Geotechnical Investigation
Proposed Residential Development
1144 St. Pierre Street,
Ottawa, ON

Client:
PulseSocieties Ltd.
135 Laurier Avenue West
Suite 100,
Ottawa, Ontario
K1P 5J2

Type of Document:
FINAL REPORT

Project Number:
OTT-25016073-A0

EXP Services Inc.
100-2650 Queensview Drive
Ottawa, Ontario K2B 8H6
t: +1.613.688.1899
f: +1.613.225.7337

Date Submitted:
April 17, 2026

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Executive Summary

Introduction

EXP Services Inc. (EXP) is pleased to present the results of the geotechnical investigation completed for the proposed residential development to be located at the site registered by the street address of 1144 St. Pierre Street, Ottawa, Ontario. Terms and conditions of this assignment were outlined in EXP Services Inc. (EXP) proposal OTT-25016073-A0 dated November 5, 2025. Authorization to proceed with this work was provided on November 13, 2025, by Pulse Societies Ltd via Po Number SPI-PO-100205.

A Phase One Environmental Site Assessment (ESA) was also completed by EXP concurrently with the geotechnical investigation and the results of this assessment are reported in a separate document.

Proposed Development

The subject site is currently a grass covered undeveloped lot. The architectural drawing set for the proposed development, dated November 25, 2025, and prepared by Lalande and Doyle Architects Inc. (L+D), indicates that the proposed building will be a four (4) storey structure with one basement level and will have an approximate footprint area of 273 m^2. The building will be serviced by an elevator. It is assumed the design will include a sump pit. Civil Drawing C200, titled “Site Grade Plan”, dated April 17, 2026 indicates that the Finished Floor Elevation (FFE) of the basement floor will be Elevation 64.69 m and the FFE of the mechanical room will be at Elevation 63.13 m. The Underside of Footing (USF) elevations of the footings for the building were noted at Elevation 63.75 m with the footings for the mechanical room at Elevation 62.21 m. The development will result in a site grade of up to 0.52 m above the existing grade. The development will also include surface parking spaces and an access laneway.

Borehole Fieldwork Program

The fieldwork for this investigation was undertaken on December 12, 2025, and consists of the drilling of two (2) boreholes (Borehole Nos. 1 and 3) advanced to termination depths ranging from 10.1 m to 10.4 m below the existing ground surface. Borehole No. 2 was not drilled due to an equipment breakdown. The fieldwork was supervised on a full-time basis by a representative from EXP.

Subsurface Conditions

The borehole information indicates that the subsurface conditions within the site consist of surficial topsoil and fill underlain by a stiff to very stiff brown silty clay crust extending to a depth of 3.7 m (Elevation 65.0 m to Elevation 64.3 m) underlain by a stiff to very stiff unweathered silty clay extending to 10.2 m depth (Elevation 55.6 m) where fully penetrated. The clay is underlain by sandy silt. The groundwater level was found to be at 2.5 m to 4.3 m depth (Elevation 63.3 m to Elevation 61.7 m) below the existing ground surface at the standpipe locations .

Geotechnical Comments and Recommendations

Based on Table 4.1.8.4.-B of the 2024 Ontario Building Code (OBC), for footings founded on the stiff to very stiff silty clay the, the site class, S, is Class C. A review of the subsurface soils encountered at the boreholes indicates that there is no liquefaction potential of the soils at the site during a seismic event.

Based on a review of the borehole logs, at Elevation 63.75 m, a stiff to very stiff consistency brown silty clay is present and is underlain by a stiff to very stiff grey silty clay encountered from Elevation 62.3 m to Elevation 62.1 m. The existing topsoil and fill are not considered as a suitable founding medium for the footings and where present should be removed with footing founded on either the brown or grey silty clay.

Footings founded at elevation 63.75 m on the brown stiff to very stiff silty clay may be designed for a bearing capacity at serviceability limit state (SLS) of 120 kPa and factored geotechnical resistance at ultimate limit state (ULS) of 180 kPa. For footings founded as deep at Elevation 62.0 m for the mechanical room and elevator pit founded on the grey stiff to very stiff silty clay may be designed for a bearing capacity at serviceability limit state (SLS) of 75 kPa and factored geotechnical resistance at ultimate limit state (ULS) of 130 kPa. The factored geotechnical resistance value at ULS includes a resistance factor of 0.5. The total and differential settlements of well designed and constructed footings placed in accordance with the above recommendations are expected to be less than 25 mm and 19 mm respectively. The SLS and factored ULS values are valid provided the site grade raise discussed in Section 7 is respected.

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.

It recommended that a perimeter drainage system should be installed. An underfloor draining system is not required. As the mechanical room basement floor will be below the highest recorded ground level by 0.2 m it is recommended that the mechanical room (including the elevator shaft and the sump pit) be designed as a water-tight structure.

The excavation within the subsurface soils should comply with the most recent Occupational Health and Safety Act (OHSA), Ontario Regulations 213/91 (August 1, 1991).

It is anticipated that the majority of the material required for backfilling purposes for the proposed building would have to be imported and should preferably conform OPSS 1010 Granular B Type II. Trench backfill and parking lot/laneway subgrade fill should consist of OPSS 1010 Granular B Type I or OPSS 1010 Select Subgrade Material (SSM).

Pavement structure for the proposed parking lot and laneway should consist of 65 mm thick asphaltic concrete, 150 mm thick OPSS Granular A base and 450 mm thick OPSS Granular B Type II subbase.

The silty clay is considered to have a high potential for soil volume change and a reduced setback for tree planting is not applicable at this site.

Closure

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

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

1. Introduction

EXP Services Inc. (EXP) is pleased to present the results of the geotechnical investigation completed for the proposed residential development to be located at the site registered by the street address of 1144 St. Pierre Street, Ottawa, Ontario. Terms and conditions of this assignment were outlined in EXP Services Inc. (EXP) proposal OTT-25016073-A0 dated November 5, 2025. Authorization to proceed with this work was provided on November 13, 2025, by Pulse Societies Ltd via Po Number SPI-PO-100205.

A Phase One Environmental Site Assessment (ESA) was also completed by EXP concurrently with the geotechnical investigation and the results of this assessment are reported in a separate document.

The subject site is currently a grass covered undeveloped lot. The architectural drawing set for the proposed development, dated November 25, 2025, and prepared by Lalande and Doyle Architects Inc. (L+D), indicates that the proposed building will be a four (4) storey structure with one basement level and will have an approximate footprint area of 273 m^2. The building will be serviced by an elevator. It is assumed the design will include a sump pit. Civil Drawing C200, titled "Site Grade Plan", dated April 17, 2026 indicates that the Finished Floor Elevation (FFE) of the basement floor will be Elevation 64.69 m and the FFE of the mechanical room will be at Elevation 63.13 m. The Underside of Footing (USF) elevations of the footings for the building were noted at Elevation 63.75 m with the footings for the mechanical room at Elevation 62.21 m. The development will result in a site grade of up to 0.52 m above the existing grade. The development will also include surface parking spaces and an access laneway.

The geotechnical investigation was undertaken to:

a) Establish the subsurface soil and groundwater conditions at three (3) borehole locations;

b) Provide the site classification for the site designation for seismic design in accordance with the requirements of the 2024 Ontario Building Code and assess the potential for liquefaction of the subsurface soils during a seismic event,

c) Comment on grade-raise restrictions ;

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

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

f) Provide lateral earth pressure parameters (for static and seismic conditions) for the subsurface (basement) walls;

g) Discuss backfilling requirements and assessment of the suitability of on-site soils for backfilling purposes;

h) Pipe bedding requirements for the proposed underground services

i) Comment on excavation conditions and de-watering requirements during construction; and

j) Comment on the corrosion potential of subsurface soils buried concrete and steel structures/members.

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

2. Site Description

The site is located at 1144 St. Pierre Street and is located between St. Joseph Boulevard and Rocque Street. The site is rectangular in shape and has a total area of approximately 836 m^2. A site location plan is provided as Figure 1.

The site is a grass covered undeveloped lot.

The ground surface generally flat with elevations at the borehole locations ranging from Elevation 65.83 m to Elevation 66.08 m.

3. Geology of the Site

3.1 Surficial Geology

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

🟦 Fine-textured glaciolacustrine deposits: silt and silty clay, minor sand and gravel

Image 1 – Surficial Geology

3.2 Bedrock Geology

The bedrock geology was reviewed via the Google Earth applications published by the Ontario Ministry of Energy, Northern Development and Mines available via http://www.geologyontario.mndm.gov.on.ca/mines/data/google/MRD219/geology/doc.kml and publish in 2007. The map indicates dolostone and minor shale and sandstone of the Oxford Formation.

🟦 Dolostone and minor shale and sandstone of the Oxford Formation

Image 2 – Bedrock Geology

4. Procedure

4.1 Fieldwork

The fieldwork for this investigation was undertaken on December 12, 2025, and consists of the drilling of two (2) boreholes (Borehole Nos. 1 and 3) advanced to termination depths ranging from 10.1 m to 10.4 m below the existing ground surface. Borehole No. 2 was not drilled due to an equipment breakdown. The fieldwork was supervised on a full-time basis by a representative from EXP.

The locations and geodetic elevations of the boreholes were established by a survey crew from EXP and are shown on the borehole location plan, Figure 2. Prior to drilling, the locations of the boreholes were cleared of any public and private underground services by a subcontractor retained by EXP.

The boreholes were drilled using a CME-55 track mounted drill rig equipped with continuous flight hollow stem augers. Standard penetration tests (SPTs) were performed in the boreholes at 0.6 m to 1.5 m depth intervals with soil samples retrieved by the split-barrel sampler. The undrained shear strengths of the cohesive soils were measured by conducting penetrometer and in-situ shear vane tests. The subsurface soil conditions in each borehole were logged with each soil sample placed in a labelled plastic bag.

Thirty-two (32) mm monitoring wells with screened section were installed in Boreholes Nos. 1 and 3 for long-term monitoring of the groundwater. The 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 the field work and the installation of the monitoring wells.

4.2 Laboratory Testing Program

Upon completion of the borehole fieldwork, the soil samples were transported to the EXP Ottawa laboratory. The soil samples were visually examined in the laboratory by a geotechnical engineer. The soil samples were classified in accordance with the Unified Soil Classification System (USCS) and the modified Burmister System (as per the 2023 Fifth Edition Canadian Foundation Engineering Manual (CFEM)).

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

Table I: Summary of Laboratory Testing Program

Type of Test	Number of Tests Completed
Moisture Content Determination	25
Grain Size Analysis	2
Atterberg Limit Determination	2
Corrosion Analysis (pH, sulphate, chloride and resistivity)	1

5. Subsurface Conditions and Groundwater Levels

A detailed description of the subsurface conditions and groundwater levels from this geotechnical investigation are given on the attached Borehole Logs, Figure Nos. 3 to 4 inclusive. The borehole logs and related information depict subsurface conditions only at the specific locations and times indicated. Subsurface conditions and water levels at other locations may differ from conditions at the locations where sampling was conducted. The passage of time also may result in changes in the conditions interpreted to exist at the locations where sampling was conducted.

Boreholes were drilled to provide representation of subsurface conditions as part of a geotechnical exploration program. Reference should be made to the Phase I ESA for the environmental aspects of the project.

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

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

5.1 Topsoil

A 75 mm to 100 mm thick surficial topsoil layer was encountered in both boreholes.

5.2 Fill

A layer of fill was encountered underlying the topsoil and extended to depths ranging from 0.8 m to 1.7 m (Elevation 65.0 m to Elevation 64.3 m). The fill ranged in consistency from silty sand to silty clay and contains roots, rootlets and topsoil. The natural moisture content of the fill ranges from 27 percent to 34 percent.

5.3 Silty Clay

The fill is underlain by a native undisturbed silty clay in both boreholes. The silty clay extends to the depth of sampling, 10.1 m depth (Elevation 55.9 m) in Borehole No. 1 and was fully penetrated and extends to 10.2 m depth (Elevation 55.6 m) in Borehole No. 3. The silty clay consists of an upper brown desiccated weathered silty clay crust underlain by a lower strength un-desiccated unweathered grey silty clay.

5.3.1 Upper Brown Silty Clay Crust

The silty clay consists of an upper weathered desiccated brown silty clay crust underlain by a weaker unweathered grey silty clay. The upper crust extends to 3.7 m depth (Elevation 62.3 m to Elevation 62.1 m). The undrained shear strength of the upper crust ranges from 72 kPa to greater than 120 kPa indicating a stiff to very stiff consistency. The natural moisture contents of the weathered crust ranges from 24 percent to 55 percent.

The results from the grain-size analysis and Atterberg limit determination conducted on one (1) selected samples of the upper brown silty clay is summarized in Table II. The grain-size distribution curve is shown in Figure 5.

Table II: Summary of Results from Grain-Size Analysis and Atterberg Limit Determination
Upper Brown Crust Silty Clay Samples

Borehole No. (BH) – Sample No. (SS)	Depth (m)	Grain-Size Analysis (%)				Atterberg Limits (%)			Soil Classification (USCS)
		Gravel	Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	
BH 1 SS4	2.3 - 2.9	0	1	25	74	66	24	42	Silty Clay of High Plasticity (CH) - Trace sand

Based on a review of the results of the grain-size analysis and Atterberg limits, the upper brown silty clay crust may be classified as a silty clay of high plasticity (CH) with trace sand.

5.3.2 Lower Grey Silty Clay

The lower unweathered grey silty clay's undrained shear strength ranged from 58 kPa to 113 kPa indicating a stiff to very stiff consistency. The natural moisture contents of the unweathered grey silty clay ranges from 37 percent to 63 percent.

The results from the grain-size analysis and Atterberg limit determination conducted on one (1) selected samples of the lower grey silty clay is summarized in Table III. The grain-size distribution curve is shown in Figure 6.

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

Borehole No. (BH) – Sample No. (SS)	Depth (m)	Grain-Size Analysis (%)				Atterberg Limits (%)			Soil Classification (USCS)
		Gravel	Sand	Silt	Clay	Liquid Limit	Plastic Limit	Plasticity Index	
BH-1 SS7	4.6 - 5.2	0	1	26	73	61	26	35	Silty Clay of High Plasticity (CH) - Trace sand

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

5.4 Sandy Silt

The silty clay in Borehole No. 3 is underlain by a sandy silt layer which extends to the depth of sampling, 10.4 m depth (Elevation 55.4 m). This layer was not encountered in Borehole No. 1.

5.5 Auger Refusal and Bedrock

Auger refusal was not encountered and therefore bedrock is deeper than the depth of sampling, 10.1 m to 10.4 m (Elevation 55.9 m to 55.4 m).

5.6 Groundwater Level Measurements

The groundwater level measurement taken in the standpipe is shown in Table IV.

Table IV: Summary of Groundwater Level Measurements

Borehole (BH)	Ground Surface Elevation (m)	Date of Measurement (Elapsed Time in Days from Date of Installation)	Screened Material	Groundwater Depth Below Ground Surface (Elevation), m
BH-1	65.96	April 17, 2026 (123 Days)	Silty Clay	4.3 (61.7)
BH-3	65.83	April 17, 2026 (123 Days)	Silty Clay	2.5 (63.3)

The groundwater level was found to be at 2.5 m to 4.3 m depth (Elevation 63.3 m to Elevation 61.7 m) below the existing ground surface at the standpipe locations.

Water levels were determined in the boreholes and in the standpipes at the times and under the conditions noted above. Note that fluctuations in the level of groundwater may occur due to a seasonal variation such as precipitation, snowmelt, rainfall activities, and other factors not evident at the time of measurement and therefore may be at a higher level during wet weather periods.

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

6.1 Site Classification for Seismic Site Response

Based on Table 4.1.8.4.-B of the 2024 Ontario Building Code (OBC), for footings founded on the stiff to very stiff silty clay the, the site class, S, is Class C.

6.2 Liquefaction Potential of Soils

A review of the subsurface soils encountered at the boreholes indicates that there is no liquefaction potential of the soils at the site during a seismic event.

7. Grade Raise Restrictions

It is understood that the proposed grade raise at the site will be as high as 0.52 m. This grade raise is considered to be acceptable from a geotechnical point of view. Should the grade raise increase beyond 0.52 m this office should be contacted and the geotechnical report may be updated.

8. Site Grading

Site grading within the **proposed building footprint** area should consist of the removal of all existing fill, topsoil and organic stained soils down to the native undisturbed silty clay and should be examined by a geotechnician. In the floor slab area of the proposed building, any loose/soft areas identified during the silty clay subgrade examination should be excavated, removed and replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II material compacted to 98 percent standard Proctor maximum dry density (SPMDD). Once the subgrade has been approved, the grades may be raised to the design underside elevation of the by the construction of an engineered fill pad consisting of Ontario Provincial Standard Specification (OPSS) Granular B Type II material with each lift compacted to 98 percent SPMDD.

Site grading within the footprint of the **new parking lot and laneway** areas should consist of the removal of the surficial topsoil and organic stained soils and proofrolling the exposed soil with a heavy vibratory roller the presence of a geotechnician. Any loose/soft areas identified during the proofrolling process should be excavated, removed and replaced with Ontario Provincial Standard Specification (OPSS) Granular B Type II or OPSS Select Subgrade Material (SSM) compacted to 95 percent standard Proctor maximum dry density (SPMDD).

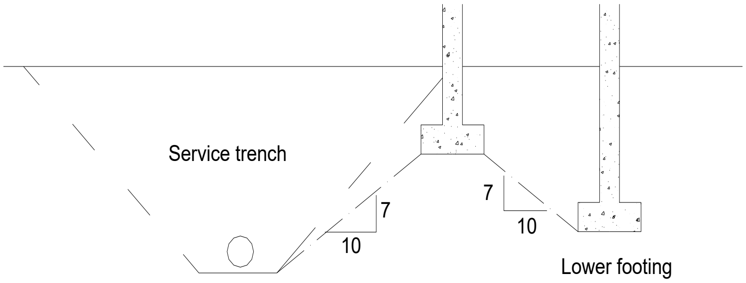
9. Foundation Considerations

Based on the provided Site Grading Plan, the underside of footing elevations for the general building will at Elevation 63.75 with the USF of the mechanical room being at Elevation 62.21 m.

Based on a review of the borehole logs, at Elevation 63.75 m, a stiff to very stiff consistency brown silty clay is present and is underlain by a stiff to very stiff grey silty clay encountered from Elevation 62.3 m to Elevation 62.1 m. The existing topsoil and fill are not considered as a suitable founding medium for the footings and where present should be removed with footing founded on either the brown or grey silty clay.

Footings founded at elevation 63.75 m on the brown stiff to very stiff silty clay may be designed for a bearing capacity at serviceability limit state (SLS) of 120 kPa and factored geotechnical resistance at ultimate limit state (ULS) of 180 kPa. For footings founded as deep at Elevation 62.0 m for the mechanical room and elevator pit founded on the grey stiff to very stiff silty clay may be designed for a bearing capacity at serviceability limit state (SLS) of 75 kPa and factored geotechnical resistance at ultimate limit state (ULS) of 130 kPa. The factored geotechnical resistance value at ULS includes a resistance factor of 0.5. The total and differential settlements of well designed and constructed footings placed in accordance with the above recommendations are expected to be less than 25 mm and 19 mm respectively. The SLS and factored ULS values are valid provided the site grade raise discussed in Section 7 is respected.

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



FOOTINGS NEAR SERVICE TRENCHES OR AT DIFFERENT ELEVATIONS

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

Since the native silty clay is susceptible to disturbance due to the effects of weather and construction traffic, it is recommended that the approved native subgrade be covered within the same day of approval with 50 mm thick concrete mud slab.

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

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

10. Floor Slab and Drainage Requirements

The provided grading plan indicates that the FFE of the basement floor will be Elevation 64.69 m and the FFE of the mechanical room will be at Elevation 63.13 m. A review of the groundwater levels indicates that the water level can be as high as Elevation 63.3. This corresponds to approximately 1.4 m below the FFE of the basement floor and approximately 0.2 m above the FFE of the mechanical room basement floor.

It is therefore recommended that a perimeter drainage system should be installed. An underfloor draining system is not required.

As the mechanical room basement floor will be below the recorded ground level, it is recommended that the mechanical room (including the elevator shaft and the sump pit) be designed as a water-tight structure.

10.1 Drained Structure

The floor slab for the proposed residence may be designed as a slab-on-grade 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 glacial till 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 slab to control cracking.

It is recommended that a perimeter drainage system.

The perimeter drain should consist of 100 mm diameter perforated pipe set on the footings and surrounded with 150 mm thick 19 mm sized clear stone that is fully wrapped or covered with an approved porous geotextile membrane, such as Terrafix 270R or equivalent. The perimeter drain should be connected to a sump equipped with backup pumps and generators in case of mechanical failure and/or power outage.

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

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

10.2 Water-Tight Structure

The floor slab for the elevator pit and mechanical room should be designed as a watertight structure. Further discussion of watertight structures is provided in Section 11.2.

11. Lateral Earth Pressures Against Basement Walls

11.1 Lateral Earth Pressure Against Drained Subsurface Walls

The subsurface basement walls of the proposed building should be backfilled with free draining material, such as OPSS Granular B Type II compacted to 95 percent SPMDD and equipped with a perimeter drainage system to prevent the buildup of hydrostatic pressure behind the walls. The walls will be subjected to lateral static and dynamic (seismic) earth forces. The expressions below assume free draining backfill material, a perimeter drainage system, level backfill surface behind the wall and vertical face on the back side of the wall.

For design purposes, the lateral static earth thrust against the subsurface walls may be computed from the following equation:

$$P = K_0\, h\, (½\, \gamma h + q) \text{ ……………………………………… (i)}$$

Where P = lateral earth pressure acting on the subsurface wall; kN/m^2

K_0 = lateral earth pressure coefficient for 'at rest' condition for Granular B Type II backfill material = 0.50

γ = unit weight of free draining granular backfill; OPSS Granular B Type II = 22 kN/m^3

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

q = surcharge load stress, kPa

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

$$\Delta_{Pe} = \gamma H^2 \frac{a_h}{g} F_b \text{……………………………………… (ii)}$$

Where Δ_{Pe} = dynamic thrust in kN/m of wall

H = height of wall, m

γ = unit weight of free draining granular backfill; OPSS Granular B Type II = 22 kN/m^3

$\frac{a_h}{g}$ = seismic coefficient = 0.379 (Based on the PGA value provided by Earthquakes Canada)

F_b = thrust factor = 1.0

The peak ground acceleration value, $\frac{a_h}{g}$, was obtained from the 2025-2020 National Building Code of Canada (NBCC) Seismic Hazard Tool website for a site designation of X_D and two (2) percent probability of exceedance in a 50-year period. Reference is made to the above website for peak ground acceleration values for 5 percent and 10 percent probability of exceedance in a 50-year period. The peak ground acceleration value will be updated once the results of the shear wave velocity sounding survey are available and will be provided in the final geotechnical report.

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

All subsurface walls should be properly waterproofed.

11.2 Lateral Earth Pressure Against Watertight Subsurface Walls

The subsurface walls of the mechanical room (including the elevator) should be designed as a water-tight structure to withstand lateral earth (soil) pressure as well as full hydrostatic pressure. The walls should be backfilled with OPSS Granular B Type II material compacted to 98 percent SPMDD below the floor slab. For this purpose, the highest groundwater table at the site should be assumed to coincide with the ground surface. The lateral thrust on the subsurface walls due to earth and water pressures may be computed from the expression:

$$P = ½k\,\gamma' H^2 + kqH + ½\gamma_w H^2 \quad \text{……………………………………………………………} \quad \text{(iii)}$$

Where P = lateral thrust due to earth and water pressure, kN/m

K_0 = lateral earth pressure coefficient for ‘at rest’ condition for Granular B Type II backfill material = 0.50

γ' = submerged unit weight of backfill = 12 kN kN/m^3

q = surcharge load stress, kPa

H = height of subsurface wall, m

γ_w = unit weight of water (9.81 kN/m^3)

In addition to the static earth and water pressures, the subsurface walls would be subjected to dynamic thrust from the soil during a seismic event. The subsurface walls would also be subjected to hydrodynamic thrust during a seismic event. The soil dynamic thrust (Δ_{Pe}) and the hydrodynamic thrust (P_w) may be computed from the equations given below:

$$\Delta_{Pe} = \gamma H^2 \frac{a_h}{g} F_b \quad \text{……………………………………………………………} \quad \text{(iv)}$$

Where Δ_{Pe} = dynamic thrust in kN/m of wall

H = height of elevator or sump pit wall, m

γ = unit weight of soil = 22 kN/m^3

$\frac{a_h}{g}$ = seismic coefficient = 0.379 (Based on the PGA value provided by Earthquakes Canada)

F_b = thrust factor = 1.0

The soil dynamic thrust acts approximately at 0.63H above the base of the wall.

$$P_w = \frac{7}{12} \frac{a_h}{g} \gamma_w H^2 \quad \text{……………………………………………………………} \quad \text{(v)}$$

Where P_w = hydrodynamic thrust in kN/m of wall

H = height of elevator shaft wall, m

γ_w = unit weight of water (9.81 kN/m^3)

$\frac{a_h}{g}$ = seismic coefficient = 0.379 (Based on the PGA value provided by Earthquakes Canada))

The hydrodynamic thrust (P_w) acts approximately at 0.4H above the base of the wall.

The peak ground acceleration value, $\frac{a_h}{g}$, was obtained from the 2025-2020 National Building Code of Canada (NBCC) Seismic Hazard Tool website for a site designation of X_D and two (2) percent probability of exceedance in a 50-year period. Reference is made to the above website for peak ground acceleration values for 5 percent and 10 percent probability of exceedance in a 50-year period. The peak ground acceleration value will be updated once the results of the shear wave velocity sounding survey are available and will be provided in the final geotechnical report.

The total lateral thrust due to the water on the face of the subsurface walls is the sum of the hydrostatic and hydrodynamic thrusts.

All subsurface walls should be properly waterproofed.

12. Excavation and De-Watering Requirements

12.1 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.

12.2 Excavation

Excavation for the construction of footings and the installation of underground services are anticipated to extend through the topsoil, fill and native silty clay.

Based on the proposed USF of Elevation 63.75 m it is anticipated that excavations for the basement will extend up to 2.5 m below the existing grade. Based on the proposed USF of Elevation 62.21 m for the mechanical room it is anticipated that excavations will extend up to 4.0 m below the existing grade. The highest recorded groundwater level was recorded at Elevation 63.3. It is therefore anticipated that excavations for the basement will be above or near the groundwater table and excavations for the mechanical room will extend as deep as 1.2 m below the highest recorded groundwater level.

Excavations may be undertaken by conventional heavy equipment.

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

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

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

Excavations that terminate within the native silty clay to a maximum depth of 4.0 m are not expected to experience a base-heave type of failure.

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

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

12.3 De-Watering Requirements

Seepage of the surface and subsurface water into excavations is anticipated and it should be possible to collect water entering the excavations at low points and to remove it by conventional pumping techniques. In areas of high infiltration and below the groundwater level, a higher seepage rate should be anticipated and may require high-capacity pumps to keep the excavation dry.

For future construction related dewatering where the daily pumping volumes exceed 50,000 L/day, the Project can be registered on the Environmental Activity and Sector Registry maintained by the Ontario Ministry of the Environment, Conservation and Parks (MECP). The registration requires dedicated Water Taking and Discharge reports to be registered in the EASR and the reports are to be prepared by a qualified Professional Engineer of Ontario or qualified Professional Geoscientist of Ontario that address all potential adverse impacts that the dewatering operations may have on the natural environment (i.e. settlement of adjacent structures, water quality of pumped water and applicable discharge location). There are no limits to the volume of water that can be included in an EASR registration, however durations of pumping of longer than 365 consecutive days will require approval from the Municipality and relevant Conservation Authorities. Specific permits related to the discharge water may be required (i.e. Sewer Use Agreements, etc.) either at the Municipal or Provincial levels depending on the volume and quality of the water to be discharged from the site.

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

13. Pipe Bedding Requirements

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

It is recommended that 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).

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

For paved surfaces that will be located over service trenches, it is recommended that the trench backfill material within the 1.8 m frost zone, should match the existing material exposed along the trench walls to minimize differential frost heaving of the subgrade. The trench backfill should be placed in 300 mm thick lifts and each lift should be compacted to 95 percent SPMDD. Alternatively, frost tapers may be used.

If the backfill for the service trenches will consist of granular fill, clay seals should be installed in the service trenches at select intervals (spacing) as per City of Ottawa Drawing No. S8. The seals should be 1.0 m wide, extend over the entire trench width and from the bottom of the trench to the underside of the pavement structure. The clay should be compacted to 95 percent SPMDD. The purpose of the clay seals is to prevent the permanent lowering of the groundwater level.

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

14. Parking Areas and Laneways

Pavement structures for the proposed parking lot and laneway is given on Table V below for the anticipated silty clay subgrade. The pavement structure is based upon the assumption that the subgrade will be properly prepared and assumes a functional design life of 15 to 18 years. The proposed functional design life represents the number of years to the first rehabilitation, assuming regular maintenance is carried out.

Table V: Recommended Pavement Structure Thicknesses

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

Notes:

1. SPMDD denotes standard Proctor maximum dry density, ASTM, D-698-12e2.
2. MRD denotes Maximum Relative Density, ASTM D2041.

The upper 300 mm of the subgrade fill must be compacted to 98% SPMDD.

Additional comments on the construction of the parking lot and laneway are as follows:

1. As part of the subgrade preparation, the proposed parking lot and laneway should be stripped of topsoil and other obviously unsuitable material. The subgrade should be properly shaped, crowned, then proofrolled with a heavy vibratory roller in the full-time presence of a representative of this office. Any soft or spongy subgrade areas detected should be sub excavated and properly replaced with suitable approved backfill compacted to 95 percent SPMDD (ASTM D698-12e2). The subgrade should be covered with geotextile prior to placing granular materials.
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 laneway(s). Subdrains must be installed in the proposed parking area at low points and should be continuous between catchbasins or open drainage ditches 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. 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.
4. 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 of 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.
5. 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 use and placement should meet OPSS 1150 or 1151 requirements. It should be compacted from 92 percent to 97 percent of the MRD (ASTM D2041). Asphalt placement should be in accordance with OPSS 310 and OPSS 313.

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

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

It is anticipated that the majority of the material required for backfilling purposes for the proposed development would have to be imported and should preferably conform to the following specifications:

- Engineered fill under footings for the proposed building - OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 100 percent SPMDD,
- Engineered fill under the floor slab - OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 98 percent SPMDD,
- Backfill in footing trenches and against foundation walls – OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 98 percent of the SPMDD inside the building and 95 percent SPMDD outside the building respectively.
- Backfill in services trenches inside building – OPSS 1010 Granular B Type II placed in 300 mm thick lifts and each lift compacted to 98 percent of the SPMDD.
- Backfill in exterior services trenches (above the bedding and cover) – On site desiccated silty clay, if compactable, placed in 300 mm thick lifts and each lift compacted to 95 percent of the SPMDD. The compactability of the clay should be determined prior to its use. It the clay is not suitable for compaction purposes; exterior service trenches should be backfilled with OPSS 1010 Granular B Type I or OPSS 1010 Select Subgrade Material (SSM) placed in 300 mm thick lifts and each lift compacted to 95 percent of the SPMDD.

16. Corrosion Potential

Chemical tests limited to pH, sulphate, chloride and resistivity were undertaken on one (1) soil sample. A summary of the results is shown in Table VI. The laboratory certificate of analysis is shown in Appendix A.

Table VI: Corrosion Test Results on Soil Samples

Borehole – Sample No.	Depth (m)	Soil Type	pH	Sulphate (%)	Chloride (%)	Resistivity (ohm-cm)
BH1 SS4	3.7 – 4.3	Silty Clay	8.18	0.029	0.041	3560

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

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

17. Tree Planting Restrictions

Tree planting at the site should be undertaken in accordance with the City of Ottawa 2005 Clay Soils Policy and 2017 Tree Planting in Sensitive Marine Clay Soils Guidelines (2017 Tree Planting Guidelines). The tree planting plans for the proposed development should be completed by a landscape architect.

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

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

The silty clay, where fully penetrated, extends to 10.2 m depth (Elevation 55.6 m) and based on a design underside of footing elevation of Elevation 63.8 m for footings and 62.2 m for the elevator pit and mechanical room, the silty clay extends up to 6.5 m below the USF elevation. The silty clay across the entirely of the site is considered to have a medium to high potential for soil volume change based on the modified plasticity index values ranging from 35 percent to 41 percent.

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

- The USF is 2.1 m or greater below the lowest finished grade. Note: this footing level must be satisfied for footings within 10m of the tree, as measured from the centre of the tree trunk, and verified by means of the Grading Plan as indicated in the Procedural Changes below.
- A small size tree must be provided with a minimum of 25 m^3 of available soil volume, as determined by a Landscape Architect. A medium size tree must be provided with a minimum of 30 m^3 of available soil volume, as determined by a Landscape Architect. The developer will ensure the soil is generally uncompacted when backfilling in street tree planting locations.
- The tree species must be small to medium size, as confirmed by a Landscape Architect in the Landscape Plan
- Grading surrounding the tree must promote draining to the tree root zone (in such a manner as not to be detrimental to the tree), as noted on the subdivision Grading Plan.

As the modified plasticity index exceeds 40% in one sample, the reduced setback is not applicable at this site. The setback for small trees (mature tree height up to 7.5m) and medium (mature tree of heights between 7.5 m to 14.0 m) should be equal to or greater than the full mature height of the tree

18. Earthworks Quality Control During Construction

All earthworks activities from construction of footing foundations to subgrade preparation to the placement and compaction of fill soils should be inspected by geotechnical personnel to ensure that construction proceeds in accordance with the project specifications.

19. General Comments

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

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

Daniel Wall

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

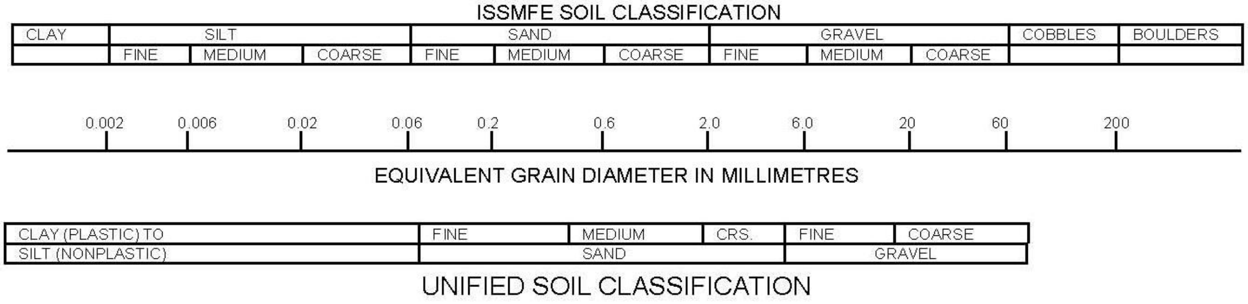
LICENSED PROFESSIONAL ENGINEER
April 17, 2026
D C WALL
100159490
PROVINCE OF ONTARIO

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

Figures

Notes On Sample Descriptions

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



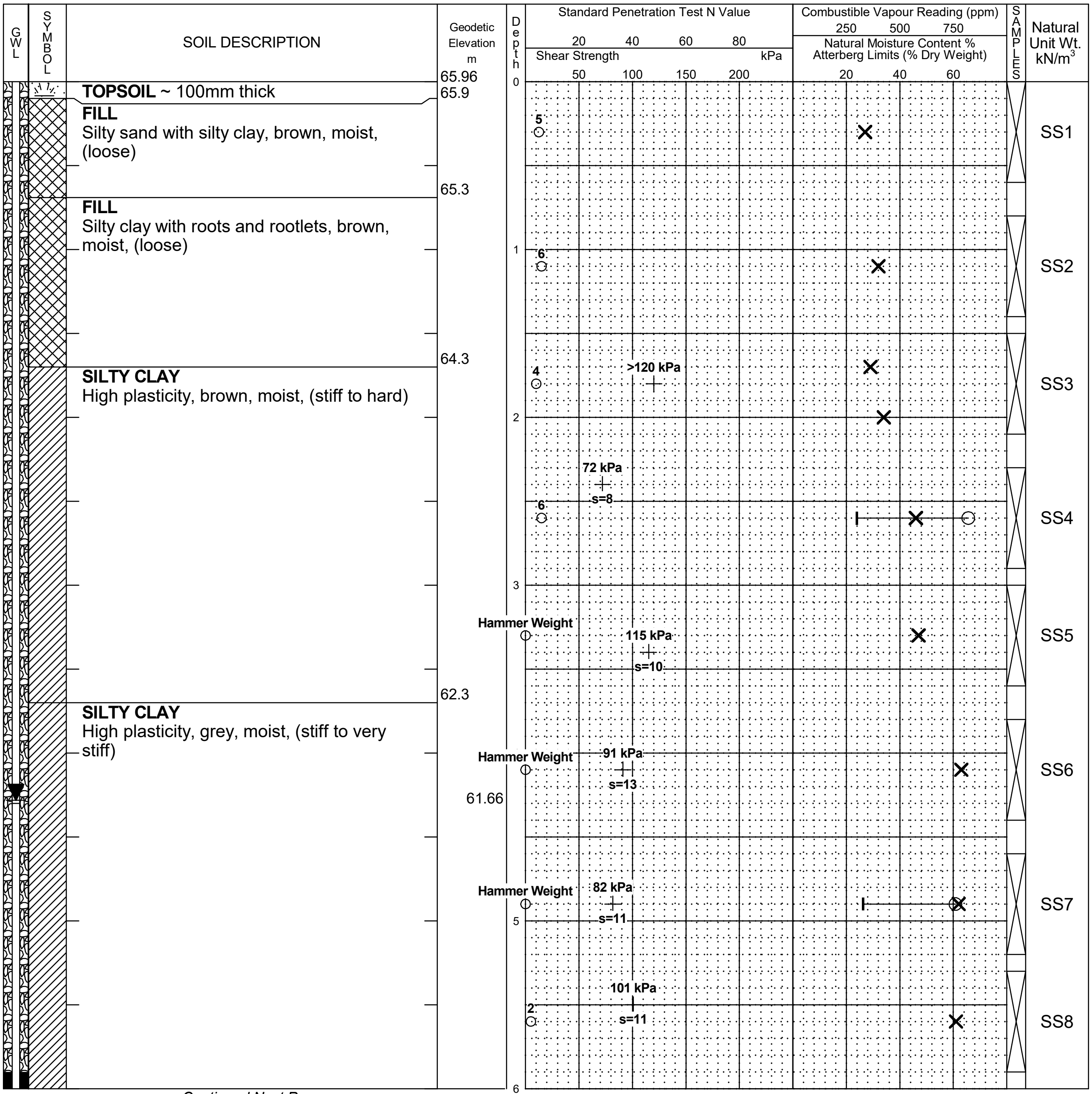
2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable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

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

Log of Borehole BH-1

Project No:	OTT-25016073-A0	Figure No.	3
Project:	Proposed Residential Development	Page.	1 of 2
Location:	1144 St. Pierre Street, Ottawa, Ontario		
Date Drilled:	'December 15, 2025		
Drill Type:	CME-55 Track Mounted Drill Rig		
Datum:	Geodetic Elevation		
Logged by:	SA	Checked by:	DW

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



TOPSOIL ~ 100mm thick

FILL
Silty sand with silty clay, brown, moist, (loose)

FILL
Silty clay with roots and rootlets, brown, moist, (loose)

SILTY CLAY
High plasticity, brown, moist, (stiff to hard)

SILTY CLAY
High plasticity, grey, moist, (stiff to very stiff)

Continued Next Page

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 32 mm monitoring well was installed in the borehole upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-25016073-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Apr 17, 2026	4.3	

CORE DRILLING RECORD

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

Log of Borehole BH-1

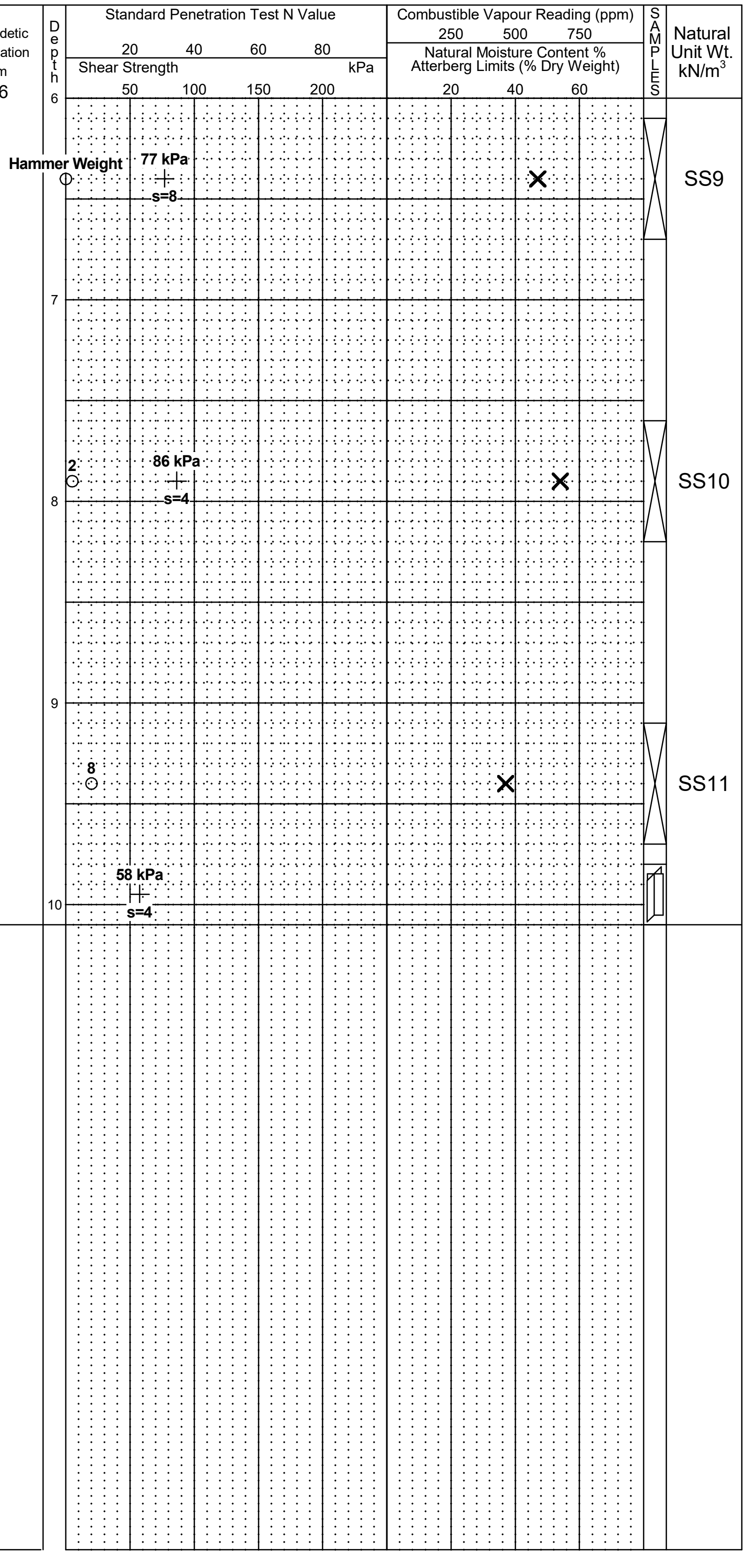
Project No: OTT-25016073-A0

Project: Proposed Residential Development

Figure No. 3

Page. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m
		SILTY CLAY High plasticity, grey, moist, (stiff to very stiff) *(continued)*	59.96
			55.9
		Borehole Terminated at 10.1 m Depth	



NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. A 32 mm monitoring well was installed in the borehole upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-25016073-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Apr 17, 2026	4.3	

CORE DRILLING RECORD

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

Log of Borehole BH-3

Project No: OTT-25016073-A0

Project: Proposed Residential Development

Location: 1144 St. Pierre Street, Ottawa, Ontario

Figure No. 4

Page. 1 of 2

Date Drilled: 'December 15, 2025

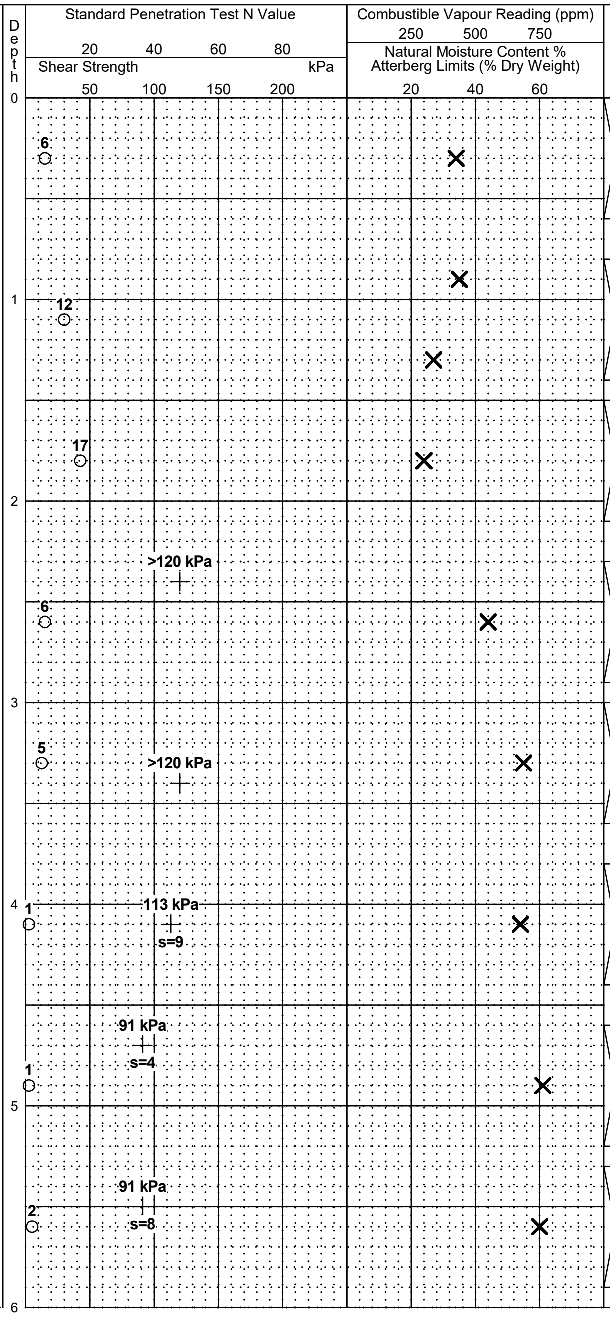
Drill Type: CME-55 Track Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: SA Checked by: DW

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
			65.83	0
		TOPSOIL ~ 75 mm thick	65.8	
		FILL Silty clay with topsoil inclusions, brown, moist, (loose)		
		SILTY CLAY Brown, moist, (very stiff)	65.0	1
▼			63.33	2
		SILTY CLAY Grey, moist, (stiff to very stiff)	62.1	4
				6



SAMPLES	Natural Unit Wt. kN/m³
SS1	
SS2	
SS3	
SS4	
SS5	
SS6	
SS7	
SS8	

Continued Next Page

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 32 mm monitoring well was installed in the borehole upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-25016073-A0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
Apr 17, 2026	2.5	

CORE DRILLING RECORD

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

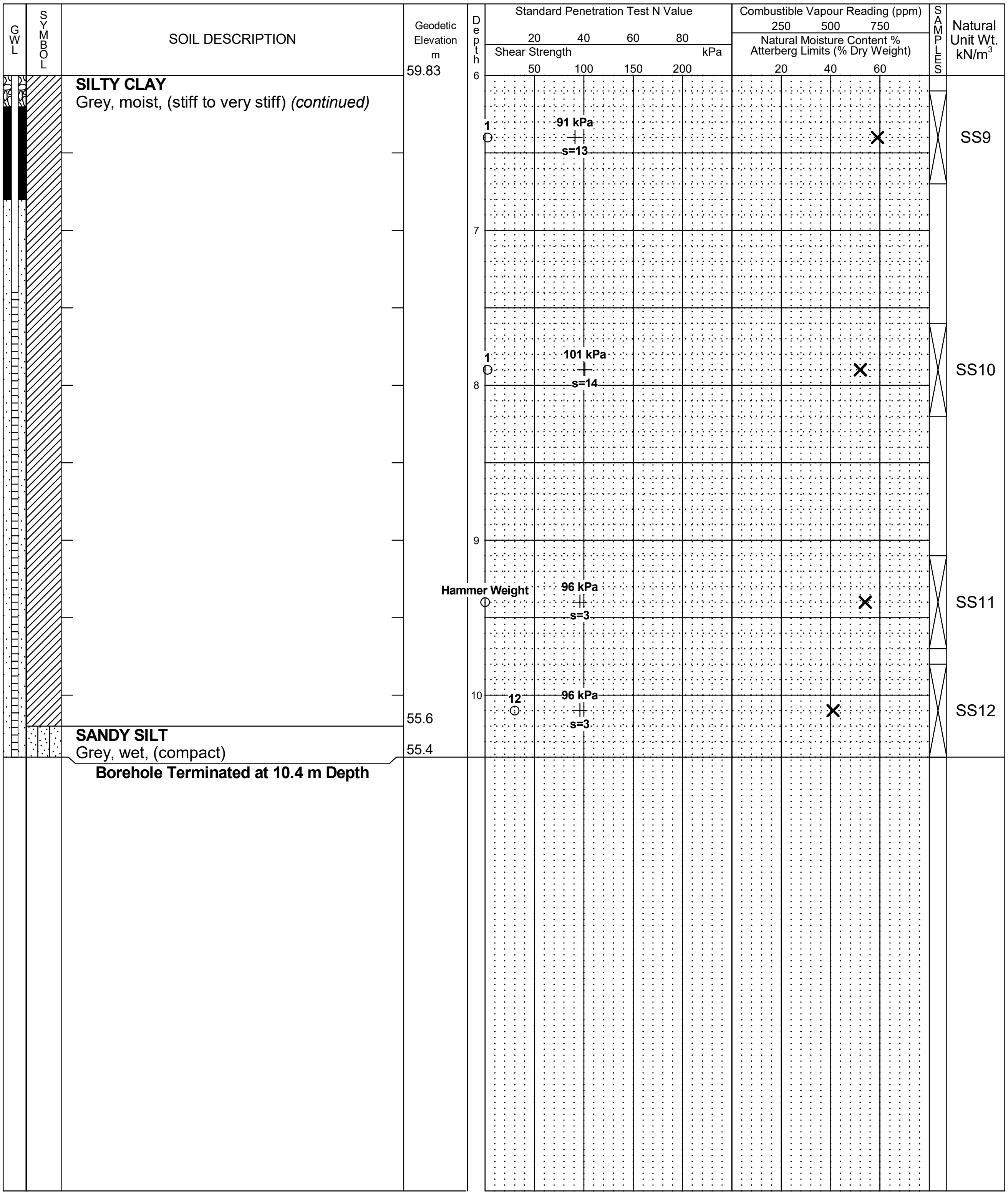
Log of Borehole BH-3

Project No: OTT-25016073-A0

Project: Proposed Residential Development

Figure No. 4

Page. 2 of 2



59.83

SILTY CLAY
Grey, moist, (stiff to very stiff) *(continued)*

55.6

SANDY SILT
Grey, wet, (compact)

55.4

Borehole Terminated at 10.4 m Depth

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 32 mm monitoring well was installed in the borehole upon completion
3. Field work was supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-25016073-A0

WATER LEVEL RECORDS

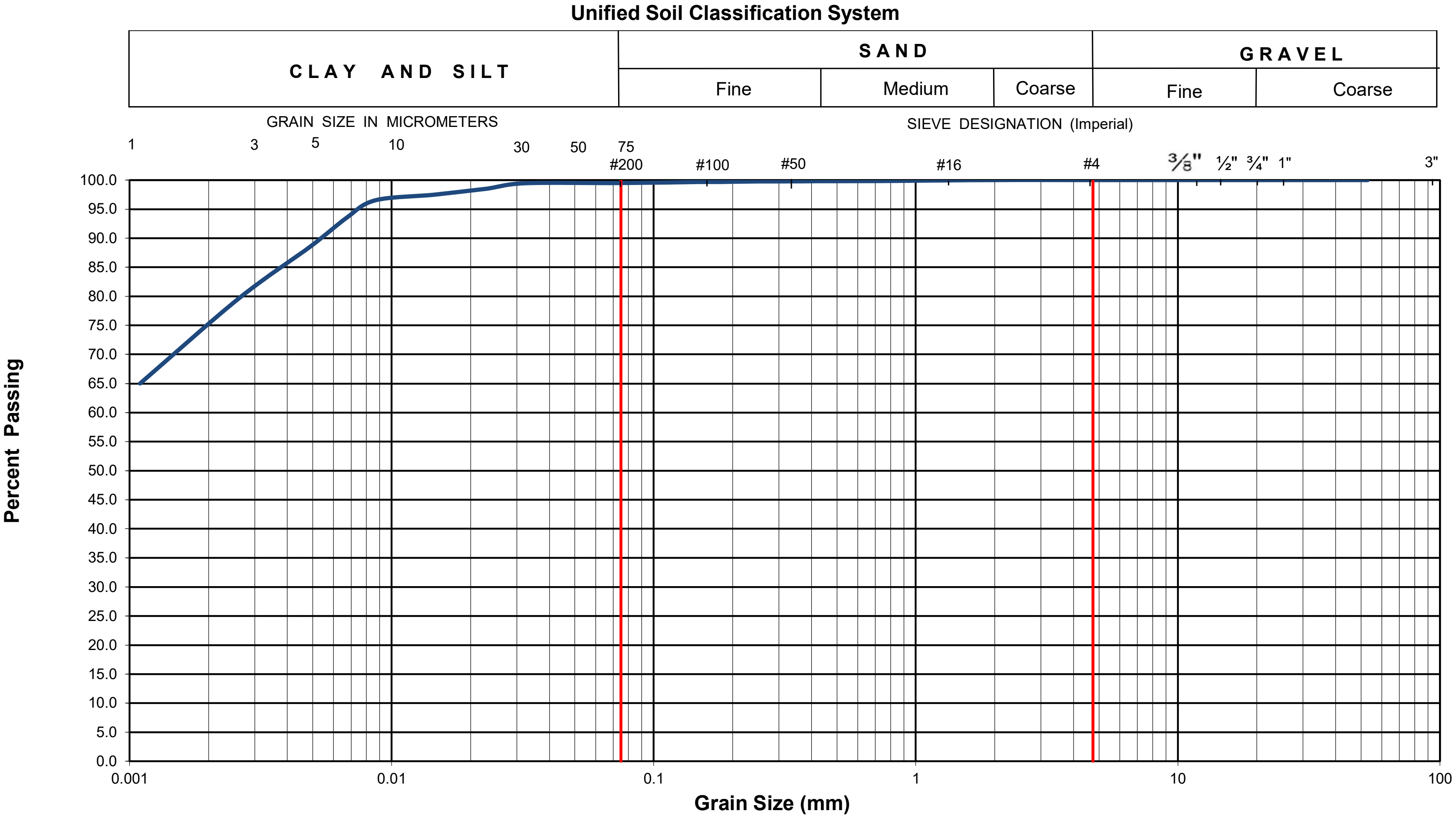
Date	Water Level (m)	Hole Open To (m)
Apr 17, 2026	2.5	

CORE DRILLING RECORD

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

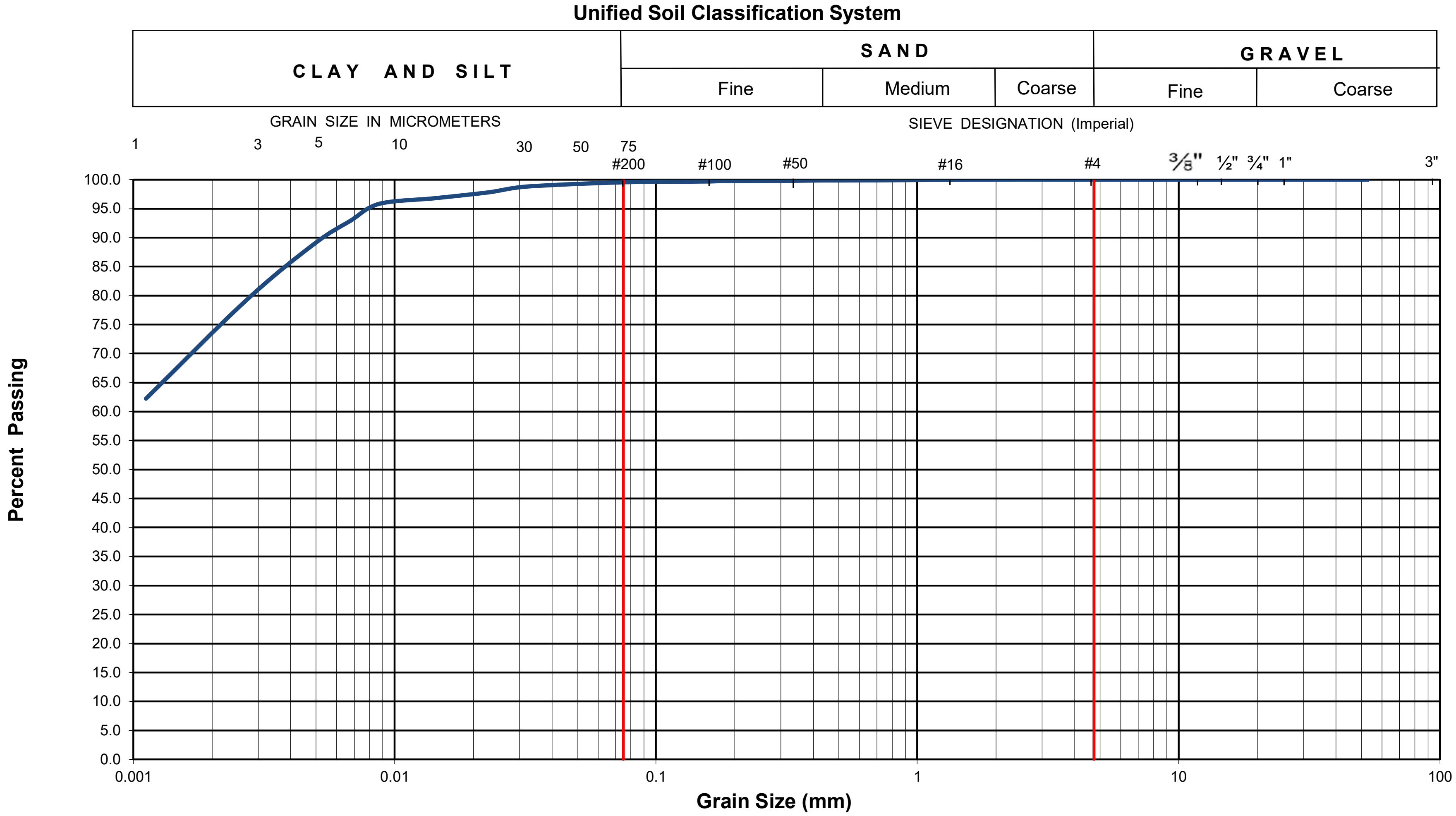
EXP Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6

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



EXP Project No.:	**OTT-25016073-A0**	**Project Name :**	**Geotechnical Investigation - 1144 St. Pierre Street, Ottawa**						
Client :	**156294-12542340 Canada Limited**	**Project Location :**	**1144 St. Pierre Street, Ottawa**						
Date Sampled :	**December 15, 2025**	**Borehole No:**	**BH1**		**Sample No.:**	**SS4**		**Depth (m) :**	**2.3-2.9**
Sample Description :		**% Silt and Clay**	**99**	**% Sand**	**1**	**% Gravel**	**0**	**Figure :**	**5**
Sample Description :	**Silty Clay of High Plasticity (CH) - Trace Sand**								

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



EXP Project No.:	**OTT-25016073-A0**	**Project Name :**	**Geotechnical Investigation - 1144 St. Pierre Street, Ottawa**						
Client :	**156294-12542340 Canada Limited**	**Project Location :**	**1144 St. Pierre Street, Ottawa**						
Date Sampled :	**December 15, 2025**	**Borehole No:**	**BH1**	**Sample No.:**	**SS7**			**Depth (m) :**	**4.6-5.2**
Sample Description :		**% Silt and Clay**	**99**	**% Sand**	**1**	**% Gravel**	**0**	**Figure :**	**6**
Sample Description :	**Silty Clay of High Plasticity (CH) - Trace Sand**								

Appendix A – AGAT Laboratory Certificate of Analysis

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

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

ATTENTION TO: Daniel Wall

PROJECT: OTT-23014181-K0

AGAT WORK ORDER: 25Z385317

SOIL ANALYSIS REVIEWED BY: Nivine Basily, Inorganic Team Lead

DATE REPORTED: Dec 19, 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

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- *This document is signed by an authorized signatory who meets the requirements of the MELCCFP, CALA, CCN and NELAP.*
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Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

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AGAT Laboratories

Certificate of Analysis

AGAT WORK ORDER: 25Z385317

PROJECT: OTT-23014181-K0

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

CLIENT NAME: EXP SERVICES INC

ATTENTION TO: Daniel Wall

SAMPLING SITE:1144 St. Pierre

SAMPLED BY:EXP

(Soil) Inorganic Chemistry

DATE RECEIVED: 2025-12-16

DATE REPORTED: 2025-12-19

			SAMPLE DESCRIPTION:	BH1 SS6 12.5'-14.5'
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	2025-12-15
Parameter	**Unit**	**G / S**	**RDL**	**7352320**
Chloride (2:1)	µg/g		2	41
Sulphate (2:1)	µg/g		2	29
pH (2:1)	pH Units		NA	8.18
Resistivity (2:1) (Calculated)	ohm.cm		1	3560

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

7352320 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 *)

ASSOCIATION OF THE CHEMICAL PROFESSION OF ONTARIO
CHARTERED
NIVINE BASILY
CHEMIST

Certified By:

Quality Assurance

CLIENT NAME: EXP SERVICES INC
PROJECT: OTT-23014181-K0
SAMPLING SITE:1144 St. Pierre

AGAT WORK ORDER: 25Z385317
ATTENTION TO: Daniel Wall
SAMPLED BY:EXP

Soil Analysis

RPT Date: Dec 19, 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)	7352320	7352320	41	39	5.0%	< 2	100%	70%	130%	109%	80%	120%	108%	70%	130%
Sulphate (2:1)	7352320	7352320	29	28	3.5%	< 2	95%	70%	130%	104%	80%	120%	108%	70%	130%
pH (2:1)	7352320	7352320	8.18	8.35	2.1%	NA	100%	80%	120%						

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

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

NIVINE BASILY

Certified By:

Method Summary

CLIENT NAME: EXP SERVICES INC

AGAT WORK ORDER: 25Z385317

PROJECT: OTT-23014181-K0

ATTENTION TO: Daniel Wall

SAMPLING SITE:1144 St. Pierre

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!

RUSH!

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

Chain of Custody Record

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

Laboratory Use Only

Work Order #: 25Z385317

Cooler Quantity: n/a - no ice/packs

Arrival Temperatures: 19.0 | 19.1 | 19.3
7.3 | 7.8 | 8.3

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes: IL - bagged ice

Report Information:

Company: EXP Services Inc
Contact: Daniel Wall
Address: 2650 Queensview Drive Unit 100, Ottawa, ON, K2B 8H6
Phone: 613-688-1891 Fax:
Reports to be sent to:
1. Email: daniel.wall@exp.com
2. Email: jeff.macmillan@exp.com

Regulatory Requirements:

(Please check all applicable boxes)

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

☐ Regulation 406
Table ______ Indicate One

☐ Regulation 558

☐ CCME

☐ Sewer Use
☐Sanitary ☐Storm
______ Region

☐ Prov. Water Quality Objectives (PWQO)

☐ Other
______ Indicate One

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

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

Turnaround Time (TAT) Required:

Regular TAT ☐ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

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

OR Date Required (Rush Surcharges May Apply):

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

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

Project Information:

Project: OTT-23014181-K0
Site Location: 1144 St. Pierre
Sampled By: EXP
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

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

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y / N	O. Reg 153 Metals & Inorganics	Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	BTEX, F1-F4 PHCs	VOC	PAHs	PCBs	PCBs: Aroclors ☐	O. Reg 558 Landfill Disposal Characterization TCLP: TCLP: ☐M&I ☐VOCs ☐ABNs ☐B(a)P ☐PCBs	O. Reg 406 Regulation 406 SPLP Rainwater Leach SPLP: ☐Metals ☐VOCs ☐SVOCs	Regulation 406 Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Corrosivity: ☐Moisture ☐ Sulphide	pH	Sulphate	Chloride	Resistivity			Potentially Hazardous or High Concentration (Y/N)
1. BH 1 SS6 12.5'-14.5'	Dec. 15	AM PM	1	S														☑	☑	☑	☑			
2.		AM PM																						
3.		AM PM																						
4.		AM PM																						
5.		AM PM																						
6.		AM PM																						
7.		AM PM																						
8.		AM PM																						
9.		AM PM																						
10.		AM PM																						
11.		AM PM																						

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time	
Jeff MacMillan	Dec. 16, 2025		C. Griffiths	12/16/25	15h10	
CG to Dario	12/16/25	15h00	Dario	12/17/25	9:15	Page 1 of 1
						Nº:

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

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