

Geotechnical  
Engineering

Environmental  
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Hydrogeology

Geological  
Engineering

Materials Testing

Building Science

Noise and Vibration  
Studies

## Geotechnical Investigation

Proposed Building Additions  
44 Eccles Street  
Ottawa, Ontario

Prepared For

Cornerstone Housing for Women

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## **1.0 Introduction**

Paterson Group (Paterson) was commissioned by Cornerstone Housing for Women to complete a geotechnical investigation for the proposed building additions for the existing building located at 44 Eccles Street in the City of Ottawa (refer to Figure 1 - Key Plan in Appendix 2 of this report).

The present report provides a summary of the existing soils information along with general recommendations from a geotechnical perspective for the design requirements of the proposed building additions.

## **2.0 Proposed Project**

It is understood that the proposed project will consist of additions to the existing four-storey building. The additions will be constructed on the southeast and south west corner of the existing building. It is also expected that the additions will include a basement level to match the existing structure.

## **3.0 Observations**

### **3.1 Surface Conditions**

Based on the available information, the site appears to be relatively flat and at grade with adjacent roadways. The site is occupied by an existing building along with at grade parking areas, access lanes and landscaped areas. The site is bordered by Eccles Steet to the north, residential buildings to the east, west and south.

### **3.2 Subsurface Profile**

Generally, the soil profile at the test hole locations consists of asphaltic concrete overlying a fill material. A compact to dense glacial till layer is present underlying the fill layer. The bedrock surface was noted to be at a depth of approximately 1 to 2.3 m below the existing ground surface

#### **Bedrock**

Based on available geological mapping and investigation findings, the bedrock below the subject site is part of the Verulam formation, which consists of interbedded limestone and shale with an overburden drift thickness ranging between 1 to 2 m depth.

## 4.0 Discussion

### 4.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is suitable for the proposed development. It is anticipated that the proposed building additions will be founded over conventional shallow footings placed on an undisturbed, compact glacial till or surface sounded bedrock bearing surface.

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

### 4.2 Site Grading and Preparation

#### Stripping Depth

Topsoil and deleterious fill, such as those containing organic materials, should be stripped from under any structures, paved areas, pipe bedding and other settlement sensitive structures. Care should be taken not to disturb subgrade soils during site preparation activities.

#### Bedrock Removal

Bedrock removal can be accomplished by hoe ramming. Sound bedrock may be removed by line drilling and hoe ramming.

#### Fill Placement

Fill placed for grading beneath the building areas should consist, unless otherwise specified, of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. The imported fill material should be tested and approved prior to delivery. The fill should be placed in maximum 300 mm thick loose lifts and compacted by suitable compaction equipment. Fill placed beneath the 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 where settlement of the ground surface is of minor concern. These materials should be spread in lifts with a maximum thickness of 300 mm and compacted by the tracks of the spreading equipment to minimize voids. 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 the SPMDD.

Non-specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless a composite drainage blanket connected to a perimeter drainage system is provided.

## 4.3 Foundation Design

### Bearing Resistance Values (Conventional Shallow Foundation)

Footings placed on an undisturbed, compact glacial till bearing surface can be designed using a bearing resistance value at SLS of **150 kPa** and a factored bearing resistance value at ULS of **250 kPa**. Footings placed on a clean, weathered bedrock can be designed using a factored bearing resistance value at ULS of **1,000 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance value at ULS.

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

Footings bearing on an undisturbed soil bearing surface and designed using the bearing resistance values provided above will be subjected to potential post-construction total and differential settlements of 25 and 15 mm, respectively.

The potential long term post construction total and differential settlement for footings placed on surface sounded bedrock are estimated to be negligible.

### 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 stiff silty clay above the groundwater table 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.

Adequate lateral support is provided to a sound bedrock bearing medium when a plane extending down and out from the bottom edge of the footing at a minimum of 1H:6V (or flatter) passes only through sound bedrock or a material of the same or higher capacity as the bedrock, such as concrete. A weathered bedrock bearing medium will require a lateral support zone of 1H:1V (or flatter).

## 4.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class C** for foundations considered at the subject site. If a higher seismic site class is required (Class A or B), a site specific shear wave velocity test shall be completed to accurately determine the applicable seismic site classification for foundation design of the proposed building, as presented in Table 4.1.8.4.A of the Ontario Building Code (OBC) 2012.

The soils underlying the proposed shallow foundations are not susceptible to liquefaction. Reference should be made to the latest revision of the 2012 Ontario Building Code for a full discussion of the earthquake design requirements..

## 4.5 Basement Slab

All fill, loose and organic material should be excavated below the footprint of the building. The upper 200 mm of sub-slab fill is recommended to consist of OPSS Granular A crushed stone.

Any soft areas in the subgrade should be removed and backfilled with appropriate backfill material prior to placing fill. Granular fill consisting of OPSS Granular B Type II, with a maximum particle size of 50 mm, is recommended for backfilling below the floor slab. All backfill material within the footprint of the proposed building additions should be placed in maximum 300 mm thick loose layers and compacted to a minimum of 98% of the SPMDD.

## 4.6 Basement Wall

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

However, undrained conditions are anticipated (i.e. below the groundwater level). Therefore, the applicable effective (undrained) unit weight of the retained soil can be taken as 13 kN/m<sup>3</sup>, where applicable. A hydrostatic pressure should be added to the total static earth pressure when using the effective unit weight. On the other hand, if a full drainage system is being implemented and approved by Paterson at the time of construction, hydrostatic pressure can be omitted in the structural design.

## Lateral Earth Pressures

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

- $K_o$  = at-rest earth pressure coefficient of the applicable retained soil (0.5)
- $\gamma$  = unit weight of fill of the applicable retained soil ( $\text{kN/m}^3$ )
- $H$  = height of the wall (m)

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

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

## Seismic Earth Pressures

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

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

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

The peak ground acceleration, ( $a_{max}$ ), for the Ottawa area is 0.32 g according to the OBC. Note that the vertical seismic coefficient is assumed to be zero.

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

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

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

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



## **5.0 Design and Construction Precautions**

### **5.1 Foundation Drainage and Backfill**

#### **Foundation Drainage**

It is recommended that a perimeter foundation drainage system be designed for the future structures. The system should consist of a 150 mm diameter, geotextile-wrapped, 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. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls, unless used in conjunction with a composite drainage system, such as Delta Drain 6000 or an approved equivalent. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should otherwise be used for this purpose.

### **5.2 Protection of Footings Against Frost Action**

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

Other 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 proper structure. These footings should be provided with a minimum 2.1 m thick soil cover (or insulation equivalent).

### **5.3 Excavation Side Slopes**

The side slopes of excavations in the overburden materials should be either 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).

## Unsupported Side Slopes

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.

## 5.4 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.

At least 150 mm of OPSS Granular A should be used for pipe bedding for sewer and water pipes. 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 or Granular B Type II with a maximum size of 25 mm. The bedding layer should be increased to a minimum thickness of 300 mm where the subgrade consists of grey silty clay. The bedding and cover materials should be placed in maximum 225 mm thick lifts compacted to 99% of the material's standard Proctor maximum dry density.

It should generally be possible to re-use the upper portion of the dry to moist (not wet) silty clay above the cover material if the excavation and filling operations are carried out in dry weather conditions. Any stones greater than 200 mm in their longest dimension should be removed from these materials prior to placement.

The backfill material within the frost zone (about 1.5 m below finished grade) should match the soils exposed at the trench walls to reduce potential differential frost heaving. The backfill should be placed in maximum 225 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD.

## **5.5 Groundwater Control**

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

It is anticipated that pumping from open sumps will be sufficient to control the groundwater influx through the sides of the excavation

## **5.6 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.

## 6.0 Recommendations

It is a requirement for the foundation design data provided herein to be applicable that the following recommendations be completed by the geotechnical consultant:

- 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.

## 7.0 Statement of Limitations

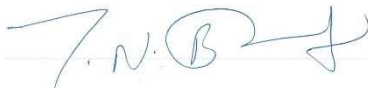
The recommendations provided are in accordance with the present understanding of the project. Paterson requests permission to review the recommendations when the drawings and specifications are completed.

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

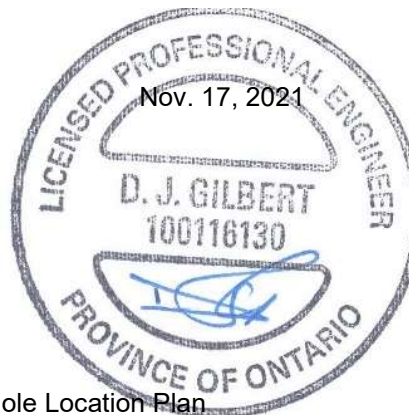
The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on or undertaking the work. The latter should evaluate the factual information provided in this report and determine the suitability and completeness 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 Cornerstone Housing for Women or their agents is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

### Paterson Group Inc.



Balaji Nirmala, M.Eng



David J. Gilbert, P.Eng

### Attachments:

- Historical Borehole Logs
- Figure 1 – Key Plan
- Drawing PG6078-1 – Test Hole Location Plan

### Report Distribution:

- Cornerstone Housing for Women (1 digital copy)
- Paterson Group (1 copy)

# APPENDIX 1

## SOIL PROFILE AND TEST DATA SHEETS SYMBOLS AND TERMS

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE October 21, 2021

FILE NO. **PE5434**

HOLE NO. **BH 1-21**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE								20	40	60	80	
Asphaltic concrete	0.05					0	68.78					
FILL: Crushed stone	0.30	AU	1									
FILL: Brown silty sand, some clay, trace gravel	0.76	SS	2	14	50+	1	67.78					
GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles and boulders	0.99	RC	1	100	33							
		RC	2	100	75	2	66.78					
BEDROCK: Poor to good quality, grey limestone		RC	3	100	87	3	65.78					
						4	64.78					
End of Borehole	4.60											

100 200 300 400 500  
RKI Eagle Rdg. (ppm)  
▲ Full Gas Resp. △ Methane Elim.

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE October 21, 2021

FILE NO. **PE5434**

HOLE NO. **BH 2-21**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE								20	40	60	80	
Asphaltic concrete	0.10					0	69.55					
FILL: Crushed stone	0.46	AU	1									
FILL: Brown silty sand, some clay, trace gravel	0.91	SS	2	18	50+	1	68.55					
GLACIAL TILL: Dense, brown isly sand with gravel, cobbles and boulders	1.32	RC	1	100	82							
		RC	2	100	70	2	67.55					
		RC	3	100	95	4	65.55					
		RC	4	100	93	5	64.55					
		RC	5	100	96	7	62.55					
<b>BEDROCK:</b> Good to excellent quality, grey limestone												
End of Borehole	7.70											

100 200 300 400 500  
**RKI Eagle Rdg. (ppm)**  
▲ Full Gas Resp. △ Methane Elim.



## SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment  
44 Eccles Street  
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE October 21, 2021

FILE NO. **PE5434**

HOLE NO. **BH 3-21**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE								20	40	60	80	
Asphaltic concrete	0.08					0	68.75					
FILL: Crushed stone	0.30											
FILL: Brown silty sand, trace gravel	0.76	AU	1									
Loose to compact, brown <b>SILTY SAND</b> , trace gravel		SS	2	0	4	1	67.75					
		SS	3	29	15							
GLACIAL TILL: Brown/black silty sand with gravel, cobbles and boulders	1.98 2.23					2	66.75					
End of Borehole												
Practical refusal to augering at 2.23m depth.												

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

# 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.

<b>RQD %</b>	<b>ROCK QUALITY</b>
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 = $(D_{30})^2 / (D_{10} \times D_{60})$
Cu	-	Uniformity coefficient = $D_{60} / D_{10}$

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		Overconsolidation 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

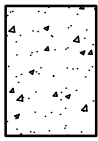
k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during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

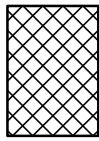
### STRATA PLOT



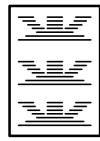
Topsoil



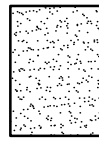
Asphalt



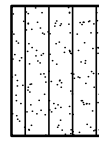
Fill



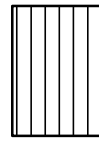
Peat



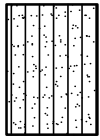
Sand



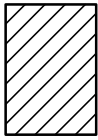
Silty Sand



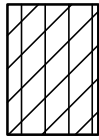
Silt



Sandy Silt



Clay



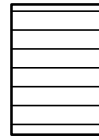
Silty Clay



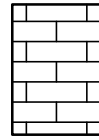
Clayey Silty Sand



Glacial Till



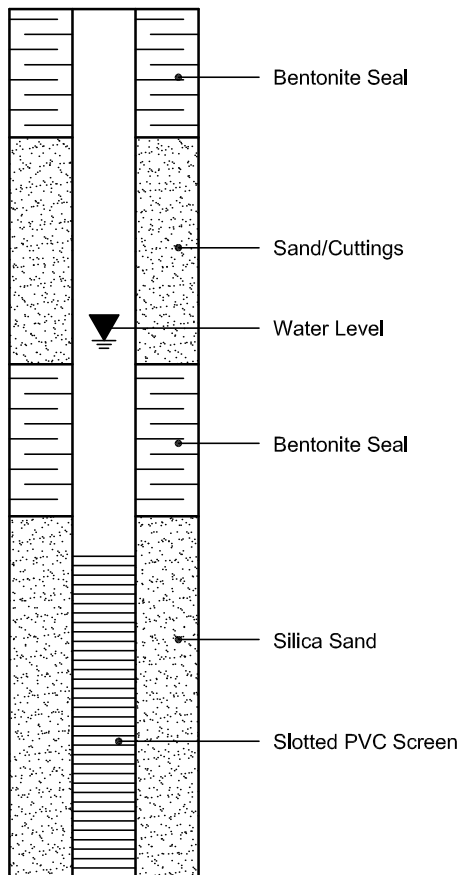
Shale



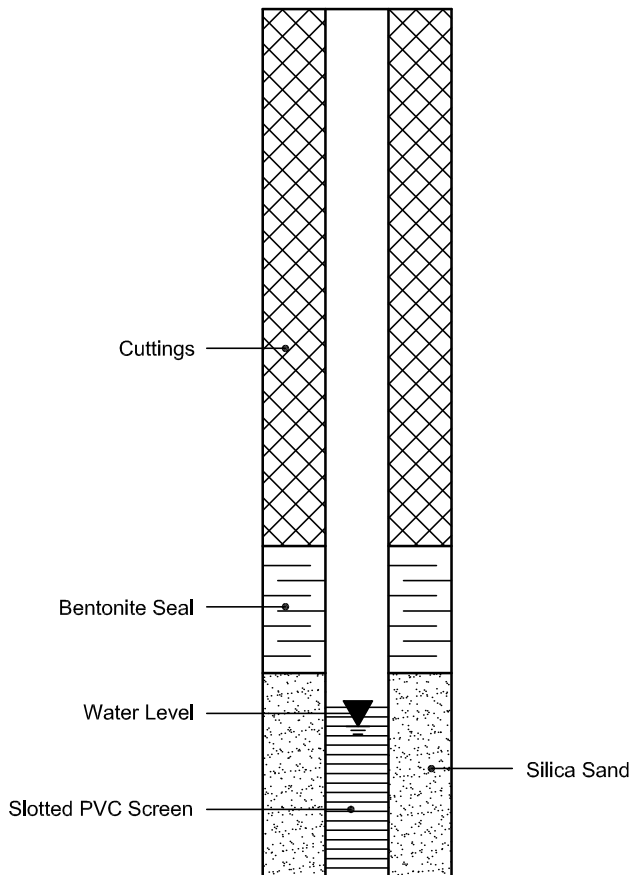
Bedrock

### MONITORING WELL AND PIEZOMETER CONSTRUCTION

#### MONITORING WELL CONSTRUCTION



#### PIEZOMETER CONSTRUCTION



# APPENDIX 2

FIGURE 1 – KEY PLAN  
DRAWING PG6078 – TEST HOLE LOCATION PLAN

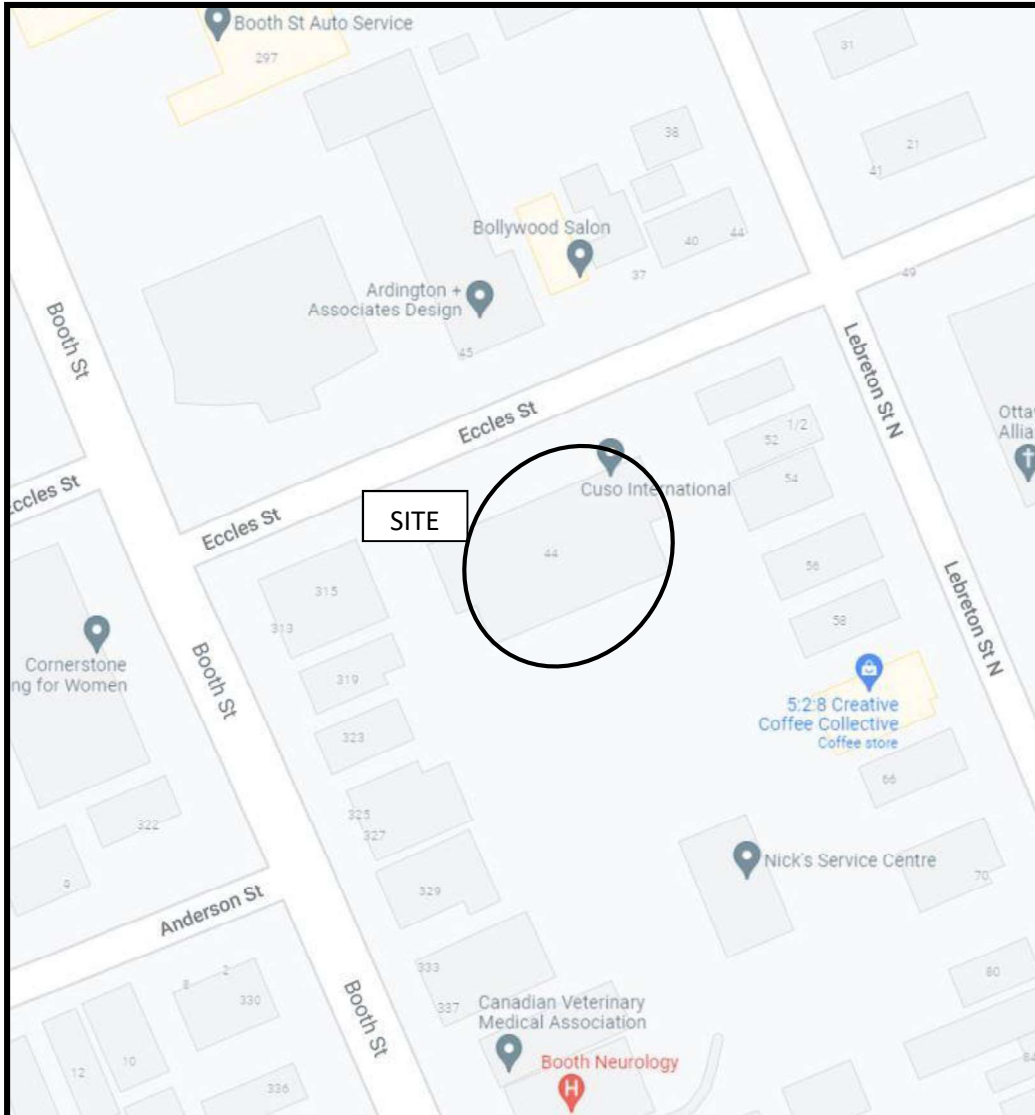
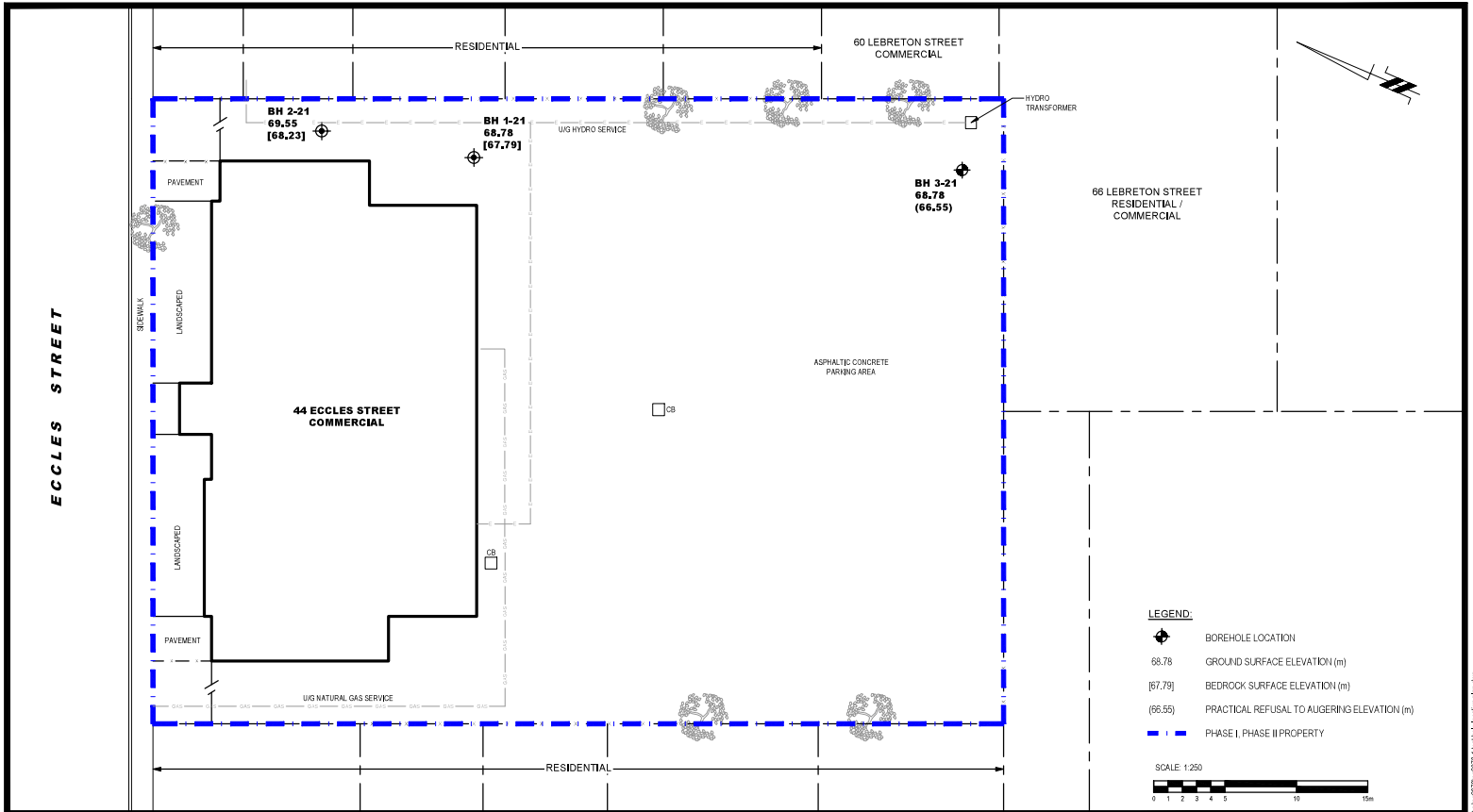


FIGURE 1  
KEY PLAN



**LEGEND:**

- BOREHOLE LOCATION
- 68.78 GROUND SURFACE ELEVATION (m)
- [67.79] BEDROCK SURFACE ELEVATION (m)
- (66.55) PRACTICAL REFUSAL TO AUGERING ELEVATION (m)
- PHASE I, PHASE II PROPERTY

SCALE: 1:250

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NO.	REVISIONS	DATE	INITIAL

**CCOC HOUSING  
GEOTECHNICAL INVESTIGATION  
44 ECCLES STREET**

OTTAWA, ONTARIO

**TEST HOLE LOCATION PLAN**

Scale:	1:250	Date:	11/2021
Drawn by:	NFRV	Report No.:	PG6078-1
Checked by:	BN	Dwg. No.:	<b>PG6078-1</b>
Approved by:	DJG	Revision No.:	