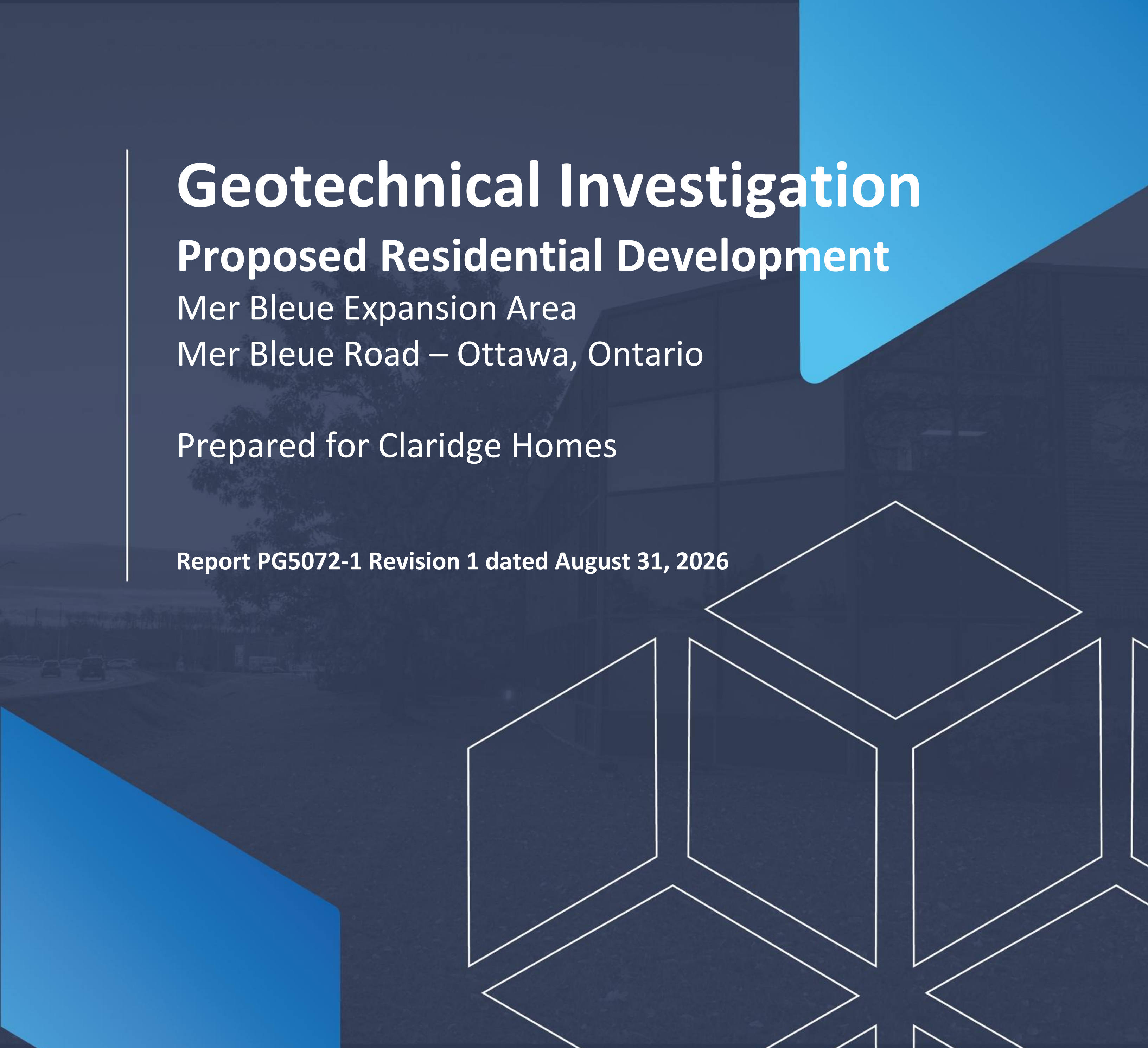

Geotechnical Investigation

Proposed Residential Development

Mer Bleue Expansion Area
Mer Bleue Road – Ottawa, Ontario

Prepared for Claridge Homes

Report PG5072-1 Revision 1 dated August 31, 2026

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Claridge Homes to conduct a geotechnical investigation for the proposed residential development to be located along Mer Bleue Road in the City of Ottawa (refer to Figure 1 – Key Plan in Appendix 2 for the general site location).

The objectives of the geotechnical investigation were to:

- ❑ Determine the subsoil and groundwater conditions at this site by means of boreholes and monitoring well program.

- ❑ Provide geotechnical recommendations for the design of the proposed development including construction considerations which may affect the design.

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

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

2.0 Proposed Development

Details of the proposed development were not available at the time of issuance of this report. It is expected that the proposed development will consist of low rise residential dwellings and townhouse style housing. Local roadways and residential driveways are also anticipated for the proposed development. It is further anticipated that the site will be serviced by future municipal services.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the current investigation was carried out on between October 4 and 7, 2019 and October 24 and November 1, 2019. At that time, 27 boreholes were completed to a maximum depth of 10.5 m below existing ground surface. The test hole locations were placed in a manner to provide general coverage of the subject site taking into consideration site features and underground utilities.

The locations of the boreholes are shown on Drawing PG5072-1– Test Hole Location Plan included in Appendix 2.

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

Sampling and In Situ Testing

Soil samples were recovered from the auger flights, and using a 50 mm diameter split-spoon sampler or a thin walled Shelby tube in combination with a fixed piston sampler. The split-spoon samples were placed in sealed plastic bags and the Shelby tubes were sealed at both ends on site. All the samples were transported to our laboratory. The depths at which the auger, split-spoon and Shelby tube samples were recovered from the boreholes are shown as AU, SS and TW, respectively, on the Soil Profile and Test Data sheets in Appendix 1.

A Standard Penetration Test (SPT) was conducted in conjunction with the recovery of the split spoon samples. The SPT results are recorded as "N" values on the Soil Profile and Test Data sheets. The "N" value is the number of blows required to drive the split spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm. This testing was done in general accordance with ASTM D1586-11 - Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils.

Undrained shear strength testing was carried out in cohesive soils using a field vane apparatus.

The overburden thickness was evaluated by a dynamic cone penetration test (DCPT) completed at BH1, BH4, BH8, BH12, BH15, BH19, BH22 and BH25. The DCPT consists of driving a steel drill rod, equipped with a 50 mm diameter cone at the tip, using a 63.5 kg hammer falling from a height of 760 mm. The number of blows required to drive the cone into the soil is recorded for each 300 mm increment.

Subsurface conditions observed in the test holes were recorded in detail in the field. Reference should be made to the Soil Profile and Test Data sheets presented in Appendix 1 for specific details of the soil profile encountered at the test hole locations.

Groundwater

Flexible piezometers were installed in all the boreholes to monitor the groundwater level subsequent to the completion of the sampling program. The groundwater observations are discussed in Subsection 4.3 and presented in the Soil Profile and Test Data sheets in Appendix 1.

3.2 Field Survey

The test hole locations were determined and located on the field by Paterson personnel. The bore location was surveyed in the field by Paterson. The elevations are referenced the CGVD28 geodetic datum. The locations of the boreholes are presented on Drawing PG5072-1– Test Hole Location Plan in Appendix 2.

3.3 Laboratory Review

The soil samples recovered from our field investigation were examined in our laboratory to collaborate the field findings.

A total of 9 representative soil samples recovered using a thin walled Shelby tubes as part of the current geotechnical investigation were submitted for unidimensional consolidation testing. The results of the unidimensional consolidation testing are further discussed in Subsection 5.4 and presented in Appendix 1.

A total of 12 representative soil samples were submitted for Atterberg limits testing as part of the current geotechnical investigation. The results of the Atterberg Limits Testing are presented in Subsection 4.2.

3.4 Analytical Testing

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

4.0 Observations

4.1 Surface Conditions

The subject site is currently mostly undeveloped, agricultural land and is mainly covered by harvest crop. A significant treed portion was noted centrally along the west portion line.

The Mckinnon's Creek runs through to the north-eastern portion of the property. Shallow drainage ditches were observed draining nearby agricultural land and roads. The subject site is relatively flat with a slight slope east towards Mckinnon's Creek. The ground surface is slightly below grade of Mer Bleue Road. The site is bordered to the south by a residential development and Wall Road, to the west by Mer Bleue Road to the north by a residential development under construction and to the east by Tenth Line Road.

4.2 Subsurface Profile

Overburden

Generally, the soil profile encountered at the test hole locations consists of an agriculturally disturbed organic layer overlying a stiff to firm, brown silty clay crust followed by a deep, firm to soft grey silty clay deposit. Practical refusal to augering was encountered at BH 5 within a glacial till layer at a depth of 5.9 m.

A DCPT was completed at BH1, BH4, BH8, BH12, BH15, BH19, BH22 and BH25. Practical refusal to DCPT was encountered at BH1, BH4 and BH8 at a depth of 30.5 m, 13.3 m and 24.8 m, respectively, below the existing ground surface. Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for the details of the soil profile encountered at each test hole location.

Based on available geological mapping, the bedrock in the area is part of the Lindsay formation, which consists of interbedded limestone and shale. Also, based on available geological mapping, the overburden thickness is expected to range from 25 to 50 m.

Silty Clay

Silty clay was encountered immediately beneath the topsoil at all test hole locations. The upper portion of the silty clay has been weathered to a firm to stiff brown crust. The crust extends to depths varying between 1.5 and 3 m.

In situ shear vane field testing carried out within the silty clay layer in the lower portion of the weathered crust yielded undrained shear strength values ranging from approximately 60 to 120 kPa. These values are indicative of a firm to very stiff consistency. In situ shear vane field testing carried out within the grey silty clay yielded undrained shear strengths ranging from approximately 20 to 50 kPa. These values are indicative of a soft to firm consistency.

Atterberg limits were tested for 20 representative samples. A summary of the results is shown in Table 1. CH represents Inorganic Clays of High Plasticity.

Table 1 – Summary of Atterberg Limits Tests

Sample	Liquid Limit %	Plastic Limit %	Plasticity Index %	Classification
BH1 SS2	68	29	39	CL
BH2 SS2	59	25	35	CL
BH4 SS3	76	33	43	CH
BH5 SS2	71	29	42	CH
BH6 SS2	66	28	38	CL
BH7 SS2	59	23	35	CL
BH9 SS2	56	22	34	CL
BH11 SS2	74	31	43	CH
BH12 SS4	53	21	32	CL
BH13-SS2	55	20	34	CL
BH16 SS2	62	24	37	CL
BH17 SS2	69	31	37	CL
BH19 SS3	60	23	37	CL
BH20 SS2	62	26	36	CL
BH21 SS2	49	25	24	CL
BH22 SS2	71	30	42	CH
BH24 SS2	60	23	37	CL
BH25 SS3	54	25	29	CL
BH26 SS2	79	32	47	CH
BH27 SS2	65	26	39	CL

Note: Ground surface elevations at borehole locations were surveyed by Paterson and are referenced to a geodetic datum.

4.3 Groundwater

Groundwater level readings were recorded on December 9, 2019 at the piezometer locations. The groundwater level readings are presented in the Soil Profile and Test Data sheets in Appendix 1. It should be noted that surface water can become trapped within a backfilled borehole that can lead to higher than typical groundwater level observations. Long-term groundwater level can also be estimated based on the observed color, moisture levels and consistency of the recovered soil samples. Based on these observations, the long-term groundwater level is expected between 2 to 3 m depth. It should be noted that groundwater levels are subject to seasonal fluctuations, therefore the groundwater levels could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is satisfactory for the proposed residential development. However, due to the presence of the sensitive silty clay layer, the proposed development will be subjected to grade raise restrictions.

The above and other considerations are further discussed in the following sections. to reduce the risks associated with the potentially heaving shale bedrock.

5.2 Site Grading and Preparation

Stripping Depth

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

Fill Placement

Engineered fill placed for grading beneath the proposed buildings, where required, should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material should be tested and approved prior to delivery to the site. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the buildings and paved areas should be compacted to at least 98% of the material’s standard Proctor maximum dry density (SPMDD).

For areas where engineered fill thicknesses of greater than 0.5 m are required below footing level, it is recommended to build the subgrade level up with a workable, brown silty clay or approved non-cohesive soil fill placed in maximum 300 mm loose lifts and compacted using a sheepsfoot roller or vibratory roller making several passes in above freezing temperatures and periodically inspected by the geotechnical consultant. The compacted silty clay fill below the proposed building footprints should be capped with a minimum 500 mm thick granular pad, consisting of Granular A or Granular B Type II, compacted to a minimum 98% of its standard Proctor maximum dry density (SPMDD) and placed in maximum 300 mm loose lifts. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the buildings should be compacted to at least 98% of its SPMDD.

Non-specified existing fill along with site-excavated soil can be used as general landscaping fill and beneath parking areas where settlement of the ground surface is of minor concern. In landscaped areas, these materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If these materials are to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 95% of the SPMDD. Non-specified existing fill and site-excavated soils are not suitable for use as backfill against foundation walls unless a composite drainage blanket connected to a perimeter drainage system is provided.

In-Filling Existing Ditches

Where existing ditches or channels are encountered, in-filling should be conducted according to the following methodology. In-filling the existing ditches and channel should be completed in a stepped fashion within the lateral support zone of the proposed buildings or other settlement-sensitive structures. The fill should consist of clean imported granular fill, such as OPSS Granular A or Granular B Type II material. The steps should have a minimum horizontal length of 1.5 m and minimum vertical height of 0.5 m, and should be compacted to a minimum of 98% of the material's SPMDD using suitable compaction equipment. Ditches infilled in accordance with the above-noted recommendations will be suitable for footing placement.

5.3 Foundation Design

Footings for the proposed buildings can be designed using the bearing resistance values presented in Table 2. Bearing resistance values for footing design should be determined on a per lot basis at the time of construction.

Table 2 – Bearing Resistance Values

Bearing Surface	Bearing Resistance Value at SLS (kPa)	Factored Bearing Resistance Value at ULS (kPa)
Stiff Brown Silty Clay or Engineered Fill Pad	**100**	**200**
Firm Grey Silty Clay	**60**	**125**

Note: Strip footings, up to 1.5 m wide, and pad footings, up to 3 m wide, can be designed using the above noted bearing resistance values.

The bearing resistance values are provided on the assumption that the footings will be placed on undisturbed soil bearing surfaces. An undisturbed soil bearing surface consists of one from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, whether in-situ or not, have been removed, prior to the placement of concrete for footings.

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to the in-situ bearing medium soils above the groundwater table when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V passes only through in-situ soil of the same or higher capacity as the bearing medium soil.

Settlement

Consideration must be given to potential settlements which could occur due to the presence of the silty clay deposit and the combined loads from the proposed footings, any groundwater lowering effects, and grade raise fill. The foundation loads to be considered for the settlement case are the continuously applied loads which consist of the unfactored dead loads and the portion of the unfactored live load that is considered to be continuously applied. For dwellings, a minimum value of 50% of the live load is recommended by Paterson.

The total and differential settlements will be dependent on characteristics of the proposed buildings. For design purposes, the total and differential settlements are estimated to be 25 and 20 mm, respectively. A post-development groundwater lowering of 0.5 m was assumed.

The potential post construction total and differential settlements are dependent on the position of the long term groundwater level when buildings are situated over deposits of compressible silty clay. Efforts can be made to reduce the impacts of the proposed development on the long term groundwater level by placing clay dykes in the service trenches, reducing the sizes of paved areas, leaving green spaces to allow for groundwater recharge or limiting planting of trees to areas away from the buildings. However, it is not economically possible to control the groundwater level.

Permissible Grade Raise Recommendations

Undrained shear strength testing was completed using a vane apparatus at each borehole location.

In addition to the shear strength testing, undisturbed silty clay samples were collected using 73 mm diameter thin walled (TW) Shelby tube in conjunction with a piston sampler. The Shelby tube sample was sealed at both ends and transported to our laboratory for unidimensional consolidation testing. Value p'c is the preconsolidation pressure of the sample and p'o is the effective overburden pressure (for the applicable groundwater level, as noted in the table). The difference between these values is the available preconsolidation. The increase in stress on the soil due to the cumulative effects of the fill surcharge, the footing pressures, the slab loadings and the lowering of the groundwater cannot exceed the available preconsolidation if the potential total and differential settlements are to be maintained within tolerable limits for the proposed development.

The values C_{cr} and C_c are the recompression and compression indices, respectively, and are a measure of the compressibility of the soil due to stress increases below and above the preconsolidation pressures. The higher values for the C_c, as compared to the C_{cr}, illustrate the increased settlement potential above, as compared to below, the preconsolidation pressure.

A total of 9 site specific consolidation tests were conducted. The results of the consolidation tests are included in Appendix 1.

Table 3 – Summary of Consolidation Test Results

Borehole No.	Sample	Sample Depth (m)	σ'_p (kPa)	σ'_{vo} (kPa)	C_r	C_c	Q
BH4	TW4	4.98	58.4	90	0.026	2.158	A
BH7	TW4	3.25	31.5	57.9	.072	2.308	A
BH12	TW5	4.22	50.6	68.9	0.040	3.077	A
BH15	TW3	4.22	53.7	73.6	.038	4.370	A
BH16	TW3	4.29	46	73.1	0.028	2.174	A
BH17	TW4	4.95	58.2	65.5	0.033	3.875	A
BH19	TW4	3.38	41.7	55.5	0.044	2.524	A
BH22	TW4	5.00	58.6	59	0.058	2.869	A
BH26	TW5	4.16	53.4	97	0.036	1.916	A

Note: Q : Quality assessment of sample, G: Good, A: Acceptable, P: Likely disturbed

It should be noted that the values of p'_C, p'_O, C_{cr} and C_c are determined using standard engineering practices and are estimates only.

The effective overburden stress, p'o, is directly influenced by the groundwater level. The effective overburden stresses for the consolidation test samples were estimated using a conservatively low groundwater depth.

It has been considered that the groundwater level will vary seasonally and may be affected by other factors that could reduce groundwater infiltration as part of development (pavements, storm sewers, etc.) or promote groundwater depletion (trees, dry seasons, etc). As such, our analyses considered the post-development long-term groundwater level at a position 0.5 m lower than the assumed long-term level.

Based on the undrained shear strength testing results, consolidation testing and experience with the local silty clay deposit. **The recommended permissible grade raise areas are defined in Drawing PG5072-2 – Permissible Grade Raise Plan in Appendix 2.**

Where the grade raise cannot be accommodated with soil fill, the following options could be used alone or in combination.

Option 1 – Use of Lightweight Fill

Lightweight fill (LWF) can be used, consisting of EPS (expanded polystyrene) Type 19 or 22 blocks or other light weight materials which allow for raising the grade without adding a significant load to the underlying soils. However, these materials are expensive and, in the case of the EPS, are more difficult to use under the groundwater level, as they are buoyant, and must be protected against potential hydrocarbon spills. Use lightweight fill within the interior of the garage and porch areas to reduce the fill-related loads.

Option 2 – Surcharge Fill Settlement Monitoring Program

Provided sufficient time is available to induce the required settlements, consideration could be given to surcharging the subject site. Settlement plates to monitor long term settlement should be installed at selected locations. Once the desired settlements have taken place, the surcharged portion can be removed and the site is considered acceptable for development.

5.4 Design for Earthquakes

The applicable seismic site response classes are presented on Drawing PG5072-4 – Seismic Site Class Plan in Appendix 2. The seismic site response class should be used for design of the proposed buildings at the subject site according to the OBC 2024.

5.5 Basement Floor Slab

With the removal of all topsoil and deleterious fill, containing organic matter, within the footprints of the proposed buildings, the native soil surface or approved engineered fill pad will be considered an acceptable subgrade on which to commence backfilling for floor slab construction. Any soft areas should be removed and backfilled with appropriate backfill material.

A clear crushed stone fill is recommended for backfilling below the floor slab for limited span slab-on-grade areas, such as front porch or garage footprints. It is recommended that the upper 200 mm of sub-slab fill consist of 19 mm clear crushed stone below basement floor slabs.

5.6 Pavement Structure

For design purposes, the pavement structure presented in the following tables could be used for the design of driveways, local residential streets and roadways with bus traffic. It should be noted that for residential driveways and car only parking areas, an Ontario Traffic Category A is applicable. For local roadways and roadways with bus traffic, an Ontario Traffic Category B and Category D should be used for design purposes, respectively.

Table 4 – Recommended Pavement Structure - Driveways

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

Table 5 – Recommended Pavement Structure - Local Residential Roadways with Bus Traffic

Thickness (mm)	Material Description
40	**Wear Course** - Superpave 12.5 Asphaltic Concrete
50	**Binder Course** - Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
400	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill	

Table 6 – Recommended Pavement Structure - Arterial Roadways with Bus Traffic

Thickness (mm)	Material Description
40	**Wear Course** - Superpave 12.5 Asphaltic Concrete
50	**Upper Binder Course** - Superpave 19.0 Asphaltic Concrete
50	**Lower Binder Course** - Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
600	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill	

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material. Weak subgrade conditions may be experienced over service trench fill materials. This may require the use of a geotextile, thicker subbase or other measures that can be recommended at the time of construction as part of the field observation program.

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for driveways and local roadways and PG 64-34 asphalt cement should be used for roadways with bus traffic. The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 100% of the material's SPMDD using suitable vibratory equipment.

Pavement Structure Drainage

Satisfactory performance of the pavement structure is largely dependent on the contact zone between the subgrade material and the base stone in a dry condition. Failure to provide adequate drainage under conditions of heavy wheel loading can result in the fine subgrade soil being pumped into the voids in the stone subbase, thereby reducing load carrying capacity.

Due to the low permeability of the subgrade materials consideration should be given to installing subdrains during the pavement construction as per City of Ottawa standards. The subdrain inverts should be approximately 300 mm below subgrade level. The subgrade surface should be crowned to promote water flow to the drainage lines.

6.0 Design and Construction Precautions

6.1 Groundwater Control for Construction

Foundation Drainage and Waterproofing

A perimeter foundation drainage system is recommended for proposed structures. The system should consist of a 100 to 150 mm diameter, geotextile-wrapped, perforated, corrugated, plastic pipe, surrounded on all sides by 150 mm of 10 mm clear crushed stone, placed at the footing level around the exterior perimeter of the structure. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

Backfill against the exterior sides of the foundation walls should consist of free- draining, non frost susceptible granular materials. The site materials will be frost susceptible and, as such, are not recommended for re-use as backfill unless a composite drainage system (such as system Platon or Miradrain G100N) connected to a drainage system is provided.

6.2 Protection of Footings Against Frost Action

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

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

However, the footings are generally not expected to require protection against frost action due to the founding depth. Unheated structures such as the access ramp may require insulation for protection against the deleterious effects of frost action.

6.3 Excavation Side Slopes

The excavations for the proposed development will be mostly through a sensitive grey silty clay.

Where excavation is above the groundwater level to a depth of approximately 3 m, the excavation side slopes should be stable in the short term at 1H:1V. Flatter slopes could be required for deeper excavations or for excavation below the groundwater level. Where such side slopes are not permissible or practical, temporary shoring should be used. The subsoil at this site is considered to be mainly a Type 2 or 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.

The slope cross-sections recommended above are for temporary slopes. Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides.

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

It is expected that deep service trenches in excess of 3 m will be completed using a temporary shoring system designed by a structural engineer, such as stacked trench boxes in conjunction with steel plates. The trench boxes should be installed to ensure that the excavation sidewalls are tight to the outside of the trench boxes and that the steel plates are extended below the base of the excavation to prevent basal heave (if required).

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

Excavation Base Stability

The base of supported excavations can fail by three (3) general modes:

- ☐ Shear failure within the ground caused by inadequate resistance to loads imposed by grade difference inside and outside of the excavation,
- ☐ Piping from water seepage through granular soils, and
- ☐ Heave of layered soils due to water pressures confined by intervening low permeability soils.

Shear failure of excavation bases is typically rare in granular soils if adequate lateral support is provided.

Inadequate dewatering can cause instability in excavations made through granular or layered soils. The potential for base heave in cohesive soils should be determined for stability of flexible retaining systems.

The factor of safety with respect to base heave, FS_b, is:

$$FS_b = N_b S_u / \sigma_z$$

where:

> N_b - stability factor dependent upon the geometry of the excavation and given in Figure 1 on the following page.
> S_u - undrained shear strength of the soil below the base level
> σ_z - total overburden and surcharge pressures at the bottom of the excavation

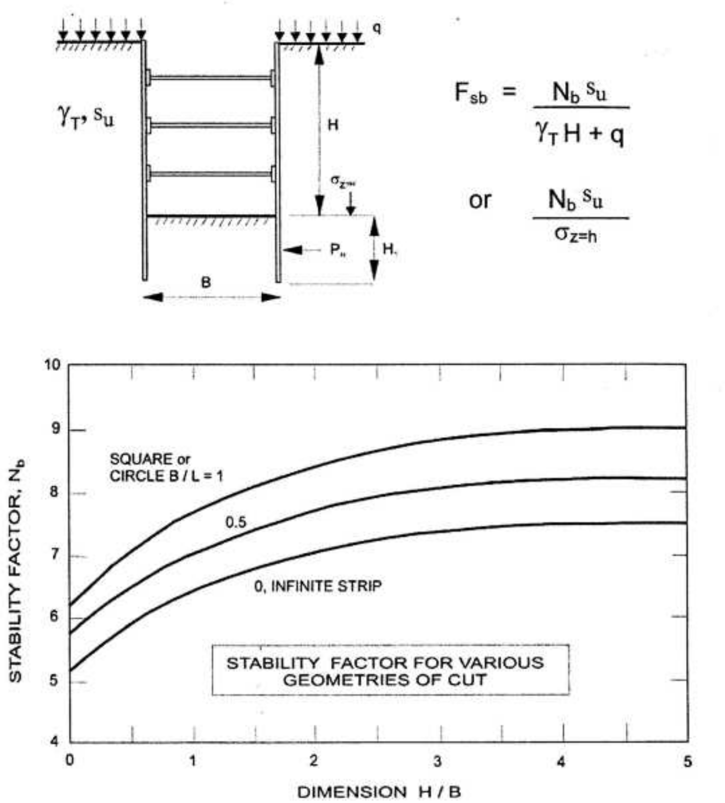

Figure 1 - Stability Factor for Various Geometries of Cut

In the case of soft to firm clays, a factor of safety of 2 is recommended for base stability.

6.4 Pipe Bedding and Backfill

Bedding and backfill materials should be in accordance with the most recent Material Specifications and Standard Detail Drawings from the City of Ottawa. These recommendations are for standard, open cut excavation placed services. The pipe bedding for sewer and water pipes should consist of at least 150 mm of OPSS Granular A material. Where the bedding is located within the firm grey silty clay, the thickness of the bedding material should be increased to a minimum of 300 mm. The material should be placed in maximum 300 mm thick lifts and compacted to a minimum of 95% of its SPMDD. The bedding material should extent at least to the spring line of the pipe.

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

Generally, it should be possible to re-use the moist (not wet) brown silty clay above the cover material if the excavation and filling operations are carried out in dry weather conditions. Wet silty clay materials will be difficult to re-use, as the high water contents make compacting impractical without an extensive drying period.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD.

To reduce long-term lowering of the groundwater level at this site, clay seals should be provided in the service trenches. The seals should be at least 1.5 m long (in the trench direction) and should extend from trench wall to trench wall. The seals should extend from the frost line and fully penetrate the bedding, subbedding and cover material. The barriers should consist of relatively dry and compactable brown silty clay placed in maximum 225 mm thick loose layers and compacted to a minimum of 95% of the SPMDD. The clay seals should be placed at the site boundaries and at strategic locations at no more than 60 m intervals in the service trenches. Periodic inspection of the clay seal placement work should be completed by Paterson personnel during servicing installation work.

6.5 Groundwater Control

Due to the relatively impervious nature of the silty clay materials, it is anticipated that groundwater infiltration into the excavations should be low and controllable using open sumps. Pumping from open sumps should be sufficient to control the groundwater influx through the sides of shallow excavations

Groundwater Control for Building Construction

Under the current regulations enacted by the Ministry of Environment, Conservation and Parks (MECP), any dewatering in excess of 50,000 L/day requires a registration on the Environmental Activity and Sector Registry (EASR), so long as that dewatering is related to construction. If the dewatering is not related to construction, a Permit to Take Water obtained from the MECP will be required.

In the event that an EASR is required to facilitate dewatering of the proposed development, a minimum of three to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan, to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. Should a Permit to Take Water be required, a minimum of five to six months should be allotted for completion of the permit, due to the minimum review period imposed by the MECP.

6.6 Winter Construction

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

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters, tarpaulins or other suitable means. In this regard, the base of the excavations should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

The trench excavations should be constructed in a manner that will avoid the introduction of frozen materials into the trenches. As well, pavement construction is difficult during winter. The subgrade consists of frost susceptible soils which will experience total and differential frost heaving as the work takes place.

In addition, the introduction of frost, snow or ice into the pavement materials, which is difficult to avoid, could adversely affect the performance of the pavement structure. Additional information could be provided, if required.

6.7 Corrosion Potential and Sulphate

One sample was submitted for testing. The analytical test results of the soil sample indicate that the sulphate content is less than 0.01%. These results along with the chloride and pH value are indicative that Type 10 Portland cement (normal cement) would be appropriate for this site. The results of the resistivity indicate the presence of a moderate to very aggressive environment for exposed ferrous metals at this site, which is typical of silty clay samples submitted for the subject area. It is anticipated that standard measures for corrosion protection are sufficient for services placed within the silty clay deposit.

6.8 Landscaping Considerations

Tree Planting Restrictions

In accordance with the City of Ottawa Tree Planting in Sensitive Marine Clay Soils (2017 Guidelines), Paterson completed a soils review of the site to determine applicable tree planting setbacks. Atterberg limits testing was completed for recovered silty clay samples at selected locations throughout the subject site. A shrinkage limit test was also completed on a select soil samples. The shrinkage limit testing indicates a shrinkage limit of 17% with a shrinkage ratio of 1.89. The results of our Atterberg limits are presented in Appendix 1.

Based on the results of our testing across the subject site, the plasticity index generally does not exceed 40% (with a few minor exceptions). In accordance with the city of Ottawa guidelines, the tree planting setback limits may be reduced to 4.5 m for small (mature tree height up to 7.5 m) and medium size trees (mature tree height 7.5 m to 14 m) provided that the following conditions are met.

- ☐ The underside of footing (USF) is 2.1 m or greater below the lowest finished grade must be satisfied for footings within 10 m from the tree, as measured from the centre of the tree trunk and verified by means of the Grading Plan as indicated procedural changes below.
- ☐ A small tree must be provided with a minimum of 25 m^3 of available soil volume while a medium tree must be provided with a minimum of 30 m^3 of available soil volume, as determined by the Landscape Architect.

The developer is to ensure that the soil is generally un-compacted when backfilling in street tree planting locations.

☐ The tree species must be small (mature tree height up to 7.5 m) to medium size (mature tree height 7.5 m to 14 m) as confirmed by the Landscape Architect. The foundation walls are to be reinforced at least nominally (minimum of two upper and two lower 15M bars in the foundation wall).

☐ Grading surround the tree must promote drainage to the tree root zone (in such a manner as not to be detrimental to the tree), as noted on the subdivision Grading Plan.

It should be noted that Paterson will be completing additional laboratory testing in accordance with the City of Ottawa's *Tree Planting in Sensitive Marine Clay Soils – 2017 Guidelines* as part of the forthcoming supplemental geotechnical investigation to confirm the Atterberg limits testing results to date.

It is well documented in the literature, and is our experience, that fast-growing trees located near buildings founded on cohesive soils that shrink on drying can result in long-term differential settlements of the structures. Tree varieties that have the most pronounced effect on foundations are seen to consist of poplars, willows and some maples (i.e. Manitoba Maples) and, as such, they should not be considered in the landscaping design.

Swimming Pools, Aboveground Hot Tubs, Decks and Additions

The in-situ soils are considered to be acceptable for swimming pools. Above ground swimming pools must be placed at least 5 m away from the residence foundation and neighbouring foundations. Otherwise, pool construction is considered routine, and can be constructed in accordance with the manufacturer's requirements.

Additional grading around the hot tub should not exceed permissible grade raises. Otherwise, hot tub construction is considered routine, and can be constructed in accordance with the manufacturer's specifications.

Additional grading around proposed deck or addition should not exceed permissible grade raises. Otherwise, standard construction practices are considered acceptable.

7.0 Recommendations

It is recommended that the following be carried out by Paterson as revised design details of the proposed development become available:

☐ Review of revised detailed grading, servicing and landscaping plans from a geotechnical perspective.

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

☐ Review detailed grading plan(s) from a geotechnical perspective.
☐ Observation of all bearing surfaces prior to the placement of concrete.
☐ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
☐ Observation of all subgrades prior to placing backfilling materials.
☐ Observation of clay seal placement at specified locations.
☐ Field density tests to ensure that the specified level of compaction has been achieved.
☐ Sampling and testing of the bituminous concrete including mix design reviews.

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

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

8.0 Statement of Limitations

The recommendations provided are in accordance with the present understanding of the project. Paterson requests permission to review the recommendations when the drawings and specifications are completed.

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

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

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Claridge Homes, or their agents, is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

Paterson Group Inc.

O. Canton

Owen R. Canton, B. Eng.

LICENSED PROFESSIONAL ENGINEER
Aug. 31, 2026
D. J. GILBERT
100116130
PROVINCE OF ONTARIO

David J. Gilbert, P.Eng.

Report Distribution:

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❑ Paterson Group

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

CONSOLIDATION TESTING RESULTS

ATTERBERG LIMIT RESULT SHEETS

ANALYTICAL TESTING RESULTS

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

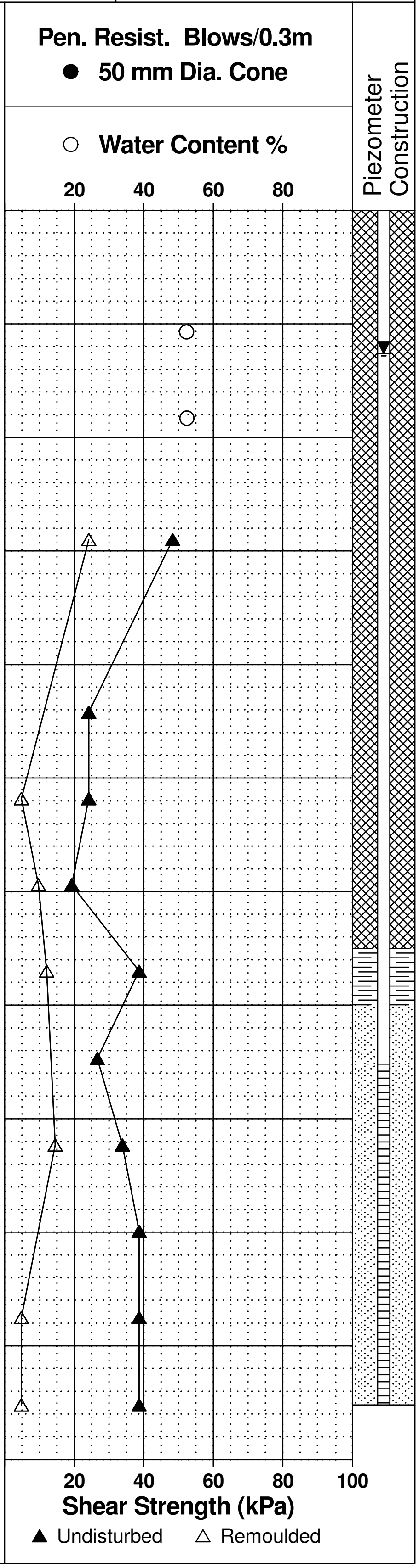
DATE 2019 October 7

FILE NO. PG5072

HOLE NO. BH 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL 0.25					
Loose, brown **SILTY SAND** 0.41		AU	1		
Stiff, brown **SILTY CLAY** 1.52		SS	2	96	5
Firm, grey **SILTY CLAY** 10.52		SS	3	100	3
		TW	4	100	

DEPTH (m)	ELEV. (m)
0	85.72
1	84.72
2	83.72
3	82.72
4	81.72
5	80.72
6	79.72
7	78.72
8	77.72
9	76.72
10	75.72
11	74.72



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

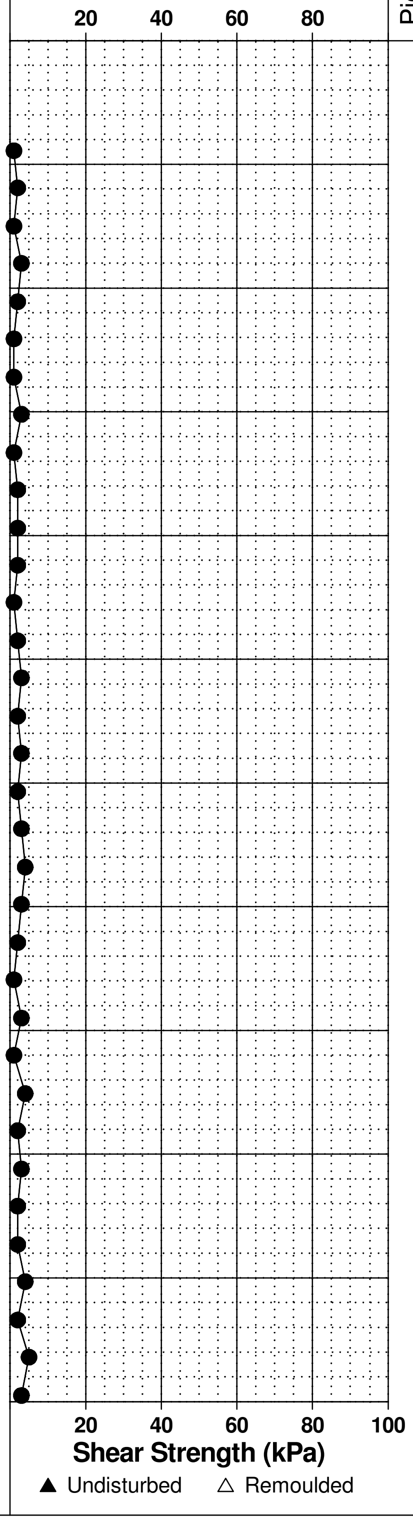
BORINGS BY CME 55 Power Auger

DATE 2019 October 7

FILE NO. PG5072

HOLE NO. BH 1

SOIL DESCRIPTION GROUND SURFACE	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
Dynamic Cone Penetration Test commenced at 10.52m depth. Cone pushed to 11.6m depth.						11	74.72		
						12	73.72		
						13	72.72		
						14	71.72		
						15	70.72		
						16	69.72		
						17	68.72		
						18	67.72		
						19	66.72		
						20	65.72		
						21	64.72		
						22	63.72		



Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5072

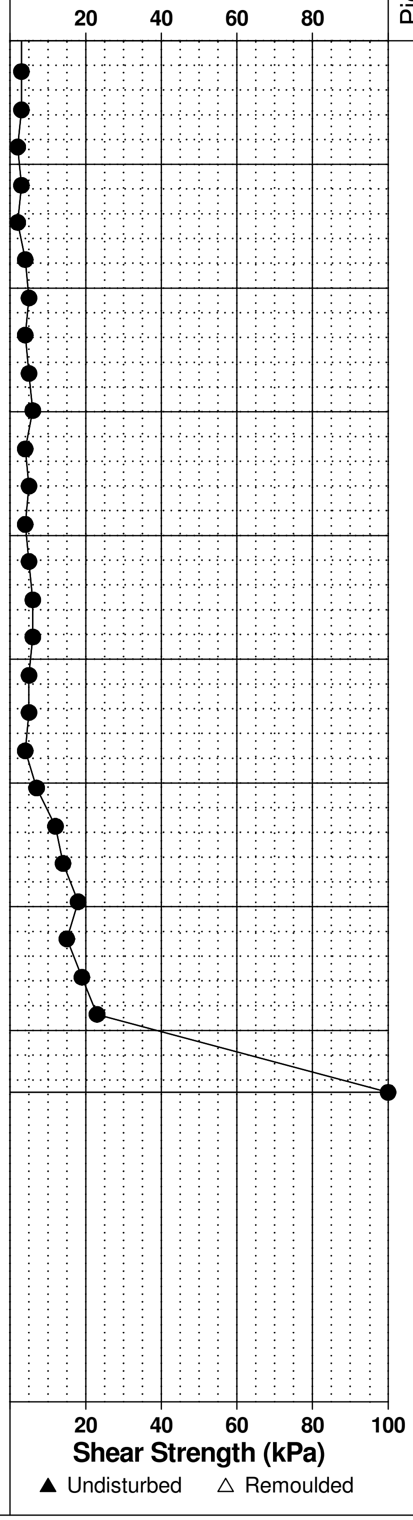
REMARKS

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger

DATE 2019 October 7

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						22	63.72		
						23	62.72		
						24	61.72		
						25	60.72		
						26	59.72		
						27	58.72		
						28	57.72		
						29	56.72		
						30	55.72		
30.50									
End of Borehole Practical DCPT refusal at 30.50m depth. (GWL @ 1.26m - Dec. 9, 2019)									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 October 4

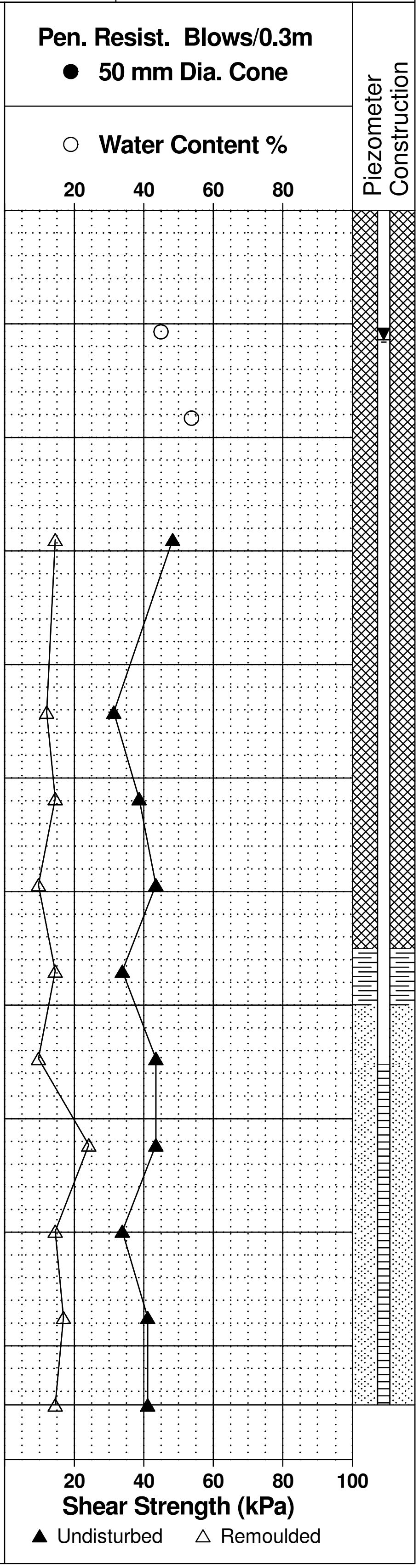
FILE NO. PG5072

HOLE NO. BH 2

SOIL DESCRIPTION	Depth (m)
GROUND SURFACE	
TOPSOIL	0.20
Brown **SILTY SAND**	0.28
Stiff, brown **SILTY CLAY**	2.30
Firm, grey **SILTY CLAY**	
(GWL @ 1.14m - Dec. 9, 2019)	10.52
End of Borehole	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	100	6
SS	3	100	3
TW	4	100	

DEPTH (m)	ELEV. (m)
0	86.15
1	85.15
2	84.15
3	83.15
4	82.15
5	81.15
6	80.15
7	79.15
8	78.15
9	77.15
10	76.15



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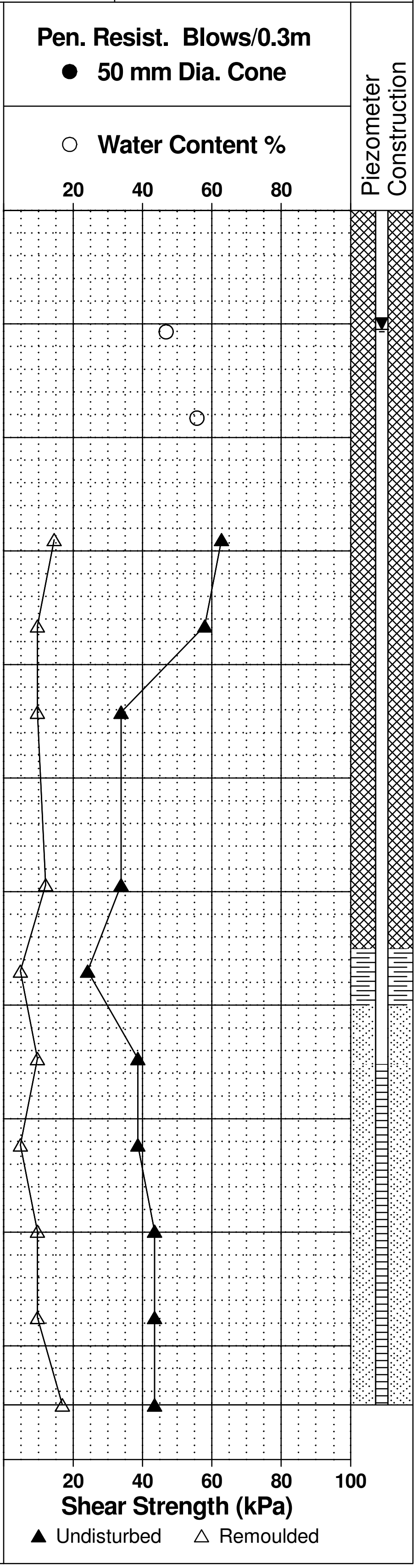
SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM	Geodetic	**FILE NO.**	PG5072
REMARKS		**HOLE NO.**	BH 3
BORINGS BY	CME 55 Power Auger	**DATE**	2019 October 4

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.25	AU	1		
Very stiff to stiff, brown **SILTY CLAY**	SS	2	100	9
	SS	3	54	5
3.00				
Stiff to firm, grey **SILTY CLAY**	TW	4	100	
(GWL @ 1.05m - Dec. 9, 2019)				
10.52				
End of Borehole				

DEPTH (m)	ELEV. (m)
0	85.63
1	84.63
2	83.63
3	82.63
4	81.63
5	80.63
6	79.63
7	78.63
8	77.63
9	76.63
10	75.63



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

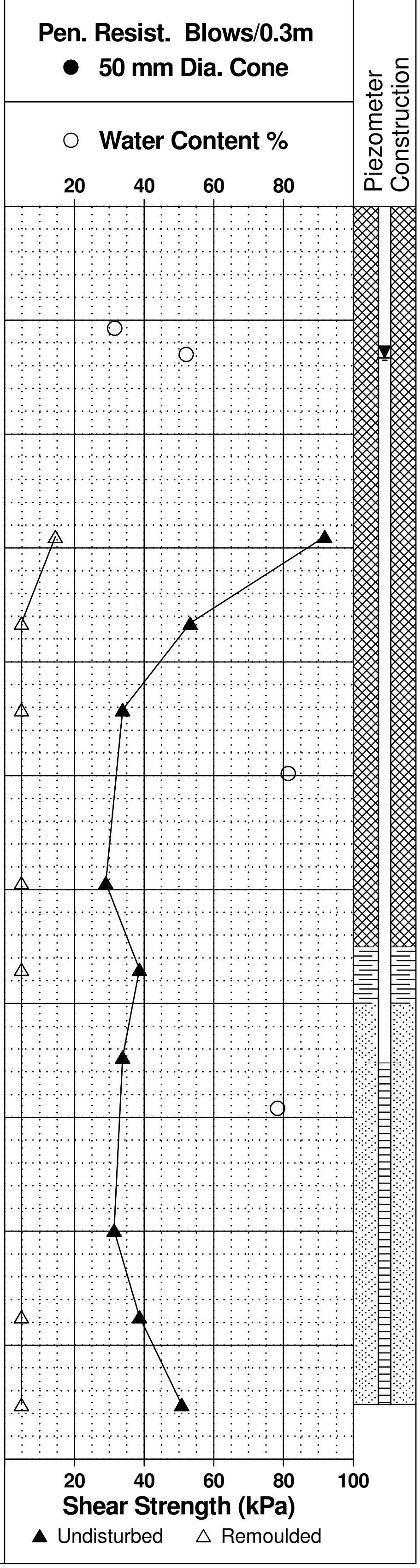
BORINGS BY CME 55 Power Auger

DATE 2019 October 4

FILE NO. PG5072

HOLE NO. BH 4

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	85.32
TOPSOIL 0.23		AU	1				
						1	84.32
Very stiff to stiff, brown **SILTY CLAY**		SS	2	100	13		
		SS	3	100	6		
						2	83.32
2.90							
						3	82.32
						4	81.32
		TW	4	96			
						5	80.32
						6	79.32
Stiff to firm, grey **SILTY CLAY**							
						7	78.32
		SS	5	100	2		
						8	77.32
						9	76.32
						10	75.32
10.52							
						11	74.32



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5072

REMARKS

HOLE NO. BH 4

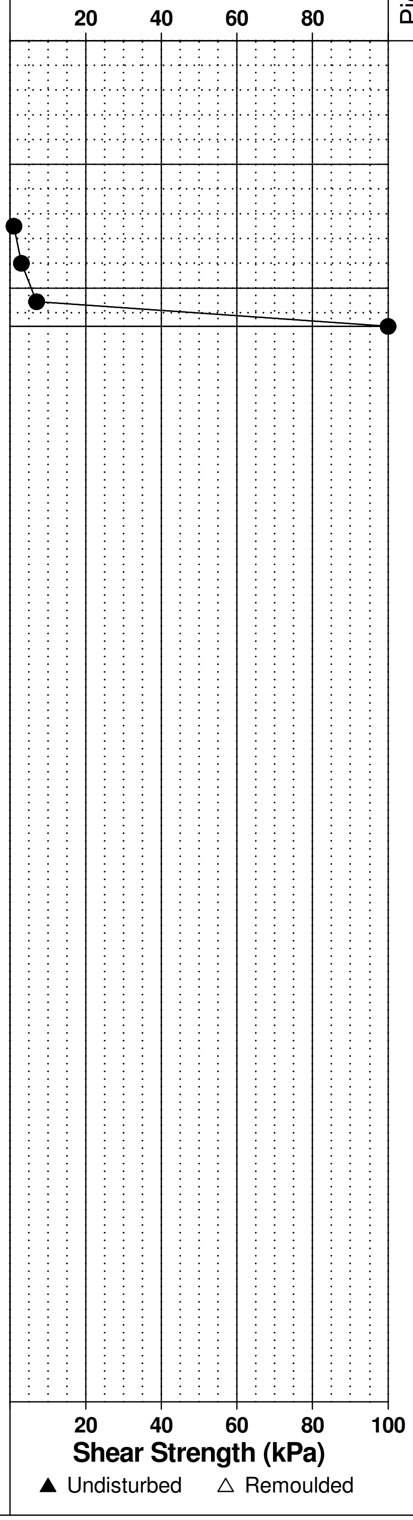
BORINGS BY CME 55 Power Auger

DATE 2019 October 4

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Dynamic Cone Penetration Test commenced at 1.52m depth. Cone pushed to 12.2m depth.						11	74.32
						12	73.32
						13	72.32
13.31							
End of Borehole Practical DCPT refusal at 13.31m depth. (GWL @ 1.33m - Dec. 9, 2019)							

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

○ Water Content %



Piezometer Construction

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

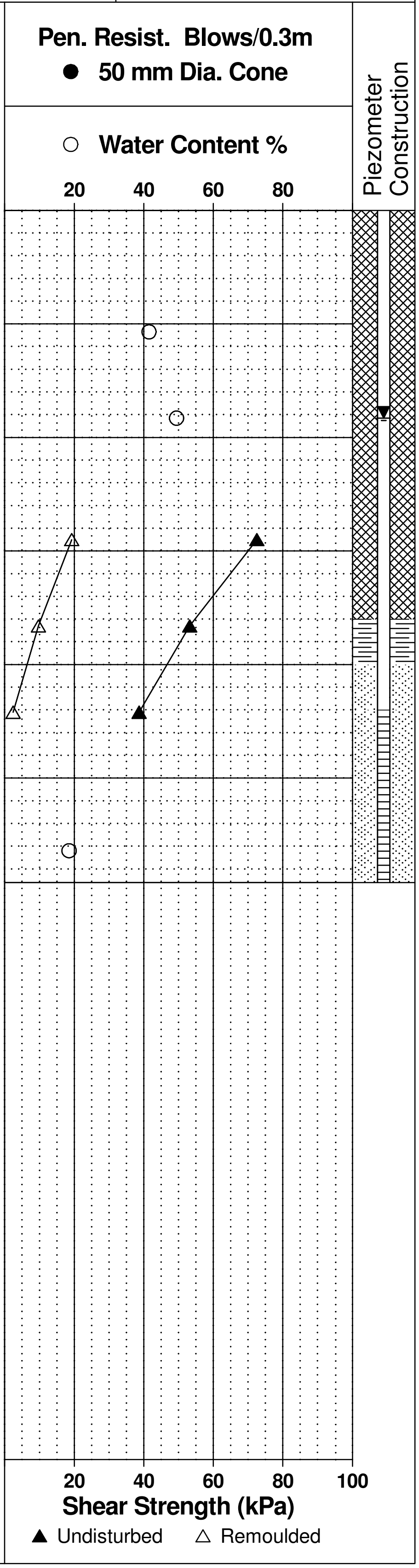
DATUM Geodetic
REMARKS
BORINGS BY CME 55 Power Auger
DATE 2019 October 4
FILE NO. PG5072
HOLE NO. BH 5

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	85.02
TOPSOIL 0.25	AU	1				
Stiff, brown **SILTY CLAY**	SS	2	100	9	1	84.02
2.10	SS	3	100	6	2	83.02
Firm, grey **SILTY CLAY**					3	82.02
					4	81.02
5.18	TW	4	100		5	80.02
GLACIAL TILL: Compact, grey silty sand with gravel, some clay, cobbles and boulders 5.92	SS	5	50	14		

End of Borehole

Practical refusal to augering at 5.92m depth.

(GWL @ 1.83m - Dec. 9, 2019)



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

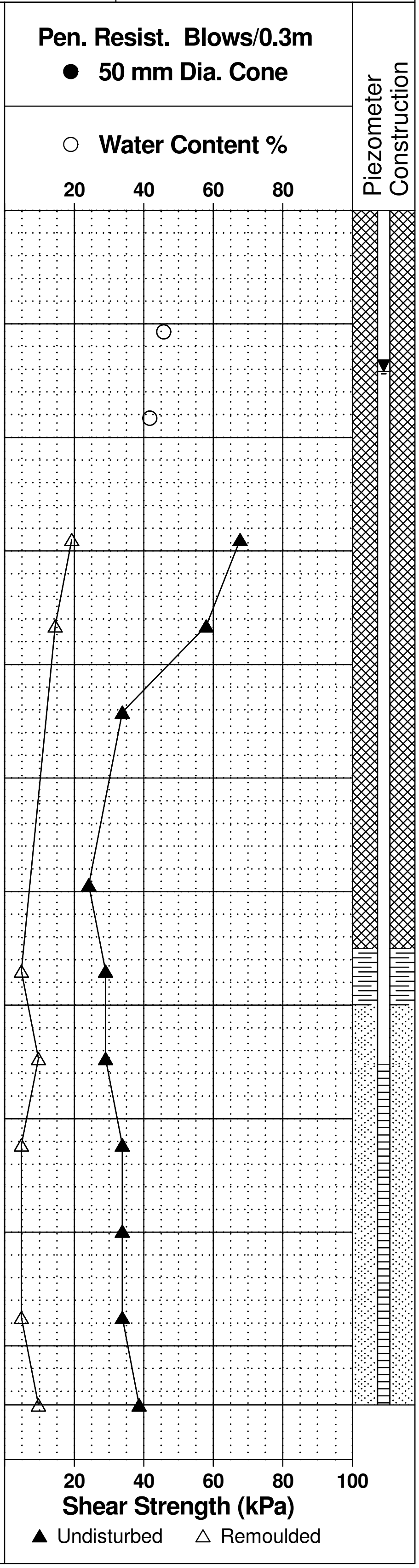
DATE 2019 October 7

FILE NO. PG5072

HOLE NO. BH 6

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL 0.28		AU	1		
Loose, brown **SILTY SAND** 0.84					
Stiff, brown **SILTY CLAY** 3.80		SS	2	100	6
		SS	3	100	4
Firm, grey **SILTY CLAY**		TW	4	100	
(GWL @ 1.42m - Dec. 9, 2019) 10.52					
End of Borehole					

DEPTH (m)	ELEV. (m)
0	86.27
1	85.27
2	84.27
3	83.27
4	82.27
5	81.27
6	80.27
7	79.27
8	78.27
9	77.27
10	76.27



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic
REMARKS
BORINGS BY CME 55 Power Auger
DATE 2019 October 7
FILE NO. PG5072
HOLE NO. BH 7

SOIL DESCRIPTION

GROUND SURFACE

TOPSOIL 0.23

Stiff, brown **SILTY CLAY** 1.40

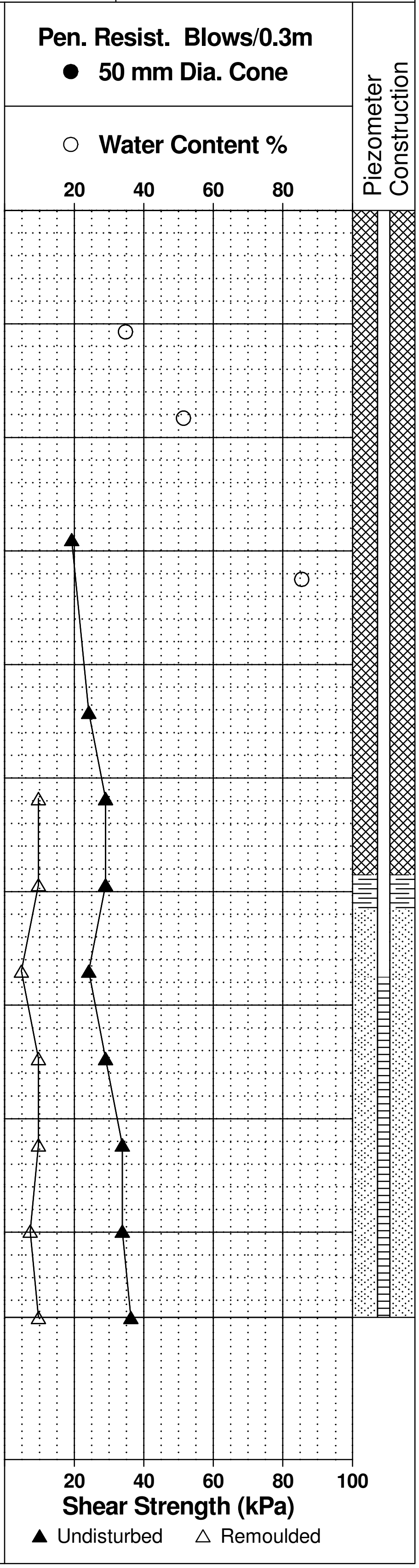
Soft to firm, grey **SILTY CLAY** 9.75

End of Borehole

(Piezometer destroyed - Dec. 9, 2019)

SAMPLE			
TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	100	6
SS	3	100	2
TW	4	79	

DEPTH (m)	ELEV. (m)
0	86.03
1	85.03
2	84.03
3	83.03
4	82.03
5	81.03
6	80.03
7	79.03
8	78.03
9	77.03



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SOIL PROFILE AND TEST DATA

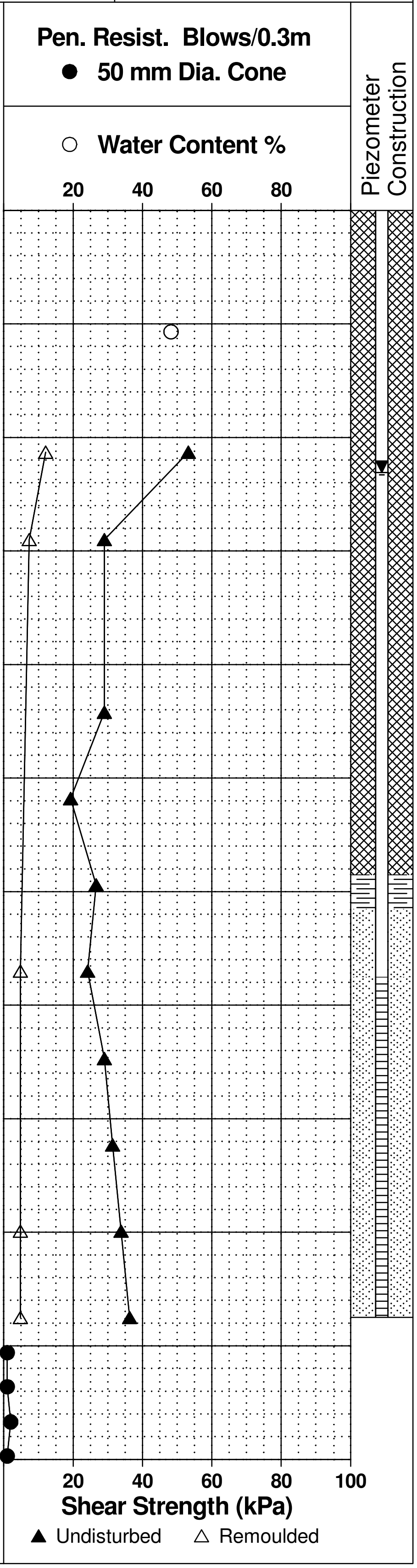
Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic
REMARKS
BORINGS BY CME 55 Power Auger
DATE 2019 October 24
FILE NO. PG5072
HOLE NO. BH 8

SOIL DESCRIPTION	
GROUND SURFACE	
TOPSOIL	0.18
Brown **SILTY SAND**	0.23
Stiff, brown **SILTY CLAY**	2.30
Firm, grey **SILTY CLAY**	9.75
Dynamic Cone Penetration Test commenced at 9.75m depth.	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	79	3
TW	3	100	

DEPTH (m)	ELEV. (m)
0	86.12
1	85.12
2	84.12
3	83.12
4	82.12
5	81.12
6	80.12
7	79.12
8	78.12
9	77.12
10	76.12
11	75.12



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5072

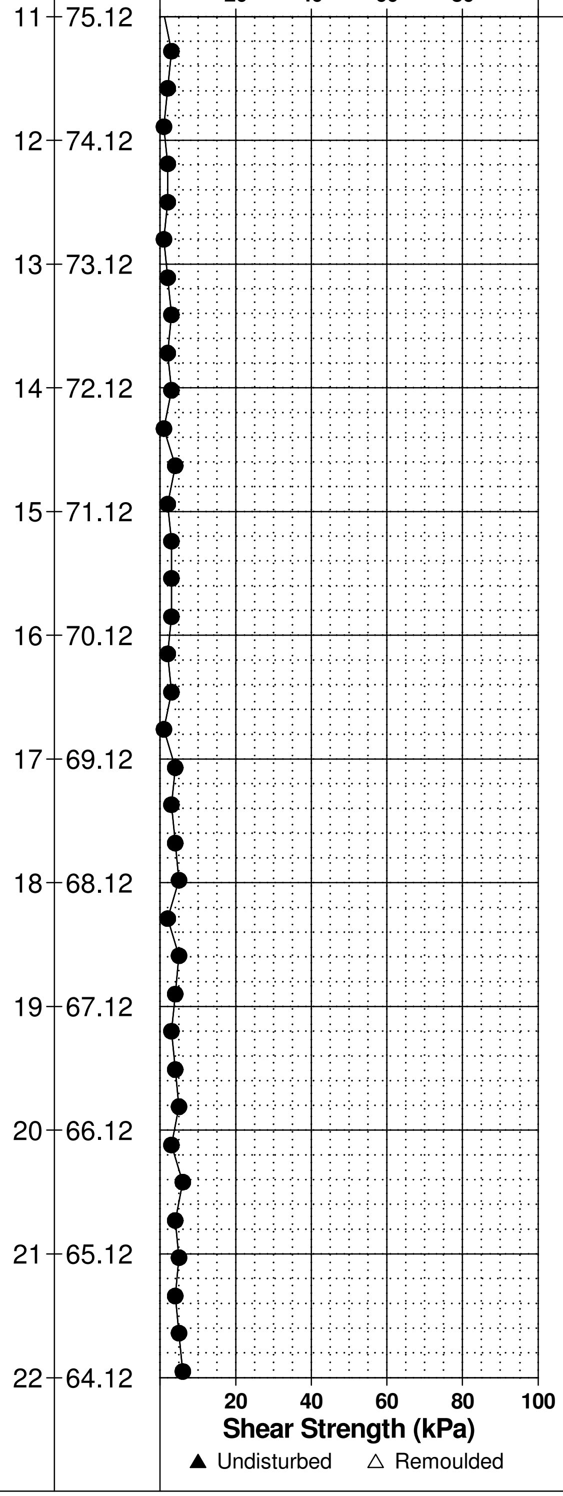
REMARKS

HOLE NO. BH 8

BORINGS BY CME 55 Power Auger

DATE 2019 October 24

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			20 40 60 80	



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

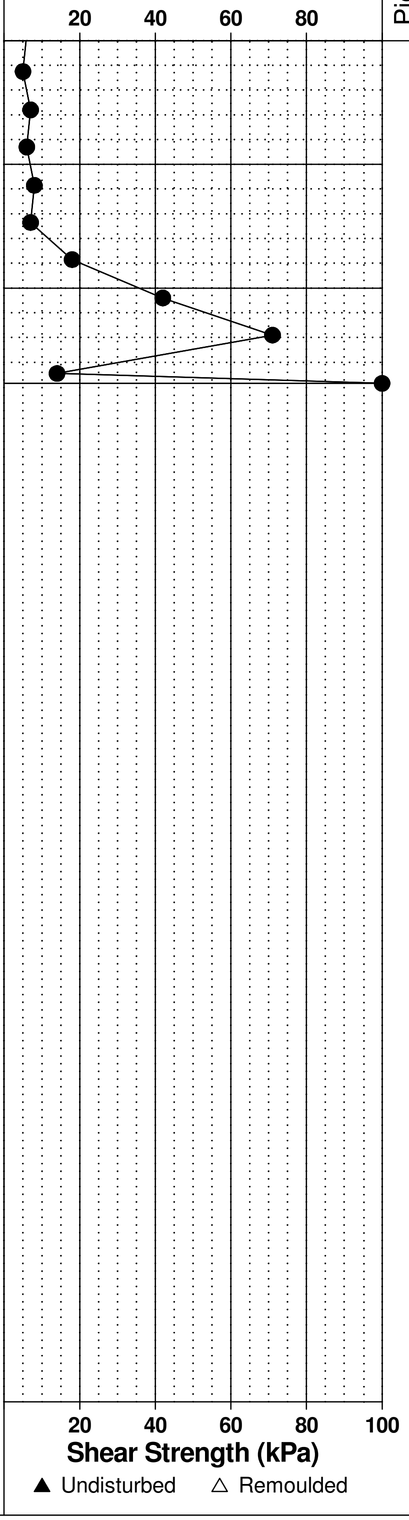
BORINGS BY CME 55 Power Auger

DATE 2019 October 24

FILE NO. PG5072

HOLE NO. BH 8

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD				
GROUND SURFACE						22	64.12		
						23	63.12		
						24	62.12		
24.77									
End of Borehole Practical DCPT refusal at 24.m depth. (GWL @ 2.31m - Dec. 9, 2019)									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5072

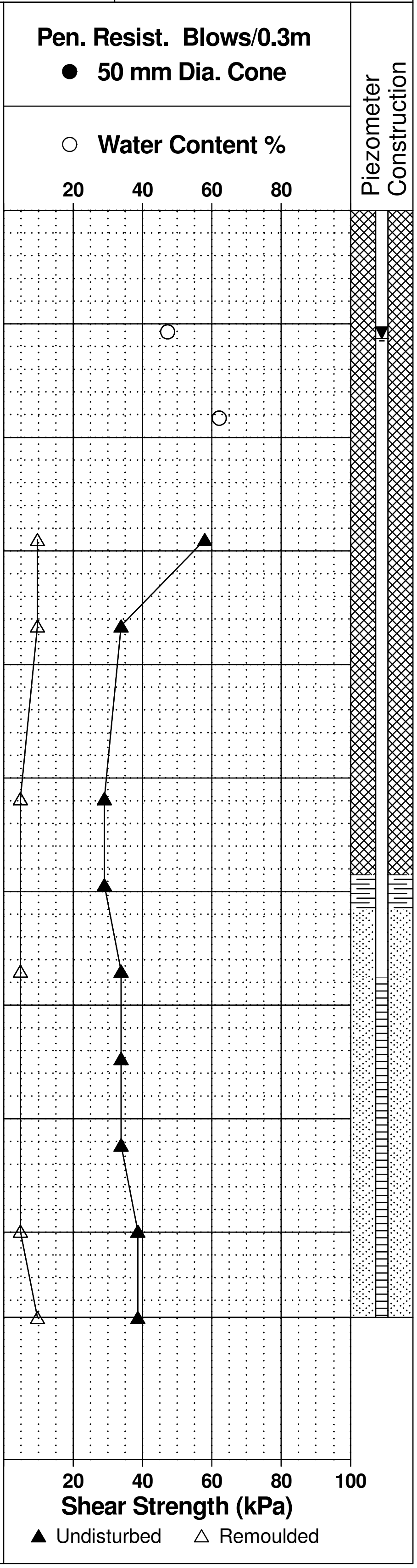
REMARKS

HOLE NO. BH 9

BORINGS BY CME 55 Power Auger

DATE 2019 October 24

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	85.94
TOPSOIL 0.20							
Brown **SILTY SAND** 0.30		AU	1				
Stiff, brown **SILTY CLAY**		SS	2	100	8	1	84.94
		SS	3	100	4	2	83.94
2.30							
Stiff to firm, grey **SILTY CLAY**						3	82.94
		TW	4	100		4	81.94
						5	80.94
						6	79.94
						7	78.94
						8	77.94
						9	76.94
9.75							
End of Borehole							
(GWL @ 1.13m - Dec. 9, 2019)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 October 4

FILE NO. PG5072

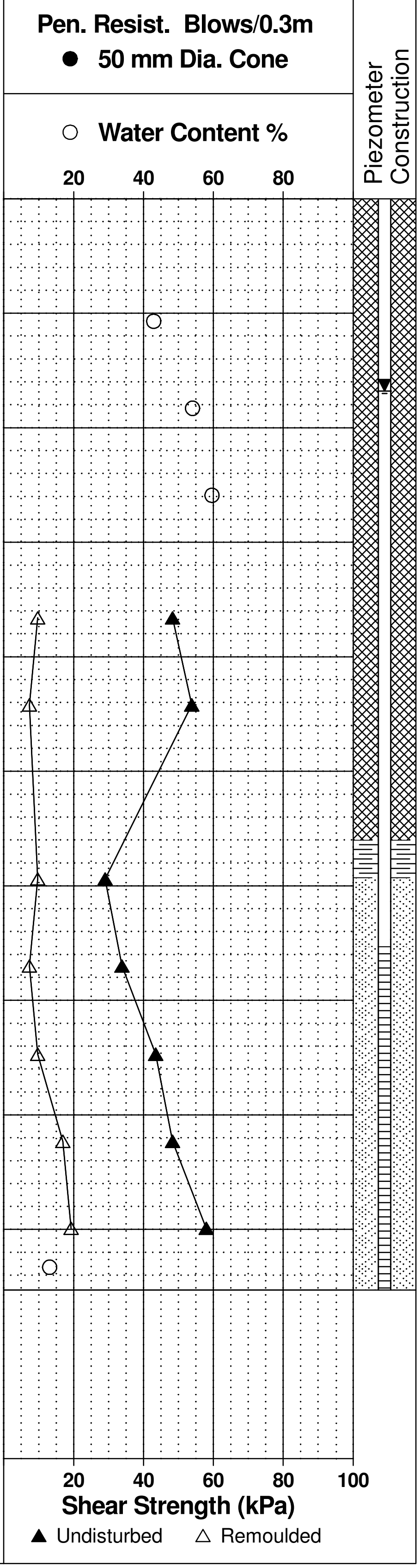
HOLE NO. BH10

SOIL DESCRIPTION	TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.20	AU	1		
Stiff, brown **SILTY CLAY**	SS	2	100	11
	SS	3	100	6
3.00	SS	4	100	5
Firm, grey **SILTY CLAY**	TW	5	96	
8.84				
GLACIAL TILL: Grey silty clay with sand and gravel, trace cobbles and boulders 9.53	SS	6	47	50+

End of Borehole
Practical refusal to augering at 9.53m depth.

(GWL @ 1.68m - Dec. 9, 2019)

DEPTH (m)	ELEV. (m)
0	85.74
1	84.74
2	83.74
3	82.74
4	81.74
5	80.74
6	79.74
7	78.74
8	77.74
9	76.74



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. **PG5072**

REMARKS

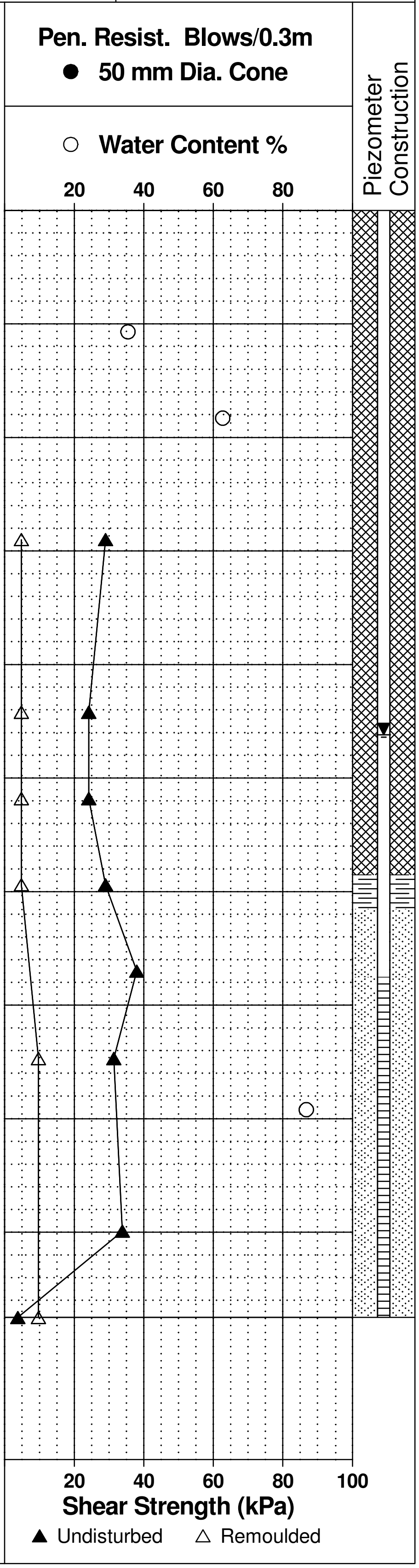
HOLE NO. **BH11**

BORINGS BY CME 55 Power Auger

DATE 2019 October 4

SOIL DESCRIPTION		STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)
			TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
GROUND SURFACE							0	85.07
TOPSOIL	0.20		AU	1				
Stiff, brown **SILTY CLAY**			SS	2	100	5	1	84.07
			SS	3	100	4		
	2.30						2	83.07
							3	82.07
			TW	4	88			
							4	81.07
							5	80.07
Firm, grey **SILTY CLAY**								
							6	79.07
							7	78.07
			SS	5	100	W		
							8	77.07
							9	76.07
End of Borehole	9.75							

(GWL @ 4.62m - Dec. 9, 2019)



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5072

REMARKS

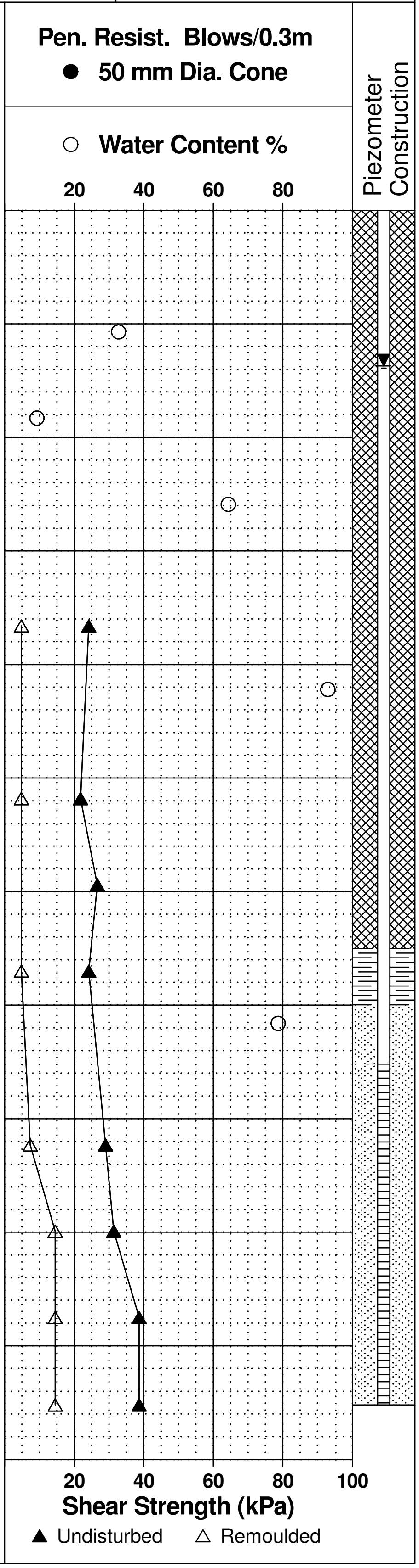
HOLE NO. BH12

BORINGS BY CME 55 Power Auger

DATE 2019 October 3

SOIL DESCRIPTION	TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.08	AU	1		
Compact, brown **SILTY SAND** with gravel 1.35	SS	2	4	10
Stiff, brown **SILTY CLAY** 2.30	SS	3	4	3
Soft to firm, grey **SILTY CLAY**	SS	4	100	W
	TW	5	92	
10.52	SS	6	100	2

DEPTH (m)	ELEV. (m)
0	85.35
1	84.35
2	83.35
3	82.35
4	81.35
5	80.35
6	79.35
7	78.35
8	77.35
9	76.35
10	75.35
11	74.35



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5072

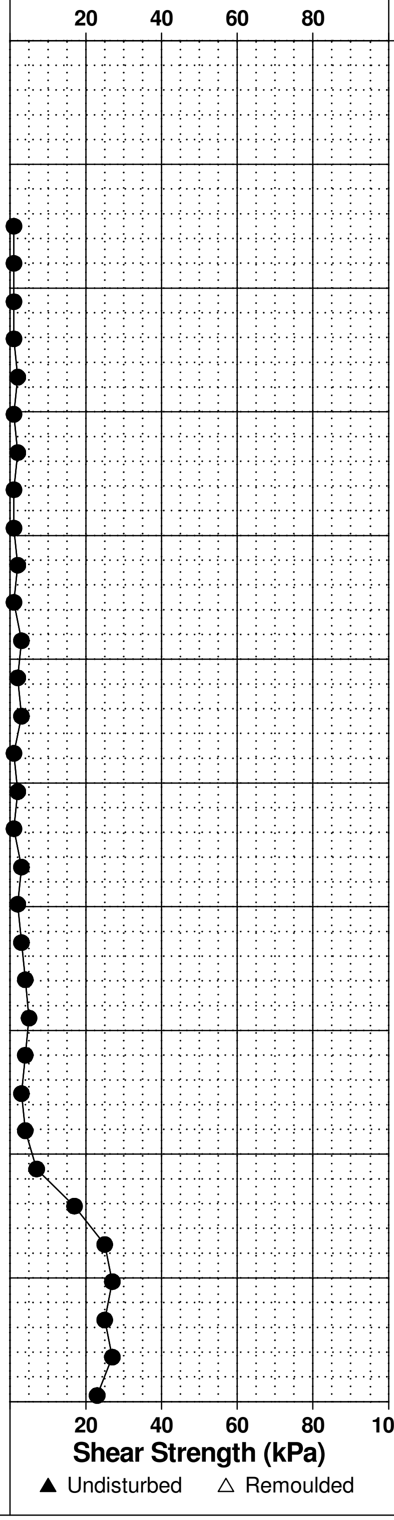
REMARKS

HOLE NO. BH12

BORINGS BY CME 55 Power Auger

DATE 2019 October 3

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									
Dynamic Cone Penetration Test commenced at 10.52m depth. Cone pushed to 12.2m depth.						11	74.35		
						12	73.35		
						13	72.35		
						14	71.35		
						15	70.35		
						16	69.35		
						17	68.35		
						18	67.35		
						19	66.35		
						20	65.35		
						21	64.35		
						22	63.35		



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

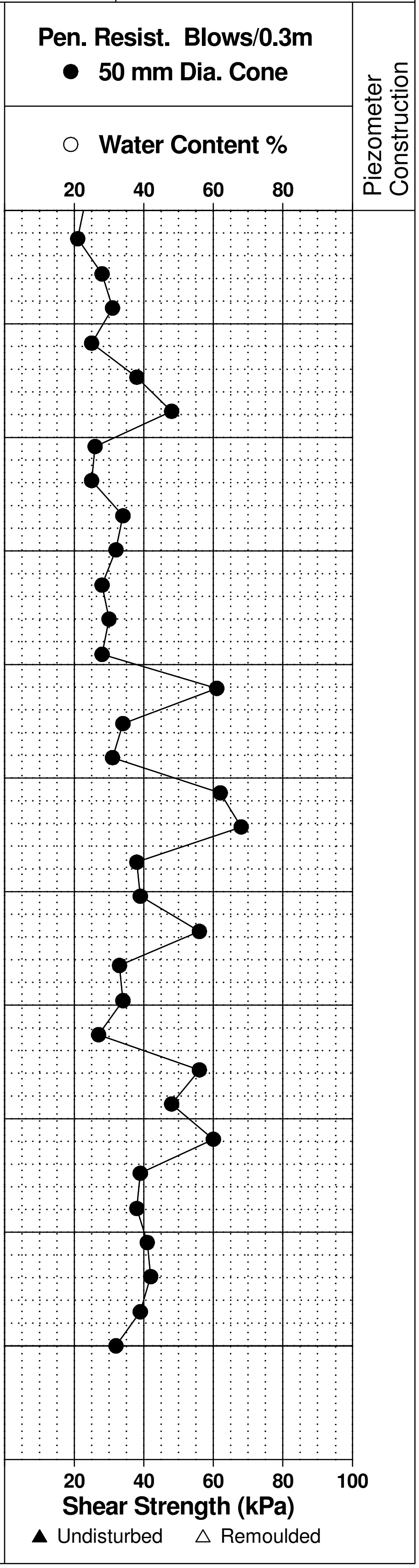
BORINGS BY CME 55 Power Auger

DATE 2019 October 3

FILE NO. PG5072

HOLE NO. BH12

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						22	63.35
						23	62.35
						24	61.35
						25	60.35
						26	59.35
						27	58.35
						28	57.35
						29	56.35
						30	55.35
						31	54.35
32.00 End of Borehole (GWL @ 1.37m - Dec. 9, 2019)						32	53.35



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5072

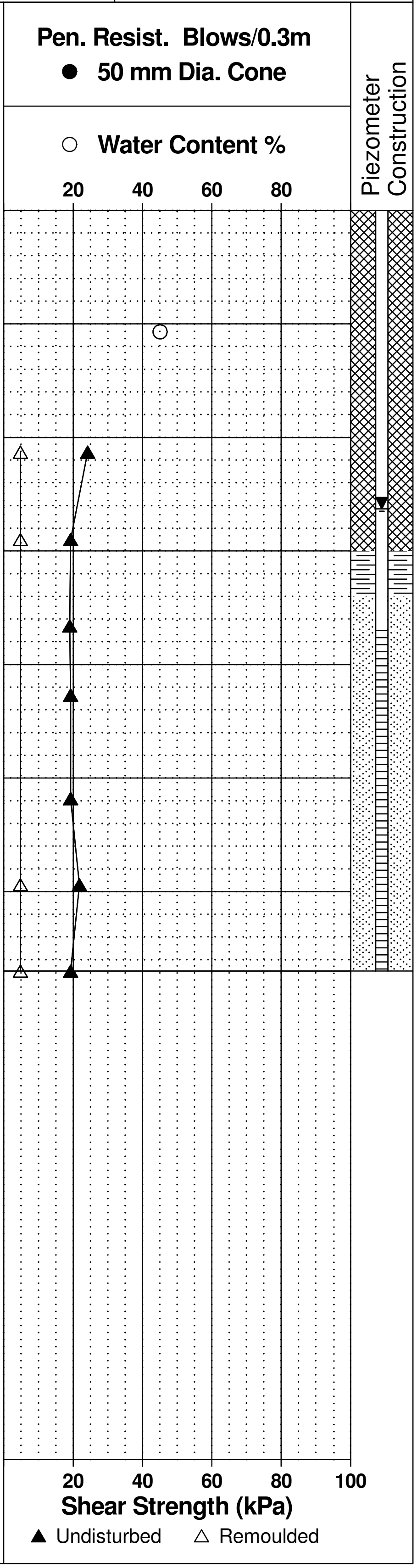
REMARKS

HOLE NO. BH13

BORINGS BY CME 55 Power Auger

DATE 2019 October 31

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	86.31
TOPSOIL 0.28		AU	1				
Firm, grey **SILTY CLAY** 1.50		SS	2	71	4	1	85.31
Soft, grey **SILTY CLAY** 6.70						2	84.31
						3	83.31
						4	82.31
						5	81.31
						6	80.31
End of Borehole (GWL @ 2.63m - Dec. 9, 2019)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5072

REMARKS

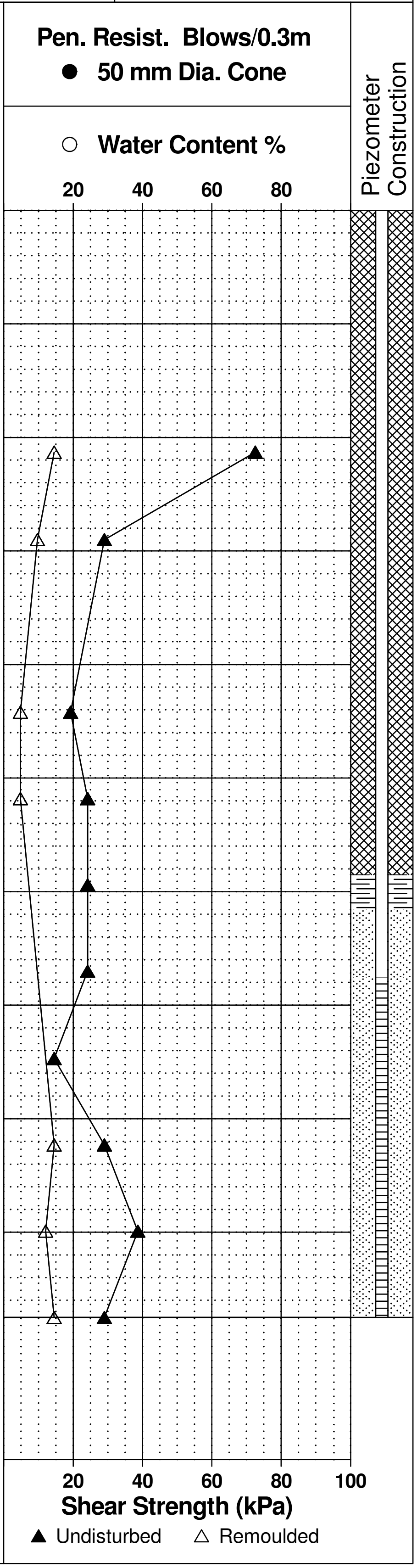
HOLE NO. BH14

BORINGS BY CME 55 Power Auger

DATE 2019 October 25

SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.15				
Brown **SILTY SAND**	0.28	AU	1		
Stiff, brown **SILTY CLAY**	2.30	SS	2	67	5
Soft to firm, grey **SILTY CLAY**	9.75	TW	3	100	
End of Borehole (Piezometer destroyed - Dec. 9, 2019)					

DEPTH (m)	ELEV. (m)
0	85.95
1	84.95
2	83.95
3	82.95
4	81.95
5	80.95
6	79.95
7	78.95
8	77.95
9	76.95



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

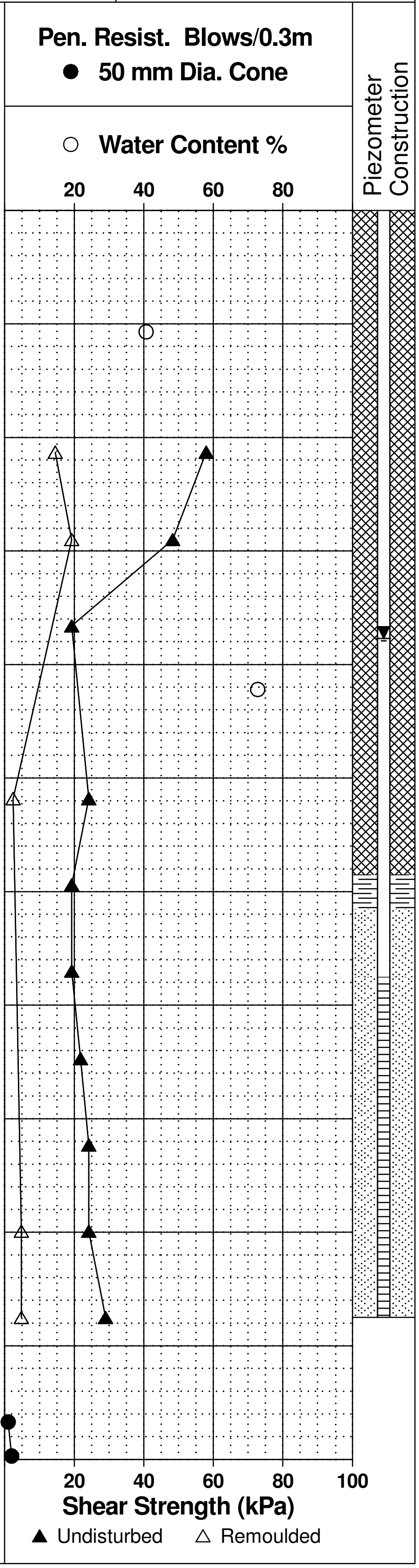
BORINGS BY CME 55 Power Auger

DATE 2019 October 31

FILE NO. PG5072

HOLE NO. BH15

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	85.65
TOPSOIL 0.18		AU	1				
Stiff to firm, brown **SILTY CLAY**		SS	2	75	6	1	84.65
						2	83.65
3.00						3	82.65
Soft to firm, grey **SILTY CLAY**		TW	3	100		4	81.65
						5	80.65
						6	79.65
						7	78.65
						8	77.65
9.75						9	76.65
Dynamic Cone Penetration Test commenced at 9.75m depth.						10	75.65
						11	74.65



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

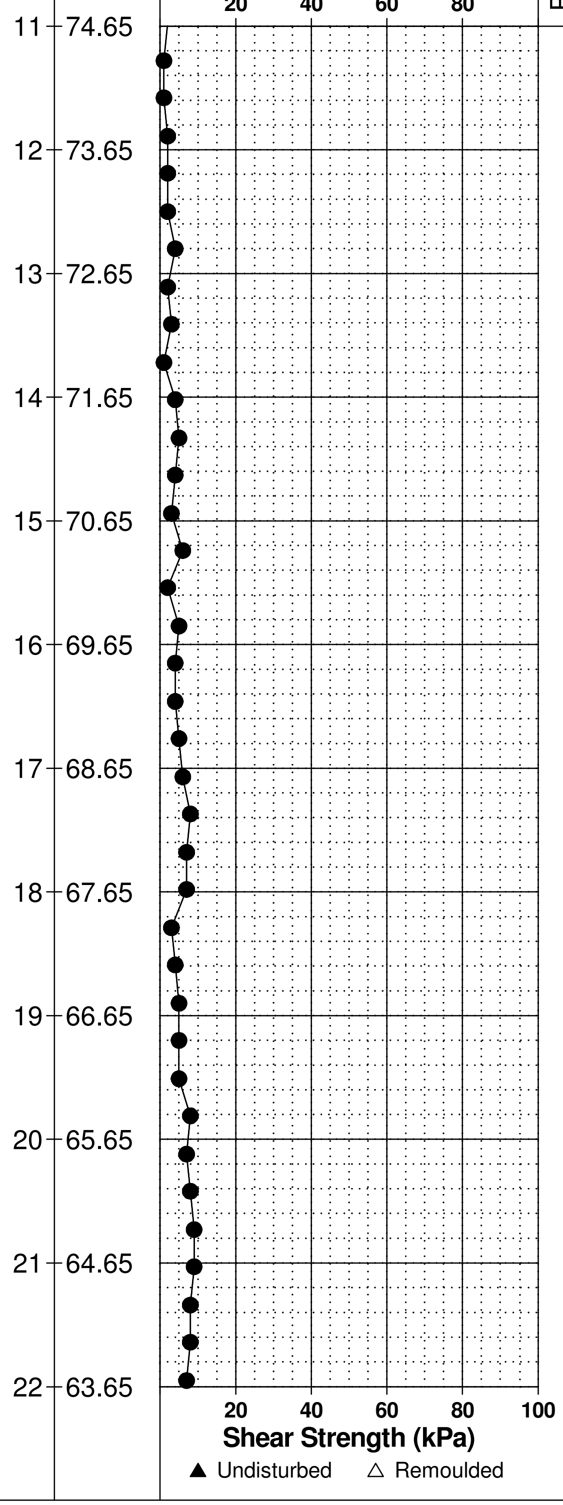
BORINGS BY CME 55 Power Auger

DATE 2019 October 31

FILE NO. PG5072

HOLE NO. BH15

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									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

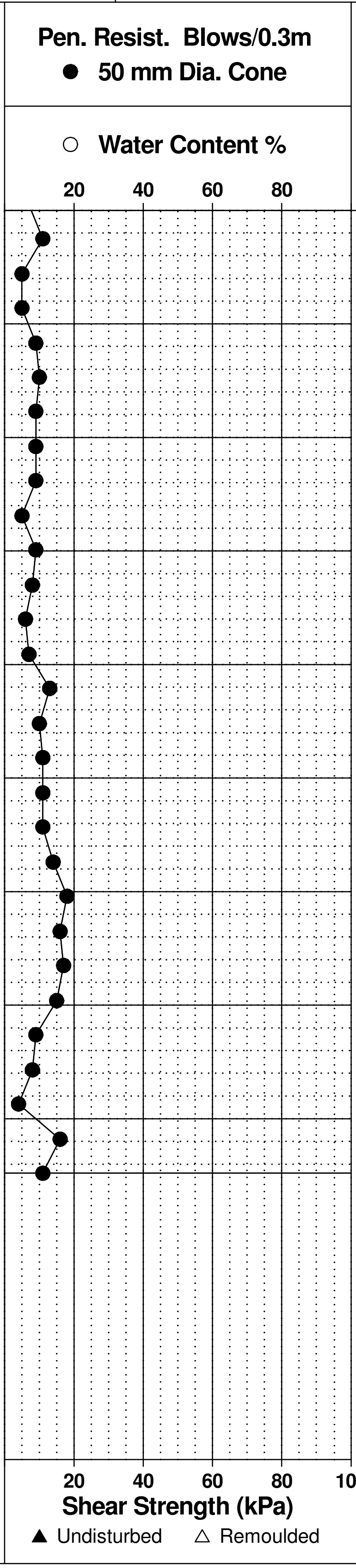
BORINGS BY CME 55 Power Auger

DATE 2019 October 31

FILE NO. PG5072

HOLE NO. BH15

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
						22	63.65
						23	62.65
						24	61.65
						25	60.65
						26	59.65
						27	58.65
						28	57.65
						29	56.65
						30	55.65
30.48							
End of Borehole (GWL @ 3.77m - Dec. 9, 2019)							



Piezometer Construction

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5072

REMARKS

HOLE NO. BH16

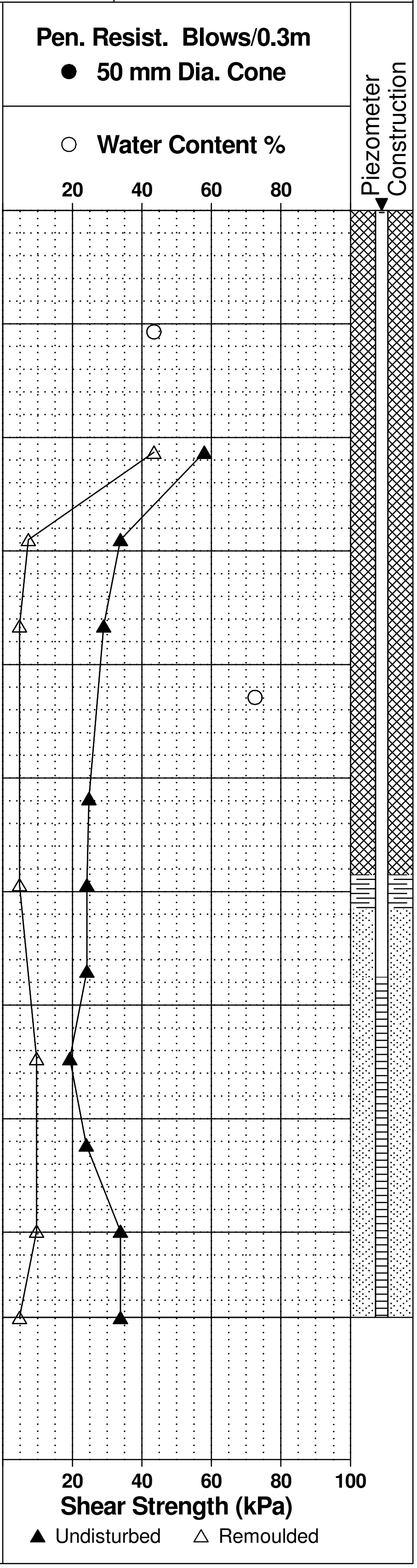
BORINGS BY CME 55 Power Auger

DATE 2019 October 25

SOIL DESCRIPTION	Depth (m)
GROUND SURFACE	
TOPSOIL	0.15
Brown **SILTY SAND**	0.25
Stiff, brown **SILTY CLAY**	2.30
Soft to firm, grey **SILTY CLAY**	9.75
End of Borehole	
(GWL at ground surface - Dec. 9, 2019)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	79	5
TW	3	100	

DEPTH (m)	ELEV. (m)
0	85.19
1	84.19
2	83.19
3	82.19
4	81.19
5	80.19
6	79.19
7	78.19
8	77.19
9	76.19



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. **PG5072**

REMARKS

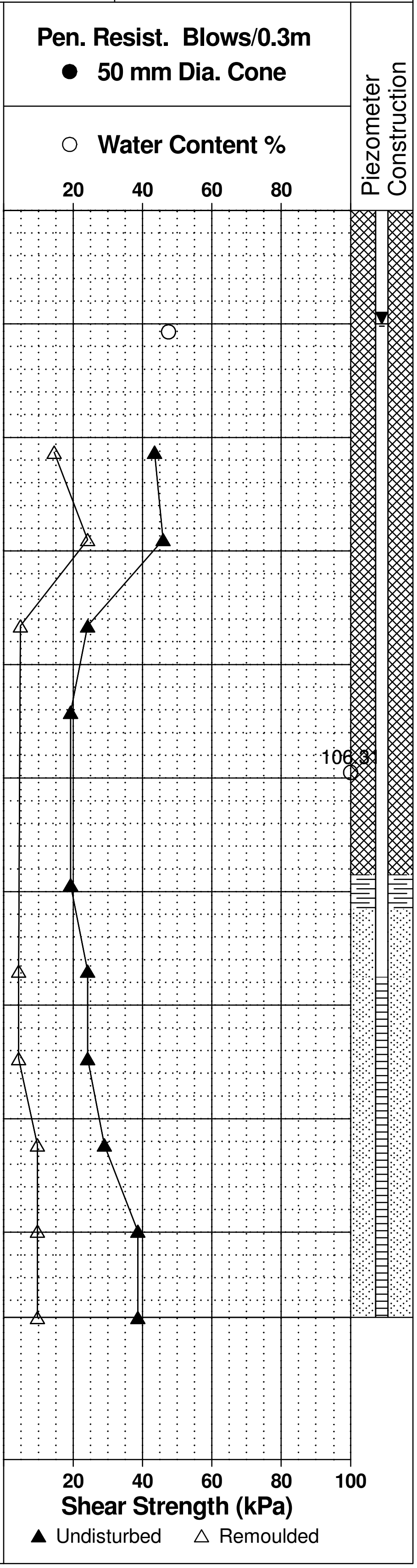
HOLE NO. **BH17**

BORINGS BY CME 55 Power Auger

DATE 2019 October 25

SOIL DESCRIPTION	Depth (m)	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.18	AU	1		
Brown **SILTY SAND**	0.28				
Stiff to firm, brown **SILTY CLAY**	3.00	SS	2	100	4
Soft to firm, grey **SILTY CLAY**	9.75	TW	3		
End of Borehole					
(GWL @ 1.00m - Dec. 9, 2019)					

DEPTH (m)	ELEV. (m)
0	85.26
1	84.26
2	83.26
3	82.26
4	81.26
5	80.26
6	79.26
7	78.26
8	77.26
9	76.26



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

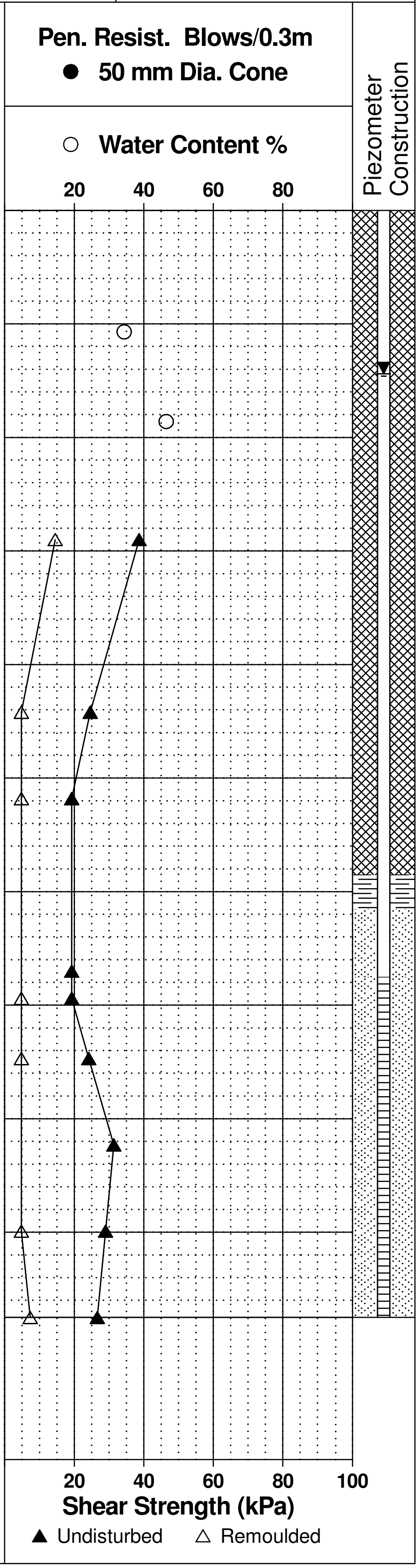
DATE 2019 October 28

FILE NO. PG5072

HOLE NO. BH18

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.20	AU	1		
Stiff to firm, brown **SILTY CLAY**	SS	2		7
1.50				
Soft to firm, grey **SILTY CLAY**	SS	3		2
	TW	4	100	
9.75				
End of Borehole				
(GWL @ 1.44m - Dec. 9, 2019)				

DEPTH (m)	ELEV. (m)
0	85.30
1	84.30
2	83.30
3	82.30
4	81.30
5	80.30
6	79.30
7	78.30
8	77.30
9	76.30



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5072

REMARKS

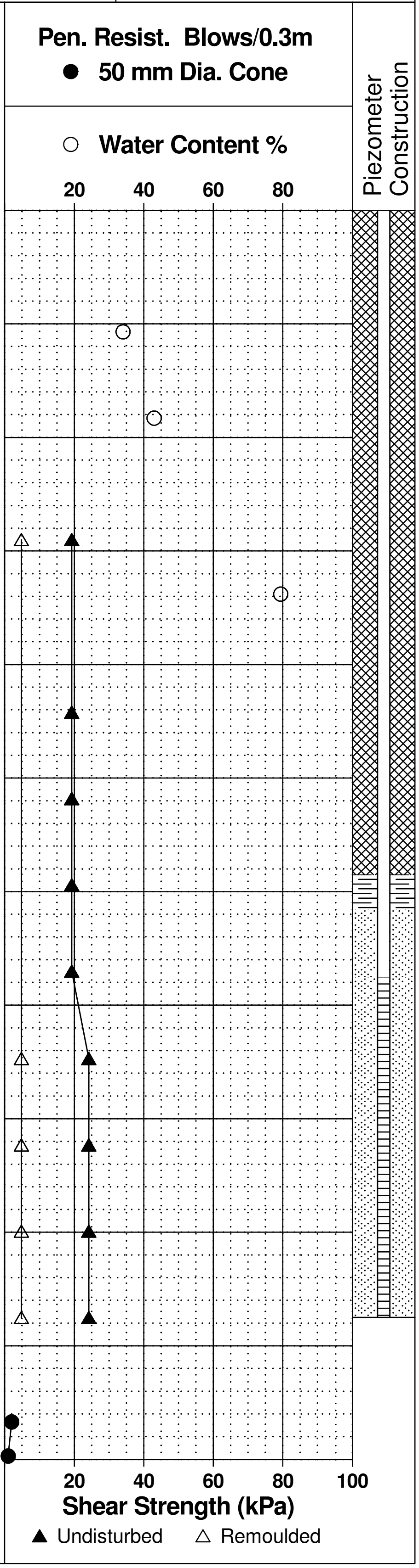
HOLE NO. BH19

BORINGS BY CME 55 Power Auger

DATE 2019 October 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL 0.28		AU	1		
Compact, brown **SILTY SAND** 1.35		SS	2	46	10
Stiff to firm, brown **SILTY CLAY** 2.30		SS	3	79	3
Soft, grey **SILTY CLAY** 9.75		TW	4	100	
Dynamic Cone Penetration Test commenced at 9.75m depth					

DEPTH (m)	ELEV. (m)
0	86.81
1	85.81
2	84.81
3	83.81
4	82.81
5	81.81
6	80.81
7	79.81
8	78.81
9	77.81
10	76.81
11	75.81



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

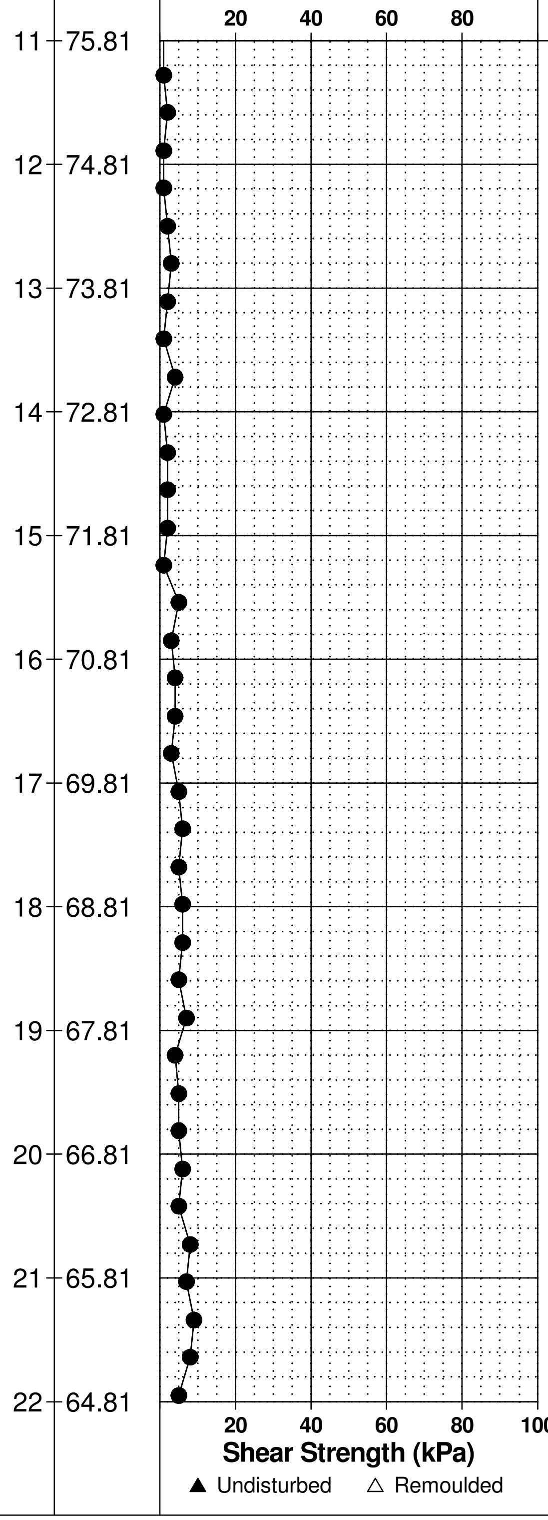
BORINGS BY CME 55 Power Auger

DATE 2019 October 29

FILE NO. PG5072

HOLE NO. BH19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE		TYPE	NUMBER	% RECOVERY	N VALUE or RQD				



Shear Strength (kPa)

▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 October 29

FILE NO. PG5072

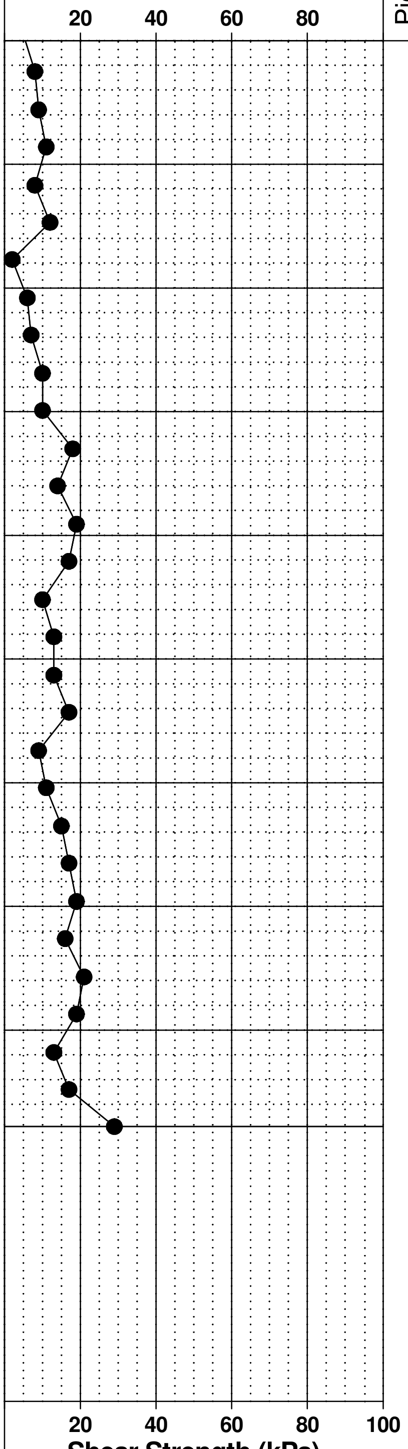
HOLE NO. BH19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
						22	64.81
						23	63.81
						24	62.81
						25	61.81
						26	60.81
						27	59.81
						28	58.81
						29	57.81
						30	56.81
30.78							
End of Borehole (Piezometer dry/blocked at 1.3m depth - Dec. 9, 2019)							

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

○ Water Content %

Piezometer Construction



Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5072

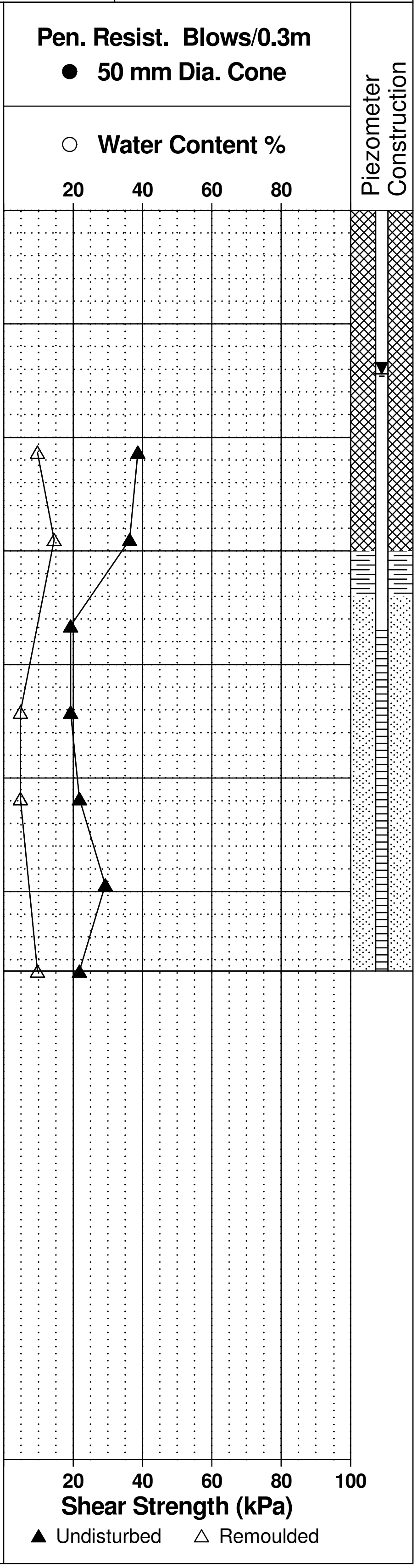
REMARKS

HOLE NO. BH20

BORINGS BY CME 55 Power Auger

DATE 2019 October 29

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	86.04
TOPSOIL 0.23		AU	1				
Stiff to firm, brown **SILTY CLAY**		SS	2	100	5	1	85.04
						2	84.04
3.00						3	83.04
Soft, grey **SILTY CLAY**						4	82.04
						5	81.04
						6	80.04
6.70							
End of Borehole (GWL @ 1.44m - Dec. 9, 2019)							



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REMARKS

BORINGS BY CME 55 Power Auger

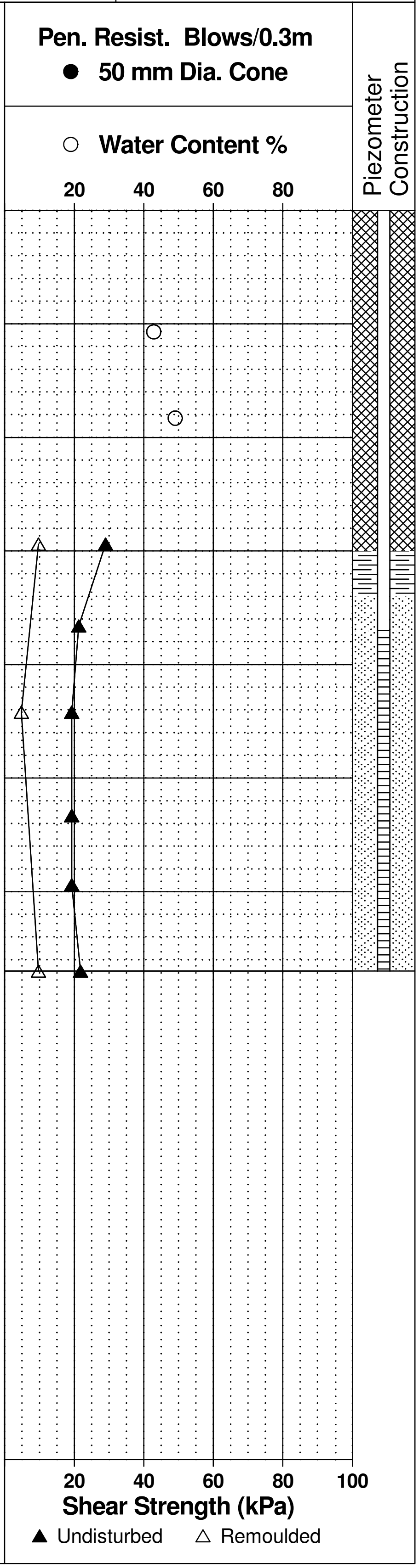
DATE 2019 October 30

FILE NO. PG5072

HOLE NO. BH21

SOIL DESCRIPTION	Depth to base (m)	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.28	AU	1		
Stiff to firm, brown **SILTY CLAY**	3.00	SS	2	100	5
		SS	3	100	2
Soft, grey **SILTY CLAY**	6.70				
End of Borehole					
(Piezometer dry - Dec. 9, 2019)					

DEPTH (m)	ELEV. (m)
0	85.68
1	84.68
2	83.68
3	82.68
4	81.68
5	80.68
6	79.68



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
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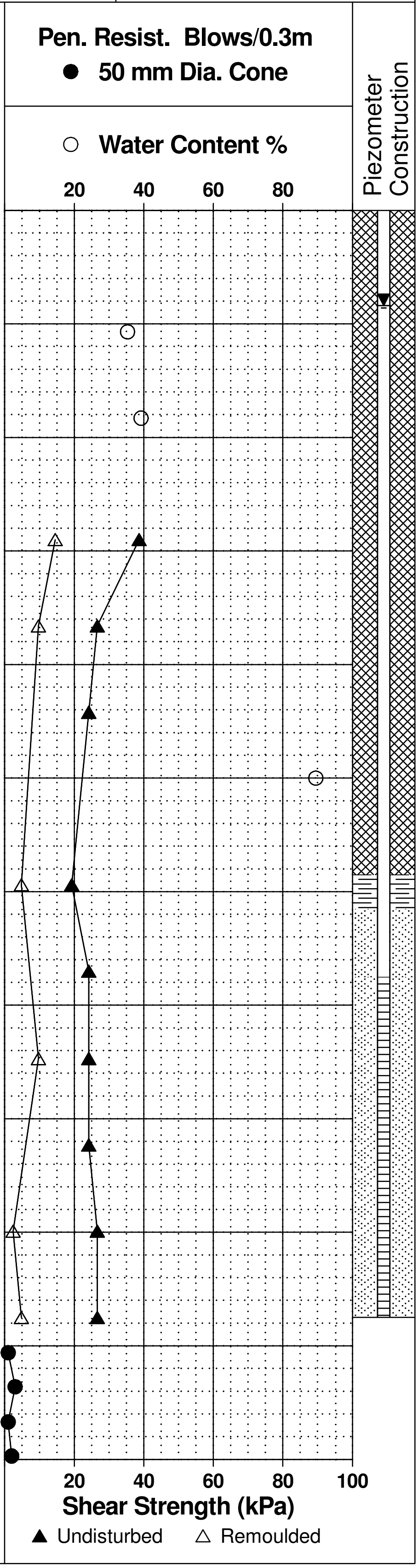
FILE NO. **PG5072**

REMARKS

HOLE NO. **BH22**

BORINGS BY CME 55 Power Auger **DATE** 2019 October 28

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	85.94
TOPSOIL 0.36		AU	1				
Stiff to firm, brown **SILTY CLAY**		SS		100	10	1	84.94
		SS	3	100	5	2	83.94
3.00						3	82.94
Soft to firm, grey **SILTY CLAY**						4	81.94
		TW	4	100		5	80.94
						6	79.94
						7	78.94
						8	77.94
						9	76.94
9.75							
Dynamic Cone Penetration Test commenced at 9.75m depth.						10	75.94
						11	74.94



SOIL PROFILE AND TEST DATA

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Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

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FILE NO. PG5072

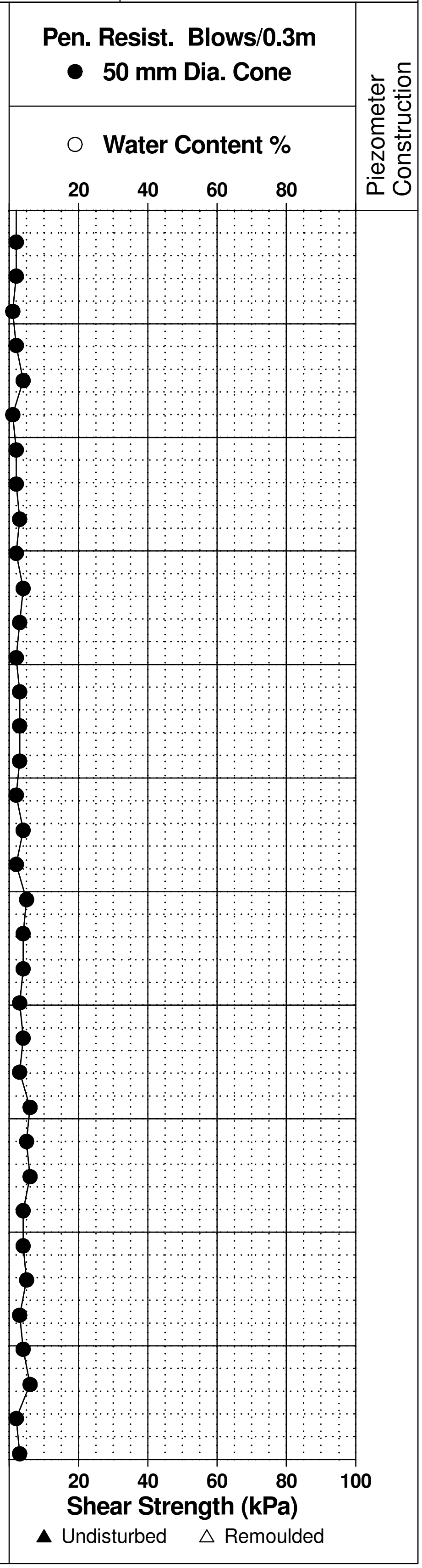
REMARKS

HOLE NO. BH22

BORINGS BY CME 55 Power Auger

DATE 2019 October 28

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)
GROUND SURFACE		TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
						11	74.94
						12	73.94
						13	72.94
						14	71.94
						15	70.94
						16	69.94
						17	68.94
						18	67.94
						19	66.94
						20	65.94
						21	64.94
						22	63.94



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SOIL PROFILE AND TEST DATA

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Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

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REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 October 28

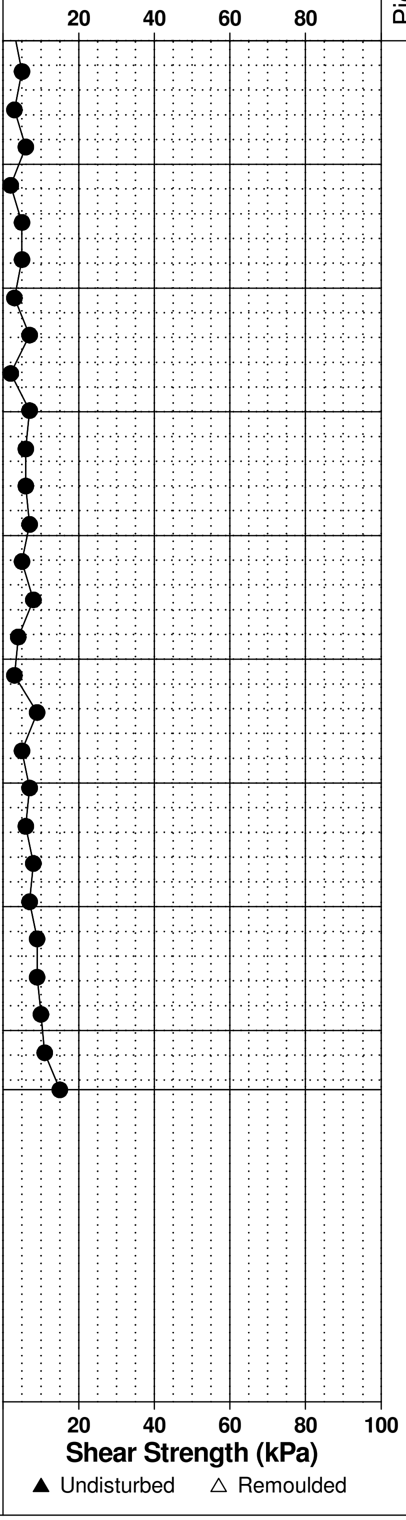
FILE NO. PG5072

HOLE NO. BH22

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						22	63.94		
						23	62.94		
						24	61.94		
						25	60.94		
						26	59.94		
						27	58.94		
						28	57.94		
						29	56.94		
						30	55.94		
30.48									

End of Borehole

(GWL @ 0.84m - Dec. 9, 2019)



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 October 28

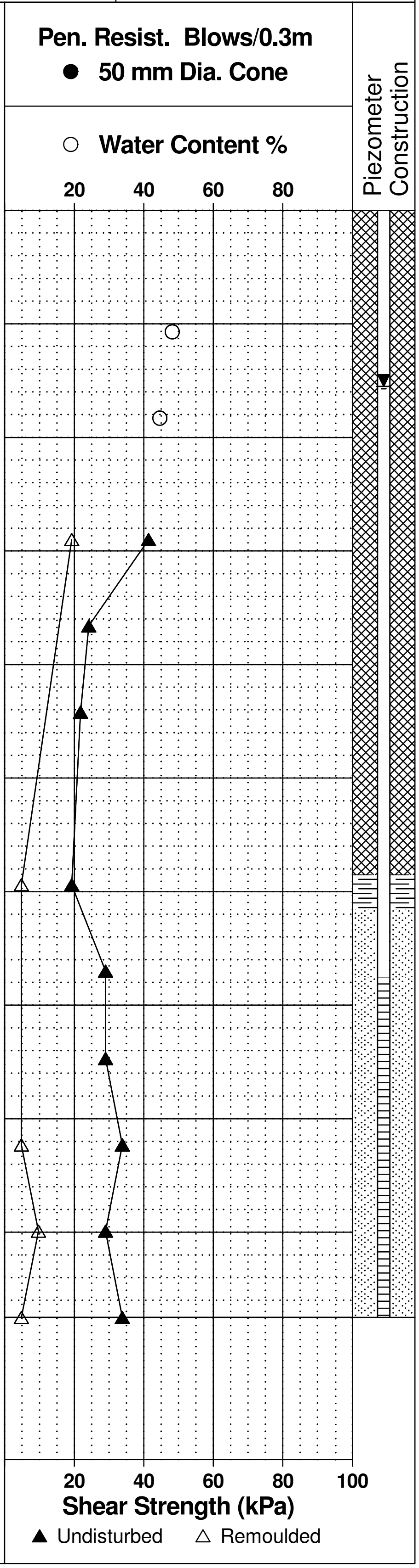
FILE NO. PG5072

HOLE NO. BH23

SOIL DESCRIPTION	Depth to base (m)	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.20	AU	1		
Brown **SILTY SAND**	0.28				
Stiff to firm, brown **SILTY CLAY**	3.00	SS	2	100	7
		SS	3	100	2
Soft to firm, grey **SILTY CLAY**	9.75	TW	4	100	
End of Borehole					

(GWL @ 1.55m - Dec. 9, 2019)

DEPTH (m)	ELEV. (m)
0	86.33
1	85.33
2	84.33
3	83.33
4	82.33
5	81.33
6	80.33
7	79.33
8	78.33
9	77.33



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

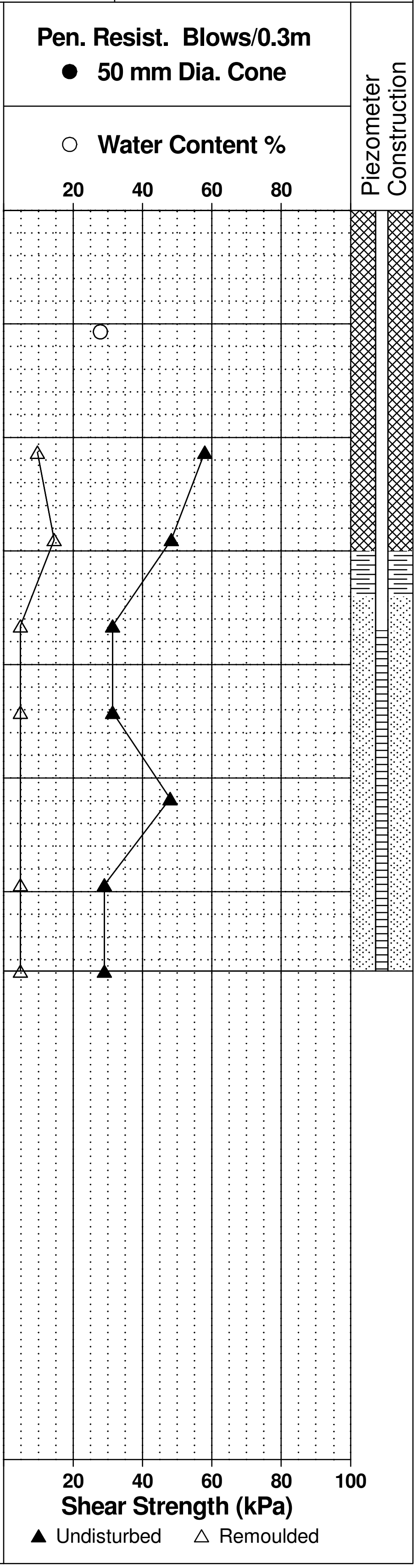
BORINGS BY CME 55 Power Auger

DATE 2019 November 1

FILE NO. PG5072

HOLE NO. BH24

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	85.30
Stiff to firm, brown **SILTY CLAY**		AU	1				
		SS	2	100	6	1	84.30
						2	83.30
2.30							
Firm, grey **SILTY CLAY**						3	82.30
						4	81.30
						5	80.30
						6	79.30
6.70							
End of Borehole (Piezometer destroyed - Dec. 9, 2019)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

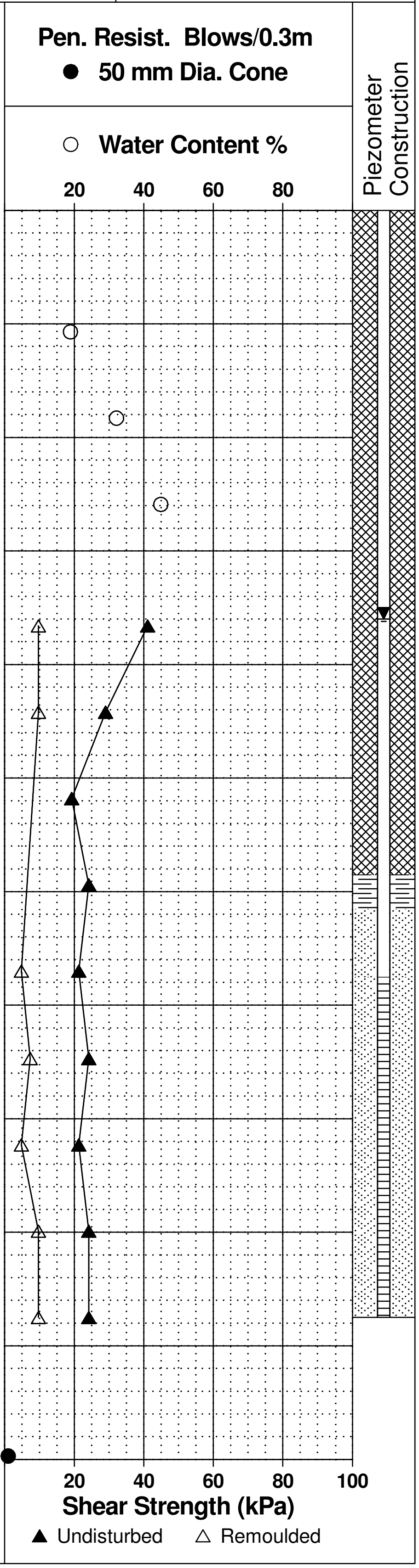
DATE 2019 October 30

FILE NO. PG5072

HOLE NO. BH25

SOIL DESCRIPTION	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE				
TOPSOIL 0.25	AU	1		
Very stiff to stiff, brown **SILTY CLAY**	SS	2	25	24
	SS	3	79	17
2.30				
Firm to soft, grey **SILTY CLAY**	SS	4	100	4
9.75				
Dynamic Cone Penetration Test commenced at 9.75m depth. Cone pushed to 11.6m depth.				

DEPTH (m)	ELEV. (m)
0	86.41
1	85.41
2	84.41
3	83.41
4	82.41
5	81.41
6	80.41
7	79.41
8	78.41
9	77.41
10	76.41
11	75.41



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

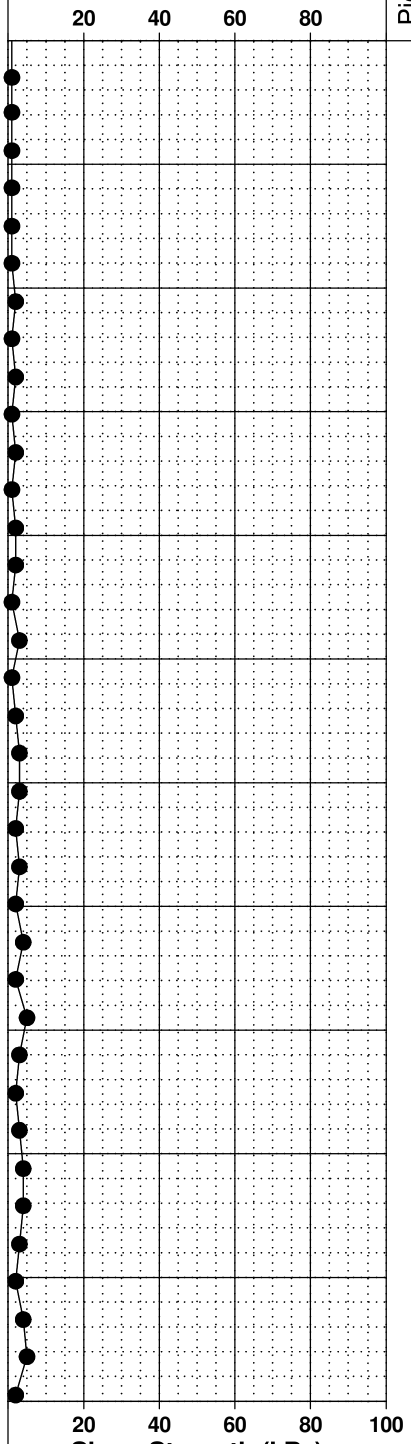
BORINGS BY CME 55 Power Auger

DATE 2019 October 30

FILE NO. PG5072

HOLE NO. BH25

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						11	75.41		
						12	74.41		
						13	73.41		
						14	72.41		
						15	71.41		
						16	70.41		
						17	69.41		
						18	68.41		
						19	67.41		
						20	66.41		
						21	65.41		
						22	64.41		



Shear Strength (kPa)

▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

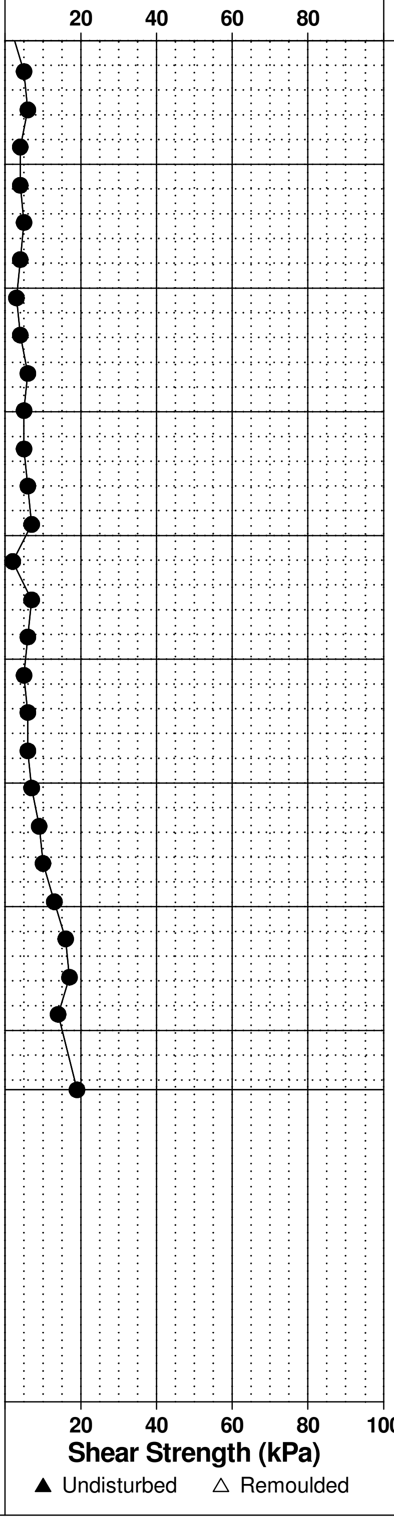
BORINGS BY CME 55 Power Auger

DATE 2019 October 30

FILE NO. PG5072

HOLE NO. BH25

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						22	64.41		
						23	63.41		
						24	62.41		
						25	61.41		
						26	60.41		
						27	59.41		
						28	58.41		
						29	57.41		
						30	56.41		
30.48									
End of Borehole (GWL @ 3.60m - Dec. 9, 2019)									



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

DATE 2019 October 29

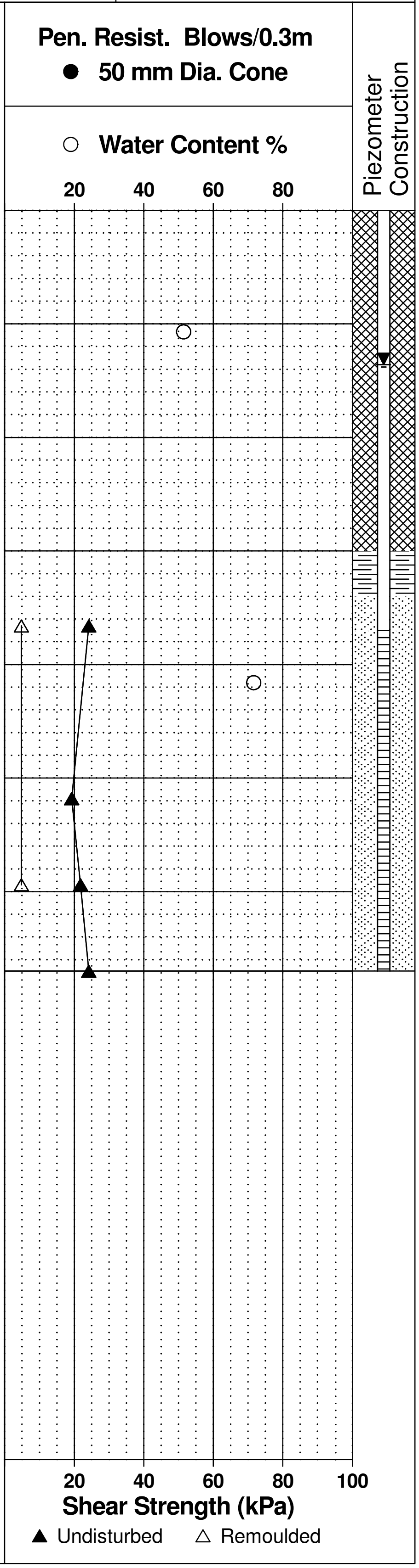
FILE NO. PG5072

HOLE NO. BH26

SOIL DESCRIPTION	Depth to base (m)
GROUND SURFACE	
TOPSOIL	0.23
Stiff to firm, brown **SILTY CLAY**	3.00
Soft, grey **SILTY CLAY**	6.70
End of Borehole (GWL @ 1.36m - Dec. 9, 2019)	

SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	54	10
SS	3	38	13
SS	4	100	4
TW	5	100	

DEPTH (m)	ELEV. (m)
0	87.26
1	86.26
2	85.26
3	84.26
4	83.26
5	82.26
6	81.26



SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Mer Bleu Lands
Mer Bleu Road, Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

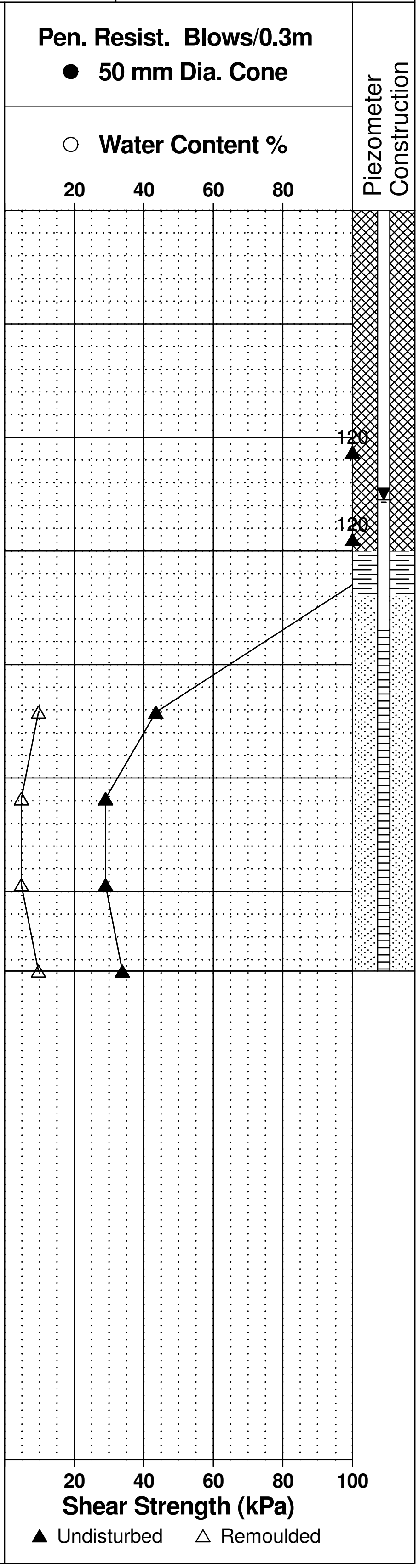
DATE 2019 November 1

FILE NO. PG5072

HOLE NO. BH27

SOIL DESCRIPTION	Bottom depth (m)	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE						
TOPSOIL	0.36	■	AU	1		
Very stiff to stiff, brown **SILTY CLAY**	3.80	▨	SS	2	54	9
			SS	3	100	5
Firm, grey **SILTY CLAY**	6.70	▨				
End of Borehole (GWL @ 2.55m - Dec. 9, 2019)						

DEPTH (m)	ELEV. (m)
0	87.14
1	86.14
2	85.14
3	84.14
4	83.14
5	82.14
6	81.14



SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	**ROCK QUALITY**
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC% - Natural moisture content or water content of sample, %
LL - Liquid Limit, % (water content above which soil behaves as a liquid)
PL - Plastic limit, % (water content above which soil behaves plastically)
PI - Plasticity index, % (difference between LL and PL)

Dxx - Grain size which xx% of the soil, by weight, is of finer grain sizes
These grain size descriptions are not used below 0.075 mm grain size
D10 - Grain size at which 10% of the soil is finer (effective grain size)
D60 - Grain size at which 60% of the soil is finer

Cc - Concavity coefficient = $(D30)^2 / (D10 \times D60)$
Cu - Uniformity coefficient = $D60 / D10$

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

p'_o - Present effective overburden pressure at sample depth
p'_c - Preconsolidation pressure of (maximum past pressure on) sample
Ccr - Recompression index (in effect at pressures below p'_c)
Cc - Compression index (in effect at pressures above p'_c)

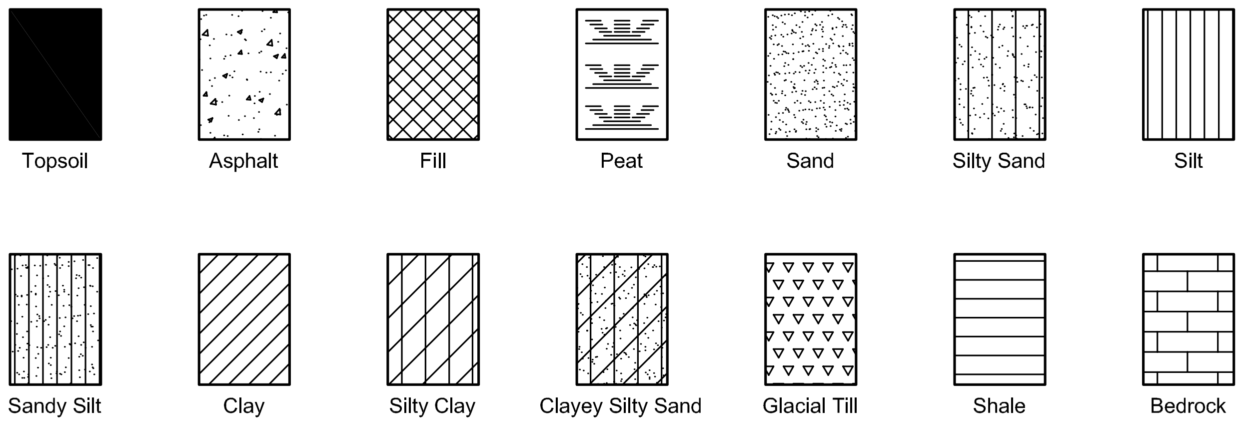
OC Ratio Overconsolidaton ratio = p'_c / p'_o
Void Ratio Initial sample void ratio = volume of voids / volume of solids
Wo - Initial water content (at start of consolidation test)

PERMEABILITY TEST

k - Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

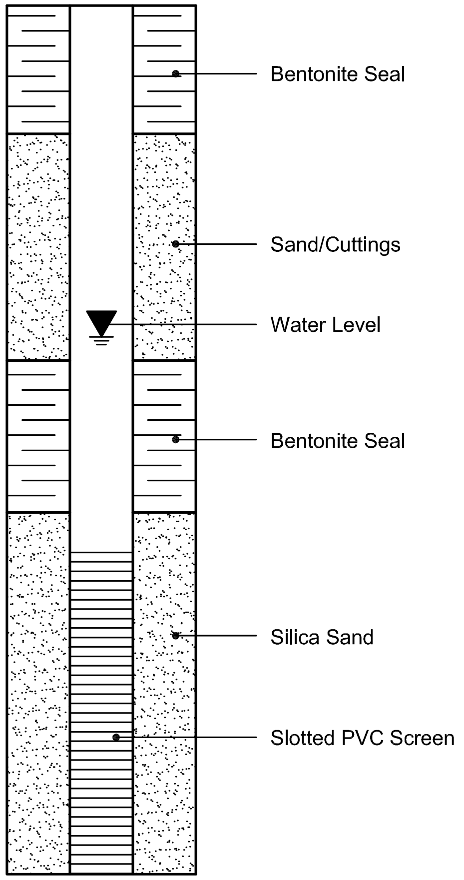
SYMBOLS AND TERMS (continued)

STRATA PLOT

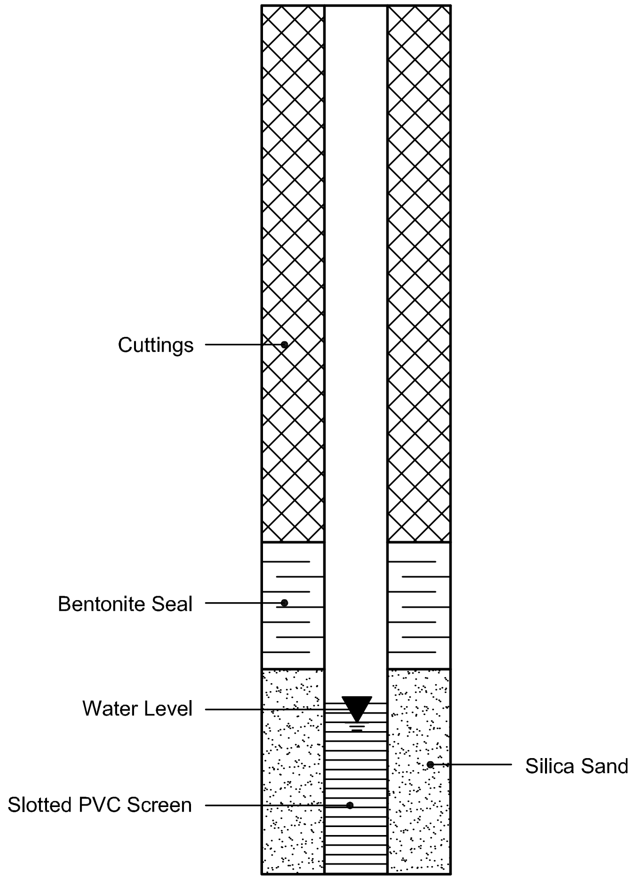


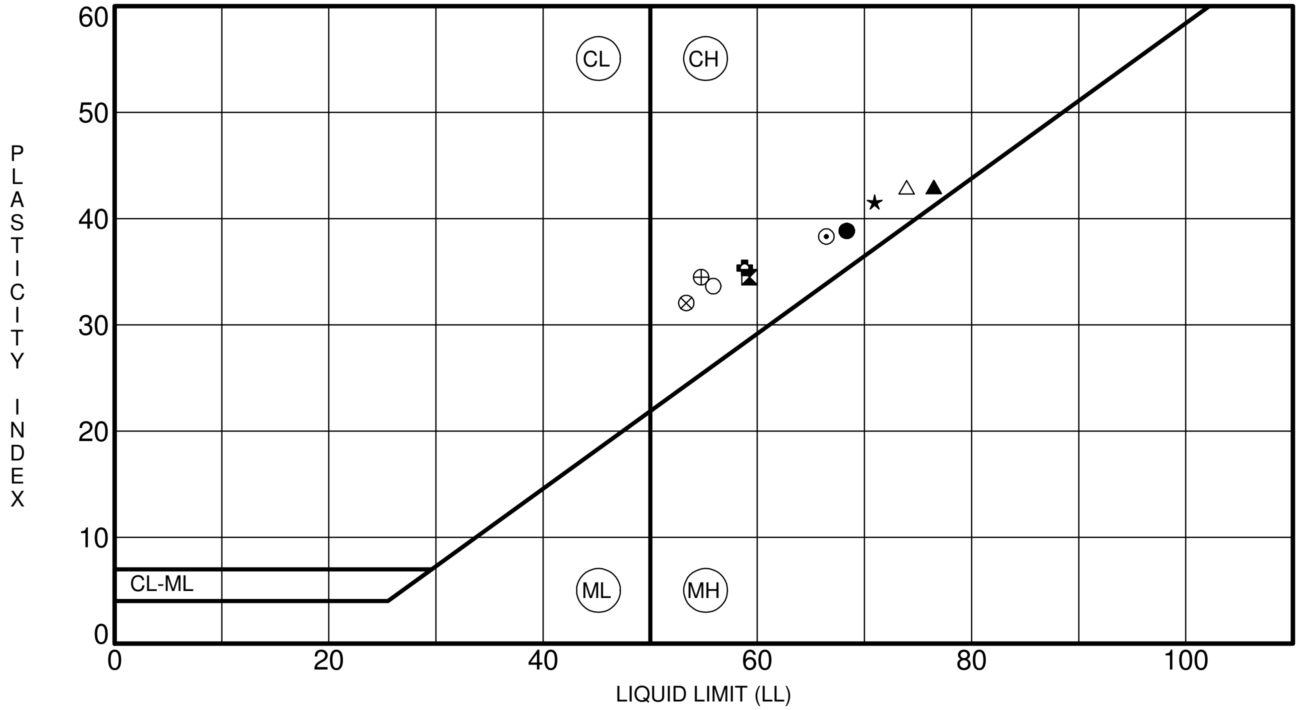
MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



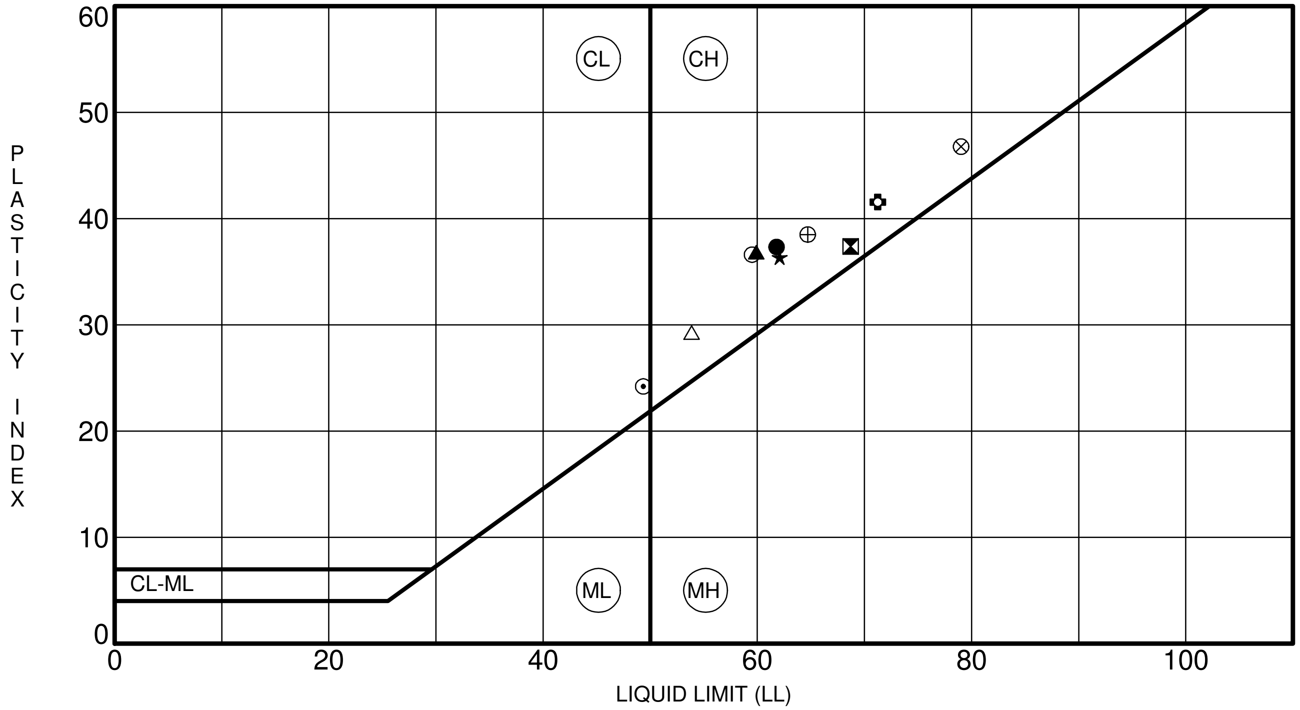


Specimen Identification			LL	PL	PI	Fines	Classification
●	**BH 1**	**SS2**	**68**	**29**	**39**		**CH - Inorganic clay of high plasticity**
⧗	**BH 2**	**SS 2**	**59**	**25**	**35**		**CH - Inorganic clay of high plasticity**
▲	**BH 4**	**SS 3**	**76**	**33**	**43**		**CH - Inorganic clay of high plasticity**
★	**BH 5**	**SS 2**	**71**	**29**	**42**		**CH - Inorganic clay of high plasticity**
⊙	**BH 6**	**SS 2**	**66**	**28**	**38**		**CH - Inorganic clay of high plasticity**
✤	**BH 7**	**SS 2**	**59**	**23**	**35**		**CH - Inorganic clay of high plasticity**
○	**BH 9**	**SS 2**	**56**	**22**	**34**		**CH - Inorganic clay of high plasticity**
△	**BH11**	**SS 2**	**74**	**31**	**43**		**CH - Inorganic clay of high plasticity**
⊗	**BH12**	**SS 4**	**53**	**21**	**32**		**CH - Inorganic clay of high plasticity**
⊕	**BH13**	**SS 2**	**55**	**20**	**34**		**CH - Inorganic clay of high plasticity**

CLIENT **Claridge Homes**
PROJECT **Geotechnical Investigation - Prop. Residential Development - Mer Bleu Lands**
FILE NO. **PG5072**
DATE **31 Oct 19**

patersongroup **Consulting Engineers**
154 Colonnade Road South, Ottawa, Ontario K2E 7J5

ATTERBERG LIMITS' RESULTS



Specimen Identification			LL	PL	PI	Fines	Classification
●	**BH16**	**SS 2**	**62**	**24**	**37**		**CH - Inorganic clay of high plasticity**
⧗	**BH17**	**SS 2**	**69**	**31**	**37**		**CH - Inorganic clay of high plasticity**
▲	**BH19**	**SS 3**	**60**	**23**	**37**		**CH - Inorganic clay of high plasticity**
★	**BH20**	**SS 2**	**62**	**26**	**36**		**CH - Inorganic clay of high plasticity**
⊙	**BH21**	**SS 2**	**49**	**25**	**24**		**CL - Inorganic clay of low plasticity**
✿	**BH22**	**SS 2**	**71**	**30**	**42**		**CH - Inorganic clay of high plasticity**
○	**BH24**	**SS 2**	**60**	**23**	**37**		**CH - Inorganic clay of high plasticity**
△	**BH25**	**SS 3**	**54**	**25**	**29**		**CH - Inorganic clay of high plasticity**
⊗	**BH26**	**SS 2**	**79**	**32**	**47**		**CH - Inorganic clay of high plasticity**
⊕	**BH27**	**SS 2**	**65**	**26**	**39**		**CH - Inorganic clay of high plasticity**

CLIENT **Claridge Homes**

PROJECT **Geotechnical Investigation - Proposed Residential Development - Mer Bleu Lands**

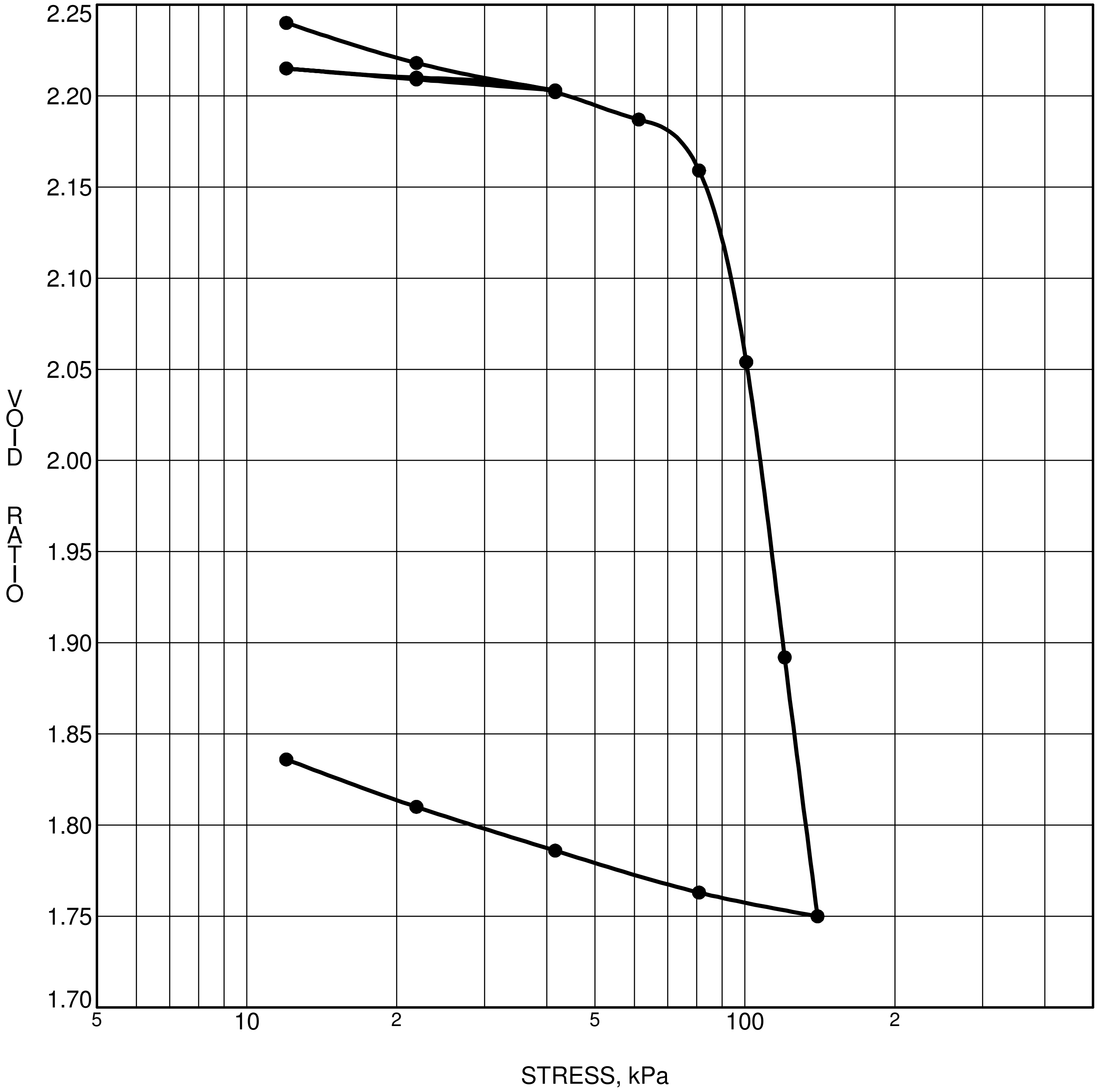
FILE NO. **PG5072**

DATE **1 Nov 19**

patersongroup **Consulting Engineers**

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

ATTERBERG LIMITS' RESULTS



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	**BH 4**	p'_o	**58.4** kPa	Ccr	**0.026**
Sample No.	**TW 4**	p'_c	**90** kPa	Cc	**2.158**
Sample Depth	**4.98** m	OC Ratio	**1.5**	Wo	**81.4** %
Sample Elev.	**80.34** m	Void Ratio	**2.237**	Unit Wt.	**15.1** kN/m ^{3}

CLIENT **Claridge Homes**

PROJECT **Geotechnical Investigation - Prop. Residential Development - Mer Bleu Lands**

FILE NO. **PG5072**

DATE **10/31/2019**

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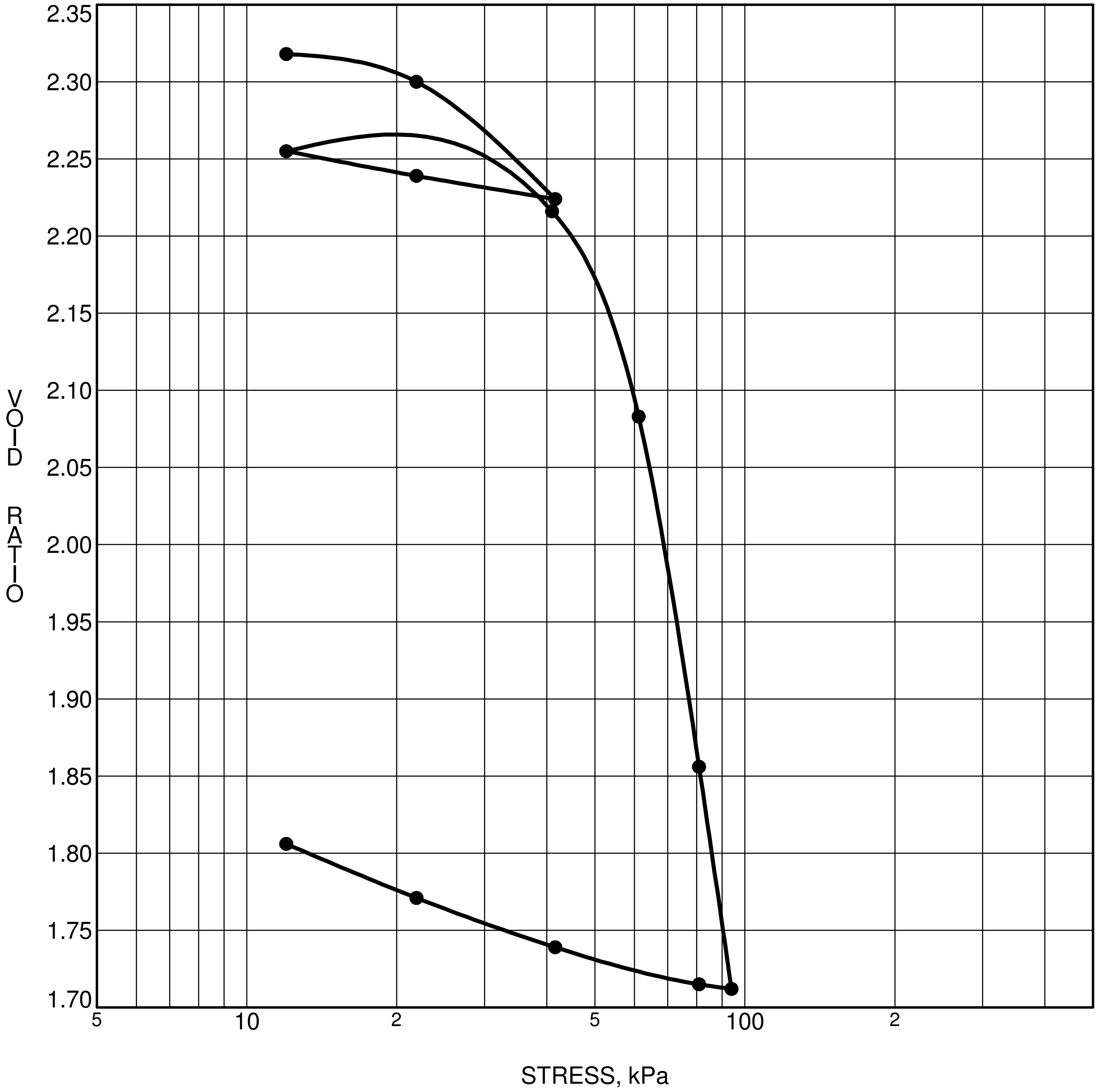
CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	**BH 7**	p'o	**31.5** kPa	Ccr	**0.072**
Sample No.	**TW 4**	p'c	**57.9** kPa	Cc	**2.308**
Sample Depth	**3.25** m	OC Ratio	**1.8**	Wo	**85.4** %
Sample Elev.	**82.78** m	Void Ratio	**2.349**	Unit Wt.	**14.9** kN/m ^{3}

CLIENT **Claridge Homes**

FILE NO. **PG5072**

PROJECT **Geotechnical Investigation - Prop. Residential Development - Mer Bleu Lands**

DATE **10/31/2019**

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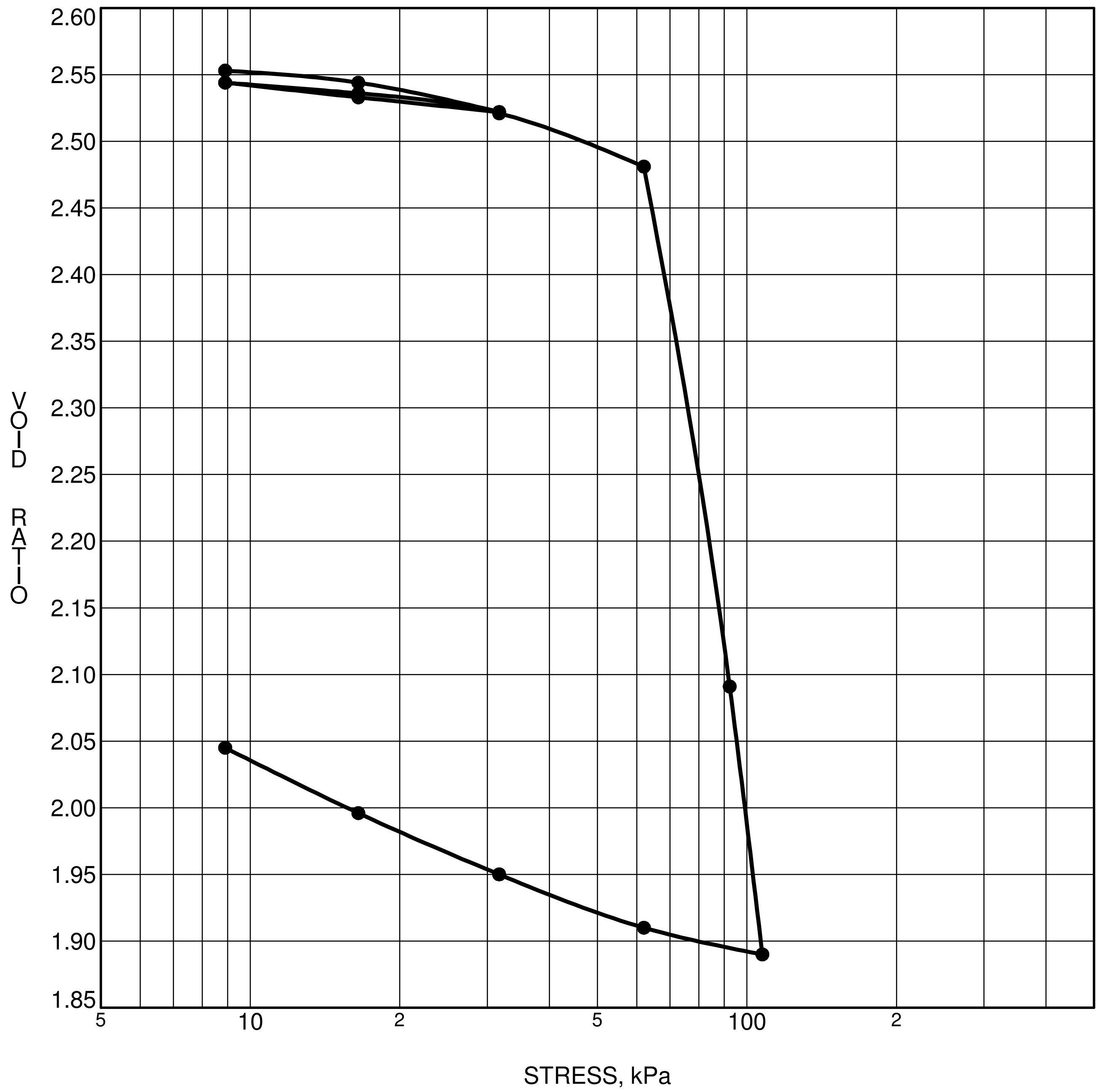
CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	**BH12**	p'_o	**50.6** kPa	Ccr	**0.040**
Sample No.	**TW 5**	p'_c	**68.9** kPa	Cc	**3.077**
Sample Depth	**4.22** m	OC Ratio	**1.4**	Wo	**92.9** %
Sample Elev.	**81.13** m	Void Ratio	**2.556**	Unit Wt.	**2.6** kN/m ^{3}

CLIENT **Claridge Homes**

FILE NO. **PG5072**

PROJECT **Geotechnical Investigation - Prop. Residential Development - Mer Bleu Lands**

DATE **10/31/2019**

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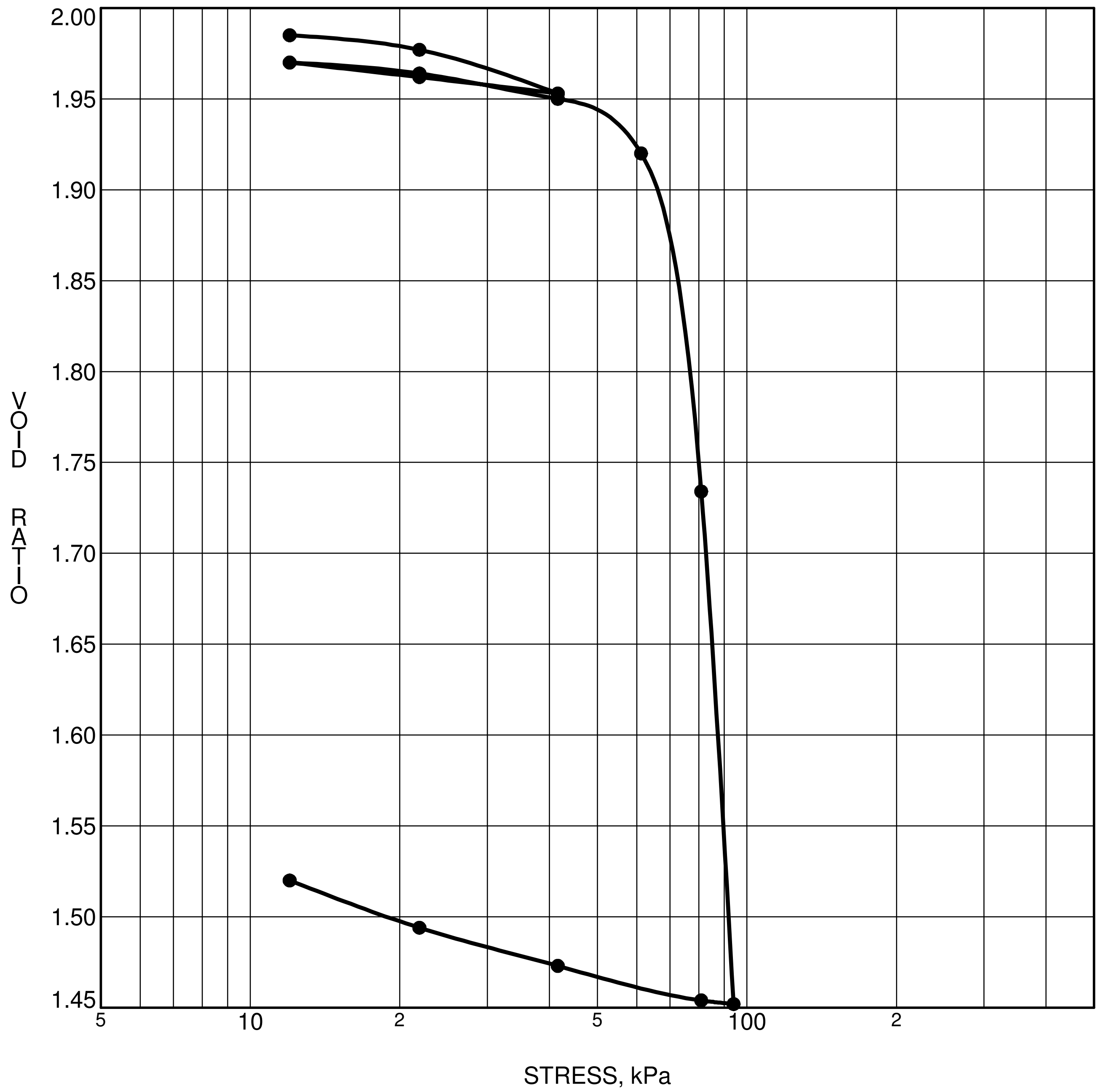
CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	**BH15**	p'o	**53.7** kPa	Ccr	**0.038**
Sample No.	**TW 3**	p'c	**73.6** kPa	Cc	**4.370**
Sample Depth	**4.22** m	OC Ratio	**1.4**	Wo	**72.8** %
Sample Elev.	**81.43** m	Void Ratio	**2.001**	Unit Wt.	**155.0** kN/m ^{3}

CLIENT	**Claridge Homes**	FILE NO.	**PG5072**
PROJECT	**Geotechnical Investigation - Prop. Residential Development - Mer Bleu Lands**	DATE	**11/15/2019**

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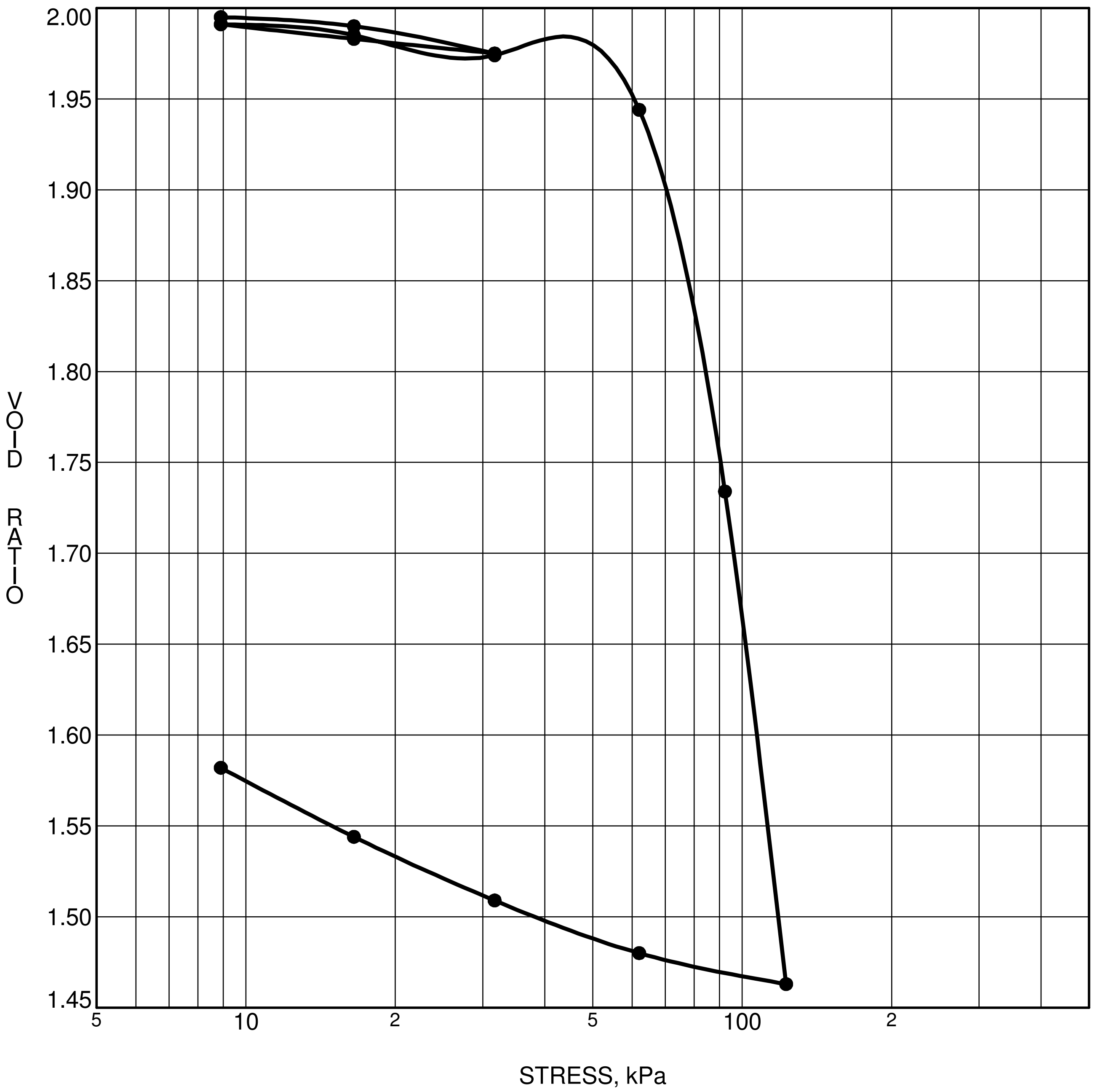
CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	**BH16**	p'o	**46** kPa	Ccr	**0.028**
Sample No.	**TW 3**	p'c	**73.1** kPa	Cc	**2.174**
Sample Depth	**4.29** m	OC Ratio	**1.6**	Wo	**72.6** %
Sample Elev.	**80.90** m	Void Ratio	**1.995**	Unit Wt.	**15.5** kN/m ^{3}

CLIENT **Claridge Homes**

FILE NO. **PG5072**

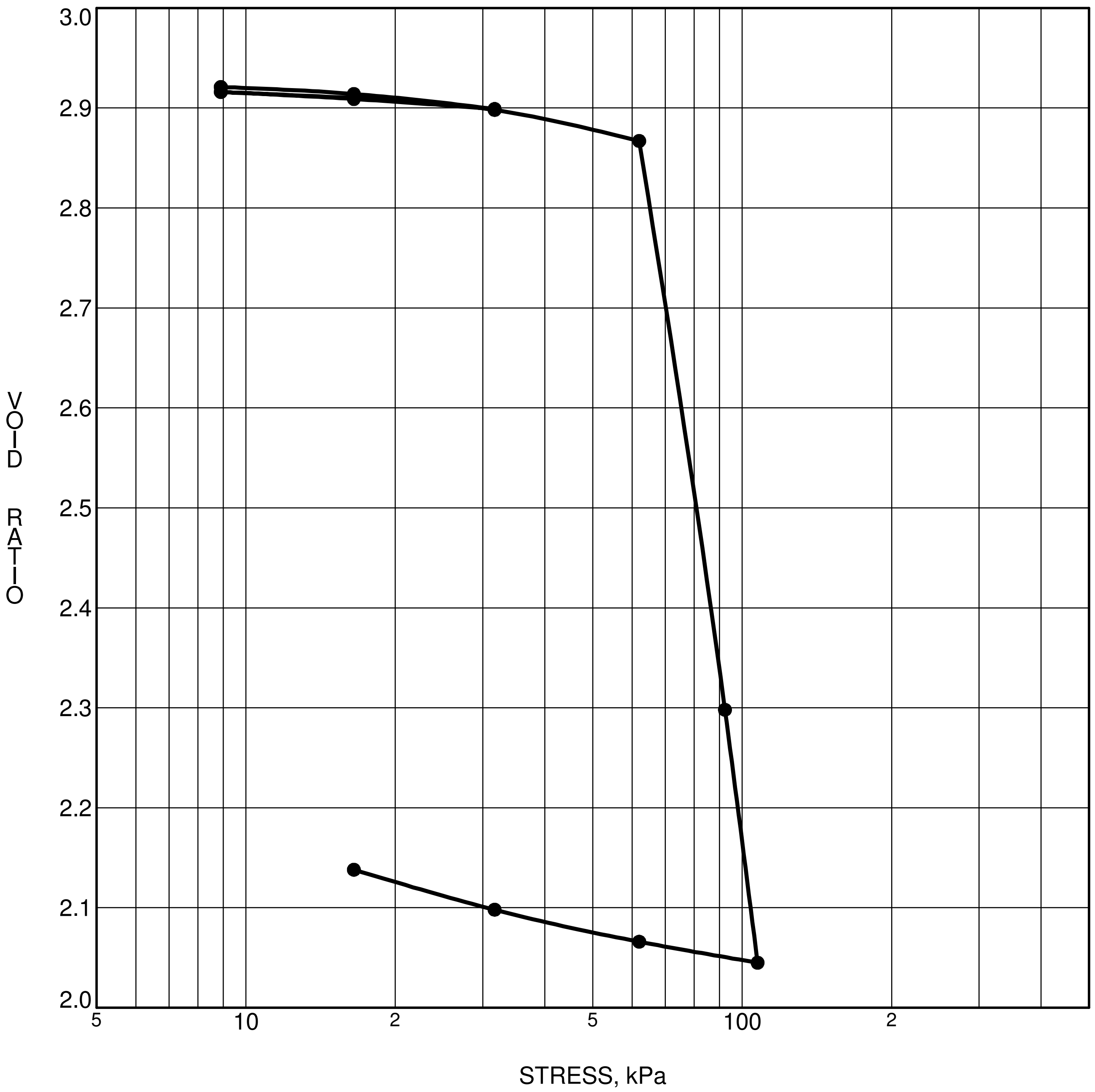
PROJECT **Geotechnical Investigation - Prop. Residential Development - Mer Bleu Lands**

DATE **11/7/2019**

patersongroup **Consulting Engineers**

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	**BH17**	p'_o	**58.2** kPa	Ccr	**0.033**
Sample No.	**TW 4**	p'_c	**65.5** kPa	Cc	**3.875**
Sample Depth	**4.95** m	OC Ratio	**1.1**	Wo	**106.3** %
Sample Elev.	**80.31** m	Void Ratio	**2.924**	Unit Wt.	**14.2** kN/m^3

CLIENT **Claridge Homes**

FILE NO. **PG5072**

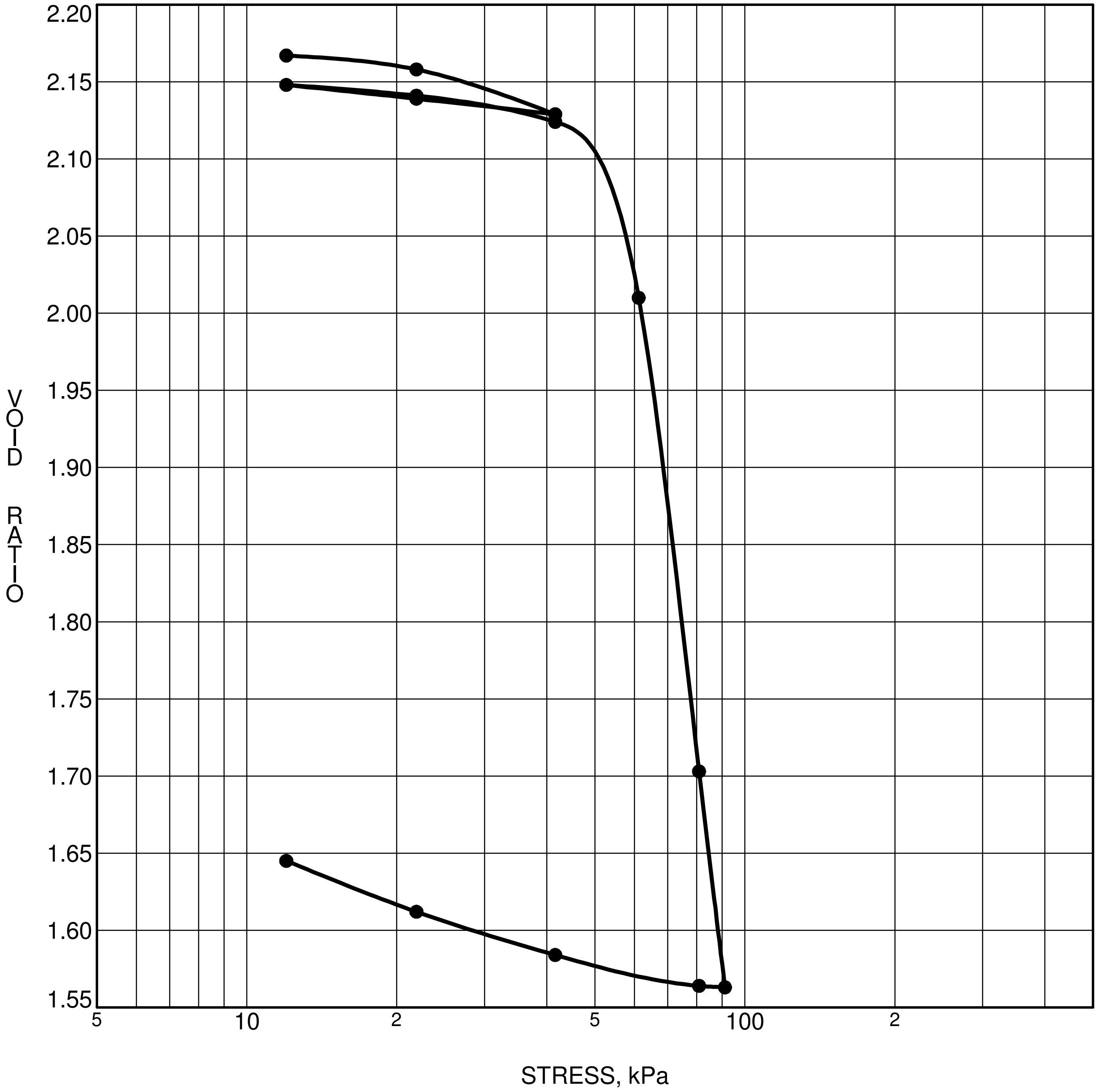
PROJECT **Geotechnical Investigation - Prop. Residential Development - Mer Bleu Lands**

DATE **11/18/2019**

patersongroup **Consulting Engineers**

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	**BH19**	p'o	**41.7** kPa	Ccr	**0.044**
Sample No.	**TW 4**	p'c	**55.5** kPa	Cc	**2.524**
Sample Depth	**3.38** m	OC Ratio	**1.3**	Wo	**79.4** %
Sample Elev.	**83.43** m	Void Ratio	**2.183**	Unit Wt.	**15.2** kN/m ^{3}

CLIENT **Claridge Homes**

PROJECT **Geotechnical Investigation - Prop. Residential Development - Mer Bleu Lands**

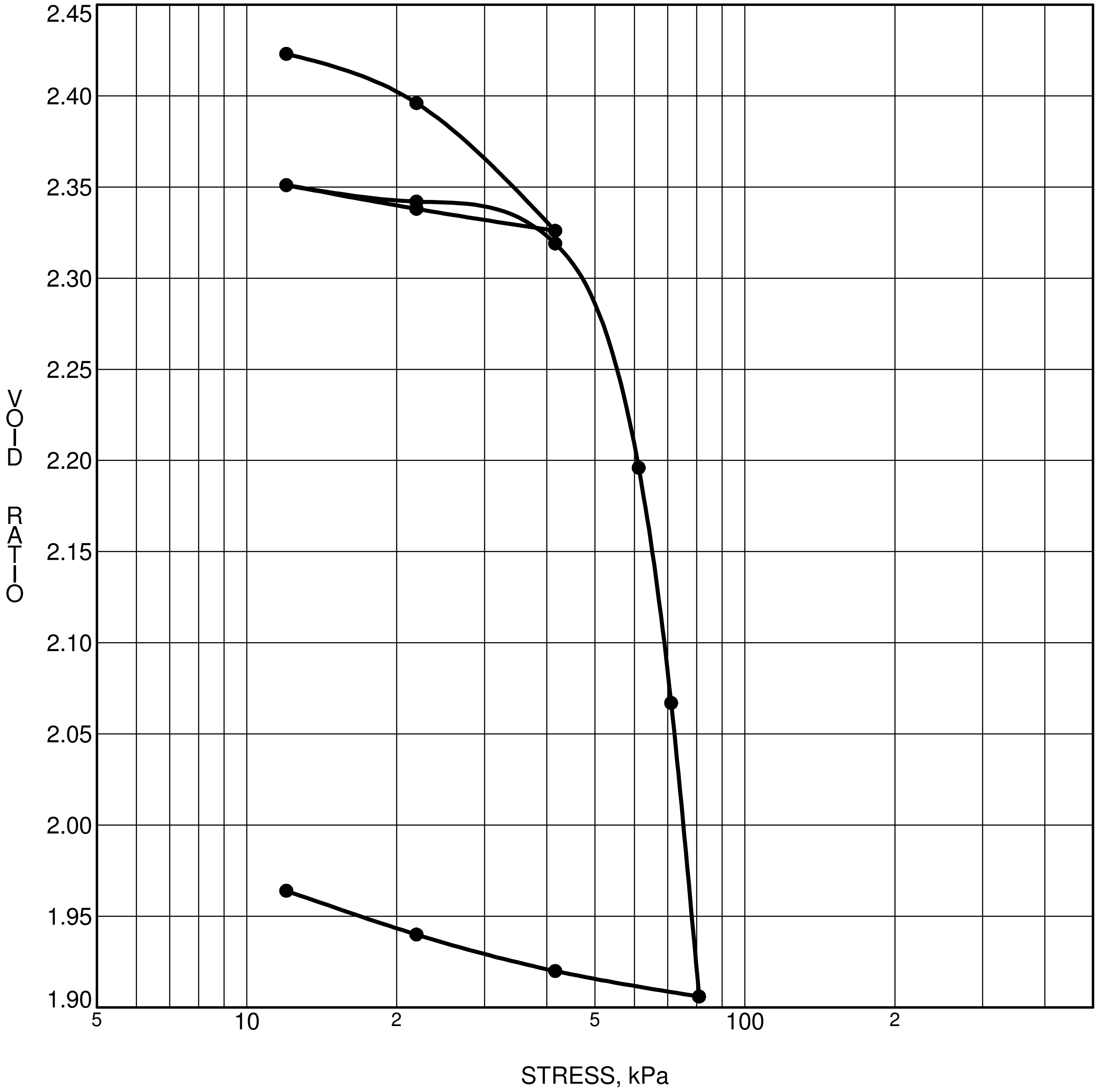
FILE NO. **PG5072**

DATE **11/15/2019**

patersongroup **Consulting Engineers**

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	**BH22**	p'o	**58.6** kPa	Ccr	**0.058**
Sample No.	**TW 4**	p'c	**59** kPa	Cc	**2.869**
Sample Depth	**5.00** m	OC Ratio	**1.0**	Wo	**89.5** %
Sample Elev.	**80.94** m	Void Ratio	**2.461**	Unit Wt.	**14.8** kN/m ^{3}

CLIENT **Claridge Homes**

FILE NO. **PG5072**

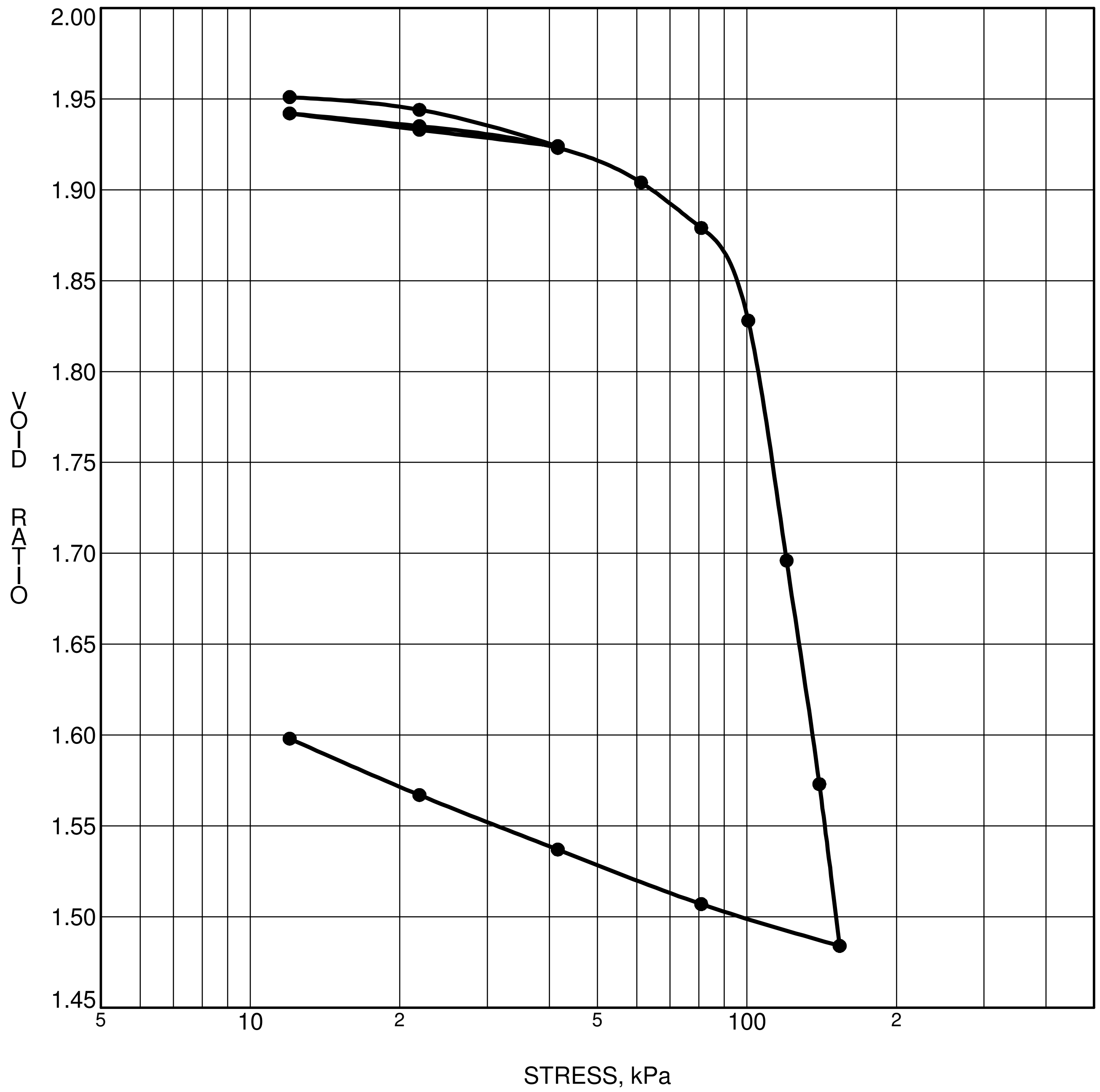
PROJECT **Geotechnical Investigation - Prop. Residential Development - Mer Bleu Lands**

DATE **11/25/2019**

patersongroup **Consulting Engineers**

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	**BH26**	p'o	**53.4** kPa	Ccr	**0.036**
Sample No.	**TW 5**	p'c	**97** kPa	Cc	**1.916**
Sample Depth	**4.16** m	OC Ratio	**1.8**	Wo	**71.6** %
Sample Elev.	**83.10** m	Void Ratio	**1.969**	Unit Wt.	**15.6** kN/m ^{3}

CLIENT **Claridge Homes**

FILE NO. **PG5072**

PROJECT **Geotechnical Investigation - Prop. Residential Development - Mer Bleu Lands**

DATE **11/25/2019**

patersongroup **Consulting Engineers**

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

CONSOLIDATION TEST

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 25606

Report Date: 04-Dec-2019

Order Date: 29-Nov-2019

Project Description: PG5072

	Client ID:	PG5072 BH8 SS2	-	-	-
	Sample Date:	24-Oct-19 09:00	-	-	-
	Sample ID:	1948647-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	72.0	-	-	-
General Inorganics					
pH	0.05 pH Units	7.17 [1]	-	-	-
Resistivity	0.10 Ohm.m	61.3	-	-	-
Anions					
Chloride	5 ug/g dry	33 [1]	-	-	-
Sulphate	5 ug/g dry	24 [1]	-	-	-

APPENDIX 2

FIGURE 1 – KEY PLAN

DRAWING PG5072-1 – TEST HOLE LOCATION PLAN

DRAWING PG5072-2 – PERMISSIBLE GRADE RAISE PLAN

DRAWING PG5072-4 – SEISMIC SITE CLASS PLAN

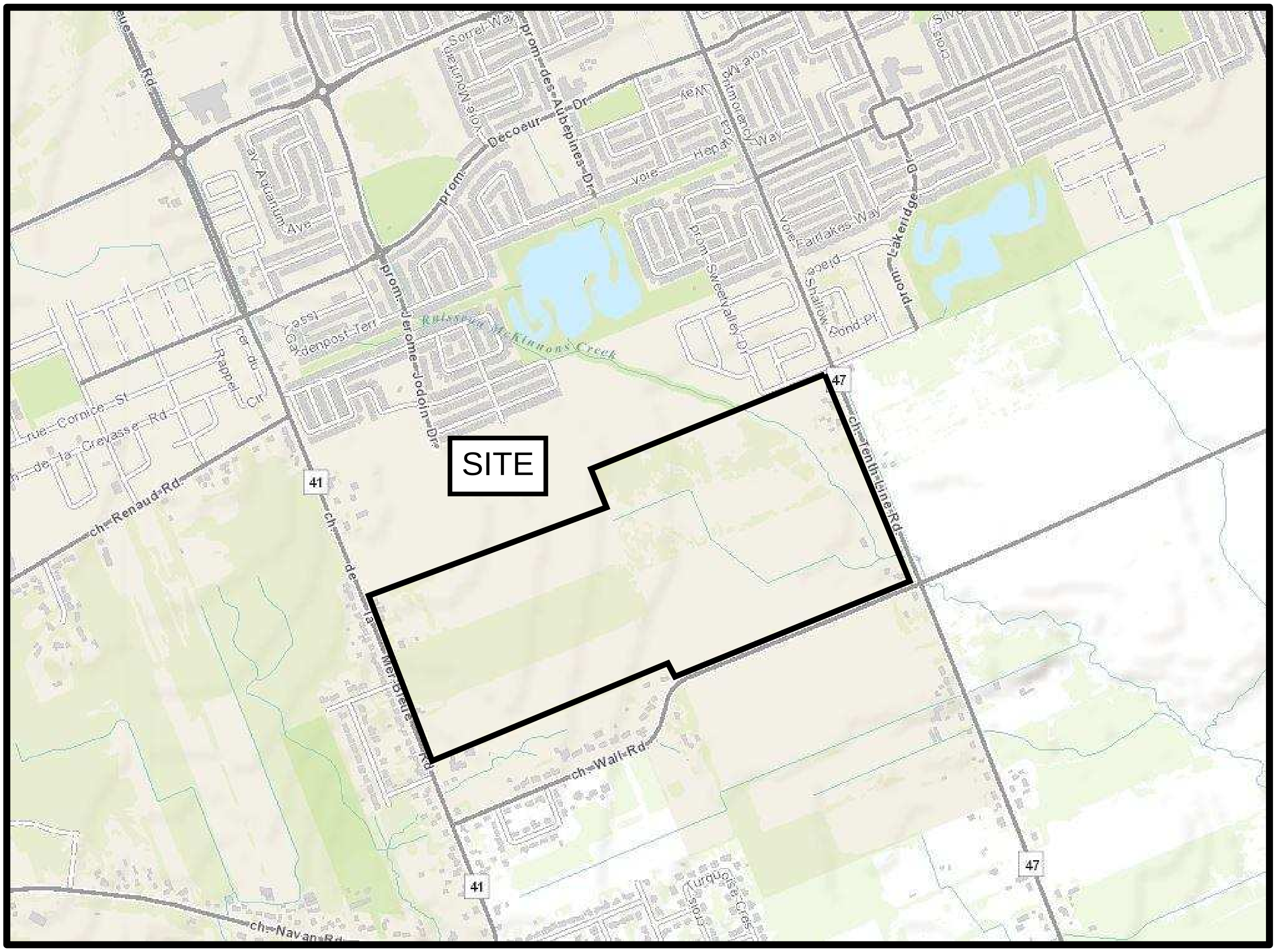
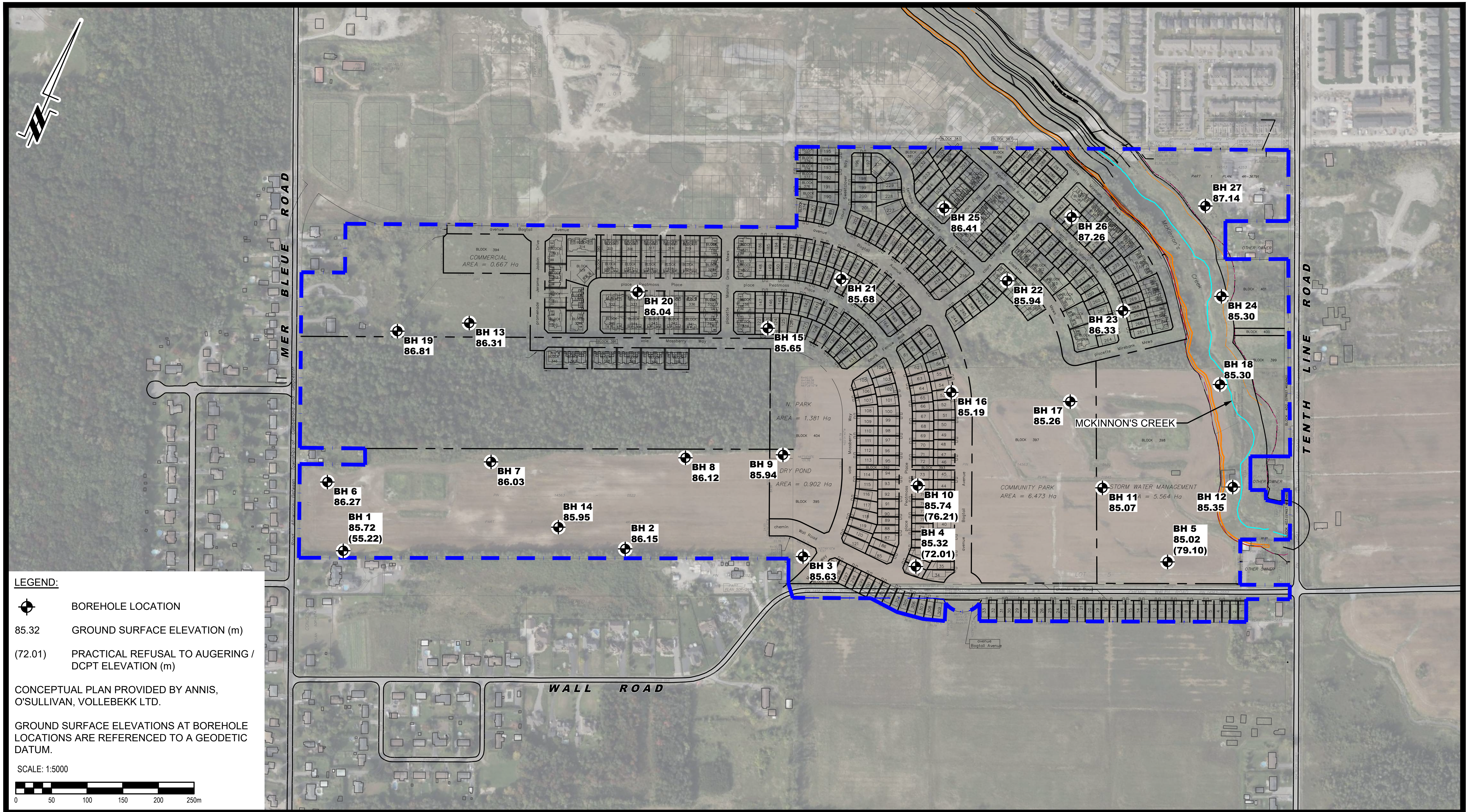


FIGURE 1

KEY PLAN

PATERSON
GROUP



LEGEND:

⊕	BOREHOLE LOCATION
85.32	GROUND SURFACE ELEVATION (m)
(72.01)	PRACTICAL REFUSAL TO AUGERING / DCPT ELEVATION (m)

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

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

SCALE: 1:5000

0 50 100 150 200 250m

PATERSON GROUP

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

NO.	REVISIONS	DD/MM/YYYY	INITIAL
2	UPDATED CONCEPTUAL PLAN	07/08/2026	OC
1	ADDED CONCEPTUAL PLAN	04/04/2025	CE

CLARIDGE HOMES

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:5000

Drawn by: YA

Checked by: JV

Approved by: DJG

Date: 12/2019

Report No.: PG5072-1

Dwg. No.: PG5072-1

Revision No.: 2

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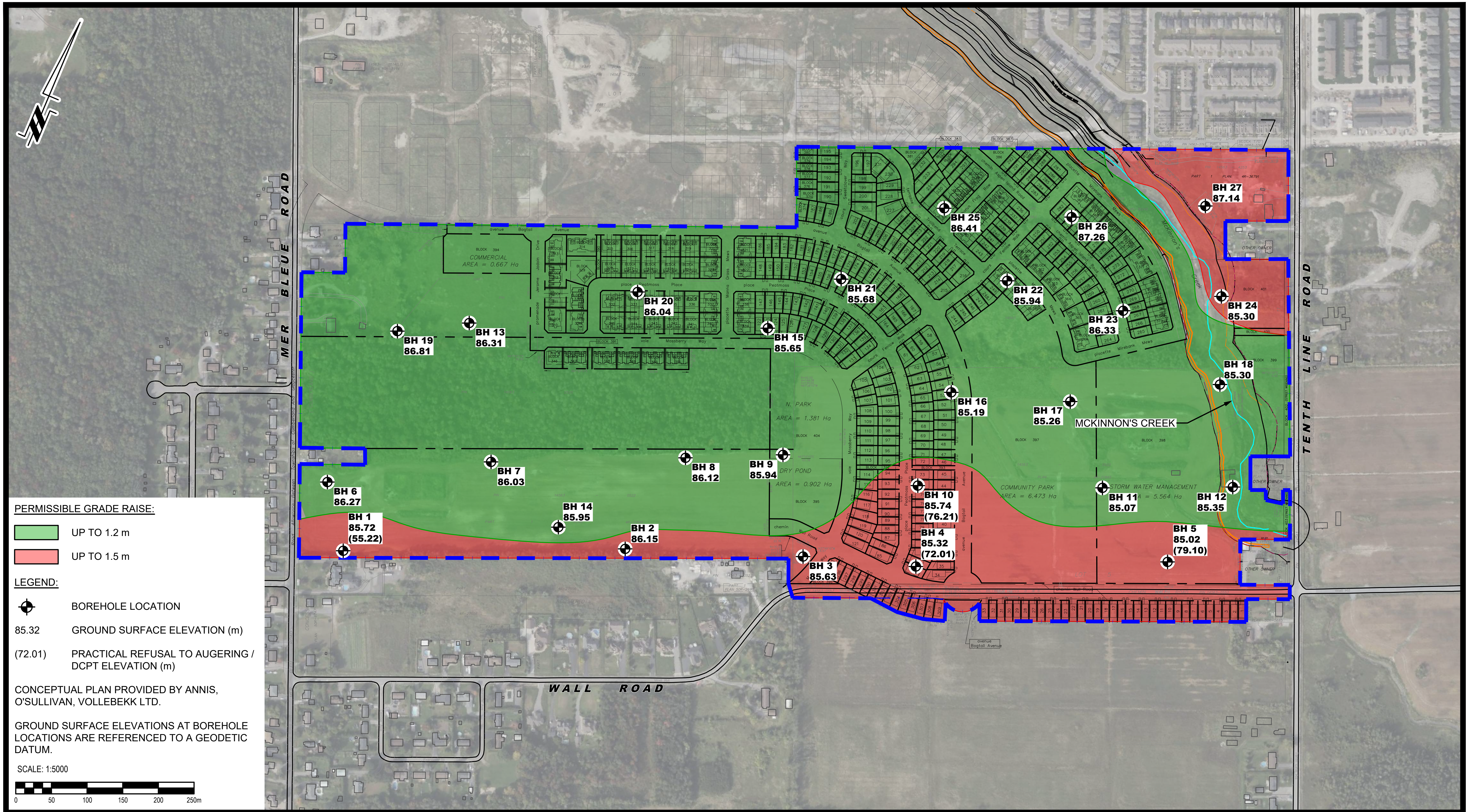
11x17



PERMISSIBLE GRADE RAISE:

🟩 UP TO 1.2 m

🟥 UP TO 1.5 m

LEGEND:

⌖	BOREHOLE LOCATION
85.32	GROUND SURFACE ELEVATION (m)
(72.01)	PRACTICAL REFUSAL TO AUGERING / DCPT ELEVATION (m)

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

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

SCALE: 1:5000

0 50 100 150 200 250m

PATERSON GROUP

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OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DD/MM/YYYY	INITIAL
2	UPDATED CONCEPTUAL PLAN	07/08/2026	OC
1	ADDED CONCEPTUAL PLAN	04/04/2025	CE

CLARIDGE HOMES

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT

OTTAWA, ONTARIO

Title:

PERMISSIBLE GRADE RAISE PLAN

Scale: 1:5000

Date: 12/2019

Drawn by: YA

Report No.: PG5072-1

Checked by: JV

Dwg. No.: PG5072-2

Approved by: DJG

Revision No.: 2

11x17

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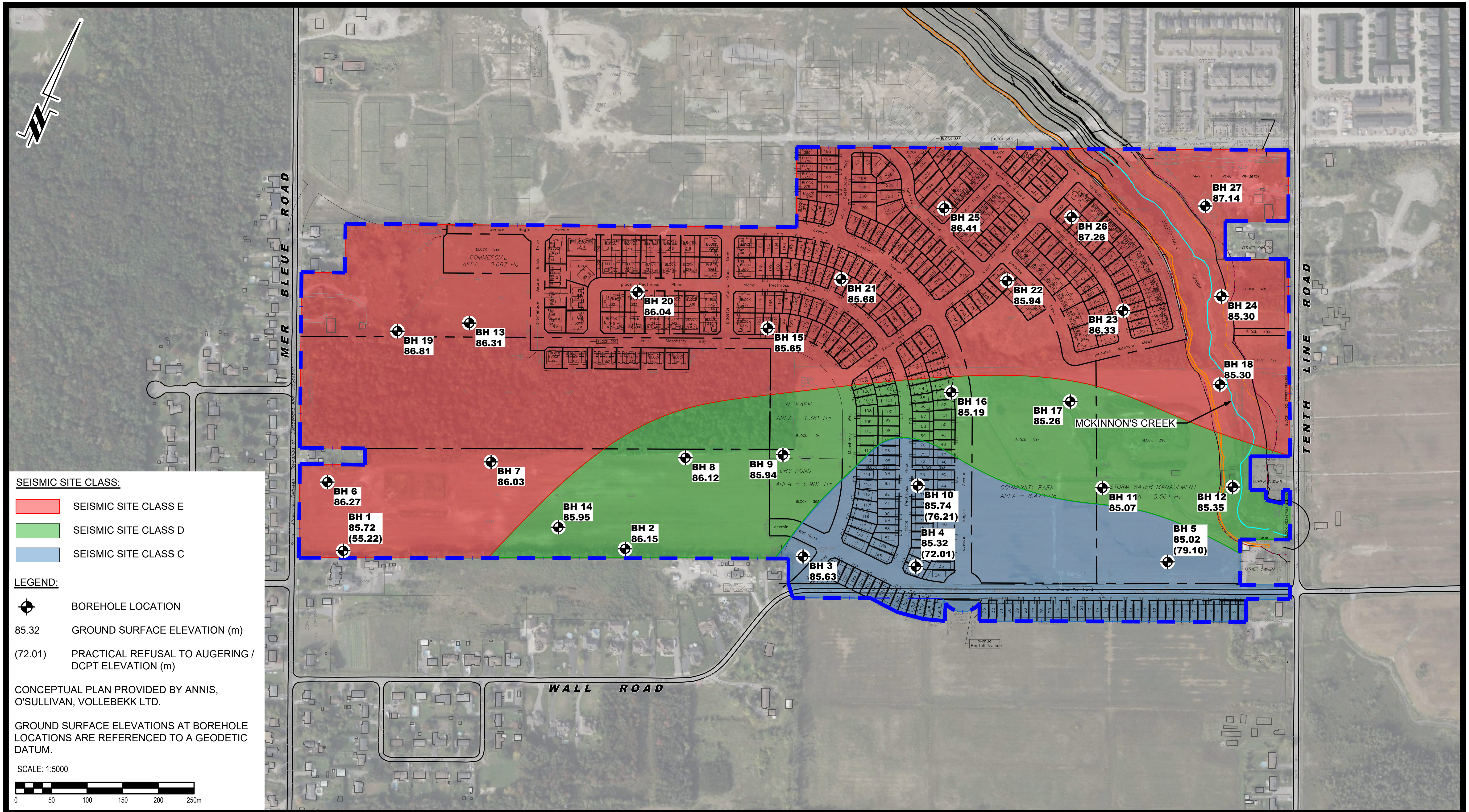

SEISMIC SITE CLASS:

🟥 SEISMIC SITE CLASS E

🟩 SEISMIC SITE CLASS D

🟦 SEISMIC SITE CLASS C

LEGEND:

⌖	BOREHOLE LOCATION
85.32	GROUND SURFACE ELEVATION (m)
(72.01)	PRACTICAL REFUSAL TO AUGERING / DCPT ELEVATION (m)

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

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

SCALE: 1:5000

0 50 100 150 200 250m

PATERSON GROUP

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NO.	REVISIONS	DD/MM/YYYY	INITIAL
2	UPDATED CONCEPTUAL PLAN	07/08/2026	OC
1	ADDED CONCEPTUAL PLAN	04/04/2025	CE

CLARIDGE HOMES

GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT

OTTAWA, ONTARIO

Title:

SEISMIC SITE CLASS PLAN

Scale: 1:5000

Date: 12/2019

Drawn by: YA

Report No.: PG5072-1

Checked by: JV

Dwg. No.: PG5072-4

Approved by: DJG

Revision No.: 2

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