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July 7, 2020
File: PG5051-LET.02 Revision 1

Art Properties and Construction
11 Rosemount Avenue, Suite 101
Ottawa, Ontario
K1Y 4R8

Attention: **Mr. Alireza Taheri**

Subject: **Geotechnical Investigation**
Proposed Residential Building
27 Monk Street - Ottawa, Ontario

Dear Sir,

Paterson Group (Paterson) was commissioned by Art Properties and Construction to conduct a geotechnical investigation for the proposed residential building to be located at 27 Monk Street, in the City of Ottawa, Ontario. The following letter report presents the findings and recommendations.

Based on the available drawings, it is our understanding that the proposed development will consist of a four storey residential building at 27 Monk Street. It is further understood that the proposed building will consist of slab-on-grade construction. At-grade walkways and landscaped areas are also anticipated. It is understood that the proposed building will be municipally serviced.

1.0 Field Investigation

The field program for the investigation was carried out on March 23, 2020. At that time, one (1) test pit was excavated to a maximum depth of 2.3 m below existing grade using a rubber tired backhoe. The test hole was distributed in a manner to provide general coverage of the subject site. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer from our geotechnical division. The field procedure consisted of excavating to the required depths, sampling and testing the overburden at selected locations.

The location of the test pit and ground surface elevation at the test hole location was recovered in the field by Paterson personnel. The ground surface elevation at the test hole location was referenced to a temporary benchmark (TBM), consisting of the top grate of a catch basing located within the driveway to 27 Monk Street. A geodetic elevation of 69.78 was provided for the TBM by Annis O'Sullivan Vollebek Ltd. for the subject site. The location and ground surface elevation at the test hole location is presented on Drawing PG5051-1 - Test Hole Location Plan attached the end of this letter.

2.0 Field Observations

2.1 Surface Conditions

The subject site is currently occupied by an existing three-storey residential dwelling with a retaining wall in the front-yard, an adjacent garage structure and a gross-covered rear yard. The subject site is bordered by a three-storey residential dwelling to the north, a commercial development to the east and south, and Monk Street followed by residential dwellings to the west. The ground surface across the subject site is generally at grade with the surrounding properties, with the exception of the ramp descending into the garage structure.

2.2 Subsurface Profile

Generally, the subsurface profile encountered at the test hole location consists of a pavement structure overlaying a layer of fill consisting of a compact silty sand with gravel and cobbles and some organics. The fill layer was observed to be underlain by a compact deposit of silty sand. Reference should be made to the Soil Profile and Test Data sheets attached to this letter for specific details of the soil profiles encountered at the test hole location.

Based on geological mapping, bedrock in the area of the subject site consists of interbedded limestone and shale or shale from the Verulam and Billings formations, respectively. The overburden drift thickness is expected to range from 15 to 25 m.

2.3 Groundwater

Groundwater levels were measured in the test pit upon completion of the field program. The measured groundwater level (GWL) readings are presented in the Soil Profile and Test Data sheets attached. The test hole was generally observed to be dry upon completion of the sampling program. Based on the above observations, moisture levels and colouring of the recovered soil samples, and our experience with the local area, the long-term groundwater table is expected to be well below 3 m depth from the existing ground surface. It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater level could vary at the time of construction.

3.0 Geotechnical Assessment

From a geotechnical perspective, the subject site is considered satisfactory for the proposed development. It is expected that the proposed building will be founded over conventional style shallow foundations placed over an undisturbed, compact silty sand bearing surface.

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

3.1 Site Grading and Preparations

Stripping Depth

All topsoil and deleterious fill, such as those containing organic materials and construction debris, should be stripped from under any building, paved areas, pipe bedding and other settlement sensitive structures.

In areas where existing silty sand fill, free of deleterious and organic materials, is encountered below the proposed building footprint and outside of the lateral support zone of the footings, it is recommended to sub-excavate at least 300 mm below underside of slab and compact using a vibratory drum roller making several passes, under dry conditions and above freezing temperatures. The fill should be approved by Paterson at the time of construction. Any poor performing areas should be removed and replaced with an approved engineered fill. Upon successful completion of compacting the silty sand fill subgrade and approved by Paterson personnel, the sub-excavation should be topped with OPSS Granular A or Granular B Type II placed in maximum 300 mm loose lifts and compacted to 98% of the material's SPMDD.

Existing foundation walls and other construction debris should be entirely removed from within the proposed buildings' perimeter. Under paved areas, existing construction remnants such as foundation walls should be excavated to a minimum of 1 m below final grade.

Fill Placement

Fill used for grading beneath the 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. 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, free of construction debris, 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 walkways or 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 unless a composite drainage blanket connected to a perimeter drainage system is provided.

3.2 Foundation Design

Bearing Resistance Values

Footings placed on an undisturbed, compact silty sand bearing surface or engineered fill placed over a compact silty sand bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **120 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **200 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance value at ULS.

If the silty sand subgrade is found to be in a loose state of compactness, the material should be proof rolled using suitable vibratory equipment making several passes under dry conditions and above freezing temperatures and approved by Paterson at the time of construction.

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.

Settlement

Footings designed using the bearing resistance value at SLS 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 compact silty sand above the groundwater table, when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V passes only through in situ soil or engineered granular fill, as described above.

3.3 Design for Earthquakes

The site class for seismic site response can be taken as **Class D** for the foundations considered. Due to the compactness of the silty sand deposit and the long term groundwater level, soils underlying the subject site are not susceptible to liquefaction. Refer to the latest revision of the 2012 Ontario Building Code for a full discussion on the earthquake design requirements.

3.4 Slab-on-Grad Construction

With the removal of all topsoil and deleterious materials, within the proposed building footprint, the native soil or existing fill, 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

3.5 Pavement and Exterior Walkway Structures

For design purposes, the hard landscaping walkway and car only parking pavement structure presented in the following table could be used for the design of pedestrian walkways.

Table 1 - Recommended Hard Landscaping - Pedestrian Walkways

Thickness (mm)	Material Description
40 - 50	**Wear Course** - Interlocking Stones/Brick Pavers
25 - 40	**Leveling Course** - Stone Dust or Sand
300	**BASE** - OPSS Granular A crushed stone
SUBGRADE - Either fill, in situ soils or OPSS Granular B Type I or II material placed over in situ soil or approved fill.	

Table 2 - 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	

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 walkway granular base should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 98% of the SPMDD.

Road Cut Reinstatement

Following the installation of each of the proposed service crossings, it is recommended to reinstate the pavement structure for a traffic level B category roadway as follows:

- Subbase:. . . . . 450 mm of OPSS Granular B Type II crushed stone
- Base:. . . . . 150 mm of OPSS Granular A crushed stone
- Binder Course: . . . . . 50 mm lift of HL-8 or SP 19.0 asphaltic concrete
- Wear Course: . . . . . 45 mm of HL-3 or SP 12.5 asphaltic concrete

In order to tie the new paved area to the existing pavement structure, the following should be implemented:

- It is recommended to mill a 300 mm wide and 50 mm deep section of the existing asphalt, and construct an extension of the subbase and base to the excavated section, and then place a new asphalt surface.
- The proposed pavement structure subbase materials should be tapered no greater than 3H:1V to meet the existing subbase materials.
- The new pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% of the material's SPMDD.
- All compaction efforts should be reviewed and approved by Paterson at the time of construction.

Construction Considerations

Performance graded (PG) 58-34 asphaltic concrete is recommended for use on this project. If soft spots develop in the subgrade for the service crossings bedding layer during compaction or due to construction traffic, the affected areas should be sub-excavated and replaced with OPSS Granular B Type II material compacted to a minimum of 95% of the material's standard Proctor maximum dry density (SPMDD) using suitable vibratory equipment.

The pavement granular base and subbase layers should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 99% of the material's SPMDD. 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. Non-specified existing fill along with site-excavated soil can be used beneath the pavement structure. Fill used for grading beneath the pavement structure should be compacted in maximum 300 mm lifts and compacted to 95% of the material's SPMDD.

4.0 Design and Construction Precautions

4.1 Foundation Drainage and Backfill

A perimeter foundation drainage system is recommended to be provided for the proposed structure. The system should consist of a 100 to 150 mm diameter perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 10 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. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should be used for this purpose. 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 blanket, such as Miradrain G100N or Delta Drain 6000.

4.2 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 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.

4.3 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.

The pipe bedding for sewer and water pipes should consist of at least 150 mm of OPSS Granular A material. The material should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% of its SPMDD. The bedding material should extend at least to the spring line of the pipe.

The cover material, which should consist of OPSS Granular A, should extend from the spring line of the pipe to at least 300 mm above the obvert of the pipe. The material should be placed in maximum 300 mm thick lifts and compacted to a minimum of 95% of its 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 material's SPMDD.

4.4 Temporary Shoring and Excavation Side Slopes

Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should either be excavated to acceptable slopes or retained by shoring systems from the beginning of the excavation until the structure is backfilled. Sufficient room should be available in selected areas of the excavation to be completed 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 excavated at 1H:1V or shallower. A shallower slope is required for excavation below groundwater level. The subsurface soil is considered to be mainly a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be 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.

A trench box should be installed at all times to protect personnel working in trenches with steep or vertical sides. Services are expected to be installed by “cut and cover” methods and excavations should not be remain open for extended periods of time.

Underpinning

Due to the close proximity of the neighbouring buildings along the north, east and south boundary lines, underpinning may be required. It is recommended that the footings of the existing buildings be exposed to verify the depth of the founding level of each building in order to provide proper underpinning recommendations, if required.

4.5 Groundwater Control

Infiltration levels are anticipated to be low through the excavation face, based on the local groundwater table. The groundwater infiltration is anticipated to be controllable with open sumps and pumps. The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source.

If the anticipated pumping volumes exceed 400,000 L/day of ground and/or surface water, a temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) will be required for this project 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.

4.6 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.

4.7 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 low to moderately aggressive corrosive environment.

5.0 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.

- ❏ 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.

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.

6.0 Statement of Limitations

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

A soils investigation is a limited sampling of a site. Should any conditions at the sire 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 an 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 this document. Use of this report for purposes other than those described herein or by person(s) other than Art Properties and Construction 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.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

Drew Petahtegoose, B.Eng.

Faisal I. Abou-Seido, P.Eng.

Attachments

- ❑ Soil Profile and Test Data sheets
- ❑ Symbols and Terms
- ❑ Analytical Testing Results
- ❑ Figure 1 - Key Plan
- ❑ Drawing PG5051-1 - Test Hole Location Plan

Report Distribution

- ❑ Art Properties and 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
27 Monk Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5051

REMARKS

HOLE NO. TP 1

BORINGS BY Backhoe **DATE** March 23, 2020

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									
Brick pavers 0.05						0	69.91		
FILL: Compact, brown silty sand with gravel, trace organics		G	1						
0.63									
		G	2			1	68.91		
Compact, brown **SILTY SAND,** some gravel		G	3						
						2	67.91		
2.31									
End of Test Pit									
(TP dry upon completion)									

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

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

The standard terminology to describe the 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

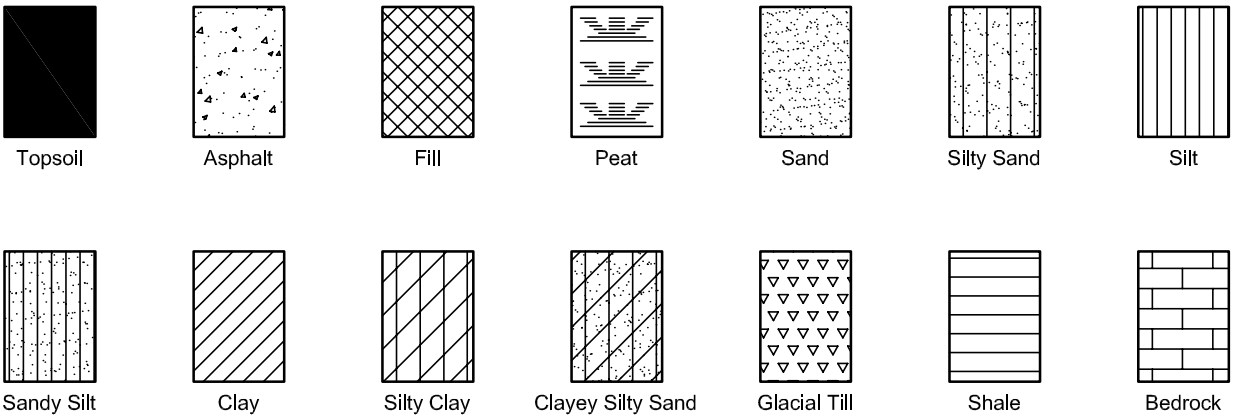
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

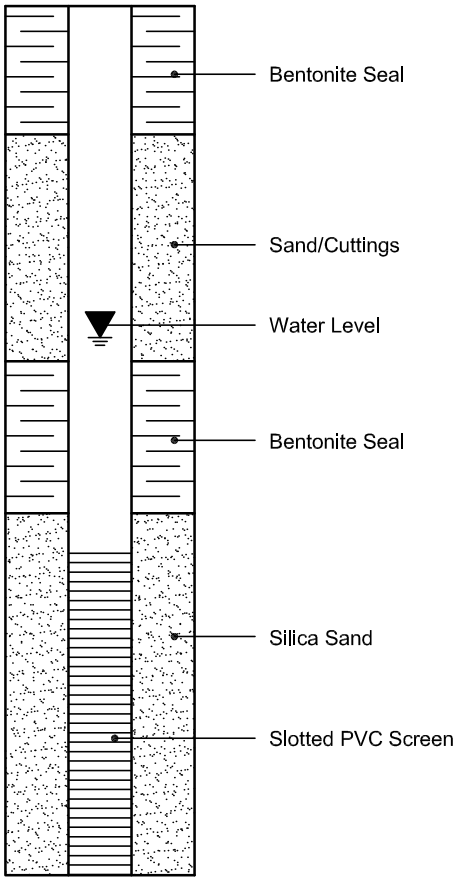
SYMBOLS AND TERMS (continued)

STRATA PLOT

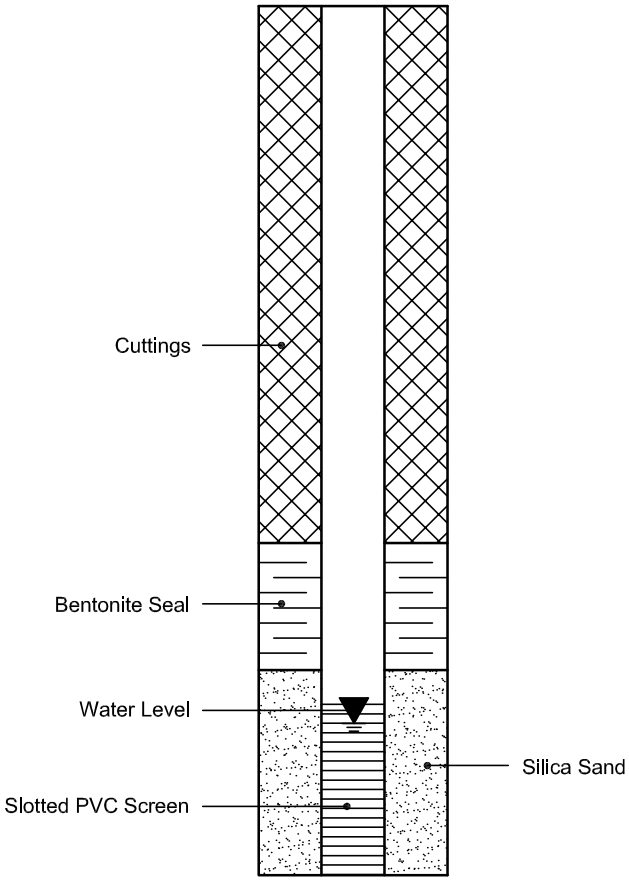


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Report Date: 30-Mar-2020

Client: Paterson Group Consulting Engineers

Order Date: 25-Mar-2020

Client PO: 29776

Project Description: PG5051

	Client ID:	TP3-G4	-	-	-
	Sample Date:	23-Mar-20 13:00	-	-	-
	Sample ID:	2013231-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	94.0	-	-	-
General Inorganics					
pH	0.05 pH Units	7.69	-	-	-
Resistivity	0.10 Ohm.m	44.1	-	-	-
Anions					
Chloride	5 ug/g dry	61	-	-	-
Sulphate	5 ug/g dry	75	-	-	-

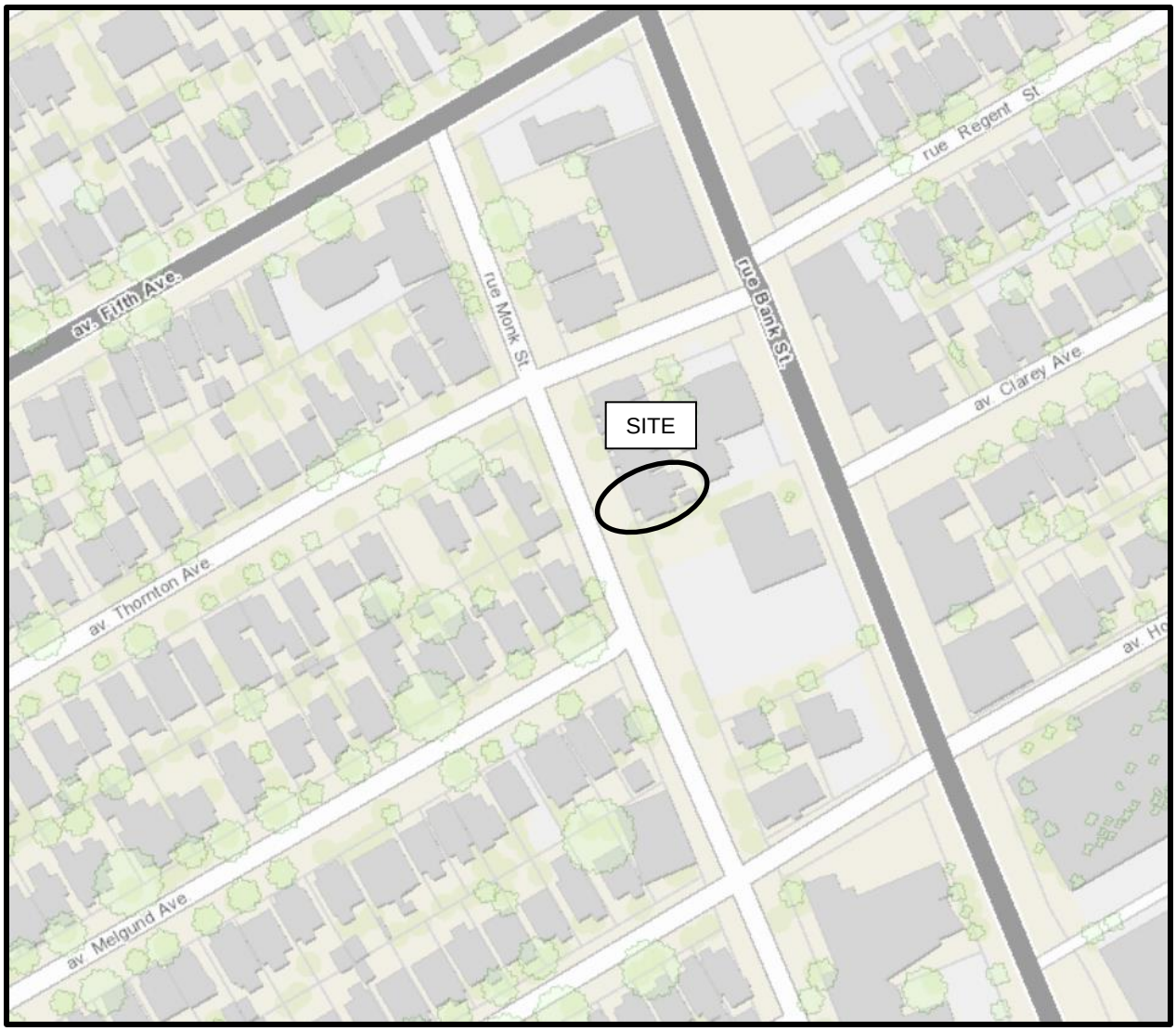
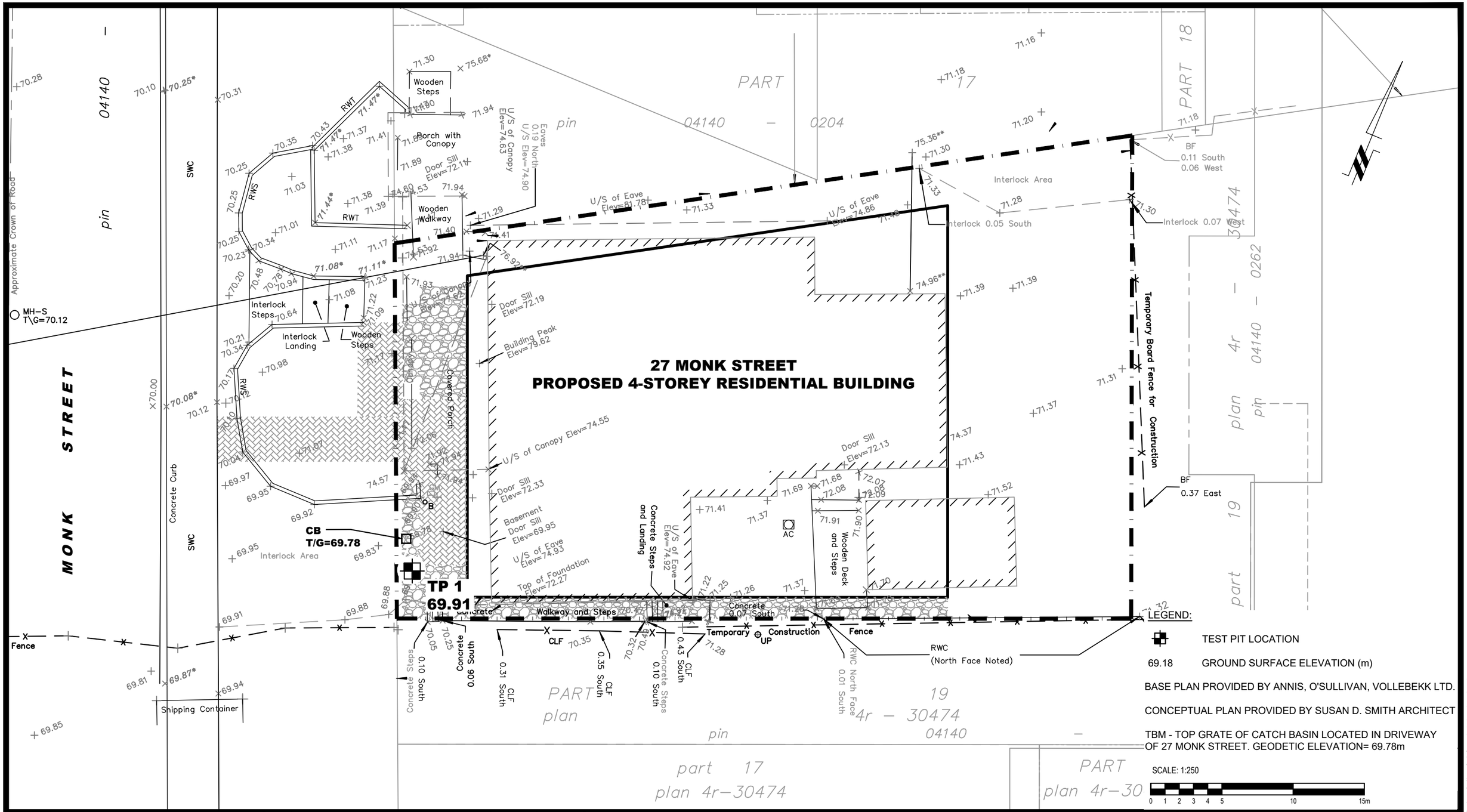


FIGURE 1

KEY PLAN



LEGEND:

TEST PIT LOCATION

69.18 GROUND SURFACE ELEVATION (m)

BASE PLAN PROVIDED BY ANNIS, O'SULLIVAN, VOLLEBEKK LTD.

CONCEPTUAL PLAN PROVIDED BY SUSAN D. SMITH ARCHITECT

TBM - TOP GRATE OF CATCH BASIN LOCATED IN DRIVEWAY OF 27 MONK STREET. GEODETIC ELEVATION= 69.78m

SCALE: 1:250

0 1 2 3 4 5 10 15m

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NO.	REVISIONS	DATE	INITIAL

ART PROPERTIES AND CONSTRUCTION

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL BUILDING- 27 MONK STREET

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:100	Date: 04/2020
Drawn by: YA	Report No.: PG5051-1
Checked by: DP	Dwg.No.: PG5051-1
Approved by: FA	Revision No.:

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