PATERSON GROUP

Geotechnical Investigation

Proposed Residential Development

3400 Woodroffe Avenue
Ottawa, Ontario

Prepared for DCR Phoenix Group of Companies

Report PG7287–1 dated October 3, 2024

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by DCR Phoenix Group of Companies to conduct a geotechnical investigation for the proposed residential development to be located at 3400 Woodroffe Avenue in Ottawa, Ontario (refer to Figure 1 - Key Plan in Appendix 2 of this report for the general site location).

The objectives of the geotechnical investigation were to:

- Determine the subsoil and groundwater conditions at this site by means of test holes, and to
- Provide geotechnical recommendations pertaining to 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.

Investigating the presence or potential presence of contamination on the subject property was not part of the scope of work of this present investigation. Therefore, the present report does not address environmental issues.

2.0 Proposed Development

Based on the available drawings, it is understood that the proposed development would consist of a series of townhouse blocks. At finished grades, the proposed buildings will be surrounded by landscaped areas and asphalt paved access lanes and parking areas.

It is further understood that the site will be municipally serviced by water, storm and sanitary services.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the current geotechnical investigation was carried out on September 20, 2024. The current investigation consisted of excavating 9 test pits to a maximum depth of 3.3 m below the existing ground surface. The test pit locations were distributed in a manner to provide general coverage of the subject site. The approximate locations of the test pits are shown on Drawing PG7287-1 - Test Hole Location Plan included in Appendix 2.

The current investigation test holes were advanced using an excavator. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer.

A previous investigation was completed by others on September 2008, which consisted of excavating 10 test pits to a maximum depth of 4.9 m below ground surface. The associated test pit logs are presented in Appendix 2.

Sampling and In Situ Testing

Soil samples obtained from the test pits were recovered from the sidewalls of the open excavation. Grab samples were collected from the test pits at selected intervals. The samples were classified on site, placed in sealed plastic bags, and transported to our laboratory. The depths at which the grab samples were recovered from the test pits are shown as G on the Soil Profile and Test Data sheets in Appendix 1.

The subsurface conditions observed in the test pits were recorded in detail in the field. The soil profiles are logged on the Soil Profile and Test Data sheets presented in Appendix 1.

Groundwater

Groundwater infiltration levels were observed and recorded in the open test pits at the time of excavation. 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 test pit locations, and ground surface elevations at each test pit location, were surveyed by Paterson using a handheld GPS referenced to a geodetic datum. The locations of the test pits, and the ground surface elevation at each test pit location, are presented on Drawing PG7287-1 – Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

Soil samples were collected from the subject site during the investigation and were visually examined in our laboratory to review the results of the field logging.

All samples from the current investigation will be stored in the laboratory for a period of 1 month after issuance of this report. The samples will then be discarded unless otherwise directed.

3.4 Analytical Testing

One (1) soil sample was submitted for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. The sample was submitted 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 is generally vacant with a vegetated surface. Several cobbles and boulders were also observed at the ground surface level. The ground surface across the site is gently sloped down towards the eastern and western portions, from the central portion of the site. The site is bordered by Woodroffe Avenue to the east, and residential properties to the north, south and east. Available aerial photography indicates that the site was previously occupied by 2 residential homes.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile at the test pit locations consists of a relatively thin layer of fill underlain by a glacial till deposit. The fill was generally observed to consist of silty sand with gravel and organics. Construction debris, such as crushed stone, bricks and concrete, were encountered within the upper approximate 0.3 and 2.4 m of the fill at test pits TP 2- 24 and TP-3-24, respectively. It should also be noted that test pit TP 2-24 encountered refusal on a concrete slab at an approximate depth of 0.34m.

The underlying glacial till was generally composed of compact to very dense, brown silty sand with gravel, cobbles and boulders. The amount of gravel, cobbles and boulders within the glacial till was noted to gradually increase with depth, varying approximately from 40 to 70 % of the total composition of the glacial till. The dimensions of the boulders observed within the test pits varied between about 300 to 1200 mm. Reference should be made to the test pit photos in Appendix 2 for a visual indication of the quantity and size of the gravel, cobbles, and boulders.

All the test pits, with the exception of test pit TP 2-24, were terminated upon encountering refusal in the glacial till at a maximum depth of 3.3 m.

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

Bedrock

Based on available geological mapping, the bedrock at the subject site consists of sandstone and dolomite of the March formation with an overburden drift thickness of 5 to 10 m.

4.3 Groundwater

Based on our observations, no groundwater infiltration was noted within the test pit locations prior to backfilling.

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 suitable for the proposed development. It is recommended that the proposed buildings be founded on conventional spread footings bearing on the undisturbed glacial till.

Significant cobbles and boulders should be expected during the servicing and building excavations at the subject site. An budget should be provided in the project tender for the removal of cobbles and boulders.

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

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, such as those containing significant organic materials, should be stripped from under any buildings and other settlement sensitive structures.

Existing construction debris should be entirely removed from within the perimeter of all buildings. The existing fill material, free of organic materials, should be reviewed by Paterson personnel at the time of construction to determine if the existing fill can be left in place below paved areas.

Fill Placement

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

If these materials are to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 98% of their respective SPMDD.

If excavated boulders larger than 300 mm in dimension is to be used as fill, it should be suitably fragmented to produce a well-graded material with a maximum particle size of 100 mm. Where the fill is open graded, a blinding layer of finer granular fill and/or a woven geotextile may be required to prevent adjacent finer materials from migrating into the voids, with associated loss of ground and settlements. This can be assessed at the time of construction. Site-generated blast rock fill should be compacted using a suitably sized smooth drum vibratory roller when considered for placement.

5.3 Foundation Design

Conventional Spread Footings

Footing placed on the undisturbed glacial till can be designed using a 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 above noted bearing resistance value at ULS.

Footings placed on a soil bearing surface and designed using the bearing resistance values at SLS given above will be subjected to potential post construction total and differential settlements of 25 and 20 mm respectively.

An undisturbed soil bearing surface consists of a surface from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, whether in situ or not, have been removed, in the dry, prior to the placement of concrete for footings.

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 glacial till 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 of the same or higher capacity as the bearing medium soil.

5.4 Design for Earthquakes

The proposed site can be taken as seismic site response **Class C** as defined in the Ontario Building Code (OBC) 2012 for foundations placed over an undisturbed glacial till bearing surface. For the National Building Code of Canada (NBCC 2020), the seismic site designation can be referenced as **Class X_C**. The soils underlying the 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 from within the footprints of the proposed buildings, the existing fill and/or glacial till will be considered acceptable subgrades on which to commence backfilling for floor slab construction.

Where the subgrade consists of existing fill, a vibratory drum roller should complete several passes over the subgrade surface as a proof-rolling program. Any poor performing areas should be removed and reinstated with an engineered fill, such as Granular B Type II.

For structures with basement slabs, it is recommended that the upper 200 mm of sub-floor fill consists of 19 mm clear crushed stone.

For structures with slab-on-grade construction, the upper 300 mm of sub-slab fill is recommended to consist of OPSS Granular A crushed stone. All backfill material within the footprints of the proposed buildings should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 98% of its SPMDD.

5.6 Pavement Structure

For design purposes, the following pavement structures, presented below, are recommended for the design of the car parking areas and local roadways.

Table 1 - Recommended Pavement Structure – Driveways

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

Table 2 - Recommended Pavement Structure – Local Residential Roadways	
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 fill, in situ soil, or OPSS Granular B Type I or II material placed over in situ soil, bedrock 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 material's SPMDD using suitable vibratory equipment.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

It is recommended that a perimeter foundation drainage system be provided for each proposed structure. The system should consist of a 150 mm diameter perforated and corrugated plastic pipe which is surrounded by a geosock and 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 or mechanically connected to a sump pump within the proposed structures.

A geocomposite drainage board, such as Delta Drain 6000, should be installed over the exterior below-grade foundation walls and connected to the perimeter drainage system.

The exterior foundation walls can then be backfilled with the site excavated materials, provided that they are maintained in an unfrozen state and at a suitable moisture content for compaction. Imported granular materials, such as clean sand or OPSS Granular B Type II granular material, should otherwise be used for this purpose.

6.2 Protection of Footings Against Frost Action

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

6.3 Excavation Side Slopes

The side slopes of the shallow excavations anticipated at this site should either be cut back at acceptable slopes or be retained by temporary 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 ground water level. The subsoil at this site appeared to be mainly a Type 2 or 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

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

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

It is recommended that a trench box be used at all times to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by “cut and cover” methods and excavations will not be left open for extended periods of time. It is expected that a deep excavation will be required to complete the connection to the storm trunk sewer in the right of way. The deep excavation should be fully supported by trench boxes or temporary shoring during the entirety of the time where the excavation is completed.

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.

At least 150 mm of OPSS Granular A should be used for pipe bedding for sewer and water pipes. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to at least 300 mm above the obvert of the pipe, should consist of OPSS Granular A or Granular B Type II with a maximum size of 25 mm. The bedding and cover materials should be placed in maximum 225 mm thick lifts compacted to 98% of the material’s standard Proctor maximum dry density.

It should generally be possible to re-use the site excavated fill above the cover material if the operations are carried out in dry weather conditions.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.5 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

225 mm thick loose lifts and compacted to a minimum of 95% of the material standard Proctor maximum dry density.

6.5 Groundwater Control

Based on our observations, it is anticipated that groundwater infiltration into the excavations should be low to moderate and controllable using open sumps. The contractor should be prepared to direct water away from all subgrades, regardless of the source, to prevent disturbance to the founding medium.

Groundwater Control for Building Construction

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

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, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

Impacts to Neighboring Properties

It is expected that nearby structures will be found on the relatively shallow glacial till, which is not susceptible to settlement from dewatering. Therefore, no adverse effects to neighbouring properties are expected as a result of dewatering.

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 in the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions. Additional information could be provided, if required.

6.7 Corrosion Potential and Sulphate

One (1) sample was submitted for testing. The analytical test results of the soil sample indicate that the sulphate content is less than 0.1%. These results along with the chloride and pH value are indicative that Type 10 Portland cement (Type GU) would be appropriate for this site. The chloride content and the pH of the sample indicate they are not significant factors in creating a corrosive environment for exposed ferrous metals at this site, whereas the resistivity is indicative of a mild to slightly aggressive corrosive environment.

7.0 Recommendations

For the foundation design data provided herein to be applicable, a material testing and observation services program is required to be completed. The following aspects be performed by Paterson:

- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Sampling and testing of the concrete and fill materials.
- ❑ Observation of the placement of the foundation insulation, if applicable.
- ❑ 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 and follow-up field density tests to determine the level of compaction achieved.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming the construction has been conducted in general accordance with the recommendations could be issued, upon request, following the completion of a satisfactory materials testing and observation program by Paterson.

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

8.0 Statement of Limitations

The recommendations provided herein 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 DCR Phoenix Group of Companies, 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.

Pratheep Thirumoolan, M.Eng.

Scott S. Dennis, P.Eng.

Report Distribution:

- ❑ DCR Phoenix Group of Companies (e-mail copy)
- ❑ Paterson Group Inc (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

SOIL PROFILE AND TEST DATA SHEETS BY OTHERS

ANALYTICAL TESTING RESULTS

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

3400 Woodroffe Avenue

COORD. SYS.: MTM ZONE 9 **EASTING:** 366360.22 **NORTHING:** 5014633.83 **ELEVATION:** 103.84

PROJECT: Proposed Residential Development

BORINGS BY: Excavator

REMARKS:

DATE: September 20, 2024

FILE NO. : PG7287

HOLE NO. : TP 1-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							103
FILL: Compact, brown silty fine sand, with gravel, trace organics 0.09m [103.75m]			G 1						
GLACIAL TILL: Dense to very dense, brown silty fine sand, with gravel, cobbles and boulders - Cobbles and gravel comprise approximately 30 to 40 % of the total composition of the glacial till. - Boulders, 0.3 to 0.7 m in dimension, comprise approximately 20 to 30 % of the total composition of the glacial till. - Total composition of gravel, cobbles and boulders increasing with depth.		1							102
			G 2						
2.10m [101.74m]		2							101
End of Test Pit Test Pit terminated on very dense glacial till at 2.10 m depth. (Test Pit dry upon completion)		3							100
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

3400 Woodroffe Avenue

COORD. SYS.: MTM ZONE 9 **EASTING:** 366336.47 **NORTHING:** 5014606.43 **ELEVATION:** 104.02

PROJECT: Proposed Residential Development

BORINGS BY: Excavator

REMARKS:

DATE: September 20, 2024

FILE NO. : PG7287

HOLE NO. : TP 2-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) ▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0									104
FILL: Compact, brown silty fine sand, with gravel, cobbles and organics 0.04m [103.98m]			G 1								
FILL: Brown silty sand, with gravel, trace crushed stone, brick, concrete and organics 0.34m [103.68m]											
End of Test Pit											
Test Pit terminated on concrete slab at 0.34 m depth.		1									103
(Test Pit dry upon completion)		2									102
		3									101
		4									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

3400 Woodroffe Avenue

COORD. SYS.: MTM ZONE 9 **EASTING:** 366337.45 **NORTHING:** 5014617.44 **ELEVATION:** 104.51

PROJECT: Proposed Residential Development

BORINGS BY: Excavator

REMARKS:

DATE: September 20, 2024

FILE NO. : PG7287

HOLE NO. : TP 2A-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) ▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE											
FILL: Compact, brown silty fine sand, with gravel, cobbles, boulders and organics 0.07m [104.44m]		0	G 1								
GLACIAL TILL: Dense to very dense, brown silty fine sand, with gravel, cobbles and boulders			G 2								104
- Cobbles and gravel comprise approximately 20 to 30 % of the total composition of the glacial till.		1									
- Boulders, 0.3 to 0.4 m in dimension, comprise approximately 10 % of the total composition of the glacial till.			G 3								103
- Total composition of gravel, cobbles and boulders increasing with depth. 1.95m [102.56m]		2									102
End of Test Pit Test Pit terminated on very dense glacial till at 1.95 m depth. (Test Pit dry upon completion)		3									101
		4									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

3400 Woodroffe Avenue

COORD. SYS.: MTM ZONE 9 **EASTING:** 366307.01 **NORTHING:** 5014598.50 **ELEVATION:** 103.91

PROJECT: Proposed Residential Development

BORINGS BY: Excavator

REMARKS:

DATE: September 20, 2024

FILE NO. : PG7287

HOLE NO. : TP 3-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							103
FILL: Compact, brown silty fine sand, with gravel, cobbles, concrete and trace organics			G 1						
- Some construction debris, trace wood and glass		1							
			G 2						102
2.70m [101.21m]		2							
GLACIAL TILL: Very dense, brown silty fine sand, with gravel, cobbles and boulders									
- Cobbles and gravel comprise 20 to 30 % of the total composition of the glacial till.			G 3						101
- Boulders, 0.3 to 1 m in dimension, comprise 30 to 40 % of the total composition of the glacial till.		3							
3.10m [100.81m]									
End of Test Pit									
Test Pit terminated on very dense glacial till at 3.10 m depth.									
(Test Pit dry upon completion)		4							100

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

3400 Woodroffe Avenue

COORD. SYS.: MTM ZONE 9 **EASTING:** 366297.45 **NORTHING:** 5014644.95 **ELEVATION:** 104.33

PROJECT: Proposed Residential Development

BORINGS BY: Excavator

REMARKS:

DATE: September 20, 2024

FILE NO. : PG7287

HOLE NO. : TP 4-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) ▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0									104
FILL: Compact, brown silty sand, with gravel, trace concrete and organics 0.05m [104.28m]			G 1								
GLACIAL TILL: Compact to very dense, brown silty fine sand, with gravel, cobbles and boulders - Cobbles and gravel comprise approximately 30 to 40 % of the total composition of the glacial till. - Boulders, 0.3 to 0.7 m in dimension, comprise approximately 10 to 20 % of the total composition of the glacial till. - Total composition of gravel, cobbles and boulders increasing with depth.		1	G 2								103
2.90m [101.43m]		2	G 3								102
End of Test Pit Test Pit terminated on very dense glacial till at 2.90 m depth. (Test Pit dry upon completion)		3									101
		4									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

3400 Woodroffe Avenue

COORD. SYS.: MTM ZONE 9 **EASTING:** 366262.93 **NORTHING:** 5014665.01 **ELEVATION:** 103.75

PROJECT: Proposed Residential Development

BORINGS BY: Excavator

REMARKS:

DATE: September 20, 2024

FILE NO. : PG7287

HOLE NO. : TP 5-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							103
FILL: Compact, brown silty sand, with gravel and cobbles, trace organics 0.03m [103.72m]			G 1						
GLACIAL TILL: Compact, dark brown silty fine sand, with gravel, cobbles and boulders		1							102
- Dense to very dense by 1.3 m depth.			G 2						
1.60m [102.15m]									
GLACIAL TILL: Very dense, light brown silty fine sand, with gravel, cobbles and boulders - Cobbles and gravel comprise 30 to 40 % of the total composition of the glacial till. - Boulders, 0.3 to 1.2 m in dimension, comprise 20 to 30 % of the total composition of the glacial till. - Total composition of gravel, cobbles and boulders increasing with depth.		2							101
		3	G 3						
3.20m [100.55m]									100
End of Test Pit Test Pit terminated on very dense glacial till at 3.20 m depth. (Test Pit dry upon completion)		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

3400 Woodroffe Avenue

COORD. SYS.: MTM ZONE 9 **EASTING:** 366285.94 **NORTHING:** 5014686.19 **ELEVATION:** 104.48

PROJECT: Proposed Residential Development

BORINGS BY: Excavator

REMARKS:

DATE: September 20, 2024

FILE NO. : PG7287

HOLE NO. : TP 6-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0									104
FILL: Compact, brown silty sand, with gravel 0.03m [104.45m]											
GLACIAL TILL: Dense to very dense, brown silty fine sand, with gravel, cobbles and boulders			G 1								
- Cobbles and gravel comprise approximately 30 to 40 % of the total composition of the glacial till.		1									103
- Boulders, 0.3 to 0.6 m in dimension, comprise approximately 10 to 20 % of the total composition of the glacial till.			G 2								
- Total composition of gravel, cobbles and boulders increasing with depth.		2									102
3.30m [101.18m]			G 3								
End of Test Pit Test Pit terminated on very dense glacial till at 3.30 m depth. (Test Pit dry upon completion)		3									101
		4									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

3400 Woodroffe Avenue

COORD. SYS.: MTM ZONE 9 **EASTING:** 366322.76 **NORTHING:** 5014673.60 **ELEVATION:** 105.41

PROJECT: Proposed Residential Development

BORINGS BY: Excavator

REMARKS:

DATE: September 20, 2024

FILE NO. : PG7287

HOLE NO. : TP 7-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0									105
FILL: Compact, brown silty fine sand, with gravel and cobbles, trace organics and concrete											
0.40m [105.01m]											
GLACIAL TILL: Dense, brown silty fine sand, with gravel, cobbles and boulders			G 1								
- Cobbles and gravel comprise approximately 20 to 30 % of the total composition of the glacial till.		1	G 2								104
- Boulders, 0.3 to 0.7 m in dimension, comprise approximately 5 to 15 % of the total composition of the glacial till.											
- Total composition of boulders and cobbles increasing with depth.		2	G 3								103
2.80m [102.61m]											
End of Test Pit		3									102
Test Pit terminated on very dense glacial till at 2.80 m depth.											
(Test Pit dry upon completion)		4									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

3400 Woodroffe Avenue

COORD. SYS.: MTM ZONE 9 **EASTING:** 366365.80 **NORTHING:** 5014682.88 **ELEVATION:** 104.22

PROJECT: Proposed Residential Development

BORINGS BY: Excavator

REMARKS:

DATE: September 20, 2024

FILE NO. : PG7287

HOLE NO. : TP 8-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							104
FILL: Compact, brown silty sand, with gravel and cobbles, trace organics 0.20m [104.02m]			G 1						
GLACIAL TILL: Compact to very dense, brown silty fine sand, with gravel, cobbles and boulders - Cobbles and gravel comprise approximately 30 to 40 % of the total composition of the glacial till. - Boulders, 0.3 to 1 m in dimension, comprise approximately 20 to 30 % of the total composition of the glacial till. - Total composition of gravel, cobbles and boulders increasing with depth.		1	G 2						103
2.50m [101.72m]		2	G 3						102
End of Test Pit Test Pit terminated on very dense glacial till at 2.50 m depth. (Test Pit dry upon completion)		3							101
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

3400 Woodroffe Avenue

COORD. SYS.: MTM ZONE 9 **EASTING:** 366337.76 **NORTHING:** 5014713.17 **ELEVATION:** 104.62

PROJECT: Proposed Residential Development

BORINGS BY: Excavator

REMARKS:

DATE: September 20, 2024

FILE NO. : PG7287

HOLE NO. : TP 9-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0									104
FILL: Compact, brown silty sand, with gravel and cobbles, trace organics 0.03m [104.59m]			G 1								
GLACIAL TILL: Dense to very dense, brown silty fine sand, with cobbles and boulders - Cobbles and gravel comprise approximately 30 to 40 % of the total composition of the glacial till. - Boulders, 0.3 to 1.1 m in dimension, comprise approximately 20 to 30 % of the total composition of the glacial till. - Total composition of gravel, cobbles and boulders increasing with depth.		1	G 2								103
2.60m [102.02m]		2	G 3								102
End of Test Pit Test Pit terminated on very dense glacial till at 2.60 m depth. (Test Pit dry upon completion)		3									101
		4									

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 = $(D30)^2 / (D10 \times D60)$
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

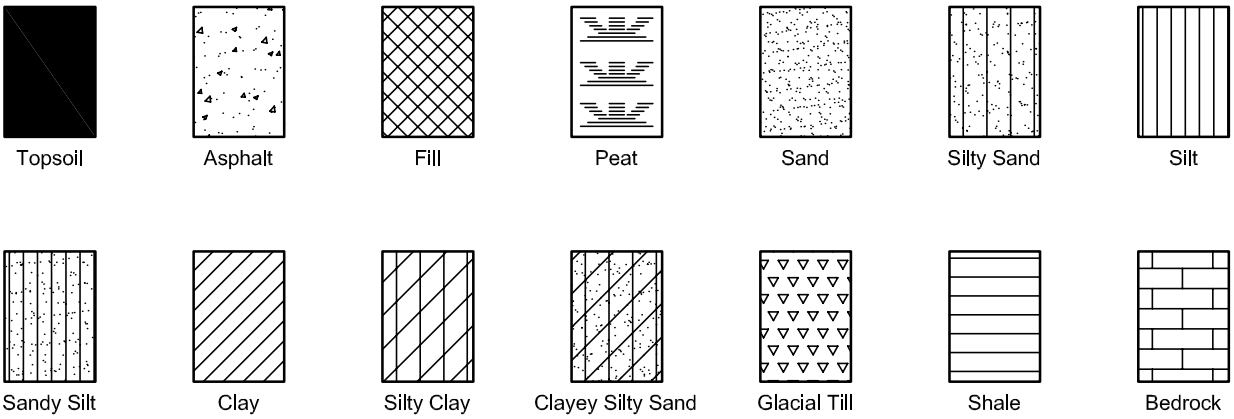
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

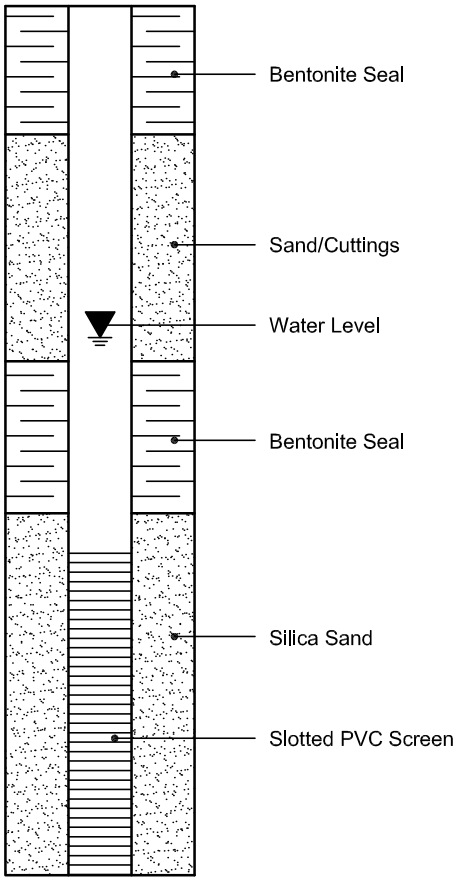
SYMBOLS AND TERMS (continued)

STRATA PLOT

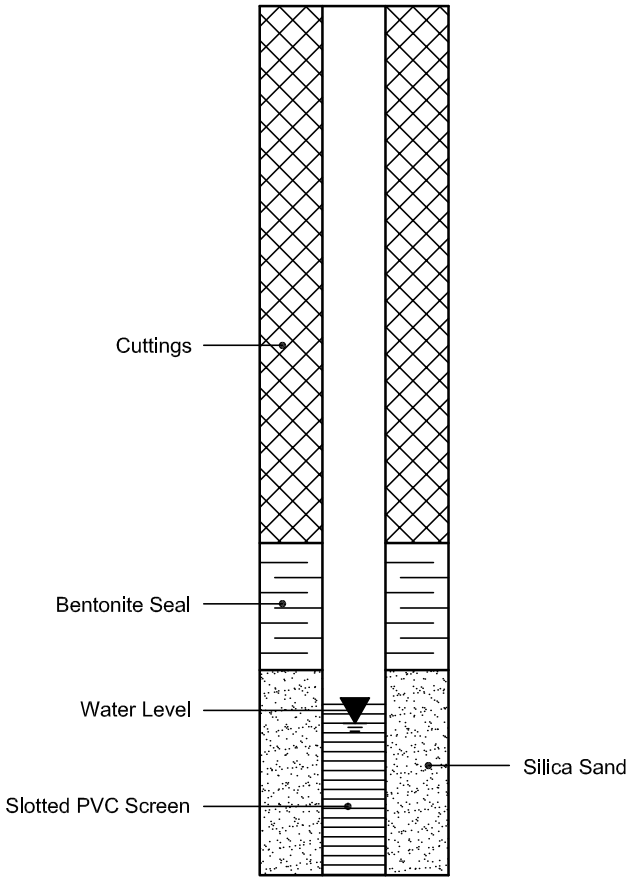


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Golder Associates Ltd.

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TEST PIT RECORD

TEST PIT #08-1

DATE: # September 25, 2008

PROJECT: BORRELLO DEVELOPMENT - PROPOSED RESIDENTIAL RESIDENCE
PROJECT No.: 08-1121-0147

EQUIPMENT: Test pit excavated with rubber-tired back-hoe, Type Deere 362

NOTES : Ground surface elevation at the testpit location is refererenced to Goedetic datum

Depth (m)	Elevation (m)	Description	Remarks
0.00	104.73	Dark Brown organic Topsoil with roots	
0.15	104.58	Red brown SILTY SAND and GRAVEL, trace organics and rootlets	
0.42	104.31	Compact to very dense, grey brown silty to bouldery SAND and GRAVEL, some cobble and boulder (GLACIAL TILL)	very difficult digging below 2 metres depth due to increase boulders (up to 0.7 m size) content
0.42	104.31	Very dense BOULDER, SAND and GRAVEL	
4.00	100.73	Bottom of test pit within bouldery TILL	

-- Backhoe refusal at 4.0m
-- Test pit walls stable.
-- No water seepage.
-- Dimensions : 2m x 4m

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TEST PIT RECORD

TEST PIT #08-2

DATE: # September 25, 2008

PROJECT: BORRELLO DEVELOPMENT - PROPOSED RESIDENTIAL RESIDENCE
PROJECT No.: 08-1121-0147

EQUIPMENT: Test pit excavated with rubber-tired back-hoe, Type Deere 362

NOTES : Ground surface elevation at the testpit location is refererenced to Goedetic datum

Depth (m)	Elevation (m)	Description	Remarks
0.00	104.22	Dark Brown organic TOPSOIL with roots	
0.15	104.07	Red brown Silty SAND and GRAVEL, some cobble, trace rootlet	
0.50	103.72	Compact to very dense, grey brown SILTY SAND and GRAVEL, increasing cobble and boulder content with depth (GLACIAL TILL)	very difficult digging below 1.5 metres depth due to increasing boulder (upto 0.7 m size) content
1.50	102.72	Very dense, bouldery (GLACIAL TILL)	
4.00	100.22	Bouldery SAND and GRAVEL with variable silt content (GLACIAL TILL)	

-- End of test pit at 4.0 m.
-- Test pit walls stable.
-- No water seepage.
-- Dimensions : 1m x 3m

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TEST PIT RECORD

TEST PIT #08-3

DATE: # September 25, 2008

PROJECT: BORRELLO DEVELOPMENT - PROPOSED RESIDENTIAL RESIDENCE
PROJECT No.: 08-1121-0147

EQUIPMENT: Test pit excavated with rubber-tired back-hoe, Type Deere 362

NOTES : Ground surface elevation at the testpit location is refererenced to Goedetic datum

Depth (m)	Elevation (m)	Description	Remarks
0.00	104.98	Dark Brown organic TOPSOIL with roots	
0.18	104.80	Red brown SAND and GRAVEL, some silt and cobble, trace rootlet	
0.45	104.53	Dense to very dense, grey brown silty to bouldery SAND and GRAVEL (GLACIAL TILL)	Boulder up to 1.2 metres long is noted with in the test pit
4.00	100.98	Bottom of the test pit within very dense bouldery SAND and GRAVEL with variable silt content (GLACIAL TILL)	

-- End of testpit at 4.0 m.
-- Test pit walls stable.
-- No water seepage.
-- Dimensions : 1 x 3m

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TEST PIT RECORD

TEST PIT #08-4

DATE: # September 25, 2008

PROJECT: BORRELLO DEVELOPMENT - PROPOSED RESIDENTIAL RESIDENCE
PROJECT No.: 08-1121-0147

EQUIPMENT: Test pit excavated with rubber-tired back-hoe, Type Deere 362

NOTES : Ground surface elevation at the testpit location is refererenced to Goedetic datum

Depth (m)	Elevation (m)	Description	Remarks
0.00	104.71	Dark Brown organic TOPSOIL	
0.20	104.51	Red brown sandy GRAVEL, some cobble, trace to some shells	
0.90	103.81	Compact to dense, grey brown silty SAND and GRAVEL with variable cobble and boulder content (GLACIAL TILL)	very difficult digging below 2 metres depth due to increasing boulder (upto 1.2 m size) content
2.00	102.71	Dense to very dense bouldery	
4.00	100.71	Bottom of Testpit within Bouldery SAND and GRAVEL with variable silt content (GLACIAL TILL)	

-- End of test pit at 4.0 m.
-- Test pit walls stable.
-- No water seepage.
-- Dimensions : 1m x 3m

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TEST PIT RECORD

TEST PIT #08-5

DATE: # September 25, 2008

PROJECT: BORRELLO DEVELOPMENT - PROPOSED RESIDENTIAL RESIDENCE
PROJECT No.: 08-1121-0147

EQUIPMENT: Test pit excavated with rubber-tired back-hoe, Type Deere 362

NOTES : Ground surface elevation at the testpit location is refererenced to Goedetic datum

Depth (m)	Elevation (m)	Description	Remarks
0.00	105.76	Dark Brown organic TOPSOIL with roots	
0.18	105.58	Red brown coarse SAND and GRAVEL, some cobble and boulder, trace silt	
1.20	104.56	Dense to very dense, grey brown silty to bouldery SAND and GRAVEL (GLACIAL TILL)	
4.00	101.76	Bottom of Test pit within very dense bouldery SAND and GRAVEL with variable silt content (GLACIAL TILL)	

-- End of test pit at 4.0m.
-- Test pit walls stable.
-- No water seepage.
-- Dimensions : 1m x 3m

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TEST PIT RECORD

TEST PIT #08-6

DATE: # September 26, 2008

PROJECT: BORRELLO DEVELOPMENT - PROPOSED RESIDENTIAL RESIDENCE
PROJECT No.: 08-1121-0147

EQUIPMENT: Test pit excavated with rubber-tired back-hoe, Type Deere 362

NOTES : Ground surface elevation at the testpit location is refererenced to Goedetic datum

Depth (m)	Elevation (m)	Description	Remarks
0.00	105.99	Dark Brown organic TOPSOIL	
0.12	105.87	Grey brown SAND and GRAVEL, some silt, cobble and shell	
0.80	105.19	Brown coarse SAND and GRAVEL with some shells	
1.40	104.59	Dense to very dense silty SAND and GRAVEL/COBBLE, some boulder (GLACIAL TILL)	
4.00	101.99	Bottom of Testpit within very dense silty SAND and GRAVEL with some boulder (GLACIAL TILL)	

-- End of test pit at 4.0 m.
-- Test pit walls stable.
-- No water seepage.
-- Dimensions : 1m x 3m

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TEST PIT RECORD

TEST PIT #08-7

DATE: # September 25, 2008

PROJECT: BORRELLO DEVELOPMENT - PROPOSED RESIDENTIAL RESIDENCE
PROJECT No.: 08-1121-0147

EQUIPMENT: Test pit excavated with rubber-tired back-hoe, Type Deere 362

NOTES : Ground surface elevation at the testpit location is refererenced to Goedetic datum

Depth (m)	Elevation (m)	Description	Remarks
0.00	100.63	Dark brown organic TOPSOIL	
0.15	100.48	Red brown silty SAND and GRAVEL, some cobble, trace organics and rootlet	
0.55	100.08	Dense to very dense grey brown silty/bouldery SAND and GRAVEL (GLACIAL TILL)	Very difficult [illegible] below 2.2 metres [illegible] due to greater boulder content ([illegible]
3.80	96.83	Bottom of Test pit within very dense bouldery SAND and GRAVEL with variable silt content (GLACIAL TILL)	

-- End of test pit at 3.8 m.
-- Test pit walls stable.
-- No water seepage.
-- Dimensions : 1m x 3m

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TEST PIT RECORD

TEST PIT #08-8

DATE: # September 25, 2008

PROJECT: BORRELLO DEVELOPMENT - PROPOSED RESIDENTIAL RESIDENCE
PROJECT No.: 08-1121-0147

EQUIPMENT: Test pit excavated with rubber-tired back-hoe, Type Deere 362

NOTES : Ground surface elevation at the testpit location is refererenced to Goedetic datum

Depth (m)	Elevation (m)	Description	Remarks
0.00	102.54	Dark brown organic TOPSOIL	
0.20	102.34	Red brown silty SAND, some gravel, trace organics	
0.60	101.94	Compact to dense grey brown silty SAND and GRAVEL with variable cobble and boulder (GLACIAL TILL)	very difficult digging below 2 metres depth due to increasing boulder (> 0.15 m size) content
2.00	100.54	- very dense, cobbly and bouldery	
4.90	97.64	Bottom of Testpit within bouldery SAND and GRAVEL with variable silt content (GLACIAL TILL)	

-- End of test pit at 4.9 m.
-- Test pit walls stable.
-- No water seepage.
-- Dimensions : 1m x 3m

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TEST PIT RECORD

TEST PIT #08-9

DATE: # September 26, 2008

PROJECT: BORRELLO DEVELOPMENT - PROPOSED RESIDENTIAL RESIDENCE
PROJECT No.: 08-1121-0147

EQUIPMENT: Test pit excavated with rubber-tired back-hoe, Type Deere 362

NOTES : Ground surface elevation at the testpit location is refererenced to Geodetic [illegible]

Depth (m)	Elevation (m)	Description	Remarks
0.00	101.90	Dark brown organic TOPSOIL with roots	
0.20	101.70	Red brown silty SAND, some gravel, trace organics	
0.70	101.20	Compact to dense grey brown silty SAND and GRAVEL with variable cobble and boulder content (GLACIAL TILL)	very difficult digging below 1 metre depth due to increasing water content
1.00	100.90	- becomes very dense and bouldery	
3.10	98.80	Bottom of Testpit within bouldery SAND and GRAVEL with variable silt content (GLACIAL TILL)	

-- End of test pit at 3.1 m.
-- Test pit walls stable.
-- No water seepage.
-- Dimensions : 1m x 3m

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TEST PIT RECORD

TEST PIT #08-10

DATE: # September 26, 2008

PROJECT: BORRELLO DEVELOPMENT - PROPOSED RESIDENTIAL RESIDENCE
PROJECT No.: 08-1121-0147

EQUIPMENT: Test pit excavated with rubber-tired back-hoe, Type Deere 362

NOTES : Ground surface elevation at the testpit location is refererenced to Goedetic datum

Depth (m)	Elevation (m)	Description	Remarks
0.00	107.04	Dark brown SAND, some gravel and cobbles, trace organics (FILL)	
0.50	106.54	Brown fine SAND (FILL)	
0.80	106.24	Dark brown SAND, some gravel and cobbles, occasional boulder, trace organics (FILL)	very difficult digging below 1 metres depth due to increasing boulder content
1.30	105.74	Native TOPSOIL	
1.45	105.59	Gray borwn silty SAND and GRAVEL (Glacial Till)	
1.80	105.24	Bottom of Testpit	

-- End of test pit at 1.8 m.
-- Test pit walls stable.
-- No water seepage.
-- Dimensions : 1m x 3m

Certificate of Analysis

Report Date: 25-Sep-2024

Client: **Paterson Group Consulting Engineers (Ottawa)**

Order Date: 23-Sep-2024

Client PO: **61341**

Project Description: PG7287

	Client ID:	TP7-24 G2	-	-	-		
	Sample Date:	23-Sep-24 09:00	-	-	-	-	-
	Sample ID:	2439085-01	-	-	-		
	Matrix:	Soil	-	-	-		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	92.7	-	-	-	-	-
General Inorganics							
pH	0.05 pH Units	7.48	-	-	-	-	-
Resistivity	0.1 Ohm.m	163	-	-	-	-	-
Anions							
Chloride	10 ug/g	<10	-	-	-	-	-
Sulphate	10 ug/g	<10	-	-	-	-	-

APPENDIX 2

FIGURE 1 – KEY PLAN

PHOTOGRAPHS FROM SITE VISIT – SEPTEMBER 20, 2024

DRAWING PG7287-1 - TEST HOLE LOCATION PLAN

FIGURE 1

KEY PLAN

PATERSON GROUP

Photographs from Site Visit – September 20, 2024

Photo 1: Photo of the test pit TP 1-24.

Photo 2: Photo illustrating the boulder excavated from the test pit TP 1-24.

Photo 3: Photo of the test pit TP 2-24.

Photo 4: Photo illustrating the boulders from the test pit TP 2-24.

Photo 5: Photo of the test pit TP 3-24.

Photo 6: Photo illustrating the boulders excavated from the test pit TP 3-24.

Photo 7: Photo illustrating the boulders excavated from the test pit TP 4-24.

Photo 8: Photo of the test pit TP 4-24.

Photo 9: Photo illustrating the boulders excavated from the test pit TP 5-24.

Photo 10: Photo illustrating the boulders excavated from the test pit TP 5-24.

Photo 11: Photo illustrating the boulders excavated from the test pit TP 7-24.

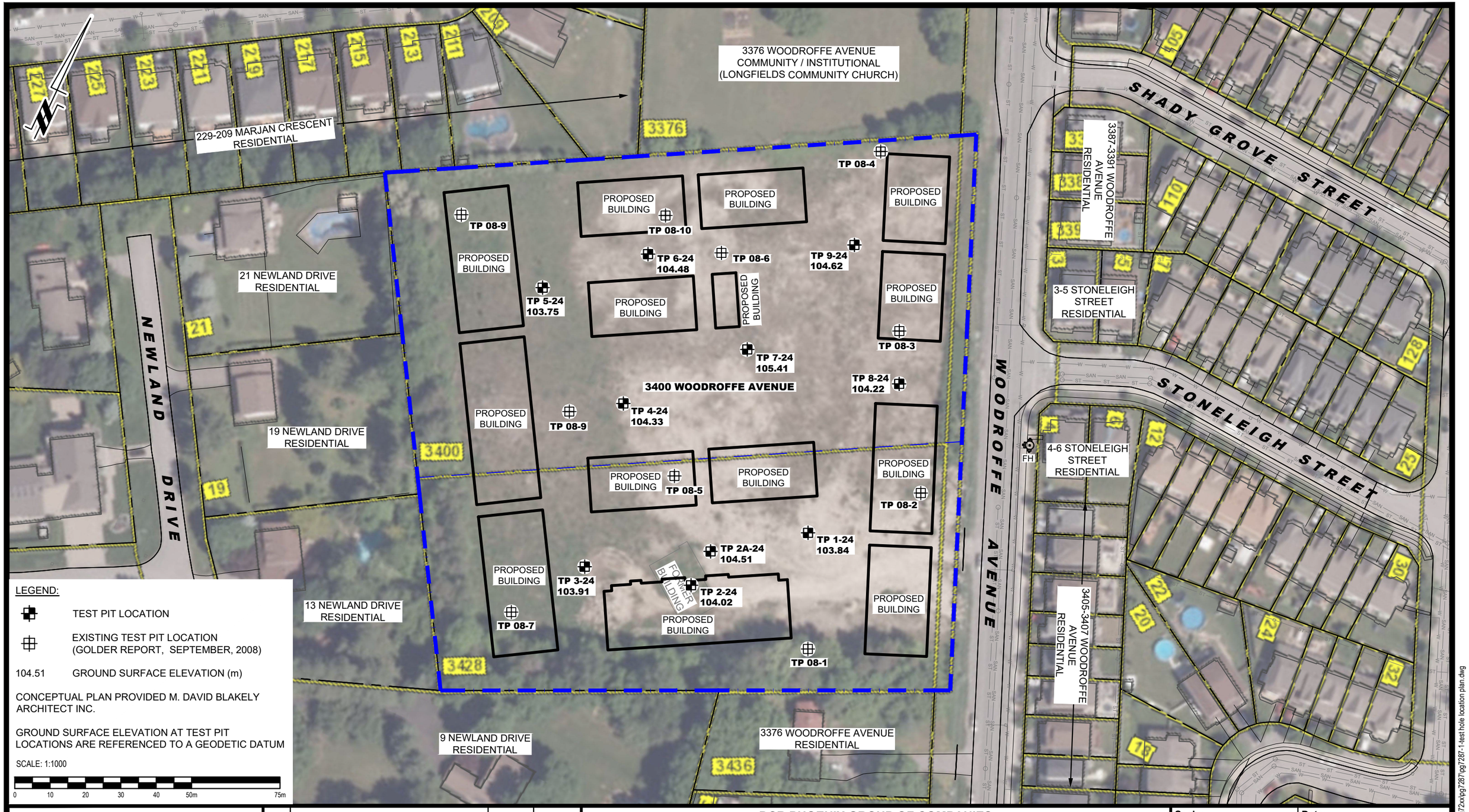
Photo 12: Photo of the test pit TP 7-24.

Photo 13: Photo of the test pit TP 8-24.

Photo 14: Photo illustrating the boulders excavated from the test pit TP 8-24.

Photo 15: Photo of the test pit TP 9-24.

Photo 16: Photo illustrating the boulders excavated from the test pit TP 8-24.



LEGEND:

- TEST PIT LOCATION
- EXISTING TEST PIT LOCATION (GOLDER REPORT, SEPTEMBER, 2008)
- 104.51 GROUND SURFACE ELEVATION (m)

CONCEPTUAL PLAN PROVIDED M. DAVID BLAKELY ARCHITECT INC.

GROUND SURFACE ELEVATION AT TEST PIT LOCATIONS ARE REFERENCED TO A GEODETIC DATUM

SCALE: 1:1000

0 10 20 30 40 50m 75m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

DCR PHOENIX GROUP OF COMPANIES
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
3400 WOODROFFE AVENUE
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:1000	Date: 09/2024
Drawn by: YA	Report No.: PG7287-1
Checked by: PT	Dwg. No.: PG7287-1
Approved by: SD	Revision No.:

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