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April 6, 2017
Report: PG4059-LET.01

AF Martins Construction
35 Linden Terrace
Ottawa, ON
K1S 1Z1

Attention: **Mr. Fernando Martins**

Subject: **Geotechnical Investigation**
Proposed Residential Building
355 - 361 Nelson Street - Ottawa

Dear Sir,

Paterson Group (Paterson) was commissioned by AF Martins Construction to conduct a geotechnical investigation for the proposed residential building to be located at 355 - 361 Nelson Street, in the City of Ottawa, Ontario.

Based on the available conceptual drawings, it is our understanding that the proposed development will consists of a 4 storey apartment building with one basement level. It is further understood that car parking, access lanes and landscaping areas are also anticipated as part of the proposed development.

1.0 Field Investigation

The fieldwork for the current investigation was conducted on February 23, 2017. At that time, two (2) test pits were excavated to a maximum depth of 3.2 m below existing ground surface. The test holes were located in the field by Paterson personnel to provide general coverage of the subject site taking into consideration of existing site features and underground utilities. All fieldwork was conducted under the full-time supervision of our personnel under the direction of a senior engineer from our geotechnical department. The test hole procedures consisted of excavating to the required depths at the selected locations and sampling the overburden.

The location and ground surface elevation at each test pit location was surveyed by Paterson personnel. The ground surface elevation at the test pit locations were surveyed with respect to a temporary benchmark (TBM), consisting of the top of spindle of the fire hydrant located in front of 315 Nelson Street. A geodetic elevation of 70.04 m was provided for the TBM by Farley, Smith and Denis Surveying Ltd. The test hole locations and ground surface elevation at the test hole locations along with the TBM location are presented on Drawing PG4059-1 - Test Hole Location Plan attached to the end of this report.

2.0 Field Observations

The ground surface across the subject site is relatively flat and approximately at grade with neighbouring properties and the adjacent roadway (Nelson Street). The subject site is currently occupied by three (3) residential buildings with a basement level. Asphalt covered car parking, access lanes and landscaping areas occupy the remainder of the site.

It should be noted that the subject site is bordered to the north by a two (2) storey commercial building with a basement level, to the south by a three (3) storey residential apartment structure with a basement level.

Generally, the subsurface profile encountered at the test pit locations consists of fill and/or asphalt overlying a fill layer consisting of brown silty clay with sand, crushed stone and brick followed by a hard to very stiff silty clay crust and stiff grey silty clay. It should be noted that fill overlying topsoil and loose silty sand was encountered above the silty clay at TP 1 within the rear yard of 355 Nelson Street. Refer to the Soil Profile and Test Data sheets attached for specific details of the soil profile encountered at the test pit locations.

Based on available geological mapping, bedrock in this area consists of limestone from the Lindsay Formation. The overburden drift thickness is expected to range between 10 to 15 m depth.

Based on our knowledge of the subject area, the observed groundwater infiltration levels within the open excavation, moisture levels and colour of the recovered soil samples at the time of excavation, the long-term groundwater level is expected to be between 2.5 and 3.5 below existing ground surface. Groundwater levels are subject to seasonal fluctuations and therefore, the groundwater levels could vary at the time of construction.

3.0 Geotechnical Assessment

From a geotechnical perspective, the subject site is suitable for the proposed residential development. The proposed residential building is expected to be constructed with conventional shallow foundations placed over an undisturbed, hard to very stiff, weathered brown silty clay bearing surface.

Due to the presence of a silty clay deposit, a permissible grade raise restriction of **2 m** above existing ground surface is recommended for the subject site.

Site Grading and Preparation

Topsoil and fill, containing deleterious or organic materials, should be stripped from under any building, paved areas, pipe bedding and other settlement sensitive structures. Care should provided not to disturb adequate bearing soils at subgrade level during site preparation activities.

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.

Consideration could be given to leaving the existing fill, free of significant amounts of deleterious materials, below the proposed building floor slab outside the lateral support zone of the proposed footings and within the proposed parking areas and access lanes. However, it is recommended that the existing fill be approved by the geotechnical consultant once the subgrade level is exposed. The approved existing fill material should be proof-rolled using suitable compaction equipment under dry conditions and reviewed by Paterson personnel. Poor performing areas should be removed and replaced with engineered fill.

Fill placed for grading beneath the proposed building footprint, 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. The fill should be placed in maximum lift thickness of 300 mm and compacted with 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 surface settlement is of minor concern. The existing materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If the existing materials are to be placed to increase the subgrade level for areas to be paved, the non-specified existing fill should be compacted in 300 mm lifts and compacted to a minimum density of 95% of the respective SPMDD.

Foundation Design

Pad footings, up to 6 m wide, and strip footings, up to 3 m wide placed on an undisturbed, very stiff brown silty clay bearing surface 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 bearing resistance values 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 a soil bearing medium when a plane extending horizontally and vertically from the footing perimeter at a minimum of 1.5H:1V, passing through in situ soil or engineered fill of equal or higher capacity as the soil.

Design for Earthquakes

The site class for seismic site response can be taken as **Class D** for foundations constructed at the subject site. Refer to the latest revision of the 2012 Ontario Building Code for a full discussion of the earthquake design requirements. The soils underlying the subject site are not susceptible to liquefaction.

Basement Slab

With the removal of all topsoil and deleterious materials, within the proposed building footprint, the native soil, free of organic and deleterious materials, and approved by the geotechnical consultant at the time of construction is considered to be an acceptable subgrade surface on which to commence backfilling for the floor slab. The upper 200 mm of sub-slab fill should consist of an OPSS Granular A crushed stone material for slab-on-grade construction. All backfill material within the proposed building footprint should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 98% of the SPMDD.

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

Pavement Structure

For design purposes, the pavement structure presented in the following tables could be used for the design of car only parking areas and access lanes.

Table 1 - 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 soils or OPSS Granular B Type I or II material placed over in situ soil or fill	

Table 2 - 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
400	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soils or OPSS Granular B Type I or II material placed over in situ soil or fill	

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 backfilled 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 SPMDD.

Where the proposed pavement structure meets the existing asphalt surface, the following recommendations should be followed:

- ❏ A 300 mm wide section of the existing asphalt roadway should be saw cut from the existing pavement edge to provide a sound surface to abut the proposed pavement structure.
- ❏ It is recommended to mill a 300 mm wide and 40 mm deep section of the existing asphalt at the saw cut edge.
- ❏ The proposed pavement structure subbase materials should be tapered no greater than 3H:1V to meet the existing subbase materials.
- ❏ Clean existing granular road subbase materials can be reused upon assessment by the geotechnical consultant at the time of excavation (construction) as to its suitability.

4.0 Design and Construction Precautions

Foundation Drainage and Backfill

A perimeter foundation drainage system is recommended to be provided for the proposed structure. 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 structure. 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 are not recommended for placement as backfill against the foundation walls, unless placed in conjunction with a drainage geocomposite, such as Miradrain G100N or Delta Drain 6000. The drainage geocomposite should be connected to the perimeter foundation drainage system. Otherwise, imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should be placed for foundation backfill.

Protection of Footings 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.

Exterior unheated footings, such as 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.

Excavation Side Slopes

The excavation side slopes in overburden materials should either be excavated to acceptable slopes or be retained by shoring systems from the beginning of the excavation until the structure is backfilled. Sufficient room should be available for the greater part of the excavation to be construction by open-cut methods (i.e. unsupported excavations). If sufficient room is unavailable due to existing structures or property boundaries, a shoring system may be required.

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be excavated at 1H:1V or shallower. The shallower slope is required for excavation below groundwater level. The subsurface soil is considered to be mainly 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.

Groundwater Control

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

A temporary Ministry of the Environment and Climate Change (MOECC) 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 MOECC.

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. If a project qualifies for a PTTW based upon anticipated conditions, and EASR will not be allowed as a temporary dewatering measure while awaiting the MOECC review of the PTTW application.

Impacts on Neighbouring Properties

Based on the proximity of neighbouring buildings, the proposed development will not negatively impact the neighbouring structures. It should be noted that no issues are expected with respect to groundwater lowering that would cause long term adverse effects to adjacent structures surrounding the proposed building.

Pipe Bedding and Backfill

A minimum of 150 mm of OPSS Granular A should be placed 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 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 300 mm thick lifts compacted to a minimum of 95% of the SPMDD.

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 SPMDD.

Winter Construction

If winter construction is considered for this project, precautions should be provided for frost protection. The subsurface soil conditions mainly consist of frost susceptible materials. In 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 installation of straw, propane heaters and tarpaulins or other suitable means. The excavation base 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.

The trench excavations should be completed in a manner to avoid the introduction of frozen materials, snow or ice into the trenches. Where excavations are constructed in proximity of existing structures precaution to adversely affecting the existing structure due to the freezing conditions should be provided.

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 samples 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 slightly aggressive to agressive corrosive environment.

5.0 Recommendations

A materials testing and observation services program is a requirement for the provided foundation design data to be applicable. The following aspects of the program should be performed by the geotechnical consultant:

- ❏ Review of the grading plan(s) from a geotechnical perspective
- ❏ 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 the construction have been conducted in general accordance with Paterson's recommendations could be issued upon the completion of a satisfactory inspection program by the geotechnical consultant.

6.0 Statement of Limitations

The recommendations provided in the report are in accordance with Paterson's present understanding of the project. Paterson request 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 the test locations, Paterson requests immediate notification to permit reassessment of the recommendations.

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

The present report applies only to the project described in the report. The use of the report for purposes other than those described above or by person(s) other than AF Martins Construction or their agents is not authorized without review by Paterson.

Best Regards,

Paterson Group Inc.

Richard Groniger, C. Tech.

Faisal I. Abou-Seido, P.Eng.

Attachments

- ❑ Soil Profile and Test Data sheets
- ❑ Analytical Test Results
- ❑ Figure 1 - Key Plan
- ❑ Drawing PG4059-1 - Test Hole Location Plan

Report Distribution

- ❑ AF Martins Construction (3 copies)
- ❑ Paterson Group (1 copy)

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Prop. Residential Building - 355, 359 & 361 Nelson St.
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located in front of 315 Nelson Street. Geodetic elevation = 70.04m provided by Farley, Smith & Denis Surveying Ltd.

FILE NO. PG4059

REMARKS

HOLE NO. TP 1

BORINGS BY Backhoe **DATE** February 23, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	69.45
FILL: Brown sand and clay with crushed stone, slag, coal and brick		G	1				
0.60		G	2				
TOPSOIL		G	3				
0.75		G	4				
Loose, brown **SILTY SAND** with clay						1	68.45
1.10							
Hard to very stiff, brown **SILTY CLAY**		G	5				
		G	6			2	67.45
- grey by 2.5m depth							
3.10		G	7			3	66.45
End of Test Pit							
(Groundwater infiltration at 2.8m depth)							

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

250
250
140
160

Piezometer Construction

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. Residential Building - 355, 359 & 361 Nelson St.
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located in front of 315 Nelson Street. Geodetic elevation = 70.04m provided by Farley, Smith & Denis Surveying Ltd.

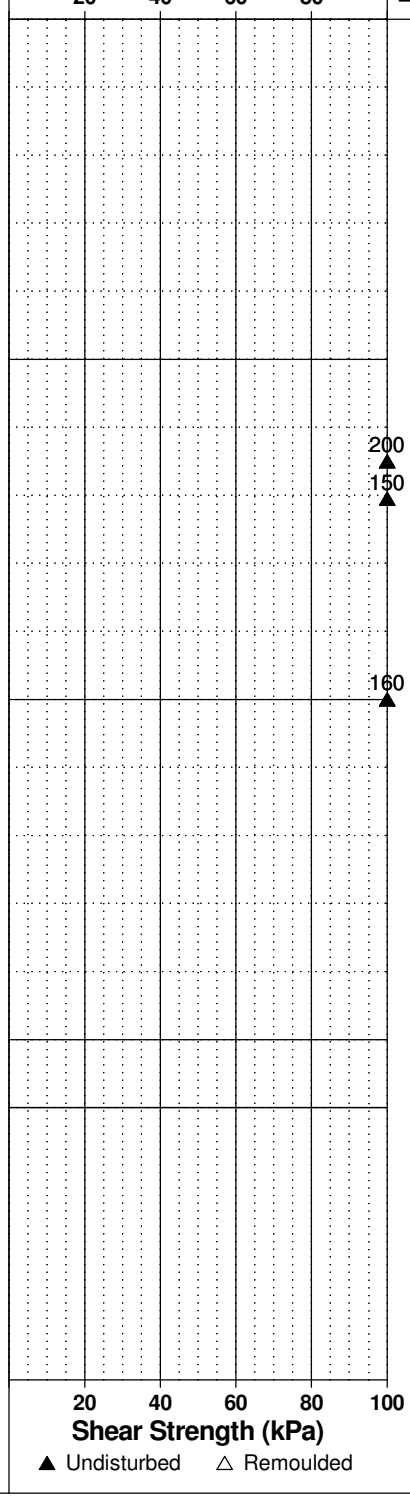
FILE NO. PG4059

REMARKS

HOLE NO. TP 2

BORINGS BY Backhoe **DATE** February 23, 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	69.15		
Asphaltic concrete 0.05									
FILL: Crushed stone 0.30		G	1						
FILL: Brown silty clay with sand, some crushed stone and brick, trace coal, glass and blast rock 1.10						1	68.15		
		G	2						
Hard to very stiff, brown **SILTY CLAY**						2	67.15		
- grey by 2.7m depth		G	3						
		G	4						
						3	66.15		
3.20		G	5						
End of Test Pit									
(TP dry upon completion)									



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

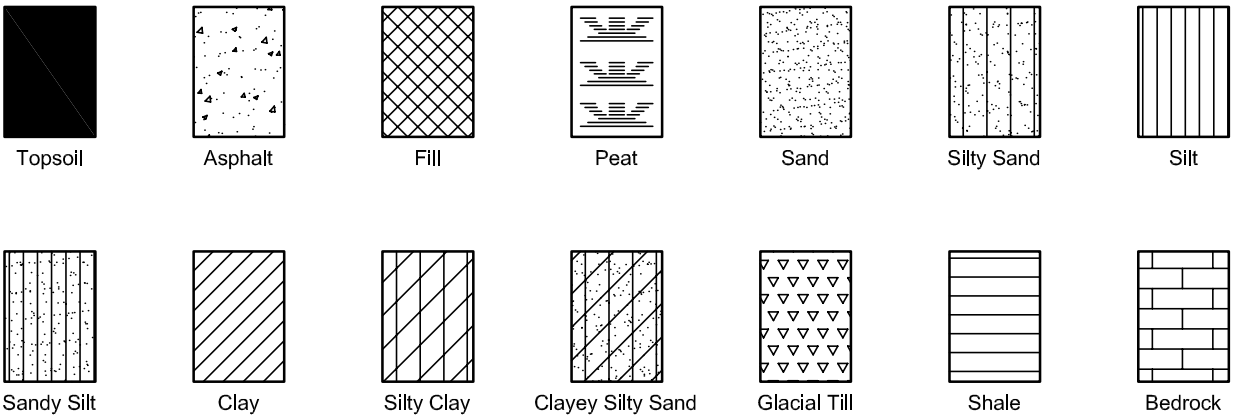
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

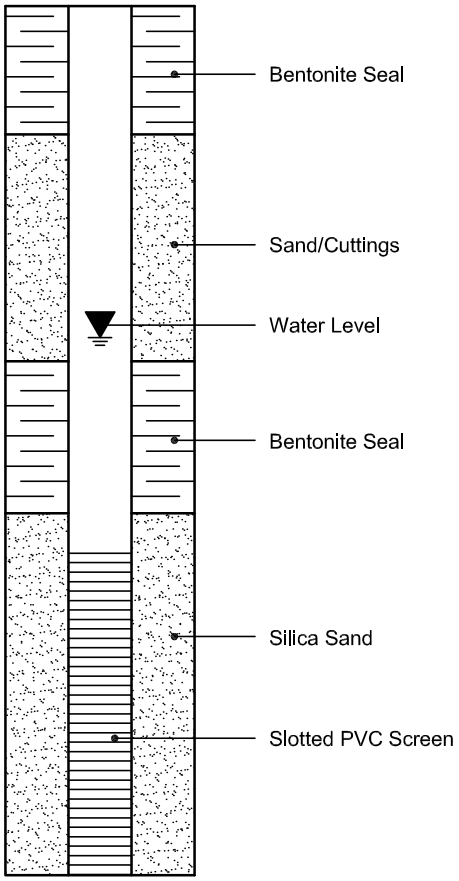
SYMBOLS AND TERMS (continued)

STRATA PLOT

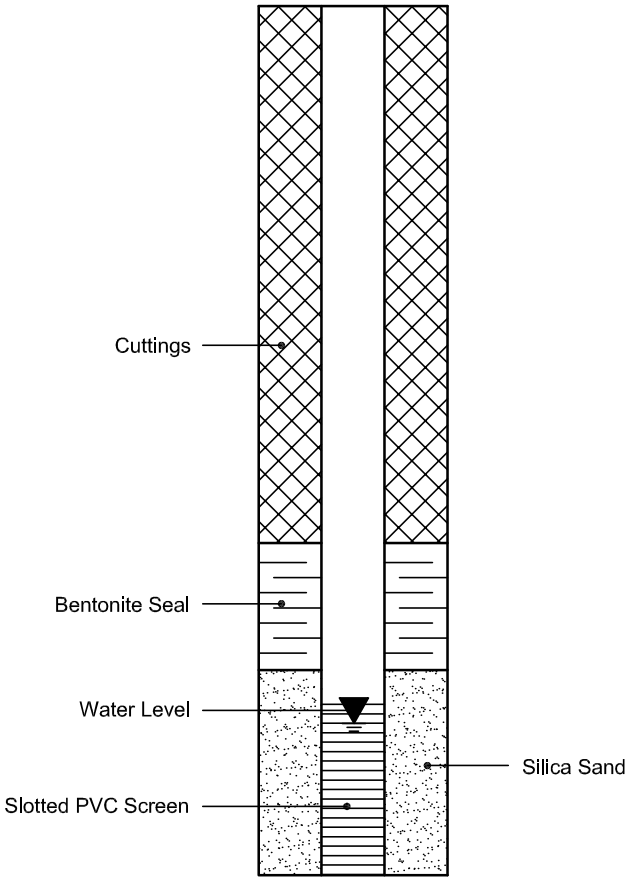


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 21643

Report Date: 06-Mar-2017

Order Date: 28-Feb-2017

Project Description: PG4059

	Client ID:	TP1 G7	-	-	-
	Sample Date:	23-Feb-17	-	-	-
	Sample ID:	1709154-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	58.1	-	-	-
General Inorganics					
pH	0.05 pH Units	7.06	-	-	-
Resistivity	0.10 Ohm.m	34.3	-	-	-
Anions					
Chloride	5 ug/g dry	72	-	-	-
Sulphate	5 ug/g dry	66	-	-	-

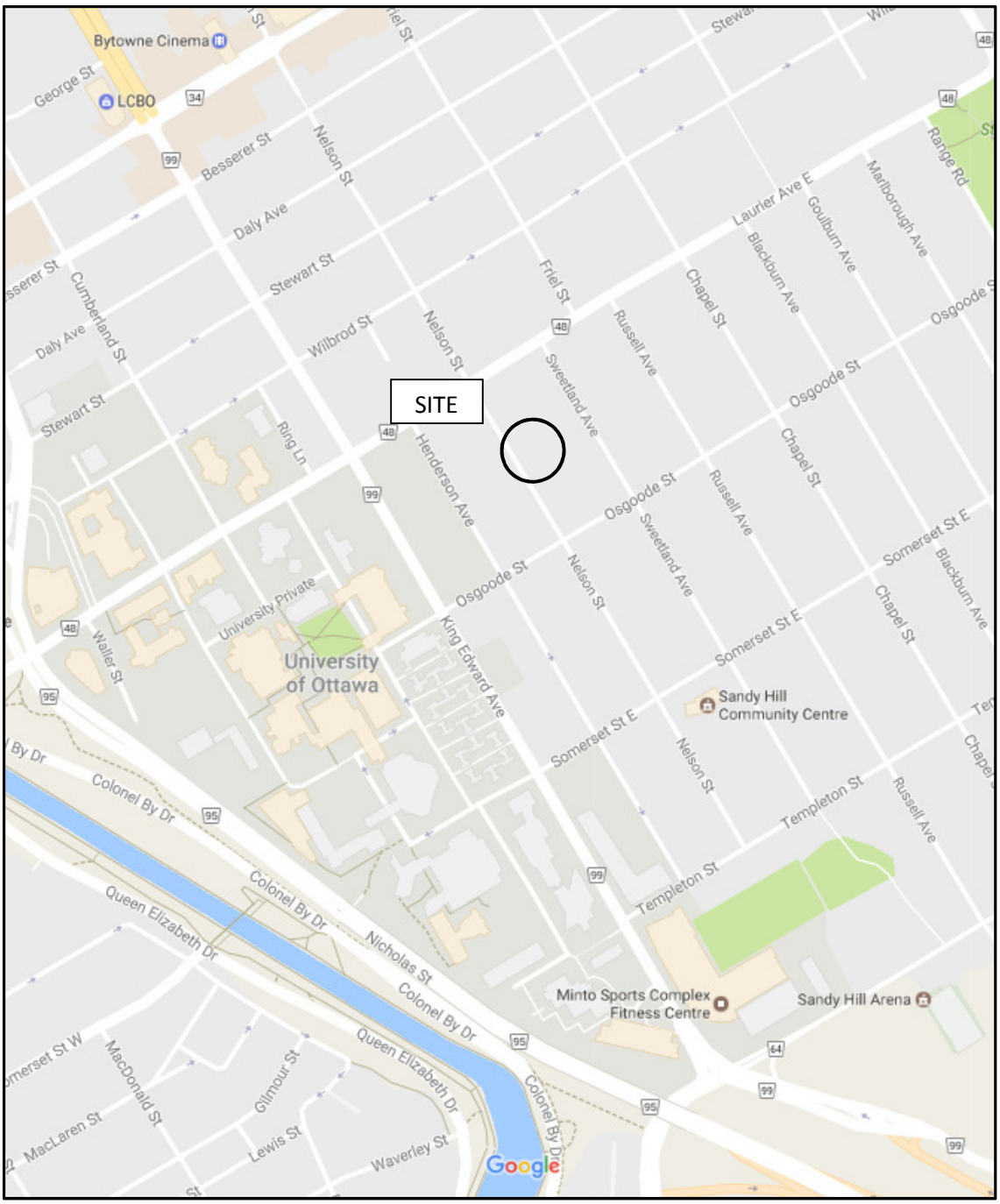
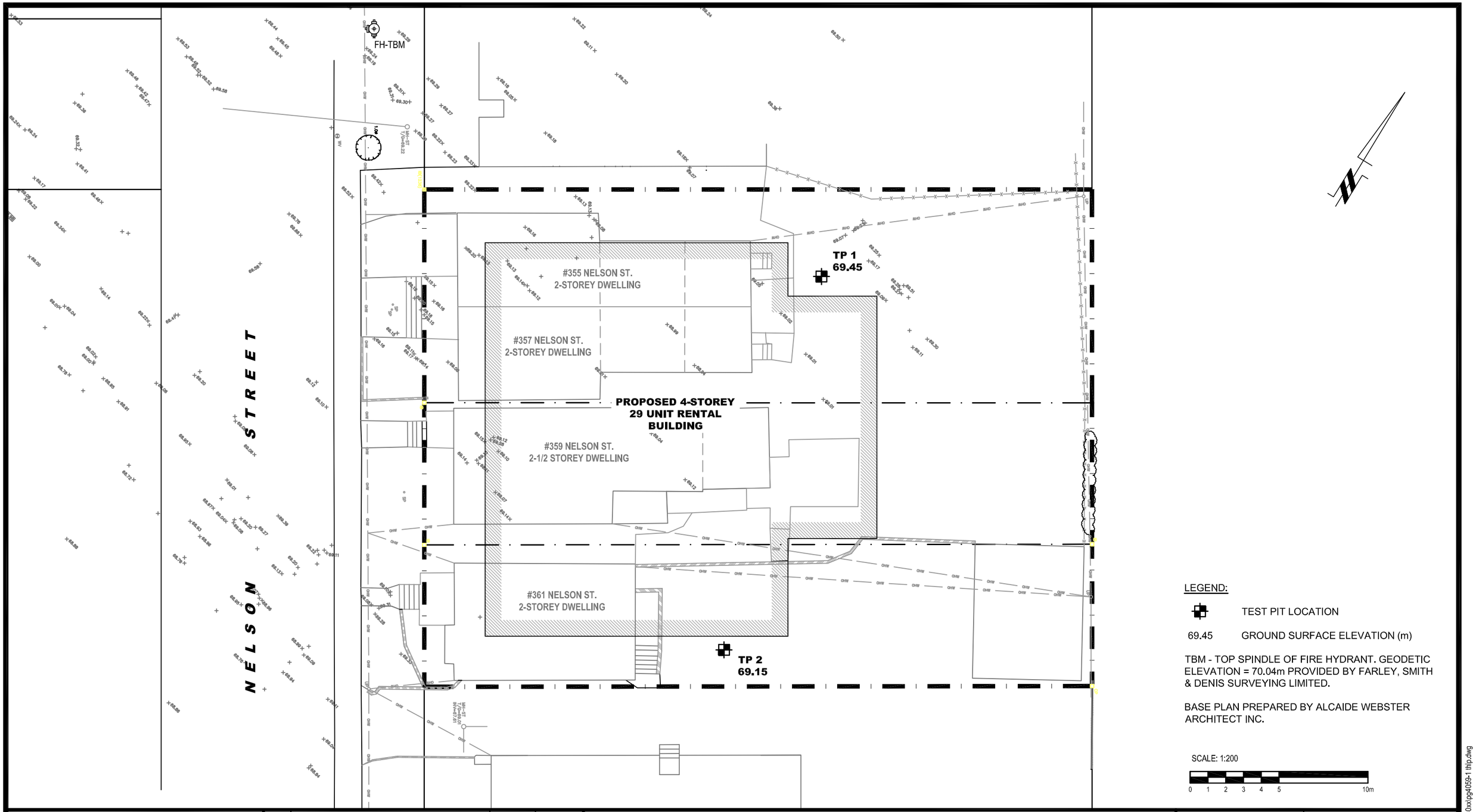


FIGURE 1

KEY PLAN



LEGEND:

TEST PIT LOCATION

69.45 GROUND SURFACE ELEVATION (m)

TBM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 70.04m PROVIDED BY FARLEY, SMITH & DENIS SURVEYING LIMITED.

BASE PLAN PREPARED BY ALCAIDE WEBSTER ARCHITECT INC.

SCALE: 1:200

0 1 2 3 4 5 10m

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consulting engineers

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NO.	REVISIONS	DATE	INITIAL
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AF MARTINS CONSTRUCTION

GEOTECHNICAL INVESTIGATION
PROP. RESIDENTIAL BUILDING - 355, 357, 359 & 361 NELSON ST.
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:200	Date: 02/2017
Drawn by: MPG	Report No.: PG4059-LET.01
Checked by: RG	Dwg. No.: PG4059-1
Approved by: DJG	Revision No.: 0

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