Geotechnical Engineering

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Geotechnical Investigation

Proposed Development
3130, 3150 & 3162 Woodroffe Avenue
and 15 Deerfox Drive
Ottawa, Ontario

Prepared For

P-Squared Concepts Inc.

April 22, 2022

Report: PG6182-1

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by P-Squared Concepts Inc. to conduct a geotechnical investigation for the proposed development to be located at 3130, 3150 & 3162 Woodroffe Avenue and 15 Deerfox Drive, in the City of Ottawa, Ontario (refer to Figure 1 - Key Plan in Appendix 2 of this report).

The objectives of the geotechnical investigation were to:

- Determine the subsoil and groundwater conditions at this site by means of boreholes.
- Provide geotechnical recommendations pertaining to the design of the proposed development including construction considerations which may affect the design.

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

2.0 Proposed Development

Based on the available drawings, it is understood that the proposed development at 3130 Woodroffe Avenue will consist of a one-storey commercial building and 2 multi-storey residential buildings. Associated asphalt-paved access lanes and parking areas, with walkways and landscaped margins, are proposed surrounding the buildings.

Further, the proposed development will include the extension of the municipal sanitary sewer extending north, east, and west of the intersection between Woodroffe Avenue, Deerfox Drive and Stoneway Drive, including sanitary connections to 3130 Woodroffe Avenue and 15 Deerfox Drive.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the geotechnical investigation was carried out on April 18 and 19, 2022, and consisted of a total of 6 boreholes, advanced to a maximum depth of 6.6 m. Previous investigations were also completed by others on December 8 and 13, 2016, and consisted of three (3) boreholes advanced to a maximum depth of 15.1 m below the ground surface. The borehole locations were distributed in a manner to provide general coverage of the subject site and taking into consideration underground utilities and site features. The approximate locations of the boreholes are shown on Drawings PG6182-1A & PG6182-1B - Test Hole Location Plans included in Appendix 2.

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

Sampling and In Situ Testing

Soil samples were collected from the auger flights (AU) or using a 50 mm diameter split- spoon (SS) sampler. The samples were classified on site, placed in sealed plastic bags, and transported to our laboratory. The depths at which the auger and split spoon samples were recovered from the boreholes are shown as AU and SS, respectively, on the Soil Profile and Test Data Sheets in Appendix 1.

A Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split spoon samples. The SPT results are recorded as "N" values on the Soil Profile and Test Data sheets. The "N" value is the number of blows required to drive the split spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

The overburden thickness was evaluated by a dynamic cone penetration test (DCPT) completed at borehole BH 1-22. The DCPT consists of driving a steel drill rod, equipped with a 50 mm diameter cone at the tip, using a 63.5 kg hammer falling from a height of 760 mm. The number of blows required to drive the cone into the soil is recorded for each 300 mm increment.

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

Groundwater

Flexible standpipes were installed in all boreholes during the field investigation to permit monitoring of the groundwater levels subsequent to the completion of the sampling program. Groundwater level observations are discussed in Section 4.3 and are presented in the Soil Profile and Test Data sheets in Appendix 1.

3.2 Field Survey

The borehole locations were selected by Paterson to provide general coverage of the subject site, taking into consideration the existing site features and underground utilities. The borehole locations and ground surface elevations were surveyed by Paterson using a handheld GPS, referenced to a geodetic datum, and are presented on Drawing PG6182-1A & PG6182-1B - Test Hole Location Plans in Appendix 2.

3.3 Laboratory Testing

Soil samples were recovered from the subject site and visually examined in our laboratory to review the results of the field logging. All samples will be stored in the laboratory for a period of one month after this report is completed. They will then be discarded unless otherwise directed.

3.4 Analytical Testing

One soil sample was submitted by Paterson and 2 soil samples were submitted by others for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. The samples were tested to determine the concentration of sulphate and chloride, the resistivity and the pH of the sample. The results are presented in Appendix 1 and are discussed further in Section 6.7.

4.0 Observations

4.1 Surface Conditions

The subject site consists of 3 contiguous properties, 3150 & 3162 Woodroffe Avenue and 15 Deerfox Drive, which are located on the south side of Deerfox Drive, and 3130 Woodroffe Avenue which is located on the north side of Deerfox Drive. The subject site is currently occupied by several existing residential dwellings with basement or slab-on-grade construction. Asphalts driveways, garage, sheds, inground pools, decks, interlocking stones and a concrete retaining wall were also observed at the site. The majority of the site is covered with grass, landscaped, and partially treed areas.

The subject site is bordered to the north, west and south by single family residential dwellings and to the east by Woodroffe Avenue. The site is bisected by Deerfox drive in an east-west direction. The ground surface across the subject site is relatively flat and at grade with adjacent roadways and properties.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile encountered at the test hole locations consists of a layer of topsoil underlain by fill, silty clay, and or silty sand followed by glacial till. The fill was observed to consist of silty clay and sand, gravel, and organics, and was observed to extend to depths ranging between approximately 0.9 and 1.3 m below the existing ground surface.

The fill was observed to be underlain by a thin deposit of brown silty clay at the locations of boreholes BH 2-22 and BH 3-22. Further, a brown silty sand, with trace amounts of gravel, was observed directly underlying the topsoil at boreholes BH 4-22 and BH 5-22. The silty sand or silty clay deposits were observed to extend to depths ranging between about 0.3 and 1.4 m below the existing ground surface.

The fill, silty clay and/or silty sand were observed to be underlain by a compact to very dense glacial till deposit. The glacial till was observed to consist of silty sand and/or sandy silt with gravel, cobbles and boulders.

Practical refusal to augering or the DCPT was observed at varying depths over the subject site, ranging from about 5.2 m at the north end of the site, to about 13.6 m at the south end of the site.

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

Bedrock

The bedrock was cored in borehole BH-3, by others, and was observed to consist of limestone with an average Rock Quality Designation (RQD) value of approximately 90% and a recovery value of 100%. The quality of bedrock is considered as excellent quality.

Based on available geological mapping, the bedrock in the subject area consists of interbedded sandstone and dolomite of the March Formation with an overburden drift thickness of 5 to 10 m on the north portion of the site, and 10 to 15 m on the southern portion of the site.

Grain Size Distribution and Hydrometer Testing

Grain size distribution (sieve and hydrometer analysis) was also completed by others on two (2) selected soil sample. The results of the grain size analysis are summarized in Table 1 and presented on the Laboratory Testing Results by Others in Appendix 1.

Table 1 - Summary of Grain Size Distribution Analysis

Test Hole	Sample	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
BH 2	SS6	14	50	27	9
BH 3	SS5	31	45	24	0

4.3 Groundwater

The groundwater levels were measured during the previous investigation by others. The measured ground water levels are presented in Table 2 below.

Table 2 – Summary of Groundwater Levels

Test Hole Number	Ground Surface Elevation (m)	Measured Groundwater Level		Dated Recorded
		Depth (m)	Elevation (m)	
BH 1	96.7	6.7	90.0	Upon Completion
BH 2	96.0	4.6	91.4	
BH 3	96.9	7.3	89.6	

Note: The ground surface elevation at each test hole location was provided by others.

The long-term groundwater levels can also be estimated based on the observed colour, moisture content and consistency of the recovered soil samples.

Based on these observations and our knowledge of the geology of the area, the long-term groundwater table can be expected at approximate depths of 3 to 4 m below ground surface.

However, it should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is considered suitable for the proposed development. The proposed buildings may be founded on conventional spread footings placed on the undisturbed, compact silty sand, stiff silty clay, and/or compact to very dense glacial till.

Recommendations for the site servicing are provided in Section 6.4. The above and other considerations are further discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and fill, such as those containing organic or deleterious material, should be stripped from under any buildings and other settlement sensitive structures. It is anticipated that the existing fill within the proposed building footprints, free of deleterious material and significant amounts of organics, can be left in place below the proposed building footprint outside of lateral support zones for the footings.

It is recommended that the existing fill layer be proof-rolled with several passes of a vibratory drum roller, under dry conditions and above freezing temperatures, and which is approved by Paterson personnel at the time of construction. Any poor performing areas noted during the proof-rolling operation should be removed and replaced with an approved fill.

Existing foundation walls and other demolished debris should be completely removed from the proposed building perimeter and within the lateral support zones of the foundation. Under paved area, existing construction remnants, such as foundation walls should be excavated to a minimum of 1 m below final grade.

Fill Placement

Engineered fill placed for grading beneath the proposed buildings should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material should be tested and approved prior to delivery to the site. The fill 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 buildings and paved areas should be compacted to at least 98% of the material's standard Proctor maximum dry density (SPMDD).

Non-specified existing fill, along with site-excavated soil, can be used as general landscaping fill and beneath exterior parking areas where settlement of the ground surface is of minor concern. This material should be spread in thin lifts with a maximum thickness of 300 mm and at least compacted by the tracks of the spreading equipment to minimize voids. If this material is to be used to build up the subgrade level for areas to be paved, it should be compacted in thin lifts to at least 95% of the material's SPMDD.

5.3 Foundation Design

Footings placed on an undisturbed, compact silty sand, stiff silty clay, and/or compact to very dense glacial till bearing surface can be designed using bearing resistance value at serviceability limit states (SLS) of **200 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **300 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 prior to the placement of concrete for footings. The bearing resistance value given for footings 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 glacial till bearing surface 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.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class C**. Soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the OBC 2012 for a full discussion of the earthquake design requirements.

5.5 Basement Slab / Slab-on-Grade Construction

With the removal of all topsoil and deleterious fill within the footprint of the proposed building, the existing fill subgrade and/or native soil surface approved by

the geotechnical consultant at the time of construction will be considered an acceptable subgrade on which to commence backfilling for floor slab construction.

It is recommended that the existing fill layer, free of deleterious and organic materials, be proof-rolled several times and approved by the geotechnical consultant at the time of construction. Any soft areas should be removed and backfilled with appropriate granular material.

It is recommended that the concrete floor slab be poured over a minimum 200 mm thick layer of sub-slab fill consisting of 19 mm clear crushed stone, for a basement slab. A minimum 200 mm thick layer of Granular A crushed stone is recommended for placing below proposed slabs-on-grade.

5.6 Pavement Structure

Car only parking areas and access lanes are anticipated as part of the proposed development. The recommended pavement structures are presented in Tables 3 and 4 below.

Table 3 - Recommended Pavement Structure - Car Only Parking Areas

Thickness (mm)	Material Description
50	**Wear Course** – HL-3 or Superpave 12.5 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
300	**SUBBASE** - OPSS Granular B Type II
SUBGRADE – Either approved fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil or fill.	

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

Thickness (mm)	Material Description
40	**Wear Course** – HL-3 or Superpave 12.5 Asphaltic Concrete
50	**Binder Course** – HL-8 or Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
450	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either approved fill, in situ soil, 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 replaced with OPSS Granular B Type II material. The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 99% of the SPMDD using suitable vibratory equipment.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

Foundation Drainage

Since the proposed residential dwellings are understood to each include a partial basement level, it is recommended that a perimeter foundation drainage system be provided for each of these proposed structures. The system should consist of a 150 mm diameter, perforated and corrugated plastic or PVC pipe which is surrounded by 150 mm of 19 mm clear crushed stone, placed at the footing level around the exterior perimeter of each structure. The pipe should have a positive outlet, such as a gravity connection to the storm sewer. Slab-on-grade buildings, which have no occupied below-grade space, do not require a perimeter drainage system.

Foundation Backfill

For the proposed residential buildings, which will have partial basements, the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against these foundation walls, unless used in conjunction with a drainage geocomposite, such as Delta Drain 6000, connected to the perimeter foundation drainage system. 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 otherwise be used for this purpose.

6.2 Protection of Footings Against Frost Action

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

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

6.3 Excavation Side Slopes

The side slopes of excavations in the overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is anticipated that sufficient space will be available for the great part of the excavations to be undertaken by open-cut methods (i.e. unsupported excavations).

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsoil at this site is considered to be mainly a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box is used to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by “cut and cover” methods and excavations will not be left open for extended periods of time.

6.4 Pipe Bedding and Backfill

Bedding and backfill materials should be in accordance with the most recent Material Specifications and Standard Detail Drawings from the Department of Public Works and Services, Infrastructure Services Branch of the City of Ottawa.

The pipe bedding for water and pipes placed on a relatively dry, undisturbed subgrade surface should consist of at least 150 mm of OPSS Granular A material. 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 and cover materials should be placed in maximum 225 mm thick lifts and compacted to 98% of the SPMDD.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.2 m below finished grade) and above the cover material 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 98% of the material's SPMDD. All cobbles larger than 200 mm in their longest direction should be segregated from re-use as trench backfill.

6.5 Groundwater Control

It is anticipated that groundwater infiltration into the excavations should be controllable using open sumps. The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

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

For typical ground or surface water volumes being pumped during the construction phase, 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.

Impacts on Neighbouring Properties

Due to the relatively shallow depth of the compact to very dense glacial till deposit, it is anticipated that neighbouring structures are bearing on this strata, which is not susceptible to settlement from dewatering,. Therefore, no adverse effects from short-term or long-term dewatering are expected for surrounding structures. The short-term dewatering during the excavation program will be managed by the excavation contractor.

6.6 Winter Construction

Precautions must be taken if winter construction is considered for this project. The subsoil conditions at this site consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures using 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 into the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions. Additional information could be provided, if required.

6.7 Corrosion Potential and Sulphate

The results of analytical testing show that the sulphate content is less than 0.1%. This result is indicative that Type 10 Portland cement (normal cement) would be appropriate for this site. The chloride content and the pH of the sample indicate that they are not significant factors in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of a moderate to slightly aggressive corrosive environment.

7.0 Recommendations

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

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

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

All excess soils must be handled as per *Ontario Regulation 406/19: On-Site and Excess Soil Management.*

8.0 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 soils investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, Paterson requests immediate notification to permit reassessment of our recommendations.

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

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than P-Squared Concepts Inc. 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.

Fernanda Carozzi, PhD. Geoph. Scott S. Dennis, P.Eng.

Report Distribution:

- ❑ P-Squared Concepts Inc. (email copy)
- ❑ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

BOREHOLE LOGS BY OTHERS

LABORATORY TESTING RESULTS BY OTHERS

ANALYTICAL TESTING RESULTS

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
3130, 3150 & 3162 Woodroffe Ave. & 15 Deerfox Dr.
Ottawa, Ontario

DATUM Geodetic

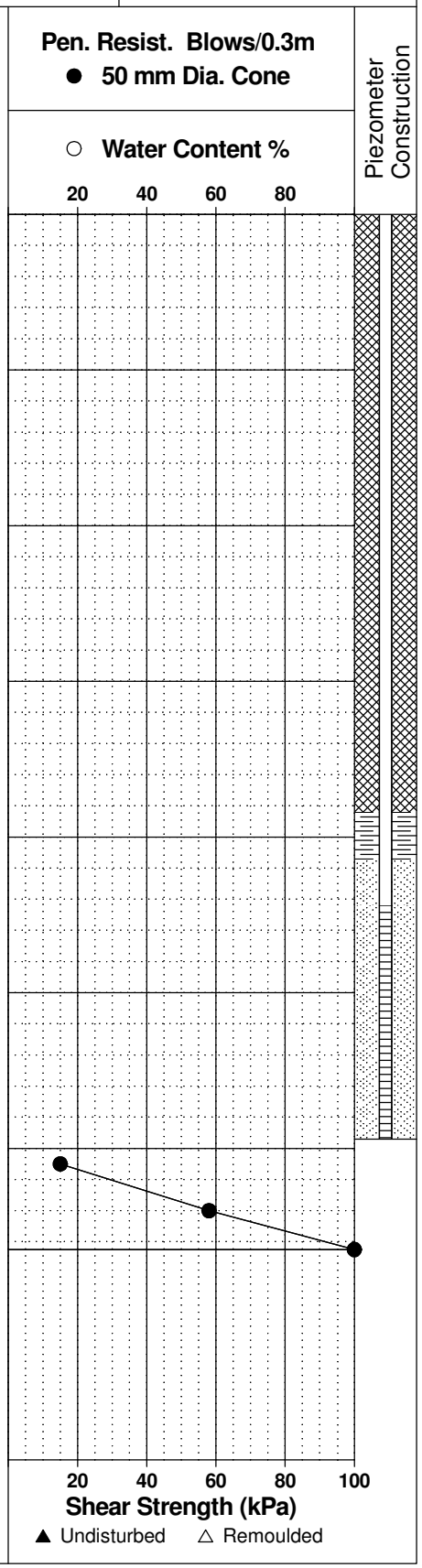
REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** April 18, 2022

FILE NO. PG6182

HOLE NO. BH 1-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.85
TOPSOIL 0.20		AU	1				
FILL: Brown silty clay with sand, gravel, shale fragments and topsoil		SS	2	71	4	1	92.85
1.37							
GLACIAL TILL: Compact, brown silty sand to sandy silt, some clay and gravel, occasional cobbles		SS	3	83	19	2	91.85
		SS	4	62	20		
3.00						3	90.85
GLACIAL TILL: Loose to dense, brown silty clay with sand and gravel, occasional cobbles		SS	5	79	5		
- grey by 3.7m depth		SS	6	71	34	4	89.85
4.70							
GLACIAL TILL: Dense to very dense, grey silty sand to sandy silt with gravel, cobbles and boulders, trace clay		SS	7	79	31	5	88.85
		SS	8	8	91		
5.94						6	87.85
Dynamic Cone Penetration Test commenced at 5.94m depth.							
6.65							
End of Borehole							
Practical DCPT refusal at 6.65m depth.							



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DATUM Geodetic

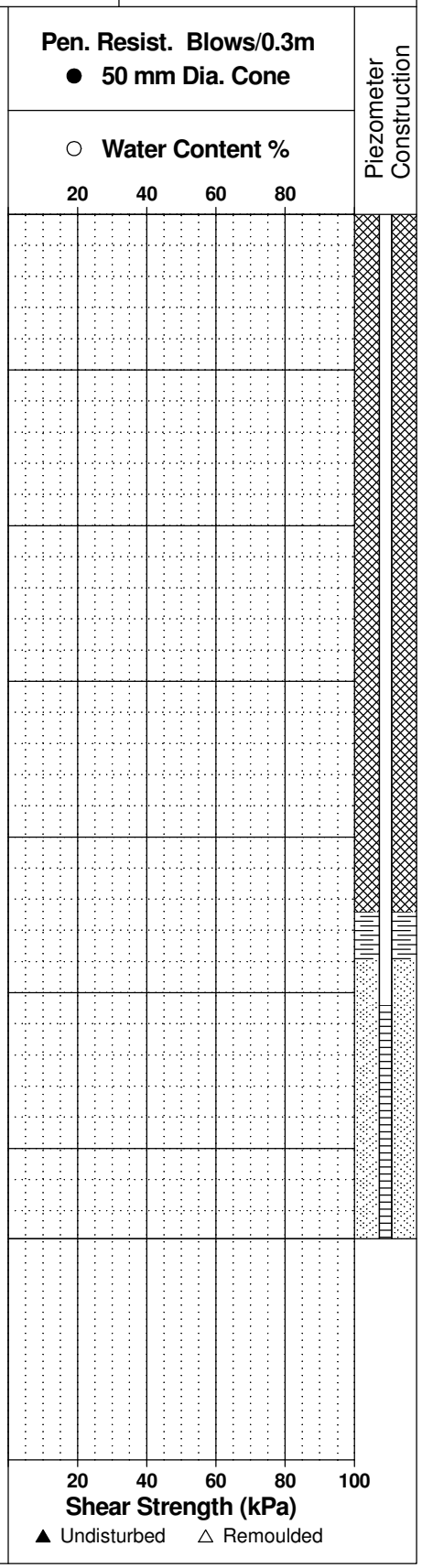
REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** April 18, 2022

FILE NO. PG6182

HOLE NO. BH 2-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.57
TOPSOIL 0.18							
FILL: Brown silty sand, some clay, trace topsoil		AU	1				
0.91						1	92.57
Stiff, brown **SILTY CLAY**		SS	2	58	12		
1.45							
GLACIAL TILL: Compact to very dense, brown silty sand to sandy silt with gravel, cobbles and boulders, trace clay		SS	3	95	27	2	91.57
- grey by 2.2m depth		SS	4	94	50+		
3.00						3	90.57
		SS	5	63	70		
GLACIAL TILL: Very dense to compact, brown silty sand with gravel, occasional cobbles		SS	6	67	27	4	89.57
- grey by 4.5m depth		SS	7	33	47	5	88.57
		SS	8	29	24		
						6	87.57
6.58							
End of Borehole							
Practical refusal to augering at 6.58m depth.							



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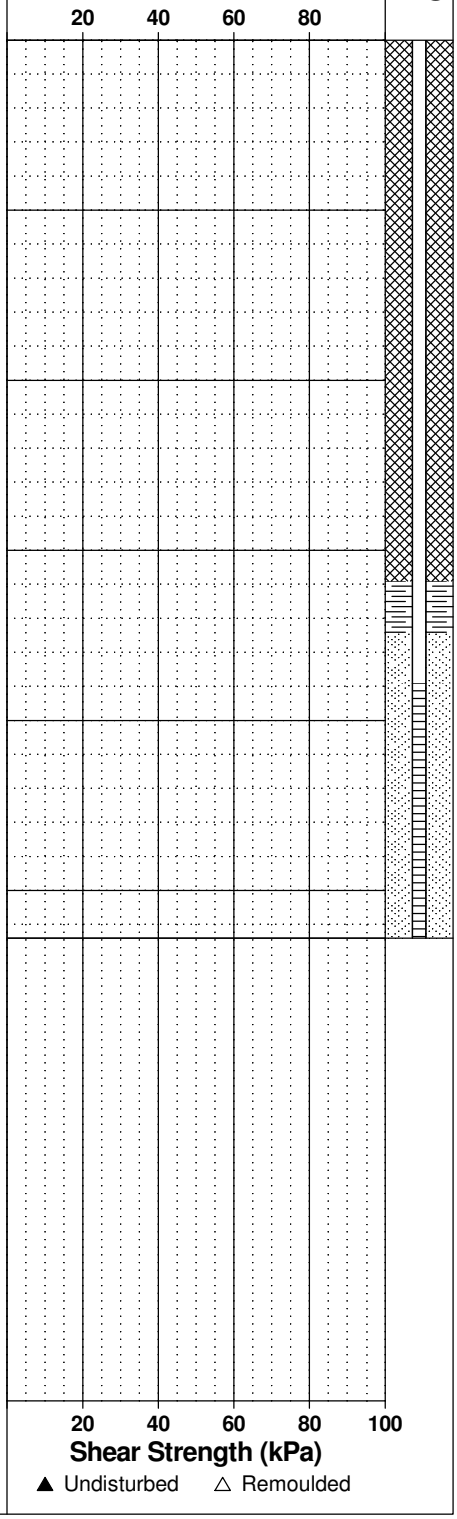
FILE NO. PG6182

HOLE NO. BH 3-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.22
TOPSOIL 0.30		AU	1				
FILL: Brown silty clay, some sand, trace gravel and organics 0.91		SS	2	75	12	1	93.22
Stiff, brown **SILTY CLAY** 1.37		SS	3	42	12	2	92.22
GLACIAL TILL: Compact, brown silty clay with sand, gravel, cobbles and boulders		SS	4	67	14		
- grey by 2.2m depth		SS	5	62	11	3	91.22
3.70							
GLACIAL TILL: Dense to compact, grey silty sand, some gravel, cobbles, trace to some clay		SS	6	54	39	4	90.22
		SS	7	58	10	5	89.22
5.28							
End of Borehole							
Practical refusal to augering at 5.28m depth.							

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



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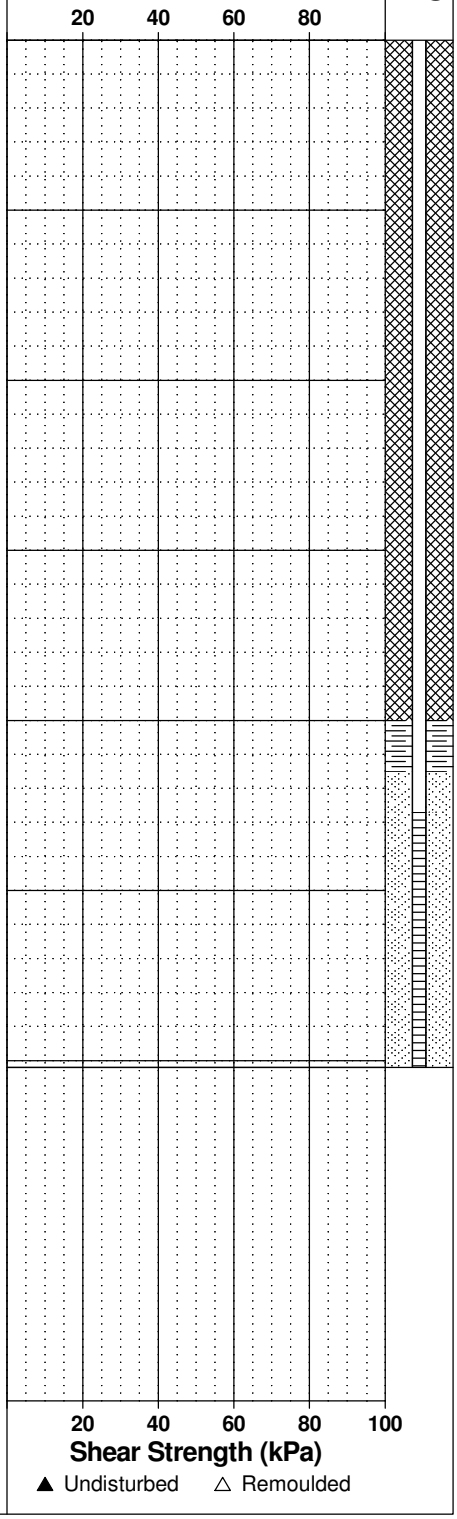
FILE NO. PG6182

HOLE NO. BH 4-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.96
TOPSOIL 0.20							
Reddish brown **SILTY SAND,** trace gravel and organics		AU	1				
0.69		SS	2	100	50+	1	93.96
		SS	3	94	50+	2	92.96
GLACIAL TILL: Very dense to dense, brown silty sand with gravel, cobbles and boulders						3	91.96
		SS	4	83	77		
		SS	5	100	50+	4	90.96
- grey by 4.6m depth		SS	6	75	62	5	89.96
		SS	8		37		
6.04						6	88.96
End of Brohole							
Practical refusal to augering at 5.26m depth.							

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



Piezometer Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
3130, 3150 & 3162 Woodroffe Ave. & 15 Deerfox Dr.
Ottawa, Ontario

DATUM Geodetic

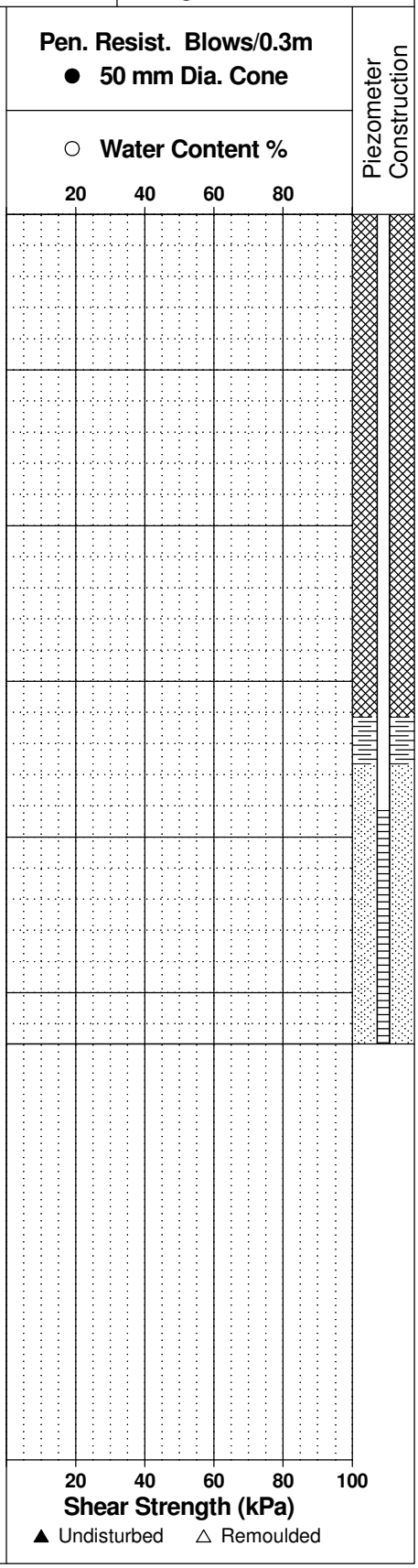
REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** April 18, 2022

FILE NO. PG6182

HOLE NO. BH 5-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	95.81
TOPSOIL 0.08							
Reddish brown **SILTY SAND,** trace gravel and organics 0.38		AU	1				
		SS	2	69	50+	1	94.81
		SS	3	21	24	2	93.81
GLACIAL TILL: Compact to very dense, brown silty sand to sandy silt with gravel, cobbles and boulders, trace to some clay		SS	4	42	20		
		SS	5	33	35	3	92.81
		SS	6	62	50	4	91.81
		SS	7	42	53	5	90.81
5.33							
End of Borehole							
Practical refusal to augering at 5.33m depth.							



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
3130, 3150 & 3162 Woodroffe Ave. & 15 Deerfox Dr.
Ottawa, Ontario

DATUM Geodetic

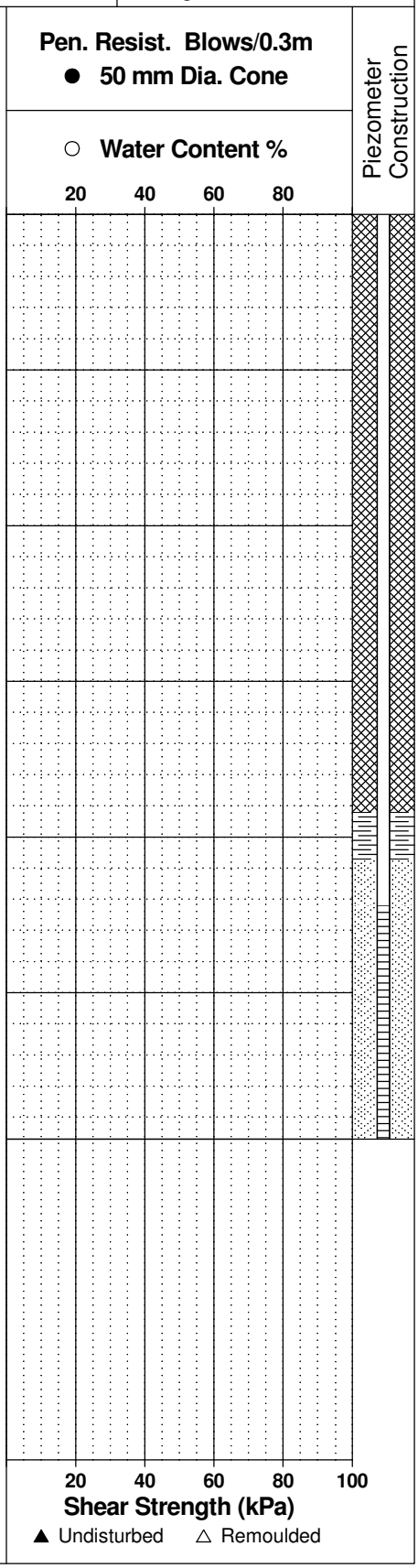
REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** April 19, 2022

FILE NO. PG6182

HOLE NO. BH 6-22

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	94.66
TOPSOIL 0.08							
FILL: Brown silty sand, some clay, trace topsoil		AU	1				
1.07		SS	2	67	8	1	93.66
		SS	3	92	31	2	92.66
GLACIAL TILL: Dense to compact, brown silty sand to sandy silt with gravel, cobbles and boulders, trace clay		SS	4	17	58	3	91.66
		SS	5	38	27	4	90.66
		SS	6	4	40		
- grey by 4.5m depth		SS	7	33	23	5	89.66
		SS	8	89	14		
5.94							
End of Borehole							
Practical refusal to augering at 5.94m depth.							



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

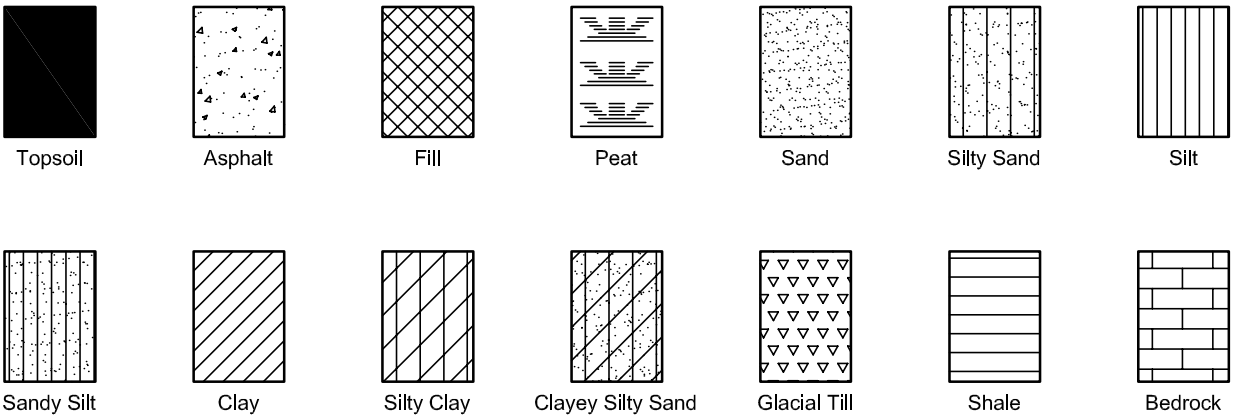
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

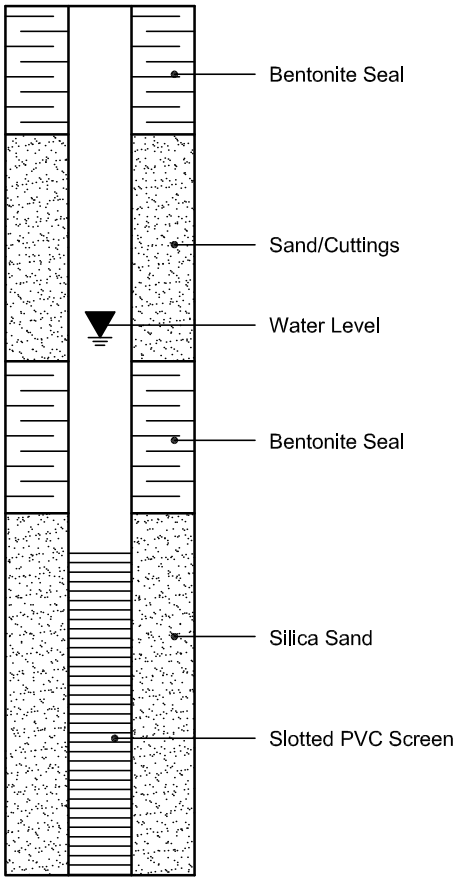
SYMBOLS AND TERMS (continued)

STRATA PLOT

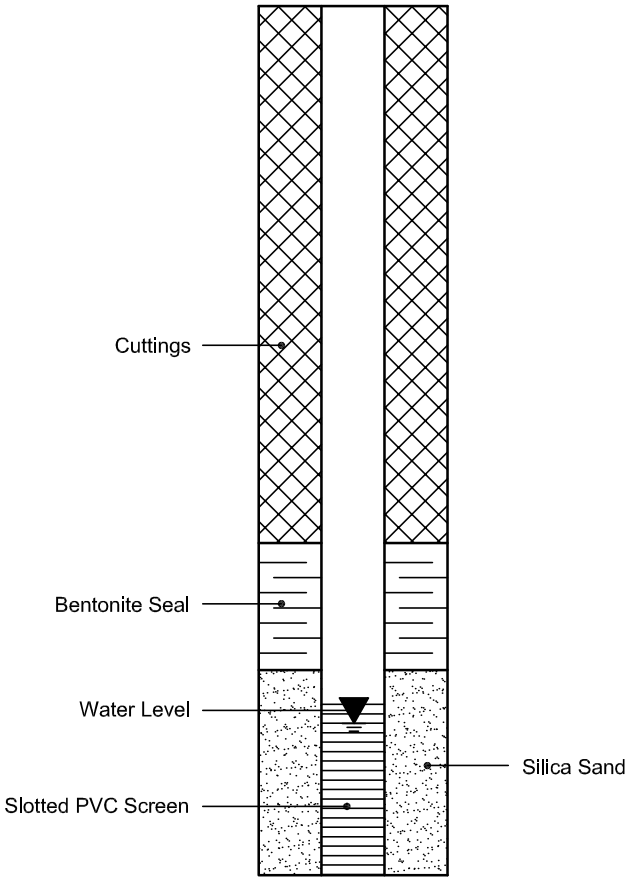


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Log of Borehole BH-1

Project No: OTT-00237006-A0

Project: Geotechnical Investigation, Woodroffe & Deerfox/Xtreme Trampoline Park

Location: 3162 Woodroffe, Ottawa, Ontario

Figure No. 3

Page. 1 of 2

Date Drilled: "December 09, 2016

Drill Type: Truck mounted drill

Datum: Geodetic

Logged by: AN Checked by: ZG

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits —○—
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		ASPHALTIC CONCRETE 50 mm	96.67	0				
		GRANULAR FILL	96.6					
		Sand and gravel, brown, moist, compact.						
			95.5	1	12			
		TILL						
		Silty sand, some gravel to gravelly, tsome clay, scattered cobbles and boulders, moist to wet, grey, compact to very dense.		2	56			
					50/50mm			
				3	50/100mm			23.8
				4	29			
				5	14			
					11			
				6	42			23.4
				7				
		Loose layer/pocket at 7.6 m depth.		8	7			

Continued Next Page

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 4/10/17

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A 19 mm diameter slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00237006-A0

WATER LEVEL RECORDS		
Elapsed Time	Water Level (m)	Hole Open To (m)
Upon Completion	6.7	

CORE DRILLING RECORD			
Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH-1

Project No: OTT-00237006-A0

Project: Geotechnical Investigation, Woodroffe & Deerfox/Xtreme Trampoline Park

Figure No. 3

Page. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		TILL Silty sand, some gravel to gravelly, tsome clay, scattered cobbles and boulders, moist to wet, grey, compact to very dense. *(continued)*	88.67	8				
				9	34	×		
				10				
			85.7	11				
		Auger Refusal at 11 m Depth						

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A 19 mm diameter slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00237006-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Upon Completion	6.7	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 4/10/17

Log of Borehole BH-2

Project No: OTT-00237006-A0

Project: Geotechnical Investigation, Woodroffe & Deerfox/Xtreme Trampoline Park

Location: 3162 Woodroffe, Ottawa, Ontario

Figure No. 4

Page. 1 of 2

Date Drilled: "December 08, 2016

Drill Type: Truck mounted drill

Datum: Geodetic

Logged by: AN Checked by: ZG

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth
		TOPSOIL, 50 mm	96.01	0
		GRANULAR FILL Sand and gravel, organic matter, brown to black, moist to wet, loose.	95.9	
		TILL Silty sand, some gravel to gravelly, some clay, scattered cobbles and boulders, moist to wet, grey, loose.	94.8	1
				2
				3
			91.31	4
				5
				6
			89.3	7
		Borehole Terminated at 6.7 m Depth		8

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60
SAMPLES
Natural Unit Wt. kN/m³

7
4
50/75mm
10
8
6
6
5

23.3
23.6

Continued Next Page

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A 19 mm diameter slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00237006-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Upon Completion	4.6	
13 days	4.7	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 4/10/17

Log of Borehole BH-2

Project No: OTT-00237006-A0

Project: Geotechnical Investigation, Woodroffe & Deerfox/Xtreme Trampoline Park

Figure No. 4

Page. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		Borehole Terminated at 6.7 m Depth *(continued)*	88.01	8				
				9				
				10				
				11				
				12				
				13				
			82.4					
		Cone Refusal at 13.6 m Depth						

NOTE: A dynamic cone was advanced from ground surface to refusal encountered at 13.6 m depth.

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A 19 mm diameter slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00237006-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Upon Completion	4.6	
13 days	4.7	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 4/10/17

Log of Borehole BH-3

Project No: OTT-00237006-A0

Project: Geotechnical Investigation, Woodroffe & Deerfox/Xtreme Trampoline Park

Location: 3162 Woodroffe, Ottawa, Ontario

Figure No. 5

Page. 1 of 2

Date Drilled: "December 13, 2016

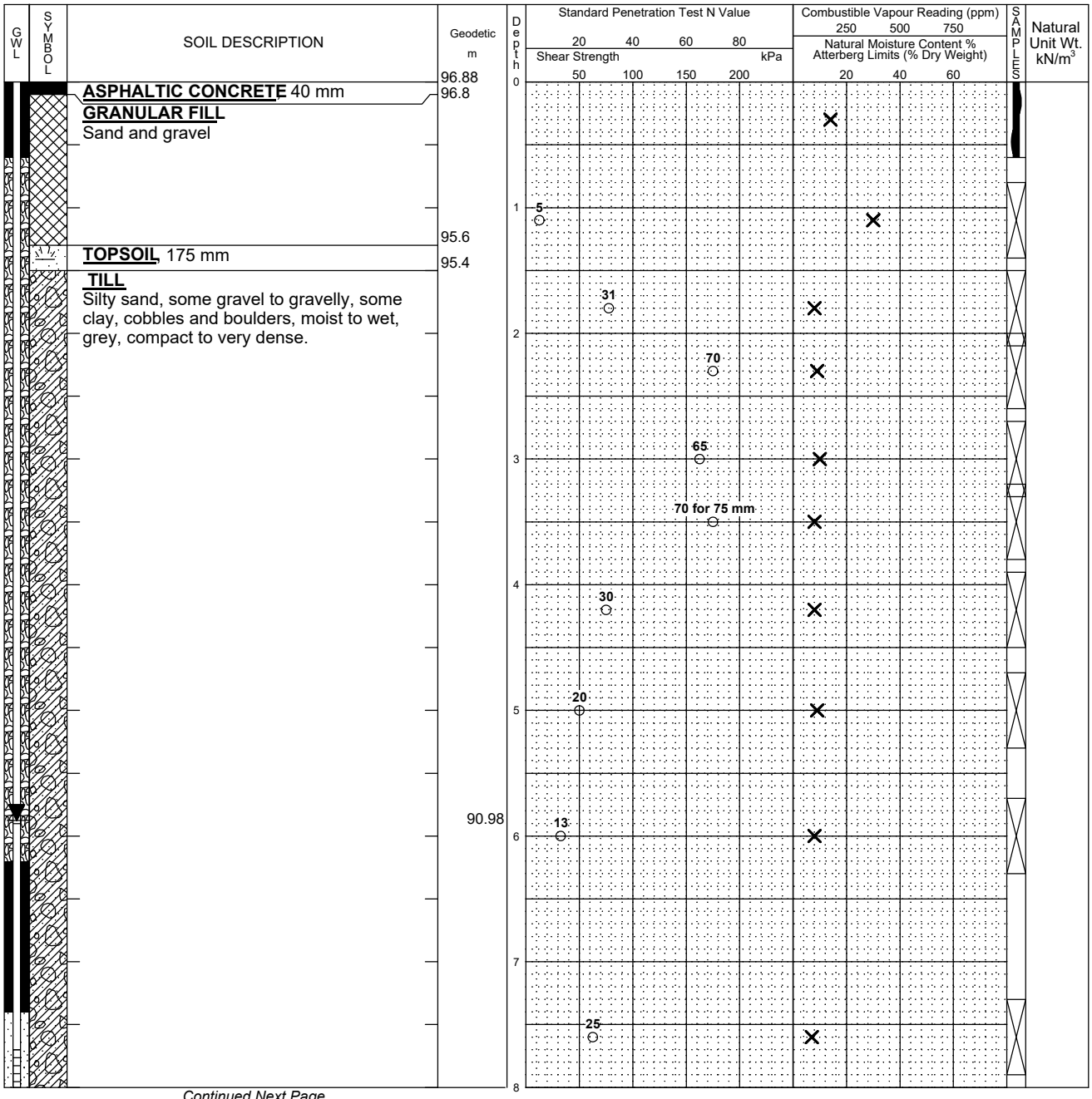
Drill Type: Truck mounted drill

Datum: Geodetic

Logged by: AN Checked by: ZG

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test (S)

Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test



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NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A 19 mm diameter slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00237006-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Upon Completion	7.3	
8 days	5.9	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	13.6 - 15.1	100	90

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 4/10/17

Log of Borehole BH-3

Project No: OTT-00237006-A0

Project: Geotechnical Investigation, Woodroffe & Deerfox/Xtreme Trampoline Park

Figure No. 5

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TILL Silty sand, some gravel to gravelly, some clay, cobbles and boulders, moist to wet, grey, compact to very dense. *(continued)*	88.88	8	Shear Strength: 20 40 60 80 / 50 100 150 200 kPa	250 500 750 / 20 40 60		
				9	12			
				10	32			
				11				
				12				
				13	50 for 75 mm			
		LIMESTONE BEDROCK Excellent quality	83.3	14				
			81.8	15				
		Borehole Terminated at 15.1 m Depth						

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 4/10/17

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A 19 mm diameter slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00237006-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Upon Completion	7.3	
8 days	5.9	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	13.6 - 15.1	100	90

exp Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6

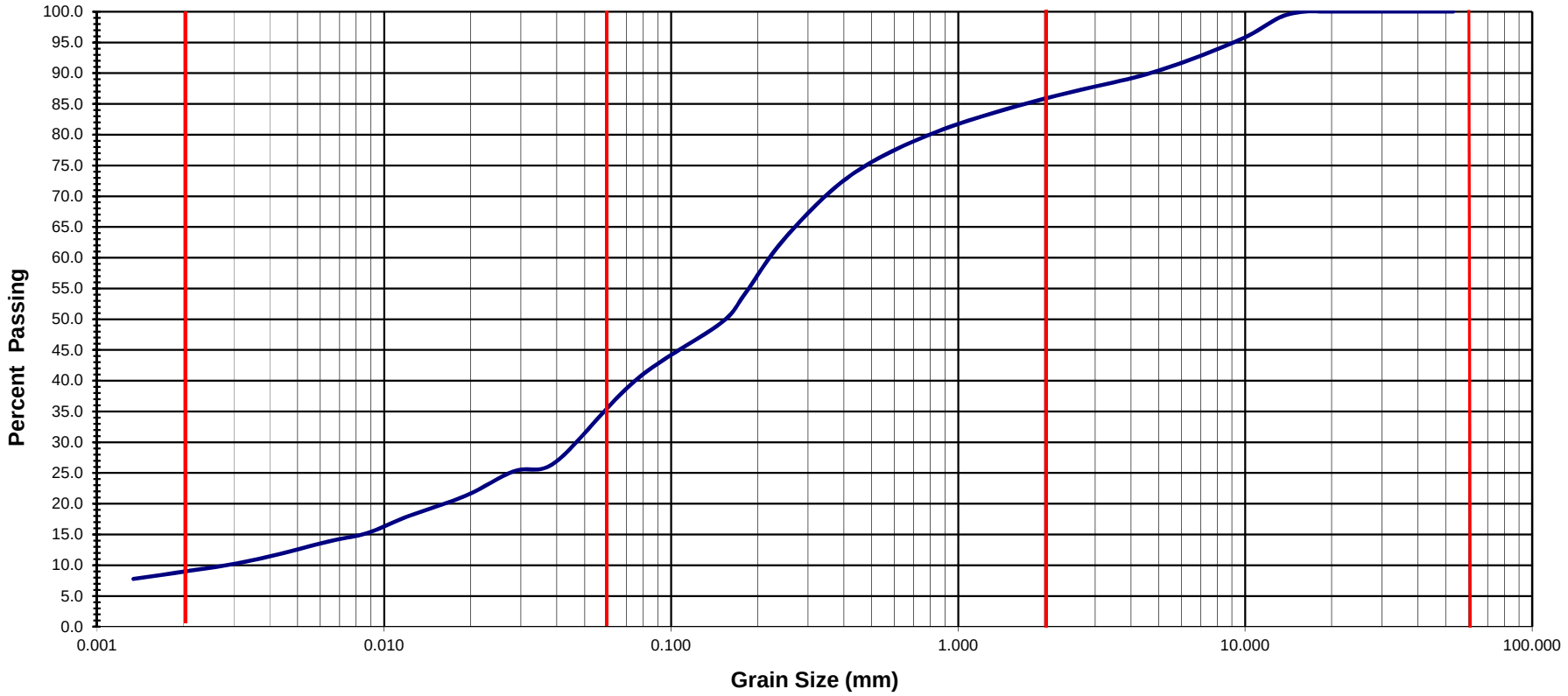
Grain-Size Distribution Curve

Method of Test for Particle Size Analysis of Soil

MTO Test Method LS - 702, Rev. No. 19

Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL			
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	



Exp Project No.:	**OTT-00237006-A0**	**Project Name :**	**Geotechnical Investigation. Propsoed Xtreme Trampoline Recreational Park**		
Client :	**Xtreme Trampoline Inc.**	**Project Location :**	**3162 Woodroffe Avenue & 15 Deerfox Drive, City of Ottawa, ON**		
Date Sampled :	**December 9, 2016**	**Bore Hole/Test Pit No.:**	**2**	**Sample No.:** **SS6**	**Depth (m) :** **3.8 - 4.4**
Sample Description :	**Silty Gravelly Sand, Some trace Clay**				**Figure :** **6**

exp Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6

Grain-Size Distribution Curve

Method of Test for Sieve Analysis of Aggregate

ASTM C-136 (LS-602)

Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL		
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse

Exp Project No.:	**OTT-00237006-A0**	**Project Name :**	**Geotechnical Investigation. Proposed Xtreme Trampoline Recreational Park**				
Client :	**Xtreme Trampoline Inc.**	**Project Location :**	**3162 Woodroffe Avenue & 15 Deerfox Drive. City of Ottawa, ON**				
Date Sampled :	**December 13, 2016**	**Borehole:**	**3**	**Sample:**	**SS5**	**Depth (m) :**	**2.7 - 3.3**
Sample Description :	**Silty, Gravelly Sand**					**Figure :**	**7**

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 16Z170803

PROJECT: OTT-00237006-A0

CLIENT NAME: EXP SERVICES INC

ATTENTION TO: Zohra Guetif

SAMPLING SITE:3162 Woodroffe Ave, Ottawa

SAMPLED BY:EXP

Inorganic Chemistry (Soil)

DATE RECEIVED: 2016-12-15 **DATE REPORTED: 2016-12-21**

		SAMPLE DESCRIPTION:		BH1 SS3 5'-7'	BH3 SS3 5'-7'
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2016-12-09	2016-12-13
Parameter	**Unit**	**G / S**	**RDL**	**8090333**	**8090339**
Chloride (2:1)	µg/g		2	16	14
Sulphate (2:1)	µg/g		2	31	38
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.69	7.76
Resistivity (2:1)	ohm.cm		1	6210	5950

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8090333-8090339 EC/Resistivity, Chloride and Sulphate were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By: Amanjot Bhela

Certificate of Analysis

Report Date: 22-Apr-2022

Client: Paterson Group Consulting Engineers

Order Date: 19-Apr-2022

Client PO: 26829

Project Description: PG6182

	Client ID:	BH2-22-SS3	-	-	-
	Sample Date:	18-Apr-22 17:10	-	-	-
	Sample ID:	2217203-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	90.7	-	-	-
General Inorganics					
pH	0.05 pH Units	7.45	-	-	-
Resistivity	0.10 Ohm.m	93.7	-	-	-
Anions					
Chloride	5 ug/g dry	6	-	-	-
Sulphate	5 ug/g dry	7	-	-	-

APPENDIX 2

FIGURE 1 - KEY PLAN

DRAWING PG6182-1A & PG6182-1B - TEST HOLE LOCATION PLANS

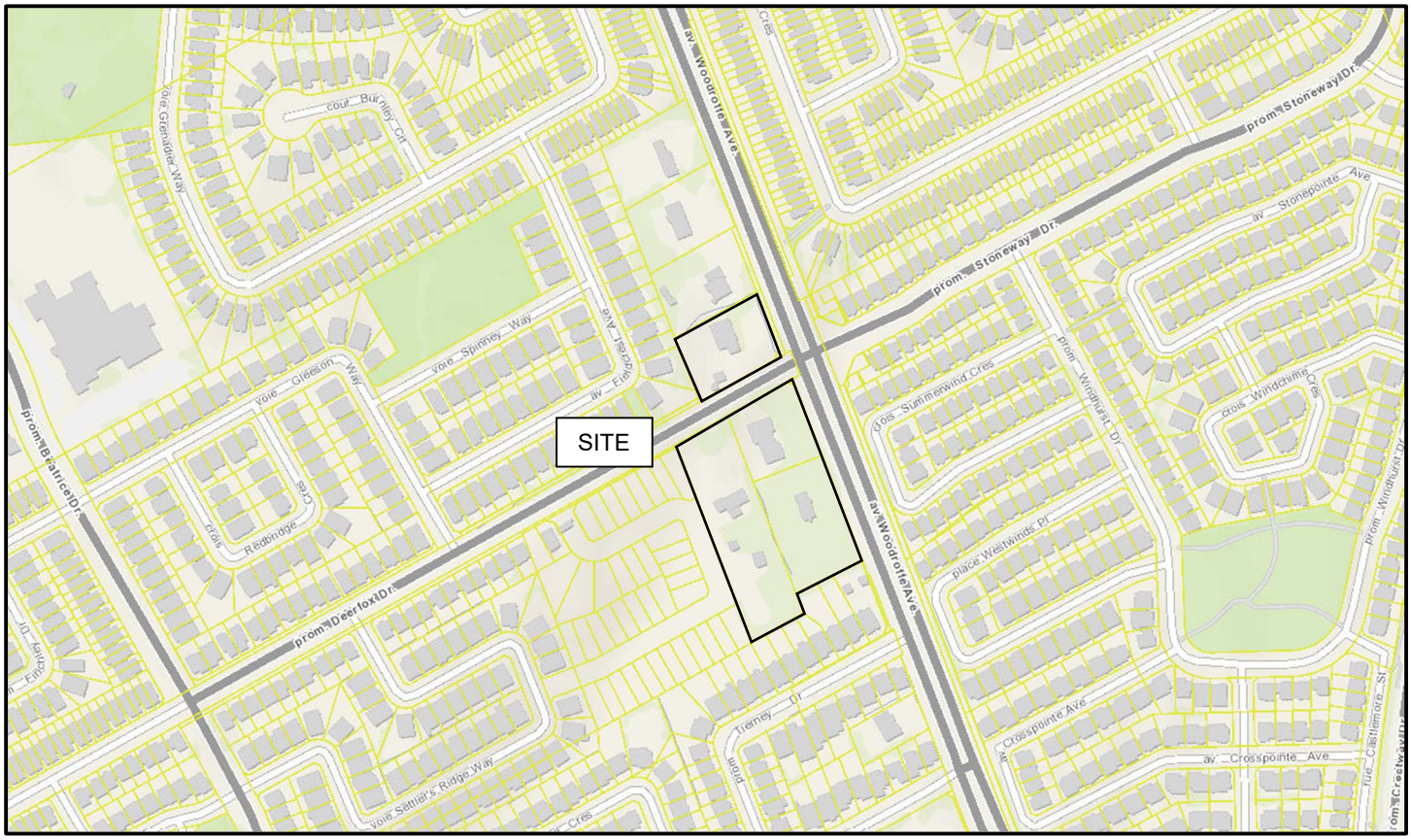
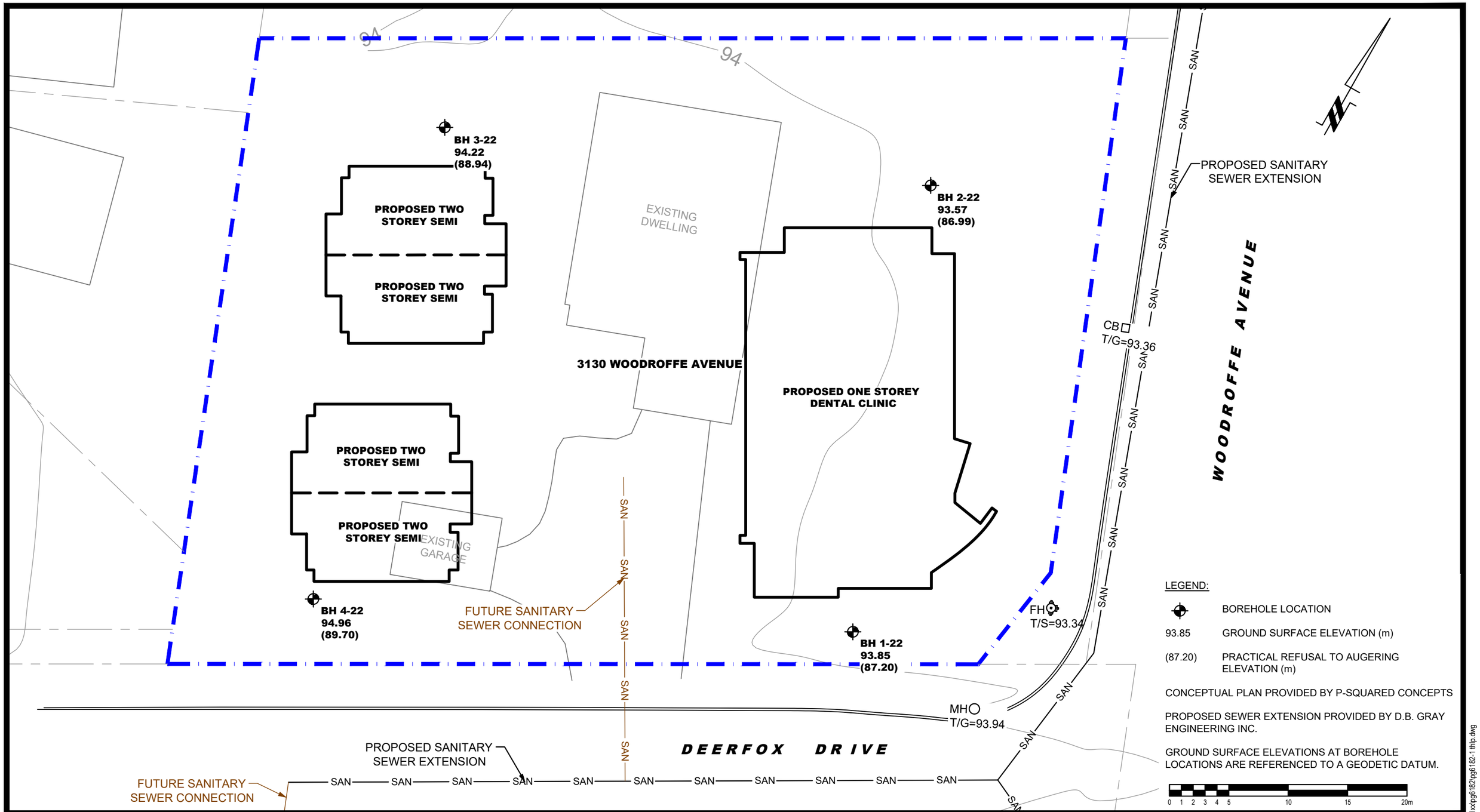


FIGURE 1

KEY PLAN



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NO.	REVISIONS	DATE	INITIAL

P-SQUARED CONCEPTS INC.
GEOTECHNICAL INVESTIGATION
PROPOSED DEVELOPMENT
3130 WOODROFFE AVENUE
OTTAWA, ONTARIO

Title:
TEST HOLE LOCATION PLAN

Scale: 1:300	Date: 04/2022
Drawn by: JM	Report No.: PG6182-1
Checked by: FC	Dwg. No.: PG6182-1A
Approved by: SD	Revision No.:

11x17

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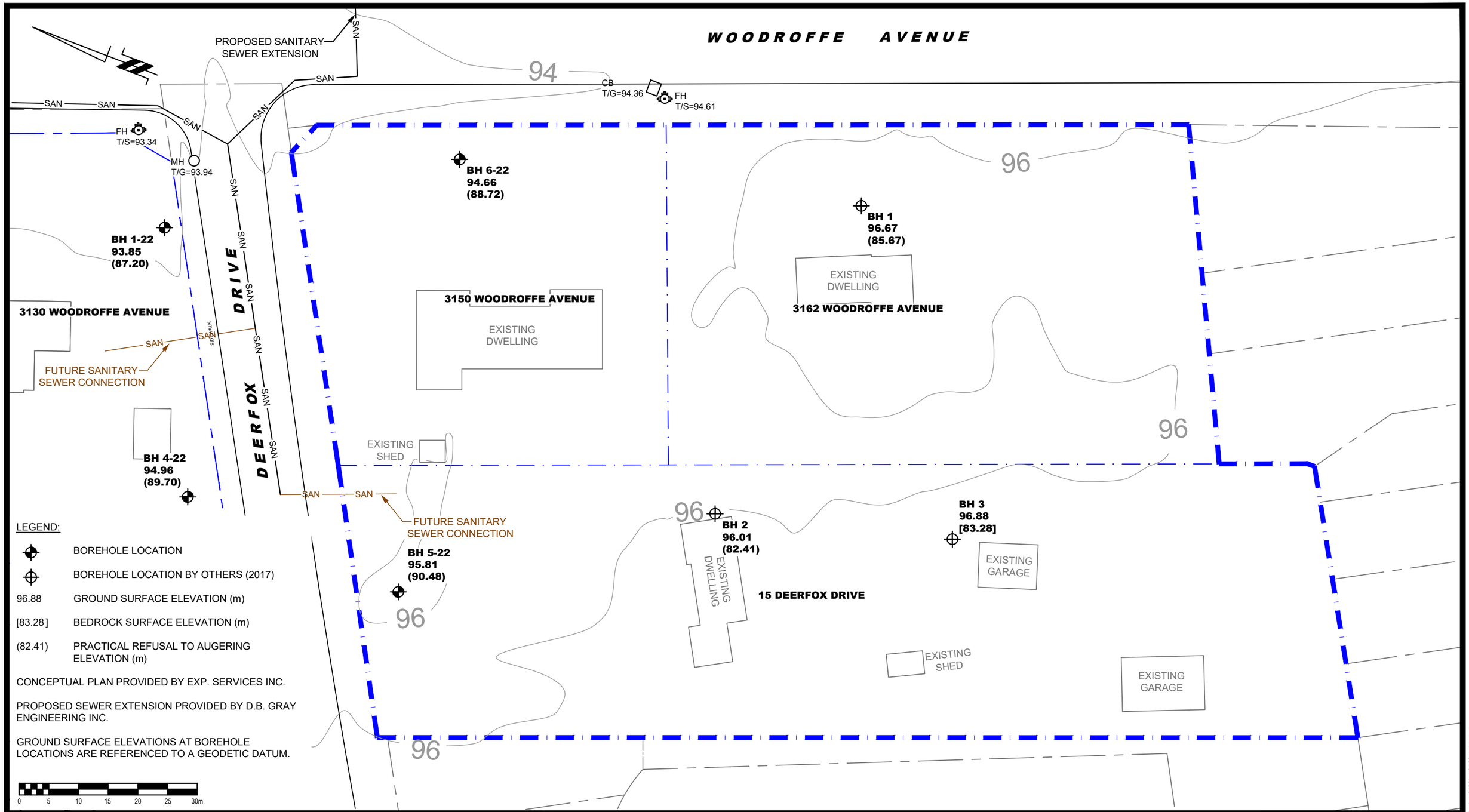

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE LOCATION BY OTHERS (2017)
- 96.88 GROUND SURFACE ELEVATION (m)
- [83.28] BEDROCK SURFACE ELEVATION (m)
- (82.41) PRACTICAL REFUSAL TO AUGERING ELEVATION (m)

CONCEPTUAL PLAN PROVIDED BY EXP. SERVICES INC.

PROPOSED SEWER EXTENSION PROVIDED BY D.B. GRAY ENGINEERING INC.

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

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NO.	REVISIONS	DATE	INITIAL

P-SQUARED CONCEPTS

GEOTECHNICAL INVESTIGATION
PROPOSED DEVELOPMENT
OTTAWA, 3162 & 3150 WOODROFFE AVENUE & 15 DEERFOX DRIVE ONTARIO

Title: **TEST HOLE LOCATION PLAN**

Scale: 1:600	Date: 04/2022
Drawn by: JM	Report No.: PG6182-1
Checked by: FC	Dwg. No.: PG6182-1B
Approved by: SD	Revision No.:

11x17

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