patersongroup

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

Supplemental Geotechnical Investigation

Proposed Multi-Storey Buildings
Blocks 8 - Petrie's Landing II
8466 Jeanne D'Arc Boulevard
Ottawa, Ontario

Prepared For

Construction Brigil

July 30,2019

Report: PG4112-2

Paterson Group Inc.
Consulting Engineers
154 Colonnade Road South
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

Table of Contents

Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Construction Brigil to conduct a supplemental geotechnical investigation for Blocks 8 at Petrie's Landing II residential development located at 8466 Jeanne D'Arc Boulevard in the City of Ottawa (refer to Figure 1 - Key Plan presented in Appendix 2).

The objective of the investigation was to:

- ☐ determine the subsoil and groundwater conditions at this site by means of test holes and existing soils information.

- ☐ provide geotechnical recommendations for the design of the proposed development including construction considerations which may affect the design.

The following 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

It is understood that Block 8 of the residential development will consist of a 10 storey residential building with 2 levels of underground parking with pathways, landscaping and paved parking areas with local access roadways and will be serviced by municipal services.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the supplemental geotechnical investigation was carried out on July 9 and 10, 2019, at that time 3 boreholes (BH1-19 to BH3-19) were drilled to a maximum depth of 42.9 m. A initial geotechnical investigation was carried out, for the subject block, on April 24 and 25, 2017 which consisted of extending a total of 3 boreholes (BH 4-17 to BH 6-17) to a maximum depth of 9.8 m below the existing grade. The borehole locations were distributed in a manner to provide general coverage of the subject site at the proposed buildings footprints area and taking into consideration site features. Borehole locations are illustrated on Drawing PG4112-2 - Test Hole Location Plan included in Appendix 2.

The boreholes were drilled using a track-mounted auger drill rig operated by a two-person crew. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer. The drilling procedure consisted of augering to the required depths at the selected locations, sampling and testing the overburden.

Sampling and In Situ Testing

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

Standard Penetration Tests (SPT) were conducted and 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 sample 300 mm into the soil after the initial penetration of 150 mm using a 63.5 kg hammer falling from a height of 760 mm.

Undrained shear strength testing, using a vane apparatus, was carried out at regular intervals of depth in cohesive soils.

The overburden thickness was evaluated by a dynamic cone penetration test (DCPT) completed on all 3 boreholes of the current investigation. The DCPT consists of driving a steel drill rod, equipped with a 50 mm diameter cone at the tip, using a 63.5 kg hammer falling from a height of 760 mm. The number of blows required to drive the cone into the soil is recorded for each 300 mm increment.

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

Groundwater

Flexible polyethylene standpipes were installed in boreholes to permit monitoring of the groundwater levels subsequent to the completion of the sampling program.

3.2 Field Survey

The borehole locations and ground surface elevations at the borehole locations were provided by Annis, O'Sullivan Vollebekk Ltd. The borehole locations and the ground surface elevation at the borehole locations are presented on Drawing PG4112-2 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

Soil samples recovered from the subject site were visually examined in our laboratory to review the field logs.

One representative soil sample was submitted for Atterberg limits testing and hydrometer sieve analysis as part of the current investigation. The results are presented in Subsection 6.8.

3.4 Analytical Testing

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

4.0 Observations

4.1 Surface Conditions

The subject property is bordered to the north by Jeanne D'Arc Boulevard North, to the east by a treed area and Taylor Creek, to the south by parcel currently in development by the same owner, and to the west by Prestige Circle and residential dwellings.

The site is relatively flat and grass covered. Some existing fill piles containing organic and construction debris were observed near the south portion of the site near the current construction project

4.2 Subsurface Profile

Generally, the soil conditions encountered at the test holes locations consist of topsoil or fill overlying a brown silty clay crust over a deep deposit of grey silty clay.

Based on available geological mapping and previous investigations conducted by Paterson in the area, interbedded limestone and dolomite bedrock of the Gull River formation is present in this area with a drift thickness of 40 to 50 m.

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

Silty Clay

A weathered silty clay crust varying in depths between 0.3 and 3 m was encountered at the borehole locations. In situ shear vane field testing was carried out in the lower portion of the weathered crust yielded undrained shear strength values ranging from approximately 90 to 105 kPa. These values are indicative of a stiff to very stiff consistency.

Grey silty clay was encountered below the weathered crust at all borehole locations. In situ shear vane field testing carried out in the grey silty clay yielded undrained shear strength values ranging between 38 and 60 kPa. These values are indicative of a firm to stiff consistency.

4.3 Groundwater

The measured groundwater levels in the boreholes are presented in Table 1 below.

Table 1
Summary of Groundwater Level Readings

Borehole Number	Ground Elevation (m)	Groundwater Levels (m)		Recording Date
		Depth	Elevation	
BH 1-19	54.29	4.04	50.25	July 29, 2019
BH 2-19	52.71	6.53	46.18	July 29, 2019
BH 3-19	52.57	6.10	46.47	July 29, 2019
BH 4-17	53.84	dry	-	May 1, 2017
BH 5-17	52.45	4.35	48.10	May 1, 2017
BH 6-17	52.59	5.48	47.11	May 1, 2017

Note: The groundwater level at each current borehole location is referenced to the borehole ground surface elevation, as provided by Annis, O'Sullivan Vollebekk Ltd.

It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater level could vary at the time of construction. The long term groundwater level is expected to be at a depth of 4 to 6 m below the existing grade.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is considered satisfactory for the proposed multi-storey building. Based on the results of the field program, it's expected that the proposed building will be founded on a raft foundation placed on the undisturbed stiff silty clay bearing surface. Where design building loads exceed the given bearing resistance values, consideration may be given to placing the building footprint on end bearing piles and the building garage footprint extending beyond the building would be placed on conventional spread footings.

A permissible grade raise restriction is required for the subject site due to the presence of a deep silty clay deposit. It's expected that final grades will be close to the existing grades.

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

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, such as those containing organics, should be stripped from under any buildings, paved areas, pipe bedding and other settlement sensitive structures.

Fill Placement

Fill used for grading beneath the building footprints, unless otherwise specified, should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. The fill should be tested and approved prior to delivery to the site. It should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the building area should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Site-excavated soil can be used as general landscaping fill where settlement of the ground surface is of minor concern. These materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If these materials are to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 95% of their respective SPMDD. Site-excavated soils are not suitable for use as backfill against foundation walls due to the frost heave potential of the site excavated soils below settlement sensitive areas, such as concrete sidewalks and exterior concrete entrance areas.

5.3 Foundation Design

Raft Foundation

Consideration can be given to a raft foundation if the building loads are acceptable. It's expected that a raft foundation will be founded at a depth of approximately 7 to 8 m below the existing grade. The following parameters may be used for a raft foundation design:

- ☐ For design purposes, the factored bearing resistance at ULS can be taken as **250 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance value at ULS.
- ☐ The amount of settlement of the raft slab will be dependent on the sustained raft contact pressure. A bearing resistance value at SLS (contact pressure) of **175 kPa** can be used. The loading conditions for the contact pressure are based on sustained loads, that are generally taken to be 100% Dead Load and 50% Live Load.
- ☐ The modulus of subgrade reaction was calculated to be **5 MPa/m** for a contact pressure of **150 kPa**. The design of the raft foundation is required to consider the relative stiffness of the reinforced concrete slab and the supporting bearing medium.
- ☐ The proposed building can be designed using the above parameters and a total and differential settlement of 25 and 20 mm, respectively.

Deep Foundation

For support of the proposed multi-storey building consideration could be given to using concrete filled steel pipe piles driven to refusal on the bedrock surface.

For deep foundations, concrete-filled steel pipe piles are generally utilized in the Ottawa area. Applicable pile resistance at SLS values and factored pile resistance at ULS values are given in Table 2. A resistance factor of 0.4 has been incorporated into the factored ULS values. Note that these are all geotechnical axial resistance values.

The geotechnical pile resistance values were estimated using the Hiley dynamic formula, to be confirmed during pile installation with a program of dynamic monitoring. For this project, the dynamic monitoring of two to four piles would be recommended. As a minimum, the pipe piles should be equipped with a base plate having a thickness of at least 20 mm to minimize damage to the pile tip during driving. Re-striking of all piles at least once will also be required after at least 48 hours have elapsed since initial driving.

Table 2 - Pile Foundation Design Data

Pile Outside Diameter (mm)	Pile Wall Thickness (mm)	Geotechnical Axial Resistance		Final Set (blows/12 mm)	Transferred Hammer Energy (kJ)
		SLS (kN)	Factored at ULS (kN)		
245	9	940	1130	10	29
245	11	1175	1410	10	35
245	13	1375	1650	10	42

Permissible Grade Raise Restriction

Due to the presence of the silty clay layer, the subject site will be subjected to a permissible grade restriction. A permissible grade raise restriction of **2 m** is recommended for the subject site.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class E** as defined in the Ontario Building Code 2012 (OBC 2012; Table 4.1.8.4.A) for the foundations considered at this site. The soil underlying the proposed shallow foundations are not susceptible to liquefaction for the local seismicity. It may be possible that the seismic site classification could be a Class D. To confirm this better site classification, a site specific shear wave velocity test will be required.

5.5 Slab-on-Grade Construction

With the removal of all topsoil and deleterious materials, within the footprint of the proposed buildings, the native soil or engineered fill surface will be considered to be an acceptable subgrade surface on which to commence backfilling for the floor slab. The upper 150 mm of sub-slab fill should consist of an OPSS Granular A crushed stone. All backfill material within the footprint of the proposed buildings should be placed in maximum 300 mm thick loose lifts and compacted to at least 98% of its SPMDD.

Any soft areas should be removed and backfilled with appropriate backfill material. OPSS Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab.

5.6 Pavement Design

Car only parking areas, access lanes and heavy truck parking areas are anticipated at this site. The proposed pavement structures are shown in Tables 3 and 4.

Table 3 - 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 fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill	

Table 4 - Recommended Pavement Structure
Access Lanes and Heavy Truck Parking Areas

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

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material. The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 98% of the material's SPMDD using suitable vibratory equipment.

Pavement Structure Drainage

Satisfactory performance of the pavement structure is largely dependent on keeping 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 its load carrying capacity.

Due to the impervious nature of the subgrade materials consideration should be given to installing subdrains during the pavement construction. These drains should be installed at each catch basin, be at least 3 m long and should extend in four orthogonal directions or longitudinally when placed along a curb. Along local streets, the drains should be placed along the edges of the pavement. 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

It is recommended that a perimeter foundation drainage system be provided for the proposed structures. The system should consist of a 150 mm diameter perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 19 mm clear crushed stone, placed at the footing level around the exterior perimeter of the structures. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

Backfill against the exterior sides of the foundation walls should consist of free-draining non frost susceptible granular materials, such as clean sand or OPSS Granular B Type I granular material. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls. A drainage geocomposite, such as Miradrain G100N or Delta Drain 6000, connected to the perimeter foundation drainage system is recommended.

6.2 Protection of Footings, Pile Caps and Grade Beams Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effect of frost action. A minimum of 1.5 m thick soil cover (or equivalent) should be provided in this regard.

Exterior unheated footings, such as those for isolated exterior piers, are more prone to deleterious movement associated with frost action than the exterior walls of the structure proper and require additional protection, such as soil cover of 2.1 m or a combination of soil cover and foundation insulation.

6.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is assumed that sufficient room will be available for the greater part of the excavation to be undertaken 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 subsoil at this site 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 be kept away 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 & Standard Detail Drawings from the Department of Public Works and Services, Infrastructure Services Branch of the City of Ottawa.

At least 150 mm of OPSS Granular A should be used for bedding for sewer and water pipes when placed on soil subgrade. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to at least 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 compacted to a minimum of 95% of the material's SPMDD.

Generally, it should be possible to re-use the moist, not wet, silty clay above the cover material if the excavation and filling operations are carried out in dry weather conditions. The wet silty clay should be given a sufficient drying period to decrease its moisture content to an acceptable level to make compaction possible prior to being re-used.

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.

6.5 Groundwater Control

Groundwater Control for Building Construction

It is anticipated that groundwater infiltration into the excavations should be low to moderate and controllable using open sumps. Pumping from open sumps should be sufficient to control the groundwater influx through the sides of shallow excavations.

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.

Permit to Take Water

A temporary Ministry of the Environment, Conservation and Parks (MECP) Category 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 of 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, 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. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

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 (normal cement) would be appropriate for this site. The chloride content and the pH of the sample indicate that they are not significant factors 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

Tree Planting Restrictions

In accordance with the City of Ottawa Tree Planting in Sensitive Marine Clay Soils(2017 Guidelines), Paterson completed a soil review of the site to determine applicable tree planting setbacks. Atterberg limits testing was completed for recovered silty clay samples at selected locations throughout the subject site. A shrinkage limit test and sieve analysis testing was also completed on selected soil samples. The shrinkage limit testing indicates a shrinkage limit of 15% with a shrinkage ratio of 1.99. The results of our Atterberg limit and sieve testing are presented in Appendix 1.

Based on the results of our testing, the clay on site can be defined as low to medium plasticity silty clay (Plasticity index < 40%). In accordance with the city of Ottawa guidelines, the tree planting setback limits may be reduced to 4.5 m for small (mature tree height up to 7.5m) and medium size trees (mature tree height 7.5 m 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 must be satisfied for footings within 10 m from the tree, as measured from the centre of the tree trunk and verified by means of the Grading Plan as indicated procedural changes below.

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

- ❏ The tree species must be small (mature 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 surround 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 subdivision Grading Plan.

7.0 Recommendations

It is a requirement for the foundation design data provided herein to be applicable that the following material testing and observation program be performed by the geotechnical consultant.

- Review of the grading plan once available
- Observation of all subgrades prior to backfilling.
- Observation of all bearing surfaces prior to the placement of concrete.
- Sampling and testing of the concrete and fill materials used.
- Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- Observation of all subgrades prior to backfilling.
- Field density tests to determine the level of compaction achieved.
- Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued upon the completion of a satisfactory inspection program by the geotechnical consultant.

8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review the grading plan once available and our recommendations when the drawings and specifications are complete.

A geotechnical investigation of this nature is a limited sampling of a site. The recommendations are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around the test locations. The extent of the limited area depends on the soil, bedrock and groundwater conditions, as well the history of the site reflecting natural, construction, and other activities. Should any conditions at the site be encountered which differ from those at the test locations, we request notification immediately in order to permit reassessment of our recommendations.

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 Construction Brigil or their agent(s) is not authorized without review by Paterson Group for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Joey R. Villeneuve, M.A.Sc, P.Eng.

Carlos P. Da Silva, P.Eng., ing., QP_{ESA}

LICENSED PROFESSIONAL ENGINEER
C. P. DA SILVA
PROVINCE OF ONTARIO

Report Distribution

☐ Construction Brigil
☐ Paterson Group

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ATTERBERG LIMITS RESULTS

HYDROMETER SIEVE ANALYSIS RESULTS

ANALYTICAL TESTING RESULTS

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

REMARKS

BORINGS BY CME 55 Power Auger

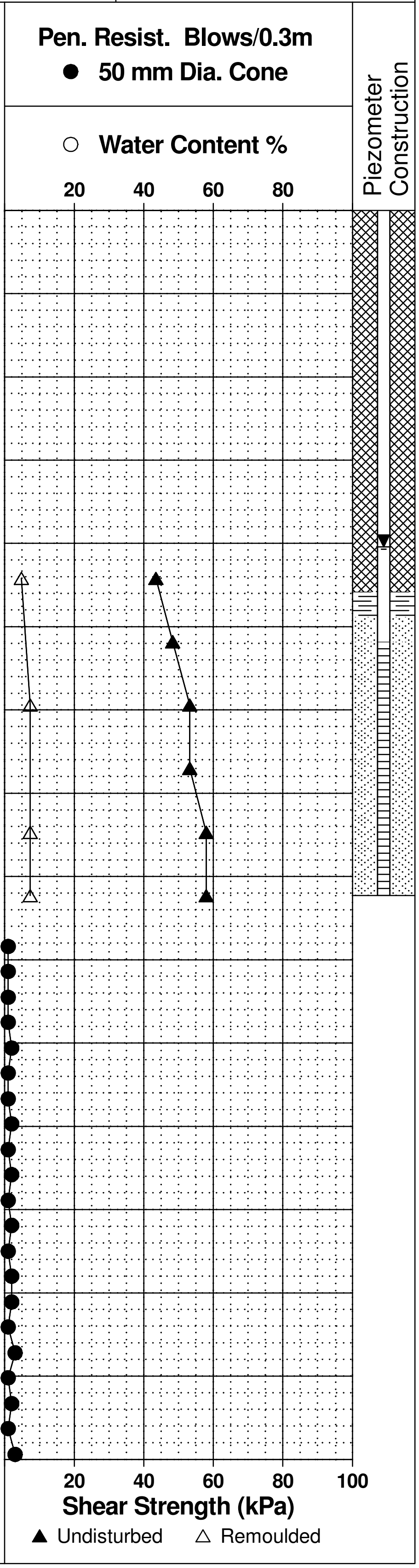
DATE 2019 July 9

FILE NO. PG4112

HOLE NO. BH 1-19

SOIL DESCRIPTION	TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
FILL: Brown silty sand, some gravel and organics 0.28	AU	1		
Brown **SILTY CLAY** with organics 1.37	SS	2	58	8
Very stiff to stiff, brown **SILTY CLAY** - grey by 3.0m depth 8.23	SS	3	88	15
	SS	4	100	9
	SS	5	100	3
	SS	6	100	W
Dynamic Cone Penetration Test commenced at 8.23m depth.				

DEPTH (m)	ELEV. (m)
0	54.29
1	53.29
2	52.29
3	51.29
4	50.29
5	49.29
6	48.29
7	47.29
8	46.29
9	45.29
10	44.29
11	43.29
12	42.29
13	41.29
14	40.29
15	39.29



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

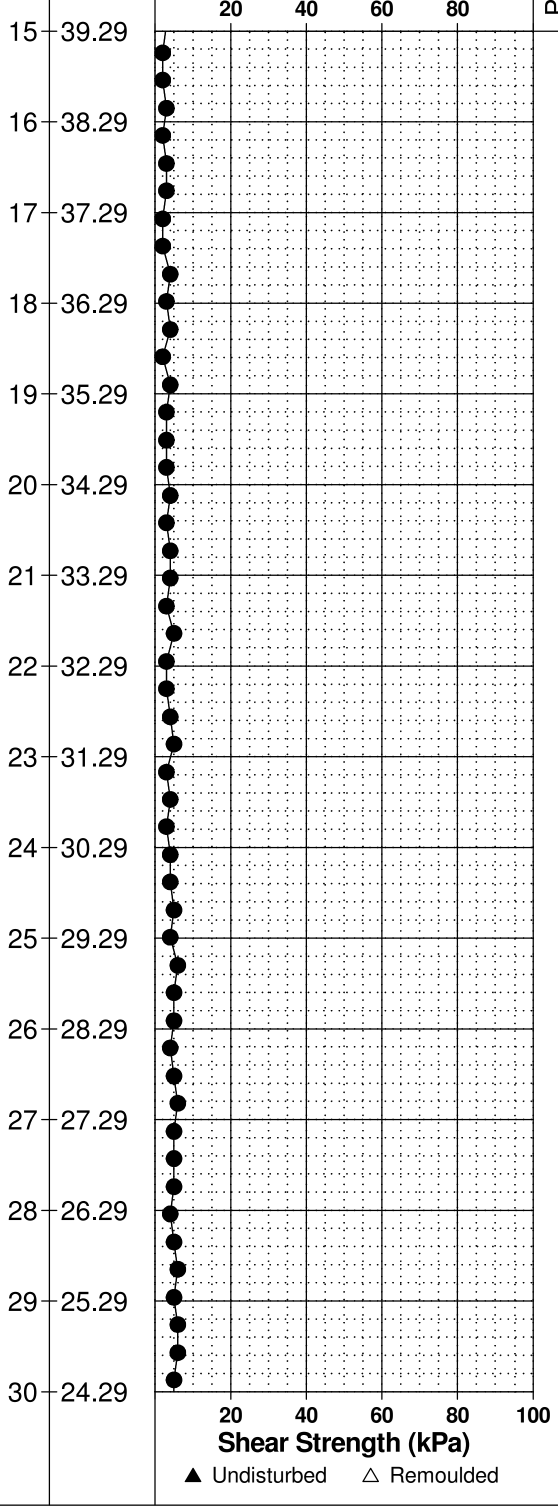
REMARKS

BORINGS BY CME 55 Power Auger **DATE** 2019 July 9

FILE NO. PG4112

HOLE NO. BH 1-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD				
GROUND SURFACE									



patersongroup Consulting Engineers
154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

REMARKS

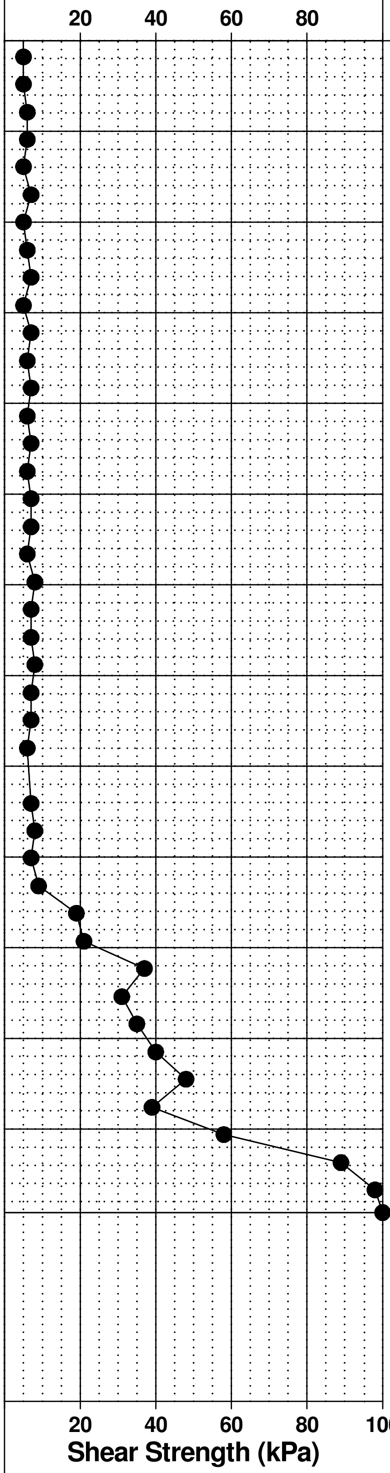
BORINGS BY CME 55 Power Auger

DATE 2019 July 9

FILE NO. PG4112

HOLE NO. BH 1-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE		TYPE	NUMBER	% RECOVERY	N VALUE or RQD				
						30	24.29		
						31	23.29		
						32	22.29		
						33	21.29		
						34	20.29		
						35	19.29		
						36	18.29		
						37	17.29		
						38	16.29		
						39	15.29		
						40	14.29		
						41	13.29		
						42	12.29		
42.92 End of Borehole Practical DCPT refusal at 42.92m depth. (GWL @ 4.04m - July 29, 2019)									



Shear Strength (kPa)

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers
154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

REMARKS

BORINGS BY CME 55 Power Auger

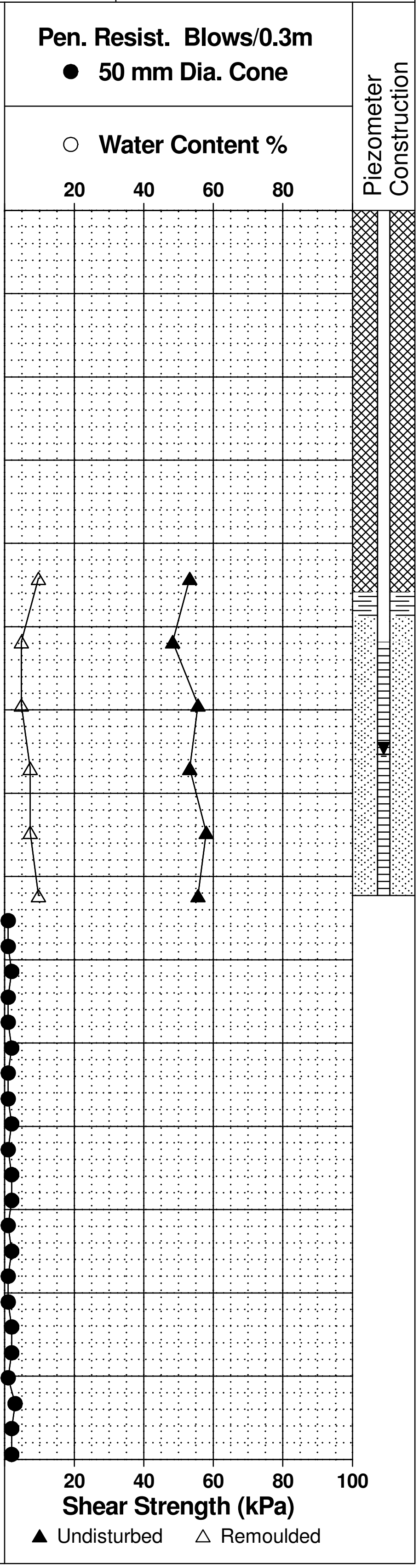
DATE 2019 July 9

FILE NO. PG4112

HOLE NO. BH 2-19

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
FILL: Brown silty sand, some gravel and organics 0.33	AU	1		
Very stiff to stiff, brown **SILTY CLAY** - grey by 3.0m depth	SS	2	17	13
	SS	3	100	7
	SS	4	33	4
	SS	5	100	W
8.23				
Dynamic Cone Penetration Test commenced at 8.23m depth.				

DEPTH (m)	ELEV. (m)
0	52.71
1	51.71
2	50.71
3	49.71
4	48.71
5	47.71
6	46.71
7	45.71
8	44.71
9	43.71
10	42.71
11	41.71
12	40.71
13	39.71
14	38.71
15	37.71



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

FILE NO. **PG4112**

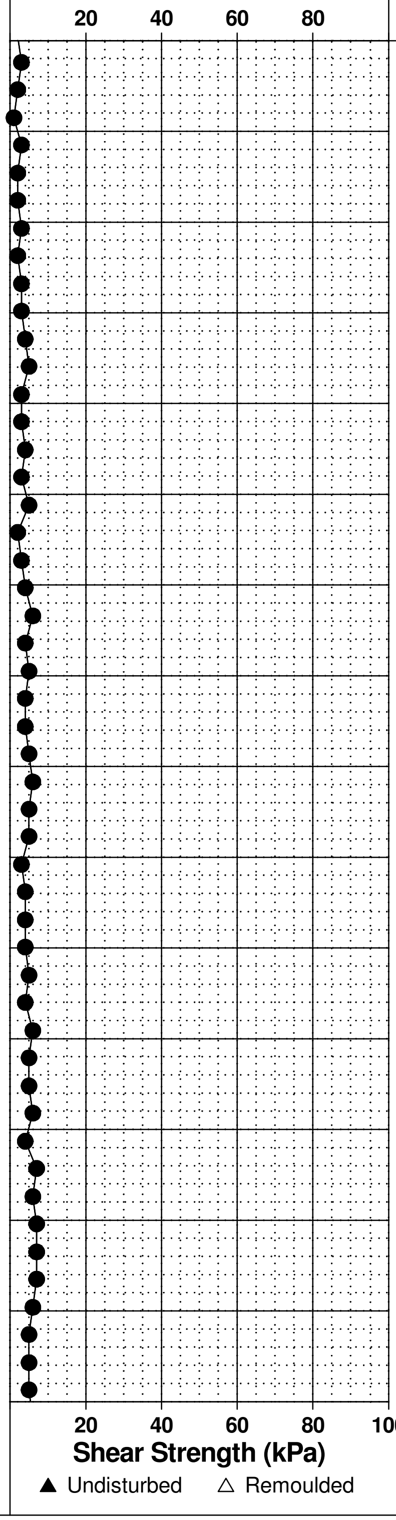
REMARKS

HOLE NO. **BH 2-19**

BORINGS BY CME 55 Power Auger

DATE 2019 July 9

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE		TYPE	NUMBER	% RECOVERY	N VALUE or RQD				
						15	37.71		
						16	36.71		
						17	35.71		
						18	34.71		
						19	33.71		
						20	32.71		
						21	31.71		
						22	30.71		
						23	29.71		
						24	28.71		
						25	27.71		
						26	26.71		
						27	25.71		
						28	24.71		
						29	23.71		
						30	22.71		



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 July 9

FILE NO. PG4112

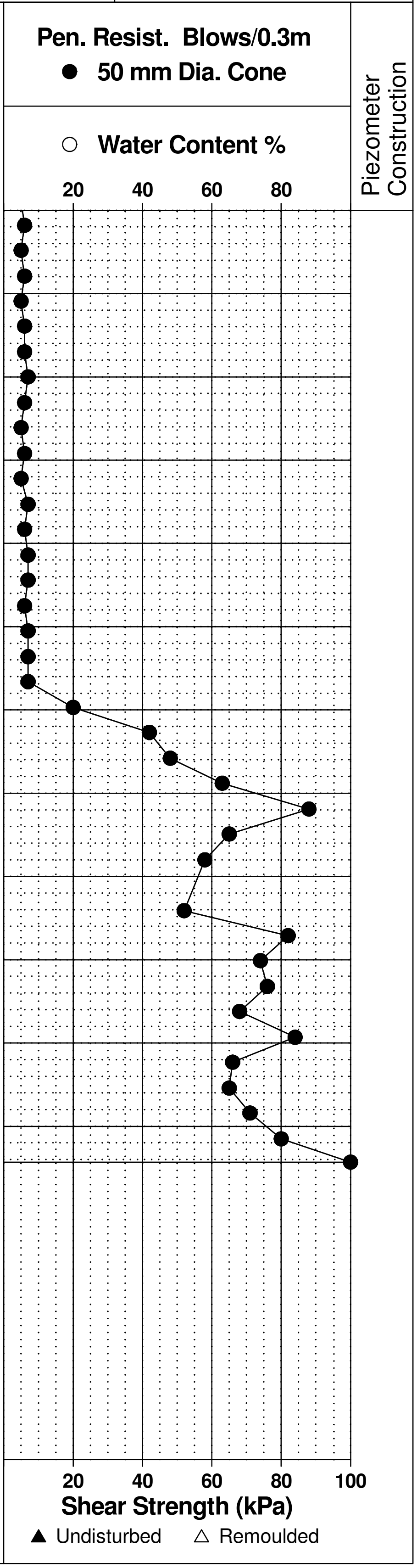
HOLE NO. BH 2-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
						30	22.71
						31	21.71
						32	20.71
						33	19.71
						34	18.71
						35	17.71
						36	16.71
						37	15.71
						38	14.71
						39	13.71
						40	12.71
						41	11.71
41.43							

End of Borehole

Practical DCPT refusal at 41.43m depth.

(GWL @ 6.53m - July 29, 2019)



patersongroup Consulting Engineers
154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

REMARKS

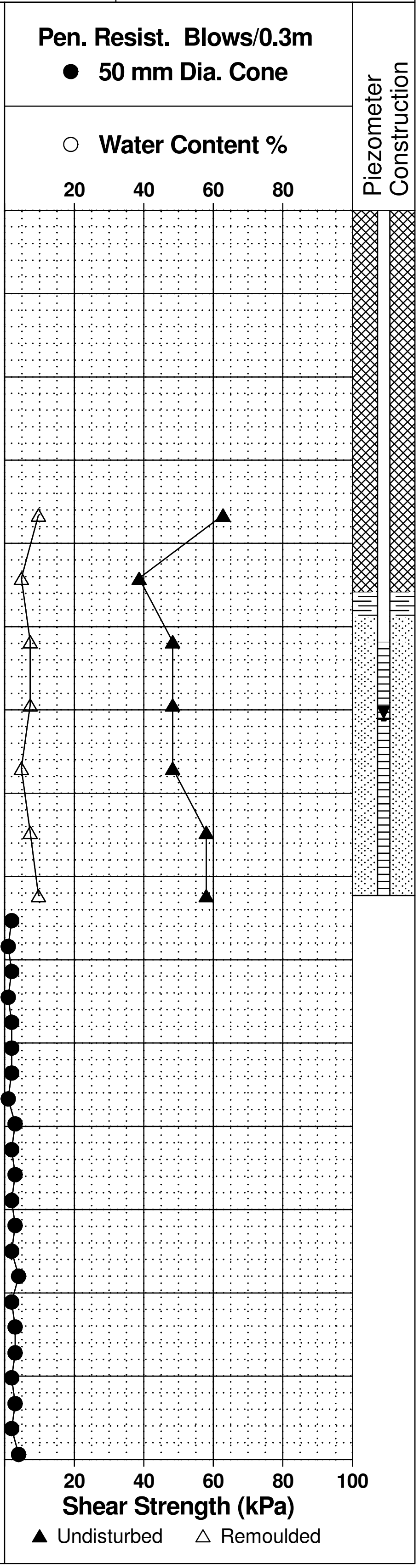
BORINGS BY CME 55 Power Auger

DATE 2019 July 10

FILE NO. PG4112

HOLE NO. BH 3-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	52.57
FILL: Brown silty sand, some gravel and organics 0.33		AU	1				
		SS	2	54	14	1	51.57
		SS	3	100	9	2	50.57
Very stiff to stiff, brown **SILTY CLAY**		SS	4	38	5		
- grey by 3.0m depth						3	49.57
						4	48.57
						5	47.57
						6	46.57
						7	45.57
8.23						8	44.57
Dynamic Cone Penetration Test commenced at 8.23m depth.							
						9	43.57
						10	42.57
						11	41.57
						12	40.57
						13	39.57
						14	38.57
						15	37.57



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

REMARKS

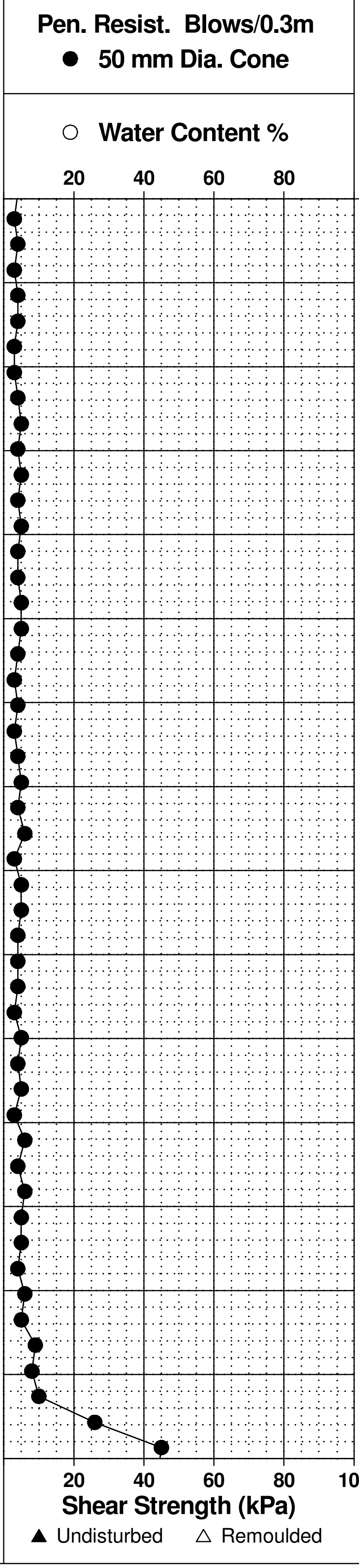
BORINGS BY CME 55 Power Auger

DATE 2019 July 10

FILE NO. PG4112

HOLE NO. BH 3-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
GROUND SURFACE							
						15	37.57
						16	36.57
						17	35.57
						18	34.57
						19	33.57
						20	32.57
						21	31.57
						22	30.57
						23	29.57
						24	28.57
						25	27.57
						26	26.57
						27	25.57
						28	24.57
						29	23.57
						30	22.57



Piezometer Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Petrie's Landing III - Block 8 - 2466 Jeanne D'arc Blvd.
Ottawa, Ontario

DATUM Geodetic elevations provided by Annis O'Sullivan Vollebekk Ltd.

REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 July 10

FILE NO. PG4112

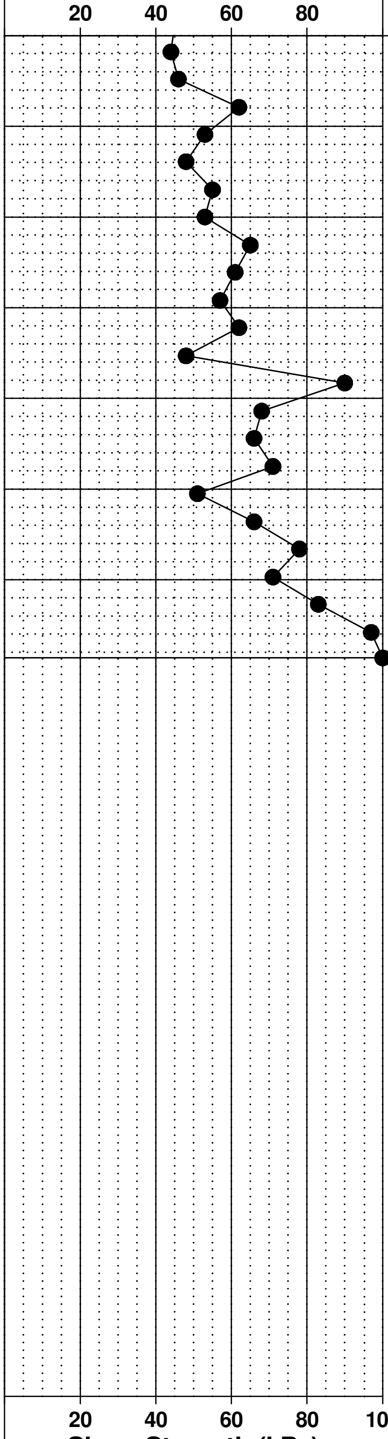
HOLE NO. BH 3-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
						30	22.57
						31	21.57
						32	20.57
						33	19.57
						34	18.57
						35	17.57
						36	16.57
36.86							
End of Borehole Practical DCPT refusal at 36.86m depth. (GWL @ 6.10m - July 29, 2019)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Water Content %

Piezometer Construction



Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers
154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Multi-Storey Building - 8466 Jean D'Arc Boulevard
Ottawa, Ontario

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

REMARKS

BORINGS BY CME 55 Power Auger

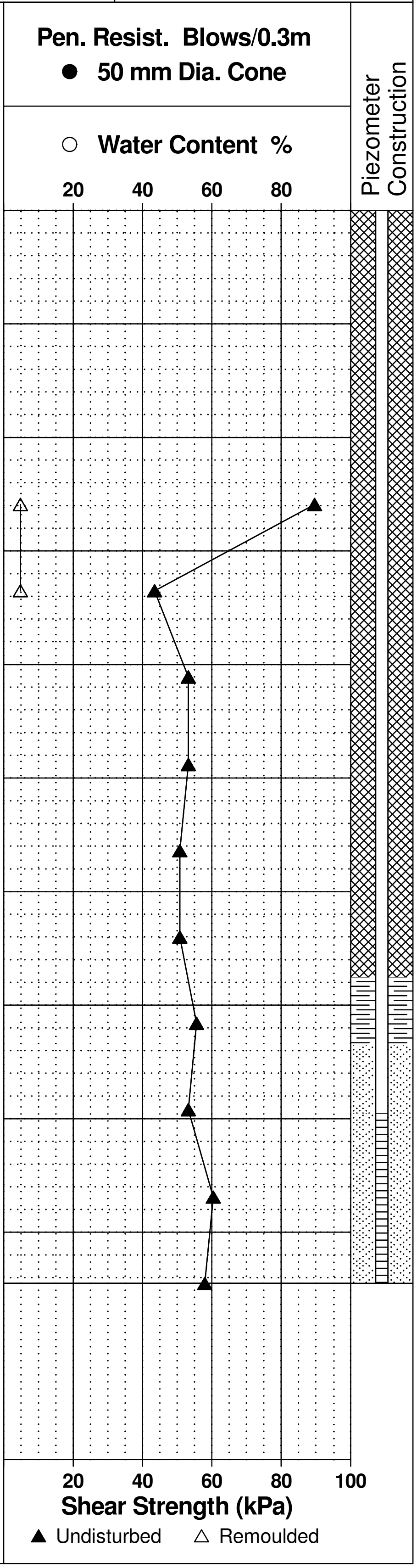
DATE April 24, 2017

FILE NO. PG4112

HOLE NO. BH 4-17

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
FILL: Brown silty clay with sand and topsoil, trace gravel, cobbles, boulders, crushed stone and organics (0.69)	AU	1		
Firm to stiff, brown **SILTY CLAY** - grey by 3.0m depth	SS	2	83	10
	SS	3	83	10
(9.45) End of Borehole (BH dry and blocked at 5.46m depth - May 1, 2017)				

DEPTH (m)	ELEV. (m)
0	53.84
1	52.84
2	51.84
3	50.84
4	49.84
5	48.84
6	47.84
7	46.84
8	45.84
9	44.84



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Multi-Storey Building - 8466 Jean D'Arc Boulevard
Ottawa, Ontario

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

REMARKS

BORINGS BY CME 55 Power Auger

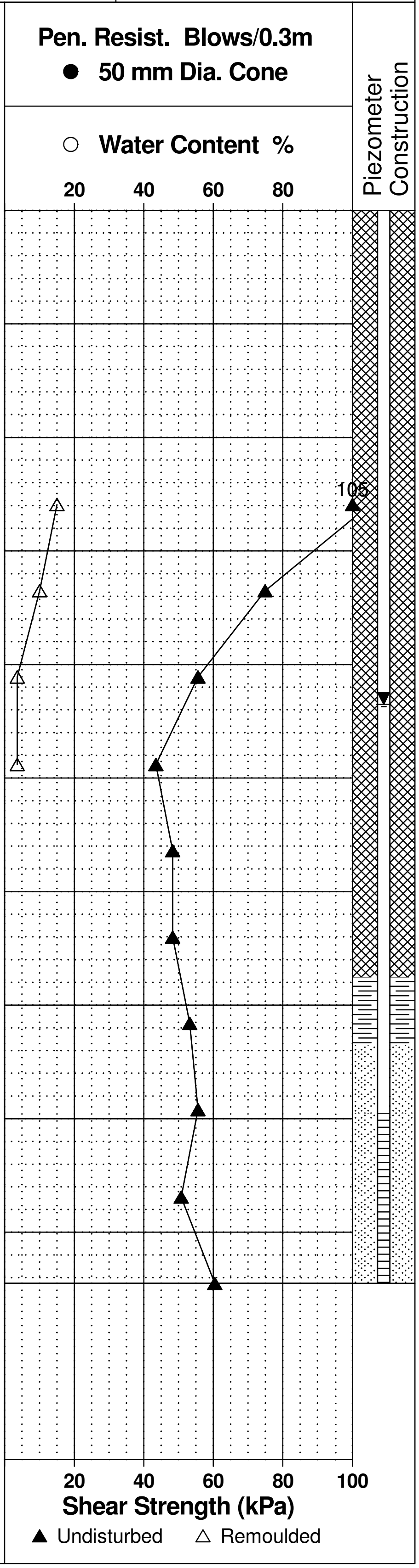
DATE April 24, 2017

FILE NO. PG4112

HOLE NO. BH 5-17

SOIL DESCRIPTION	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
FILL: Brown silty sand with clay, trace gravel, cobbles and organics 0.18	AU	1		
Very stiff to firm, brown **SILTY CLAY,** some reddish lenses - grey by 3.8m depth	SS	2	79	13
	SS	3	96	8
9.45 End of Borehole (GWL @ 4.35m - May 1, 2017)				

DEPTH (m)	ELEV. (m)
0	52.45
1	51.45
2	50.45
3	49.45
4	48.45
5	47.45
6	46.45
7	45.45
8	44.45
9	43.45



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Multi-Storey Building - 8466 Jean D'Arc Boulevard
Ottawa, Ontario

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

REMARKS

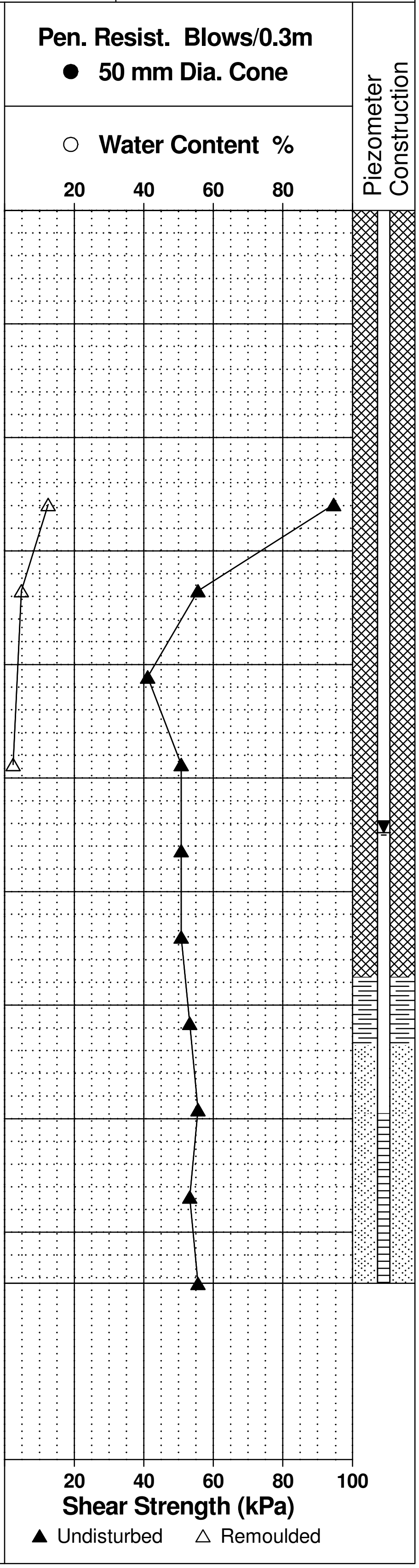
BORINGS BY CME 55 Power Auger

DATE April 24, 2017

FILE NO. PG4112

HOLE NO. BH 6-17

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	52.78
FILL: Brown silty clay with topsoil, some gravel, trace sand and organics 0.43	AU	1				
	SS	2	96	9	1	51.78
	SS	3	100	5	2	50.78
Firm to stiff, brown **SILTY CLAY** with reddish lenses					3	49.78
- grey by 3.8m depth					4	48.78
					5	47.78
					6	46.78
					7	45.78
					8	44.78
					9	43.78
9.45						
End of Borehole (GWL @ 5.48m - May 1, 2017)						



SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

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

Cc - Concavity coefficient = $(D30)^2$ / (D10 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)

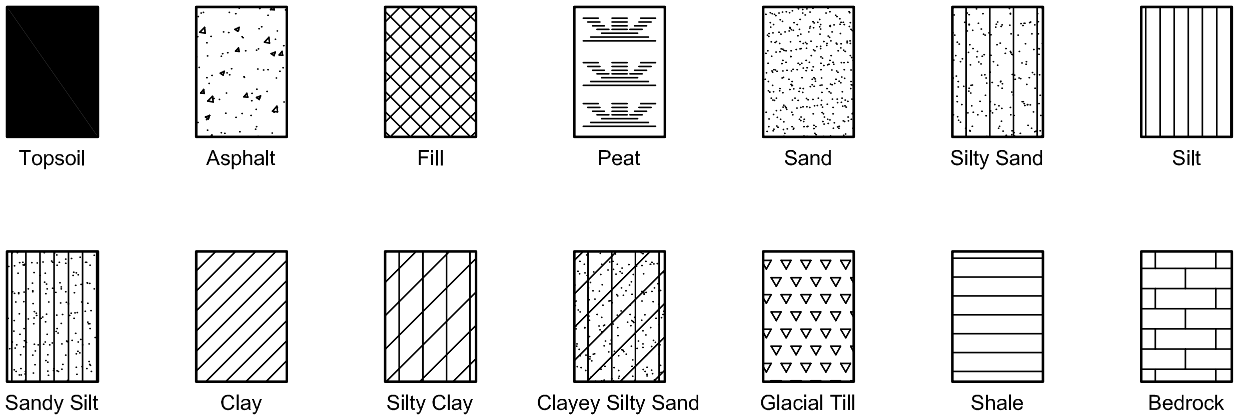
OC Ratio Overconsolidaton ratio = p'_c / p'_o
Void Ratio Initial sample void ratio = volume of voids / volume of solids
Wo - Initial water content (at start of consolidation test)

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.

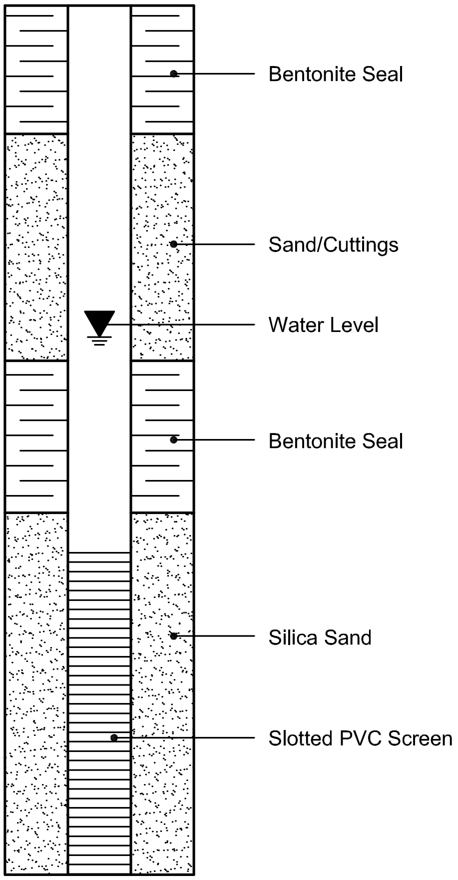
SYMBOLS AND TERMS (continued)

STRATA PLOT

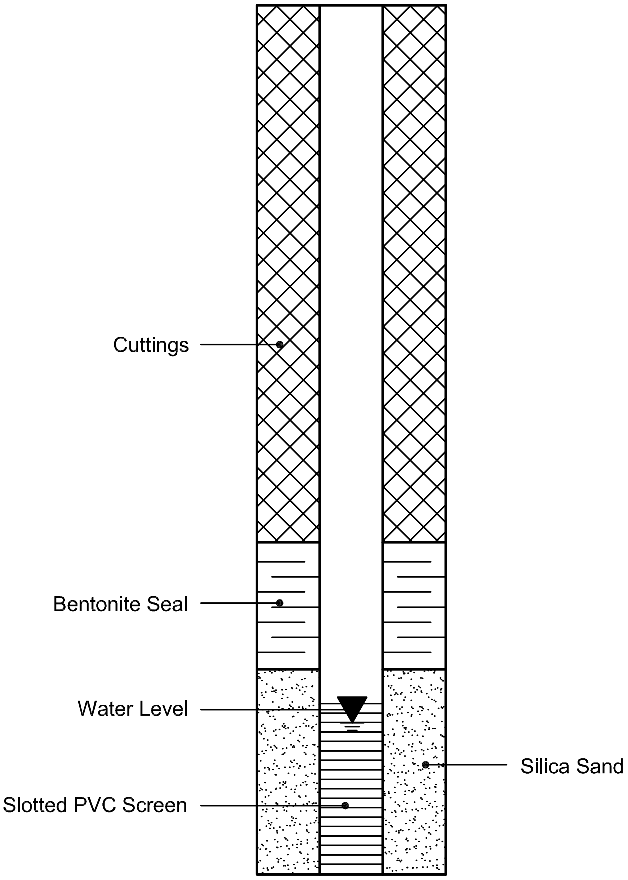


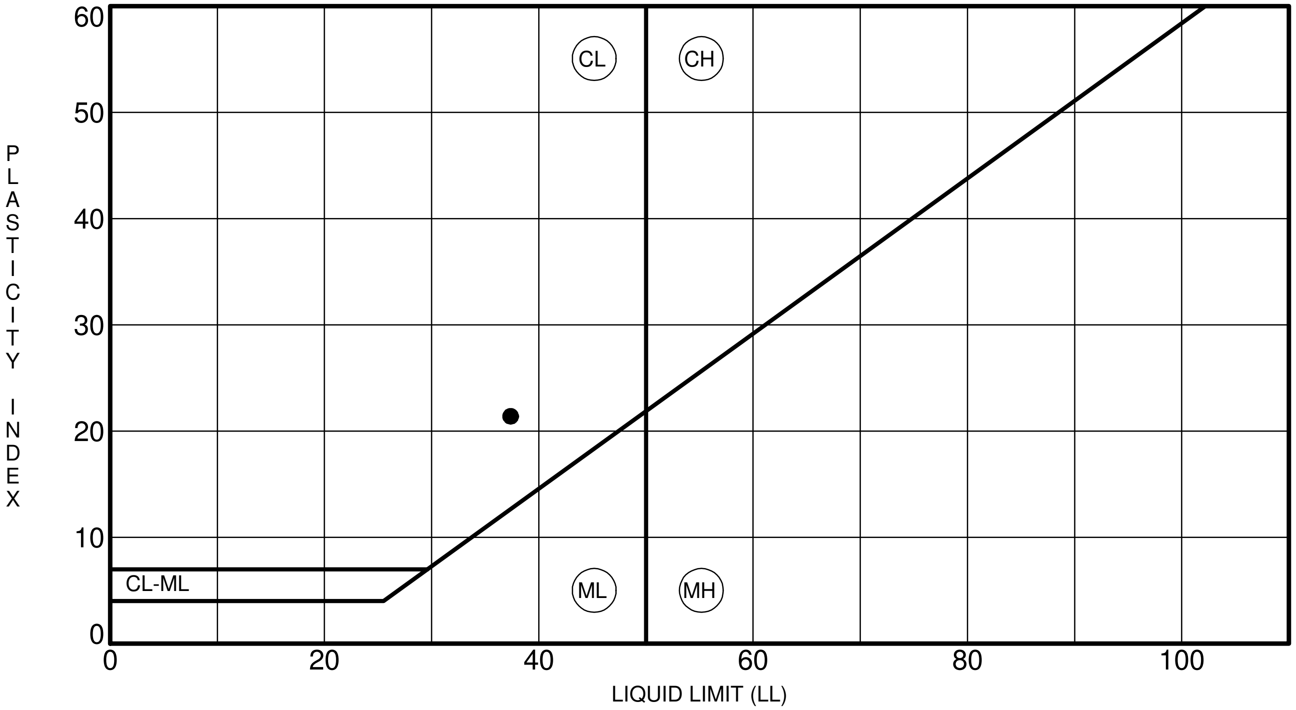
MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION





	Specimen Identification	LL	PL	PI	Fines	Classification
●	**BH 1-19 SS 4**	**37**	**16**	**21**		**CL - Inorganic clays of low plasticity**

CLIENT **Brigil Construction**

FILE NO. **PG4112**

PROJECT **Geotechnical Investigation - Petrie's Landing III -**
Block 8 - 2466 Jeanne D'arc Blvd.

DATE **9 Jul 19**

patersongroup **Consulting Engineers**

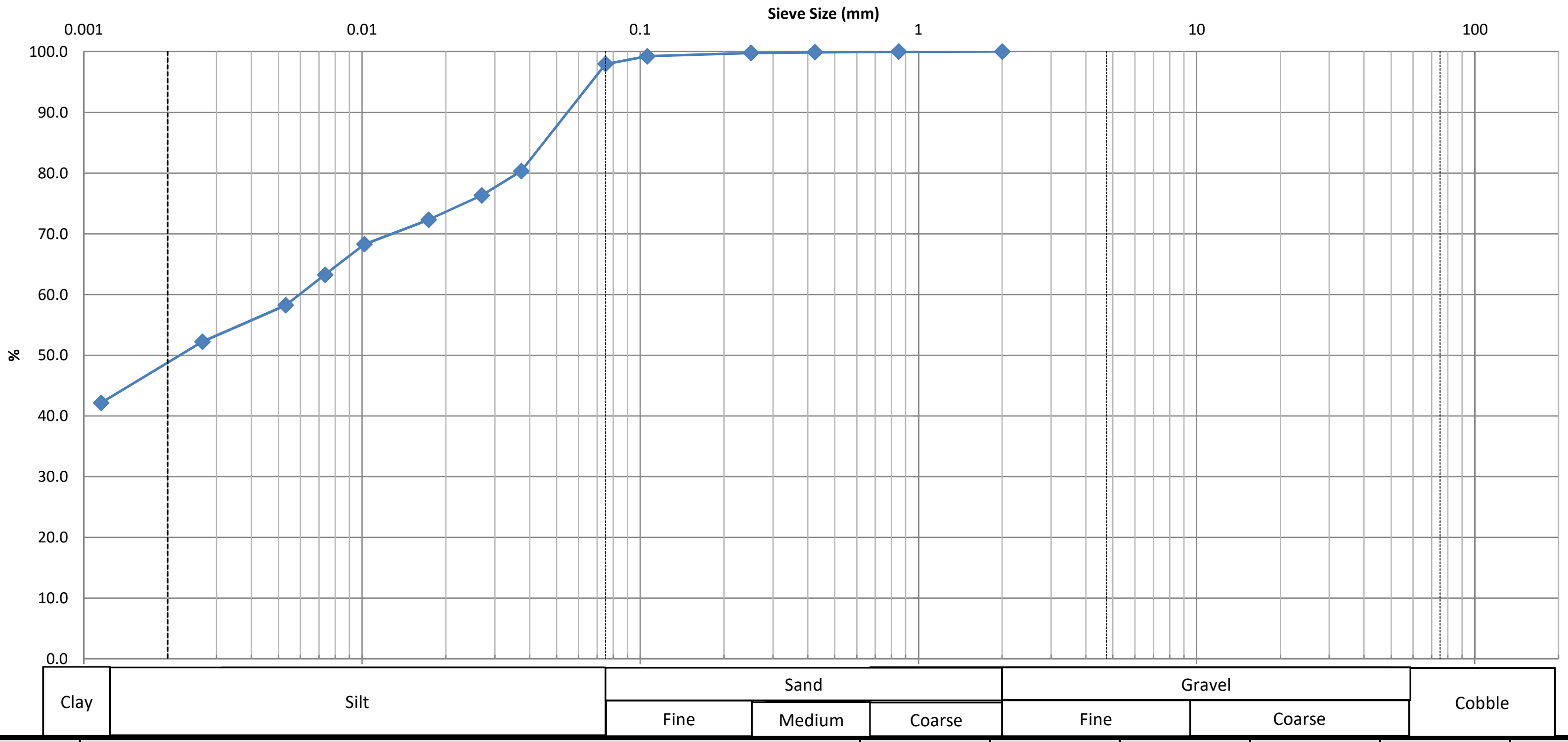
154 Colonnade Road South, Ottawa, Ontario K2E 7J5

ATTERBERG LIMITS' RESULTS

patersongroup
consulting engineers

SIEVE ANALYSIS
ASTM C136

CLIENT:	Brigil	DEPTH:	7' - 9'6"	FILE NO:	PG4112
CONTRACT NO.:		BH OR TP No.:	BH1	LAB NO:	09370
PROJECT:	Petries Landing II			DATE RECEIVED:	12-Jul-19
				DATE TESTED:	17-Jul-19
DATE SAMPLED:	10-Jul-19			DATE REPORTED:	19-Jul-19
SAMPLED BY:	-			TESTED BY:	D.Bertrand



Identification	**Soil Classification**					**MC(%)**	**LL**	**PL**	**PI**	**Cc**	**Cu**
						29.9					
	D100	D60	D30	D10	Gravel (%)	Sand (%)		Silt (%)		Clay (%)	
					0.0	2.1		48.4		49.5	

Comments:

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

HYDROMETER
LS-702 ASTM-422

CLIENT:	Brigil	DEPTH:	7' - 9'6"	FILE NO.:	PG4112
PROJECT:	Petries Landing II	BH OR TP No.:	BH1	DATE SAMPLE	10-Jul-19
LAB No. :	09370	TESTED BY:	D.Bertrand	DATE RECEIVE	12-Jul-19
SAMPLED BY:	-	DATE REPT'D:	19-Jul-19	DATE TESTED:	17-Jul-19

SAMPLE INFORMATION

SAMPLE MASS	SPECIFIC GRAVITY
116.0	2.700

INITIAL WEIGHT	50.00	**HYGROSCOPIC MOISTURE**		
WEIGHT CORRECTED	49.25	TARE WEIGHT	50.00	ACTUAL WEIGHT
WT. AFTER WASH BACK SIEVE	1.28	AIR DRY	150.00	100.00
SOLUTION CONCENTRATION	40 g/L	OVEN DRY	148.50	98.50
		CORRECTED	0.985	

GRAIN SIZE ANALYSIS

SIEVE DIAMETER (mm)	WEIGHT RETAINED (g)	PERCENT RETAINED	PERCENT PASSING
13.2			
9.5			
4.75			
2.0	**0.0**	0.0	**100.0**
Pan	**116.0**		
0.850	**0.01**	0.0	**100.0**
0.425	**0.05**	0.1	**99.9**
0.250	**0.11**	0.2	**99.8**
0.106	**0.38**	0.8	**99.2**
0.075	**1.01**	2.1	**97.9**
Pan	**1.28**		

SIEVE CHECK	0.0	MAX = 0.3%	

HYDROMETER DATA

ELAPSED	TIME (24 hours)	Hs	Hc	Temp. (^{o}C)	DIAMETER	(P)	TOTAL PERCENT PASSING
1	7:38	45.0	5.0	25.0	0.0373	80.3	**80.3**
2	7:39	43.0	5.0	25.0	0.0269	76.3	**76.3**
5	7:42	41.0	5.0	25.0	0.0173	72.3	**72.3**
15	7:52	39.0	5.0	25.0	0.0102	68.3	**68.3**
30	8:07	36.5	5.0	25.0	0.0074	63.2	**63.2**
60	8:37	34.0	5.0	25.0	0.0053	58.2	**58.2**
250	11:47	31.0	5.0	25.0	0.0027	52.2	**52.2**
1440	7:37	26.0	5.0	25.0	0.0012	42.2	**42.2**

COMMENTS:

Moisture Content = 23.2%

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

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 21273

Report Date: 04-May-2017

Order Date: 28-Apr-2017

Project Description: PG4112

	Client ID:	BH3-SS3	-	-	-
	Sample Date:	25-Apr-17	-	-	-
	Sample ID:	1717537-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	75.3	-	-	-
General Inorganics					
pH	0.05 pH Units	7.08	-	-	-
Resistivity	0.10 Ohm.m	76.6	-	-	-
Anions					
Chloride	5 ug/g dry	36	-	-	-
Sulphate	5 ug/g dry	21	-	-	-

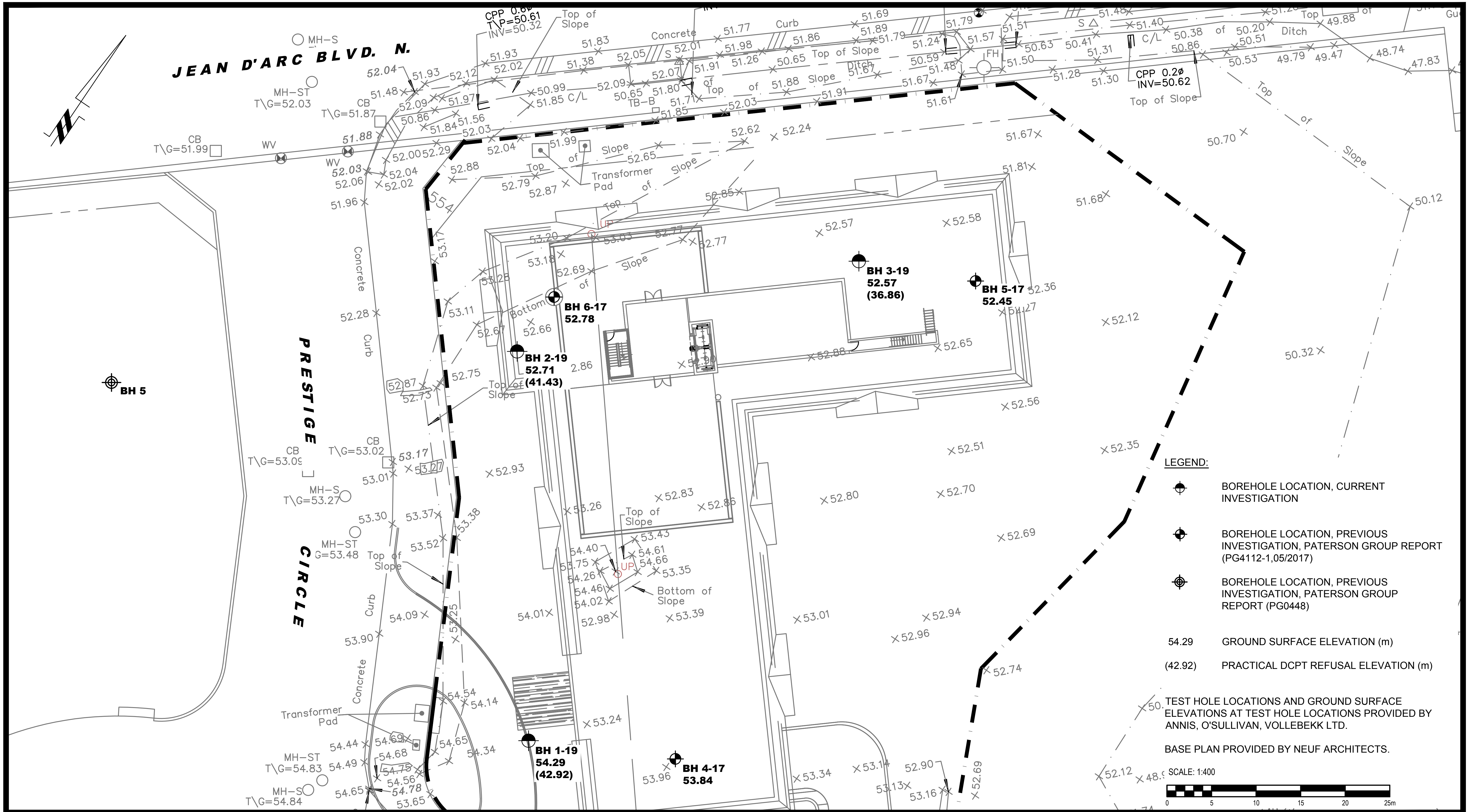
APPENDIX 2

FIGURE 1 - KEY PLAN

DRAWING PG4112-2 - TEST HOLE LOCATION PLAN

FIGURE 1

KEY PLAN



LEGEND:

- BOREHOLE LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT (PG4112-1,05/2017)
- BOREHOLE LOCATION, PREVIOUS INVESTIGATION, PATERSON GROUP REPORT (PG0448)

54.29	GROUND SURFACE ELEVATION (m)
(42.92)	PRACTICAL DCPT REFUSAL ELEVATION (m)

TEST HOLE LOCATIONS AND GROUND SURFACE ELEVATIONS AT TEST HOLE LOCATIONS PROVIDED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD.

BASE PLAN PROVIDED BY NEUF ARCHITECTS.

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL

BRIGIL CONSTRUCTION

GEOTECHNICAL INVESTIGATION
PETRIE`S LANDING - BLOCK 8 -2466 JEANNE D`ARC BOULEVARD
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:400
Date: 07/2019
Drawn by: YA
Report No.: PG4112-1
Checked by: JV
Dwg. No.: PG4112-2
Approved by: DJG
Revision No.:

p:\autocad drawings\geotechnical\pg41xx\pg4112\pg4112- thlp.dwg