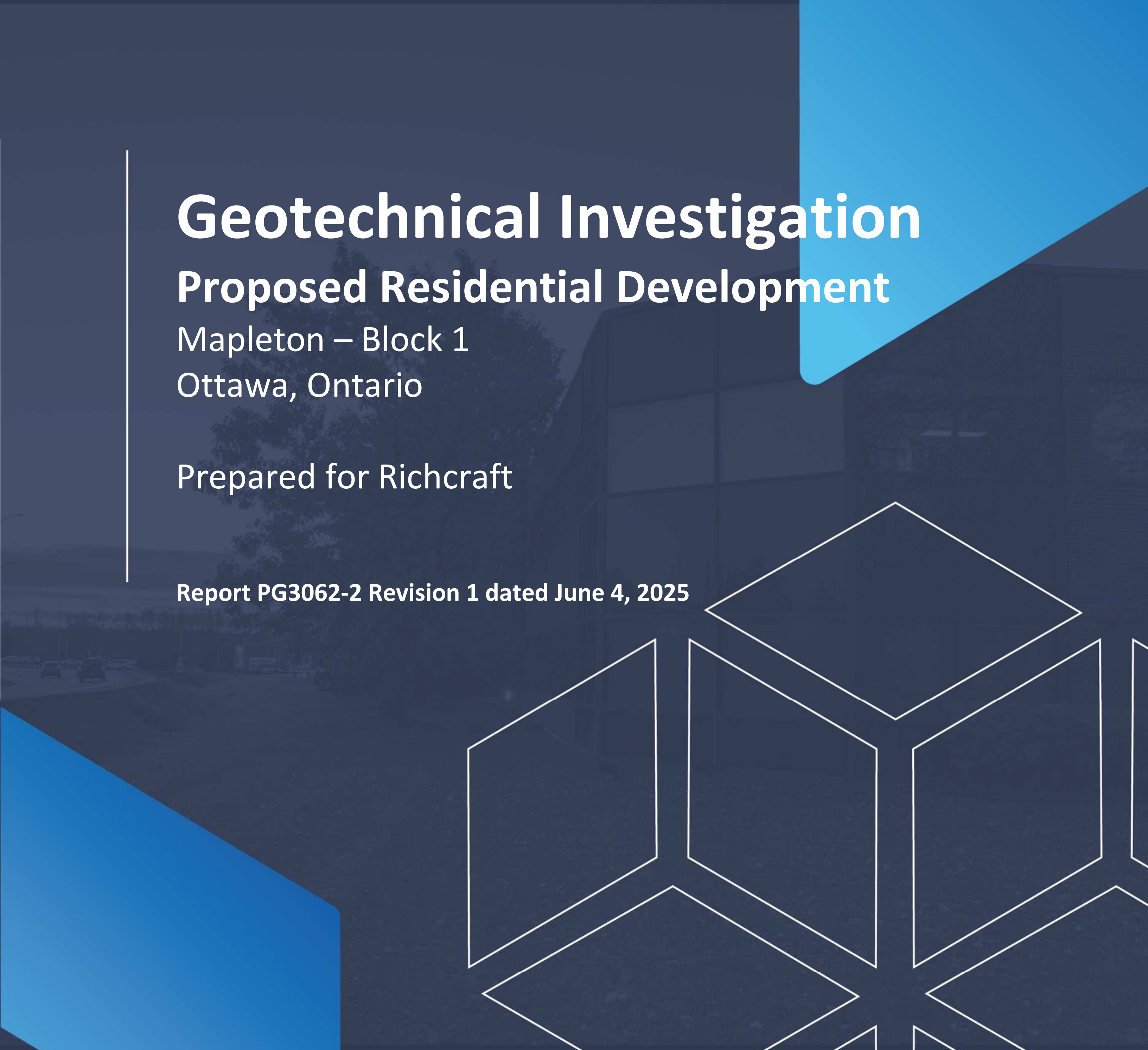

Geotechnical Investigation

Proposed Residential Development

Mapleton – Block 1
Ottawa, Ontario

Prepared for Richcraft

Report PG3062-2 Revision 1 dated June 4, 2025

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Richcraft to conduct a geotechnical investigation for the proposed Mapleton - Block 1 residential development to be located along Maple Grove Road in the City of Ottawa (reference should be made to Figure 1 – Key Plan in Appendix 2 of this report for the general site location).

The objectives of the geotechnical investigation were to:

☐ Determine the subsoil and groundwater conditions at this site by means of boreholes.

☐ Provide geotechnical recommendations pertaining to the design of the proposed development including construction considerations which may affect the design.

This report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

2.0 Proposed Development

Based on the available conceptual plan, it is understood that the proposed development will consist of two 3-storey residential buildings with one underground parking level each, six townhouse blocks with at-grade parking, and an accessory building.

Further, it is understood that the remainder of the site will generally be occupied by asphalt-paved access lanes and landscaped areas. It is also expected that the proposed development will be municipally serviced.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the current geotechnical investigation was carried out on March 21, 2025, and consisted of advancing a total of 6 boreholes to a maximum depth of 6.7 m below the existing ground surface. A previous geotechnical investigation by Paterson also included borehole BH 14 and test pit TP-8 within Block 1.

The test hole locations were determined in the field by Paterson personnel and distributed in a manner to provide general coverage of the subject site, taking into consideration existing site features and underground utilities. The test hole locations are presented on Drawing PG3062-9 – Test Hole Location Plan included in Appendix 2.

The boreholes were advanced with a low-clearance track-mounted drill rig operated by a two-person crew. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer from the geotechnical division. The drilling procedure consisted of augering to the required depth at the selected location, sampling, and testing the overburden.

Sampling and In Situ Testing

Soil samples were recovered from the boreholes using a 50 mm diameter split-spoon sampler or from the auger flights. The split spoon, and auger samples were classified on site and placed in sealed plastic bags. All soil samples were transported to our laboratory for further review. The depths at which the split spoon, and auger samples were recovered from the boreholes are shown as SS, and AU, respectively, on the Soil Profile and Test Data sheets in Appendix 1.

The Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split-spoon samples. The SPT results are recorded as “N” values on the Soil Profile and Test Data sheets. The “N” value is the number of blows required to drive the split-spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

Undrained shear strength testing was carried out in cohesive soils using a field vane apparatus in all boreholes.

The overburden thickness was evaluated by a dynamic cone penetration test (DCPT) at borehole BH 4-25, completed during the current field program. The DCPT consists of driving a steel drill rod, equipped with a 50 mm diameter cone at the tip, using a 63.5 kg hammer falling from a height of 760 mm. The number of blows required to drive the cone into the soil is recorded for each 300 mm increment. Due to the low resistance exerted by the silty clay in some boreholes, the cone was often pushed using the hydraulic head of the drill rig until resistance to penetration was encountered. The hammer was then used to further advance the cone to practical refusal.

Subsurface conditions observed in the test holes were recorded in detail in the field. Reference should be made to the Soil Profile and Test Data sheets presented in Appendix 1 for specific details of the soil profile encountered at the test hole locations.

Groundwater

Boreholes BH 1-25, BH 2-25, BH 4-25 and BH 5-25 were fitted with a flexible polyethylene standpipe to allow groundwater level monitoring. The groundwater level readings were obtained after a suitable stabilization period subsequent to the completion of the field investigation.

The groundwater observations are discussed in Section 4.3 and presented in the Soil Profile and Test Data sheets in Appendix 1.

Sample Storage

All samples from the current investigation will be stored in the laboratory for a period of 1 month after the issuance of this report. They will then be discarded unless directed otherwise.

3.2 Field Survey

The borehole locations and ground surface elevation at each borehole location were surveyed by Paterson using a high-precision handheld GPS and referenced to a geodetic datum. The locations of the boreholes, and the ground surface elevation at each borehole location, are presented on Drawing PG3062-9 – Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

The soil samples recovered from the test holes were examined in our laboratory to review the results of the field logging. From the current boreholes, two samples were submitted for Atterberg Limits testing, one sample was submitted for grain size distribution testing and one sample was submitted for shrinkage testing.

The results of the Atterberg Limits testing, grain size distribution testing, and shrinkage testing are presented in Appendix 1 and are further discussed in Sections 4.2.

3.4 Analytical Testing

One (1) soil sample was submitted for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. The sample was submitted to determine the concentration of sulphate and chloride, the resistivity, and the pH of the sample. The results are presented in Appendix 1 and are discussed further in Section 6.7.

4.0 Observations

4.1 Surface Conditions

The subject site is currently occupied by site trailers along the western portion of the subject site, which were placed on a temporary granular pad facing Roger Griffith Avenue. The eastern part of the site is covered with several soil stockpiles.

The site is bordered by Roger Griffith Avenue to the west, Ploughshare Road to the south, an industrial building to the east, and Maple Grove Road to the north. The ground surface elevation across the subject site is currently relatively level at approximate geodetic elevation 97 m, although the older test holes indicate the site grade was previously around geodetic elevation 95 to 96 m.

4.2 Subsurface Profile

Generally, the subsurface profile encountered at the borehole locations consists of an approximate 1.7 to 2.2 m thickness of fill, which was generally observed to consist of compact, brown silty sand to silty clay. However, where the granular pad is present, the fill was observed to consist of granular crushed stone.

The fill was generally underlain by a loose to compact, brown sandy silt, turning grey with depth. A layer of firm, grey silty clay was encountered beneath the sandy silt layer at an approximate depth of 4.5 m below the existing ground surface.

A DCPT was conducted at borehole BH 4-25. Practical refusal to the DCPT was encountered at the borehole location at 15.8 m below ground surface.

Specific details of the soil profile at each test hole location are presented on the Soil Profile and Test Data sheets in Appendix 1.

Bedrock

Based on available geological mapping, the bedrock in the subject area is part of the Verulam formation, which consists of interbedded limestone and dolomite with an overburden drift thickness ranging between 5 to 15 m.

Atterberg Limits Testing

Atterberg limits testing was completed on the recovered silty clay samples at select borehole locations. The results of the Atterberg limits test are presented in Table 1 and on the Atterberg Limits Results sheet in Appendix 1.

Table 1 – Atterberg Limits Results

Sample	Depth (m)	LL (%)	PL (%)	PI (%)	Classification
BH 1-25 SS4	2.30	21	15	6	CL
BH 4-25 SS6	3.80	35	18	17	CL

Notes: LL: Liquid Limit; PL: Plastic Limit; PI: Plasticity Index.
CL: Inorganic Clay of Low Plasticity, CH: Inorganic Clays of High Plasticity

Grain Size Distribution and Hydrometer Testing

Grain size distribution analysis was completed on 1 selected recovered sandy silt deposit sample from the current investigation. The results of the grain size distribution analysis is presented in Table 2 and on the Grain Size Distribution sheets in Appendix 1.

Table 2 – Grain Size Distribution Results

Sample	Depth (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH 2-25 SS4	2.30	0.0	31.9	63.3	4.8

Shrinkage Testing

Linear shrinkage testing was completed on one sample recovered at a depth of 2.30 m from BH 5-25. The shrinkage limit and shrinkage ratio of the tested sandy silt sample were found to be 19.38% and 1.806, respectively. The results of the linear shrinkage testing are presented in Appendix 1.

4.3 Groundwater

Groundwater levels were recorded at each borehole location and are presented in Table 3 below. The groundwater level readings are also presented in the Soil Profile and Test Data sheets in Appendix 1.

Table 3 – Summary of Groundwater Levels

Borehole Number	Ground Surface Elevation (m)	Measured Groundwater Level		Date Recorded
		Depth (m)	Elevation (m)	
BH 1-25	97.24	2.84	94.40	March 31, 2025
BH 2-25	96.99	2.19	94.80	

Table 3 – Summary of Groundwater Levels

Borehole Number	Ground Surface Elevation (m)	Measured Groundwater Level		Date Recorded
		Depth (m)	Elevation (m)	
BH 4-25	97.40	2.87	94.53	
BH 5-25	97.10	Blocked	-	

Note: The ground surface elevation at each borehole location was surveyed using a handheld GPS using a geodetic datum.

It should be noted that surface water can become trapped within a backfilled borehole that can lead to higher than typical groundwater level observations. The long-term groundwater levels can also be estimated based on the observed colour and consistency of the recovered soil samples.

Based on these observations, the long-term groundwater table can be expected at a depth of approximately **2 to 3 m** below the existing ground surface.

However, groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is considered suitable for the proposed development. The proposed buildings are recommended to be founded on conventional spread footings placed on the undisturbed sandy silt, silt, and/or silty clay.

Due to the presence of the silty clay deposit, the subject site is subject to grade raise restrictions. The permissible grade raise recommendations are discussed in Section 5.3.

The above and other considerations are further discussed in the following sections.

5.2 Grading and Preparation

Stripping Depth

Asphalt, topsoil, construction debris, and deleterious fill, such as those containing organic materials, should be removed from within the perimeters of the proposed buildings and from under paved areas, pipe bedding or other settlement sensitive structures.

Care should be taken not to disturb adequate bearing soils below the founding level during site preparation activities. Disturbance of the subgrade may result in having to sub-excavate the disturbed material and the placement of additional suitable fill material.

Fill Placement

Fill placed for grading beneath the proposed buildings should consist, unless otherwise specified, of clean imported granular fill such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. The imported fill material should be tested and approved prior to delivery. The fill should be placed in maximum 300 mm thick loose lifts and compacted by suitable compaction equipment. Fill placed beneath the proposed building should be compacted to a minimum of 98% of the material’s standard Proctor maximum dry density (SPMDD).

Non-specified site-excavated soil could be placed as general landscaping fill and beneath paved areas. In landscaped areas, these materials should be spread in lifts with a maximum thickness of 300 mm and compacted by the tracks of the spreading equipment to minimize voids. In areas to be paved, the site-excavated soils should be compacted to a minimum of 98% of the material's standard Proctor maximum dry density (SPMDD).

Vibration Considerations

Construction operations could cause vibrations, and possibly, sources of nuisance to the community. Therefore, means to reduce the vibration levels as much as possible should be incorporated in the construction operations to maintain a cooperative environment with the residents.

The following construction equipment could be the source of vibrations: hoe ram, compactor, dozer, crane, truck traffic, etc. Vibrations, whether caused by blasting operations or by construction operations, could be the source of detrimental vibrations on the nearby buildings and structures. Therefore, all vibrations are recommended to be limited.

Two parameters are used to determine the permissible vibrations, namely, the maximum peak particle velocity and the frequency. For low frequency vibrations, the maximum allowable peak particle velocity is less than that for high frequency vibrations. As a guideline for construction activities, the peak particle velocity should be less than 19 mm/s between frequencies of 4 to 15 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 15 and 40 Hz).

5.3 Foundation Design

Conventional Spread Footings

Footings placed on the undisturbed sandy silt, silt, or silty clay can be designed using a bearing resistance value at serviceability limit states (SLS) of **100 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **150 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance value at ULS.

An undisturbed soil bearing surface consists of one from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, have been removed, in the dry, prior to the placement of concrete for footings.

Footings designed using the bearing resistance values at SLS given above will be subjected to potential post construction total and differential settlements of 25 and 20 mm, respectively.

Permissible Grade Raise Recommendations

Due to the presence of the silty clay deposit, a permissible grade raise restriction of **2.0 m** above the **original site grade** is recommended for grading at the subject site. If higher than permissible grade raises are required, preloading with or without a surcharge, lightweight fill and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction total and differential settlements.

Lateral Support

The bearing medium under footing- and raft-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to the in-situ bearing medium soils when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V passes only through in situ soil of the same or higher capacity as the bearing medium soil.

5.4 Design for Earthquakes

The seismic site designation is **Class X_D** as referenced the Ontario Building Code (OBC) 2024. The soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the Ontario Building Code (OBC) 2024 for a full discussion of the earthquake design requirements.

5.5 Basement Slab

With the removal of all topsoil and deleterious materials within the footprint of the proposed building, a compact fill or native soil subgrade, approved by Paterson, is considered an acceptable subgrade surface on which to commence backfilling for the floor slab construction.

For the buildings with underground parking, the recommended pavement structure noted in Section 5.8 will be applicable. Further, it is recommended underslab drainage be provided for the proposed buildings with underground parking. This is discussed further in Section 6.1.

For the townhouses, the upper 200 mm of sub-slab fill is recommended to consist of 19 mm clear crushed stone.

For the accessory building, which is anticipated to have a slab-on-grade, it is recommended that the sub-slab fill consist of a 200 mm thickness of OPSS Granular A.

5.6 Basement Wall

There are several combinations of backfill materials and retained soils that could be applicable for the basement walls of the subject structure. However, the conditions can be well-represented by assuming the retained soil consists of a material with an angle of internal friction of 30 degrees and a bulk (drained) unit weight of 20 kN/m^3.

The total earth pressure (P_{AE}) includes the static earth pressure component (P_o) and the seismic component (ΔP_{AE}).

Lateral Earth Pressures

The static horizontal earth pressure (P_o) can be calculated using a triangular earth pressure distribution equal to $K_o \cdot \gamma \cdot H$ where:

K_o = at-rest earth pressure coefficient of the applicable retained soil (0.5)
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H = height of the wall (m)

An additional pressure having a magnitude equal to $K_o \cdot q$ and acting on the entire height of the wall should be added to the above diagram for any surcharge loading, q (kPa), that may be placed at ground surface adjacent to the wall. The surcharge pressure will only be applicable for static analyses and should not be used in conjunction with the seismic loading case.

Actual earth pressures could be higher than the “at-rest” case if care is not exercised during the compaction of the backfill materials to maintain a minimum separation of 0.3 m from the walls with the compaction equipment.

Seismic Earth Pressures

The total seismic force (P_{AE}) includes both the earth force component (P_o) and the seismic component (ΔP_{AE}).

The seismic earth force (ΔP_{AE}) can be calculated using $0.375 \cdot a_c \cdot \gamma \cdot H^2/g$ where:

a_c = $(1.45 - a_{max}/g)\ a_{max}$
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H = height of the wall (m)
g = gravity, 9.81 m/s^2

The peak ground acceleration, (a_{max}), for the area of the subject site, is 0.353 g according to the OBC 2024. Note that the vertical seismic coefficient is assumed to be zero.

The earth force component (P_o) under seismic conditions can be calculated using $P_o = 0.5\ K_o\ \gamma\ H^2$, where $K_o = 0.5$ for the soil conditions noted above.

The total earth force (P_{AE}) is considered to act at a height, h (m), from the base of the wall, where:

$$h = \{P_o \cdot (H/3) + \Delta P_{AE} \cdot (0.6 \cdot H)\}/P_{AE}$$

The earth pressures calculated are unfactored. For the ULS case, the earth loads should be factored as live loads, as per the OBC 2024.

5.7 Pavement Design

Flexible Pavement Structure for Surface Parking

For design purposes, the following pavement structures, presented below, are recommended for the design of car only parking areas, access lanes, and heavy truck parking areas at the subject site.

Table 4 – Recommended Pavement Structure - Car-Only Parking Areas

Thickness (mm)	Material Description
50	**Wear Course** - HL-3 or Superpave 12.5 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
300	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either in situ soil, fill or OPSS Granular B Type I or II material placed over in situ soil.	

Table 5 – Recommended Pavement Structure - Access Lanes and Heavy Truck Parking Areas

Thickness (mm)	Material Description
40	**Wear Course** - HL-3 or Superpave 12.5 Asphaltic Concrete
50	**Binder Course** - HL-8 or Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
450	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either in situ soil, fill or OPSS Granular B Type I or II material placed over in situ soil.	

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project. If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material.

The pavement granular (base and subbase) should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% of the material's SPMDD using suitable compaction equipment.

Rigid Pavement Structure for Underground Parking

For design purposes, it is recommended that the rigid pavement structure for the underground parking consist of Category C2, 32 MPa concrete at 28 days with air entrainment of 5 to 8%. The recommended rigid pavement structure is presented below in Table 6.

Table 6 – Recommended Rigid Pavement Structure – Lower Parking Level

Thickness (mm)	Material Description
125	**Exposure Class C2 - 32 MPa Concrete** (5 to 8% Air Entrainment)
300	**Base** – OPSS Granular A Crushed Stone
SUBGRADE - Either in situ soil, fill or OPSS Granular B Type I or II material placed over in situ soil.	

To control cracking due to shrinking of the concrete floor slab, it is recommended that strategically located saw cuts be used to create control joints within the concrete floor slab of the lower underground parking level.

The control joints are generally recommended to be located at the center of the column lines and spaced at approximately 24 to 36 times the slab thickness (for example; a 0.15 m thick slab should have control joints spaced between 3.6 and 5.4 m). The joints should be cut between 25 and 30% of the thickness of the concrete floor slab and completed as early as 4 hours after the concrete has been poured during warm temperatures, and up to 12 hours during cooler temperatures.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

Foundation Drainage

It is recommended that a perimeter foundation drainage system be provided for the proposed structures. The system should consist of a 100 mm diameter perforated and corrugated plastic pipe, surrounded on all sides by 150 mm of 19 mm clear crushed stone, and which is placed at the footing level around the exterior perimeter of the structure. The clear crushed stone should be wrapped in a non-woven geotextile. The pipe should have a positive outlet, such as a gravity connection to the storm sewer or sump pump pit.

Underslab Drainage

For the 3-storey apartment buildings with underground parking, underslab drainage will be required to control water infiltration. For design purposes, we recommend that 100 mm diameter perforated pipes be placed at 6 m centers below the lowest level floor slab. The spacing of the underfloor drainage system should be confirmed at the time of completing the excavation when water infiltration can be better assessed.

Foundation Backfill

Backfill against the exterior sides of the foundation walls should consist of free-draining, non-frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls, unless used in conjunction with a drainage geocomposite, such as Delta Drain 6000, connected to the perimeter foundation drainage system. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should otherwise be used for this purpose.

6.2 Protection of Footings Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effects of frost action. A minimum 1.5 m thick soil cover alone, or a combination of soil cover in conjunction with foundation insulation, should be provided in this regard.

Other exterior unheated footings (such as those for isolated exterior piers, or underground parking garage access ramp footings) or footings adjacent to garage bay doors which may be open to exterior conditions for extended periods of time (such as the entrance to the underground parking garage), are more prone to deleterious movement associated with frost action than the exterior walls of the proper structure. These footings should be provided with a minimum 2.1 m thick soil cover, or an equivalent combination of soil cover and foundation insulation.

6.3 Excavation Side Slopes

The temporary excavation side slopes anticipated should either be excavated to acceptable slopes or retained by shoring systems from the beginning of the excavation until the structure is backfilled. It is anticipated that sufficient space will be available from property lines such that the excavations can be sloped.

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level.

The subsurface soil is considered to be mainly a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should maintain a safe working distance from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by “cut and cover” methods and excavations will not be left open for extended periods of time.

6.4 Pipe Bedding and Backfill

Bedding and backfill materials should be in accordance with the most recent material specifications and standard detail drawings from the department of public works and services, infrastructure services branch of the City of Ottawa.

A minimum of 150 mm of OPSS Granular A should be placed for bedding for sewer or water pipes when placed on a soil subgrade. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to a minimum of 300 mm above the obvert of the pipe, should consist of OPSS Granular A or Granular B Type II with a maximum size of 25 mm. The bedding layer should be increased to a minimum thickness of 300 mm where the subgrade consists of grey silty clay. The bedding and cover materials should be placed in maximum 300 mm thick lifts and compacted to 98% of the SPMDD.

It should generally be possible to re-use the moist (not wet) site-generated fill above the cover material if the excavation and filling operations are carried out in dry weather conditions. All cobbles larger than 200 mm in their longest direction should be segregated from re-use as trench backfill.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material’s SPMDD. All cobbles larger than 200 mm in their longest direction should be segregated from re-use as trench backfill.

To reduce long-term lowering of the groundwater level, clay seals should be provided in the service trenches. The seals should be a minimum of 1.5 m long (in the trench direction) and should extend from trench wall to trench wall. The seals should extend from the frost line and fully penetrate the bedding, subbedding and cover material. The barriers should consist of relatively dry impervious material placed in maximum 225 mm thick loose lifts and compacted to a minimum of 95% of the SPMDD. The clay seals should be placed at the site boundaries and at strategic locations at a maximum of 60 m intervals in the service trenches.

6.5 Groundwater Control

Groundwater Control for Building Construction

Based on our observations, it is anticipated that groundwater infiltration into the excavations should be low to moderate and controllable using open sumps.

The contractor should be prepared to direct water away from all subgrades, regardless of the source, to prevent disturbance to the founding medium.

Permit to Take Water

A temporary Ministry of Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required if more than 400,000 L/day of ground and/or surface water are to be pumped during the construction phase. At least 4 to 5 months should be allowed for completion of the application and issuance of the permit by the MECP.

For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Persons as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

Impacts on Neighboring Properties

The excavation for the proposed buildings is not expected to extend significantly below the groundwater level. Therefore, impacts to adjacent properties are not expected as a result of minor, localized dewatering which may occur at this site.

6.6 Winter Construction

Precautions must be taken if winter construction is considered for this project.

The subsoil conditions at this site consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters and tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

Trench excavations and pavement construction are also difficult activities to complete during freezing conditions without introducing frost in the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions. Additional information could be provided, if required.

Precaution must be taken where excavations are carried in proximity of existing structures which may be adversely affected due to the freezing conditions. In particular, it should be recognized that where a shoring system is used, the soil behind the shoring system will be subjected to freezing conditions and could result in heaving of the structure(s) placed within or above frozen soil. Provisions should be made in the contract document to protect the walls of the excavations from freezing, if applicable.

6.7 Corrosion Potential and Sulphate

The results of analytical testing show that the sulphate content is less than 0.1%. This result is indicative that Type 10 Portland cement (GU – General Use cement) would be appropriate for this site. The chloride content and pH of the sample indicate that they are not a significant factor in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of low to slightly aggressive corrosive environment.

6.8 Tree Planting Restrictions

In accordance with the City of Ottawa Tree Planting in Sensitive Marine Clay Soils (2017 Guidelines), Paterson completed a soils review of the site to determine applicable tree planting setbacks. Based on the results of our review, a low to medium sensitivity soil was encountered, and the modified plasticity index does not exceed 40%. Therefore, the following tree planting setbacks are recommended for the low to medium sensitivity area as per City Guidelines.

Large trees (mature height over 14 m) can be planted within these areas provided a tree to foundation setback equal to the full mature height of the tree can be provided (e.g. in a park or other green space). Tree planting setback limits may be **reduced to 4.5 m** for small (mature height up to 7.5 m) and medium size trees (mature height 7.5 to 14 m), provided that the conditions noted below are met.

❒ The underside of footing (USF) is 2.1 m or greater below the lowest finished grade. This footing level must be satisfied for footings within 10 m from the tree, as measured from the centre of the tree trunk and verified by means of the Grading Plan.

❒ A small tree must be provided with a minimum 25 m^3 of available soil volume while a medium tree must be provided with a minimum of 30 m^3 of available soil volume, as determined by the Landscape Architect. The developer is to ensure that the soil is generally un-compacted when backfilling in street tree planting locations.

☐ The tree species must be small (mature height up to 7.5 m) to medium size (mature height 7.5 m to 14 m) as confirmed by the Landscape Architect.

☐ 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.

☐ Grading surrounding the tree must promote drainage to the tree root zone (in such a manner as not to be detrimental to the tree).

6.9 Corrosion Potential and Sulphate

The analytical test results of the soil sample indicate that the sulphate content is less than 0.1%. These results along with the chloride and pH value are indicative that Type 10 Portland cement (Type GU) would be appropriate for this site. The chloride content and the pH of the sample indicate they are not significant factors in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of a moderately corrosive environment.

7.0 Recommendations

It is recommended that the following be carried out by Paterson once preliminary and/or detailed designs of the proposed development have been prepared:

☐ Review detailed grading, servicing, landscaping, and structural plan(s) from a geotechnical perspective.

In addition, it is a requirement for the foundation design data provided herein to be applicable that a material testing and observation program be performed by the geotechnical consultant. The following aspects of the program should be performed by Paterson:

☐ Review and inspection of the installation of the foundation drainage systems.

☐ Observation of all bearing surfaces prior to the placement of concrete.

☐ Sampling and testing of the concrete and fill materials used.

☐ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.

☐ Observation of all subgrades prior to backfilling.

☐ Field density tests to determine the level of compaction achieved.

☐ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued, upon request, following the completion of a satisfactory materials testing and observation program by the geotechnical consultant.

All excess soils, with the exception of engineered crushed stone fill, generated by construction activities that will be transported on-site or off-site should be handled ***Ontario Regulation 406/19: On-Site and Excess Soil Management*.**

8.0 Statement of Limitations

The recommendations provided in this report are in accordance with the present understanding of the project. Paterson requests permission to review the recommendations when the drawings and specifications are completed.

A soils investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, Paterson requests immediate notification to permit reassessment of our recommendations.

The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on or undertaking the work. The latter should evaluate the factual information provided in this report and determine the suitability and completeness for their intended construction schedule and methods. Additional testing may be required for their purposes.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Richcraft, or their agents, is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

Paterson Group Inc.

O.Canton

Owen R. Canton, B.Eng.

LICENSED PROFESSIONAL ENGINEER
Jun. 4, 2025
S. S. DENNIS
100519516
Scott Dennis
PROVINCE OF ONTARIO

Scott Dennis

Scott. S. Dennis, P.Eng.

Report Distribution:

- ☐ Richcraft (e-mail copy)
- ☐ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ATTERBERG LIMIT TESTING RESULTS

GRAIN SIZE TESTING RESULTS

ANALYTICAL TESTING RESULTS

PATERSON GROUP

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Mapleton - Block 1, Ottawa, ON

COORD. SYS.: MTM Zone 9 **EASTING:** 351006.65 **NORTHING:** 5017215.98 **ELEVATION:** 97.24

PROJECT: Proposed Residential Development

ADVANCED BY: CME-55 Low Clearance Drill

REMARKS:

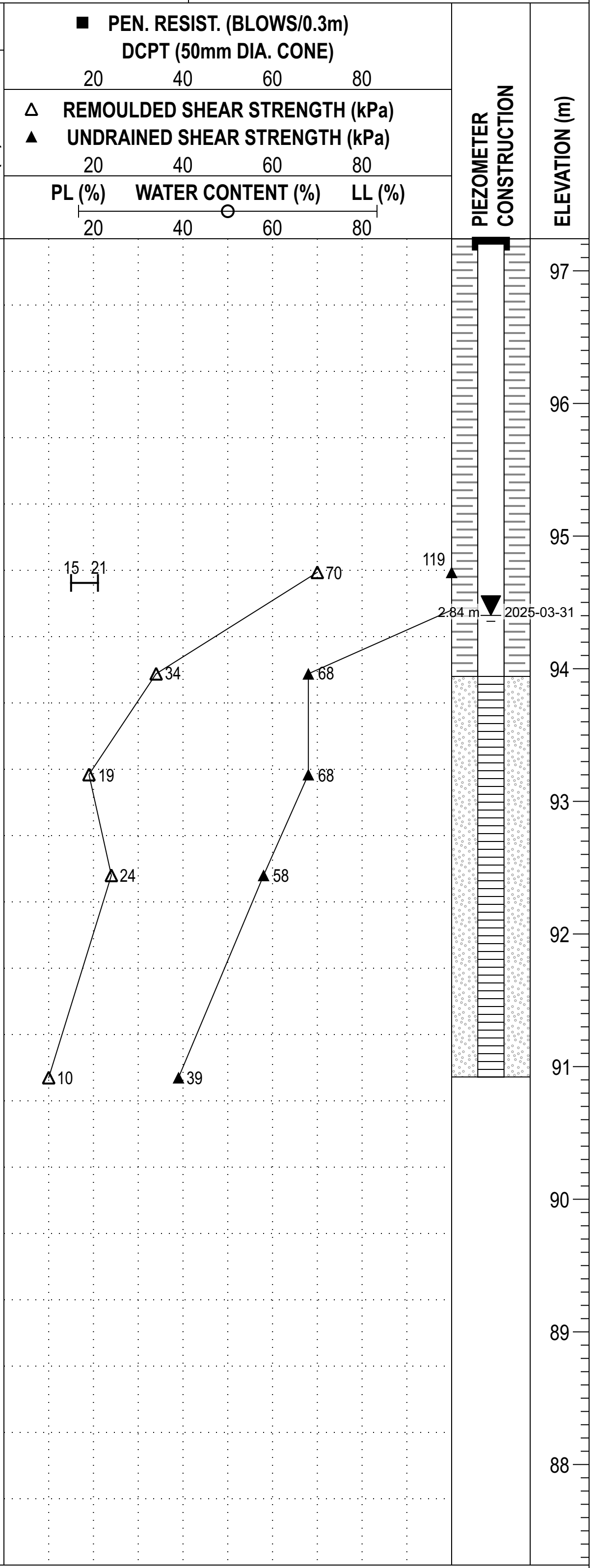
DATE: March 21, 2025

FILE NO. : **PG3062**

HOLE NO. : **BH 1-25**

SAMPLE DESCRIPTION	Depth / Elevation
GROUND SURFACE	
FILL: Compact, course granular, crushed stone	0.10m [97.14m]
FILL: Compact, brown silty fine sand, some gravel	0.69m [96.55m]
FILL: Compact, brown sandy slit, trace clay and gravel	1.68m [95.56m]
Very stiff brown **SILTY CLAY** trace gravel	2.21m [95.03m]
Compact, brown **SILT**, some clay, trace sand - Clay content increasing with depth	4.50m [92.74m]
Compact, grey **SANDY SILT**	5.31m [91.93m]
Firm, grey **SILTY CLAY**	6.71m [90.53m]
End of Borehole (GWL at 2.84 m depth - March 31, 2025)	

TYPE AND NO.	RECOVERY (%)	N OR RQD	WATER CONTENT (%)
AU 1			
SS 2	50	6-5-11-9 16	
SS 3	67	2-3-3-4 6	
SS 4	71	P	
SS 5	75	P	
SS 6	83	P	
SS 7	67	P	
SS 8	100	P	
SS 9	100	P	



DISCLAIMER: THE DATA PRESENTED IN THIS SHEET IS THE PROPERTY OF PATERSON GROUP AND THE CLIENT FOR WHOM IT WAS PRODUCED. THIS SHEET SHOULD BE READ IN CONJUNCTION WITH ITS CORRESPONDING REPORT. PATERSON GROUP IS NOT RESPONSIBLE FOR THE UNAUTHORIZED USE OF THIS DATA.

PATERSON GROUP

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Mapleton - Block 1, Ottawa, ON

COORD. SYS.: MTM Zone 9 **EASTING:** 350949.57 **NORTHING:** 5017222.10 **ELEVATION:** 96.98

PROJECT: Proposed Residential Development

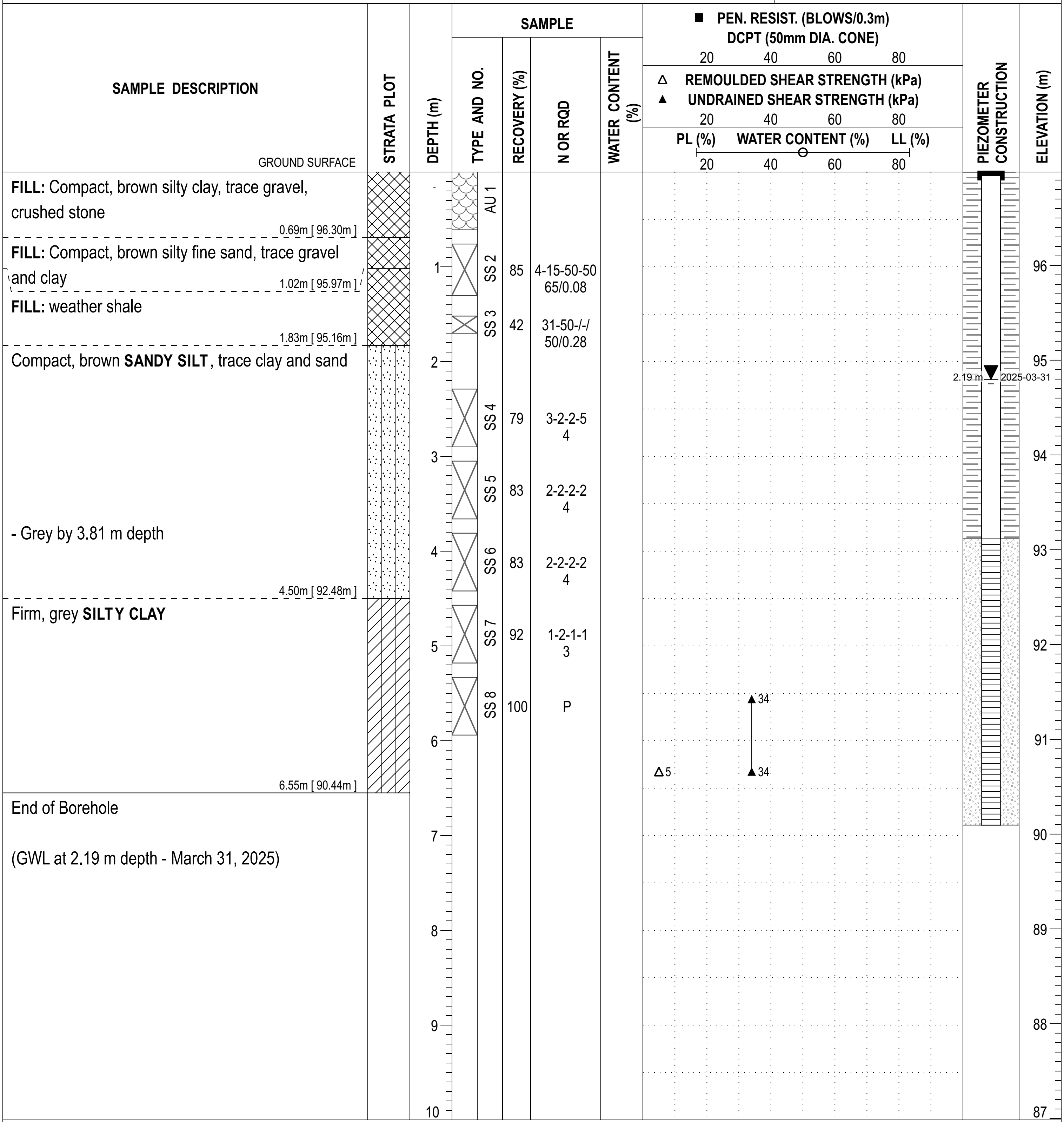
ADVANCED BY: CME-55 Low Clearance Drill

REMARKS:

DATE: March 21, 2025

FILE NO. : PG3062

HOLE NO. : BH 2-25



SAMPLE DESCRIPTION

GROUND SURFACE

FILL: Compact, brown silty clay, trace gravel, crushed stone

0.69m [96.30m]

FILL: Compact, brown silty fine sand, trace gravel and clay

1.02m [95.97m]

FILL: weather shale

1.83m [95.16m]

Compact, brown **SANDY SILT**, trace clay and sand

- Grey by 3.81 m depth

4.50m [92.48m]

Firm, grey **SILTY CLAY**

6.55m [90.44m]

End of Borehole

(GWL at 2.19 m depth - March 31, 2025)

TYPE AND NO.	RECOVERY (%)	N OR RQD
AU 1		
SS 2	85	4-15-50-50 65/0.08
SS 3	42	31-50-/-/ 50/0.28
SS 4	79	3-2-2-5 4
SS 5	83	2-2-2-2 4
SS 6	83	2-2-2-2 4
SS 7	92	1-2-1-1 3
SS 8	100	P

PATERSON GROUP

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Mapleton - Block 1, Ottawa, ON

COORD. SYS.: MTM Zone 9 **EASTING:** 350897.73 **NORTHING:** 5017214.37 **ELEVATION:** 97.21

PROJECT: Proposed Residential Development

ADVANCED BY: CME-55 Low Clearance Drill

REMARKS:

DATE: March 21, 2025

FILE NO. : PG3062

HOLE NO. : BH 3-25

SAMPLE DESCRIPTION

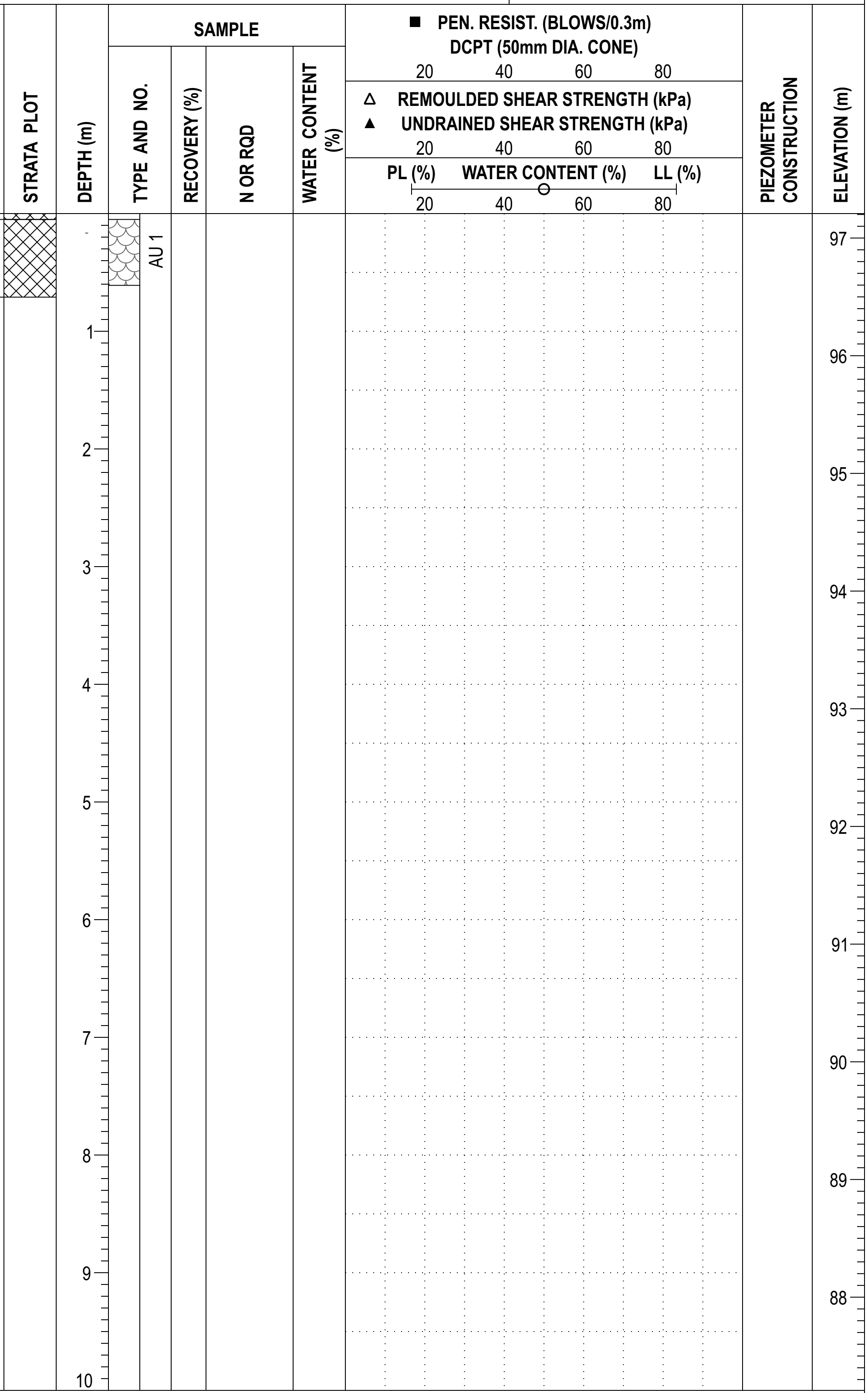
GROUND SURFACE

FILL: Compacted granular, crushed stone 0.05m [97.16m]

FILL: Compact, brown silty sand with gravel, crushed stone 0.71m [96.50m]

End of Borehole

Practical refusal to augering at 0.71 m depth



SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Mapleton - Block 1, Ottawa, ON

COORD. SYS.: MTM Zone 9 **EASTING:** 350897.73 **NORTHING:** 5017214.37 **ELEVATION:** 97.21

PROJECT: Proposed Residential Development

ADVANCED BY: CME-55 Low Clearance Drill

REMARKS:

DATE: March 21, 2025

FILE NO. : PG3062

HOLE NO. : BH 3A-25

■ PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80

△ REMOULDED SHEAR STRENGTH (kPa)
▲ UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80

PL (%) WATER CONTENT (%) LL (%) 20 40 60 80

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	RECOVERY (%)	N OR RQD	WATER CONTENT (%)	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE								
FILL: Compacted granular, crushed stone 0.05m [97.16m]	▨		AU 1					97
FILL: Compact, brown silty sand with gravel, crushed stone, trace clay 0.89m [96.32m]	▨	1	SS 2	78	50-/-/-/ 50/0.13			96
End of Borehole		2						95
Practical refusal to augering at 0.89 m depth		3						94
		4						93
		5						92
		6						91
		7						90
		8						89
		9						88
		10						

PATERSON GROUP

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Mapleton - Block 1, Ottawa, ON

COORD. SYS.: MTM Zone 9 **EASTING:** 350934.73 **NORTHING:** 5017162.09 **ELEVATION:** 97.40

PROJECT: Proposed Residential Development

ADVANCED BY: CME-55 Low Clearance Drill

REMARKS:

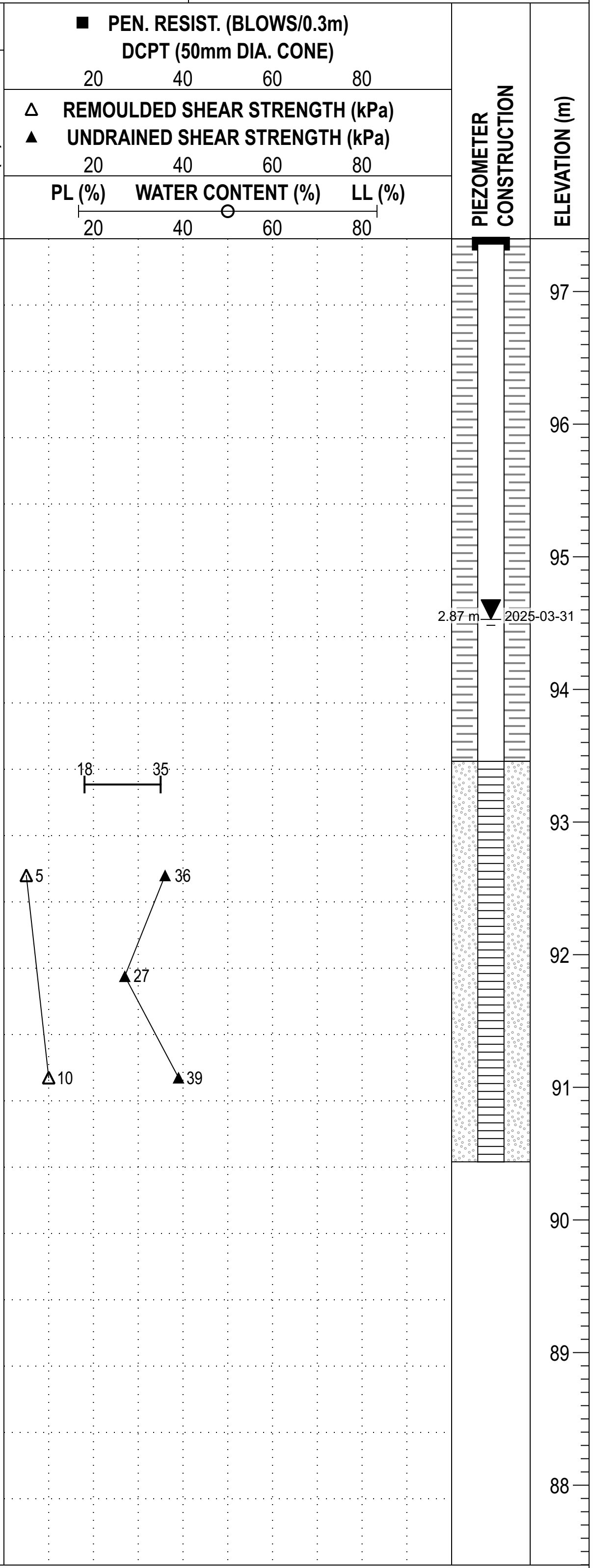
DATE: March 21, 2025

FILE NO. : PG3062

HOLE NO. : BH 4-25

SAMPLE DESCRIPTION	Bottom depth / elevation
GROUND SURFACE	
FILL: Compact granular, crushed stone	0.08m [97.32m]
FILL: Firm, brown silty clay with gravel, crushed stone	0.69m [96.71m]
Compact, brown **SANDY SILT**, trace clay and sand	3.51m [93.89m]
Compact, brown **SILTY SAND**	3.73m [93.67m]
Firm, grey **SILTY CLAY**	6.55m [90.85m]
Dynamic Cone Penetration Test commenced at 6.55 m depth	

TYPE AND NO.	RECOVERY (%)	N OR RQD	WATER CONTENT (%)
AU 1			
SS 2		3-4-6-5 10	
SS 3	75	4-5-4-4 9	
SS 4	75	1-1-1-1 2	
SS 5	75	1-1-4-3 5	
SS 6	100	1-1-1-1 2	



DEPTH (m): 1 2 3 4 5 6 7 8 9 10

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Mapleton - Block 1, Ottawa, ON

COORD. SYS.: MTM Zone 9 **EASTING:** 350934.73 **NORTHING:** 5017162.09 **ELEVATION:** 97.40

PROJECT: Proposed Residential Development

ADVANCED BY: CME-55 Low Clearance Drill

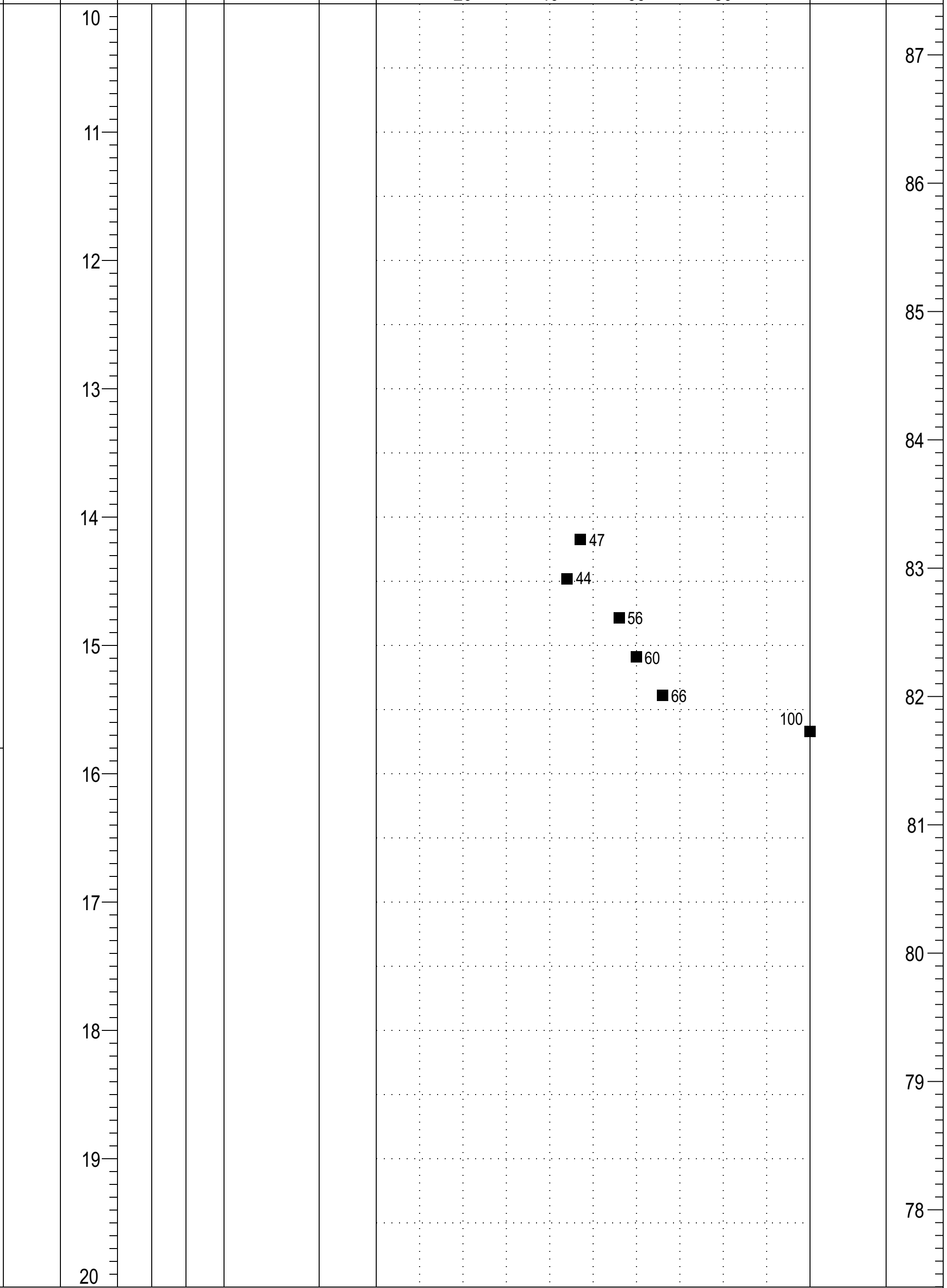
REMARKS:

DATE: March 21, 2025

FILE NO. : PG3062

HOLE NO. : BH 4-25

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	 RECOVERY (%)	 N OR RQD	 WATER CONTENT (%)	■ PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 △ REMOULDED SHEAR STRENGTH (kPa) ▲ UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)



15.80m [81.60m]

End of Borehole

Cone pushed form 6.55 to 14.02 m depth

Practical refusal to DCPT at 15.8 m depth

(GWL at 2.87 m depth - March 31, 2025)

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Mapleton - Block 1, Ottawa, ON

COORD. SYS.: MTM Zone 9 **EASTING:** 350888.40 **NORTHING:** 5017218.34 **ELEVATION:** 97.10

PROJECT: Proposed Residential Development

ADVANCED BY: CME-55 Low Clearance Drill

REMARKS:

DATE: March 21, 2025

FILE NO. : PG3062

HOLE NO. : BH 5-25

SAMPLE DESCRIPTION

GROUND SURFACE

FILL: Compact granular, crushed stone

0.05m [97.05m]

FILL: Compact, brown silty sand with gravel, crushed stone, weatherd shale, trace clay

2.21m [94.89m]

Compact, brown **SANDY SILT**, trace clay and sand

3.43m [93.67m]

Compact, brown **SANDY SILT**

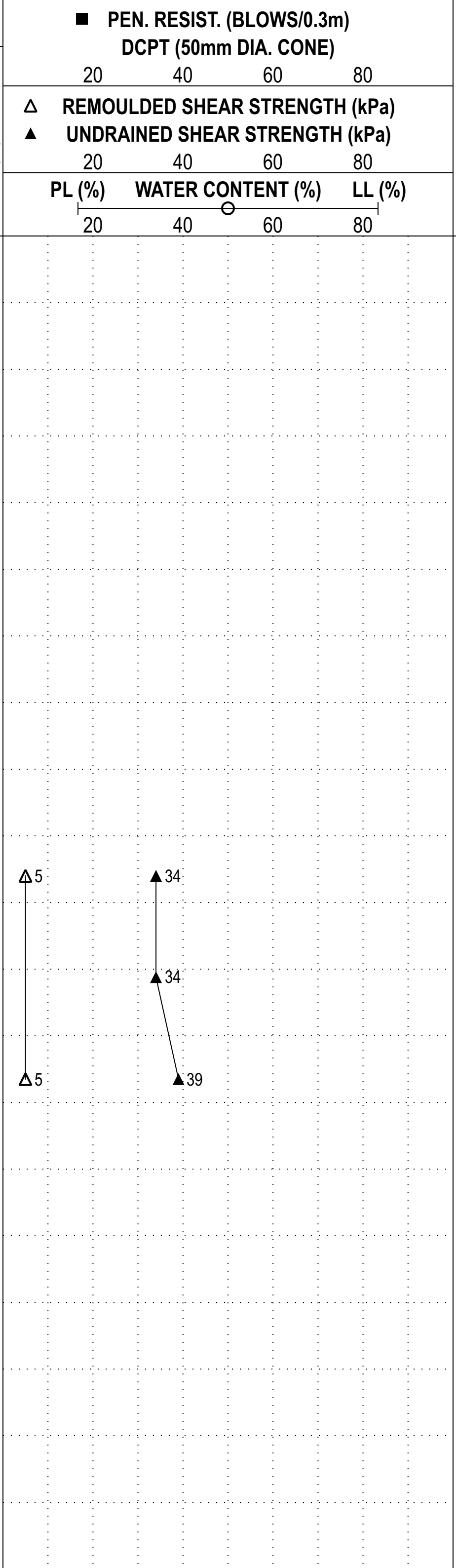
3.73m [93.37m]

Firm, grey **SILTY CLAY**

6.55m [90.55m]

End of Borehole

TYPE AND NO.	RECOVERY (%)	N OR RQD
AU 1		
SS 2	100	19-50-/-/ 50/0.13
SS 3	4	5-6-5-6 11
SS 4	67	2-2-1-1 3
SS 5	79	1-1-2-3 3
SS 6	100	P



DEPTH (m): 1 2 3 4 5 6 7 8 9 10

ELEVATION (m): 97 96 95 94 93 92 91 90 89 88

WATER CONTENT (%)

PIEZOMETER CONSTRUCTION

JOHN D. PATERSON & ASSOCIATES LTD.
Consulting Engineers
28 Concourse Gate, Nepean, Ont. K2E 7T7

SOIL PROFILE & TEST DATA

Preliminary Geotechnical Investigation
Proposed Development, Hazeldean Road
Ottawa (Kanata), Ontario

DATUM Ground surface elevations provided by Novatech Engineering Consultants Limited.

REMARKS

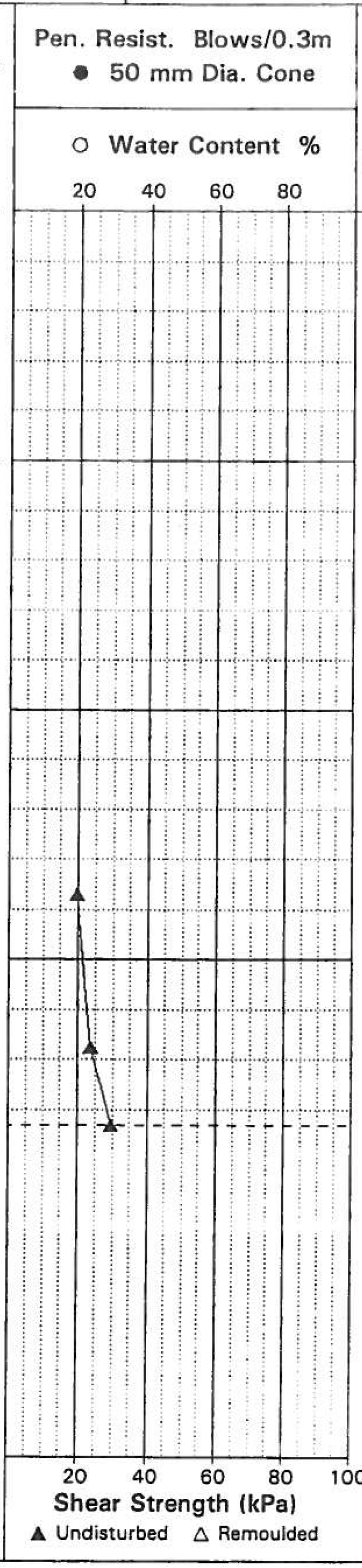
BORINGS BY Hydraulic Excavator

DATE 27 MAR 03

FILE NO. G8886

HOLE NO. TP 8

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	95.24
TOPSOIL 0.23							
						1	94.24
Compact, brown SANDY SILT		G	1				
						2	93.24
2.59							
Soft to firm, grey SILTY CLAY						3	92.24
3.66							
End of Test Pit (Open hole GWL @ 3.7m depth)							



Piezometer Construction

patersongroup Consulting Engineers

154 Colonnade Road, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Geotechnical Investigation
Proposed Kanata West Subdivision
Ottawa (Kanata), Ontario

DATUM Geodetic

REMARKS

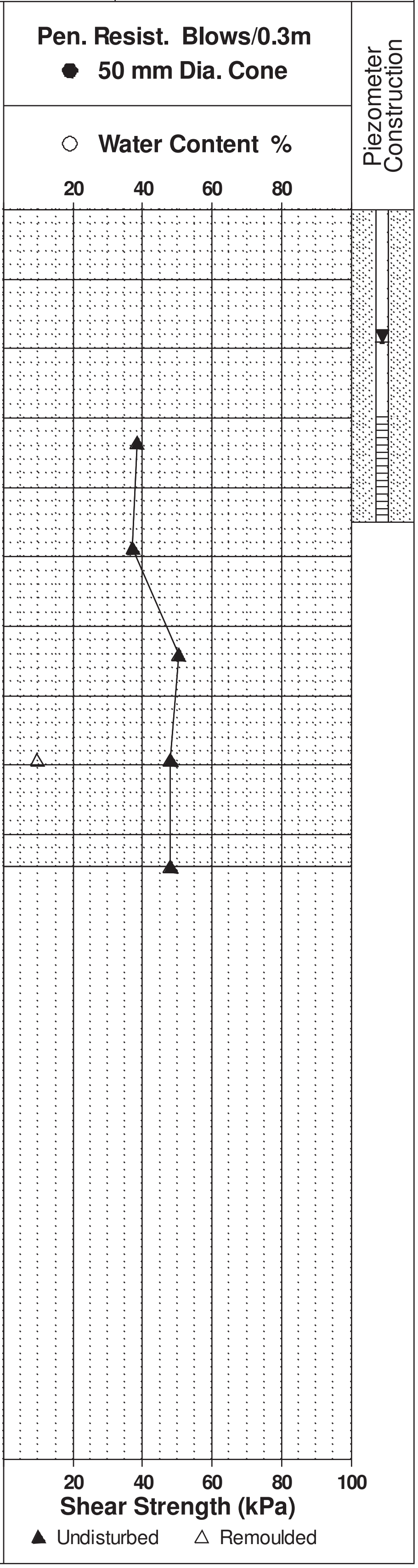
BORINGS BY CME 75 Power Auger

DATE Aug 6, 03

FILE NO. G9012

HOLE NO. BH14

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	95.24
TOPSOIL 0.15							
Loose, brown **SILTY** fine **SAND** 1.45		SS	30	96	6	1	94.24
Very loose, greyish brown **SANDY SILT** with clay 2.13		SS	31	100	2	2	93.24
Firm, brown **SILTY CLAY** - grey by 3.0m depth						3	92.24
						4	91.24
						5	90.24
						6	89.24
						7	88.24
						8	87.24
						9	86.24
9.45							
End of Borehole (GWL @ 1.90m-Aug. 18/03)							



SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the relative strength of cohesionless soils is the compactness condition, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm. An SPT N value of "P" denotes that the split-spoon sampler was pushed 300 mm into the soil without the use of a falling hammer.

Compactness Condition	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory shear vane tests, unconfined compression tests, or occasionally by the Standard Penetration Test (SPT). Note that the typical correlations of undrained shear strength to SPT N value (tabulated below) tend to underestimate the consistency for sensitive silty clays, so Paterson reviews the applicable split spoon samples in the laboratory to provide a more representative consistency value based on tactile examination.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity, S_t, is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil. The classes of sensitivity may be defined as follows:

Low Sensitivity:	$S_t < 2$
Medium Sensitivity:	$2 < S_t < 4$
Sensitive:	$4 < S_t < 8$
Extra Sensitive:	$8 < S_t < 16$
Quick Clay:	$S_t > 16$

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NQ or larger size core. However, it can be used on smaller core sizes, such as BQ, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	**ROCK QUALITY**
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube, generally recovered using a piston sampler
G	-	"Grab" sample from test pit or surface materials
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size BQ, NQ, HQ, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC% - Natural water content or water content of sample, %
LL - Liquid Limit, % (water content above which soil behaves as a liquid)
PL - Plastic Limit, % (water content above which soil behaves plastically)
PI - Plasticity Index, % (difference between LL and PL)

Dxx - Grain size at which xx% of the soil, by weight, is of finer grain sizes
These grain size descriptions are not used below 0.075 mm grain size
D10 - Grain size at which 10% of the soil is finer (effective grain size)
D60 - Grain size at which 60% of the soil is finer

Cc - Concavity coefficient = $(D30)^2 / (D10 \times D60)$
Cu - Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay (more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

p'_o - Present effective overburden pressure at sample depth
p'_c - Preconsolidation pressure of (maximum past pressure on) sample
Ccr - Recompression index (in effect at pressures below p'_c)
Cc - Compression index (in effect at pressures above p'_c)

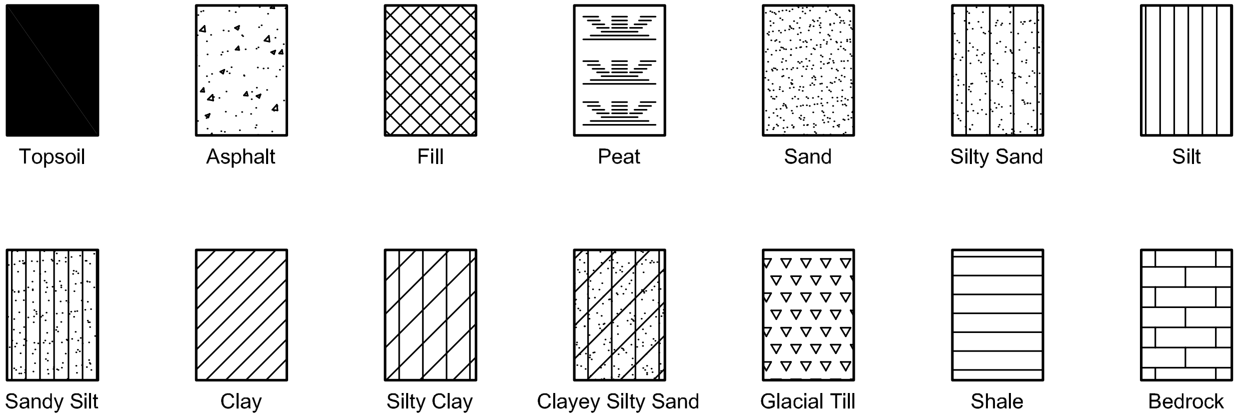
OC Ratio Overconsolidaton ratio = p'_c / p'_o
Void Ratio Initial sample void ratio = volume of voids / volume of solids
Wo - Initial water content (at start of consolidation test)

PERMEABILITY TEST

k - Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

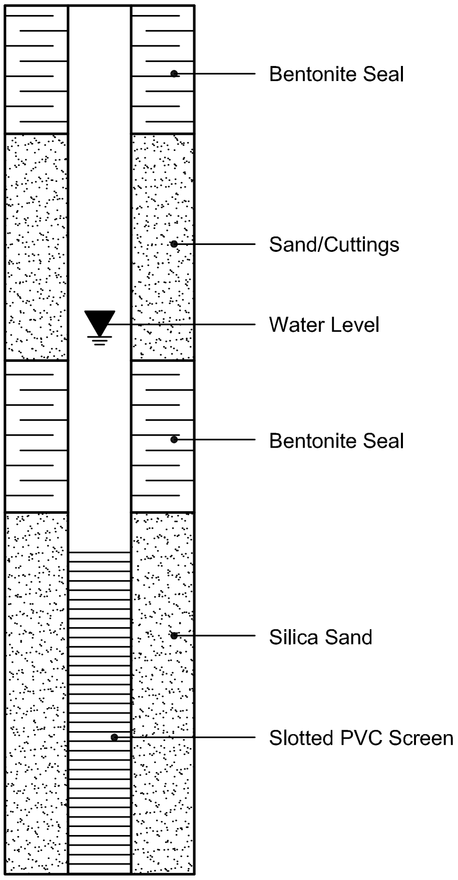
SYMBOLS AND TERMS (continued)

STRATA PLOT

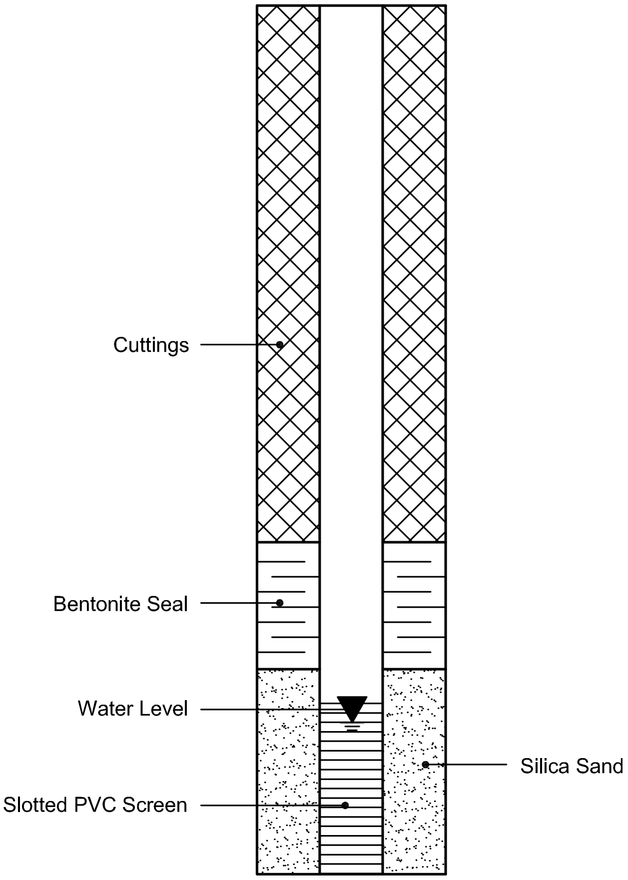


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



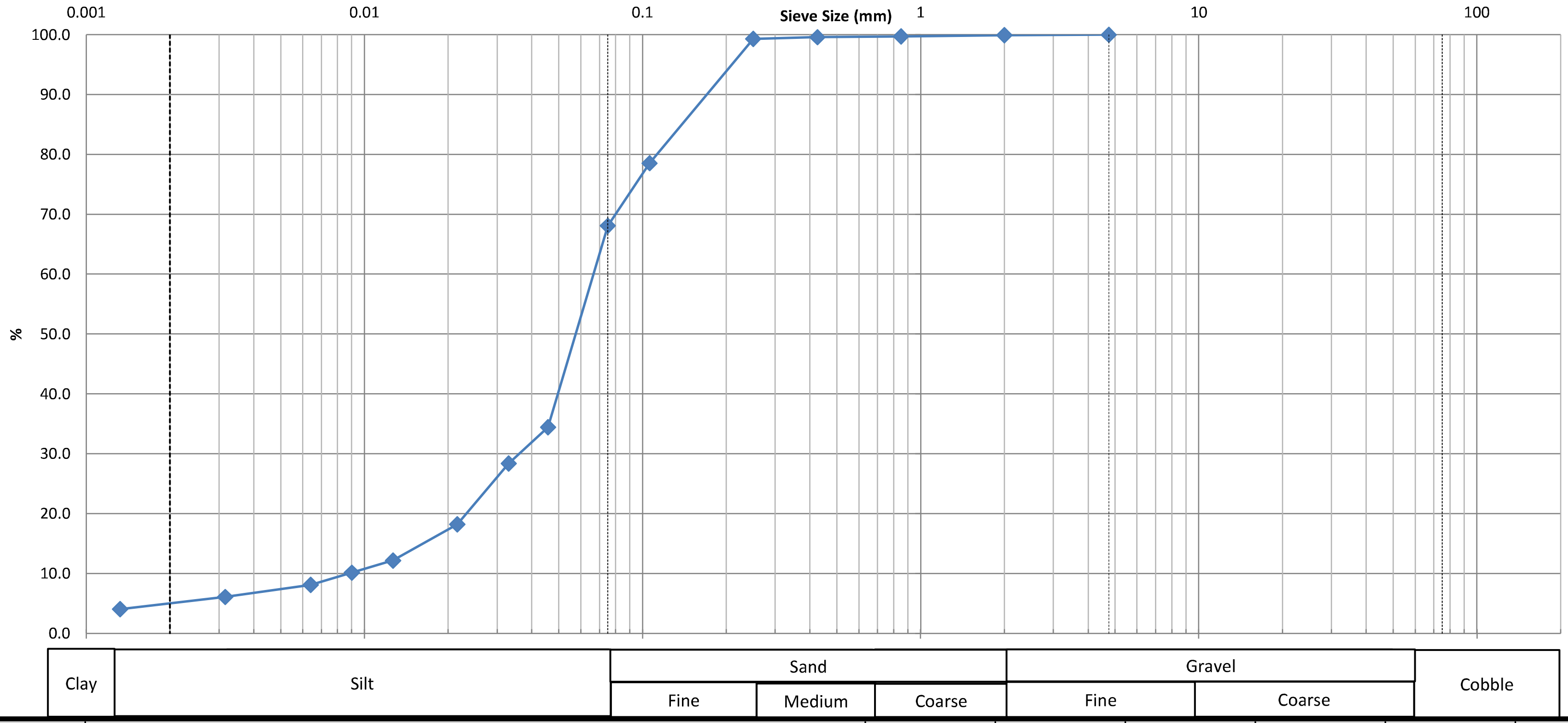
PIEZOMETER CONSTRUCTION



PATERSON GROUP

SIEVE ANALYSIS
ASTM C136

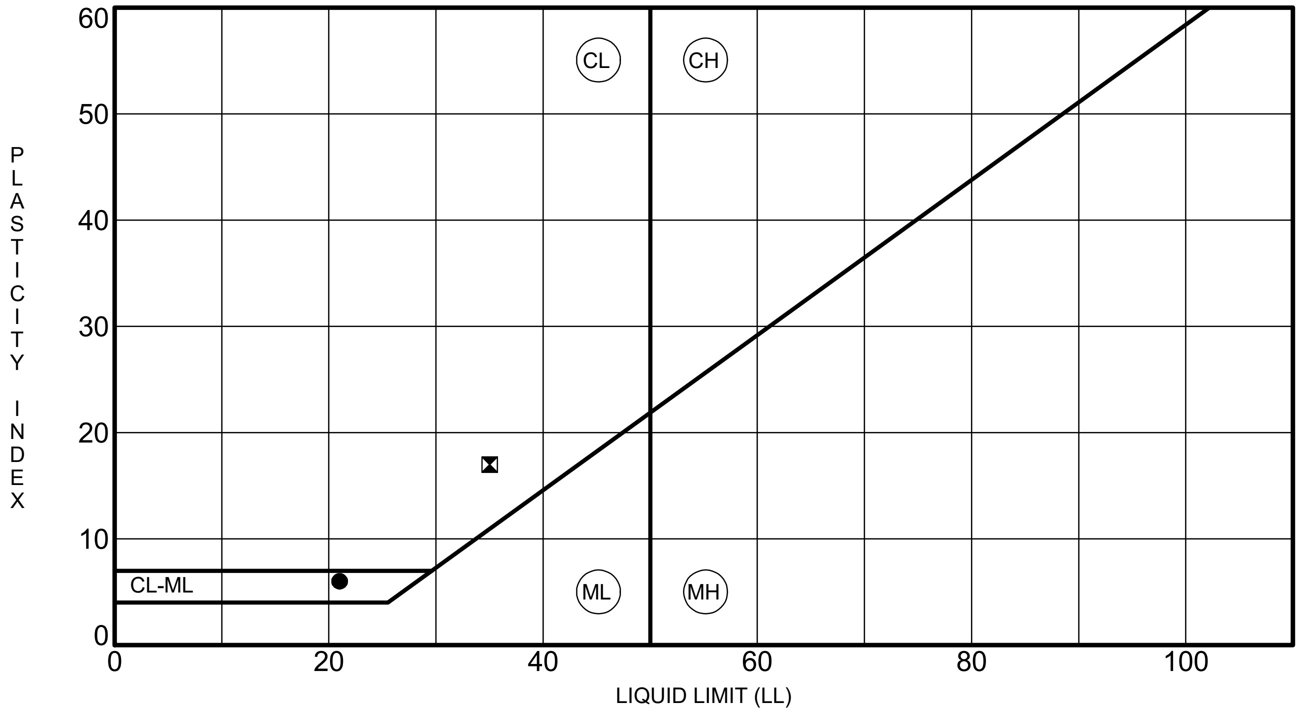
CLIENT:	Richcraft	DEPTH:	BH2-25 SS4	FILE NO:	PG3062
CONTRACT NO.:		BH OR TP No.:	2.3m - 2.9m	LAB NO:	59116
PROJECT:	Maple Grove			DATE RECEIVED:	24-Mar-25
				DATE TESTED:	24-Mar-25
DATE SAMPLED:	21-Mar-25			DATE REPORTED:	31-Mar-25
SAMPLED BY:	M.R.			TESTED BY:	D.K



Identification	Soil Classification					MC(%)	LL	PL	PI	Cc	Cu
						23.3%					
	D100	D60	D30	D10	Gravel (%)	Sand (%)		Silt (%)		Clay (%)	
					0.0	31.9		63.3		4.8	

Comments:

REVIEWED BY:	Curtis Beadow	Joe Forsyth, P. Eng.



Specimen Identification			LL	PL	PI	Fines	Classification
●	**BH 1-25**	**SS4**	**21**	**15**	**6**		**CL-ML Inorganic silts-clays of low plasticity**
☒	**BH 4-25**	**SS6**	**35**	**18**	**17**		**CL Inorganic clays of low plasticity**

CLIENT **Richcraft Group of Companies**
PROJECT **Geotechnical Investigation -**
Mapleton - Block 1, Ottawa, Ontario

FILE NO. **PG3062**
DATE **31 Mar 25**

PATERSON GROUP

9 Auriga Drive
Ottawa, Ontario
K2E 7T9
TEL: (613) 226-7381

ATTERBERG LIMITS' RESULTS

Certificate of Analysis

Report Date: 27-Mar-2025

Client: **Paterson Group Consulting Engineers (Ottawa)**

Order Date: 24-Mar-2025

Client PO: 62672

Project Description: PG3062

	Client ID:	PG3062-BH2-25-SS 4	-	-	-		
	Sample Date:	21-Mar-25 09:00	-	-	-	-	-
	Sample ID:	2513087-01	-	-	-		
	Matrix:	Soil	-	-	-		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	80.0	-	-	-	-	-
General Inorganics							
pH	0.05 pH Units	7.19	-	-	-	-	-
Resistivity	0.1 Ohm.m	55.7	-	-	-	-	-
Anions							
Chloride	10 ug/g	11	-	-	-	-	-
Sulphate	10 ug/g	42	-	-	-	-	-

APPENDIX 2

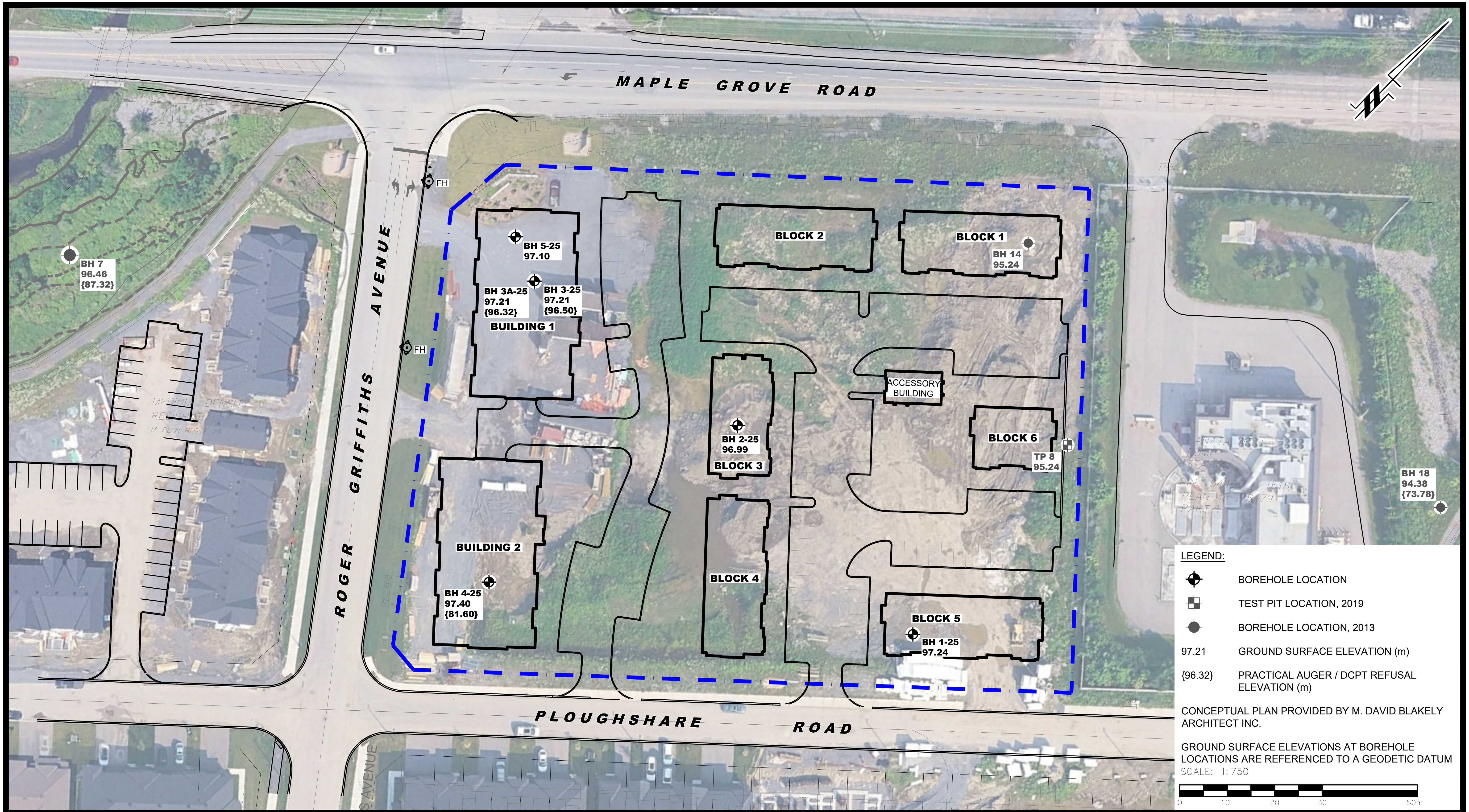
FIGURE 1 – KEY PLAN

DRAWING PG3062-9 – TEST HOLE LOCATION PLAN

FIGURE 1

KEY PLAN

PATERSON GROUP



LEGEND:

⌖	BOREHOLE LOCATION
⊞	TEST PIT LOCATION, 2019
●	BOREHOLE LOCATION, 2013
97.21	GROUND SURFACE ELEVATION (m)
{96.32}	PRACTICAL AUGER / DCPT REFUSAL ELEVATION (m)

CONCEPTUAL PLAN PROVIDED BY M. DAVID BLAKELY ARCHITECT INC.

GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM

SCALE: 1: 750

0 10 20 30 50m

PATERSON GROUP

9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL
1	REVISED WITH UPDATED CONCEPTUAL PLAN	02/06/2025	OC

RICHCRAFT HOMES
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
MAPLETON - BLOCK 1

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:750	Date: 03/2025
Drawn by: YA	Report No.: PG3062-2
Checked by: PB	Dwg. No.: PG3062-9
Approved by: SD	Revision No.: 1

11x17

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