11654128 Canada Inc.

Geotechnical Investigation

Type of Document
FINAL

Project Name
Proposed Residential Development
6171 Hazeldean Road, Ottawa, Ontario

Project Number
OTT-00258780-B0

Prepared By: Gary Cui, E.I.T.

Reviewed By: Ismail Taki, P.Eng.

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

Date Submitted:
July 24, 2020

11654128 Canada Inc.

768 St. Joseph Boulevard, #100
Gatineau, Quebec
J8Y 4B8

Attention: Mr. Carmine Zayoun

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Prepared By:
EXP Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6
Canada
T: 613-688-1899
F: 613-225-7337
www.exp.com

Gary Cui, E.I.T.
Engineer in Training, Geotechnical Services
Earth and Environment

Ismail Taki, M.Eng, P.Eng..
Manager, Geotechnical Services
Earth and Environment

LICENSED PROFESSIONAL ENGINEER
ISMAIL TAKI
July 24/2020
PROVINCE OF ONTARIO

Date Submitted:
July 24, 2020

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Executive Summary

A geotechnical investigation was undertaken at the proposed residential development to be located at the site registered by the civic address of 6171 Hazeldean Road, City of Ottawa, Ontario. This work was authorized by Mr. Carmine Zayoun on behalf of 11654128 Canada Inc.

The geotechnical investigation was completed concurrently with a Phase I and Phase II Environmental Site Assessments (ESA), which are reported under separate covers.

Current plans call for the development of the subject site with residential buildings comprising of one nine (9) storey mixed used building with multi levels of underground parking, five (5) blocks of residential buildings with one to two levels of underground parking each, townhome blocks and single homes with one basement level. Amenities buildings, storm management pond, park, underground services and subdivision roadways will be also constructed as part of the proposed development. Preliminary grading plans available indicates the proposed site grades along the roadway will vary from Elevation 122.00 m to Elevation 120.20 m along the west end of the site and from Elevation 118.0 m to Elevation 118.4 m along the east end of the site.

The fieldwork for the geotechnical investigation comprised the drilling/excavation a total of 22 test holes comprising of six (6) boreholes drilled to refusal/ termination depths of 1.8 to 7.2 m and sixteen (16) test pits excavated to excavator bucket refusal depths ranging between 0.3 m and 4.2 m below the existing ground surface. Monitoring wells were installed in three (3) boreholes for long-term monitoring of the groundwater at the site.

The investigation has revealed that the subsurface conditions at the site to comprise of 0.3 m to 3.4 m thick heterogenous fill deposit over the entire site extending to the surface of bedrock in the majority of the test holes and to the surface of thin deposit of native silty sand/glacial till in localized areas of the site as described in detail in the main body of the report. Deposit of marl/clay crust and peat was encountered in the southern part of the site as well as in localized pockets in other areas of the site Refusal to augers/excavator bucket was met in all the test holes at depths ranging between 0.3 and 6.2 (Elevation 118.1 to 110.3 m). Washboring and core drilling used to advance Borehole Nos. 1 to 3 beyond the refusal depths revealed that the refusal was met on very strong limestone bedrock.

Groundwater measurements taken on July 2, 2020 in monitoring wells installed in three of the boreholes indicate that the groundwater table to be at a depth of 2.02 m to 2.75 m below grade, i.e. Elevation 118.29 m to 113.75. The groundwater table is subject to seasonal fluctuation and may be at higher depths during wet weather conditions. Groundwater infiltration was recorded in some of the test pits following the excavation as indicated in the report.

Preliminary grading plans indicates that the grades at the site will be raised by 1 to 2 m . However, for design purposes, a grade raise of up to 2 m is considered feasible at the site from a geotechnical point of view.

The heterogenous fill encountered throughout the site, peat and marl are not considered suitable as founding material for the proposed residential development and roadways and therefore must be excavated and replaced with engineered fill as described in detail on the main body of the report. It may be possible to leave some of the fill in place under the roadway pending further evaluation in the field and if peat and marl does not exist below the fill. It may be possible to leave the peat and marl as well as the fill in the area of the proposed park. For budgeting purpose, it should be assumed that all fill, peat and marl will required to be removed from the envelopes of the proposed buildings and roadways and replaced with engineered fill as per the final grading plan and the recommendation of the report.

Footings founded on the surface of the bedrock below any weathered or broken rock may be designed for a bearing pressure at Ultimate Limit State (ULS) of ULS of 500 KPa. A higher ULS bearing is available if founding at lower depths in the bedrock and can be provided once the final design of the multi storey building and blocks is finalized Footings designed to bear on the compact silty sand /glacial till or on well-prepared engineered fill pad may be designed for a bearing pressure SLS of 150 kPa and factored geotechnical resistance ULS of 225 kPa. The factored ULS value includes a geotechnical resistance factor of 0.5.

The basement and garage floor slabs of the proposed structures may be constructed as slabs-on-grade set on a bed of 300 mm of clear stone set over bedrock or engineered fill. Perimeter drainage as well as underfloor system may be required for the proposed structures however, these requirements per type of structure proposed at the site will have to be established/refined following the completion of the design grades for the site as well, number of basement levels for each of the proposed building.

Excavations in the overburden at the site may be undertaken as open-cut provided they are cut back at a slope of 1H to 1V above the groundwater table and at slope of 2H:to 1V to 3H:1V below the groundwater table. Excavation of the bedrock would require the use of line drilling and blasting technique and may be undertaken with near vertical sides. Vibrations should be monitored during construction to prevent damage to adjacent structures and services. A pre-condition survey of all the structures and services situated within proximity of the site will be required prior to commencement of construction and during the excavation of the bedrock. Seepage of surface and sub-surface water into the excavations should be anticipated, however it should be possible to collect the water entering the excavation in perimeter ditches and to remove it by pumping from sumps.

The subject site has been classified as **Class C** for seismic site response in relation to Section 4.1.8.4 of the 2012 Ontario Building Code (OBC 2012) provided that the foundations are placed on engineering fill pads or on glacial till. A higher site class, if required, may be available for the site if a shear-wave measurement is completed which will be applicable for footings founded on intact bedrock and in areas where no more than 3 m of overburden exists between the bedrock surface and the underside of the foundations.

The pavement structure for the parking areas, subdivision roadways and roadways to be used by bus traffic are presented in Table IX of the report.

Review of the site and latest site layout and data available to date revealed a lack/gap in the subsurface/bedrock data along the eastern part of the. Therefore, and as part of the final design and prior to tendering, it is recommended that test pits be completed in these areas in order to collect additional data and/or to confirm the data on the subsurface conditions, i.e. fill depth and the depth of the bedrock.

The above and other related considerations are discussed in greater detail in the report.

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Appendix

1 Introduction

EXP Services Inc. (EXP) completed a geotechnical investigation for the proposed residential development to be located at the site registered by the street address of 6171 Hazeldean Road in the City of Ottawa, Ontario (Figure No. 1). This work was authorized by Mr. Carmine Zayoun on behalf of 11654128 Canada Inc.

Latest project plans call for the development of the site with the following residential products;

- One nine storey, multi use building with one or more underground parking – Totalling 160 units
- Five residential block buildings (Block A to E), each of 35 unit and with one underground parking level;
- Twenty (20) single homes with one basement level each;
- Twenty-two (22) townhome blocks of two (2) to eight (8) units each with one basement level; and
- Two amenity park buildings;

Underground services, subdivision roadways, a community park and a storm management pond will be also constructed as part of the facility.

Final design grades were not available at the time of preparation of this report. However, preliminary plans available indicate the proposed grades along the roadways would range from 122.00 m to 120.20 m along the west end of the site and from 118.0 m to 118.4 m along the east end of the site

The geotechnical investigation was undertaken to:

- Establish the subsurface soil/bedrock and groundwater conditions at the borehole and test pits locations;
- Classify the site for Seismic Site Response in accordance the requirements of the 2012 Ontario Building Code (OBC), and comment on the liquefaction potential of the subsurface soils;
- Establish the grade-raise restrictions at the site;
- Make recommendations regarding the most suitable type of foundations, founding depth, Serviceability Limit State (SLS) bearing pressure and Ultimate Limit State (ULS) factored geotechnical resistance of the founding strata for the various residential buildings proposed for the site;
- Discuss slab-on-grade construction and permanent drainage requirements foreach of the proposed building type;
- Discuss excavations and dewatering requirements during construction;
- Comment on backfilling requirements and suitability of on-site soils for backfilling purposes; and
- Recommend pavement structures for the proposed subdivision roadways.

The comments and recommendations given in this report assume that the above-described design concept will proceed to construction. If changes are made either in the design phase or during construction, this office must be retained to review these modifications. The result of this review may be a modification of our recommendations or it may require additional field or laboratory work to check whether the changes are acceptable from a geotechnical viewpoint.

2 Background Information

A geotechnical report prepared for the subject site by Paterson Group (Paterson), under Report PG4917-1 dated May 23, 2019 was provided to EXP as reference material. The report was prepared for Kavanagh Family Investments Ltd.

Series of test pits and boreholes were excavated/drilled by Patersongroup as part of the investigation as well as previous investigated distributed throughout the site. The report indicates that the elevation of the bedrock at the location of test pits/borehole ranged between to Elevation 117.93 m to lower than 113.6 m Paterson group has also identified an area of peat and marl in portion of the southern area of the site as well as fill in all the test holes. Infiltration of groundwater was recorded in some of the test pits at depths ranging between 2.5 m and 3.0 m below ground surface Logs of test pits/boreholes excavated by Paterson group are attached in Appendix A.

Test pits excavated by Paterson group as well as bedrock data recorded at each location are presented on Site Plan Figure No.2 Relying on this data will be the sole responsibility of the user. The user must refer to the original report for the locations of test pits and boreholes as well as the subsurface conditions recorded.

3 Site Description

The subject is registered by the street address of 6171 Hazeldean Road, near the intersection of Carp Road, in Ottawa (Stittsville), Ontario. The property is legally described as Concession 12, Part of Lot 23, Parts 2, 4, and 6 of Registered Plan No. 4R-23045.

The property is currently unoccupied and covered by grass with some granular and asphaltic concrete patches. Sparse vegetation covers the western half of the subject site, with lightly wooded area occupying the western corner of the site. The property is bounded by Hazeldean Road to the southeastern side and by residential developments from all other sides.

Ground surface elevations at the site slopes in the easterly direction with elevations at the locations of the boreholes and test pits ranging from 116.2 m to 120.8. Topographical survey prepared for the site should be referred for a more detailed information regarding the site grades and topography

Preliminary grading plans available indicates the proposed site grades along the roadway will vary form Elevation 122.00 m to Elevation 120.20 m along the west end of the site and from Elevation 118.0 m to Elevation 118.4 m along the east end of the site. As the results, a grade raise of up 2 m is expected at the site with some areas will be in cut.

4 Procedure

The fieldwork for the geotechnical investigations was completed between March 17 and March 24, 2020, and comprised the drilling of six (6) boreholes (Borehole Nos. 1 to 6) using a CME-55 track mounted drill rig and the excavation of sixteen (16) test pits (Test Pit Nos. 3 to 18) using a 320 excavator to refusal depths ranging between 0.3 m to 6.2 m below the existing ground surface. The fieldwork was supervised on a full-time basis by a representative of EXP.

The locations and geodetic elevations of the boreholes and test pits were established in the field by representative of EXP as shown on Figure No. 2. Their locations were cleared from any underground services by USL-1 cable locators.

Standard penetration tests samples were performed in the overburden in the boreholes at 0.75 m depth intervals and the soil samples retrieved by split-barrel sampler to refusal depth. Below the refusal depth, Borehole Nos. 1 to 3 were cased and advanced further using washboring and coring techniques and NQ-size core barrel to termination depths between 4.2 m to 7.2 m below the existing ground surface. During bedrock coring, a careful record of any sudden drops of the drill rods, colour of wash water and wash water return was kept. In the Test Pits, grab samples were collected from selected Test Pits and depths.

All the soil samples were visually examined in the field for textural classification, logged, preserved in plastic bags and identified. Similarly, the rock cores were logged, placed in core boxes and identified. On completion of the fieldwork, all the soil samples and rock cores were transported to the EXP laboratory in the City of Ottawa, Ontario where they were visually examined by a geotechnical engineer and borehole/test pits logs prepared. The engineer also assigned the laboratory testing, which consisted of performing natural moisture content on all soil samples and grain-size analysis tests on selected soil samples. In addition, unconfined compressive strength was completed on selected rock samples.

Water levels were measured in the open boreholes and test pits upon completion of drilling/excavation operations. In addition, 37 mm monitoring wells were installed in Borehole Nos. 1, 3, and 5 for long-term monitoring of the groundwater. The installation was completed in accordance with EXP standard practice and is documented on the respective borehole logs. The test pits were backfilled upon completion of the fieldwork.

5 Site and Soil Description

A detailed description of the geotechnical conditions encountered in the six (6) boreholes and sixteen (16) test pits are given on the borehole and test pit logs, Figure Nos. 3 to 24 inclusive. The borehole and test pit logs and related information depict subsurface conditions only at the specific locations and times indicated. Subsurface conditions and water levels at other locations may differ from conditions at the location where sampling was conducted. The passage of time also may result in changes in the conditions interpreted to exist at the locations where sampling was conducted. Boreholes and test pits were drilled to provide representation of subsurface conditions as part of a geotechnical exploration program and are not intended to provide evidence of potential environmental conditions.

A review of Figures Nos. 3 to 24 inclusive indicates that the lithology of the site consists of surficial topsoil or granular fill overlying a substantial deposit of fill material, which is underlain by native sand/silty sand, glacial till, or directly underlain by bedrock. Locally, deposits of marl/clay crust and peat are present underlying the fill material and overlying the native soils or bedrock.

5.1 Topsoil

A 100 mm to 200 mm thick layer of topsoil was encountered at the surface in Borehole Nos. 2, 6 and at Test Pit Nos. 5, 11, 12 and 13.

5.2 Fill Material

Heterogeneous fill material was encountered at all borehole and test pit locations and extended to depths ranging between 0.3 m to 2.9 m (Elevations 119.8 m to 114.2 m). The fill extends to the surface of the bedrock/auger refusal depths of 0.3 m 2.3 m (Elevation 117.8 m to 115.7 m) in Borehole Nos. 1, 3 and 4 and in Test Pit Nos. 3 to 5,10, 11, 13 and 14.

The fill is generally heterogenous and variable and likely was deposited at the site over the years and from different sources and therefore other type and nature of fill may exist in areas not investigated by EXP. The fill comprised of a mixture of silty sand, silty gravelly sand, or gravelly sand with cobbles and boulders. Rootlets, wood pieces and bark fragments, and traces of other organic matter were detected within the fill material in some of the boreholes/test pits. Extensive and concentrated boulders were encountered within the fill at the locations of Test Pit Nos. 14, 17 and 18. In Test Pit Nos 11 and. 13, several large concrete blocks were present within the fill. The natural moisture content of the fill ranged between 3 to 30 percent, indicating moist to very moist conditions. It should be noted that the fill was likely deposited over the years and from different sources and therefore my have different matrix than recorded in other areas of the site. Previous reports indicated the presence of blast shattered rock fill in some areas of the site.

Grain-size analyses performed on four (4) fill samples and the results presented on Figure Nos. 25 to 28. A review of these figures revealed a fill composition of 7 to 51 percent gravel, 39 to 86 percent sand and 7 to 31 percent silt and clay as summarized in Table I below.

Table I: Summary of Lab Test Results on Fill Samples					
Test Pit No.	Sample Depth (m)	Composition			Figure No.
		Gravel (%)	Sand (%)	Silt and Clay (%)	
BH-02	0.8 - 1.4	26	50	24	25
BH-03	0.8 - 1.4	51	39	10	26
BH-04	0 - 0.6	22	47	31	27
TP 14	0 – 0.5	7	86	7	28

5.3 Peat/Marl/Clay Crust

Peat/marl complex deposit was encountered underlying the fill material in Borehole Nos. 2, 4 and 5 and in Test Pit Nos. 6 to 9, 12, and 15 at depths ranging from 0.8 m to 2.3 (Elevations 118.8 m to 114.2) and extended to depths ranging from 1.4 m to 3.6 m (Elevations 118.5 m to 113.5 m).. The approximate extent of the peat/marl organic deposit is shown on Figure 2. The peat/marl deposit extends to the surface of the bedrock in Test Pit Nos. 6, 9 and 12.

The organic peat/mark deposit is highly compressible and comprised of decomposed organic matter including wood fragments, bark pieces and rootlets fragments. The grey to grey-green calcareous marl is cohesive and often spongy in texture, indicating a high degree of saturation. A calcified tan to light brown clay crust was contacted between the peat and marl deposit in Test Pit No. 9. The natural moisture content of the peat/marl complex ranged between 22 to over 100 percent. Table II present the depths and elevations of the peat and marl in the test pits and boreholes by EXP.

Table II: Summary of Depth/Elevation of Peat/Marl in Test holes					
Test Hole	GS Elevation (m)	Peat Depth Interval		Peat Elevation	
		From (m)	To (m)	From (m)	To (m)
BH-2	119.1	1.4	3.6	117.7	115.5
BH-4	117.8	0.7	1.4	117.1	116.4
BH-5	116.5	2.3	3,0	114.2	113.5
TP-6	118.1	0.8	1.9	117.3	116.2 (Rock)
TP-7	117.6	1.3	1.5	116.3	116.1
TP-8	118.8	1.2	2.0	117.6	116.8

Table II: Summary of Depth/Elevation of Peat/Marl in Test holes (ctn'd)					
Test Hole	GS Elevation (m)	Peat Depth Interval		Peat Elevation	
		From (m)	To (m)	From (m)	To (m)
TP-9	118.8	1.2	3.1	117.6	115.7 (Rock)
TP-12	119.6	2.0	2.3	117.6	117.3 (Rock)
TP-15	120.2	1.4	1.7	118.8	118.5

Additional information on the peat and marl can be found in the logs of test holes completed by Paterson group, attached in Appendix A.

5.4 Sand/Silty Sand/Gravelly Sand

The organic peat in Borehole No. 5 is underlain by a deposit of silty sand with some gravel which extends to 5.3 m depth (Elevation 111.2 m). This deposit is compact as indicated by the SPT (N values) which ranged between 15 to 24 blows per 300 mm penetration of the split spoon sampler and has a natural moisture content ranging between 9 to 20 percent, indicating moist to very moist conditions. Grain-size analyses performed on one (1) sample from this deposit is presented on Figure No. 29 and summarized in Table III below.

Table III: Summary of Lab Test Results on Silty Sand Sample				
Test Pit No.	Sample Depth (m)	Composition		
		Gravel (%)	Sand (%)	Silt and Clay (%)
BH-05	3.8 - 4.4	1	56	43

5.5 Till

The peat/marl in Borehole No. 2 and in Test Pit Nos. 7, 8, 15, fill in Borehole No. 6, Test Pit 16 to 18 and the silty sand in Borehole No. 5 are underlain by glacial till deposit which extends to auger refusal depth, i.e. inferred surface of the bedrock contacted at depths of 1.8 m to 6.2 m (Elevation 118.1 m to 110.3 m)

The glacial till is grey and comprised of silty sand with clay and numerous cobbles and boulders. The glacial till is dense to very dense based on SPT (N values) which ranged from 41 blows to greater than 50 blows per 300 mm or less of penetration of the split spoon ampler. It has a natural moisture content ranging between 3 to 10 percent, indicating moist conditions. Grain-size analysis performed on one (1) sample from this deposit is presented on Figure No. 30 and summarized in Table IV below.

Table IV: Summary of Lab Test Results on Till Sample				
Test Pit No.	Sample Depth (m)	Composition		
		Gravel (%)	Sand (%)	Silt and Clay (%)
BH-06	3.0 – 3.6	39	44	17

5.6 Auger/Backhoe Refusal

Refusal to augers or to excavator bucket advancement was encountered in all boreholes/test pits at depths ranging between 0.3 and 6.2 m below the existing ground surface (Elevation 115.3 m to 118.1 m). The inferred depth and elevation of the bedrock at the location of the testhoels is summarized in Table V.

Table V: Summary of Bedrock Depth and Elevation in Boreholes and Test Pits			
Borehole or Test Pit No.	Ground Surface Elevation (m)	Bedrock Depth (m)	Bedrock Elevation (m)
BH-01	117.1	0.7	116.4
BH-02	119.1	3.8	115.3
BH-03	120.4	3.9	117.0
BH-04	117.8	1.8	116.0
BH-05	116.5	6.2	110.3
BH-06	120.5	3.6	116.9
TP-03	116.2	0.6	115.6
TP-04	117.2	0.5	116.7
TP-05	117.6	0.3	117.3
TP-06	118.1	1.9	116.2
TP-07	117.6	2.3	115.3
TP-08	118.8	2.5	116.3
TP-09	118.8	3.1	115.7
TP-10	118.7	3.3	116.4
TP-11	119.2	1.4	117.8
TP-12	119.6	2.3	117.3
TP-13	119.4	2.9	116.5
TP-14	120.1	2.3	117.8
TP-15	120.2	2.2	118.0
TP-16	119.9	1.8	118.1
TP-17	120.5	4.2	116.3
TP-18	120.8	3.7	117.1

Washboring and core drilling techniques were used to advance beyond the refusal depth in Borehole Nos. 1 to 3 revealed that refusal was met on bedrock. A review of the recovered rock cores and geological maps revealed that the bedrock underlying the site is limestone bedrock of the Bobcaygeon Formation.

A Total Core Recovery (TCR) and Rock Quality Designation (RQD) of 48 to 100 percent and 0 to 72 percent respectively were obtained when core drilling the bedrock. On this basis, the bedrock quality within the depth investigated may be classified as very poor to good.

A total of eight (8) rock samples were selected for unconfined compressive strength testing and the test results are presented in Table VI. A review of the test results indicates a very strong bedrock with compressive strength ranging between 124 MPa and 182 MPa (Canadian Foundation Engineering Manual, 4th edition, 2006). The unit weight of the bedrock ranged between 2650 kg/m^3 and 2695 kg/m^3.

Table VI: Results of Unconfined Compression Tests on Rock Samples

Borehole No./RUN No.	Depth (m)	Compressive Strength (MPa)	Unit Weight of Bedrock (kg/m^3)
BH 1 – Run 1	0.9 – 1.0	153	2668
BH 1 – Run 2	2.2 – 2.3	176	2680
BH 1 – Run 3	3.1 – 3.3	124	2668
BH 2 – Run 1	3.8 – 4.0	174	2673
BH 2 – Run 2	5.6 – 5.7	182	2678
BH 3 – Run 1	2.0 – 2.2	168	2695
BH 3 – Run 3	3.6 – 3.7	127	2650
BH 3 – Run 3	4.4 – 4.5	160	2695

Photographs of the recovered bedrock cores are presented on Figures Nos. 31 to 33.

5.7 Groundwater Level

Water level observations were made in the open boreholes and test pits upon completion of the field work and subsequently in monitoring wells installed in Borehole Nos. 1 and 5. A summary of the observations made are presented in Table VII.

Table VII: Summary of Groundwater Measurements in Boreholes/Test Pits				
Monitoring Well ID	**Ground Elevation (m)**	**Date of Last Reading**	**Depth to Water (m)**	**Elevation of Groundwater (m)**
BH-01	117.1	May 14, 2020	1.20	115.94
		July 2, 2020	2.02	115.08
BH-03	120.4	May 14, 2020	1.60	118.77
		July 2, 2020	2.11	118.29
BH-05	116.5	May 14, 2020	2.60	113.90
		July 2, 2020	2.75	113.75
TP -7	117.6	Completion	1.7	115.9
TP-11	119.2	Completion	0.9	118.3
TP-12	119.6	Completion	1.5	118.1
TP-13	119.4	Completion	2.6	116.8
TP-17	120.8	Completion	3.1	117.70

A review of Table IV indicates the groundwater table in the boreholes to be at depths 2.02 m to 2.75 m below grade, i.e. Elevation 118.29 m to 113.75 m.

Water levels observations were made in the exploratory boreholes at the times and under the conditions stated in the scope of services. These data were reviewed and EXP's interpretation of them discussed in the text of the report. Note that fluctuations in the level of the groundwater may occur due to seasonal variation such as precipitation, snowmelt, rainfall activities, and other factors not evident at the time of measurement and therefore may be at a higher level during wet weather periods.

6 Grade Raise

The investigation has revealed that the site to be underlain by heterogenous fill deposit overlain by silty sand to silty sand and gravel and glacial till and limestone bedrock contacted at depths of ranging between 0.3 and 6.2 m below the existing ground surface (Elevation 118.1 m to 110.3 m). As part of the site preparation, all fill, peat and marl will be removed from the envelope of the proposed buildings and roadways and replaced with engineered fill.

Preliminary grading plans indicate that the grades at the site will be raised by up to 2 m with some areas will be in cut. This grade raise is considered feasible at the site from a geotechnical point of view.

7 Site Preparation/Site Grading

Site grading within the footprint of the proposed buildings and roadways should consist of the removal of fill, peat and marl to the surface of bedrock or native soil whichever occurs first. Under the roadways, it may be possible to leave some of the fill in place, if it is not underlain by any peat/marl and pending further evaluation and treatment on-site during construction it may be possible to leave the organic soils in the area of the proposed park.

The following recommendation are provided for the site development preparation;

- All fill, peat and organic must be removed from the envelope of the proposed building, roadways box, underground services etc. to the surface of native soils or bedrock whichever occurs first, and the areas evaluated by a geotechnical engineer. In areas where the exposed approved surface of native soils or bedrock is below the proposed underside of footings, OPSS Granular B Type II should be placed in 300 mm lifts and each lift compacted to100 % and 95 % of the Standard Maximum Proctor Dry density (SPMDD) in accordance with ASTM D698-12e2 for underside of footings to be founded on engineered fill or bedrock and services respectively.

- Along the roadways and following the removal of all the peat/organic and fill to subgrade level, the subgrade should be proofrolled using a 10 tons vibratory roller in the presence of a geotechnician. Any soft areas detected should be sub-excavated and replaced with imported material (as per Section 14) or by on-site approved material which is free of organic, boulders or cobbles; Approved subgrade fill should be placed in 300 mm lifts and each lift compacted to 95 % of SPMDD.

- The removal of unsuitable material should extend a sufficient distance beyond the perimeter of the structure/roadway box to accommodate a 1.0 m wide bench of engineered fill, which is thereafter sloped at an inclination of 1H:1V down to the native soil/bedrock.

- The engineered fill should be placed under the full-time supervision of a geotechnician working under the direction of a geotechnical engineer. In-place density tests should be undertaken on each lift of the engineered fill to ensure that it is properly compacted prior to placement of the subsequent lift.

- Management of the access fill material should be done as per the recommendation of the Phase II Environmental site Assessment report prepared by EXP for this site under a sperate report.

8 Foundation Considerations

The investigation has revealed the site to be underlain by heterogenous fill extending to depths of 0.3 m to 2.9 m below grade and by marl and peat and glacial till. The overburden is underlain by bedrock contacted at depths of 0.3 and 6.2 m below grade. The fill, peat and marl are not suitable as founding medium for the proposed residential development (building and roadways) and must be removed and replaced with engineered fill or footings placed on top of the limestone bedrock or the surface of the glacial till and silty sand contacted at localized areas throughout the site as described in Section 7 of the report.

Design underside of footings for the various residential building proposed at the site was not available at the time of preparation of this report. Table VIII present the anticipated founding medium for each of the proposed buildings based on the information available to date.

Table VIII: Summary of Anticipated Founding Medium For Each type of Structure

Building	Anticipated Founding Medium
Nine-storey, multi use building with one or more underground parking	Limestone Bedrock
Block A to E	Limestone Bedrock or Engineered Fill on Top of Bedrock
Townhouse blocks	Limestone Bedrock/Engineered Fill or Glacial Till

Since underside of footings elevations were not available at this time, each of the foundation mentioned above will be discussed separately. This will require updating once the final plans become available

8.1 Footings Directly on Bedrock

Footings designed to bear on the surface or in the bedrock below any weathered or fractured zones may be designed for a bearing pressure at a factored geotechnical resistance ULS of 500 KPa. A higher ULS bearing value is available for buildings which will be founded some depths into the bedrock such as the nine-storey building and/or some of the blocks which will contain one or more level of underground parking. This can be updated once the final design of the underside of footings becomes available.

The surface of the exposed bedrock at the underside of the footings should be examined by a geotechnical engineer and any fractured bedrock zones or fissured removed/cleaned prior to casting of the footings. Filling of the cleaned fissures with concrete and addition of rebar across any large fissures may be required and can be best established in the field by qualified geotechnical engineers or senior technicians.

Settlement of the footings designed for the ULS bearing pressure recommended above and properly constructed are expected to minimal..

8.2 Footings on Engineered Fill Pad, On Silty Sand or on Glacial Till

As indicated above, all fill, peat and marl should be removed from the envelope of the proposed building and replaced with engineered fill as indicated in Section 7.0 of the report.

Footings designed to bear on the native soils or on the well-prepared engineered fill pad may be designed for a bearing pressure SLS of 150 kPa and factored geotechnical resistance ULS of 225 kPa. The factored ULS value includes a geotechnical resistance factor of 0.5. The SLS value recommended assumes a maximum grade raise at the site of up to 2.0 m.

Settlement of the footings designed for the SLS bearing pressure recommended above and properly constructed are expected to be within the normally tolerated limits of 25 mm total and 19 mm differential.

8.3 General Recommendation

Footings shouldn't be founded partly on engineered fill/native soils and partly on bedrock. In such cases, additional reinforcement should be provided to the footings and foundations in areas where the founding medium changes from bedrock to engineered fill. In addition, a transition zone treatment may be required in areas where the subgrade changes from overburden to bedrock and vice versa.

A minimum of 1.5 and 1.0 m of earth cover should be provided to the footings of a heated structure founded on engineered fill/native soil and on bedrock respectively. The frost cover should be increased to 2.1 and 1.5 m for unheated structures respectively.

All footing subgrades and beds should be examined by a geotechnical engineer to ensure that the founding surfaces can support the design bearing pressure and that the footing beds have been properly prepared as described above. In areas of glacial till, a 50 mm mud slab is recommended to be placed on the surface of the approved subgrade to minimize disturbance.

The recommended bearing pressures have been calculated by EXP from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes and test pits when foundation construction is underway. The interpretation between boreholes and test pits and the recommendations of this report must therefore be checked through field monitoring provided by an experienced geotechnical engineer to validate the information for use during the construction stage.

9 Floor Slabs and Drainage Requirements

The lowest basement of the nine storey building, residential blocks and two-storey townhouse blocks may be constructed as slab-on-grade provided they are set on beds of well compacted 19 mm clear stone at least 300 mm thick placed on bedrock or on well compacted engineered fill. The clear stone would prevent the capillary rise of moisture to the floor slab. Adequate saw cuts should be provided in the floor slab to control cracking.

It is anticipated that perimeter drains would be required for the proposed residential blocks with basement. The perimeter drains may consist of 100 mm diameter perforated pipe wrapped with filter cloth (sock) and set on the footings and surrounded with 150 mm of 19 mm clear stone and properly outletted. The subsurface walls should be adequately damp proofed.\

Underfloor drainage system will likely be required for some of the townhouse blocks, the nine storey building and or the residential blocks with more one level of underground parking. These requirements will be best established once the design has been finalized and underside of footings, number of underground parking levels established for each of the high rise as well as the residential townhouse blocks.

The finished exterior grade should be sloped away from the buildings to prevent surface ponding of water close to the exterior walls.

10 Pipe Bedding Requirement

It is recommended that the bedding for the underground services including material specification, thickness of cover material and compaction requirements conform to the local requirements of the municipality and/or Ontario provincial Standard Specification and Drawings (OPSS and OPSD).

For guidance, the pipe bedding may consist of 300 mm and 150 mm of OPSS 1010 Granular A for services founded on native soils/engineered fill and bedrock respectively. The bedding material should be also placed along the sides and on top of the pipes to provide a minimum cover of 300 mm. The bedding, spring line and cover should be compacted to at least 98 percent the Standard Proctor Maximum Dry Density (SPMDD).

Where the subgrade changes form bedrock to native soil, a transition zone must be provided to minimize the concentration of stresses along the change in the founding medium.

11 Lateral Earth Pressure against Basement Walls

The subsurface walls should be backfilled with free draining material, such as OPSS 1010 for Granular B, Type II and equipped with a perimeter drainage system to prevent the buildup of hydrostatic pressure behind the walls. The walls will be subjected to lateral static and dynamic (seismic) earth forces.

For design purposes, the lateral static earth thrust against the subsurface walls may be computed from the following equation:

$$P = K_0 H (q + \tfrac{1}{2} \gamma H)$$

where P = lateral earth thrust acting on the subsurface wall; kN/m

K_0 = lateral earth pressure coefficient for 'at rest' condition for Granular B Type II backfill material = 0.5

γ = unit weight of free draining granular backfill; Granular B = 22 kN/m^3

H = Height of backfill adjacent to foundation wall, m

q = surcharge load, kPa

The lateral seismic thrust may be computed from the equation given below:

$$\Delta P_E = 0.32 \gamma H^2$$

where ΔP_E = resultant thrust due to seismic activity; kN/m

γ = unit weight of free draining granular backfill; Granular B Type II = 22 kN/m^3

H = height of backfill behind wall, (m)

The ΔPE value does not take into account the surcharge load. The resultant load should be assumed to act at 0.6 H from the bottom of the wall.

The requirement of damproofing/waterproofing of the foundation walls of the various structures proposed for the site must be established once the design grades at the site have been finalized.

12 Excavations

Excavations for the construction of the residential blocks and underground services will be extended through the fill, native soils and into bedrock in some areas of the site and will be below the groundwater table in some areas throughout the site.

Excavations at the site must comply with the latest version of Ontario Occupational Health and Safety Act, Ontario Regulations 213/91 (January 11, 2014), i.e. excavation in the overburden should be cut back at a slope of 1H to 1V above the groundwater table. Below the groundwater table, the excavations sides are expected to slough and will eventually stabilize at a slope of 2H:1V to 3H:1V. If space restriction prevents the provision of the above slopes, the excavation may be undertaken within the confines of a prefabricated support system, such as a trench box which is designed and installed in accordance with the requirement of OHSA 213/91. In the vicinity of Borehole No. 5, any excavation below the groundwater tale in the silty sand will require additional pumping and flatter excavation side slopes.

Excavation of the bedrock may be undertaken with near vertical sides and would require the use of line drilling and blasting techniques. To prevent any damage to the surrounding structures and services, the blasting operations would have to be carefully planned and closely monitored. It is recommended that the blasting contractor should retain the services of a blast specialist to provide him with a blasting plan. The contractor should have a licensed blaster on site always during the blasting and a vibration engineer on retainer. A condition survey of all the structures near the site should be undertaken prior to commencement of the excavation work. Vibration monitoring should be carried out during blasting operations. Vibrations should be monitored at property boundaries and should be limited so that there will be no damage to the existing structures or services.

Water inflow into the excavation should be expected. However, it should be possible to adequately handle this inflow by collecting the water in perimeter ditches and pumping from properly filtered sumps. It is possible that additional localized sumps may be required in areas where the seepage is more extensive.

12.1 Dewatering Requirement

Seepage of the surface and subsurface water into the excavations is anticipated. Should such seepage occur, it should be possible to collect water entering the excavation in perimeter ditches and to remove it by pumping from sumps located at low points. In areas of high infiltration or in areas where more permeable layers may exist in the till, a higher seepage should be anticipated. Therefore, the need of high capacity pumps to keep the excavation dry should not be overlooked.

It is anticipated the civil work as well excavation for the residential development would necessitate groundwater removal from the site. It is noteworthy to mention that new legislation came into force in Ontario on March 29, 2016 to regulate groundwater takings for construction dewatering purposes. Prior to March 29, 2016, a Category 2 Permit to Take Water (PTTW) was required from the Ontario Ministry of the Environment and Climate Change (MOECC) for groundwater takings related to construction dewatering, where taking volumes were in excess of 50 m^3/day, but less than 400 m^3/day, and the taking duration was

13 Seismic Site Classification

The investigation has revealed that the proposed residential buildings proposed for the site will be founded either on well engineered fill pad, glacial till or on bedrock an all the fill and organic material will be removed and replaced with well prepared and compacted engineered fill..

The subject site has been classified as Class C for seismic site response in relation to Section 4.1.8.4 of the 2012 Ontario Building Code (OBC 2012) provided that the foundations are placed on engineering fill pads or on glacial till. A higher site class, if required, may be available for the site if a shear-wave measurement is completed which will be applicable for footings founded on intact bedrock and in areas where no more than 3 m of overburden exists between the bedrock surface and the underside of the foundations..

Based on the results of the investigation, there is no liquefaction potential of the subsurface soil during a seismic event given that loose and soft areas will be sub-excavated and replaced with engineering fill during construction from under foundations and services.

13 Seismic Site Classification

The investigation has revealed that the proposed residential buildings proposed for the site will be founded either on well engineered fill pad, glacial till or on bedrock an all the fill and organic material will be removed and replaced with well prepared and compacted engineered fill..

Based on the subsurface conditions, the site is classified as **Class C for seismic site response** in accordance with Section 4.1.8.4 of the 2012 Ontario Building Code (ONBC 2012) given that foundations or engineering fill pads or on glacial till. A higher site class will likely be available if a shear-wave velocity testing is completed at the site for the high rise and residential blocks founded on intact bedrock surface and , and if no more than 3 m of softer material exists between the bedrock surface and the underside of the foundations.

Based on the results of the investigation, there is no liquefaction potential of the subsurface soil during a seismic event given that loose and soft areas will be sub-excavated and replaced with engineering fill during construction from under foundations and services.

14 Backfilling Requirements and Suitability of On-Site Soils for Backfilling Purposes

The material to be excavated from the site will comprise of excessive amount of heterogenous fill containing boulders, cobbles, peat and marl, wood fragments, construction debris, etc. native soils and bedrock.

The following recommendation are provided with respect to the re-use of the on-site excavated soils as backfill and subgrade fil as well as requirement for backfilling;

- Topsoil, peat and marl are not suitable for use as backfill and must be removed and disposed of site,

- The heterogenous fill is not suitable for use as subgrade fill or as fill against the foundation wall in its present state. Select fill material free of organics, boulders and cobbles may be used as subgrade fill in the landscaped area, i.e. in areas where some settlement is not of a concern Select on-site fill, free of organics, debris , boulders and cobbles may be used as subgrade material in the lower levels under the roadways provided it is reviewed on-site by a geotechnician and is placed and compacted in 300 mm lifts using 10 vibratory roller. Prior to the re-use of the on-site fill, all boulders, debris and organic must be removed from it. It should be noted that the amount of material available for this purpose, cannot be quantified due to its high variability and its heterogenous nature which was likely deposited at the site over the years and from different sources. Contractor bidding on this project should review the available data and decide on their own whether or not some of the on-site fill can be used for this purpose;

- Blast shattered bedrock excavated from the site with maximum size of 400 mm and containing sufficient fines to fill any voids may be used as subgrade fill in the lower levels to raise the grades under the roadways provided it is placed in 500 mm lifts and each lift compacted with a 10 ton vibratory roller under the supervision of a geotechnican. Blending of the blast/shattered rock with finer material such as OPSS 1010 Granular A may be required to fill any void within the rock matrix;

- Crushing of the excavated bedrock on-site for use as OPSS 1010 Granular B type II can be considered as an option by the contractor undertaken this work, if considered feasible from an economic point of view. .

- Management of excess soils generated from the site should be undertaken as per the recommendation provided in the Phase II ESA report prepared for the site by EXP.

It is anticipated that most of the material required for backfilling purposes and subgrade fill will need to be imported and should preferably conform to the following specifications:

- Engineering fill under footing and basement floor– OPSS 1010 Granular B Type II placed in 300 mm thick lifts and compacted to 100 percent of the SPMDD under footings and to 98 percent of the SPMDD under the basement floors;

- Backfilling against exterior basement walls – OPSS 1010 Granular B Type I or II, placed in 300 mm thick lifts and compacted to 95 percent of the SPMDD;

- Trench backfill and fill placement to subgrade level for pavement – OPSS 1010 Select Subgrade Material (SSM), free of organics, debris and with a natural moisture content within 2 percent of the optimum moisture content. It should be placed in 300 mm thick lifts compacted to minimum 95 percent of the SPMDD.

15 Subdivision Road and Parking Area

The subgrade under roadways is expected to engineered fill prepared as per the recommendation o f this report. Pavement structure thicknesses required for the subdivision streets and driveways were computed and are shown on Table IX. The thicknesses are based upon an estimate of the subgrade soil properties determined from visual examination, textural classification of the soil samples and functional design life of 18 to 20 years. The proposed functional design life represents the number of years to the first rehabilitation, assuming regular maintenance is carried out.

Table IX: Recommended Pavement Structure Thicknesses

Pavement Layer	Compaction Requirements	Cars Only	Subdivision Roadways	Bus Traffic
Asphaltic Concrete (PG 58-34)	92 to 97% MRD	65 mm HL3	40 mm SP12.5 – cat B OR HL3 50 mm SP19 OR HL8	50 mm SP12.5 Cat B OR HL3 70 mm of SP19 OR HL8
Granular A Base (crushed limestone)	100% SPMDD*	150 mm	150 mm	150 mm
Granular B Sub-base, Type II	100% SPMDD*	300 mm	400 mm	500 mm

SPMDD* Standard Proctor Maximum Dry Density, ASTM-D698
MRD denotes Maximum Relative Density, ASTM D2041
Asphaltic Concrete in accordance with OPSS 1150/ 1151

Additional comments on the construction of parking area are as follows:

1. As part of the subgrade preparation for the areas to be paved, the subdivision roadways should be stripped of topsoil, fill, marl as described in Section 7 of the report and any unsuitable material down to subgrade level. The exposed area should be proof rolled with a 10 tons vibratory roller. Any soft areas detected should be sub-excavated and replaced with approved imported material conforming to OPSS 1010 for Select subgrade Material (SSM) or with on-site approved fill which should be placed in 300 mm lifts and each lift compacted to 95 percent of the SPMDD.

2. The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. As a minimum, subdrains stubs should be installed between catchbasin and at low points. This will ensure no water collects in the granular course, which could result in pavement failure during the spring thaw. The location and extent of sub drainage required within the paved areas should be reviewed by this office in conjunction with the proposed site grading.

3. To minimize the problems of differential movement between the pavement and catch basins/manhole due to frost action, the backfill around the structures should consist of free-draining granular preferably conforming to OPSS Granular B, Type II material. Weep holes should be provided in the catch basins/manholes to facilitate drainage of any water that may accumulate in the granular fill.

4. The most severe loading conditions on light-duty pavement areas and the subgrade may occur during construction. Consequently, special provisions such as restricted lanes, half-loads during paving, etc., may be required, especially if construction is carried out during unfavorable weather.

5. The finished pavement surface should be free of depressions and should be sloped (preferably at a minimum cross fall of 2 percent) to provide effective surface drainage towards catch basins. Surface water should not be allowed to pond adjacent to the outside edges of paved areas.

6. Relatively weaker subgrade may develop over service trenches at subgrade level if wet soils is used to backfill of the service trenches. Therefore, only dry and compactible material should be used to backfill service trenches as recommended in Section 7 of the report.

7. The granular materials used for pavement construction should conform to OPSS 1010 for Granular A and Granular B, Type II and should be compacted to 100 percent of the SPMDD (ASTM D698-12 e2). The asphaltic concrete used, and its placement should meet OPSS 1150/1151 and 310/313 requirements. It should be compacted to 92 to 97 percent of the maximum relative density in accordance with ASTM D2041.

It is recommended that EXP be retained to review the final pavement structure design and drainage plans prior to construction to ensure that they are consistent with the recommendations of this report.

16 Additional Investigation

Review of the site and latest site layout and data available to date revealed a lack/gap in the subsurface/bedrock data along the eastern part of the site. Therefore and as part of the final design and prior to tendering, it is recommended that test pits be completed in these area in order to collect additional data and/or to confirm the data on the subsurface conditions, i.e. fill depth and the depth of the bedrock.

17 General Comments

The comments given in this report are intended only for the guidance of the design engineers. The number of boreholes and test pits required to determine the localized underground conditions, especially bedrock elevations between boreholes and test pits affecting construction costs, techniques, sequencing, equipment, scheduling, etc., would be much greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should in this light, decide on their own investigations, as well as their own interpretation of the factual borehole and test pit results to draw their own conclusions as to how the subsurface conditions may affect them.

The information contained in this report is not intended to reflect on environmental aspects of the soils and groundwater. Should specific information be required, including for example, the presence of pollutants, contaminants or other hazards in the soil, additional testing may be required.

We trust that this information is satisfactory for your purposes. Should you have any questions, please contact this office.

0 200m 400m 800m

HORIZONTAL 1:20,000

exp Services Inc. **www.exp.com**

t: +1.613.688.1899 | f: +1.613.225.7337
2650 Queensview Drive, Suite 100
Ottawa, ON K2B 8H6, Canada

DATE: MAY 2020	CLIENT: 11654128 CANADA LTD. 6171 HAZELDEAN ROAD, OTTAWA, ON	project no. OTT-00258780-B0
DESIGN: I.T. / CHECKED: I.T.		scale: 1:20,000
DRAWN BY: G.C.	TITLE: SITE LOCATION PLAN	FIG 1

Filename: e:\ott\ott-00258780-b0\60 execution\65 drawings\6171 hazeldean fig_1.dwg
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Last Plotted:6/5/2020 2:47:55 PM Plotted by: CuiG Pen Table:: exp-64.ctb

LEGEND

BH-01	TESTHOLE NUMBER AND LOCATION (EXP, MARCH 2020)
TP-03	TEST PIT NUMBER AND LOCATION (EXP, MARCH 2020)
TP 1-19	TEST PIT NUMBER AND LOCATION (PREVIOUS PATTERSON GROUP INVESTIGATION PG4917-1 DATED MAY 2019)
BH 1-18	TESTHOLE NUMBER AND LOCATION (PREVIOUS PATTERSON GROUP INVESTIGATION PG4706 DATED OCT. 2018)
TP 1-18	TEST PIT NUMBER AND LOCATION (PREVIOUS PATTERSON GROUP INVESTIGATION PG4706 DATED OCT. 2018)
117.0 116.2	GEODETIC ELEVATION (m)
(115.5) [116.6]	BEDROCK ELEVATION (m)
	APPROXIMATE EXTENT OF PEAT BELOW FILL LAYER (PREVIOUS PATTERSON GROUP INVESTIGATION PG4917-1 DATED MAY 2019)
	ADDITIONAL EXTENT OF PEAT BELOW FILL LAYER

0 15m 30m 60m

HORIZONTAL 1:1500

NOTES :

1. THE BOUNDARIES, ROCK TYPES AND SOIL TYPES HAVE BEEN ESTABLISHED ONLY AT BOREHOLE LOCATIONS. BETWEEN BOREHOLES THEY ARE ASSUMED AND MAY BE SUBJECT TO CONSIDERABLE ERROR.
2. ROCK CORES AND SOIL SAMPLES WILL BE RETAINED IN STORAGE FOR THREE MONTHS AND THEN DESTROYED UNLESS THE CLIENT ADVISES THAT AN EXTENDED TIME PERIOD IS REQUIRED.
3. ASPHALT AND TOPSOIL QUANTITIES SHOULD NOT BE ESTABLISHED FROM THE INFORMATION PROVIDED AT THE BOREHOLE LOCATIONS.
4. TESTHOLE ELEVATIONS SHOULD NOT BE USED TO DESIGN BUILDING(S) OR FLOOR SLABS OR PARKING LOT(S) GRADES.
5. THIS DRAWING FORMS PART OF THE REPORT PROJECT NUMBER AS REFERENCED AND SHOULD BE USED ONLY IN CONJUNCTION WITH THIS REPORT.
6. BASE PLAN OBTAINED FROM SURVEY PLAN BY FAIRHALL, MOFFATT & WOODLAND LTD., JOB NO. Z38800, REFERENCE NO. 415(A) - 12 GOULBOURN, DATED JANUARY 14, 2020.
7. TESTHOLES LOCATION BY OTHERS ARE APPROXIMATE - REFER TO ORIGINAL SITE PLAN FOR ACCURATE POSITION

EXP Services Inc.
t: +1.613.688.1899 | f: +1.613.225.7337
2650 Queensview Drive, Suite 100
Ottawa, ON K2B 8H6
Canada
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DATE: JUNE 2020	CLIENT: 11654128 CANADA INC		project no. OTT-00258780-B0
DESIGN: I.T.	CHECKED: I.T.	TITLE: TESTHOLE LOCATION PLAN PROPOSED RESIDENTIAL DEVELOPMENT 6171 HAZELDEAN ROAD, OTTAWA, ON	scale 1:1,500
DRAWN BY: S.K.			FIG 2

Filename: e:\ott\ott-00258780-b0\60 execution\65 drawings\test hole plan.dwg
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Notes On Sample Descriptions

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Societv for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by **exp** Services Inc. also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

0.002 0.006 0.02 0.06 0.2 0.6 2.0 6.0 20 60 200

EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Figures

Log of Borehole BH-01

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 3

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation m	Depth
		FILL Sandy silt, trace gravel, trace clay, contains organics and rootlets, dark brown, moist (compact)	117.1	0
		LIMESTONE BEDROCK Limestone with minor shaley laminations and turbidites, grey to dark grey, lightly weathered, moderate to closely spaced fractures, (poor to good quality)	116.4	
			115.08	2
			112.9	4
		Borehole Terminated at 4.2 m Depth		

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: SS1
Natural Unit Wt. kN/m³

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	
'May 14, 2020	1.2	
July 2, 2020	2.0	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	0.71 - 1.17	100	61
2	1.17 - 2.67	100	34
3	2.67 - 4.22	98	72

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Borehole BH-02

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 4

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation 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
		TOPSOIL ~150 mm thick	119.1	0				
		FILL Silty gravelly sand, trace clay, contains rootlets and organics, brown, moist, no odor	119.0		35	×	SS1	
				1	20	×	SS2	
		PEAT Organic, contains numerous bark pieces and roots, dark brown, very moist, no odor	117.7		4	× 100	SS3	11.1
		MARL Grey, very moist, no odor	116.8	2	1/HW		SS4	
				3	5	×	SS5	
		GLACIAL TILL Gravelly sand, trace silt, trace clay, grey, moist, no odor (very dense)	115.5 115.3		50/25 mm	× ×	Run 1	
		LIMESTONE BEDROCK Limestone with minor shaley laminations and turbidites, grey to dark grey, lightly weathered, moderate to closely spaced fractures, (fair to good quality)		4				
				5			Run 2	
				6			Run 3	
				7				
		Borehole Terminated at 7.2 m Depth	111.9					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3.79 - 4.17	100	47
2	4.17 - 5.74	97	39
3	5.74 - 7.24	100	61

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Borehole BH-03

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 5

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation 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
		GRANULAR FILL ~50 mm thick	120.4	0				
		FILL Sandy silt to sandy gravelltrace clay, some rootlets, organics and asphalt pieces, boulders and cobbles, brown, moist, no odor (compact) Frozen to 0.6 m depth	120.4	0	24	×	SS1	
				1	26	×	SS2	
				1	89/280 mm	×	SS3	
		BOULDERS AND COBBLES FILL some silty sand filling between boulders and cobbles.	118.4 118.29	2				
				3			Run 1	
		LIMESTONE BEDROCK Limestone with minor shaley laminations and turbidites, grey to dark grey, lightly weathered, moderate to closely spaced fractures, (very poor to fair quality)	117.0	4			Run 2	
				5			Run 3	
			114.3	6				
		Borehole Terminated at 6.2 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

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	
'May 14, 2020	1.6	
July 2, 2020	2.1	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.03 - 3.2	48	26
2	3.2 - 3.45	100	0
3	3.45 - 4.62	61	30
4	4.62 - 6.15	85	48

Log of Borehole BH-04

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 6

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation 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
		FILL Silty gravelly sand to silty sand, trace clay, rootlets and organics, cobbles and boulders, asphalt fill between 0.4 to 0.7 m depth, brown, moist, no odor Frozen to 0.4 m depth	117.8	0	60		SS1	
		ORGANIC SANDY SILT Some peat inclusions, green-grey, very moist, no odor	117.1	1	9		SS2	20.5
		FILL Silty sand, grey, wet, no odor	116.4		50 for 130 mm		SS3	
		Refusal to Augers at 1.8 m Depth	116.0					

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. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Borehole BH-05

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 7

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation 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
		FILL Gravelly silty sand to sandy silt, cobbles and bolders, grey to brown, moist, no odor Frozen to 0.7 m depth	116.5	0	50 for 130 mm		SS1	
				1	26		SS2	
				2	60 for 280 mm		SS3	
		PEAT TO ORGANIC SANDY SILT Numerous bark pieces and rootlets, dark brown to green grey, very moist, no odor	114.2		2		SS4	
		SILTY SAND Some sandy gravel seams or pcokets grey to wet, no odor, (compact)	113.75 / 113.5	3	15		SS5	
				4	24		SS6	
				5	22		SS7	
		GLACIAL TILL Silty sand, grace gravel, grey, cobbles, occasional boulders, very moist to wet, no dor, (dense to very dense)	111.2	6	41		SS8	
			110.3		50 for 80 mm		SS9	
		Refusal to Augers at 6.2 m Depth						

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 32 mm diameter monitoring well installed as shown.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	
'May 14, 2020	2.4	
July 2, 2020	2.8	

CORE DRILLING RECORD

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

Log of Borehole BH-06

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 8

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation 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
		TOPSOIL ~200 mm, frozen	120.5	0				
		FILL	120.3					
		Sandy silt, trace grave and clay, rootlets and organics, brown, moist, no odor (comapct)			25		SS1	
		Frozen to 0.4 m depth	119.8					
		TILL		1	66		SS2	
		Gravelly silty sand, trace clay, numerous cobbles and boulders, brown, moist, no odor (very dense)			97		SS3	
				2	69		SS4	21.0
				3	60		SS5	
		Refusal to Augers at 3.60 m Depth	116.9					

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. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Test Pit TP-03

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 9

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		FILL Gravelly sand to silty sand, some cobbles and boulders, clayey silt inclusions, brown, moist, no odor	116.2	0	20 40 60 80 50 100 150 200	250 500 750 20 40 60		
		Refusal to Excavator Bucket at 0.6 m Depth on Inferred Bedrock	115.6					

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-04

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 10

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊢○
Dynamic Cone Test	———	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		FILL Gravelly sand to silty sand, cobbles and boulders, some clayey silt inclusions, brown, moist	117.2	0	20 40 60 80 / 50 100 150 200	250 500 750 / 20 40 60		
			116.7					
		Refusal to Excavator Bucket at 0.5 m Depth on Inferred Bedrock						

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-05

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 11

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		TOPSOIL ~100 mm thick	117.6	0	20 40 60 80 / 50 100 150 200	250 500 750 / 20 40 60		
		FILL Silty sand, some gravel, brown, moist, no odor	117.5					
		Refusal to Excavator Bucket at 0.3 m Depth on Inferred Bedrock	117.3					

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-06

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 12

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊢○
Dynamic Cone Test	———	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
		FILL Gravelly sand to silty sand, cobbles and boulders, rootlets and organics, brown, moist, no odor	118.1	0
		PEAT Numerous bark pieces and rootlers, dark brown, very moist, no odor	117.3	1
▼		**MARL** Green-grey, minor oxidization staining, very moist, no odor	116.7	
		Refusal to Excavator Bucket at 1.9 m Depth on Inferred Bedrock	116.4 116.2	

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

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	1.7	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-07

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 13

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
		FILL Gravelly sand to sandy silt, some clay, cobbles and boulders, brown, moist	117.6	0
		FILL Silty sand, some gravel, cobbles, boulders and wood pieces, brown, moist	117.0	1
		PEAT Organic, numerous bark pieces and rootlers, dark brown, very moist, no odor	116.3	
		GLACIAL TILL Gravelly silty sand, numerous cobbles and boulders, grey, wet	116.1	2
		Refusal to Excavator Bucket at 2.3 m Depth on Inferred Bedrock	115.3	

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

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-08

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 14

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation 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
		FILL Gravelly sand to silty sand, cobbles, boulderrs and wood pieces, brown, moist	118.8	0	Shear Strength 50 100 150 200 kPa	250 500 750 / 20 40 60		
		PEAT Organic, numerous bark pieces and rootlets, dark brown, very moist, no odor	117.6	1			100 GS1	
		MARL Green-grey to grey, oxidized stains, very moist to wet, no odor	117.1				GS2	
		GLACIAL TILL Gravelly sand, some silt, numerous cobbles and boulders, grey, wet	116.8	2				
		Refusal to Excavator Bucket at 2.5 m Depth on Inferred Bedrock	116.3					

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-09

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 15

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation 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
		FILL Gravelly sand, trace silt, brown, moist, no odor	118.8	0	20 40 60 80 / 50 100 150 200 kPa	250 500 750 / 20 40 60		
			118.5					
		FILL Silty sand, some gravel, contains cobbles and boulders, contains wood pieces, brown, moist		1				
			117.6					
		MARL Green grey, moist	117.3					
		PEAT Numerous bark pieces and rootletrs, dark brown, very moist, no odor					100 GS1	
			116.8	2				
		CLAY CRUST Silty clay, trace sand and gravel, light brown, no odor					GS2	
			116.3					
		MARL Green-grey to dark grey, very moist, no odor		3				
			115.7					
		Refusal to Excavator Bucket at 3.1 m Depth on Inferred Bedrock						

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-10

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 16

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		FILL Silty sand, some gravel and frequent wood pieces, brown, moist	118.7	0	20 40 60 80 50 100 150 200 kPa	250 500 750 20 40 60		
		FILL Silty gravelly sand, numerous cobbles and boulders, brown, moist to wet	117.6	1			GS1	
		Refusal to Excavator Bucket at 2.3 m Depth on Inferred Bedrock	116.4	2				

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-11

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 17

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation 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
		TOPSOIL ~ 100 mm	119.2	0	20 40 60 80 / 50 100 150 200 kPa	250 500 750 / 20 40 60		
		FILL Silty gravelly sand, contains numerous cobbles and boulders, large concrete slabs throughout, brown, moist to wet	119.1					
▼			118.3	1		×	GS1	
		Refusal to Excavator Bucket at 1.4 m Depth on Inferred Bedrock	117.8					

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	0.9	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-12

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 18

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation m	Depth
		TOPSOIL ~150 mm	119.6	0
		FILL Silty sand, some gravel, cobbles, boulders and wood pieces, brown, moist	119.5	
▼			118.4	1
		PEAT Organic, numerous bark pieces and rootlets, dark brown, very moist, no odor	117.6 117.3	2
		Refusal to Excavator Bucket at 2.3 m Depth on Inferred Bedrock		

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
100	GS1

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	1.2	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-13

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 19

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊢○
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
		TOPSOIL ~ 220 mm	119.4	0
		FILL Silty gravelly sand, numerous cobbles and boulders, large concrete slabs throughout, brown, moist to wet, no odor	119.2	
▼			116.8	1
		Refusal to Excavator Bucket at 2.9 m Depth on Inferred Bedrock	116.5	2

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

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	2.6	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-14

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 20

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊖
Dynamic Cone Test	—	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		FILL Granular fill over silty sand and gravel, wood pieces, brown, moist, no odor	120.1	0	20 40 60 80 50 100 150 200 kPa	250 500 750 20 40 60		
		BOULDERS AND COBBLES FILL Some silty sand inclusions - possible till in lower levels	119.4	1				
			117.8	2				
		Refusal to Excavator Bucket at 2.3 m Depth on Inferred Bedrock						

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-15

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 21

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation m	Depth
		FILL Granular fill (150mm) OVER silty sand with gravel, rootlets and asphalt pieces, cobbles and blulders below 0.8 m depth, brown, moist, no odor	120.2	0
			118.8	1
		PEAT Organic, numerous bark pieces and roots, dark brown, very moist, no odor	118.5	
		GLACIAL TILL Gravelly sand, trace silt and gravel, oxidized stains, numerous cobbles and boulders, brown, wet	118.0	2
		Refusal to Excavator Bucket at 2.2 m Depth on Inferred Bedrock		

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: GS1 at 1 m

Natural Unit Wt. kN/m³

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-16

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 22

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation m	Depth
		FILL Silty sand, some gravel, wood pieces troughout, brown, moist	119.9	0
		SILTY SAND (POSSIBLE TILL) Silty gravelly sand, numerous cobbles and boulders, brown, moist to wet	118.9	1
		Refusal to Excavator Bucket at 1.8 m Depth on Inferred Bedrock	118.1	

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

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Test Pit TP-17

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 23

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation m	Depth
		FILL 150 mm granular fill OVER silty sand and gravel, rootlers, brown, moist, no odor	120.5	0
		BOULDERS AND COBBLES FILL Gravelly silty sand inclusions , some wood pieces, moist	120.0	
		SILTY GRAVELLY SAND (POSSIBLE TILL) numerous cobbles and boulders, brown, wet	118.9	1
▼			117.4	3
		Refusal to Excavator Bucket at 4.2m Depth on Inferred Bedrock	116.3	4

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

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	3.1	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Test Pit TP-18

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 24

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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 Elevation m	Depth
		FILL Granular fill OVER Silty sand with some gravel, brown, moist, no odor	120.8	0
		BOULDERS AND COBBLES FILL Gravelly silty sand inclusions, brown, moist	120.3	1
		SILTY GRAVELLY SAND (POSSIBLE TILL) Numerous boulders and cobbles, brown, moist	118.8	2
			117.1	3
		Refusal to Excavator Bucket at 3.7 m Depth on Inferred Bedrock		

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

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
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-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

EXP Services Inc.
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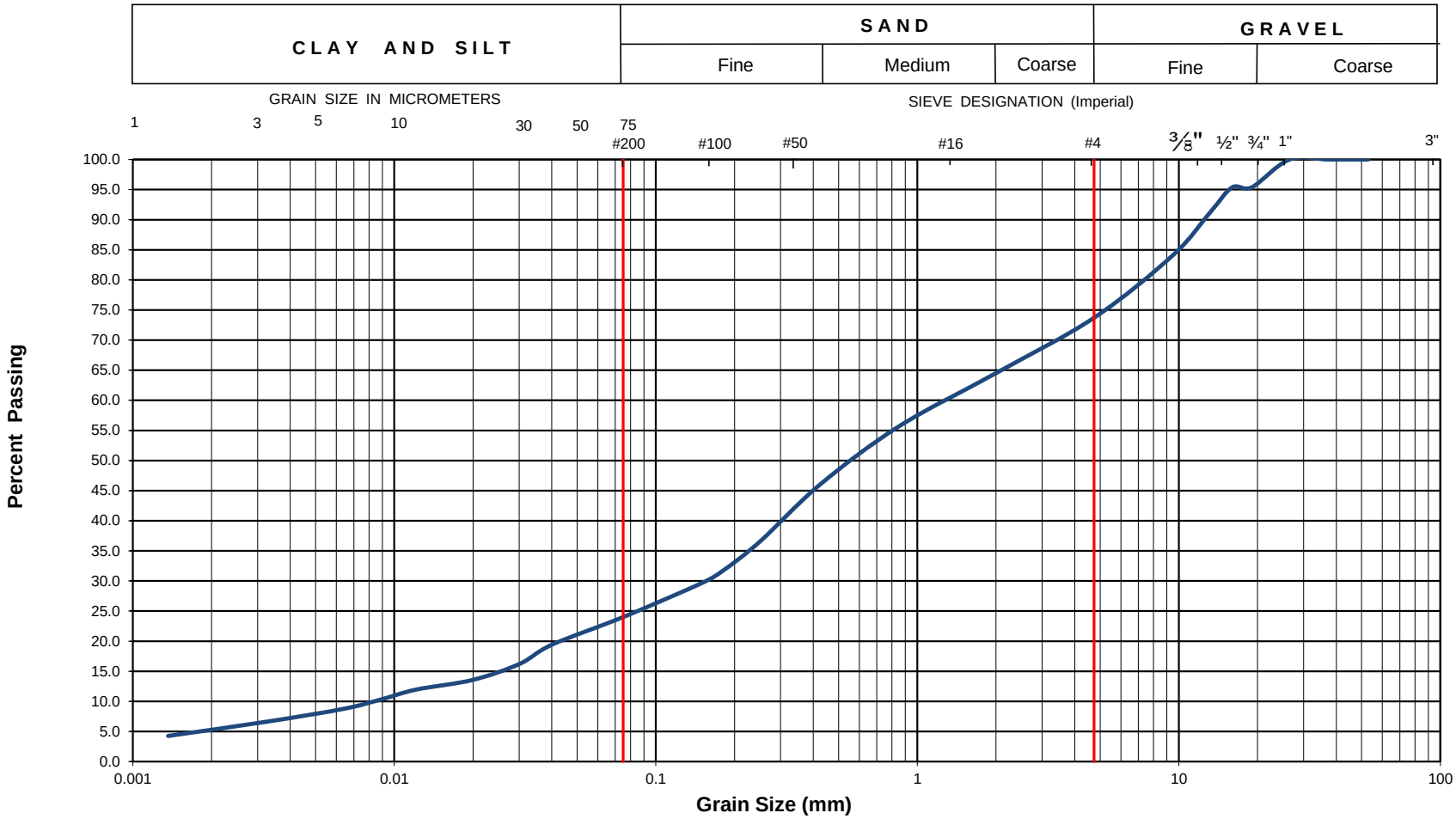
Ottawa, ON K2B 8H6

Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422

Unified Soil Classification Svstem



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**11654128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 20, 2020**	**Borehole No:**	**BH2**	**Sample No.:**	**SS2**	**Depth (m) :**	**0.8-1.4**		
Sample Description :		**% Silt and Clay**	**24**	**% Sand**	**50**	**% Gravel**	**26**	**Figure :**	**25**
Sample Description :		**Silty Gravelly Sand (SM)**							

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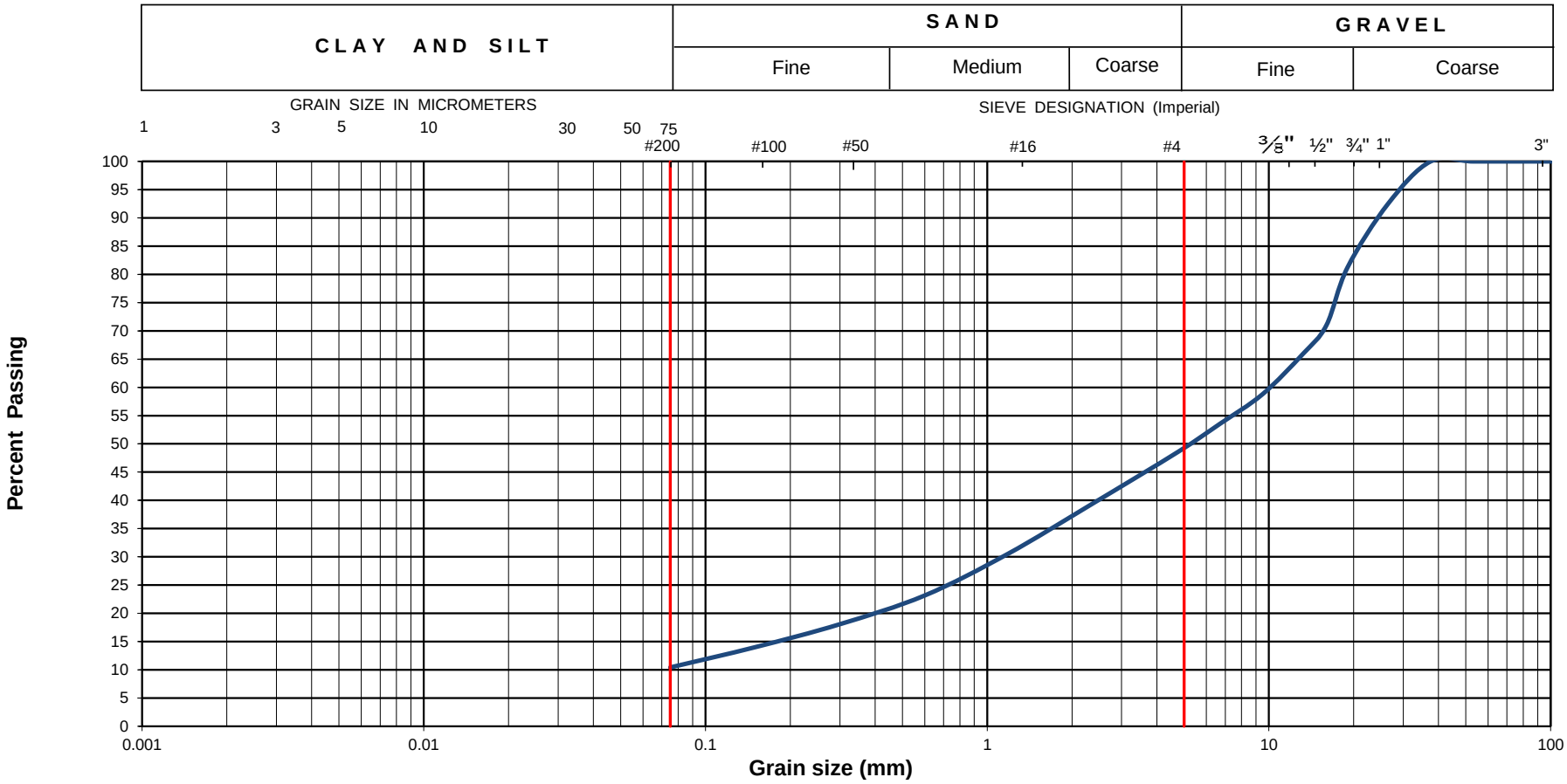
Grain-Size Distribution Curve
Method of Test For Sieve Analysis of Aggregate
ASTM C-136

Unified Soil Classification System



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**11654128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 24, 2020**	**Borehole No:**	**BH3**	**Sample:**	**SS2**	**Depth (m) :**	**0.8-1.4**		
Sample Composition :		**Gravel (%)**	**51**	**Sand (%)**	**39**	**Silt & Clay (%)**	**10**	**Figure :**	**26**
Sample Description :	**Well Graded Sandy Gravel (GW)**								

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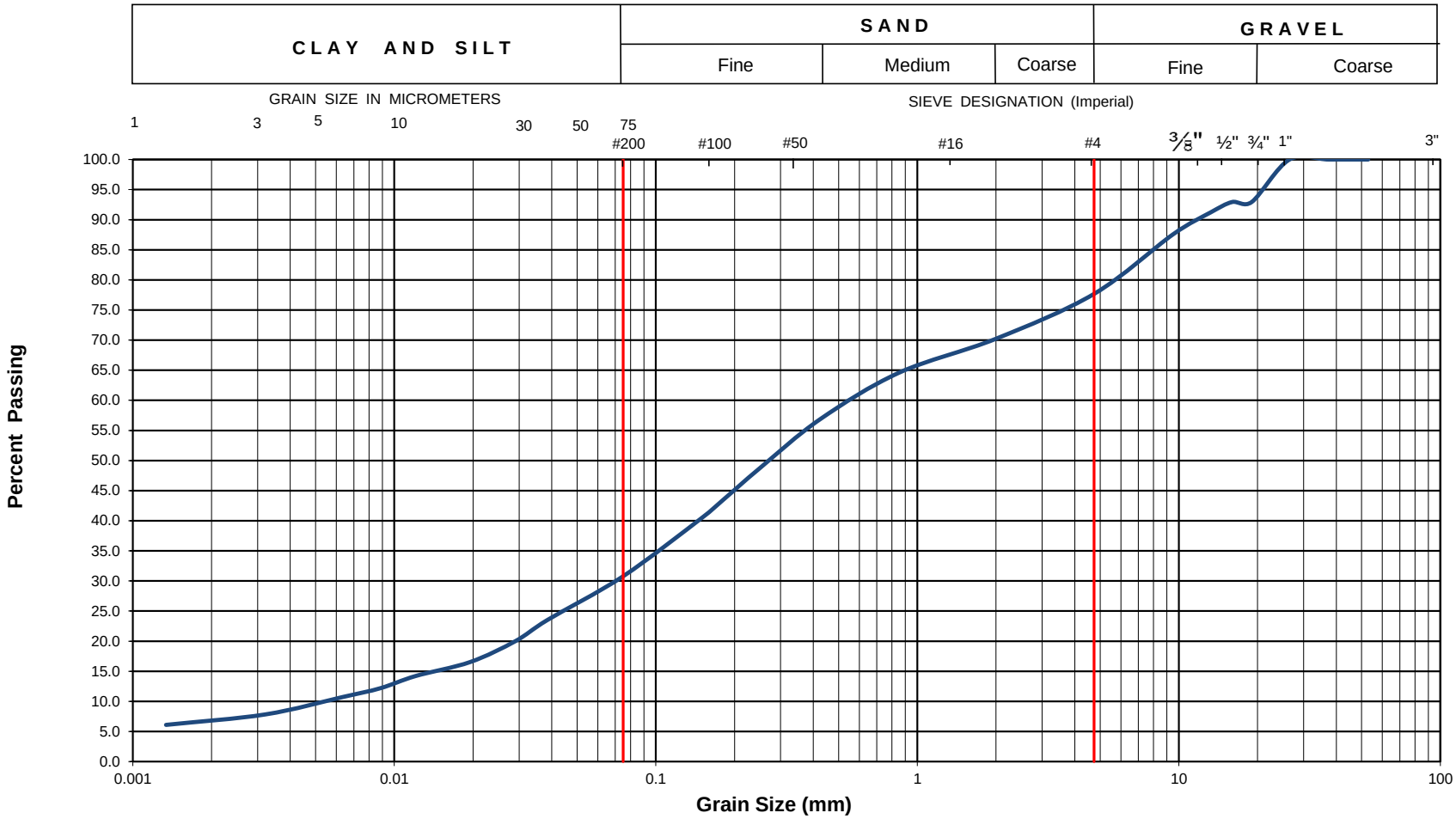
Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422

Unified Soil Classification System



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**11654128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 24, 2020**	**Borehole No:**	**BH4**	**Sample No.:**	**SS1**	**Depth (m) :**	**0-0.6**		
Sample Description :		**% Silt and Clay**	**31**	**% Sand**	**47**	**% Gravel**	**22**	**Figure :**	**27**
Sample Description :		**Silty Gravelly Sand (SM)**							

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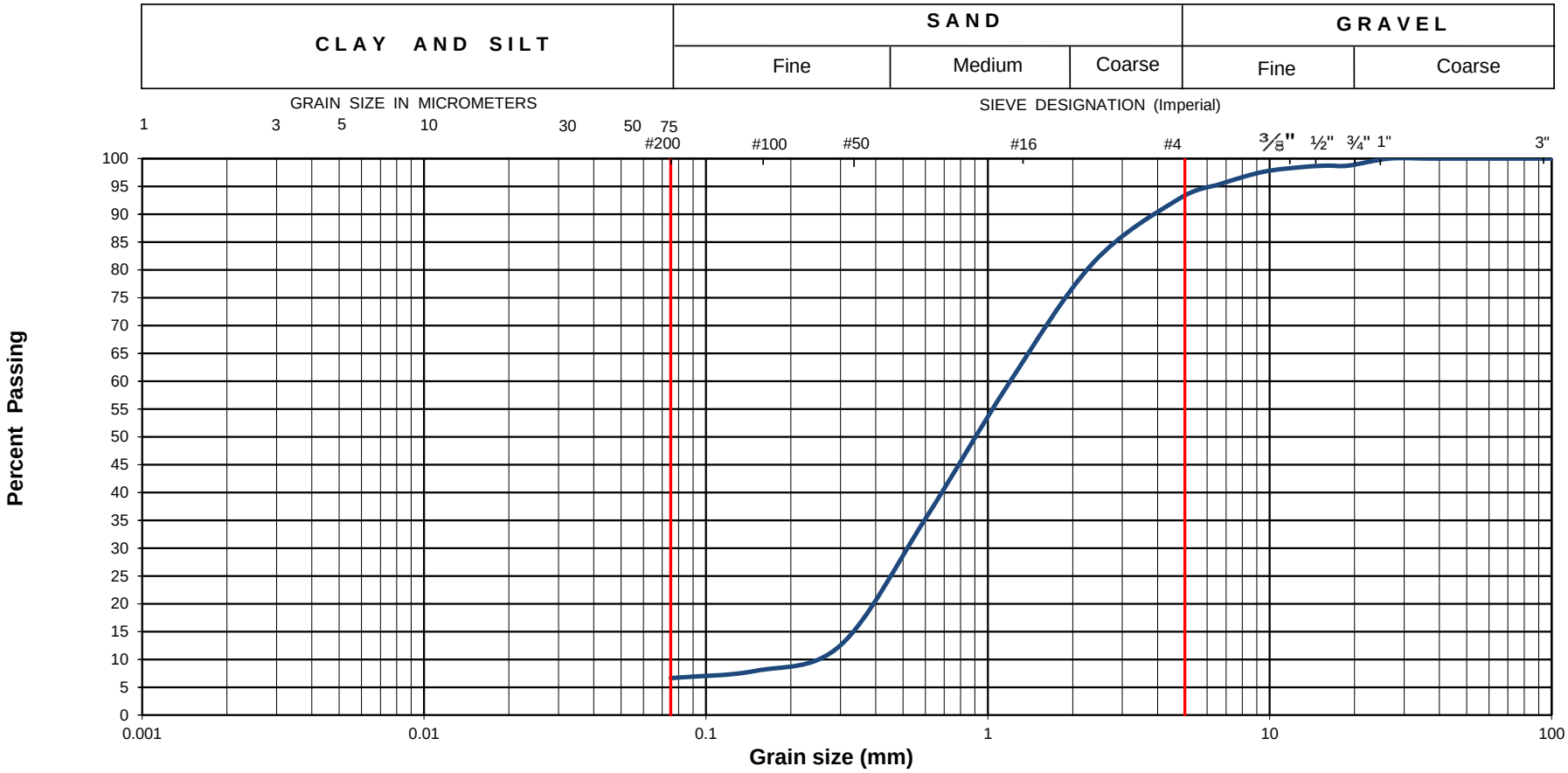
Grain-Size Distribution Curve
Method of Test For Sieve Analysis of Aggregate
ASTM C-136

Unified Soil Classification System



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**11654128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 17, 2020**	**Borehole No:**	**TP14**	**Sample:**	**AS1**	**Depth (m) :**	**0 - 0.6**		
Sample Composition :		**Gravel (%)**	**7**	**Sand (%)**	**86**	**Silt & Clay (%)**	**7**	**Figure :**	**28**
Sample Description :	**Well Graded Sand (SW)**								

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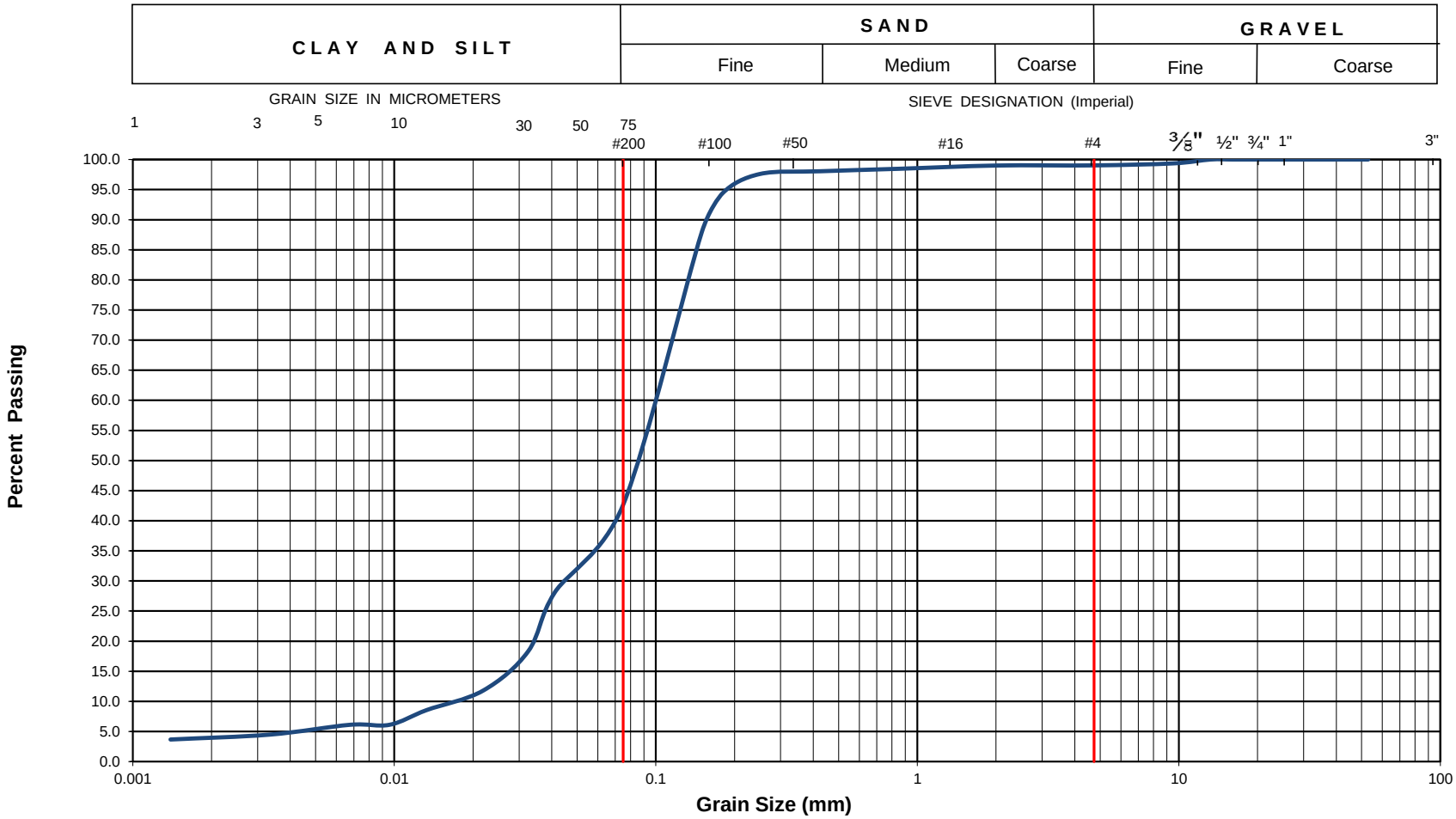
Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422

Unified Soil Classification System



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**11654128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 24, 2020**	**Borehole No:**	**BH5**	**Sample No.:**	**SS6**	**Depth (m) :**	**3.8-4.4**		
Sample Description :		**% Silt and Clay**	**43**	**% Sand**	**56**	**% Gravel**	**1**	**Figure :**	**29**
Sample Description :		**Silty Sand (SM)**							

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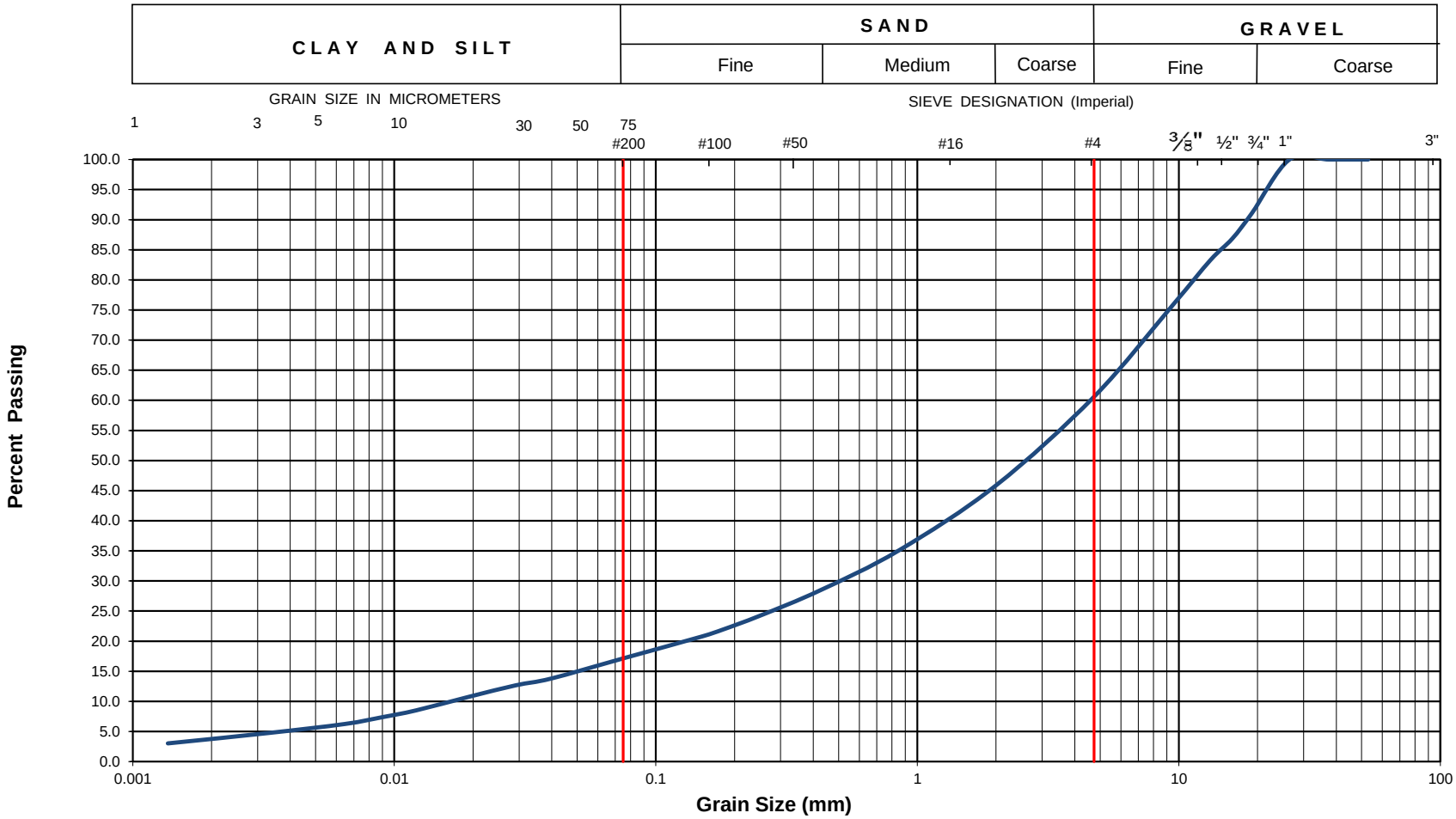
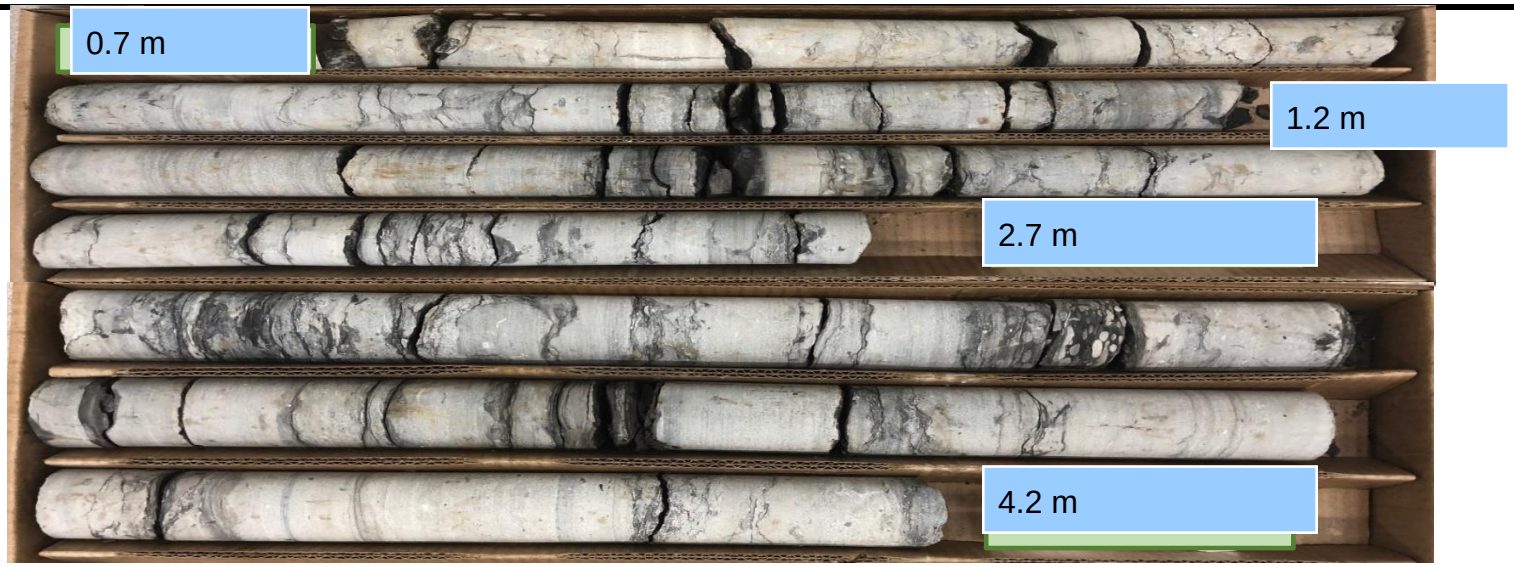
Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422

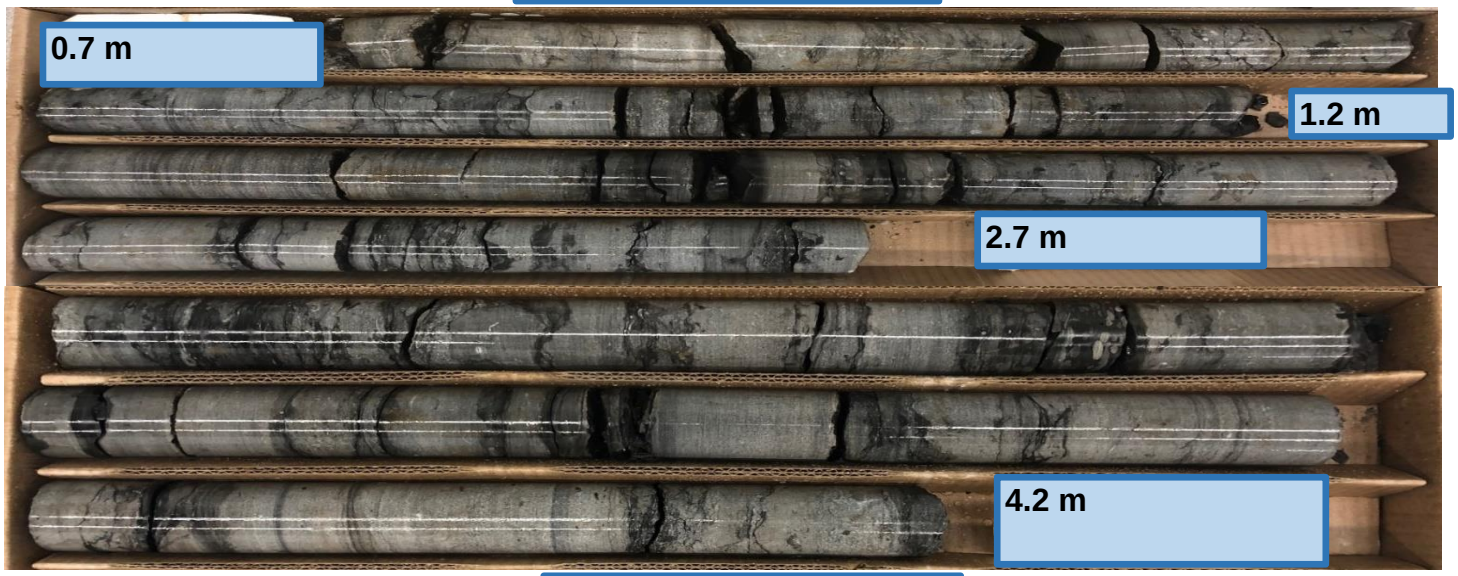
Unified Soil Classification System



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**1165128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 24, 2020**	**Borehole No:**	**BH6**	**Sample No.:**	**SS5**	**Depth (m) :**	**3.0-3.6**		
Sample Description :		**% Silt and Clay**	**17**	**% Sand**	**44**	**% Gravel**	**39**	**Figure :**	**30**
Sample Description :		**Silty Sand & Gravel (SM)**							

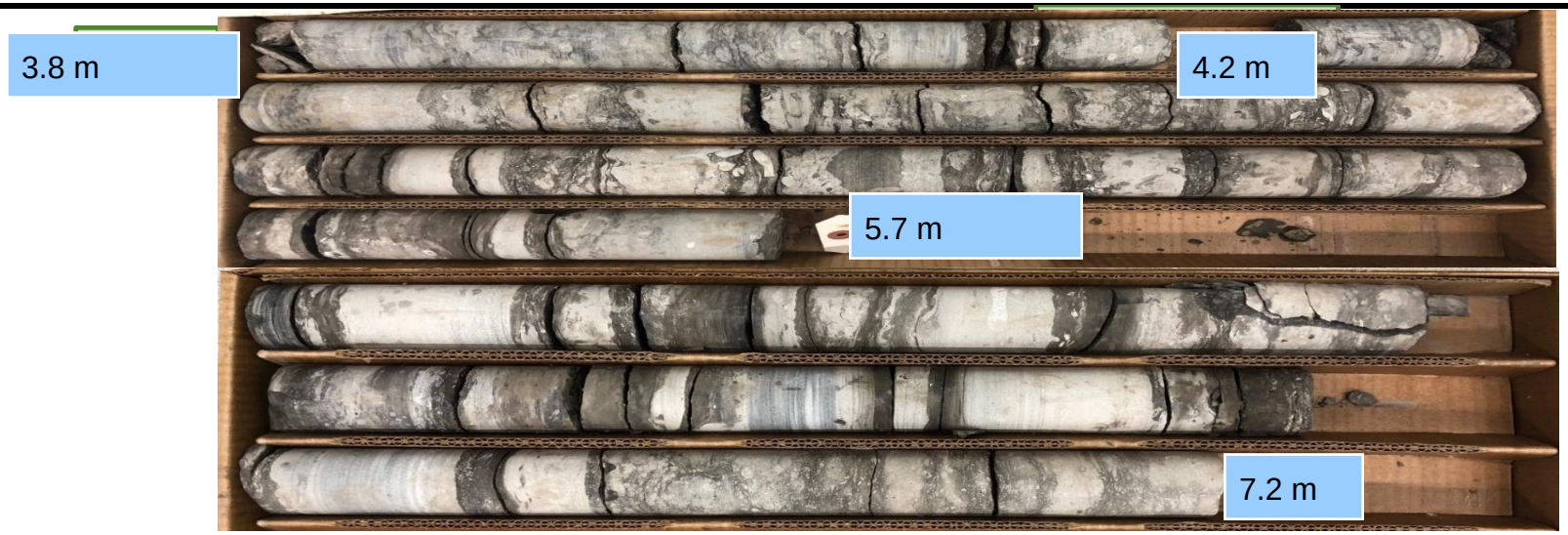


DRY BEDROCK CORES

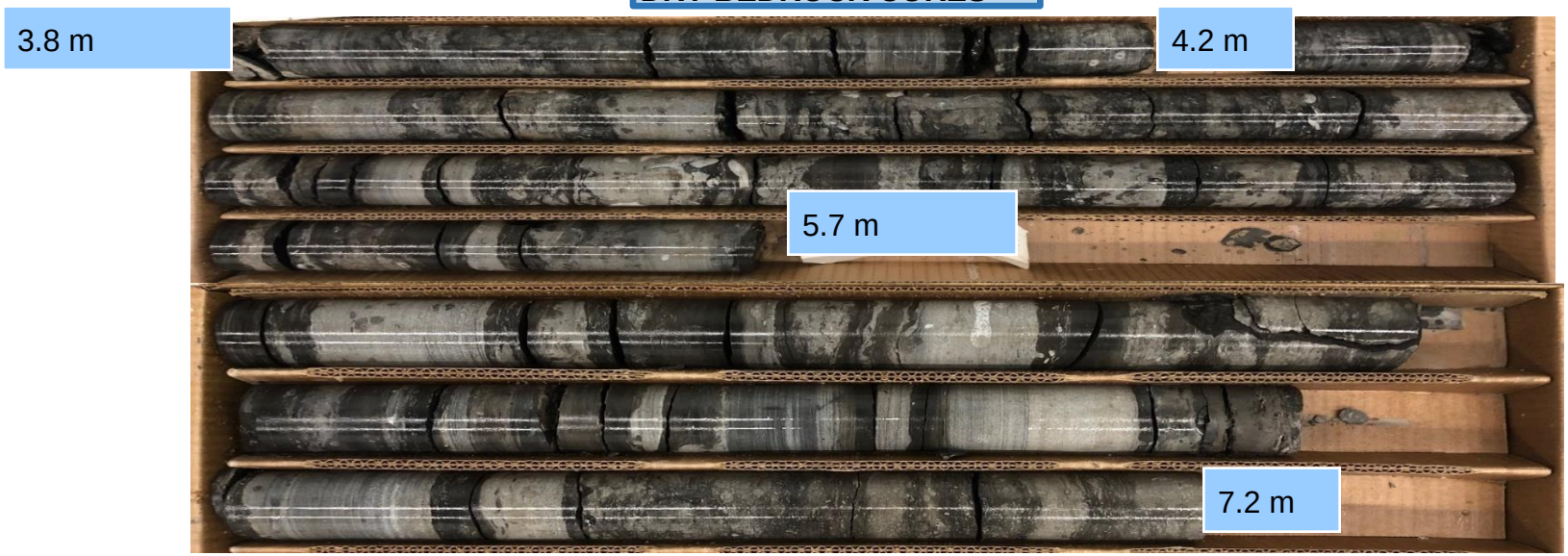


WET BEDROCK CORES

Borehole No. **BH-1**	**Core Runs** Run 1 : 0.7 - 1.2 m Run 2 : 1.2 - 2.7 m Run 3> 2.7 - 4.2 m	Project Name: **Propsoed Residential Development. 6171 Hazeldean Road, Ottawa, ON**	Project No: **OTT-000258780-B0**
		ROCK CORE PHOTOGRAPHS	Figure No: **Fig 31**

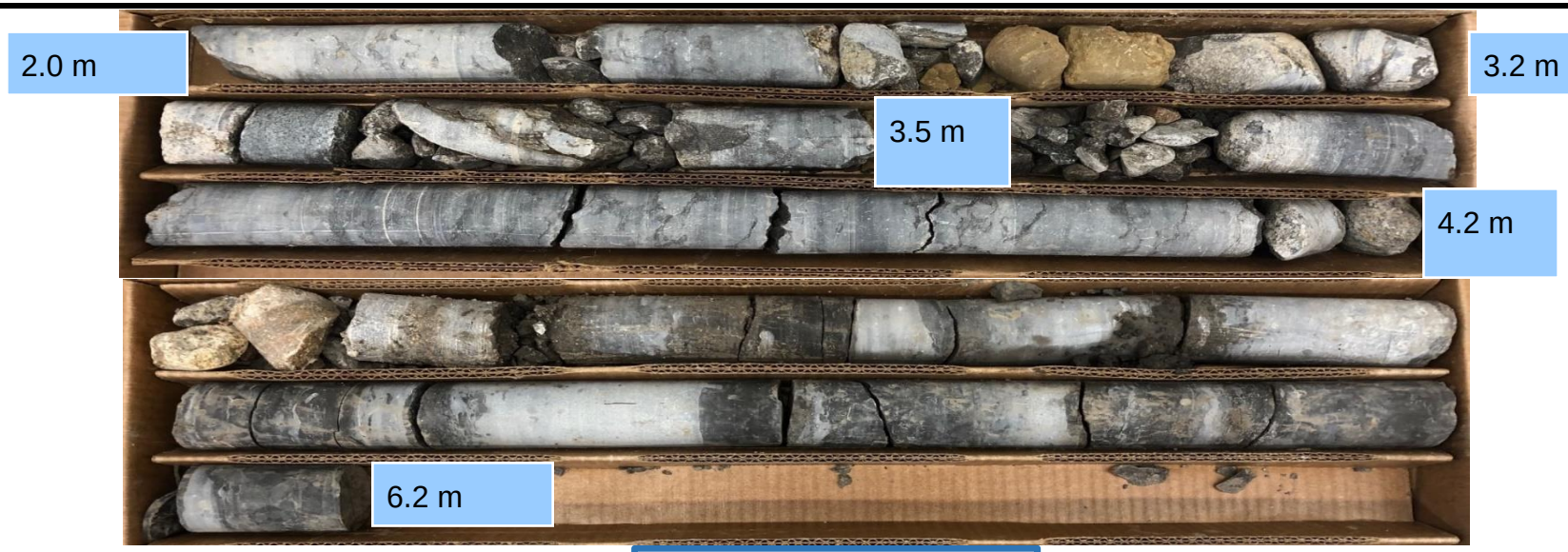


DRY BEDROCK CORES

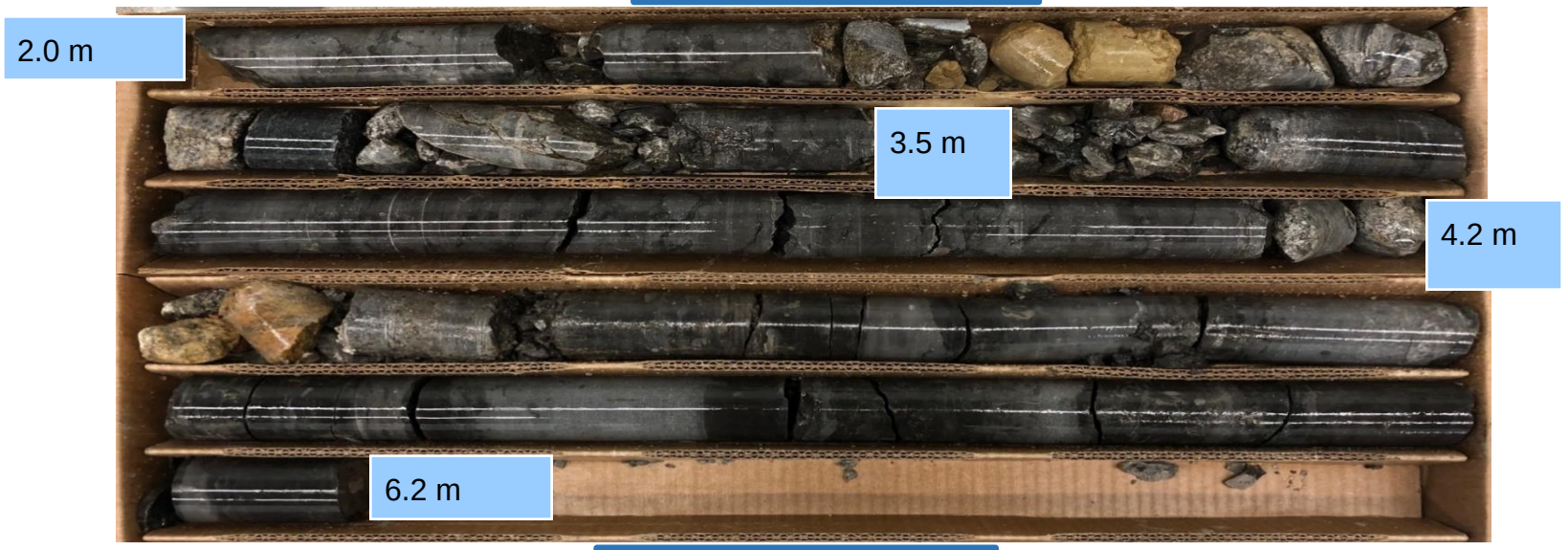


WET BEDROCK CORES

Borehole No. **BH-2**	**Core Runs** Run 1 : 3.8 - 4.2 m Run 2 : 4.2 - 5.7 m Run 3: 5.7 - 7.2 m	Project Name: **Propsoed Residential Development. 6171 Hazeldean Road, Ottawa, ON**	Project No: **OTT-000258780-B0**
		ROCK CORE PHOTOGRAPHS	Figure No: **Fig 32**



DRY BEDROCK CORES



WET BEDROCK CORES

Borehole No. **BH-3**	**Core Runs** Run 1 : 2.0 - 3.2 m Run 2 : 3.2 - 3.5 m Run 3: 3.5 - 4.6 m Run 4: 4.6 - 6.2 m	Project Name: **Propsoed Residential Development. 6171 Hazeldean Road, Ottawa, ON**	Project No: **OTT-000258780-B0**
		ROCK CORE PHOTOGRAPHS	Figure No: **Fig 33**

Appendix A: Test holes by Others

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

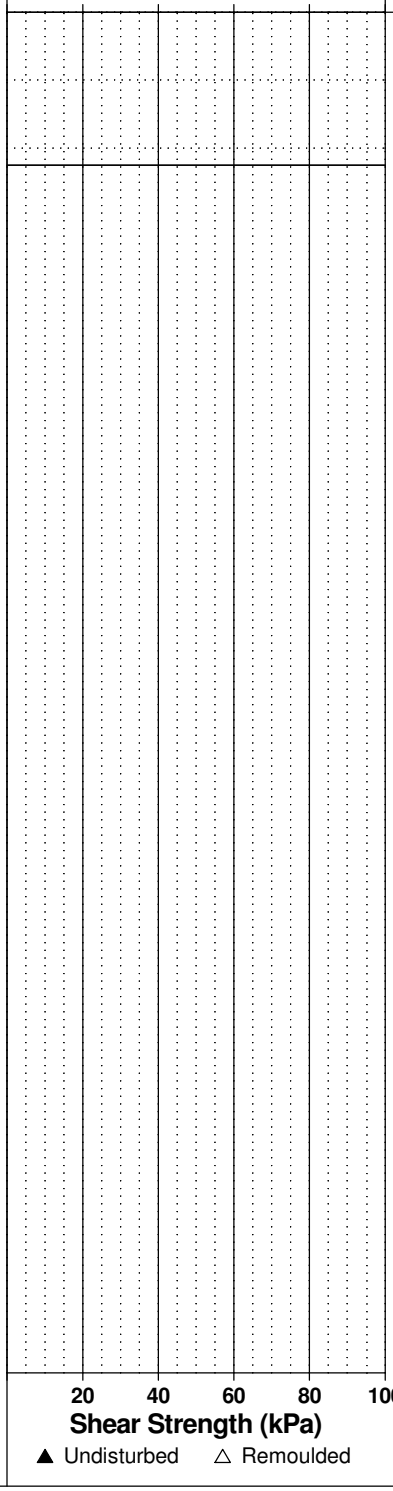
FILE NO. PG4917

REMARKS

HOLE NO. TP 7-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone / ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	118.03		
FILL: Brown silty sand, some gravel, cobbles and boulders, trace clay		G	1						
0.45									
End of Test Pit Practical refusal to excavation on inferred bedrock surface @ 0.45m depth (TP dry upon completion)									



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP 8-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone / ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	116.07		
FILL: Brown silty sand, trace clay, gravel, cobbles and boulders		G	1			1	115.07		
		G	2			2	114.07		▽
2.20									
End of Test Pit Practical refusal to excavation at 2.20m depth (Groundwater infiltration at 2.0m depth)									

Pen. Resist. Blows/0.3m: ○ Water Content % — 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP 9-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	117.13		
BEDROCK: Weathered limestone 0.10		G	1						
End of Test Pit									
(TP dry upon completion)									

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

20 40 60 80

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP10-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	116.63		
FILL: Brown silty sand, some gravel, cobbles and boulders, trace clay and organics		G	1			1	115.63		
		G	2			2	114.63		
3.00						3	113.63		
End of Test Pit									
(TP dry upon completion)									

20 40 60 80

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP11-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	118.29		
FILL: Brown silty sand, some and gravel, occasional cobbles and boulders		G	1			1	117.29		▽
		G	2			2	116.29		
2.10									
End of Test Pit Practical refusal to excavation at 2.10m depth (Groundwater infiltration at 1.8m depth)									

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

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP12-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	116.20		
FILL: Brown silty sand, trace gravel		G	1						
						1	115.20		
TOPSOIL 1.10		G	2						
GLACIAL TILL: Compact, brown silty sand, some gravel and cobbles, trace clay 1.30		G	3			2	114.20		
End of Test Pit 2.10									

Practical refusal to excavation on inferred bedrock surface at 2.10m depth

(TP dry upon completion)

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

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP13-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	117.84		
FILL: Brown silty sand, some gravel, trace organics, cobbles and boulders		G	1						
						1	116.84		
1.20									
PEAT		G	2						▽
1.40									
GLACIAL TILL: Compact, brown silty sand, some gravel, trace clay		G	3						
2.00						2	115.84		
End of Test Pit									
Practical refusal to excavation on inferred bedrock surface at 2.00m depth									
(Groundwater infiltration at 1.4m depth)									

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

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP14-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	119.27		
FILL: Brown silty sand, some gravel, trace cobbles, boulders and organics		G	1			1	118.27		
		G	2			2	117.27		
2.20									
End of Test Pit Practical refusal to excavation at 2.20m depth (TP dry upon completion)									

Pen. Resist. Blows/0.3m: ○ Water Content % — 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP15-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	119.09		
FILL: Brown silty sand, some gravel, cobbles and boulders, trace asphalt and wood		G	1			1	118.09		▽
1.70									
End of Test Pit Practical refusal to excavation at 1.70m depth (Groundwater infiltration at 1.6m depth)									

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

Shear Strength (kPa): 20 40 60 80 100; ▲ Undisturbed △ Remoulded

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP16-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	118.52		
FILL: Brown silty sand, some gravel, trace cobbles, boulders, concrete and organics		G	1						▽
						1	117.52		
End of Test Pit Practical refusal to excavation at 1.10m depth (Groundwater infiltration at 1.0m depth)						1.10			

Pen. Resist. Blows/0.3m: ○ Water Content % — 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP17-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	118.40		
FILL: Crushed stone, some silty sand		G	1						
0.20									
FILL: Brown silty sand, some gravel, trace clay		G	2			1	117.40		
1.50									
End of Test Pit Practical refusal to excavation at 1.50m depth (TP dry upon completion)									

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

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP18-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	117.78		
FILL: Brown silty sand, some gravel and cobbles		G	1						
						1	116.78		
1.40									
PEAT		G	2						
1.60									
MARL		G	3						
1.90									
Stiff, grey **CLAYEY SILT**		G	4			2	115.78	▲	
2.05									
GLACIAL TILL: Compact, grey silty sand, some gravel and cobbles		G	5						
						3	114.78		
3.00									
End of Test plt									
(TP dry upon completion)									

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP19-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	118.20		
FILL: Brown silty sand, some gravel, cobbles and boulders		G	1						▽
		G	2			1	117.20		
1.30									
PEAT									
1.70									
MARL		G	3			2	116.20		
2.00									
GLACIAL TILL: Compact, grey silty sand, some gravel, trace clay		G	4						
3.00						3	115.20		
End of Test Pit									
(Groundwater infiltration at 0.5m depth)									

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

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM TBM - Top spinde of fire hydrant located on the south side of Neil Avenue, near 1 Neil Avenue. Geodetic elevation = 114.69m.

FILE NO. PG4917

REMARKS

HOLE NO. TP20-19

BORINGS BY Backhoe **DATE** 2019 April 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	118.16		
FILL: Brown silty sand, some gravel and cobbles		G	1						
						1	117.16		
1.50									
PEAT		G	2						
1.80									
MARL									
2.00						2	116.16		
GLACIAL TILL: Compact, grey silty sand, trace clay and gravel		G	3						
3.00						3	115.16		
End of Test Pit									
(TP dry upon completion)									

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

Shear Strength (kPa)
20 40 60 80 100
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG4706

REMARKS

HOLE NO. BH 1-18

BORINGS BY CME 55 Power Auger **DATE** October 11, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	120.27
FILL: Topsoil with organics, trace gravel and cobbles 0.10		SS	1	29	20		
FILL: Brown silty sand with gravel, some cobbles, trace clay		SS	2	38	17	1	119.27
1.50							
GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles, boulders, some clay		SS	3	47	50+	2	118.27
2.34		SS	4	0	50+		
End of Borehole							
Practical refusal to augering at 2.34m depth							
(BH dry upon completion based on field observations)							

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

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG4706

REMARKS

HOLE NO. BH 2-18

BORINGS BY CME 55 Power Auger **DATE** October 11, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	119.85
TOPSOIL 0.13		AU	1				
GLACIAL TILL: Compact, brown silty sand with gravel, cobbles and boulders, some organics		SS	2	54	20	1	118.85
		SS	3	46	30	2	117.85
2.80		SS	4	40	26		
End of Borehole							
Practical refusal to augering at 2.80m depth							
(BH dry upon completion based on field observations)							

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

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG4706

REMARKS

HOLE NO. BH 3-18

BORINGS BY CME 55 Power Auger **DATE** October 11, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL 0.10						0	118.03		
PEAT 0.20		AU	1						
GLACIAL TILL: Compact to very dense, brown silty sand with gravel, cobbles and boulders		SS	2	75	19	1	117.03		
		SS	3	50	50+				
2.01						2	116.03		
End of Borehole									
Practical refusal to augering at 2.01m depth									
(BH dry upon completion based on field observations)									

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

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG4706

REMARKS

HOLE NO. BH 3A-18

BORINGS BY CME 55 Power Auger **DATE** October 11, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	118.50
FILL: Silty sand with gravel, some organics, wood 0.18		AU	1				
FILL: Brown to black silty sand with gravel 1.00		SS	2	54	17	1	117.50
GLACIAL TILL: Compact to dense, brown silty sand with gravel, cobbles and boulders, trace clay		SS	3	25	48	2	116.50
2.23							
End of Borehole							
Practical refusal to augering at 2.23m depth							
(BH dry upon completion based on field observations)							

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

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG4706

REMARKS

HOLE NO. BH 3B-18

BORINGS BY CME 55 Power Auger **DATE** October 11, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	118.70
FILL: Topsoil with organics, some gravel 0.13		AU	1				
FILL: Brown silty sand, some organics and gravel, trace wood		SS	2	54	11	1	117.70
1.37							
MARL		SS	3	17	W	2	116.70
2.13							
GLACIAL TILL: Brown silty sand with gravel, some cobbles, trace clay and peat		SS	4	21	4	3	115.70
		SS	5	29	28		
3.66							
End of Borehole							
Practical refusal to augering at 3.66m depth							
(GWL @ 2.3m depth based on field observations)							

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

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

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FILE NO. PG4706

REMARKS

HOLE NO. BH 4-18

BORINGS BY CME 55 Power Auger **DATE** October 11, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone / ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	117.02		
FILL: Brown silty sand with blast rock, gravel, boulders and cobbles		AU	1						
0.61									
End of Borehole Practical refusal to augering at 0.61m depth (BH dry upon completion based on field observations)									

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

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

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FILE NO. PG4706

REMARKS

HOLE NO. BH 4A-18

BORINGS BY CME 55 Power Auger **DATE** October 11, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone / ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	117.00		
FILL: Brown silty sand with gravel, cobbles and boulders		AU	1						
		SS	2	46	30	1	116.00		
1.42									
End of Borehole Practical refusal to augering at 1.42m depth (BH dry upon completion based on field observations)									

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

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG4706

REMARKS

HOLE NO. BH 4B-18

BORINGS BY CME 55 Power Auger **DATE** October 11, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone / ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	117.00		
FILL: Brown silty sand with gravel, cobbles and boulders		AU	1						
		SS	2	100	50+				
0.94									
End of Borehole									
Practical refusal to augering at 0.94m depth									
(BH dry upon completion based on field observations)									

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

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
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Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG4706

REMARKS

HOLE NO. TP 1-18

BORINGS BY Hydraulic Shovel **DATE** October 15, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	119.79
FILL: Topsoil, some sand and gravel							
0.30		G	1				
FILL: Brown silty sand with gravel, cobbles, boulders and organics							
- some ash and topsoil by 1.2m depth						1	118.79
- tire encountered at 1.2m depth		G	2				
1.80		G	3				
GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders 1.90							
End of Test Pit							
Practical refusal to excavation on inferred bedrock at 1.90m depth							
(TP dry upon completion)							

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

20 40 60 80

20 40 60 80 100

Shear Strength (kPa)
▲ Undisturbed △ Remoulded

Piezometer Construction

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

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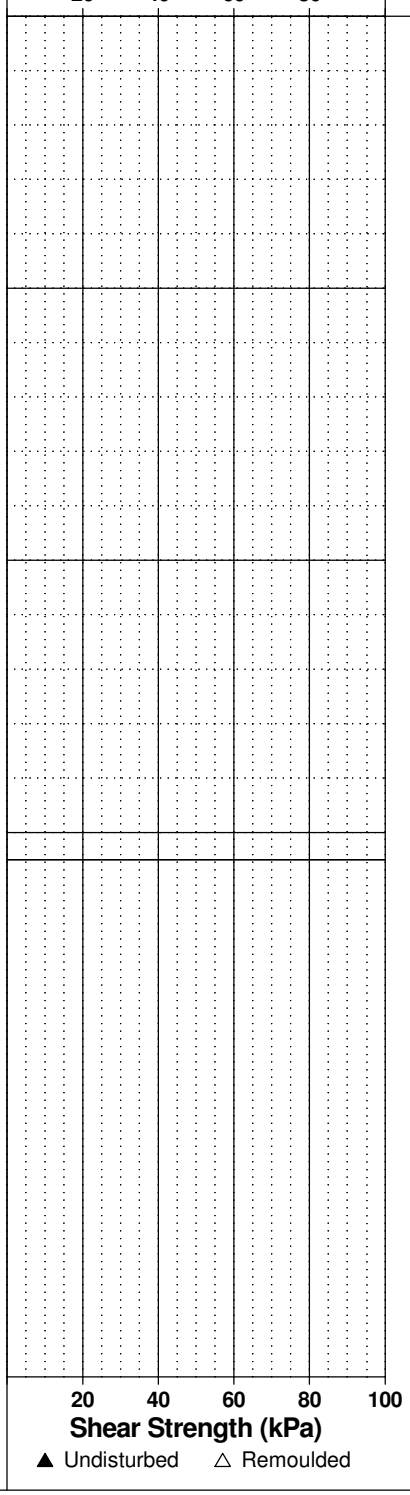
FILE NO. PG4706

REMARKS

HOLE NO. TP 2-18

BORINGS BY Hydraulic Shovel **DATE** October 15, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL 0.20						0	120.36		
GLACIAL TILL: Compact to dense, brown silty sand with gravel, cobbles and boulders		G	1			1	119.36		
						2	118.36		
3.10						3	117.36		
End of Test Pit Practical refusal to excavation on inferred bedrock at 3.10m depth (TP dry upon completion)									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

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FILE NO. PG4706

REMARKS

HOLE NO. TP 3-18

BORINGS BY Hydraulic Shovel **DATE** October 15, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	117.60		
FILL: Brown silty sand with gravel, cobbles, boulders, topsoil and organics		G	1						
		G	2			1	116.60		
1.10									
TOPSOIL, some peat and roots		G	3						
1.30									
GLACIAL TILL: Compact to dense, grey silty sand with gravel, cobbles and boulders		G	4						
1.90									
End of Test Pit									
Practical refusal to excavation on inferred bedrock at 1.90m depth									
(TP dry upon completion)									

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

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

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FILE NO. PG4706

REMARKS

HOLE NO. TP 4-18

BORINGS BY Hydraulic Shovel **DATE** October 15, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	118.91
FILL: Topsoil with gravel and cobbles — 0.20							
FILL: Brown silty sand with gravel, cobbles and boulders, some organics		G	1				
— 1.00						1	117.91
FILL: Grey sandy silt with organics		G	2				
— 1.50							
PEAT		G	3				
— 2.10						2	116.91
MARL		G	4				
— 2.70							
Grey **SANDY SILT/SILTY SAND**		G	5				
— 3.10						3	115.91
GLACIAL TILL: Grey silty sand with gravel, cobbles and boulders — 3.40							
End of Test Pit							
Practical refusal to excavation on inferred bedrock at 3.40m depth							
(Groundwater infiltration at 3.1m depth)							

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

Piezometer Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
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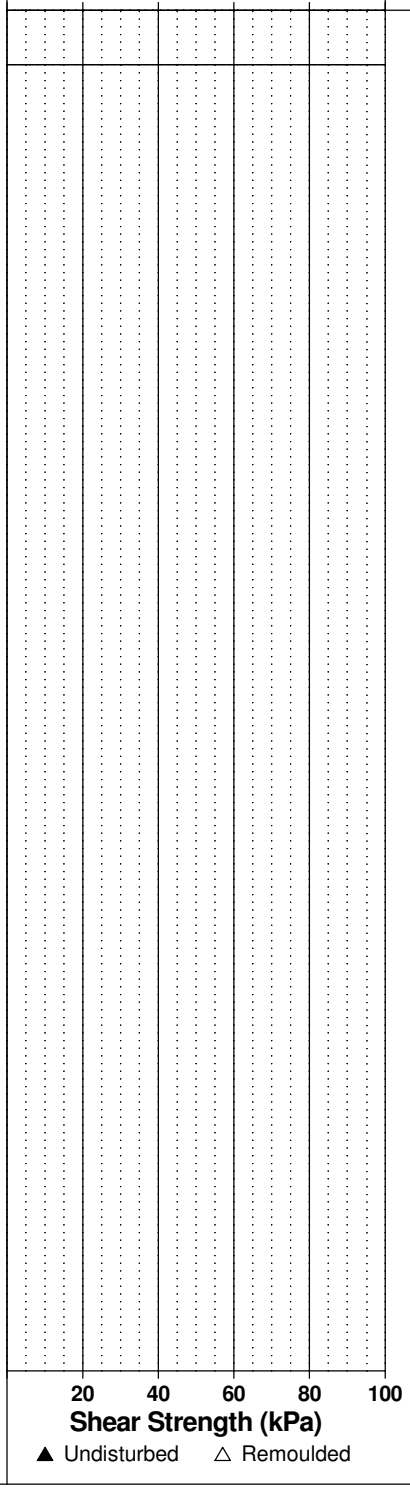
FILE NO. PG4706

REMARKS

HOLE NO. TP 5-18

BORINGS BY Hydraulic Shovel **DATE** October 15, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL with gravel, cobbles						0	117.12		
0.20									
End of Test Pit Practical refusal to excavation on inferred bedrock at 0.20m depth (TP dry upon completion)									



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SOIL PROFILE AND TEST DATA

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FILE NO. PG4706

REMARKS

HOLE NO. TP 5A-18

BORINGS BY Hydraulic Shovel **DATE** October 15, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
TOPSOIL with gravel, cobbles						0	117.10		
0.20									
GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders									
1.10						1	116.10		
End of Test Pit Practical refusal to excavation on inferred bedrock at 1.10m depth (TP dry upon completion)									

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

20 40 60 80

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG4706

REMARKS

HOLE NO. TP 6-18

BORINGS BY Hydraulic Shovel **DATE** October 15, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	116.70
FILL: Blast rock with gravel		G	1				
0.60							
FILL: Brown silty sand/sandy silt, some organics		G	2				
1.00						1	115.70
Asphalt		G	3				
1.30							
TOPSOIL		G	4				
1.60							
Fractured **BEDROCK** 1.70							
End of Test Pit							
Practical refusal to excavation on inferred bedrock at 1.70m depth							
(TP dry upon completion)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Water Content %

20 40 60 80

Piezometer Construction

20 40 60 80 100

Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
6171 Hazeldean Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Stantec Geomatics Ltd.

FILE NO. PG4706

REMARKS

HOLE NO. TP 7-18

BORINGS BY Hydraulic Shovel **DATE** October 15, 2018

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE						0	117.07		
FILL: Blast rock with sand, gravel and cobbles									
0.50									
FILL: Brown silty sand with gravel, cobbles, trace topsoil, organics		G	1			1	116.07		
1.20									
GLACIAL TILL: Brown silty sand with gravel, cobbles, boulders		G	2						
1.60									
Fractured **BEDROCK** 1.70									
End of Test Pit									
Practical refusal to excavation on inferred bedrock at 1.70m depth									
(TP dry upon completion)									

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

Water Content %: 20 40 60 80

Shear Strength (kPa): 20 40 60 80 100

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
6171 Hazeldean Road
Ottawa, Ontario

DATUM

REMARKS

BORINGS BY Backhoe **DATE** March 28, 2012

FILE NO. PE2548

HOLE NO. TP 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0			
FILL: Brown silty sand with cobbles		G	1						
0.70						1			
GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders		G	2						
2.40						2			
End of Test Pit									
Practical refusal at 2.40m depth									

Photo Ionization Detector: ● Volatile Organic Rdg. (ppm); ○ Lower Explosive Limit %

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
6171 Hazeldean Road
Ottawa, Ontario

DATUM

REMARKS

BORINGS BY Backhoe **DATE** March 28, 2012

FILE NO. PE2548

HOLE NO. TP 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0			
FILL: Crushed stone 0.05									
GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders		G	1			1			
2.50						2			
End of Test Pit									
Practical refusal at 2.50m depth									

Photo Ionization Detector: ○ Lower Explosive Limit %

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
6171 Hazeldean Road
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DATUM

REMARKS

BORINGS BY Backhoe **DATE** March 28, 2012

FILE NO. PE2548

HOLE NO. TP 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Brown **SILTY SAND,** trace cobbles		G	1			0			
0.20									
GLACIAL TILL: Grey-brown silty sand with gravel, cobbles and boulders		G	2			1			
						2			
2.45									
End of Test Pit									
(Groundwater infiltration at 2.3m depth)									

Photo Ionization Detector: Lower Explosive Limit % — 20, 40, 60, 80

RKI Eagle Rdg. (ppm) — 100, 200, 300, 400, 500

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
6171 Hazeldean Road
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DATUM

REMARKS

BORINGS BY Backhoe **DATE** March 28, 2012

FILE NO. PE2548

HOLE NO. TP 4

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0			
FILL: Brown silty sand, trace gravel		G	1						
0.40									
FILL: Brown silty sand with organics		G	2						
0.60									
FILL: Blast rock		G	3			1			
						2			
2.20									
End of Test Pit									
Test pit terminated on suspected bedrock surface @ 2.20m depth									
(Groundwater infiltration at 0.9m depth)									

Photo Ionization Detector: ○ Lower Explosive Limit %

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
6171 Hazeldean Road
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REMARKS

BORINGS BY Backhoe **DATE** March 28, 2012

FILE NO. PE2548

HOLE NO. TP 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0			
FILL: Crushed stone, trace sand									
0.50									
FILL: Organics with silty sand		G	1			1			
1.10									
GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders		G	2			2			
2.30									
End of Test Pit									
Test pit terminated on suspected bedrock @ 2.30m depth									
(Groundwater infiltration at 1.1m depth)									

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ Lower Explosive Limit %
20 40 60 80
100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
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REMARKS

BORINGS BY Backhoe **DATE** March 28, 2012

FILE NO. PE2548

HOLE NO. TP 6

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	
FILL: Brown silty sand with gravel		G	1			1	
1.60							
PEAT: Dark brown/black organic matter		G	2			2	
2.80							
ORGANIC SILT/MARL		G	3			3	
3.10							
Grey **SILTY CLAY** with sand		G	4				
3.60							
End of Test Pit (Groundwater infiltration at 3.0m depth)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
6171 Hazeldean Road
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DATUM

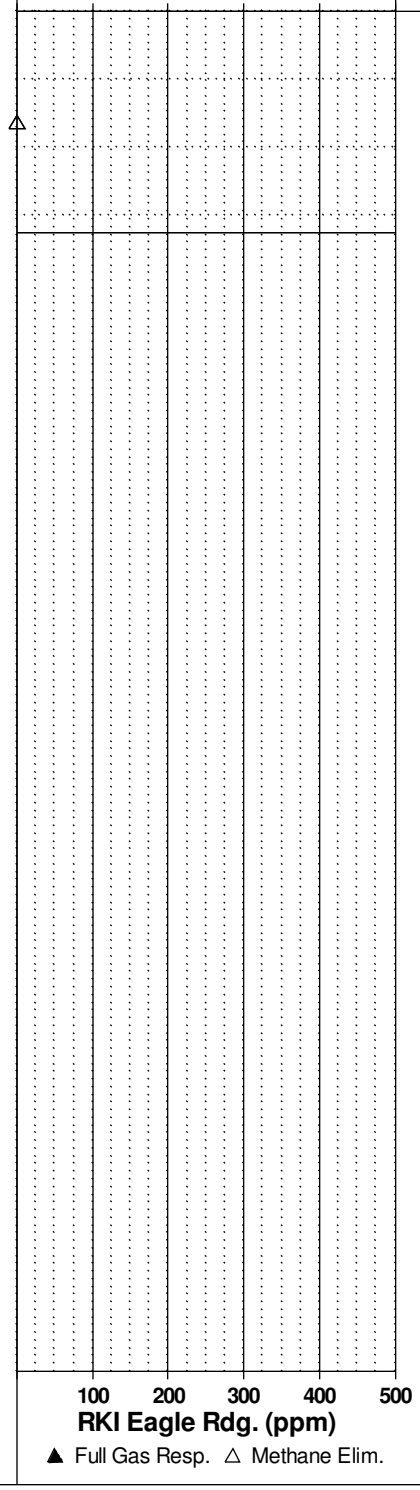
REMARKS

BORINGS BY Backhoe **DATE** March 28, 2012

FILE NO. PE2548

HOLE NO. TP 7

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0			
Brown **SANDY SILT** with gravel		G	1						
0.65									
End of Test Pit									



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SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
6171 Hazeldean Road
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DATUM

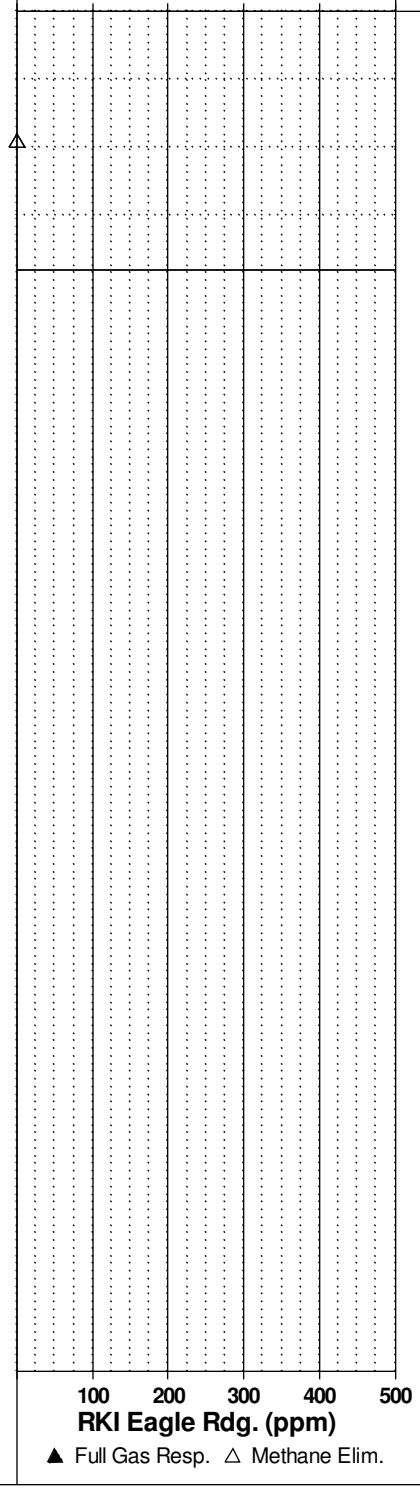
REMARKS

BORINGS BY Backhoe **DATE** March 28, 2012

FILE NO. PE2548

HOLE NO. TP 8

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0			
Brown **SANDY SILT** with gravel		G	1						
0.76									
End of Test Pit									



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SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
6171 Hazeldean Road
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REMARKS

BORINGS BY Backhoe **DATE** March 28, 2012

FILE NO. PE2548

HOLE NO. TP 9

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	
FILL: Brown to grey silty sand with gravel, cobbles and boulders		G	1			1	
		G	2				
2.00						2	
PEAT		G	3				
2.30							
Grey **SANDY SILT,** trace gravel		G	4				
3.00						3	
End of Test Pit							
(Groundwater infiltration at 2.5m depth)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

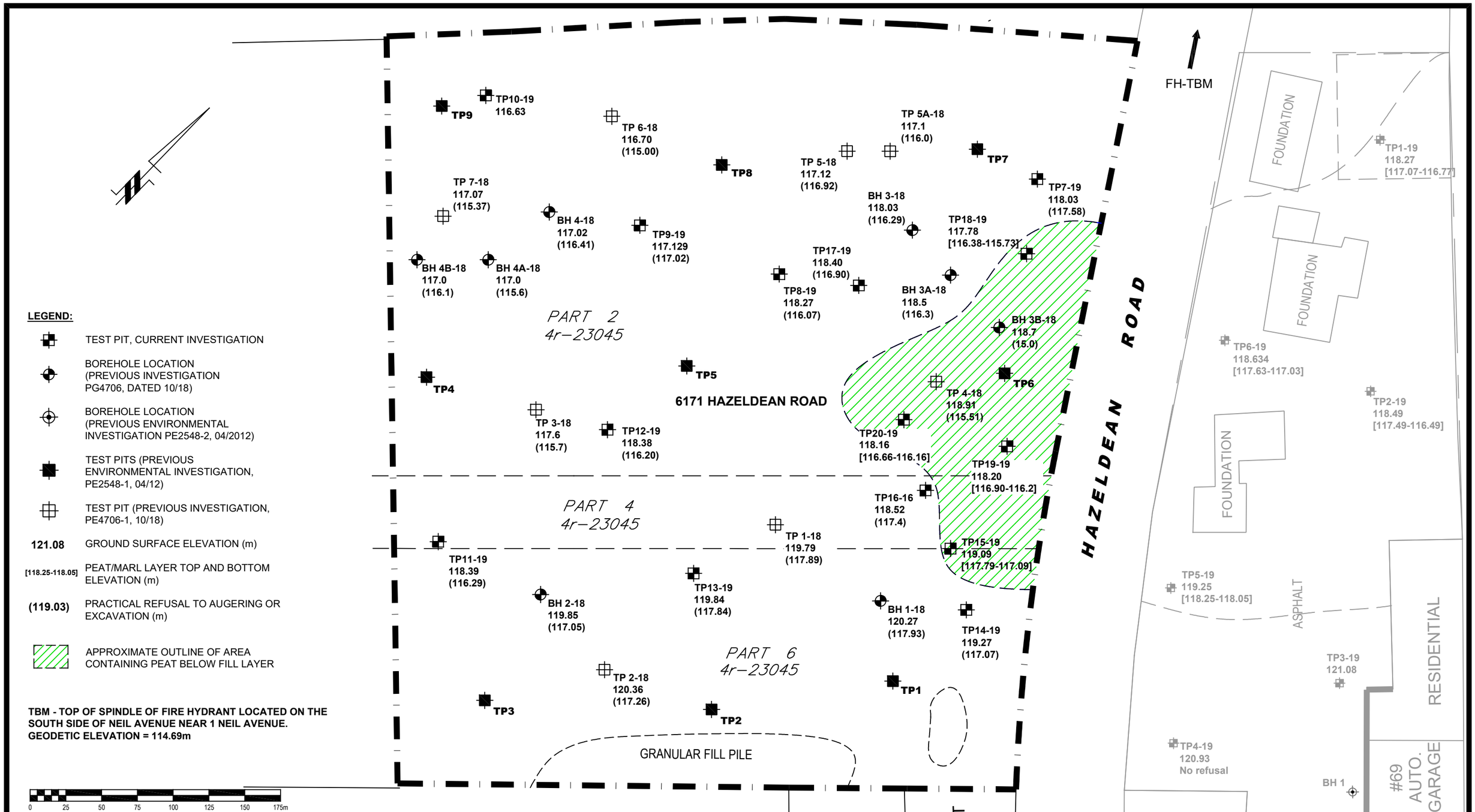
20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction



LEGEND:

- TEST PIT, CURRENT INVESTIGATION
- BOREHOLE LOCATION (PREVIOUS INVESTIGATION PG4706, DATED 10/18)
- BOREHOLE LOCATION (PREVIOUS ENVIRONMENTAL INVESTIGATION PE2548-2, 04/2012)
- TEST PITS (PREVIOUS ENVIRONMENTAL INVESTIGATION, PE2548-1, 04/12)
- TEST PIT (PREVIOUS INVESTIGATION, PE4706-1, 10/18)
- **121.08** GROUND SURFACE ELEVATION (m)
- [118.25-118.05] PEAT/MARL LAYER TOP AND BOTTOM ELEVATION (m)
- **(119.03)** PRACTICAL REFUSAL TO AUGERING OR EXCAVATION (m)
- APPROXIMATE OUTLINE OF AREA CONTAINING PEAT BELOW FILL LAYER

TBM - TOP OF SPINDLE OF FIRE HYDRANT LOCATED ON THE SOUTH SIDE OF NEIL AVENUE NEAR 1 NEIL AVENUE. GEODETIC ELEVATION = 114.69m

patersongroup
consulting engineers
154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

KAVANAGH FAMILY INVESTMENTS

GEOTECHNIAL INVESTIGATION
6171 HAZELDEAN ROAD

OTTAWA, **ONTARIO**

Title:

TEST HOLE LOCATION PLAN

Scale: 1:1500	Date: 05/2018
Drawn by: YA	Report No.: PG4917-1
Checked by: DJG	Dwg. No.: **PG4917-1**
Approved by: DJG	Revision No.: 0

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Report Distributed To:

Heafy Group- Carmine Zayoun; czayoun@groupeheafey.com
Heafy Group.- Raad Akrawi <rakrawi@groupeheafey.com>
EXP Infrastructure Division - Bruce Thomas. Bruce.thomas@exp.com
Foten Jaime Posen, MCIP RPP- posen@fotenn.com