobbles and boulders, brick and concrete pieces, steel reinforcing bars, brown, damp, no odours, no stains	67.0	0										GS1
		BLAST SHATTERED ROCK FILL Silty sand and clayey sand with gravel, cobbles and boulders	65.7	1										GS2
				2										GS3
				3										GS4
														GS5
														GS6
														GS7
		Test Pit Terminated at 3.5 m Depth	63.7											

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Test Pit backfilled on completion of excavation
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-22022218-A0

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

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

Log of Borehole TP 25-09



Project No: OTT-22022218-A0

Figure No. 20

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 20, 2025

Split Spoon Sample

Combustible Vapour Reading

Drill Type: KX080 Excavator

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test

GWL	SOIL SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			Natural Unit Wt. kN/m ³
					Shear Strength kPa				250	500	750	
					20	40	60	80	Natural Moisture Content % Atterberg Limits (% Dry Weight)			
		TOPSOIL ~ 150 mm thick	69.22	0								GS1
		FILL Silty sand and gravel, cobbles and boulders, some clay, brown, damp, no odours, no stains	69.1	0								GS2
		With concrete pieces at 1.5 m depth	67.7	1								GS3
		SILTY CLAY Some sand and gravel, brown, damp to moist, no odours, no stains		2								GS4
				3								GS5
				4								GS6
				5								GS7
				6								GS8
		Test Pit Terminated at 4.0 m Depth	65.2	4								

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Test Pit backfilled on completion of excavation
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-22022218-A0

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

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

Log of Borehole TP 25-10



Project No: OTT-2202218-A0

Figure No. 21

Project: High-Rise Commercial And Residential Development

Page. 1 of 1

Location: 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON

Date Drilled: August 20, 2025

Split Spoon Sample

Combustible Vapour Reading

Drill Type: KX080 Excavator

Auger Sample

Natural Moisture Content

SPT (N) Value

Atterberg Limits

Datum: Geodetic Elevation

Dynamic Cone Test

Undrained Triaxial at % Strain at Failure

Shelby Tube

Shear Strength by Penetrometer Test

Logged by: JE Checked by: SMP

Shear Strength by Vane Test

GWL	SOIL LOG	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			Natural Unit Wt. kN/m ³
					Shear Strength kPa				Natural Moisture Content % Atterberg Limits (% Dry Weight)			
					20	40	60	80	250	500	750	
		TOPSOIL ~ 150 mm thick	69.32	0								GS1
		FILL Silty sand and gravel, cobbles and boulders, asphalt, brick and snow fence pieces, brown, damp, no odours, no stains	69.2	1								GS2
												GS3
												GS4
		SILTY CLAY Brown, damp, no odours, no stains	67.3	2								GS5
												GS6
		Test Pit Terminated at 3.0 m Depth	66.3	3								

LOG OF BOREHOLE BH-LOGS - 265 CENTRUM BLVD.GPJ TROW OTTAWA.GDT 12/2/25

- NOTES:
- Borehole data requires interpretation by EXP before use by others
 - Test Pit backfilled on completion of excavation
 - Field work was supervised by an EXP representative.
 - See Notes on Sample Descriptions
 - Log to be read with EXP Report OTT-2202218-A0

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

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

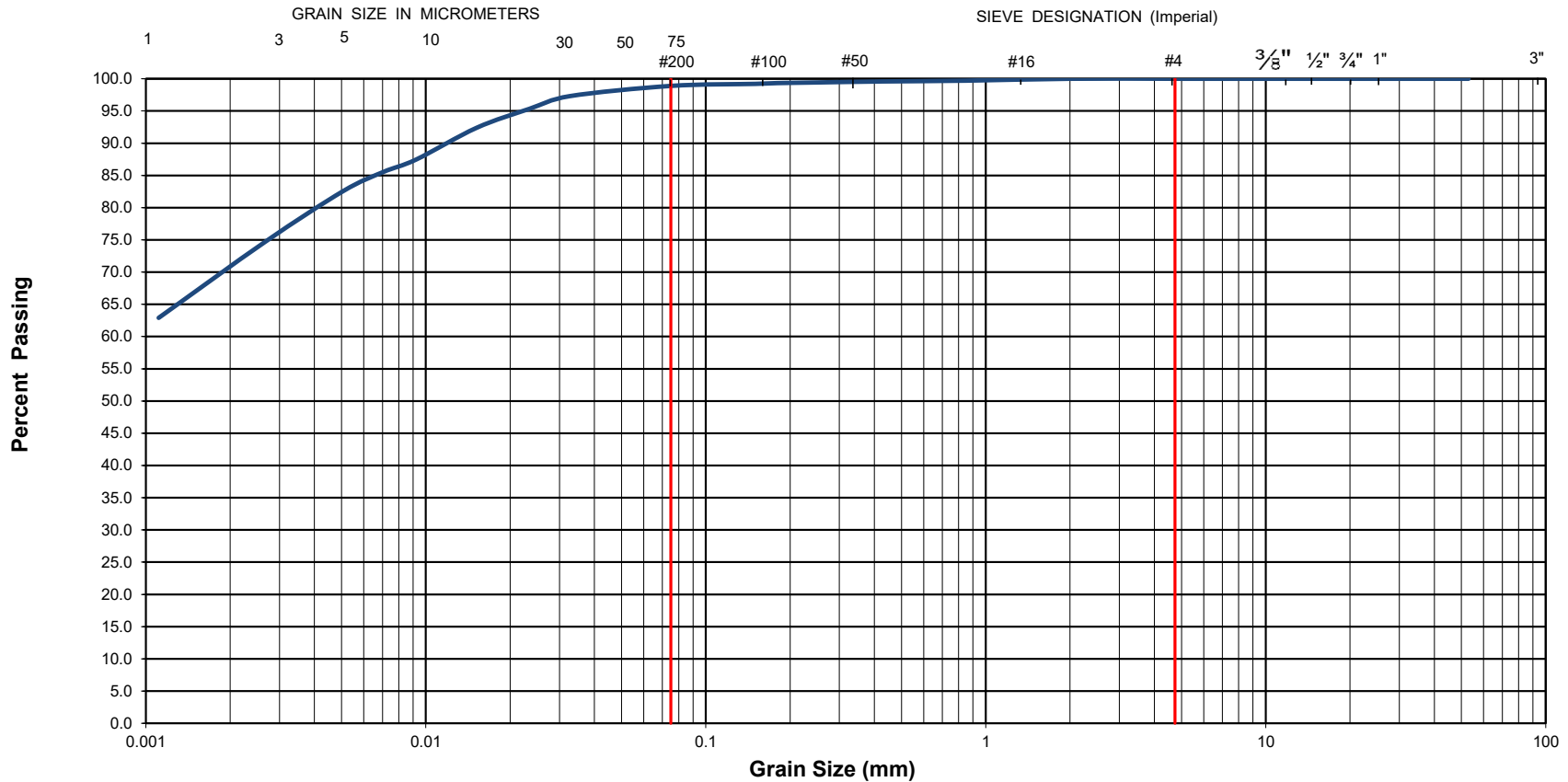


Grain-Size Distribution Curve Method of Test For Particle Size Analysis of Soil ASTM C-136/ASTM D422

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

Unified Soil Classification System

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



EXP Project No.:	OTT-22022218-A0	Project Name :	Proposed High-Rise Commercial and Residential Development			
Client :	EP Real Estate Development Ltd.	Project Location :	530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON			
Date Sampled :	August 21, 2025	Borehole No:	BH 25-01	Sample No.: SS5		
Sample Description :		Depth (m) :	3.0-3.6			
Sample Description :	SILTY CLAY of HIGH PLASTICITY (CH): Trace Sand			Figure :	22	
	% Silt and Clay	99	% Sand	1	% Gravel	0

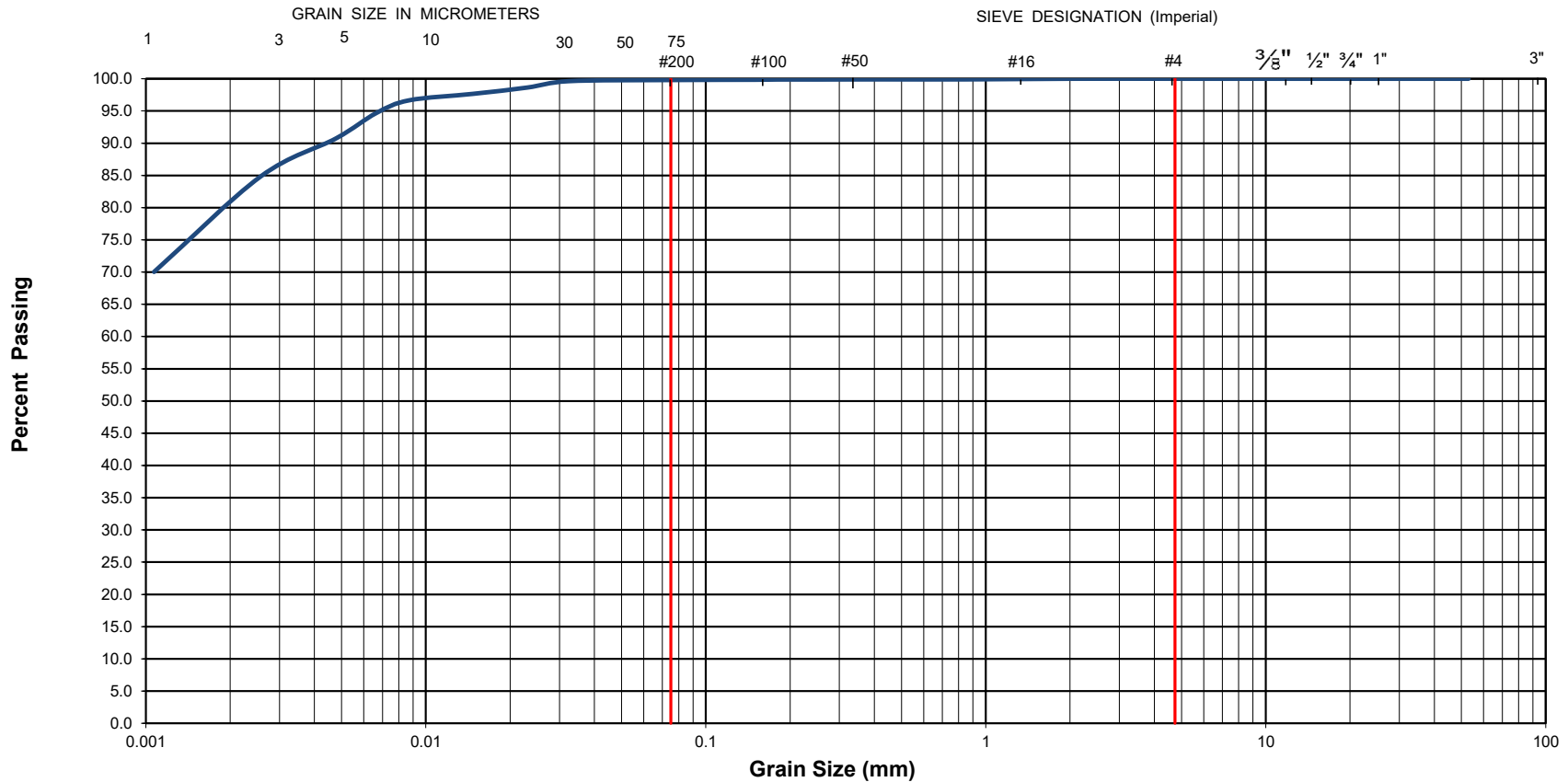


Grain-Size Distribution Curve Method of Test For Particle Size Analysis of Soil ASTM C-136/ASTM D422

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

Unified Soil Classification System

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



EXP Project No.:	OTT-22022218-A0	Project Name :	Proposed High-Rise Commercial and Residential Development		
Client :	EP Real Estate Development Ltd.	Project Location :	530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON		
Date Sampled :	August 20, 2025	Borehole No:	BH25-02	Sample No.: SS7	
Sample Description :	% Silt and Clay	100	% Sand	0	
Sample Description :			% Gravel	0	
Sample Description :	SILTY CLAY of HIGH PLASTICITY (CH)			Figure :	23
Depth (m) :	4.6-5.2				

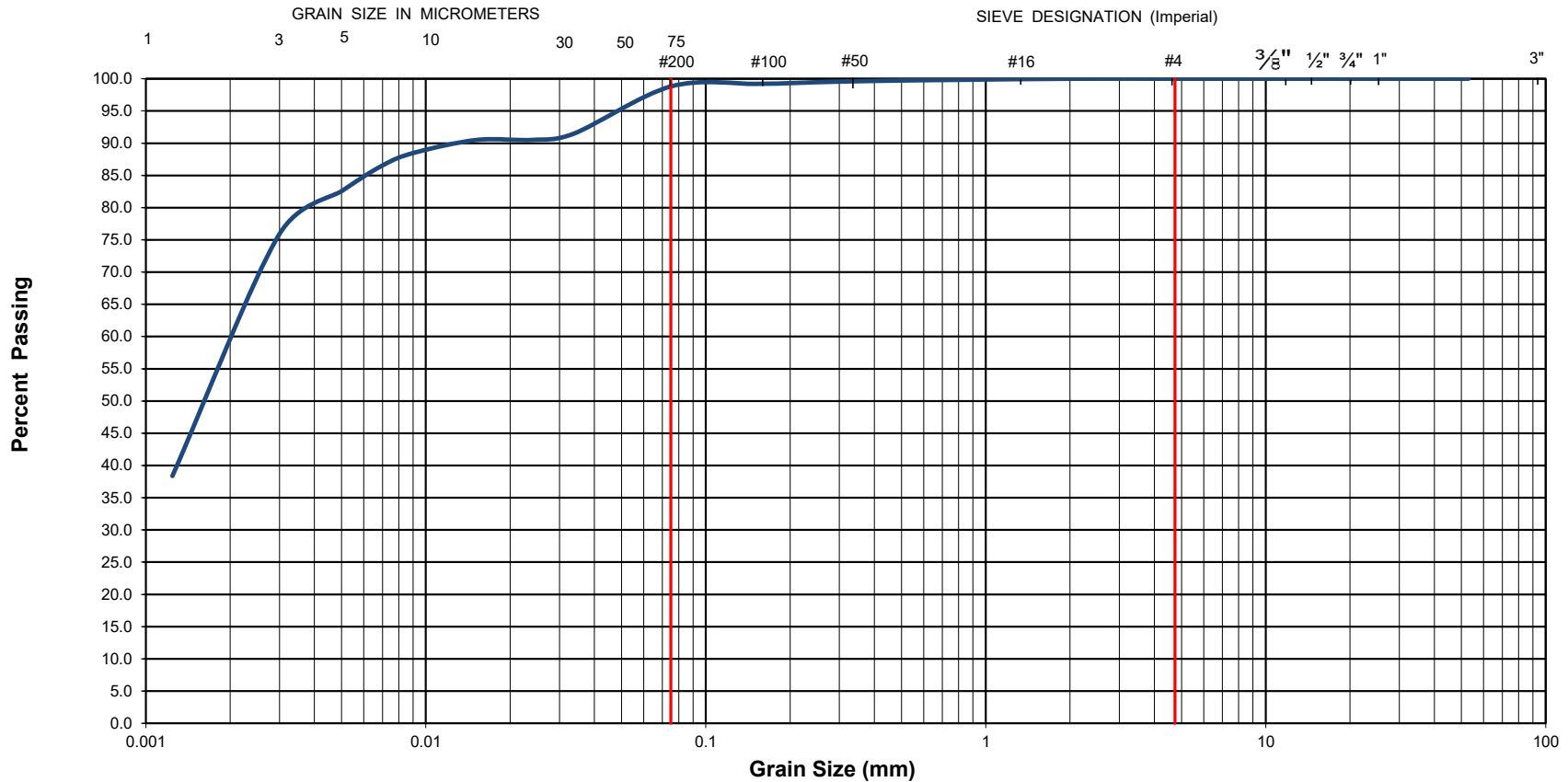


Grain-Size Distribution Curve Method of Test For Particle Size Analysis of Soil ASTM C-136/ASTM D422

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

Unified Soil Classification System

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



EXP Project No.:	OTT-22022218-A0	Project Name :	Proposed High-Rise Commercial and Residential Development		
Client :	EP Real Estate Development Ltd.	Project Location :	530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON		
Date Sampled :	August 22, 2025	Borehole No:	BH 25-05	Sample No.: SS5	
		Depth (m) :	3.0-3.6		
Sample Description :	% Silt and Clay	99	% Sand	1	
		% Gravel	0		
Sample Description :	SILTY CLAY OF HIGH PLASTICITY (CH): Trace Sand			Figure :	24

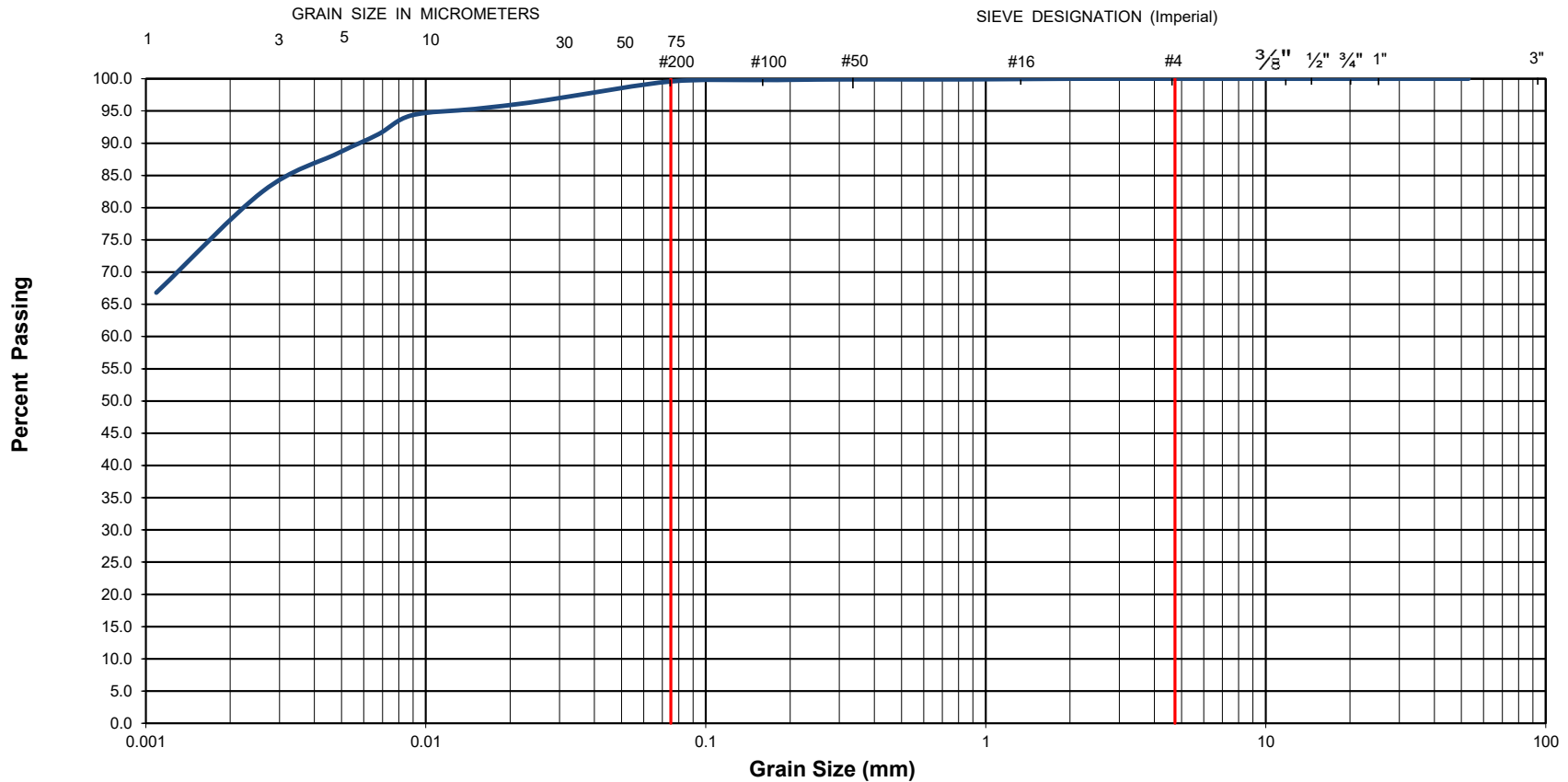


Grain-Size Distribution Curve Method of Test For Particle Size Analysis of Soil ASTM C-136/ASTM D422

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

Unified Soil Classification System

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



EXP Project No.:	OTT-22022218-A0	Project Name :	Proposed High-Rise Commercial and Residential Development		
Client :	EP Real Estate Development Ltd.	Project Location :	530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON		
Date Sampled :	August 14, 2025	Borehole No:	BH 25-06	Sample No.: SS7	
Sample Description :		Depth (m) :	4.6-5.2		
Sample Description :	% Silt and Clay	100	% Sand	0	
Sample Description :		% Gravel	0		
Sample Description :	SILTY CLAY OF HIGH PLASTICITY (CH)			Figure :	25

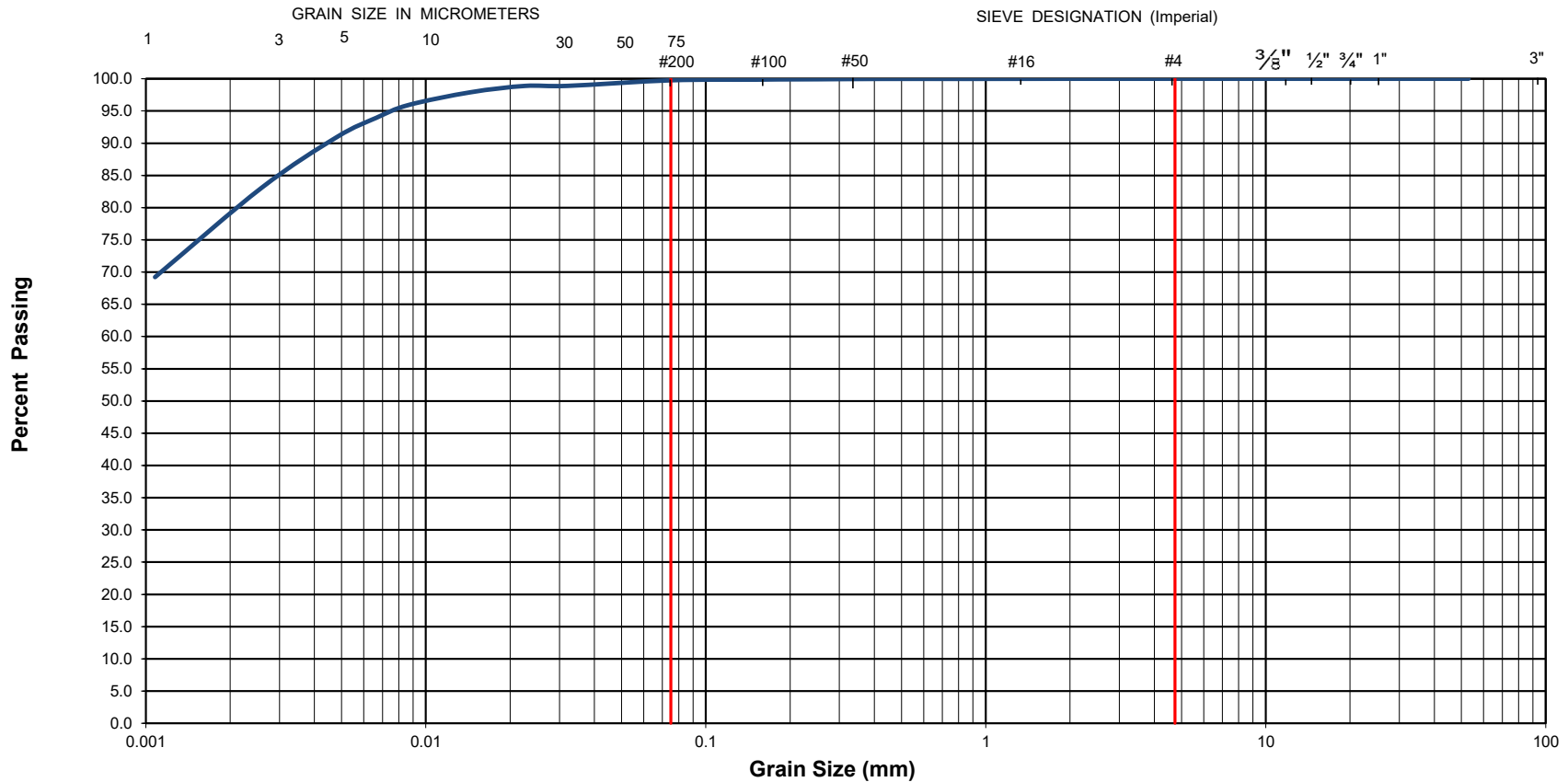


Grain-Size Distribution Curve Method of Test For Particle Size Analysis of Soil ASTM C-136/ASTM D422

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

Unified Soil Classification System

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



EXP Project No.:	OTT-22022218-A0	Project Name :	Proposed High-Rise Commercial and Residential Development		
Client :	EP Real Estate Development Ltd.	Project Location :	530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON		
Date Sampled :	August 14, 2025	Borehole No:	BH 25-07	Sample No.: SS11	
Sample Description :		Depth (m) :	7.6-8.2		
Sample Description :	% Silt and Clay	100	% Sand	0	
Sample Description :		% Gravel	0		
Sample Description :	SILTY CLAY of HIGH PLASTICITY (CH)			Figure :	26

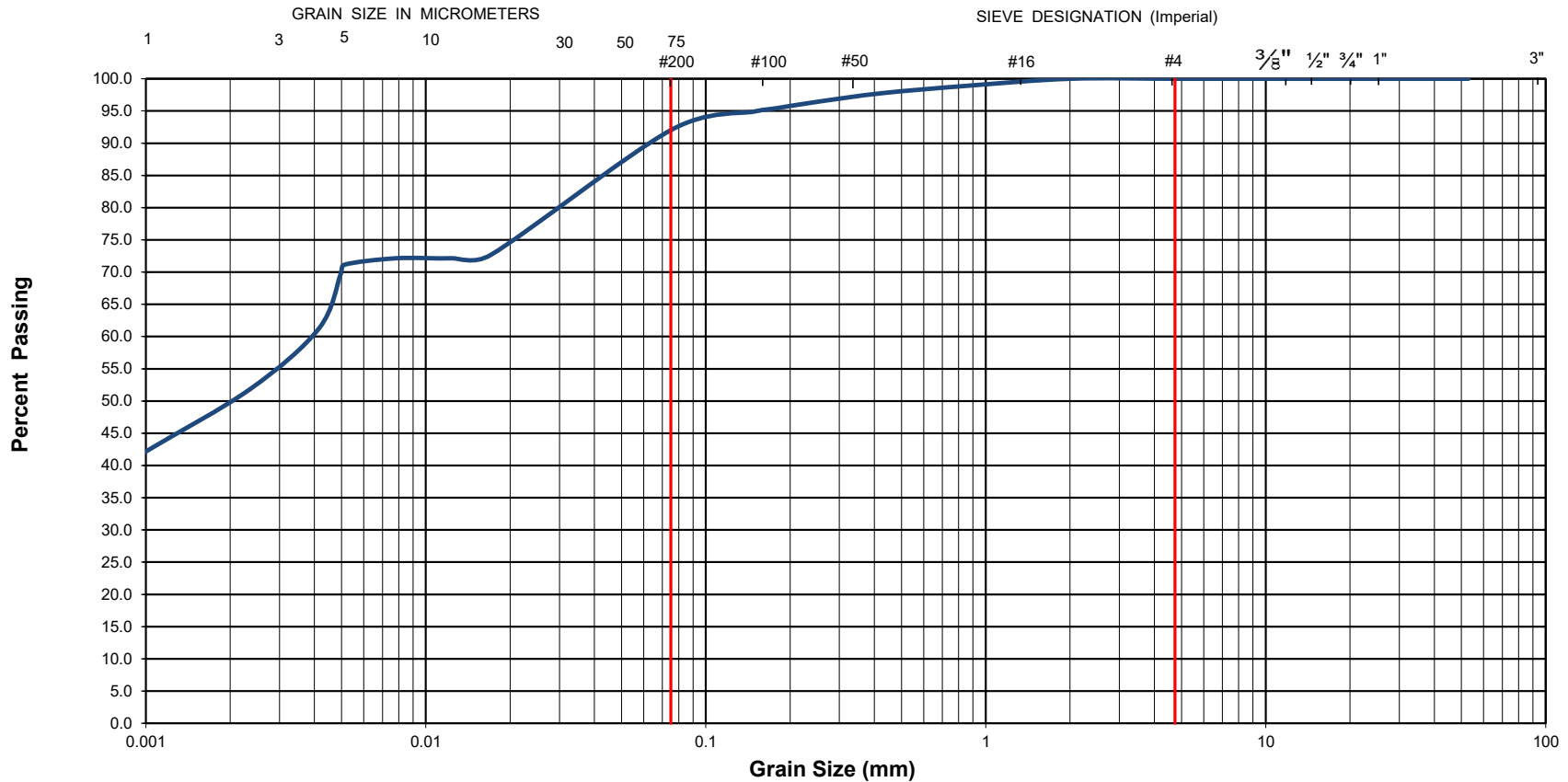


Grain-Size Distribution Curve Method of Test For Particle Size Analysis of Soil ASTM C-136/ASTM D422

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

Unified Soil Classification System

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



EXP Project No.:	OTT-22022218-A0	Project Name :	Proposed High-Rise Commercial and Residential Development		
Client :	EP Real Estate Development Ltd.	Project Location :	530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON		
Date Sampled :	August 15, 2025	Borehole No:	BH 25-09	Sample No.: SS5	
Sample Description :		Depth (m) :	3.0-3.6		
Sample Description :		% Silt and Clay	92	% Sand	
Sample Description :		% Gravel	8	0	
Sample Description :	SILTY CLAY of HIGH PLASTICITY (CH): Trace Sand			Figure :	27

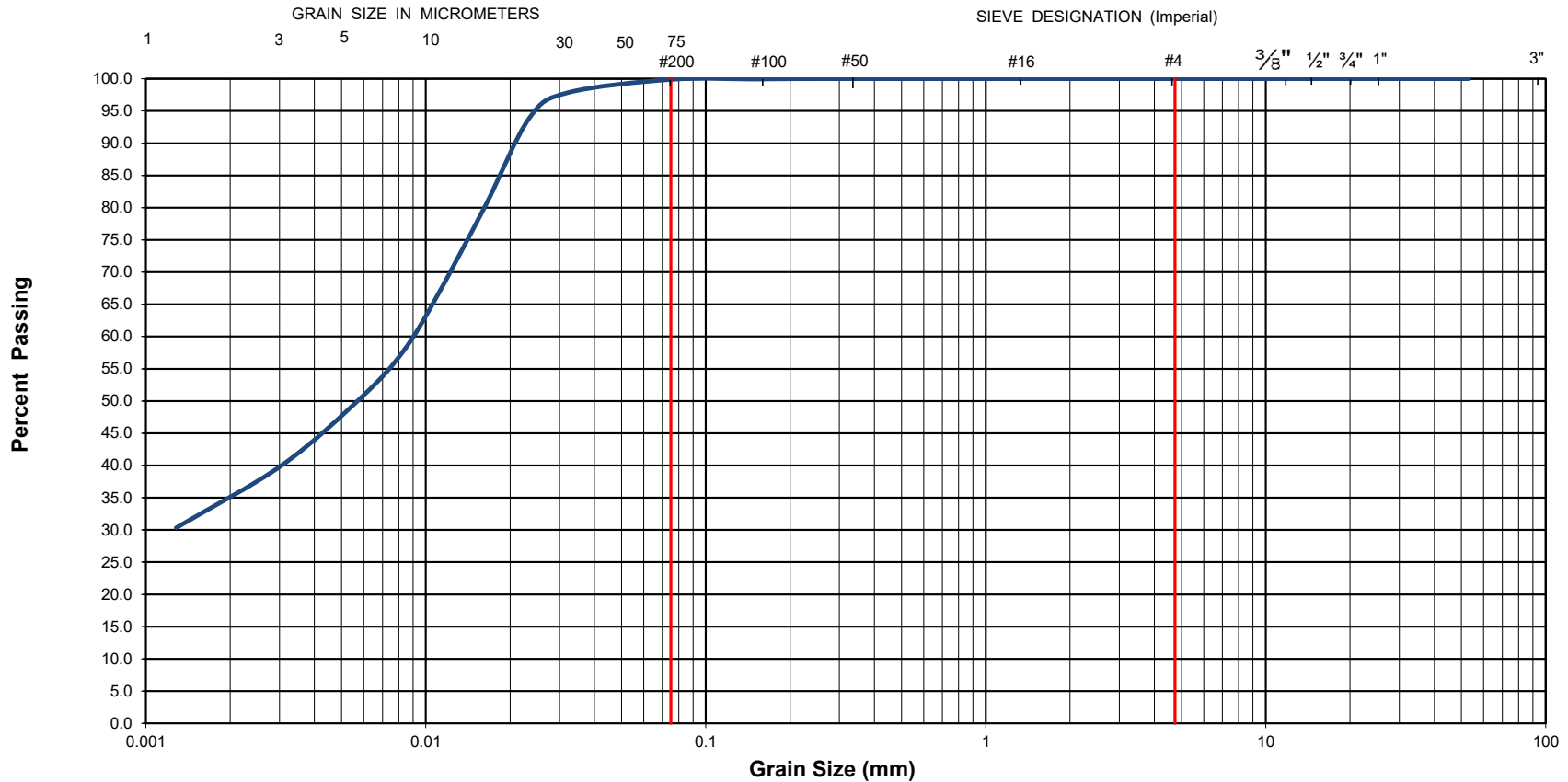


Grain-Size Distribution Curve Method of Test For Particle Size Analysis of Soil ASTM C-136/ASTM D422

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

Unified Soil Classification System

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



EXP Project No.:	OTT-22022218-A0	Project Name :	Proposed High-Rise Commercial and Residential Development	
Client :	EP Real Estate Development Ltd.	Project Location :	530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON	
Date Sampled :	August 21, 2025	Borehole No:	BH 25-01	Sample No.: SS12
Sample Description :	% Silt and Clay	100	% Sand	0
Sample Description :	% Gravel	0	Figure :	28
Sample Description :	SILTY CLAY of MEDIUM PLASTICITY (CI)			

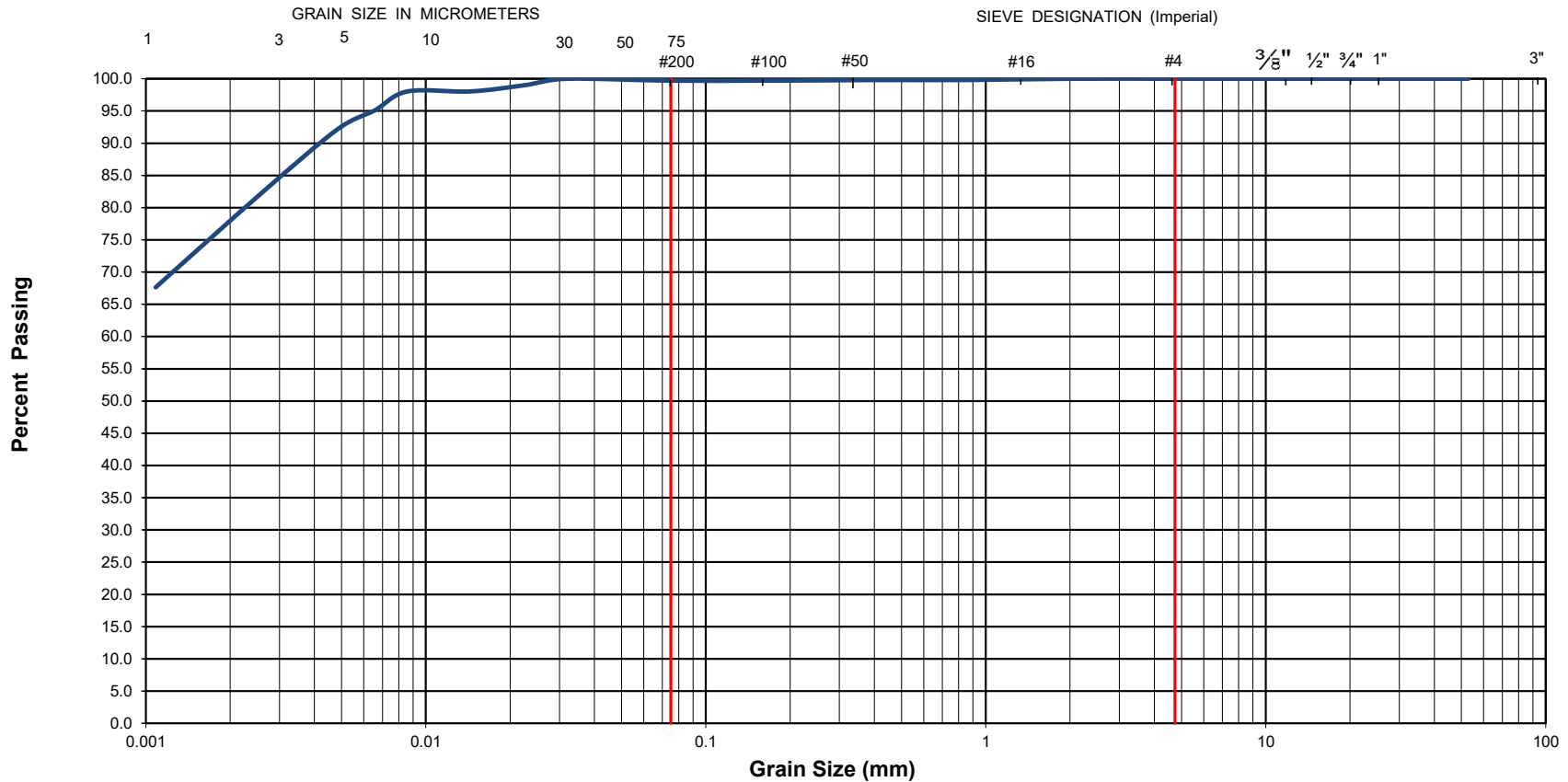


Grain-Size Distribution Curve Method of Test For Particle Size Analysis of Soil ASTM C-136/ASTM D422

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

Unified Soil Classification System

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



EXP Project No.:	OTT-22022218-A0	Project Name :	Proposed High-Rise Commercial and Residential Development		
Client :	EP Real Estate Development Ltd.	Project Location :	530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON		
Date Sampled :	August 20, 2025	Borehole No:	BH 25-02	Sample No.: SS10	
		Depth (m) :	6.9-7.5		
Sample Description :	% Silt and Clay	100	% Sand	0	
		% Gravel	0		
Sample Description :	SILTY CLAY of HIGH PLASTICITY (CH)			Figure :	29

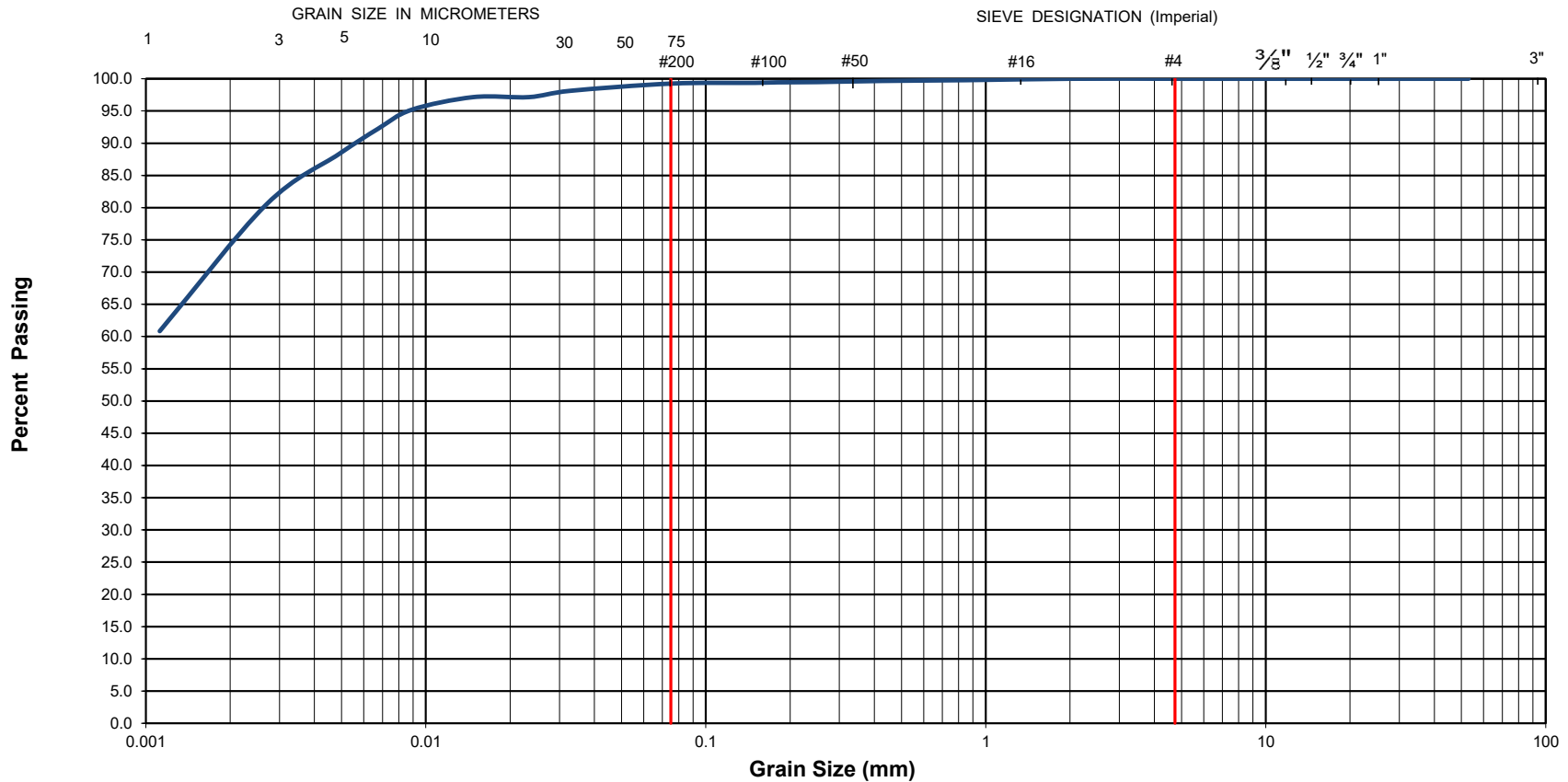


Grain-Size Distribution Curve Method of Test For Particle Size Analysis of Soil ASTM C-136/ASTM D422

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

Unified Soil Classification System

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



EXP Project No.:	OTT-22022218-A0	Project Name :	Proposed High-Rise Commercial and Residential Development		
Client :	EP Real Estate Development Ltd.	Project Location :	530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON		
Date Sampled :	August 20, 2025	Borehole No:	BH 25-02	Sample No.: SS12	
		Depth (m) :	12.2-12.8		
Sample Description :	% Silt and Clay	99	% Sand	1	
		% Gravel	0		
Sample Description :	SILTY CLAY of HIGH PLASTICITY (CH): Trace Sand			Figure :	30

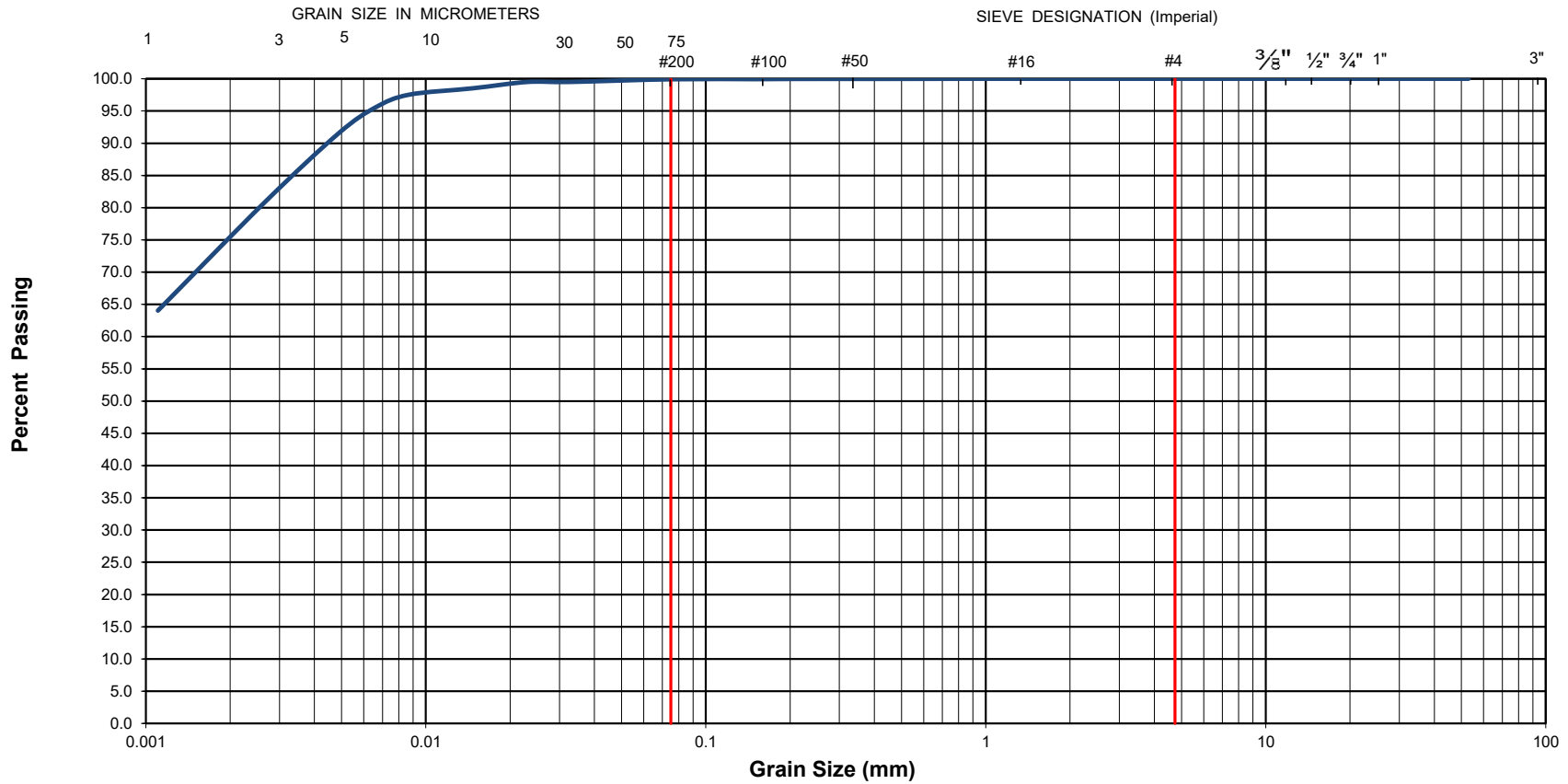


Grain-Size Distribution Curve Method of Test For Particle Size Analysis of Soil ASTM C-136/ASTM D422

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

Unified Soil Classification System

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



EXP Project No.:	OTT-22022218-A0	Project Name :	Proposed High-Rise Commercial and Residential Development		
Client :	EP Real Estate Development Ltd.	Project Location :	530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON		
Date Sampled :	August 22, 2025	Borehole No:	BH 25-05	Sample No.: SS9	
		Depth (m) :	8.4-9.0		
Sample Description :	% Silt and Clay	100	% Sand	0	
		% Gravel	0		
Sample Description :	SILTY CLAY of HIGH PLASTICITY (CH)			Figure :	31

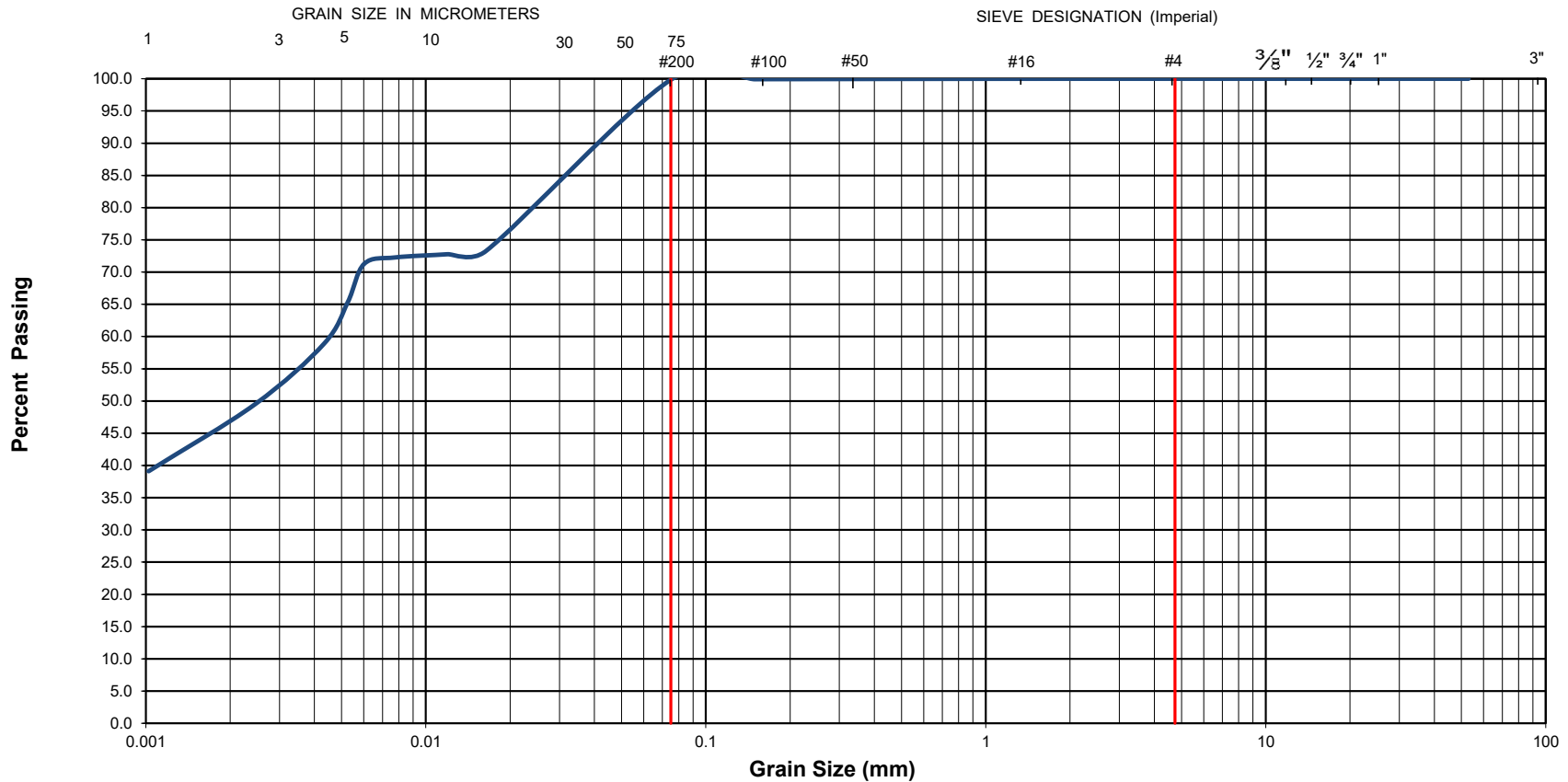


Grain-Size Distribution Curve Method of Test For Particle Size Analysis of Soil ASTM C-136/ASTM D422

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

Unified Soil Classification System

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



EXP Project No.:	OTT-22022218-A0	Project Name :	Proposed High-Rise Commercial and Residential Development					
Client :	EP Real Estate Development Ltd.	Project Location :	530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, ON					
Date Sampled :	August 14, 2025	Borehole No.:	BH 25-06	Sample No.:				
Sample Description :	% Silt and Clay	100	% Sand	0	% Gravel	0	Depth (m) :	9.1-9.7
Sample Description :	SILTY CLAY of MEDIUM PLASTICITY (CI)						Figure :	32

EXP Services Inc.
*Preliminary Geotechnical Investigation
Proposed High-Rise Commercial and Residential
Development Orleans Town Centre
530 Brisebois Crescent, Part of 265 Centrum Boulevard
(Forum Lands)
Ottawa, Ontario
OTT-22022218-A0
December 2, 2025*

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

October 3rd, 2025

Transmitted by email : ismail.taki@exp.com

Our ref : GPR25-06596-c

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

**Subject: Shear Wave Velocity Sounding for the Site Designation Determination
265 Centrum Boulevard, Orleans, Ottawa (ON)**

[Project #: OTT-22022218-A0]

Dear Mr. Taki,

Geophysics GPR International inc. has been mandated by **exp** Services inc. to carry out a seismic survey at 265 Centrum Boulevard, Orleans, in Ottawa (ON). The geophysical investigation used the Multi-channel Analysis of Surface Waves (MASW) with the Spatial AutoCorrelation (SPAC), and the seismic reflection method. From the subsequent results, the seismic shear wave velocity values were calculated for the soils, to determine the Site Designation.

The surveys were conducted September 25th, 2025, by Mrs. Karyne Faguy, B.Sc. geoph. and Mr. Timothy Ward, tech. Figure 1 shows the regional location of the site and Figure 2 illustrates the location of the seismic spreads. Both figures are presented in the Appendix.

The following paragraphs briefly describe the principles of the testing method, the survey design, 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 acquisition layouts were located beside the sidewalk north-west of Brisebois Crescent (Figure 2). The geophone spacing was 5.0 metres for the main seismic line, using 24 geophones. An intermediary seismic spread used 3.0 metres spacing, and a smaller one with geophone spacing of 1.0 metre was dedicated to the near surface materials. The seismic records were produced with a Terraloc PRO seismograph (from ABEM), and the geophones were 4.5 Hz.

The seismic records counted 4096 data, sampled at 1000 μ s for the MASW surveys, and at 40 μ s for the seismic refraction ones. The records included a pre-triggered portion of 10 ms. A 7.25 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

The rock depth was calculated between 32 and 37 metres deep from seismic reflection, and between 34.5 and 36 metres deep from seismic resonance. This parameter was used for the initial geophysical models, prior to the inversions of the MASW analysis results.

The MASW calculated V_s results are illustrated at Figure 5. Some low seismic velocities were calculated from 1.5 to 12 metres deep.

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

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

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

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

The calculation of the \bar{V}_{S30} value is presented at Table 1. The Site Designation is X_{205} , which corresponds to the Site Class "D".

The V_s values calculated for the unconsolidated materials are presented at Table 2.



CONCLUSION

Geophysical surveys were carried out to identify the Site Designation north-west of 265 Centrum Boulevard, Orleans, in Ottawa (ON). The seismic surveys used the MASW and the SPAC analysis to calculate the \bar{V}_{S30} value. Its calculation is presented at Table 1.

For the actual site, the Site Designation is X_{205} , corresponding to the Site Class "D" ($180 < \bar{V}_{S30} \leq 360$ m/s), as determined through the MASW and SPAC methods, Table 4.1.8.4.-B of the NBC (2020), and the Building Code, O. Reg. 163/24.

It must be noted that some low seismic velocities were calculated from 1.5 to 12 metres deep. A geotechnical assessment of the corresponding materials could be required for the potential of liquefaction, the degree of sensitivity of the clay and other critical parameters.

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. Tables 4.1.8.4.-A and 4.1.8.4.-B of the NBC 2020) can supersede the Site Classification and the Site Designation provided in this report based on the \bar{V}_{S30} value.

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

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

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





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



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



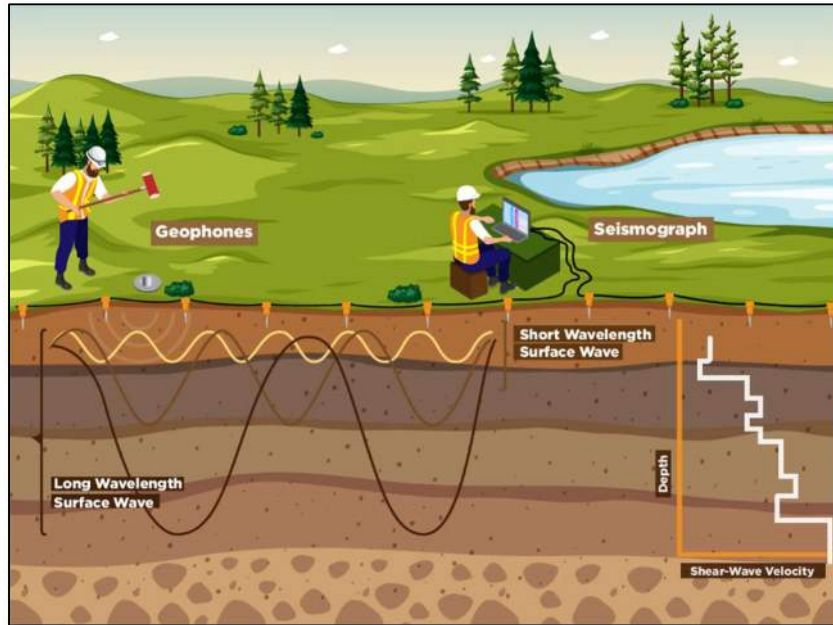


Figure 3: MASW Operating Principle

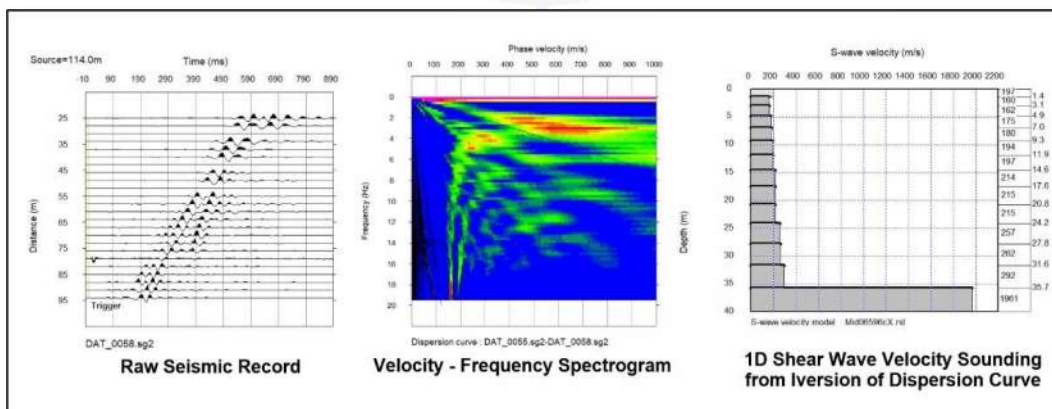


Figure 4: Example of a MASW/SPAC record, Phase Velocity - Frequency curve of the Rayleigh wave and resulting 1D Shear Wave Velocity Model



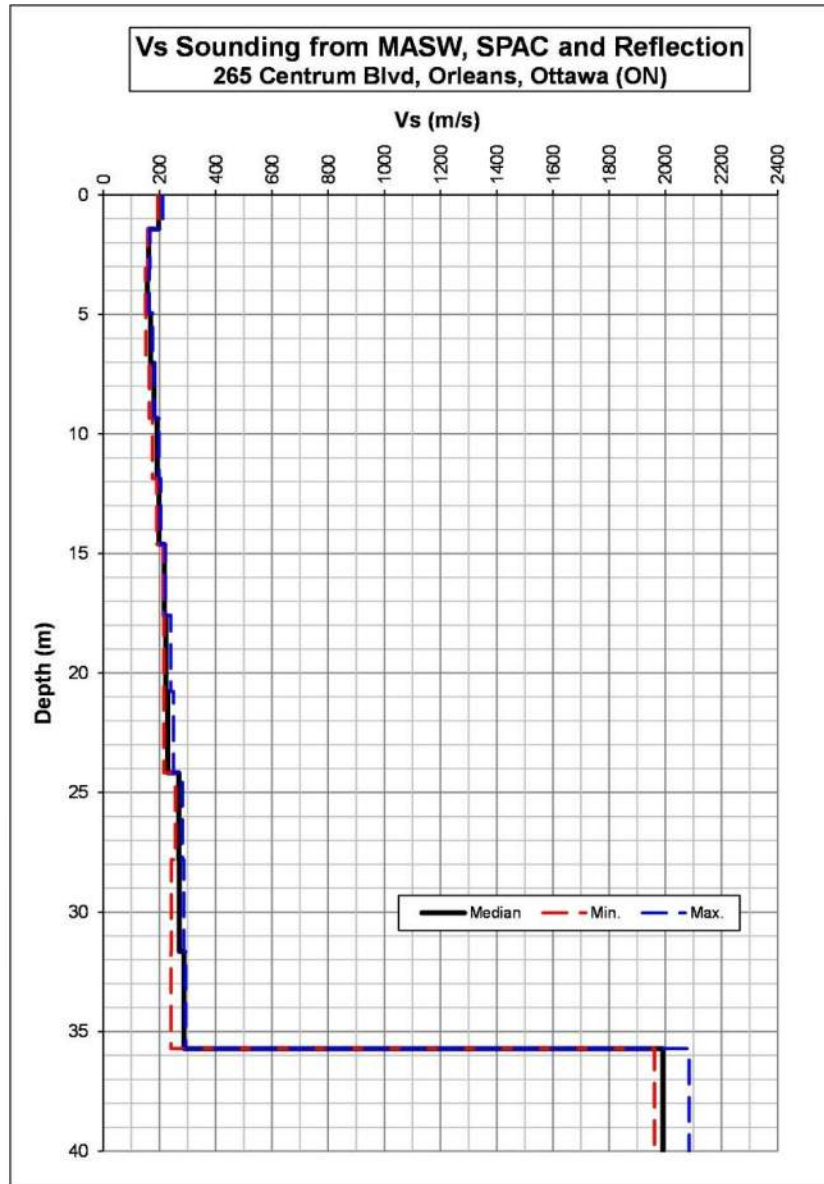


Figure 5: MASW Shear-Wave Velocity Sounding



TABLE 1
 \bar{V}_{S30} Calculation for the Site Designation (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	194.0	196.7	212.1	Grade Level (September 25th, 2025)				
1.43	158.9	161.3	165.9	1.43	1.43	0.007264	0.007264	196.7
3.08	149.9	156.4	162.9	1.65	3.08	0.010216	0.017480	176.0
4.95	151.7	168.0	175.5	1.87	4.95	0.011945	0.029425	168.1
7.03	164.1	180.5	182.3	2.09	7.03	0.012426	0.041851	168.0
9.34	174.9	191.7	199.0	2.31	9.34	0.012787	0.054638	171.0
11.87	189.8	198.1	204.2	2.53	11.87	0.013186	0.067824	175.0
14.62	212.2	217.2	221.0	2.75	14.62	0.013865	0.081689	178.9
17.58	215.3	222.4	240.2	2.97	17.58	0.013662	0.095352	184.4
20.77	215.6	229.4	249.5	3.19	20.77	0.014331	0.109683	189.4
24.18	256.5	268.1	281.4	3.41	24.18	0.014853	0.124536	194.1
27.80	242.6	270.7	286.7	3.63	27.80	0.013524	0.138060	201.4
30				2.20	30.00	0.008118	0.146178	205.2

Vs30 (m/s)	205.2
Class	D ⁽¹⁾

- (1) Some low seismic velocities were calculated from 1.5 to 12 metres deep. A geotechnical assessment of the corresponding materials could be required.

TABLE 2
Vs values calculated for the unconsolidated materials

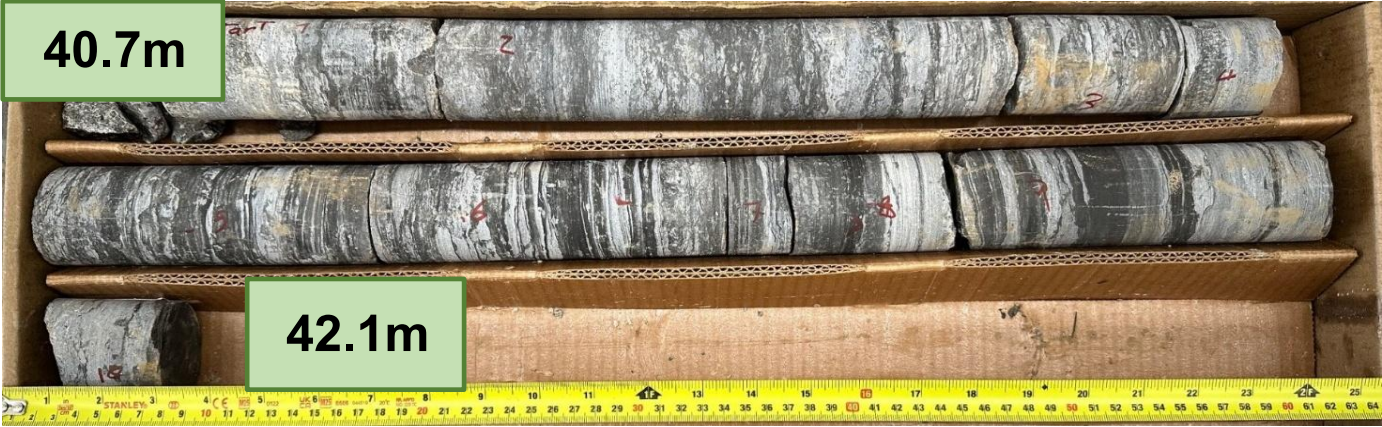
Depth (m)		Vs (m/s)		
from	to	Min.	Median	Max.
0	1.43	194.0	196.7	212.1
1.43	3.08	158.9	161.3	165.9
3.08	4.95	149.9	156.4	162.9
4.95	7.03	151.7	168.0	175.5
7.03	9.34	164.1	180.5	182.3
9.34	11.87	174.9	191.7	199.0
11.87	14.62	189.8	198.1	204.2
14.62	17.58	212.2	217.2	221.0
17.58	20.77	215.3	222.4	240.2
20.77	24.18	215.6	229.4	249.5
24.18	27.80	256.5	268.1	281.4
27.80	31.65	242.6	270.7	286.7
31.65	35.71	240.6	286.5	292.8
35.71	plus			



Appendix B – Bedrock Core Photographs



BEDROCK CORES



Run 1 - 40.7 to 42.1 m (Wet & Dry)



Borehole No: BH 25-01A	Core Runs Run 1 : 40.7 - 42.1 m	project Proposed High-Rise Commercial and Residential Development, 530 Brisebois Crescent Part of 265 Centrum Boulevard (Forum Lands), Ottawa, Ontario	Project NO: OTT-22022218-A0
Date Cored Sep 15, 2025		Rock Core Photographs	FIG. B-1



BEDROCK CORES



Run 1 - 24.0 to 25.6 m (Wet & Dry)



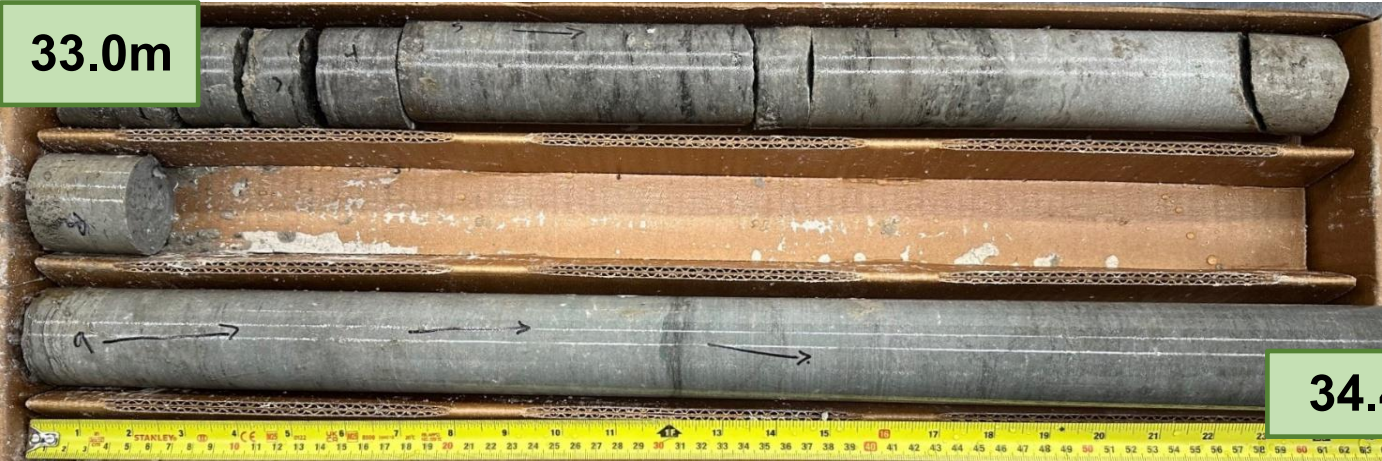
Borehole No: BH 25-05A	Core Runs Run 1 : 24.0 - 25.6 m	project Proposed High-Rise Commercial and Residential Development, 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, Ontario	Project NO: OTT-22022218-A0
Date Cored Sep 22, 2025		Rock Core Photographs	FIG. B-2



BEDROCK CORES



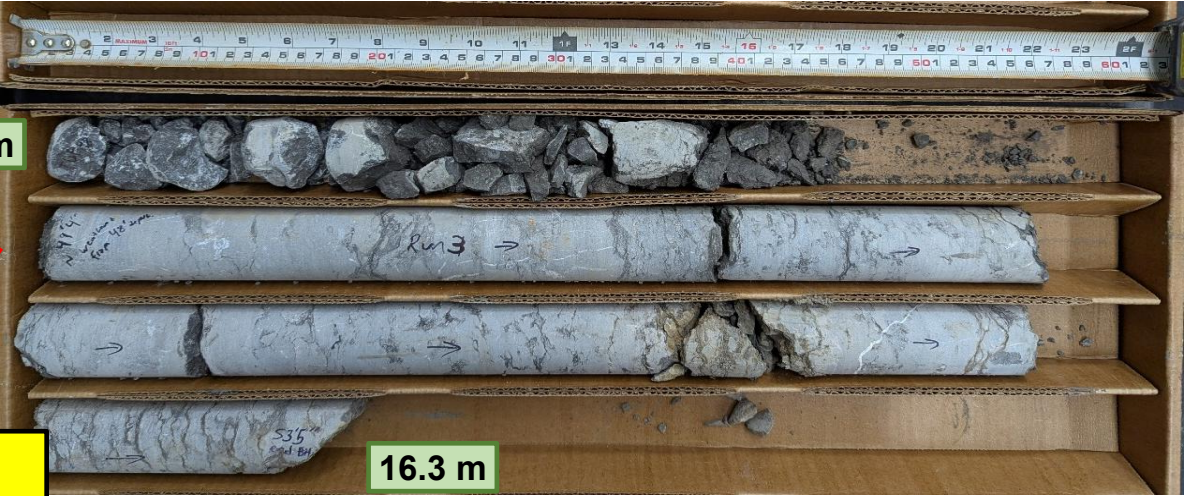
Run 2 - 33.0 to 33.4 m (Wet & Dry)



Borehole No: BH 25-06A	Core Runs Run 2 : 33.0 - 34.4 m	project Proposed High-Rise Commercial and Residential Development, 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, Ontario	Project NO: OTT-22022218-A0
Date Cored Sep 17, 2025	Rock Core Photographs		FIG. B-3



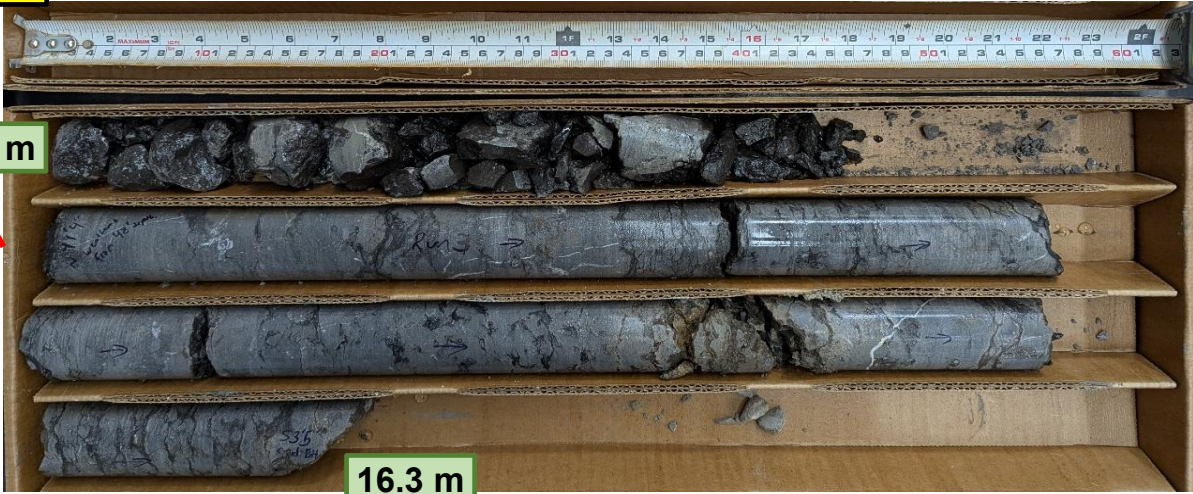
DRY BEDROCK CORES



16.3 m

Top of Unweathered Bedrock at 15.0 m

WET BEDROCK CORES



14.6 m

16.3 m

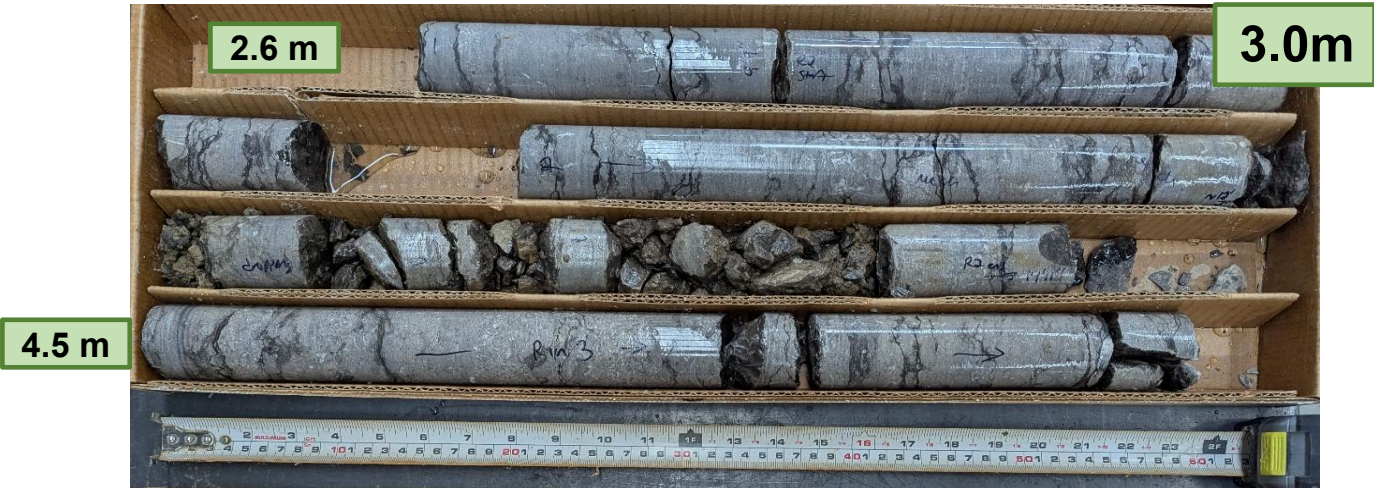
Borehole No: BH 25-07	Core Runs FILL: Run 1: 3.0m - 3.3m Run 2: 3.3m - 3.8m BEDROCK: Run 3 : 14.6 m - 16.3 m End of Borehole	project Proposed High Rise Commercial and Residential Development, 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, Ontario	Project NO: OTT-22022218-A0
Date Cored Aug 14, 2025	Rock Core Photographs		FIG. B-4



DRY BEDROCK CORES



WET BEDROCK CORES



Borehole No: BH 25-08	Core Runs BEDROCK: Run 1: 2.6m - 3.0m Run 2: 3.0m - 4.5m Run 3 : 4.5 m - 6.2 m End of Borehole	project Proposed High Rise Commercial and Residential Development, 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands) Ottawa, Ontario	Project N0: OTT-22022218-A0
Date Cored Aug 14, 2025	Rock Core Photographs		FIG. B-5 (1)



DRY BEDROCK CORES



6.2 m

WET BEDROCK CORES



6.2 m

Borehole No: BH 25-08	Core Runs BEDROCK: Run 1: 2.6m - 3.0m Run 2: 3.0m - 4.5m Run 3 : 4.5 m - 6.2 m End of Borehole	project Proposed High Rise Commercial and Residential Development, 530 Brisebois Cres. Part of 265 Centrum Blvd. (Forum Lands), Ottawa, Ontario	Project N0: OTT-22022218-A0
Date Cored Aug 14, 2025		Rock Core Photographs	FIG. B-5 (2)

EXP Services Inc.
*Preliminary Geotechnical Investigation
Proposed High-Rise Commercial and Residential
Development Orleans Town Centre
530 Brisebois Crescent, Part of 265 Centrum Boulevard
(Forum Lands)
Ottawa, Ontario
OTT-22022218-A0
December 2, 2025*

Appendix C – Laboratory Certificate of Analysis Report by AGAT

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

ATTENTION TO: Susan Potyondy

PROJECT: OTT-22022218-A0

AGAT WORK ORDER: 25Z343662

SOIL ANALYSIS REVIEWED BY: Sukhwinder Randhawa, Inorganic Team Lead

DATE REPORTED: Sep 18, 2025

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.
- All samples will be disposed of within 30 days after receipt unless a Long Term Storage Agreement is signed and returned. Some specialty analysis may be exempt, please contact your Client Project Manager for details.
- AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.
- This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
- The test results reported herewith relate only to the samples as received by the laboratory.
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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.



AGAT

Laboratories

Certificate of Analysis

AGAT WORK ORDER: 25Z343662
PROJECT: OTT-22022218-A0

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

CLIENT NAME: EXP SERVICES INC

SAMPLING SITE: Centrum Blvd/Brisebois Cres.

ATTENTION TO: Susan Potyondy
SAMPLED BY: EXP

(Soil) Inorganic Chemistry

DATE RECEIVED: 2025-09-10

DATE REPORTED: 2025-09-18

Parameter	Unit	G / S	RDL	BH1 SS6 12. 5'-14.5' Soil DATE SAMPLED: 2025-08-21 7050817	BH6 SS12 45'-47' Soil DATE SAMPLED: 2025-08-15 7050818	BH9 SS11 30'-32' Soil DATE SAMPLED: 2025-08-15 7050819	BH8 Run1 8'7"-9' Rock DATE SAMPLED: 2025-08-14 7050820
Chloride (2:1)	µg/g	2	18	357	151	120	38
Sulphate (2:1)	µg/g	2	357	7.98	9.43	8.96	21
pH (2:1)	pH Units	NA	7.98	1810	1050	3250	9.11
Resistivity (2:1) (Calculated)	ohm.cm	1	1810				6370

Comments: RDL - Reported Detection Limit: G / S - Guideline / Standard
7050817-7050820 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: _____



Signature



Quality Assurance

CLIENT NAME: EXP SERVICES INC
 PROJECT: OTT-22022218-A0
 SAMPLING SITE: Centrum Blvd/Brisebois Cres.

AGAT WORK ORDER: 25Z343662
 ATTENTION TO: Susan Potyondy
 SAMPLED BY: EXP

Soil Analysis

RPT Date: Sep 18, 2025			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits		
								Lower	Upper		Lower	Upper		Lower	Upper	
(Soil) Inorganic Chemistry																
Chloride (2:1)	7050817	7050817	18	19	5.4%	< 2	99%	70%	130%	103%	80%	120%	103%	70%	130%	
Sulphate (2:1)	7050817	7050817	357	359	0.6%	< 2	93%	70%	130%	92%	80%	120%	NA	70%	130%	
pH (2:1)	7067632		8.03	8.01	0.2%	NA	92%	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.

Matrix spike NA: Spike level < native concentration. Matrix spike acceptance limits do not apply and are not calculated.

Certified By: _____





Method Summary

CLIENT NAME: EXP SERVICES INC

PROJECT: OTT-22022218-A0

SAMPLING SITE:Centrum Blvd/Brisebois Cres.

AGAT WORK ORDER: 25Z343662

ATTENTION TO: Susan Potyondy

SAMPLED BY:EXP

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

AGAT Laboratories

Have feedback?
Scan here for a quick survey!



5635 Coopers Avenue
Mississauga, Ontario L4Z 1V2
PH: 905.712.5100 Fax: 905.712.5122
web@atlab.com

Chain of Custody Record

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

Report Information:

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

Regulatory Requirements:

(Please check all applicable boxes)

Regulation 153/04 Regulation 406

Table Indicate One Ind/Com Res/Park Agriculture

Soil Texture (Specify One) Coarse Fine Regulation 558 CCME

Sewer Use Sanitary Storm

Region Prov. Water Quality Objectives (PWQO) Other

Project Information:

Project: OTT-2202218-A0
 Site Location: Centrum Blvd / Brisebois Cres
 Sampled By: EXP
 AGAT Quote #: _____ PO: _____

Invoice Information:

Company: _____
 Contract: _____
 Address: _____
 Email: _____

Legal Sample

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

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

Report Guideline on Certificate of Analysis
 Yes No

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/Special Instructions	Y/N
1. BH1 SS6 12.5'-14.5'	Aug 21	AM 1				
2. BH6 SS12 45'-47'	Aug 15	AM 1				
3. BH9 SS11 30'-32'	Aug 15	AM 1				
4. BH8 Run1 87'-9'	Aug 14	AM 1				
5.		AM PM				
6.		AM PM				
7.		AM PM				
8.		AM PM				
9.		AM PM				
10.		AM PM				
11.		AM PM				

Field Filtered - Metals, Hg, CrVI, DOC	0. Reg 153	0. Reg 406	0. Reg 558
Metals & Inorganics			
Metals - <input type="checkbox"/> CrVI, <input type="checkbox"/> Hg, <input type="checkbox"/> HWSB			
BTEX, F1-F4 PHCs			
VOC			
PAHs			
PCBs: Aroclors <input type="checkbox"/>			
Regulation 406 Characterization Package pH, Metals, BTEX, F1-F4			
EC, SAR			
Regulation 406 SPLP Rainwater Leach mSPLP: <input type="checkbox"/> Metals <input type="checkbox"/> VOCs <input type="checkbox"/> SVOCs <input type="checkbox"/> OC			
Landfill Disposal Characterization TCLP: TCLP: <input type="checkbox"/> M&I <input type="checkbox"/> VOCs <input type="checkbox"/> ABNS <input type="checkbox"/> B(a)P <input type="checkbox"/> PCBs			
Corrosivity: <input type="checkbox"/> Moisture <input type="checkbox"/> Sulphide			
pH	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Sulphates	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Chlorides	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Resistivity	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Potentially Hazardous or High Concentration (Y/N)			

Laboratory Use Only
 Work Order #: 252343662
 Cooler Quantity: 10 - no ice pack
 Arrival Temperature: 4.9
 Depot Temperature: 23.3, 23.6, 23.1
 Custody Seal Intact: Yes No N/A
 Notes: 14

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

EXP Services Inc.
*Preliminary Geotechnical Investigation
Proposed High-Rise Commercial and Residential
Development Orleans Town Centre
530 Brisebois Crescent, Part of 265 Centrum Boulevard
(Forum Lands)
Ottawa, Ontario
OTT-22022218-A0
December 2, 2025*

Legal Notification

This report was prepared by EXP Services for the account of EP Real Estate Development Ltd. c/o OTCP (Orleans) Project.

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EXP Services Inc.
*Preliminary Geotechnical Investigation
Proposed High-Rise Commercial and Residential
Development Orleans Town Centre
530 Brisebois Crescent, Part of 265 Centrum Boulevard
(Forum Lands)
Ottawa, Ontario
OTT-22022218-A0
December 2, 2025*

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