PATERSON GROUP

Geotechnical Investigation

Proposed Commercial Development

2025 Mer Bleue Road – Phase 2
Ottawa, Ontario

Prepared for Smartcentres
c/o Calloway REIT (Orleans) Inc.

Report PG7042-1 dated September 6, 2024

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Smartcentres c/o Calloway REIT (Orleans) Inc. to conduct a geotechnical investigation for the proposed commercial development to be located at 2025 Mer Bleue Road (Phase 2) 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 and test pits.
- 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 slab-on-grade commercial buildings (Buildings S1 and S2) within Phase 2 at the subject site.

Further, it is understood that the remainder of the site will generally be occupied by asphalt-paved parking areas, access roads, and loading zones with landscaped margins. It is also expected that the subject site 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 August 8, 12, and 13, 2024, and consisted of advancing a total of 12 boreholes to a maximum depth of 6.6 m below the existing ground surface, and a total of 8 test pits to a maximum depth of 3.2 m below the existing ground surface. 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 site features and underground utilities.

Further, previous investigations were undertaken by Paterson in April 2006, November 2016, and January 2017 within the subject site and surrounding area.

The test hole locations are presented on Drawing PG7042-1 – Test Hole Location Plan included in Appendix 2.

The boreholes were advanced using a low clearance track-mounted auger drill rig operated by a two- person crew while the test pits were excavated using a backhoe. The test hole procedure consisted of augering or excavating to the required depths at the selected locations and sampling the overburden. All fieldwork was conducted under the full-time supervision of our personnel under the direction of a senior engineer from our geotechnical department.

Sampling and In Situ Testing

The soil samples were recovered from the auger flights and using a 50 mm diameter split-spoon sampler during drilling operations, and grab samples were collected from the open test holes during test pitting operations. The samples were initially classified on site, placed in sealed plastic bags, and transported to our laboratory. The depths at which the auger, split-spoon, and grab samples were recovered from the test holes are shown as AU, SS, and G, 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 boreholes.

The subsurface conditions observed in the test holes were recorded in detail in the field. The soil profiles are logged on the Soil Profile and Test Data Sheets in Appendix 1 of this report.

Groundwater

During the current investigation, monitoring wells were installed in boreholes BH 1-24, BH 4-24, and BH 9-24, and the remainder of the boreholes were fitted with a flexible polyethylene standpipe to permit monitoring of the groundwater levels. The groundwater level readings were obtained after a suitable stabilization period subsequent to the completion of the field investigation.

In addition, groundwater observations were recorded in the open-hole test pits during the current geotechnical investigation.

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

Monitoring Well Installation

Typical monitoring well construction details are described below:

- ❑ Up to 1.5 m of slotted 32 mm diameter PVC screens at base the base of the boreholes.
- ❑ 32 mm diameter PVC riser pipe from the top of the screen to the ground surface.
- ❑ No.3 silica sand backfill within annular space around the screen.
- ❑ 300 mm thick bentonite hole plug directly above the PVC slotted screen.
- ❑ Clean backfill from the top of the bentonite plug to the ground surface.

Refer to the Soil Profile and Test Data sheets in Appendix 1 for specific well construction details.

3.2 Field Survey

The test hole locations, and ground surface elevation at each test hole location, were surveyed by Paterson using a high-precision handheld GPS and referenced to a geodetic datum. The locations of the test holes, and the ground surface elevation at each test hole location, are presented on Drawing PG7042 - 1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

Soil samples were recovered from the subject site and visually examined in our laboratory to review the results of the field logging. Atterberg Limits, hydrometer and grain size distribution, shrinkage, and moisture content testing were completed on select samples obtained from the current geotechnical investigation.

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

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 samples were submitted to determine the concentration of sulphate and chloride, the resistivity, and the pH of the samples. 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 undeveloped, vacant, and grass-covered. An existing ditch has been observed within Phase 2 at the north portion of the site, along the existing completed parking area. Further, it is observed that the north portion of the parking area was completed during the construction of the previous phase at the subject site.

Furthermore, based on available historical aerial photographs, it is understood that a previously existing ditch running from the northeast to the southwest of Phase 2 has been in-filled within the subject site.

Historical aerial photographs of the subject site and its surroundings are provided in Figures 2 and 3 - Aerial Photographs, in Appendix 2.

The site is bordered by commercial buildings followed by Innes Road to the north, Noella Leclair Way followed by vacant and undeveloped land to the east, Roger-Pharand Street followed by vacant and undeveloped land to the south, and by commercial properties to the west. The ground surface across the subject site is relatively flat at approximate geodetic elevation 88 to 89 m.

4.2 Subsurface Profile

Generally, the subsurface profile at the test hole locations consists of topsoil and/or fill underlain by silty clay, glacial till and bedrock.

Fill extending to depths ranging from 0.8 to 2.1 m below the existing ground surface was encountered at all test hole locations. The fill was generally observed to consist of brown silty sand with gravel and crushed stone, or brown silty clay with trace sand.

The fill layer was observed to be underlain by a silty clay deposit, extending to approximate depths ranging between 2.0 m at the eastern end of the site to 6.6 m at the western end of the site. The silty clay generally consists of a hard to stiff, brown silty clay crust to a depth of about 3.5 m, becoming a stiff to soft, grey silty clay below these depths.

Glacial till was encountered underlying the silty clay deposit, extending to approximate depths ranging between 2.7 to 6.6 m below the ground surface. The glacial till deposit generally consists of compact to very dense, grey silty sand to silty clay with variable amounts of gravel, cobbles, and boulders.

Practical refusal to augering was encountered at depths ranging from 2.7 m at the eastern end of the site, to 6.6 m at the western end of the site.

Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for the details of the soil profile encountered at each test hole location.

Bedrock

Based on available geological mapping, the bedrock consists of interbedded limestone and dolomite of the Gull River Formation and is expected to be encountered at depths ranging from 5 to 15 m.

Atterberg Limits Testing

Atterberg limits testing was completed on silty clay samples recovered from boreholes BH 4-24 and BH 9-24. The result of the Atterberg Limits testing is presented in Table 1 below, and on the Atterberg Limits Testing Results sheet in Appendix 1.

Table 1 - Atterberg Limits Results

Sample	Depth (m)	LL (%)	PL (%)	PI (%)	w (%)	Classification
BH 4-24 SS3	1.83	70	26	44	51.64	CH
BH 9-24 SS3	1.83	72	30	42	44.69	CH

Notes: LL: Liquid Limit; PL: Plastic Limit; PI: Plasticity Index; w: water content;
CH: Inorganic Clays of High Plasticity

Grain Size Distribution and Hydrometer Testing

Grain size distribution analysis was completed on one selected recovered silty clay deposit sample. The results of the grain size distribution analysis are presented in Table 2 below and on the Grain Size Distribution sheets in Appendix 1.

Table 2 – Grain Size Distribution Results					
Sample	**Depth (m)**	**Gravel (%)**	**Sand (%)**	**Silt (%)**	**Clay (%)**
BH 3-24 SS3	1.83	0.0	0.5	31.5	68.0

Shrinkage Testing

Linear shrinkage testing was completed on one sample recovered at a depth of 1.83 from BH 7-24. The shrinkage limit and shrinkage ratio of the tested silty clay sample were found to be 22.77% and 1.65, respectively.

4.3 Groundwater

Groundwater levels were recorded at each test hole location are presented in Table 3 below, and on 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 1-24*	89.14	2.45	86.69	August 21, 2024
BH 2-24	88.75	3.29	85.46	
BH 3-24	88.57	2.24	86.33	
BH 4-24*	88.79	2.21	86.58	
BH 5-24	88.60	1.93	86.67	
BH 6-24	88.32	1.78	86.54	
BH 7-24	88.47	3.62	84.85	
BH 8-24	89.13	2.52	86.61	
BH 9-24*	88.67	2.41	86.26	

Note: The ground surface elevation at each borehole location was surveyed using a handheld GPS using a geodetic datum.
* - A monitoring well has been installed in these boreholes.

It should be noted that surface water can become trapped within a backfilled borehole that can lead to higher than typical groundwater level observations.

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 approximately **2.5 to 3.5 m** below the ground surface. However, it should be noted that 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 suitable for the proposed development. It is recommended that the proposed buildings be founded on conventional spread footings bearing on an undisturbed, hard to stiff silty clay and/or the existing fill which is prepared in accordance with the recommendations provided herein.

It is anticipated that the removal of bedrock or large boulders may be required for site servicing installation. Therefore, the contractor should be prepared for bedrock removal and the presence of large boulders within the subject site.

Due to the presence of the silty clay deposit, the proposed development will be subjected to permissible grade raise restrictions.

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

5.2 Site Grading and Preparation

Stripping Depth and Subgrade Preparation

Topsoil and any fill, containing significant amounts of deleterious or organic materials, should be stripped from under any buildings and other settlement sensitive structures.

However, it is anticipated that the existing fill, free of deleterious material and significant amounts of organics, can be left in place below the proposed building footprints. In this case, it is recommended that the existing fill layer be proof-rolled several times under dry conditions and above freezing temperatures, and approved by Paterson personnel at the time of construction. The proof-rolling should be conducted using a vibratory drum roller where the fill consists predominantly of silty sand, and using a sheep's foot roller where the fill consists predominantly of silty clay.

Any poor performing areas noted during the proof-rolling operation should be removed and replaced with an approved engineered fill, such as OPSS Granular B Type II with a maximum particle size of 50 mm and compacted to 98% of the material's SPMDD.

If encountered, existing foundation walls and other construction debris should be entirely removed from within the building perimeters. Under paved areas, existing construction remnants, such as foundation walls should be excavated to a minimum of 1 m below final grade.

Bedrock/Boulder Removal

Bedrock and/or boulder removal may be required during the site servicing installation at the subject site, and can be accomplished by hoe ramming where boulders or weathered bedrock are encountered. Sound bedrock may be removed by line drilling in conjunction with controlled blasting and/or hoe ramming.

Prior to considering blasting operations, the blasting effects on the existing services, buildings, and other structures should be addressed. A pre-blast or pre-construction survey of the existing structures located in the proximity of the blasting operations should be carried out prior to commencing site activities. The extent of the survey should be determined by the blasting consultant and should be sufficient to respond to any inquiries or claims related to the blasting operations.

As a general guideline, peak particle velocities (measured at the structures) should not exceed 50 mm/s during the blasting program to reduce the risks of damage to the existing structures. The blasting operations should be planned and conducted under the supervision of a licensed professional engineer who is also an experienced blasting consultant.

Vibration Considerations

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

The following construction equipment could be a source of vibrations: piling rig, hoe ram, compactor, dozer, crane, truck traffic, etc. Vibrations, whether caused by blasting operations or by construction operations, could be the cause of the source of detrimental vibrations on the nearby buildings and structures. Therefore, it is recommended that all vibrations 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, the peak particle velocity should be less than 15 mm/s between frequencies of 4 to 12 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 12 and 40 Hz).

In addition, it should be noted that the guidelines are for current construction standards. Considering that these guidelines are above perceptible human level and, in some cases, could be very disturbing to some people, a pre-construction survey is recommended to be completed to minimize the risks of claims during or following the construction of the proposed buildings.

Fill Placement

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

Non-specified existing fill along with site-excavated soil could be placed as general landscaping fill and beneath exterior parking areas where settlement of the ground surface is of minor concern. These materials should be spread in a maximum of 300 mm thick loose lifts and compacted by the tracks of the spreading equipment to minimize voids.

If non-specified existing fill is to be used to build up the subgrade level for areas to be paved, it should be compacted in maximum 300 mm thick loose lifts to at least 98% of the material's SPMDD.

5.3 Foundation Design

Bearing Resistance Values

Strip and pad footings bearing on the undisturbed, hard to stiff silty clay or existing fill, which is proof-rolled as discussed above, can be designed using a bearing resistance value at serviceability limit states (SLS) of **150 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **225 kPa**. A geotechnical resistance factor of 0.5 was applied to the above noted 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 prior to the placement of concrete for footings.

The bearing resistance value at SLS given for footings will be subjected to potential post construction total and differential settlements of 25 and 20 mm, respectively.

Lateral Support

The bearing medium under footing-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 an undisturbed, hard to stiff brown silty clay, or engineered fill placed over silty clay, when a plane extending down and out from the bottom edges of the footing, at a minimum of 1.5H:1V, passes only through in situ soil of the same or higher capacity as that of the bearing medium.

Permissible Grade Raise Restrictions

Consideration must be given to potential settlements that could occur due to the presence of the silty clay deposit and the combined loads from the proposed footings, any groundwater lowering effects, and grade raise fill. The foundation loads to be considered for the settlement case are the continuously applied loads which consist of the unfactored dead loads and the portion of the unfactored live load that is considered to be continuously applied.

Accordingly, a permissible grade raise of **1.8 m** above the existing ground surface is recommended for grading within 6 m of the building footprint. A permissible grade raise restriction of **2.2 m** is recommended for the parking areas and access lanes. 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.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class D**. If a higher seismic site class is required (Class C) for the proposed commercial buildings, a site-specific shear wave velocity test may be completed to accurately determine the applicable seismic site classification for foundation design of the proposed building, as defined in Table 4.1.8.4.A of the Ontario Building Code (OBC) 2012.

Soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest version of the OBC 2012 for a full discussion of the earthquake design requirements.

5.5 Slab on Grade Construction

With the removal of all topsoil and fill, containing significant amounts of deleterious or organic materials, the undisturbed, existing fill or undisturbed, hard to stiff silty clay are considered to be acceptable subgrades on which to backfill for slab on grade construction.

As noted above in Section 5.2, a proof-rolling program should be completed over the slab on grade subgrade, which should be observed and approved by Paterson. Any poor performing areas in the slab on grade subgrade should be removed and reinstated with an engineered fill such as OPSS Granular A or B Type II.

It is recommended that the upper 200 mm sub-floor fill consist of OPSS Granular A crushed stone. All backfill materials within the footprint of the proposed buildings should be placed in a maximum of 300 mm thick loose layers and compacted to at least 95% of their SPMDD.

5.6 Pavement Design

For design purposes, the following pavement structures, presented below, are recommended for the design of car only parking areas, heavy truck parking areas, and access lanes 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 engineered fill 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 engineered fill 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. Weak subgrade conditions may be experienced over service trench fill materials. This may require the use of a geotextile, such as Terratrack 200 or equivalent, thicker subbase or other measures that can be recommended at the time of construction as part of the field observation program.

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.

Pavement Structure Drainage (Clay Areas)

Satisfactory performance of the pavement structure is largely dependent on the contact zone between the subgrade material and the base stone in a dry condition. Failure to provide adequate drainage under conditions of heavy wheel loading can result in the fine subgrade soil being pumped into the voids in the stone subbase, thereby reducing load carrying capacity.

Due to the low permeability of the subgrade materials consideration should be given to installing subdrains during the pavement construction as per City of Ottawa standards. The subdrain inverts should be approximately 300 mm below subgrade level. The subgrade surface should be crowned to promote water flow to the drainage lines.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

The excavated on-site fill could be re-used for backfilling the exterior sides of the foundation walls. However, this material would need to be maintained in an unfrozen state and at a suitable moisture content for compaction if it is to be re-used for this purpose.

Otherwise, imported granular materials, such as clean sand or OPSS Granular B Type I granular material, can be used for backfilling the exterior sides of the foundation walls.

6.2 Protection of Footings Against Frost Action

Perimeter footings of heated structures are recommended to be insulated against the deleterious effects of frost action. A minimum 1.5 m thick soil cover, or an equivalent combination of soil cover and foundation insulation, should be provided in this regard.

Exterior unheated footings, such as isolated piers, are more prone to deleterious movement associated with frost action than the exterior walls of the structure, and require additional protection, such as soil cover of 2.1 m, 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. For the proposed development, it is expected that sufficient room will be available for the greater part of the excavation to be undertake by open-cut methods (i.e. unsupported excavations).

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 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 (concrete or PSM PVC pipes) or sand (concrete pipe). The bedding and cover materials should be placed in maximum 225 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.

6.5 Groundwater Control

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 bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

Groundwater Control for Building Construction

A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum 4 to 5 months should be allowed for completion of the PTTW application package 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 Person as stipulated under O.Reg. 63/16.

Impacts to Neighbouring Properties

As the proposed building will be a slab-on-grade structure, it is not anticipated that the excavation will extend below the long-term groundwater level. Accordingly, significant short-term groundwater lowering during construction, and long-term groundwater lowering following construction, is not anticipated. Therefore, adverse effects are not anticipated for neighbouring properties as a result of groundwater lowering.

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.

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 a non-aggressive to slightly aggressive corrosive environment.

6.8 Landscaping Considerations

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. Atterberg Limits testing was completed for the recovered silty clay samples at selected locations throughout the subject site. The soil samples were recovered from elevations below the anticipated design underside of footing elevation and 3.5 m depth below the anticipated finished grade. The results of our testing are presented in Table 1 in Section 4.2 and in Appendix 1.

Based on our Atterberg Limits test results, the modified plasticity index generally exceeds 40% at this site. For large trees (mature height greater than 14 m), a tree to foundation setback equal to the full mature height of the tree can be provided. Tree planting setback limits are **7.5 m** for small (mature height up to 7.5 m) and medium size trees (mature tree height 7.5 to 14 m), provided that the following conditions are met.

- The underside of footing (USF) is 2.1 m or greater below the lowest finished grade for footings within 10 m from the tree, as measured from the center of the tree trunk and verified by means of the Grading Plan.

- A small tree must be provided with a minimum of 25 m^3 of available soils 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 tree height up to 7.5 m) to medium size (mature tree 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).

- ❑ Grading surrounding the tree must promote drainage to the tree root zone (in such a manner as not to be detrimental to the tree), as noted on the Grading Plan.

It is well documented in the literature, and is our experience, that fast-growing trees located near buildings founded on cohesive soils that shrink on drying can result in long-term differential settlements of the structures. Tree varieties that have the most pronounced effect on foundations are seen to consist of poplars, willows, and some maples (i.e., Manitoba Maples) and, as such, they should not be considered in the landscaping design.

7.0 Recommendations

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 of the final Grading Plan and Landscaping Plan, from a geotechnical perspective.
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ 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 the completion of a satisfactory inspection program by the geotechnical consultant.

All excess soil must be handled as per ***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 Smartcentres c/o Calloway REIT (Orleans) Inc., or their agents, is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

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APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ATTERBERG LIMIT TESTING RESULTS

GRAIN SIZE TESTING RESULTS

SHRINKAGE TESTING RESULTS

ANALYTICAL TESTING RESULTS

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382879.45 **NORTHING:** 5035470.81 **ELEVATION:** 89.14

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 08, 2024

FILE NO. : PG7042

HOLE NO. : BH 1-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	ELEVATION (m)
GROUND SURFACE		0					89
FILL: Brown silty sand, with gravel, trace clay, organics and topsoil			AU 1			19.76	
0.69m [88.45m]		1					88
FILL: Brown silty clay, with sand, gravel and organics			SS 2	38	2-4-7-7 11	31.64	
1.45m [87.69m]							
FILL: Brown silty sand to sandy silt			SS 3	100	3-5-6-8 11	42.59	
2.21m [86.93m]		2					87
Very stiff, brown **SILTY CLAY**			SS 4	100	3-4-4-4 8	47.41	
3.73m [85.41m]		3	SS 5	100	P	59.88	86
Soft to firm, grey **SILTY CLAY**			SS 6		P	66.86	85
-Sand seam was observed from 5.3 to 5.5 m depth.		4	SS 7	100	P	36.93	84
6.55m [82.59m]		5	SS 8	100	P	66.96	83
End of Borehole		6					82
(GWL at 2.45 m - August 21, 2024)		7					
		8					

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

△ REMOULDED SHEAR STRENGTH, Cur (kPa)

▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80

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

MONITORING WELL CONSTRUCTION

159.0

2.5 m 2024-08-21

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382901.79 **NORTHING:** 5035499.22 **ELEVATION:** 88.75

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 08, 2024

FILE NO. : PG7042

HOLE NO. : BH 2-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	RECOVERY (%)	N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							88
TOPSOIL and organics									
0.10m [88.65m]									
FILL: Brown silty clay, trace sand and organics			AU 1			18.95			
		1	SS 2	75	5-8-10-11 18	36.61 37.92			
1.45m [87.30m]									87
Hard to very stiff, brown **SILTY CLAY**		2	SS 3	100	P	41.14			
			SS 4	100	P	53.39	229.0		86
		3	SS 5	100	P	74.54		3.3 m 2024-08-21	
3.81m [84.94m]									85
Firm, grey **SILTY CLAY**		4	SS 6	100	P	67.28			
		5	SS 7	100	P	75.94			84
			SS 8	100	P	82.47			83
6.35m [82.40m]		6	SS 9	100	P	75.76			
GLACIAL TILL: Grey silty sand, with gravel						13.03			82
6.60m [82.15m]									
End of Borehole		7							81
Practical refusal to augering at 6.6 m on inferred boulder or bedrock									
(GWL at 3.29 m - August 21, 2024)		8							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382933.21 **NORTHING:** 5035490.42 **ELEVATION:** 88.57

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 08, 2024

FILE NO. : PG7042

HOLE NO. : BH 3-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
TOPSOIL and organics		0	AU 1			26.59			88
0.13m [88.44m]									
FILL: Brown silty clay, trace sand, topsoil and organics		1	SS 2	100	3-7-8-10 15	40.54			
1.45m [87.12m]									87
Hard to very stiff, brown **SILTY CLAY**		2	SS 3	100	P	41.9	249.0	2.2 m 2024-08-21	
- Greyish by 2.7 m depth			SS 4	100	P	61.48	189.0		86
		3	SS 5	100	P	73.8			85
3.73m [84.84m]									
Stiff to firm, grey **SILTY CLAY**		4	SS 6	100	P	88.47			84
- Sand seams by 4.9 m depth		5	SS 7	100	P	59.95			83
		6	SS 8		P	67.52			
6.55m [82.02m]									82
End of Borehole		7							
(GWL at 2.24 m - August 21, 2024)									81
		8							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382952.88 **NORTHING:** 5035525.00 **ELEVATION:** 88.79

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 12, 2024

FILE NO. : PG7042

HOLE NO. : BH 4-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	MONITORING WELL CONSTRUCTION	ELEVATION (m)
GROUND SURFACE											
TOPSOIL and organics		0	AU 1								88
0.20m [88.59m]											
FILL: Brown silty clay, trace gravel		1	SS 2	50	4-6-7-9 13	37.58					
1.22m [87.57m]											
Very stiff to stiff, brown **SILTY CLAY**		2	SS 3	100	P	51.64		26 70		199.0	87
			SS 4	17	P	70.84				2.2 m 2024-08-21	86
3.35m [85.44m]		3									
Firm, grey **SILTY CLAY**		4	SS 5	95	P	67.62					85
4.11m [84.68m]						9.97					
GLACIAL TILL: Compact, grey silty sand, with gravel and clay											84
4.52m [84.27m]		5									
End of Borehole											83
Practical refusal to augering at 4.52 m depth		6									
(GWL at 2.21 m - August 21, 2024)											82
		7									
		8									81

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382986.43 **NORTHING:** 5035512.26 **ELEVATION:** 88.60

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 12, 2024

FILE NO. : PG7042

HOLE NO. : BH 5-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	RECOVERY (%)	N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
TOPSOIL and organics 0.18m [88.42m]		0	AU 1			28.99			88
FILL: Brown silty clay, trace sand, topsoil and organics 1.45m [87.15m]		1	SS 2	100	2-4-6-7 10	37.2			87
Very stiff to stiff, brown **SILTY CLAY**		2	SS 3	100	P	56.96	199.0	1.9 m 2024-08-21	86
			SS 4	100	P	71.53			
3.35m [85.25m]		3							85
Firm, grey **SILTY CLAY** 3.96m [84.64m]		4	SS 5	33	1-7-4-19 11	8.98			84
GLACIAL TILL: Grey silty sand, with gravel, trace clay 5.18m [83.42m]		5	SS 6	25	6-11-8-10 19	10.79			83
End of Borehole (GWL at 1.93 m - August 21, 2024)		6							82
		7							81
		8							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382973.53 **NORTHING:** 5035551.49 **ELEVATION:** 88.32

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 12, 2024

FILE NO. : PG7042

HOLE NO. : BH 6-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
TOPSOIL and organics 0.23m [88.09m]		0	AU 1						88
FILL: Brown silty clay, trace sand, gravel, boudlers and organics 1.45m [86.87m]		1	SS 2		5-5-4-6 9	32.88			87
Hard to very stiff, brown **SILTY CLAY**, with sand seams 2.08m [86.24m]		2	SS 3	92	P	43.56		249.0 ▲ 1.8 m 2024-08-21	86
GLACIAL TILL: Brown silty sand, with gravel and clay 2.77m [85.55m]			SS 4	71	5-7-50-/ 57/0.05	9.16			
End of Borehole Practical refusal to augering at 2.77 m depth (GWL at 1.78 m - August 21, 2024)		3 4 5 6 7 8							85 84 83 82 81

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382917.00 **NORTHING:** 5035531.25 **ELEVATION:** 88.47

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 12, 2024

FILE NO. : PG7042

HOLE NO. : BH 7-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
TOPSOIL and organics		0							88
0.15m [88.32m]									
FILL: Brown silty clay, trace sand, gravel and organics			AU 1			26.5	○		
		1	SS 2	100	P	35.83	○		87
1.45m [87.02m]									
Hard to very stiff, brown **SILTY CLAY**		2	SS 3	100	P	42.14	○ 249.0 ▲		
			SS 4	100	P	53.72	△ ○ 189.0 ▲		86
- Grey by 3.20 m depth		3							
3.73m [84.74m]									85
GLACIAL TILL: Very dense, grey silty clay, with sand and gravel		4	SS 5	47	0-0-50-/ 50/0.13	93.61	○	3.6 m 2024-08-21	
4.52m [83.95m]									84
End of Borehole		5							
Practical refusal to augering at 4.52 m depth									83
(GWL at 3.62 m - August 21, 2024)		6							82
		7							81
		8							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382872.70 **NORTHING:** 5035508.11 **ELEVATION:** 89.13

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 12, 2024

FILE NO. : PG7042

HOLE NO. : BH 8-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	RECOVERY (%)	N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
TOPSOIL and organics		0	AU 1			26.35			89
0.15m [88.98m]									
FILL: Brown silty clay, with gravel and boulders, trace topsoil and sand		1	SS 2	46	10-3-5-7 8	33.16			88
			SS 3	46	4-2-4-4 6	36.02			
2.21m [86.92m]		2							87
Hard to very stiff, brown **SILTY CLAY**			SS 4		2-2-3-3 5	54.92		2.5 m 2024-08-21	
3.66m [85.47m]		3							86
Firm, grey **SILTY CLAY**		4	SS 5	100	P	75.14			85
		5	SS 6	100	P	68.37			84
5.79m [83.34m]		6							83
End of Borehole									
(GWL at 2.52 m - August 21, 2024)		7							82
		8							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382874.86 **NORTHING:** 5035539.26 **ELEVATION:** 88.67

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 13, 2024

FILE NO. : PG7042

HOLE NO. : BH 9-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	ELEVATION (m)
GROUND SURFACE		0					88
TOPSOIL and organics 0.13m [88.54m]			AU 1			35.56	
FILL: Brown silty clay, trace topsoil and organics		1	SS 2	83	5-5-7-8 12	33.74	
1.45m [87.22m]							87
Very stiff to stiff, brown **SILTY CLAY**		2	SS 3	100	2-3-5-6 8	44.69	
			SS 4	100	P	62.07	86
		3	SS 5	100	P		
3.73m [84.94m]							85
Firm, grey **SILTY CLAY**		4				70.29	
4.80m [83.87m]			SS 6	100	50-/-/-/ 50/0.28	84.14	84
GLACIAL TILL: Compact, grey silty clay, trace sand and gravel 4.85m [83.82m]		5					
End of Borehole							83
(GWL at 2.41 m - August 21, 2024)		6					82
		7					
		8					81

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

△ REMOULDED SHEAR STRENGTH, Cur (kPa)

▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80

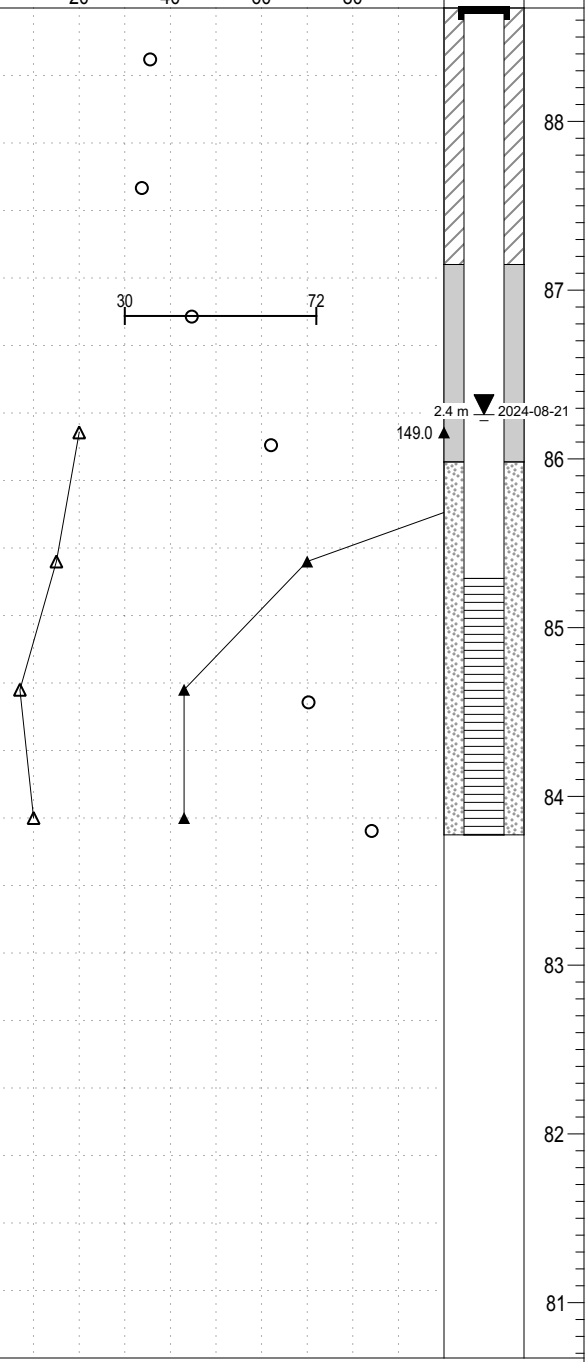
PL (%) WATER CONTENT (%) LL (%) 20 40 60 80

30 72

149.0

MONITORING WELL CONSTRUCTION

2.4 m 2024-08-21



SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382934.96 **NORTHING:** 5035570.28 **ELEVATION:** 88.36

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 13, 2024

FILE NO. : PG7042

HOLE NO. : BH 10-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	RECOVERY (%)	N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
TOPSOIL and organics 0.20m [88.16m]		0	SS 1	87	1-3-3-7 6	34.55			88
FILL: Brown silty clay, trace sand and organics 0.69m [87.67m]						29.76			
Very stiff, brown **SILTY CLAY**		1	SS 2	92	2-4-5-7 9	40.88			87
2.03m [86.33m]			SS 3	71	P	44.13	199.0		
GLACIAL TILL: Brown silty sand, with gravel and clay		2				28.23			86
2.79m [85.56m]			SS 4	100	50-/-/-/ 50/0.23	11.08			
End of Borehole		3							85
Practical refusal to augering at 2.79 m depth		4							84
		5							83
		6							82
		7							81
		8							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382926.54 **NORTHING:** 5035610.29 **ELEVATION:** 88.51

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 13, 2024

FILE NO. : PG7042

HOLE NO. : BH 11-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
ASPHALT 0.08m [88.43m]		0	AU 1			3.15			88
FILL: Brown silty sand, with crushed stone 0.69m [87.82m]									
FILL: Brown silty clay, trace sand 1.45m [87.06m]		1	SS 2	87	2-4-6-7 10	37.76			87
Very stiff, brown **SILTY CLAY**		2	SS 3		3-4-4-6 8	34.31			
			SS 4	29	P	42.91 52.77	169.0		86
3.61m [84.90m]		3	SS 5	100	1-1-2-1 3	77.04			85
Firm to soft, grey **SILTY CLAY**, trace gravel		4	SS 6	100	P	87.06			84
5.03m [83.48m]		5							83
End of Borehole		6							82
		7							81
		8							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382844.90 **NORTHING:** 5035576.84 **ELEVATION:** 89.02

PROJECT: Proposed Commercial Development

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: August 13, 2024

FILE NO. : PG7042

HOLE NO. : BH 12-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	RECOVERY (%)	N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
ASPHALT 0.05m [88.97m]		0	AU 1			5.35			89
FILL: Brown silty sand, with crushed stone and gravel, trace clay 0.69m [88.33m]									
FILL: Brown silty clay		1	SS 2	75	4-4-9-11 13	36.48			88
			SS 3	100	5-4-9-11 13	37.29			
2.21m [86.81m]		2							87
Very stiff, brown **SILTY CLAY**			SS 4	71	P	49.8	189.0 ▲		
2.79m [86.23m]									
GLACIAL TILL: Brown silty sand, with gravel and clay 3.35m [85.67m]		3	SS 5	32	2-4-50-/ 54/0.08	12.1			86
End of Borehole									
Practical refusal to augering at 3.35 m depth		4							85
		5							84
		6							83
		7							82
		8							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382878.99 **NORTHING:** 5035481.38 **ELEVATION:** 89.21

PROJECT: Proposed Commercial Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 08, 2024

FILE NO. : PG7042

HOLE NO. : TP 1-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / △ REMOULDED SHEAR STRENGTH, Cur (kPa) ▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Brown, silty clay, with organics		0	G 1						89
0.10m [89.11m]									
FILL: Very stiff, brown silty clay, some topsoil, gravel and crushed stone, trace sand									
0.60m [88.61m]									
FILL: Very stiff, brown silty clay, trace topsoil		1	G 2						88
1.80m [87.41m]									
Stiff, greyish brown **SILTY CLAY**, trace organics		2	G 3						87
2.40m [86.81m]									
Hard, brown **SILTY CLAY**		3	G 4						86
3.20m [86.01m]									
End of Test Pit									85
No groundwater infiltration was observed upon completion of the test pit		4							84
		5							83
		6							82
		7							
		8							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382887.68 **NORTHING:** 5035513.90 **ELEVATION:** 88.88

PROJECT: Proposed Commercial Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 08, 2024

FILE NO. : PG7042

HOLE NO. : TP 2-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) ▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0	G 1								88
FILL: Brown, silty clay, with organics, some topsoil 0.15m [88.73m]											
FILL: very stiff, brown silty clay, with gravel, cobbles and boulders, trace topsoil		1	G 2								87
1.50m [87.38m]			G 3								
FILL: Very stiff, brown silty clay 2.00m [86.88m]		2	G 4								86
Hard, brown **SILTY CLAY** 2.80m [86.08m]											
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		3									85
		4									84
		5									83
		6									82
		7									81
		8									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382926.17 **NORTHING:** 5035510.58 **ELEVATION:** 88.73

PROJECT: Proposed Commercial Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 08, 2024

FILE NO. : PG7042

HOLE NO. : TP 3-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) ▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0									88
TOPSOIL and organics 0.15m [88.58m]			G 1								
FILL: Stiff, brown silty clay, with gravel, crushed stone and topsoil 0.70m [88.03m]		1	G 2								87
FILL: Stiff, brown silty clay 1.25m [87.48m]			G 3								
Hard, brown **SILTY CLAY** 2.90m [85.83m]		2	G 4								86
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		3									85
		4									84
		5									83
		6									82
		7									81
		8									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382960.68 **NORTHING:** 5035506.63 **ELEVATION:** 88.57

PROJECT: Proposed Commercial Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 08, 2024

FILE NO. : PG7042

HOLE NO. : TP 4-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0	G 1								88
FILL: Stiff, brown silty clay, with gravel, trace sand, trace to some topsoil 0.10m [88.47m]											
FILL: Stiff, brown silty clay, with gravel, trace sand 0.50m [88.07m]		1	G 2								87
FILL: Stiff, brown silty clay 1.50m [87.07m]			G 3								
Hard to stiff, brown **SILTY CLAY** 3.00m [85.57m]		2	G 4								86
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		3									85
		4									84
		5									83
		6									82
		7									81
		8									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382945.97 **NORTHING:** 5035541.01 **ELEVATION:** 88.38

PROJECT: Proposed Commercial Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 08, 2024

FILE NO. : PG7042

HOLE NO. : TP 5-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0									88
FILL: Stiff to very stiff, brown silty clay, trace topsoil and crushed stone 0.20m [88.17m]			G 1								
FILL: stiff to very stiff, brown silty clay, trace crushed stone 1.00m [87.38m]		1	G 2								87
Stiff, brown **SILTY CLAY** 2.00m [86.38m]		2									86
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		3									85
		4									84
		5									83
		6									82
		7									81
		8									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382978.44 **NORTHING:** 5035534.33 **ELEVATION:** 88.41

PROJECT: Proposed Commercial Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 08, 2024

FILE NO. : PG7042

HOLE NO. : TP 6-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) ▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0									88
FILL: Stiff, brown silty clay, with organics			G 1								
0.20m [88.21m]											
FILL: Loose to compact, brown silty sand, with gravel, some crushed stone, trace clay		1	G 2								87
0.80m [87.61m]											
Very stiff, brown **SILTY CLAY**											
1.50m [86.91m]		2									86
End of Test Pit											
No groundwater infiltration was observed upon completion of the test pit		3									85
		4									84
		5									83
		6									82
		7									81
		8									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382901.54 **NORTHING:** 5035554.62 **ELEVATION:** 88.30

PROJECT: Proposed Commercial Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 08, 2024

FILE NO. : PG7042

HOLE NO. : TP 7-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0									88
FILL: Brown silty clay, with organics, some topsoil 0.20m [88.10m]			G 1								
FILL: Brown silty clay, trace organics and crushed stone 0.85m [87.45m]		1	G 2								87
FILL: Very stiff, brown silty clay 1.60m [86.70m]											86
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		2									85
		3									84
		4									83
		5									82
		6									81
		7									
		8									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

2025 Mer-Bleue Road, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 382896.29 **NORTHING:** 5035472.94 **ELEVATION:** 88.83

PROJECT: Proposed Commercial Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 08, 2024

FILE NO. : PG7042

HOLE NO. : TP 8-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) ▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0									88
FILL: Stiff, brown silty clay, some crushed stone and organics 0.10m [88.73m]			G 1								
FILL: Very stiff, brown silty clay, some crushed stone, trace sand and organics 0.90m [87.93m]		1	G 2								87
Very stiff, brown **SILTY CLAY** 1.50m [87.33m]		2									86
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		3									85
		4									84
		5									83
		6									82
		7									81
		8									

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

FILE NO. PG0811

REMARKS

HOLE NO. BH 1-17

BORINGS BY CME 55 Power Auger **DATE** January 26, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL 0.25						0	88.17		
		AU	1			1	87.17		
FILL: Brown silty clay, trace gravel		SS	2	8		2	86.17		
						3	85.17		
						4	84.17		
4.78 Stiff, grey **SILTY CLAY,** trace sand 5.18		SS	3	83	4	5	83.17		
End of Borehole									
(GWL @ 1.8m depth based on field observations)									

Pen. Resist. Blows/0.3m: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

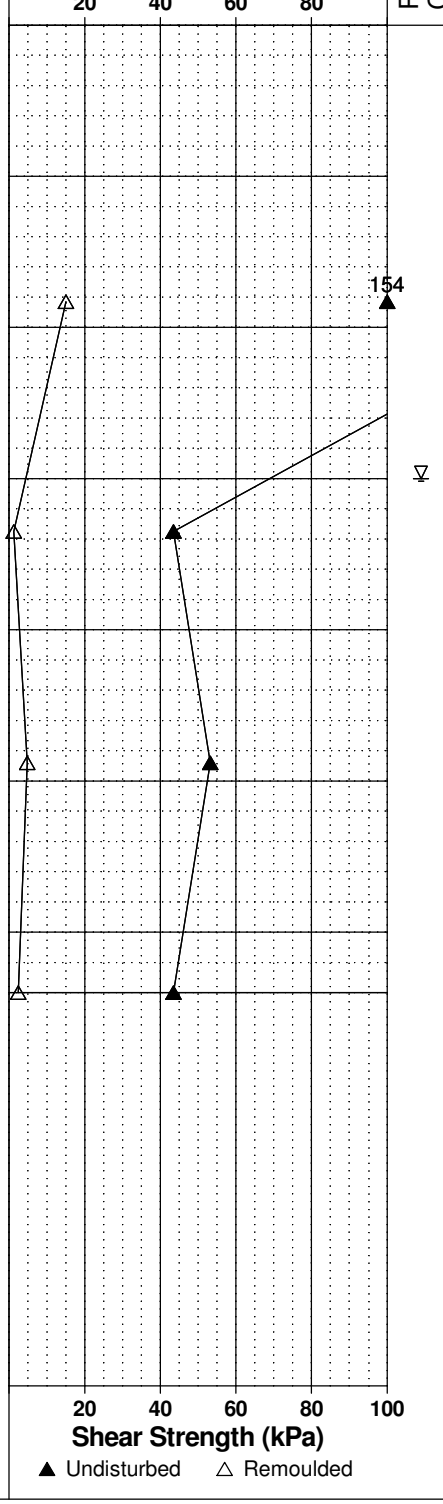
FILE NO. PG0811

REMARKS

HOLE NO. BH 2-17

BORINGS BY CME 55 Power Auger **DATE** January 25, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	88.35
TOPSOIL 0.28		AU	1			1	87.35
		SS	2	92	P	2	86.35
Very stiff to firm, brown **SILTY CLAY,** trace sand						3	85.35
- grey by 4.6m depth						4	84.35
						5	83.35
						6	82.35
6.40 End of Borehole							
(GWL @ 3.0m depth based on field observations)							



Piezometer Construction

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

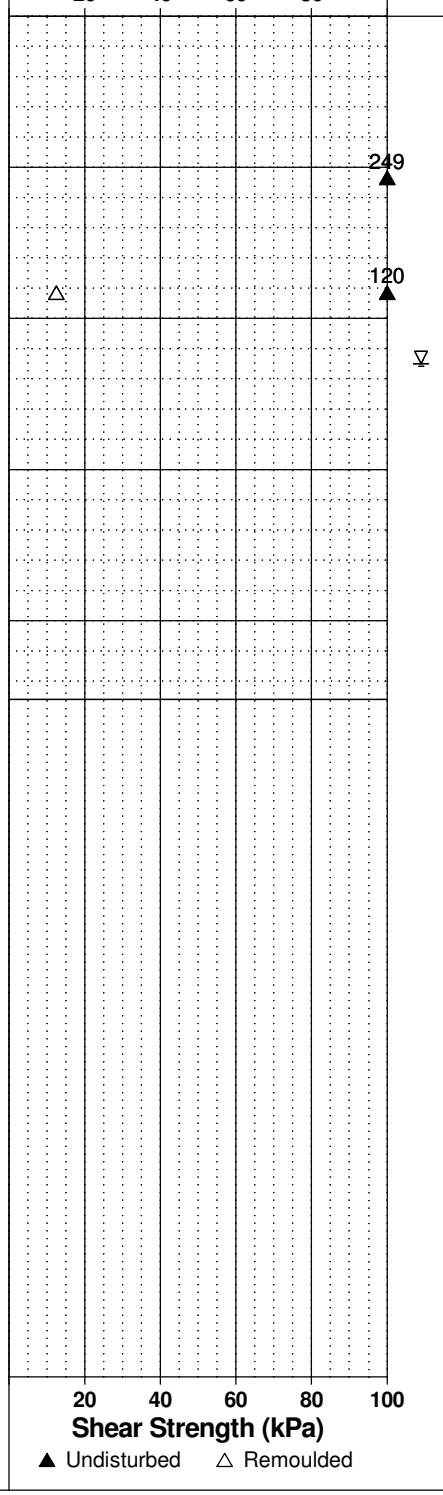
FILE NO. PG0811

REMARKS

HOLE NO. BH 3-17

BORINGS BY CME 55 Power Auger **DATE** January 25, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.60		
TOPSOIL 0.33									
Hard to very stiff, brown **SILTY CLAY,** trace sand						1	87.60	249	
								120	
						2	86.60		
3.05						3	85.60		
GLACIAL TILL: Grey silty sand with clay, gravel, cobbles and boulders		SS	1	100	11				
4.52						4	84.60		
End of Borehole Practical refusal to augering at 4.52m depth (GWL @ 2.3m depth based on field observations)									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

FILE NO. PG0811

REMARKS

HOLE NO. BH 4-17

BORINGS BY CME 55 Power Auger **DATE** January 25, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL 0.30						0	88.24		
Very stiff, brown **SILTY CLAY,** trace sand						1	87.24		
2.39						2	86.24		
End of Borehole Practical refusal to augering at 2.39m depth (BH dry upon completion)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %

20 40 60 80

△ 164 ▲

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

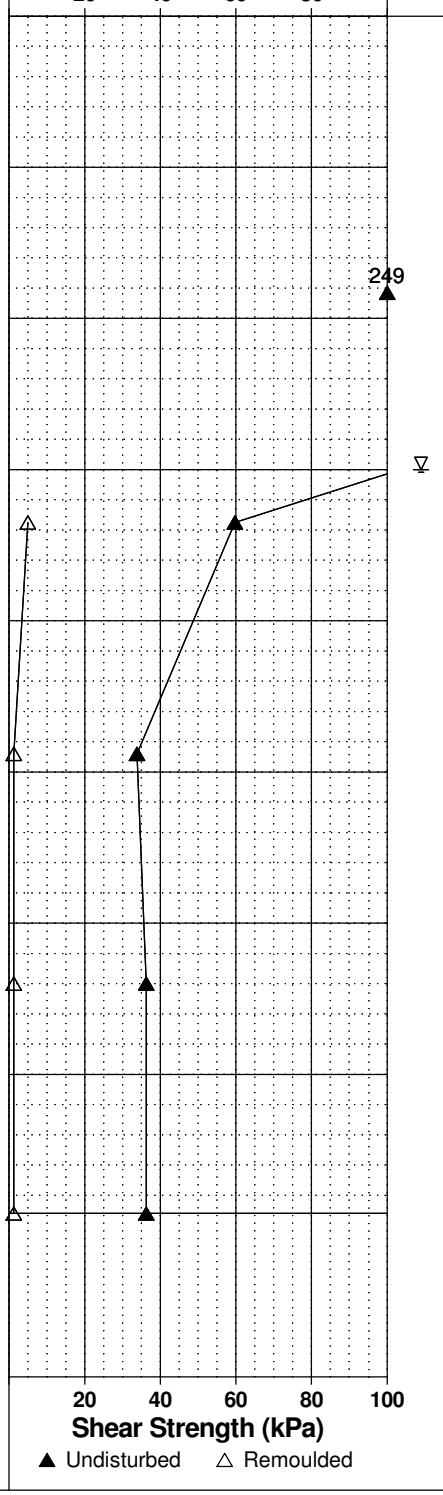
FILE NO. PG0811

REMARKS

HOLE NO. BH 5-17

BORINGS BY CME 55 Power Auger **DATE** January 25, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.11		
TOPSOIL 0.27									
Hard to stiff, brown **SILTY CLAY,** trace sand						1	87.11		
						2	86.11		
						3	85.11		
						4	84.11		
- firm and grey by 4.6m depth						5	83.11		
						6	82.11		
						7	81.11		
7.92									
End of Borehole									
(GWL @ 3.0m depth based on field observations)									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

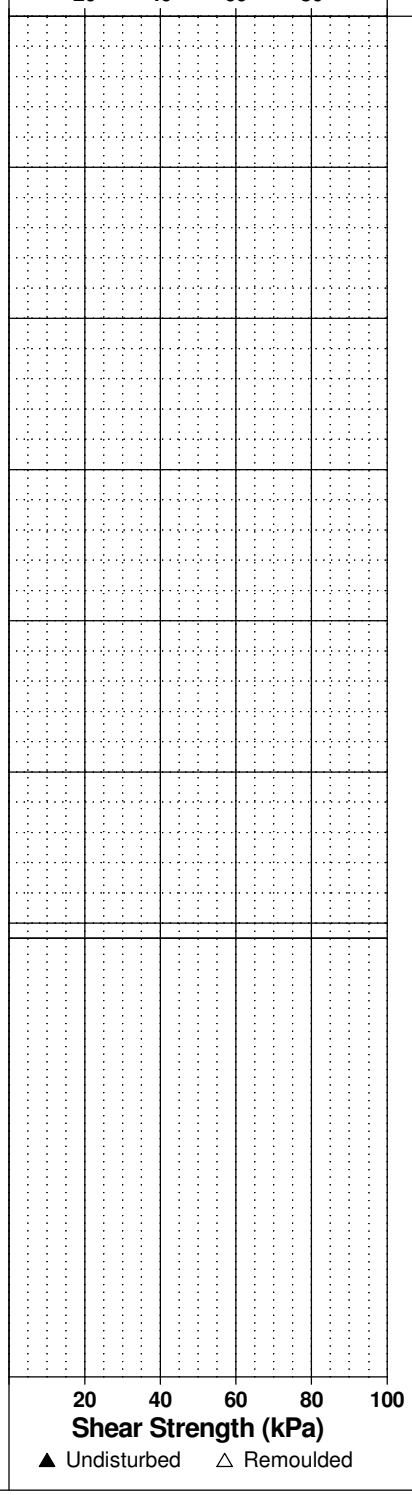
FILE NO. PG0811

REMARKS

HOLE NO. PH 1-17

BORINGS BY CME 55 Power Auger **DATE** January 26, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.32		
						1	87.32		
						2	86.32		
OVERBURDEN						3	85.32		
						4	84.32		
						5	83.32		
6.10						6	82.32		
End of Probehole									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

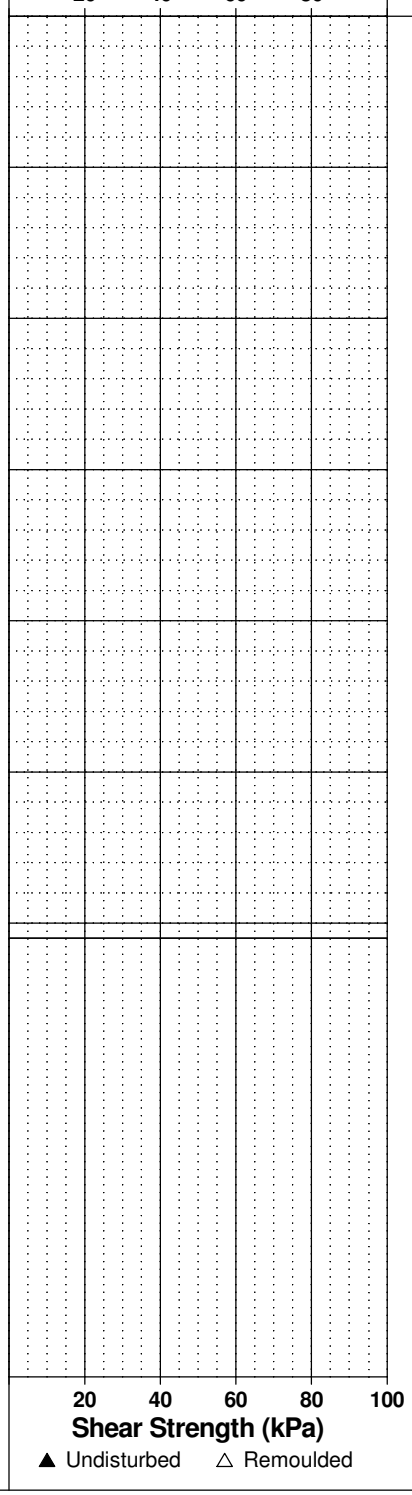
FILE NO. PG0811

REMARKS

HOLE NO. PH 2-17

BORINGS BY CME 55 Power Auger **DATE** January 26, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.02		
						1	87.02		
						2	86.02		
OVERBURDEN						3	85.02		
						4	84.02		
						5	83.02		
6.10						6	82.02		
End of Probehole									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

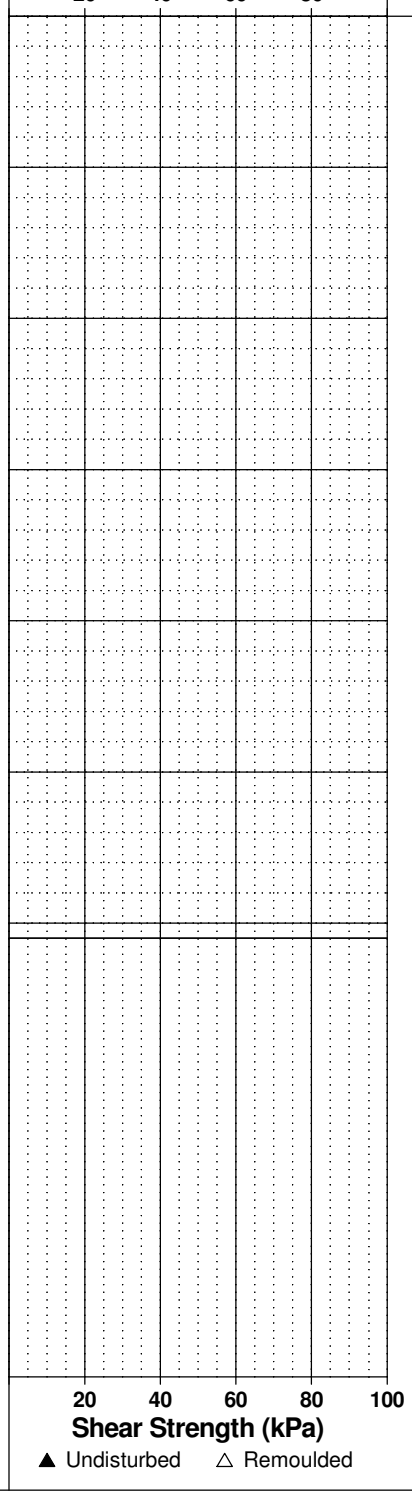
FILE NO. PG0811

REMARKS

HOLE NO. PH 3-17

BORINGS BY CME 55 Power Auger **DATE** January 25, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.53		
						1	87.53		
						2	86.53		
OVERBURDEN						3	85.53		
						4	84.53		
						5	83.53		
6.10						6	82.53		
End of Probehole									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

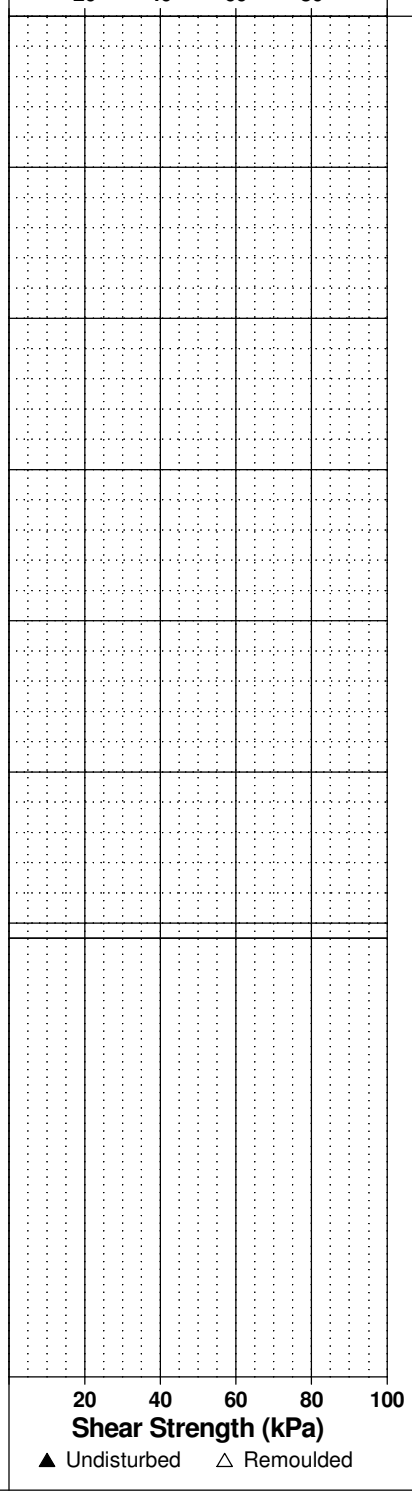
FILE NO. PG0811

REMARKS

HOLE NO. PH 4-17

BORINGS BY CME 55 Power Auger **DATE** January 25, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.53		
						1	87.53		
						2	86.53		
OVERBURDEN						3	85.53		
						4	84.53		
						5	83.53		
6.10						6	82.53		
End of Probehole									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

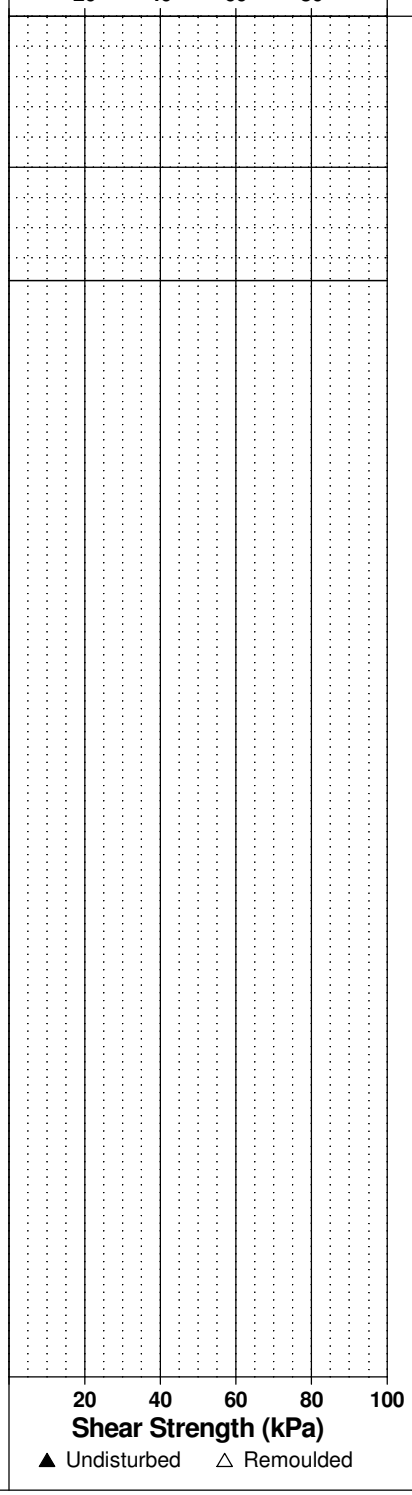
FILE NO. PG0811

REMARKS

HOLE NO. PH 5-17

BORINGS BY CME 55 Power Auger **DATE** January 25, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.66		
OVERBURDEN						1	87.66		
1.75									
End of Probehole									
Practical refusal to augering at 1.75m depth									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

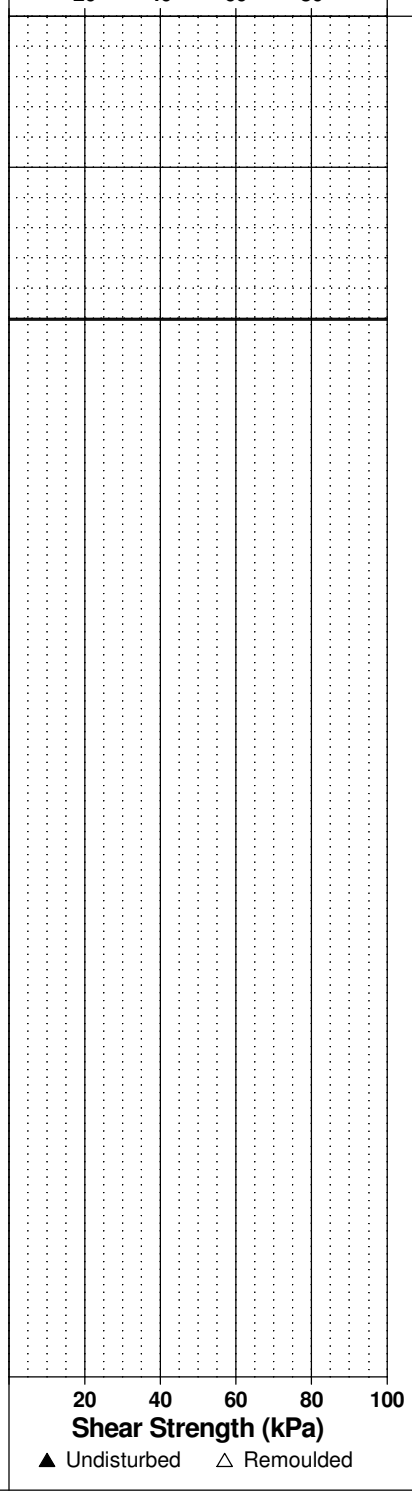
FILE NO. PG0811

REMARKS

HOLE NO. PH 6-17

BORINGS BY CME 55 Power Auger **DATE** January 25, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.52		
OVERBURDEN						1	87.52		
2.01						2	86.52		
End of Probehole Practical refusal to augering at 2.01m depth									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

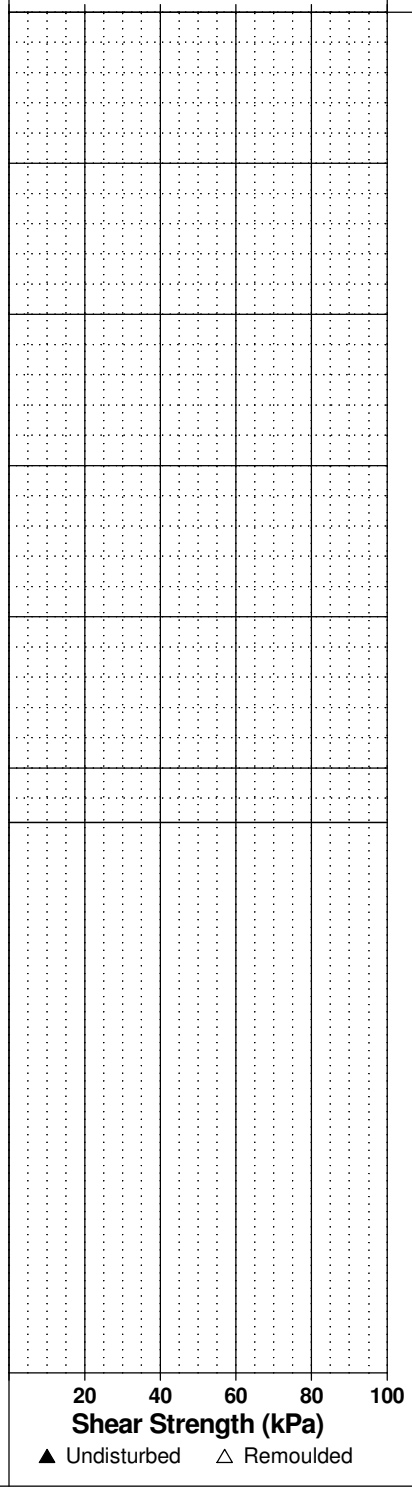
FILE NO. PG0811

REMARKS

HOLE NO. PH 7-17

BORINGS BY CME 55 Power Auger **DATE** January 25, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	87.89		
						1	86.89		
						2	85.89		
OVERBURDEN						3	84.89		
						4	83.89		
						5	82.89		
5.36									
End of Probehole Practical refusal to augering at 5.36m depth									



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

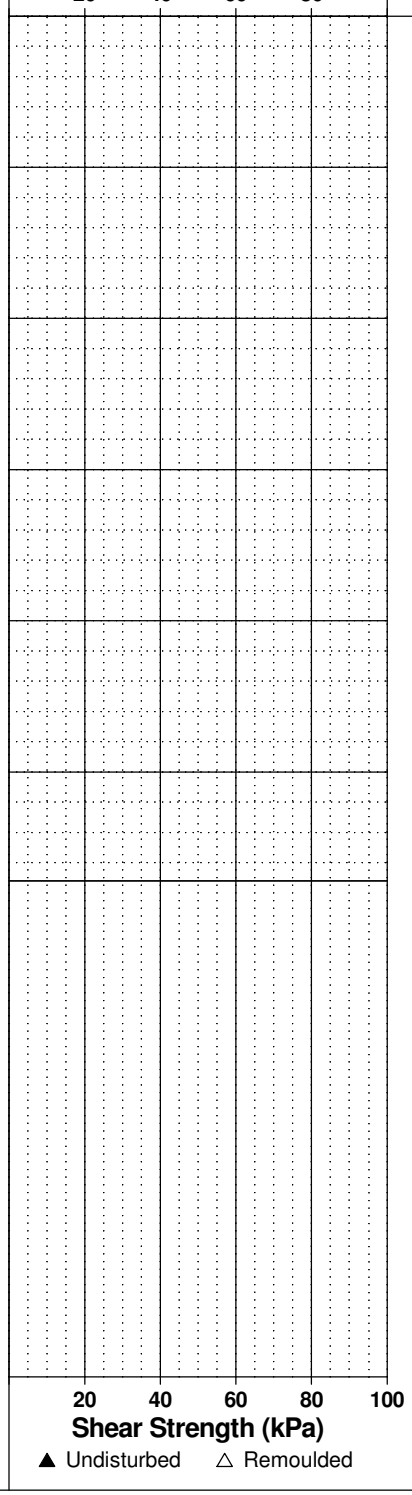
FILE NO. PG0811

REMARKS

HOLE NO. PH 8-17

BORINGS BY CME 55 Power Auger **DATE** January 25, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.13		
						1	87.13		
						2	86.13		
OVERBURDEN						3	85.13		
						4	84.13		
						5	83.13		
5.72									
End of Probehole Practical refusal to augering at 5.72m depth									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

FILE NO. PG0811

REMARKS

HOLE NO. PH 9-17

BORINGS BY CME 55 Power Auger **DATE** January 25, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	87.72		
						1	86.72		
						2	85.72		
						3	84.72		
OVERBURDEN						4	83.72		
						5	82.72		
						6	81.72		
						7	80.72		
7.62									
End of Probehole									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %; 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

FILE NO. PG0811

REMARKS

HOLE NO. PH10-17

BORINGS BY CME 55 Power Auger **DATE** January 26, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	87.95	20 40 60 80	
						1	86.95		
OVERBURDEN						2	85.95		
						3	84.95		
						4	83.95		
4.57									
End of Probehole									

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis O'Sullivan, Vollebekk Limited.

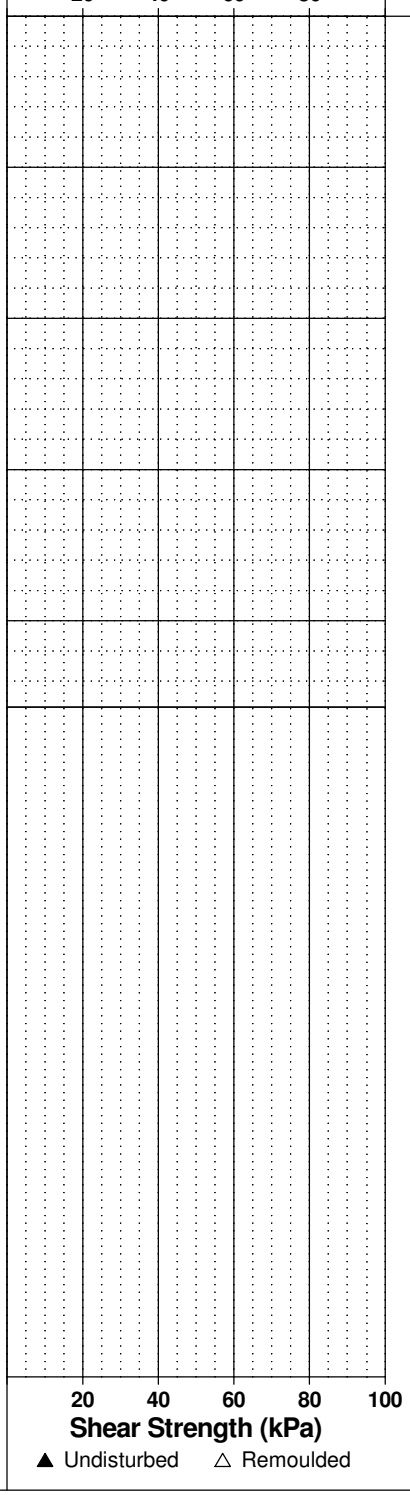
FILE NO. PG0811

REMARKS

HOLE NO. PH11-17

BORINGS BY CME 55 Power Auger **DATE** January 26, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content % (20 40 60 80)	Piezometer Construction
GROUND SURFACE						0	88.38		
						1	87.38		
OVERBURDEN						2	86.38		
						3	85.38		
						4	84.38		
4.57 End of Probehole									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG0811

REMARKS

HOLE NO. PH 2-16

BORINGS BY CME 55 Power Auger **DATE** November 10, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.64	20 40 60 80	
OVERBURDEN						1	87.64		
						2	86.64		
						3	85.64		
3.28									
End of Probehole Practical refusal to augering at 3.28m depth								20 40 60 80 100 **Shear Strength (kPa)** ▲ Undisturbed △ Remoulded	

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

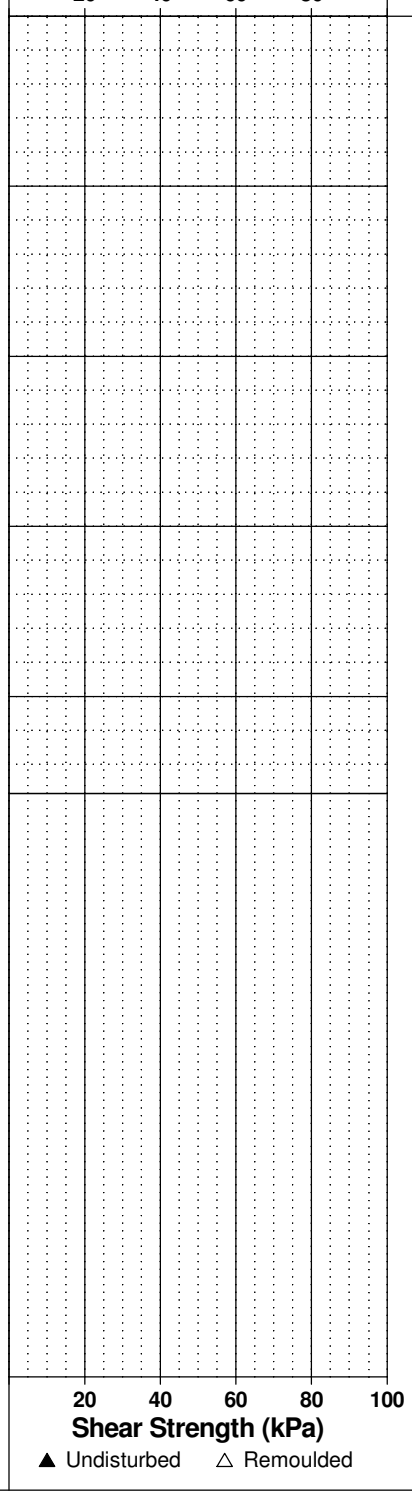
FILE NO. PG0811

REMARKS

HOLE NO. PH 4-16

BORINGS BY CME 55 Power Auger **DATE** November 11, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.28		
						1	87.28		
OVERBURDEN						2	86.28		
						3	85.28		
						4	84.28		
4.57 End of Probehole									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG0811

REMARKS

HOLE NO. PH 9-16

BORINGS BY CME 55 Power Auger **DATE** November 10, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content % (20 40 60 80)	Piezometer Construction
GROUND SURFACE						0	88.23		
						1	87.23		
OVERBURDEN						2	86.23		
						3	85.23		
						4	84.23		
4.27									
End of Probehole									
Practical refusal to augering at 4.27m depth									

Shear Strength (kPa) (20 40 60 80 100)
▲ Undisturbed △ Remoulded

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG0811

REMARKS

HOLE NO. PH10-16

BORINGS BY CME 55 Power Auger **DATE** November 11, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.42	20 40 60 80	
						1	87.42		
OVERBURDEN						2	86.42		
						3	85.42		
3.58									
End of Probehole Practical refusal to augering at 3.58m depth								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded	

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Commercial Dev. - Innes at Mer Bleue Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG0811

REMARKS

HOLE NO. PH11-16

BORINGS BY CME 55 Power Auger **DATE** November 11, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.36	20 40 60 80	
OVERBURDEN						1	87.36		
						2	86.36		
						3	85.36		
3.15 End of Probehole Practical refusal to augering at 3.15m depth								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded	

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Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation
Pharand Lands - Innes Road at Mer Bleeu Road
Ottawa, Ontario

DATUM Geodetic, as provided by Stantec Consulting Ltd.

FILE NO. PG0811

REMARKS

HOLE NO. TP 6

BORINGS BY Backhoe **DATE** 12 Apr 06

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone / ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.81		
TOPSOIL 0.20									
Grey-brown **SILTY CLAY**						1	87.81		
1.20									
GLACIAL TILL: Brown clayey silt with sand, gravel, cobbles and boulders						2	86.81		
2.00									
End of Test Pit TP terminated on bedrock surface @ 2.00m depth (TP dry upon completion)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %
20 40 60 80

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation
Pharand Lands - Innes Road at Mer Bleeu Road
Ottawa, Ontario

DATUM Geodetic, as provided by Stantec Consulting Ltd.

FILE NO. PG0811

REMARKS

HOLE NO. TP 7

BORINGS BY Backhoe **DATE** 12 Apr 06

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.71		
TOPSOIL 0.20									
Very stiff to stiff, brown **SILTY CLAY**						1	87.71		
1.40									
GLACIAL TILL: Brown clayey silt with sand, gravel, cobbles and boulders						2	86.71		
2.20									
End of Test Pit TP terminated on bedrock surface @ 2.20m depth (TP dry upon completion)									

Pen. Resist. Blows/0.3m: ○ Water Content % — 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100 — ▲ Undisturbed △ Remoulded

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Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation
Pharand Lands - Innes Road at Mer Bleeu Road
Ottawa, Ontario

DATUM Geodetic, as provided by Stantec Consulting Ltd.

FILE NO. PG0811

REMARKS

HOLE NO. TP 8

BORINGS BY Backhoe **DATE** 12 Apr 06

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone / ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.02		
TOPSOIL 0.25									
Very stiff to stiff, brown **SILTY CLAY**						1	87.02		
						2	86.02		
- grey by 3.0m depth		G	1			3	85.02		▽
3.40 End of Test Pit (Open hole GWL @ 3.0m depth)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %

20 40 60 80

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation
Pharand Lands - Innes Road at Mer Bleeu Road
Ottawa, Ontario

DATUM Geodetic, as provided by Stantec Consulting Ltd.

FILE NO. PG0811

REMARKS

HOLE NO. TP 9

BORINGS BY Backhoe **DATE** 12 Apr 06

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone / ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	88.12		
TOPSOIL 0.20									
Very stiff to stiff, grey-brown **SILTY CLAY**						1	87.12		
2.00						2	86.12		
GLACIAL TILL: Grey-brown clayey silt with sand, gravel, cobbles and boulders						3	85.12		▽
3.20									
End of Test Pit (Open hole GWL @ 2.9m depth)									

Pen. Resist. Blows/0.3m: ● 50 mm Dia. Cone; ○ Water Content %
20 40 60 80

Shear Strength (kPa)
20 40 60 80 100
▲ Undisturbed △ Remoulded

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 strength of cohesionless soils is the relative density, 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.

Relative Density	'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 vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

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 is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

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 NXL size core. However, it can be used on smaller core sizes, such as BX, 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
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture 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 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 x 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

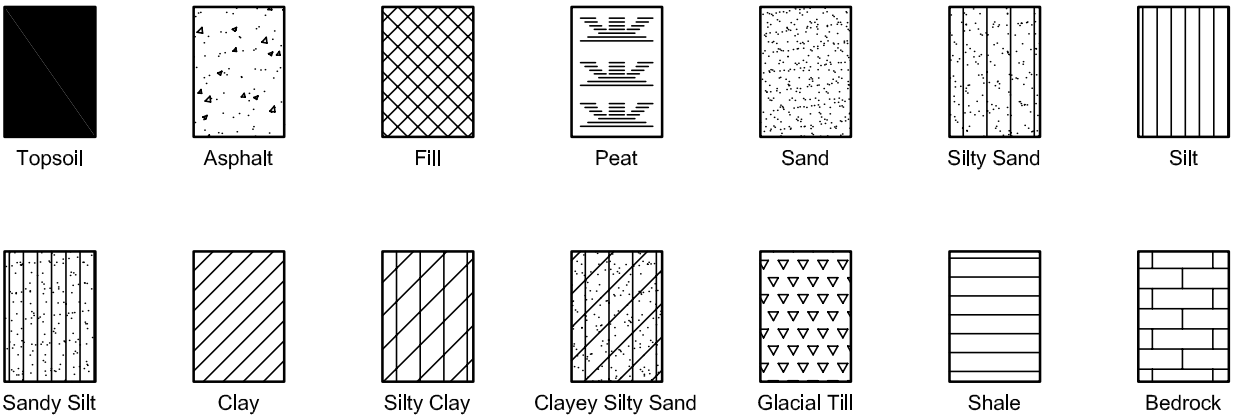
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void 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.

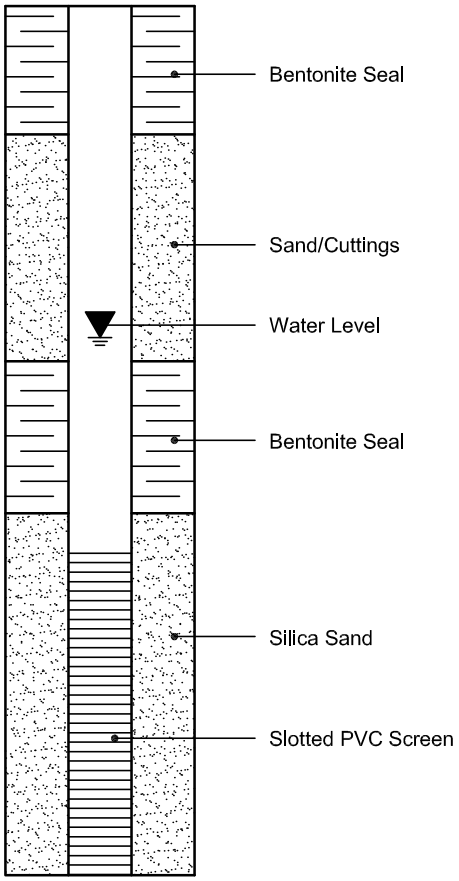
SYMBOLS AND TERMS (continued)

STRATA PLOT

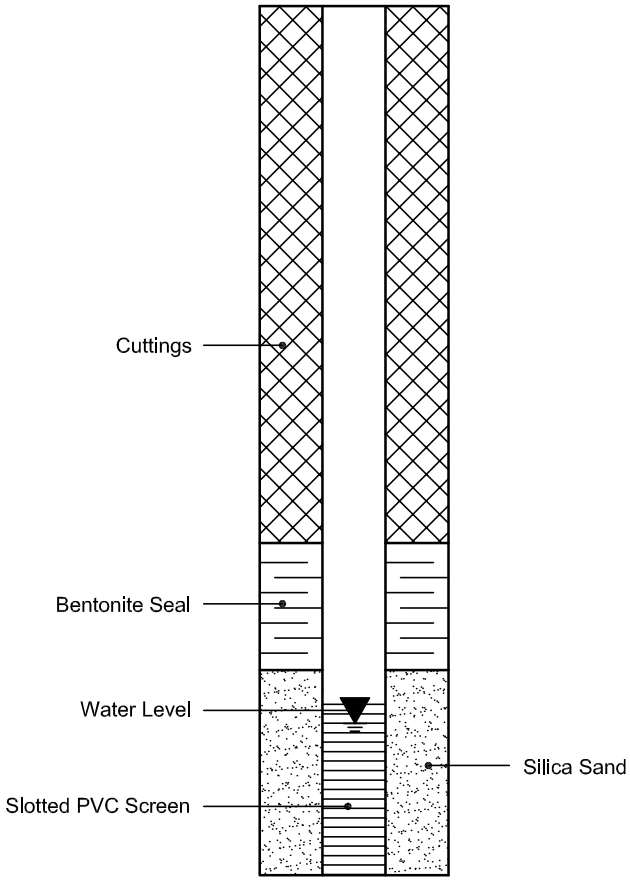


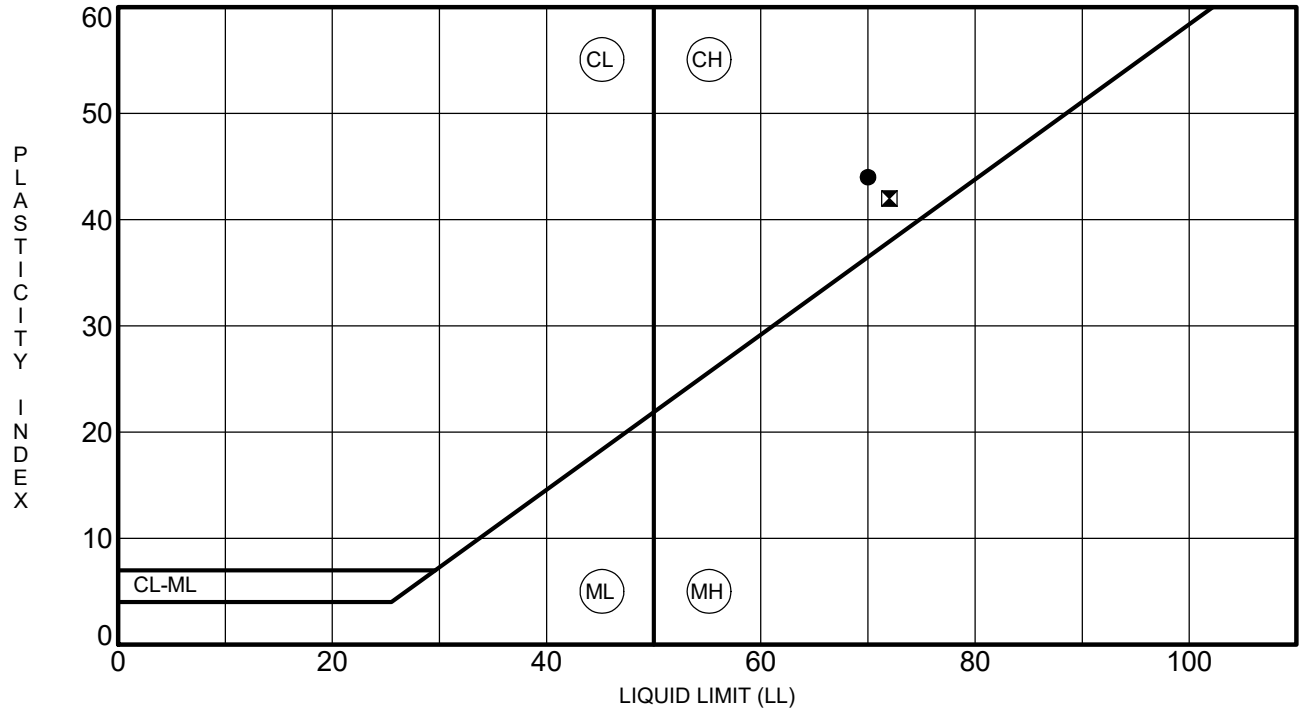
MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



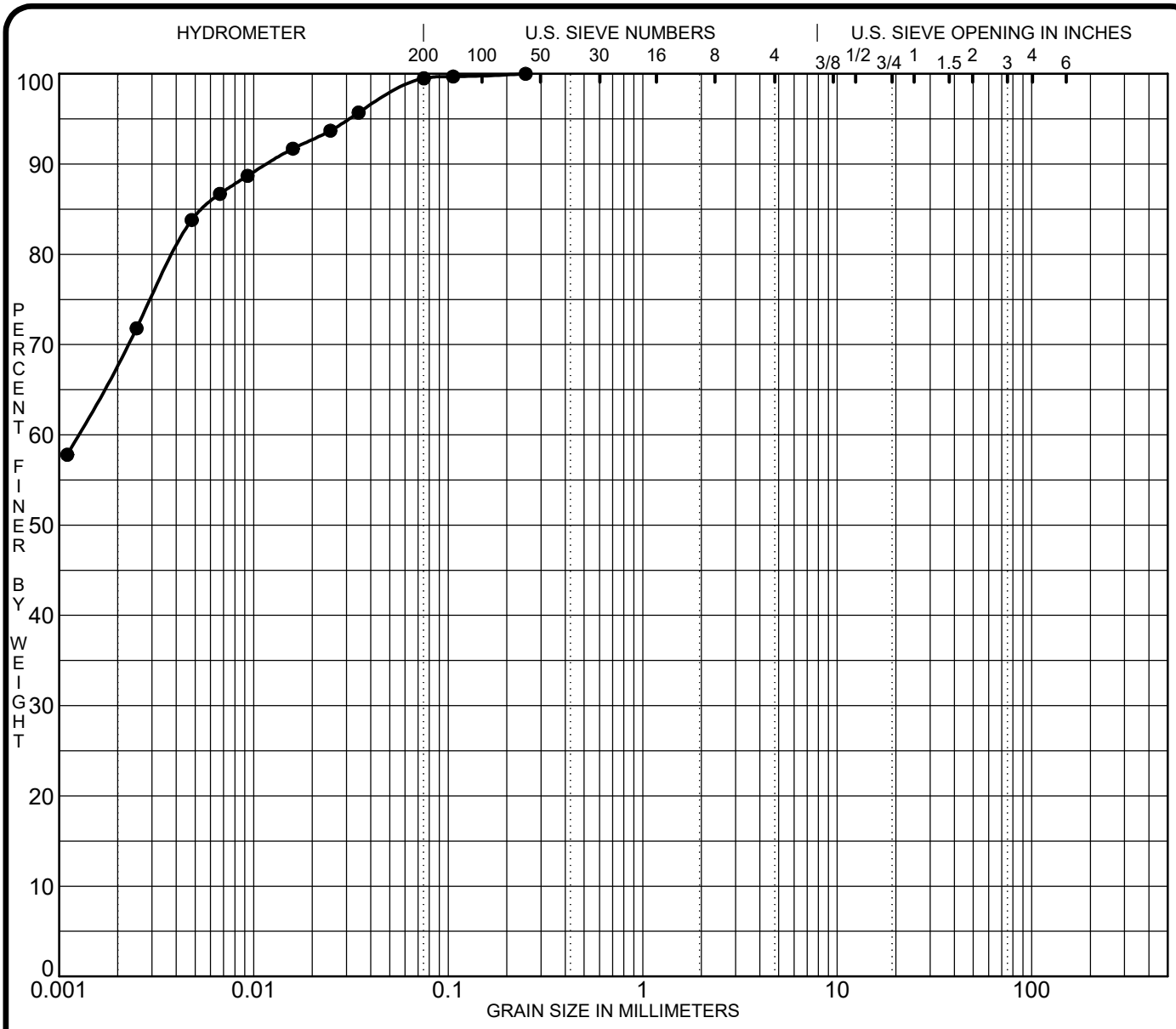


Specimen Identification		LL	PL	PI	Fines	Classification
●	**BH 4-24 SS3**	**70**	**26**	**44**		**CH - Inorganic clays of high plasticity**
⧓	**BH 9-24 SS3**	**72**	**30**	**42**		**CH - Inorganic clays of high plasticity**

CLIENT **Smartcentres c/o Calloway REIT (Orleans) Inc.**
FILE NO. **PG7042**
PROJECT **Proposed Commercial Development - 2025 Mer-Bleue Road**
DATE **08/2024**

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

ATTERBERG LIMITS' RESULTS



CLAY	SILT	SAND			GRAVEL		COBBLES
		fine	medium	coarse	fine	coarse	

	Specimen Identification	Classification	MC%	LL	PL	PI	Cc	Cu
●	**BH 3-24 SS3**		**41.9**					
⊠								
▲								
★								

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH 3-24 SS3**	**0.25**	**0.00**			**0.0**	**0.5**	**31.5**	**68.0**
⊠									
▲									
★									

CLIENT **Smartcentres c/o Calloway REIT (Orleans) Inc.**
FILE NO. **PG7042**
PROJECT **Proposed Commercial Development - 2025 Mer-Bleue Road**
DATE **08/2024**

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

GRAIN SIZE DISTRIBUTION

PATERSON GROUP

Linear Shrinkage
ASTM D4943-02

CLIENT:	Smartcentres c/o Calloway REIT (Orleans) Inc.	DEPTH	5' - 7'	FILE NO.:	PG7042
PROJECT:	2025 Mer-Bleue Rd	BH OR TP No:	BH7-24 SS3	DATE SAMPLED	12-Aug-24
LAB No:	55061	TESTED BY:	C.P	DATE RECEIVED	13-Aug-24
SAMPLED BY:	A.A.	DATE REPORTED:	28-Aug-24	DATE TESTED	14-Aug-24

LABORATORY INFORMATION & TEST RESULTS

	Moisture	**No. of Blows(7)**		**Calibration (Two Trials)**	**Tin NO.(x21)**
Tare	5.13		Tin	4.74	4.74
Soil Pat Wet + Tare	61.14		Tin + Grease	5.13	5.13
Soil Pat Wet	56.01		Glass	43.23	43.23
Soil Pat Dry + Tare	35.77		Tin + Glass + Water	85.34	85.3
Soil Pat Dry	30.64		Volume	36.98	36.94
Moisture	**82.80**		**Average Volume**	**36.96**	

Soil Pat + String	30.95
Soil Pat + Wax + String in Air	35.9
Soil Pat + Wax + String in Water	11.77
Volume Of Pat (Vdx)	24.13

RESULTS:

Shrinkage Limit	**22.77**
Shrinkage Ratio	**1.650**
Volumetric Shrinkage	**99.050**
Linear Shrinkage	**20.502**

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

Certificate of Analysis

Report Date: 20-Aug-2024

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

Order Date: 14-Aug-2024

Client PO: 61012

Project Description: PG7042

	Client ID:	BH7_24 SS3	-	-	-		
	Sample Date:	12-Aug-24 09:00	-	-	-	-	-
	Sample ID:	2433438-01	-	-	-		
	Matrix:	Soil	-	-	-		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	69.9	-	-	-	-	-
General Inorganics							
pH	0.05 pH Units	7.40	-	-	-	-	-
Resistivity	0.1 Ohm.m	65.9	-	-	-	-	-
Anions							
Chloride	10 ug/g	36	-	-	-	-	-
Sulphate	10 ug/g	45	-	-	-	-	-

APPENDIX 2

FIGURE 1 - KEY PLAN

FIGURE 2 - AERIAL PHOTOGRAPH - 2022

FIGURE 3 - AERIAL PHOTOGRAPH - 2011

DRAWING PG7042-1 - TEST HOLE LOCATION PLAN

FIGURE 1

KEY PLAN

PATERSON GROUP

FIGURE 2

Historical Aerial Photograph - 2022

PATERSON GROUP

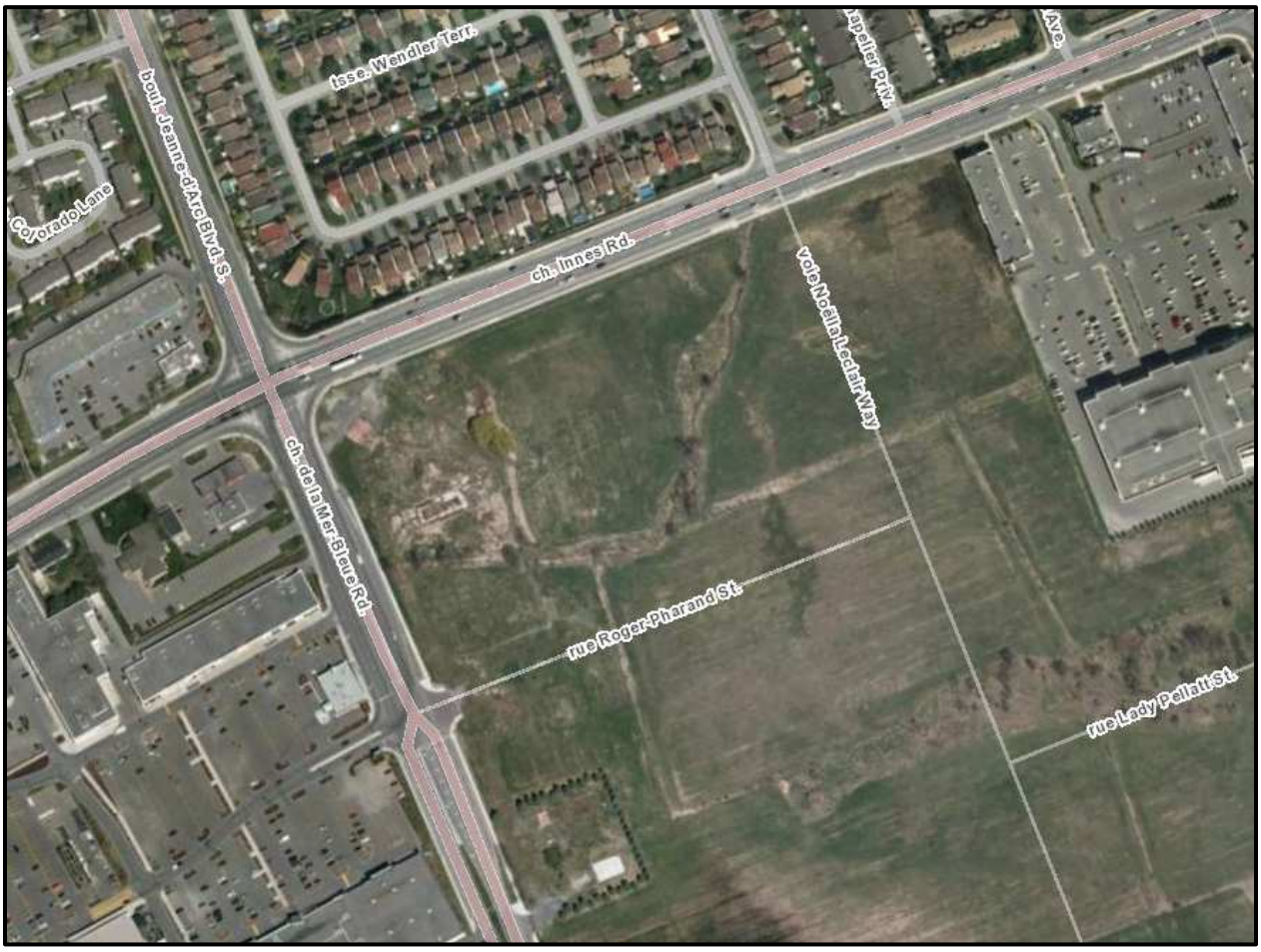
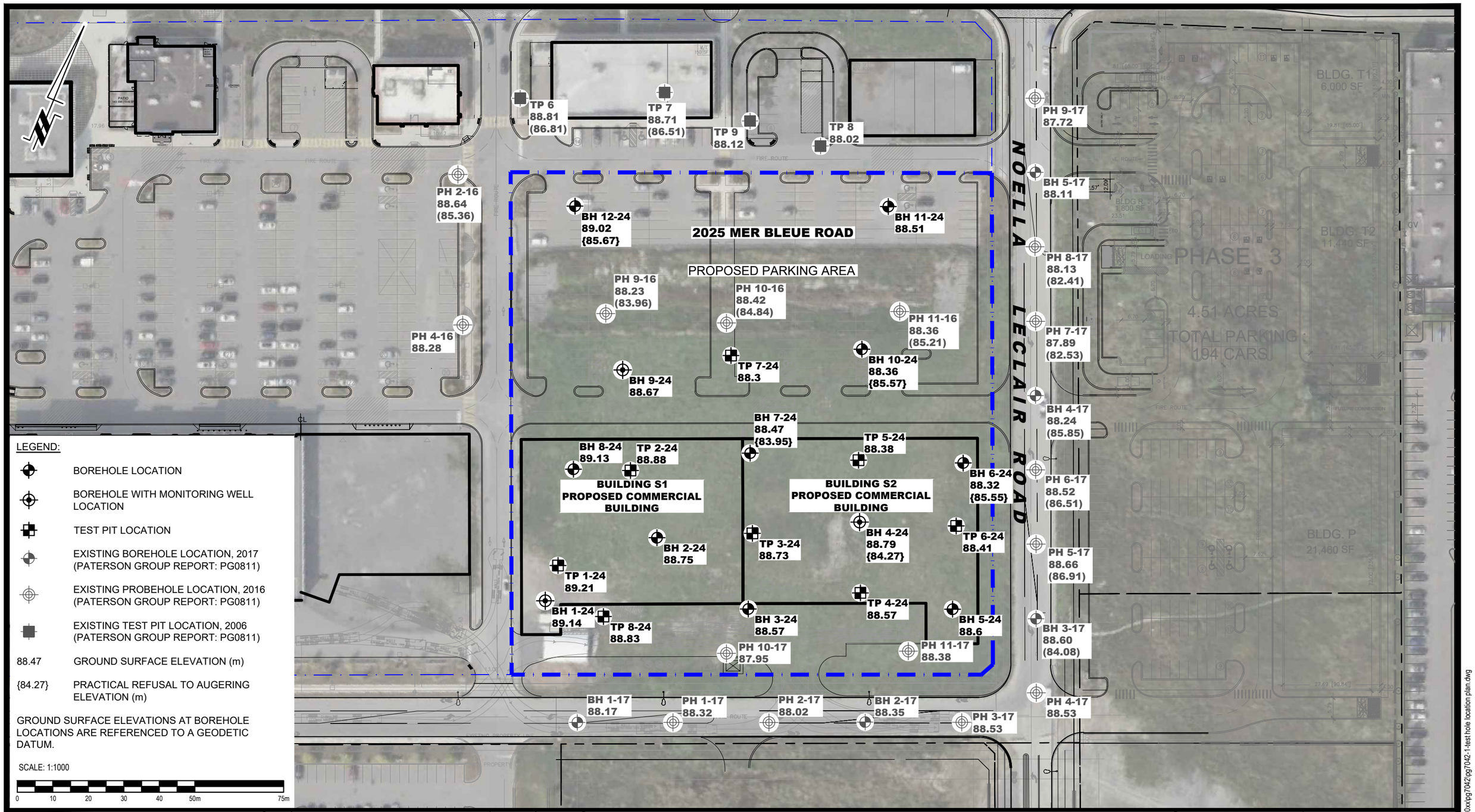


FIGURE 3

Historical Aerial Photograph - 2011

PATERSON GROUP



LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- TEST PIT LOCATION
- EXISTING BOREHOLE LOCATION, 2017 (PATERSON GROUP REPORT: PG0811)
- EXISTING PROBEHOLE LOCATION, 2016 (PATERSON GROUP REPORT: PG0811)
- EXISTING TEST PIT LOCATION, 2006 (PATERSON GROUP REPORT: PG0811)

88.47 GROUND SURFACE ELEVATION (m)

{84.27} PRACTICAL REFUSAL TO AUGERING ELEVATION (m)

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

SCALE: 1:1000

0 10 20 30 40 50m 75m

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

NO.	REVISIONS	DATE	INITIAL

SMARTCENTRES C/O CALLOWAY REIT (ORLEANS) INC.
GEOTECHNICAL INVESTIGATION
PROPOSED COMMERCIAL DEVELOPMENT
PHASE 2, 2025 MER-BLEUE ROAD
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:1000	Date: 08/2024
Drawn by: ZS	Report No.: PG7042-1
Checked by: YZ	Dwg. No.: PG7042-1
Approved by: SD	Revision No.:

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11x17