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Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Noise and Vibration Studies

Geotechnical Investigation

Proposed Commercial Development
30 Frank Nighbor Place
Kanata, Ontario

Prepared For

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April 28, 2022

Report: PG6153-1 Revision1

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1.0 Introduction

Paterson Group (Paterson) was commissioned by 942073 Uhaul Co. (Canada) Ltd. to conduct a geotechnical investigation for the proposed commercial development to be located at 30 Frank Nighbor Place in Kanata, City of Ottawa (refer to Figure 1 - Key Plan in Appendix 2 of this report).

The objective of the geotechnical investigation was to:

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

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

2.0 Proposed Development

Based on the available drawings, it is understood that the proposed development will consist of commercial steel structures. It is expected that the main commercial building will have 4 to 5 stories and will be constructed of slab on grade construction. Associated paved access lanes, parking areas, and landscaped areas are also anticipated as part of the development. It is anticipated that the site will be municipally serviced.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field program for the current investigation was carried out on March 25, 2022 and consisted of a total of 6 test pits (TP1-22 to TP6-22) sampled to a maximum depth of 4.4 m below the existing grade.

Previous geotechnical investigations were carried out by Paterson Group for the subject site and adjacent properties on September 9 to 10, 2002 and March 23 to 24, 2005. The test holes located within the subject site include 6 boreholes (BH1-02, BH1-05 to BH5-05) and 5 test pits (TP4 and TP6 to TP10) advanced to a maximum depth of 21 m and 3.5 m below the existing grade, respectively. The test hole locations were located in the field in a manner to provide general coverage of the subject site. Additionally, test hole data from the neighboring site (TP1 to TP3, inclusive) extending to a maximum depth of 3.6 m below the existing grade has been included with the current report for information purposes. The test hole locations are shown on Drawing PG6153-1- Test Hole Location Plan in Appendix 2.

The test pits were excavated using a rubber-tire backhoe and the boreholes were advanced using a track-mounted rig operated by a two-person crew. All fieldwork was conducted under the full-time supervision of our personnel under the direction of a senior engineer from our geotechnical department. The drilling procedures consisted of advancing each test hole to the required depths at the selected locations and sampling and testing the overburden.

Sampling and In Situ Testing

Soil samples from the test pits were recovered from the side walls of the open excavation. Soil samples from the boreholes were recovered from the auger flights or using a 50 mm diameter split-spoon sampler. All soil samples were initially classified on site, placed in sealed plastic bags and transported to our laboratory for further review. The depths at which the grab, auger and split spoon samples were recovered from the test holes are shown as G, AU and SS, respectively, on the Soil Profile and Test Data sheets presented in Appendix 1.

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 for specific details of the soil profile encountered at each test hole.

The 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.

Undrained shear strength testing, using a vane apparatus, was carried out at regular intervals of depth in cohesive soils.

The overburden thickness was also evaluated during the course of the previous investigation on March 23 to 24, 2022 by dynamic cone penetration testing (DCPT) at each borehole location. The DCPT consists of driving a steel drill rod, equipped with a 50 mm diameter cone at its 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

Groundwater levels were measured in the open excavation of the test pits completed within the subject site. Groundwater levels were previously monitored via installed flexible PVC standpipes for boreholes (BH1-02, and BH1-05 to BH5 05) to permit monitoring of the groundwater levels following completion of the previous sampling program. The groundwater level observations are presented on the Soil Profile and Test Data sheets in Appendix 1.

Sample Storage

All samples will be stored in the laboratory for a period of one (1) month after issuance of this report. They will then be discarded unless we are otherwise directed.

3.2 Field Survey

The test hole locations were selected in the field by Paterson personnel in a manner to provide general coverage of the subject site taking into consideration underground utilities and existing site features. Ground surface elevations were referenced to a temporary benchmark (TBM), consisting of the top spindle of a fire hydrant located on the north side of Frank Nighbor Place. A geodetic elevation of 95.64 m was provided to the TBM. The locations of the test holes and TBM are presented on Drawing PG6153-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

The soil samples recovered from the site were visually examined in our laboratory by a geotechnical engineer to confirm the results of the field logging. All samples will be stored in the laboratory for a period of one month after issuance of this report. They will then be discarded unless we are otherwise directed.

Two representative samples were submitted for Atterberg limit testing, one sample was submitted for grain size analysis test and all test pits had moisture content testing. The results are presented in Appendix 1.

4.0 Observations

4.1 Surface Conditions

The subject site is currently used as agricultural field and slopes down from east to west towards the cape river. The site is bordered to the north by Highway 417, to the east by an existing commercial development, to the south by Frank Nighbor Place and to the west by the Carp River and parking lots for the Canadian Tire Center.

4.2 Subsurface Profile

Overburden

Generally, the soil profile at the test hole locations consists of fill and/or topsoil overlying a discontinuous layer of sandy silt/silty sand, in turn overlying a deep silty clay deposit. Practical refusal to DCPT was encountered at depths ranging from 15.6 to 21.1 m at boreholes BH1-05 and BH5-05. Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for the specific details of the soil profiles encountered at each test hole location.

Bedrock

Based on available geological mapping, the local bedrock consists of either sandstone of the Nepean Formation or interbedded limestone and shale of the Verulam Formation. The overburden thickness is expected to range from 10 to 25 m.

4.3 Groundwater

Groundwater level readings were recorded in September 2002 and March 2005 for the previous field investigations test hole locations and on March 25, 2022, for test pits of the current investigation. The current groundwater levels were measured in the open excavation of the test pits completed within the subject site. The groundwater levels vary between 2.6 and 3.0 m depth at the test pits completed within the subject site. The groundwater level readings are presented in the Soil Profile and Test Data sheet in Appendix 1.

The long-term groundwater level can also be estimated based on the observed colour, moisture levels and consistency of the recovered soil samples. It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater level could vary at the time of construction.

5.0 Discussion

5.1 Geotechnical Assessment

The subject site is considered suitable for the proposed development from a geotechnical perspective. It is expected that the proposed structure will be founded over conventional shallow footings placed on an undisturbed, stiff silty clay bearing surface.

Due to the presence of the sensitive silty clay layer, the subject site will be subjected to grade raise restrictions.

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

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and deleterious fill, such as those containing significant amounts of organic materials, or construction debris/remnants should be stripped from under any buildings, paved areas, pipe bedding and other settlement sensitive structures.

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

Fill Placement

Fill placed for grading beneath the building areas should consist, unless otherwise specified, of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. The imported fill material should be tested and approved prior to delivery. The fill should be placed in maximum 300 mm thick loose lifts and compacted by suitable compaction equipment. Fill placed beneath the building should be compacted to a minimum of 98% of the standard Proctor maximum dry density (SPMDD).

It is expected that existing fill along with site-excavated soil approved and free of deleterious materail could be placed below the granular base of the proposed slab on grade sturucture.

Non-specified site excavated and fill considered unsuitable for use within the structure can be used in landscaped areas and where settlement is not important. These materials should be spread in lifts with a maximum thickness of 300 mm and compacted by the tracks of the spreading equipment to minimize voids.

Existing fill and site-excavated soils are not suitable for placement as backfill against foundation walls, unless used in conjunction with a geocomposite drainage membrane, such as Miradrain G100N or Delta Drain 6000.

5.3 Foundation Design

Bearing Design Values (Conventional Shallow Foundation)

Strip footings, up to 3 m wide, and pad footings, up to 6 m wide, placed on undisturbed, brown stiff silty clay bearing surface, can be designed using a bearing resistance value at SLS of **150 kPa** and a factored bearing resistance value at ULS of **275 kPa**, incorporating a geotechnical resistance factor of 0.5.

Strip footings, up to 3 m wide, and pad footings, up to 6 m wide, placed on undisturbed, firm grey silty clay bearing surface, can be designed using a bearing resistance value at serviceability limit states (SLS) of **100 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **150 kPa**, incorporating a geotechnical resistance factor of 0.5.

Furthermore, the smaller self-storage facilities (four mini buildings and Building B) may consist of full depth strip and pad footings. The proposed footings should be placed below the frost line in trenches on native soil, reviewed and approved by Paterson. If further excavation is required to reach an undisturbed native soil, the proposed USF may be raised by placing a minimum 300 mm thick granular pad consisting of Granular A or Granular B Type 2 compacted to 98% SPMDD or an infilling the trench with 15 MPa high compressive strength concrete.

Footings designed using the above noted bearing resistance values at SLS will be subjected to potential post construction total and differential settlements of 25 and 20 mm, respectively.

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

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to a stiff silty clay 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.

Permissible Grade Raise Recommendation

The permissible grade raise restriction varies within the subject site above existing ground surface. The permissible grade raise restrictions are shown on the PG6153-2 Permissible Grade Raise plan in Appendix 2 and can be used for design purposes.

For design purposes, the total and differential settlements associated with the combination of grade raises and slab loading conditions are estimated to be 25 and 20 mm, respectively. A post-development groundwater lowering of 0.5 m was assumed.

To reduce potential long-term liabilities, consideration should be given to provide means to reduce long term groundwater lowering (e.g. clay dykes, restriction on planting around the structures, etc).

If required, LWF should consist of EPS (expanded polystyrene) Type 12 blocks for placement below the building footprint, 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 building to reduce the fill-related loads.

LWF should be covered by an 8-mil polyethylene liner followed by a non-woven geotextile, such as Terrafix 270 R or equivalent, and a biaxial geogrid, such as Geosynthetics Systems TBX2500 or equivalent for areas within the building footprint and under pavement structures, where required.

5.4 Design for Earthquakes

The site class for seismic site response is a **Class D** for the foundations considered. The soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the Ontario Building Code 2012 for a full discussion of the earthquake design requirements.

5.5 Slab on Grade Construction

The existing fill material consisting of a sandy silt/silty sand is considered an acceptable subgrade material for building up the subgrade below the slab-on-grade. However, test pitting in the fill layer should be completed to determine the extent of the organics and deleterious fill within the fill layer. All organic and deleterious fill material should be removed from the fill layer and stockpiled separately. The reviewed and approved existing fill material should be placed in maximum 300 mm loose lifts and compacted to 98% of the materials SPMDD.

OPSS Granular B Type II or Granular A Crushed stone are recommended for backfilling below the floor slab. It is recommended that the upper 150 to 200 mm of sub-slab fill consist of OPSS Granular A crushed stone. All backfill materials within the footprint of the proposed building should be placed in maximum 300 mm loose lifts and compact to at least 98% of the material's SPMDD.

Any soft or poor performing areas should be removed and backfilled with appropriate backfill material prior to placing any fill. OPSS Granular A or Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab.

5.6 Pavement Design

Permeable Pavement Structures

For design purposes, the pavement structure presented in Table 2 and 3 below could be used for the design of car only parking areas and access lanes.

Table 2 – Recommended Pavement Structure – Car Only (light traffic) Parking Areas Car Only Parking Areas

Thickness (mm)	Material Description
50	**Wear Course –** HL-3 or Superpave 12.5 Asphaltic Concrete
150	**Base –** OPSS Granular A Crushed Stones
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 3 – Recommended Pavement Structure – Access Lanes and Heavy Trucks Parking Areas

Thickness (mm)	Material Description
40	**Wear Course –** HL-3 or Superpave 12.5 Asphaltic Concrete
50	**Wear Course –** HL-8 or Superpave 19 Asphaltic Concrete
150	**BASE –** OPSS Granular A Crushed Stone
450	**SUBBASE –** OPSS Granular B Type II
SUBGRADE – Either fill, in-situ soil, or OPSS Granular B Type I or II material placed over in-situ soil or fill.	

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project.

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type I or II material.

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 compaction equipment.

Pavement Structure Drainage

Satisfactory performance of the pavement structure is largely dependent on keeping 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 its load carrying capacity.

Consideration should be given to installing subdrains at each catch basin during the pavement construction. These drains should be at least 3 m long and extend in four orthogonal directions or longitudinally when placed along a curb. The subdrain inverts should be approximately 300 mm below subgrade level. The subgrade surface should be shaped to promote water flow to the drainage lines.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

Foundation Drainage

A perimeter foundation drainage system is recommended to be provided for the proposed building to provide an outlet for surface water trapped within the backfill material below any sidewalk structure. Trapped water within subgrade soils can lead to more significant frost heave for sidewalks adjacent to slab-on-grade buildings. The system should consist of a 150 mm diameter, geotextile-wrapped, perforated, corrugated, plastic pipe, surrounded on all sides by 150 mm of 19 mm clear crushed stone, placed at the footing level around the exterior perimeter of the buildings. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

Foundation Backfill

Backfill against the exterior sides of the foundation walls should consist of free-draining, non-frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls, unless used in conjunction with a drainage geocomposite, such as Delta Drain 6000, connected to the perimeter foundation drainage system. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should otherwise be used for this purpose.

6.2 Protection of Footings Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effects of frost action. A minimum 1.5 m thick soil cover (or insulation equivalent) should be provided in this regard.

Other exterior unheated footings, such as those for isolated exterior piers and retaining walls, are more prone to deleterious movement associated with frost action. These should be provided with a minimum 2.1 m thick soil cover (or insulation equivalent).

6.3 Excavation Side Slopes

The temporary excavation side slopes anticipated should either be cut back at acceptable slopes or retained by shoring systems from the beginning of the excavation until the structure is backfilled. It is assumed that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations).

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

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should maintain safe working distance from the excavation sides.

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

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

6.4 Pipe Bedding and Backfill

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

A minimum of 150 mm of OPSS Granular A should be placed for bedding for sewer or water pipes when placed on soil subgrade. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to a minimum of 300 mm above the obvert of the pipe should consist of OPSS Granular A (concrete or PSM PVC pipes) or sand (concrete pipe). The bedding and cover materials should be placed in maximum 225 mm thick lifts and compacted to 95% of the material’s SPMDD. Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to reduce the potential 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 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 and should extend from trench wall to trench wall. Generally, 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 compatible brown silty clay placed in maximum 225 mm thick loose layers and compacted to a minimum of 95% of the material’s 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.

6.5 Groundwater Control

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

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

For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MOECC review of the PTTW application.

6.6 Infiltration Testing

A total of 7 constant head Pask (Constant Head Well) permeameter tests were conducted at 3 test pit locations within the proposed development to determine the infiltration rates of the fill material and native silty clay deposit. Testing was completed at various depths ranging between 0.6 and 2.4 m depth below ground surface. The permeameter test locations were selected by Paterson in a manner to provide general coverage of the proposed development and representation of the subsurface material. Preparation and testing of this investigation are in accordance with the Canadian Standards Association (CSA) B65-12 - Annex E. The field saturated hydraulic conductivity (K_{fs}) and estimated infiltration values at each test pit location are presented in Table 4.

Field saturated hydraulic conductivity values were determined using Engineering Technologies Canada (ETC) Ltd. reference tables provided in the most recent ETC Pask Permeameter User Guide dated March 2016. The field saturated hydraulic conductivity values were used to estimate the infiltration rates based on the approximate relationship between infiltration rate and hydraulic conductivity, as described in the *2010 Low Impact Development Stormwater Management Planning and Design Guide* prepared by the CVC and the TRCA. Given the subsurface profile encountered across the subject site, a conservative safety correction factor of 2.5 has been applied to the estimated infiltration rates of the silty clay (CVC and TRCA, 2010).

Table 4 – Field Saturated Hydraulic Conductivity and Infiltration Results

Test Hole ID	Permeameter Testing Invert (m bgs)	Material	K_{fs} (m/sec)	Infiltration Rate (mm/hr)	Reduced Infiltration Rate (mm/hr)
TP 1-22	0.8	Fill– SiCl	< 3.1 x 10^{-9} m/s	<10 mm/hr	< 4 mm/hr
	1.3	Fill - SiCl	6.3 x 10^{-7} m/s	42 mm/hr	17 mm/hr
TP 3-22	0.6	Fill - SiCl	< 3.1 x 10^{-9} m/s	<10 mm/hr	< 4 mm/hr
	1.1	Fill - SiCl	< 3.1 x 10^{-9} m/s	<10 mm/hr	< 4 mm/hr
TP 4-22	1.4	Fill - SiCl	1.1 x 10^{-7} m/s	26 mm/hr	10 mm/hr
	2.0	Silty Clay	< 3.1 x 10^{-9} m/s	<10 mm/hr	< 4 mm/hr
	2.4	Silty Clay	< 3.1 x 10^{-9} m/s	<10 mm/hr	< 4 mm/hr

6.7 Winter Construction

Precautions must be taken if winter construction is considered for this project.

The subsoil conditions at this site consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

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

Trench excavations and pavement construction are also difficult activities to complete during freezing conditions without introducing frost in the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions. Additional information could be provided, if required.

6.8 Corrosion Potential and Sulphate

The results of analytical testing show that the sulphate content is less than 0.1%. This result is indicative that Type 10 Portland cement (normal cement) would be appropriate for this site. The results of the chloride content, pH and resistivity indicate the presence of a severe to very aggressive environment for exposed ferrous metals at this site.

6.9 Landscaping Considerations

Tree Planting Restrictions

Based on the results of the representative soil samples, the subject site is considered as a **low/medium** sensitivity area for tree planting according to the City of Ottawa Tree Planting in Sensitive Marine Clay Soils (2017 Guidelines)

Since the modified plasticity limit (PI) generally does not exceed 40%, large trees (mature height over 14 m) can be planted at the subject site provided a tree to foundation setback equal to the full mature height of the tree can be provided (e.g. in a park or other green space).

Based on our testing results, tree planting setback limits should be 4.5 m for small (mature tree height up to 7.5m) 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 around the tree must promote drainage to the tree root zone (in such a manner as not to be detrimental to the tree).

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.

7.0 Recommendations

For the foundation design data provided herein to be applicable, a materials testing and observation services program is required to be completed. The following aspects 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.
- Sampling and testing of the concrete and fill materials used.
- Obervation of installation of drainage component.
- Observation of all subgrades prior to backfilling.
- Field density tests to determine the level of compaction achieved.
- Sampling and testing of the bituminous concrete including mix design reviews.

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

8.0 Statement of Limitations

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

A geotechnical investigation of this nature is a limited sampling of a site. The recommendations are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around the test locations. The extent of the limited area depends on the soil, bedrock and groundwater conditions, as well the history of the site reflecting natural, construction, and other activities. Should any conditions at the site be encountered which differ from those at the test locations, we request notification immediately in order to permit reassessment of our recommendations.

The recommendations provided in this report are intended for the use of design professionals associated with this project. Contractors bidding on or undertaking the work should examine the factual information contained in this report and the site conditions, satisfy themselves as to the adequacy of the information provided for construction purposes, supplement the factual information if required, and develop their own interpretation of the factual information based on both their and their subcontractors construction methods, equipment capabilities and schedules.

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 942073 Uhaul Co. (Canada) Ltd or their agent(s) is not authorized without review by Paterson Group for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

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Report Distribution:

- ☐ 942073 Uhaul Co. (Canada) Ltd.
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APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

PREVIOUS INVESTIGATION SOIL PROFILE AND TEST DATA SHEETS

ATTERBERG LIMIT TESTING RESULTS

SHRINKAGE TESTING RESULTS

GRAIN-SIZE DISTRIBUTION AND HYDROMETER TESTING RESULT

CONSOLIDATION TESTING RESULTS

ANALYTICAL TESTING RESULTS

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical and Hydrogeological Investigation
Proposed Commercial Development
30 Frank Nighbor Place, Kanata, Ontario

DATUM Geodetic

REMARKS

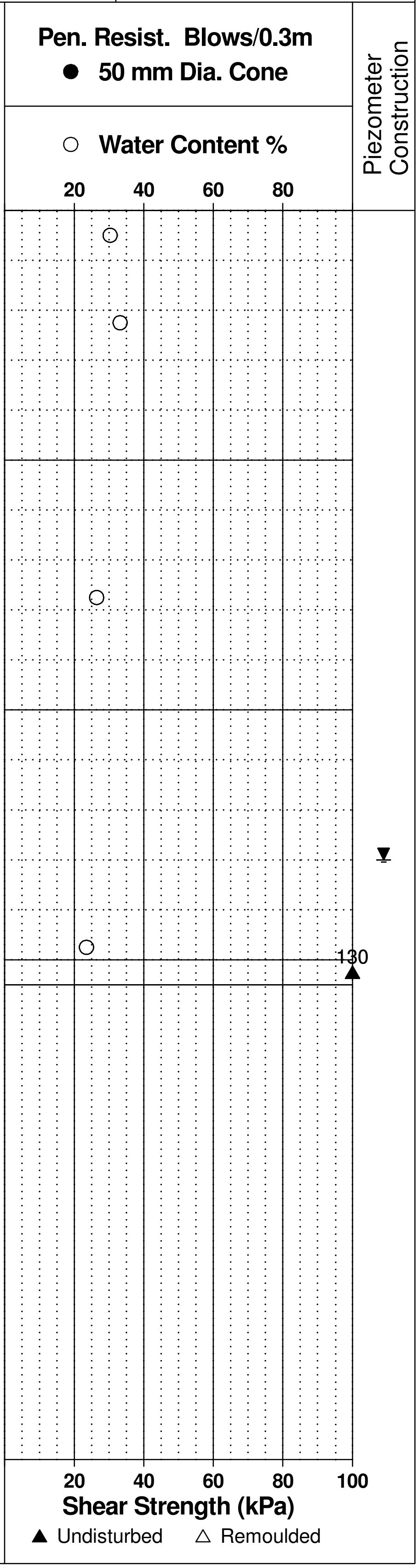
BORINGS BY Excavator

DATE 2022 March 25

FILE NO. PG6153

HOLE NO. TP 1-22

SOIL DESCRIPTION		STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)
			TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
GROUND SURFACE							0	95.56
TOPSOIL	0.15	■	G	1				
FILL: Crushed stone, some sand	0.65	▨	G	2				
Hard to very stiff, brown **SILTY CLAY,** trace sand		▨					1	94.56
			G	3				
							2	93.56
			G	4			3	92.56
	3.10							
End of Test Pit (Groundwater infiltration at 2.6m depth)								



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SOIL PROFILE AND TEST DATA

Geotechnical and Hydrogeological Investigation
Proposed Commercial Development
30 Frank Nighbor Place, Kanata, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE 2022 March 25

FILE NO. PG6153

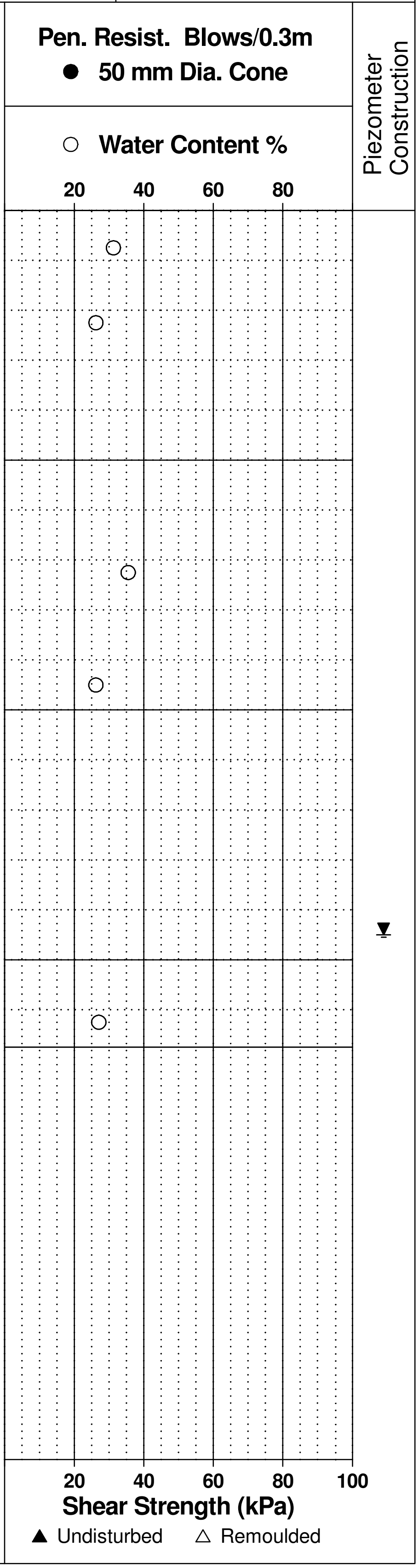
HOLE NO. TP 2-22

SOIL DESCRIPTION	Depth to base (m)	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.20	G	1		
FILL: Brown silty clay with crushed stone, cobbles and gravel	0.62	G	2		
FILL: Brown silty clay, some sand and topsoil	1.80	G	3		
Compact, brown **SILTY SAND to SANDY SILT**	1.95	G	4		
Hard to very stiff, brown **SILTY CLAY,** some sand	3.35	G	5		

End of Test Pit

(Groundwater infiltration at 2.9m depth)

DEPTH (m)	ELEV. (m)
0	95.79
1	94.79
2	93.79
3	92.79



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SOIL PROFILE AND TEST DATA

Geotechnical and Hydrogeological Investigation
Proposed Commercial Development
30 Frank Nighbor Place, Kanata, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator

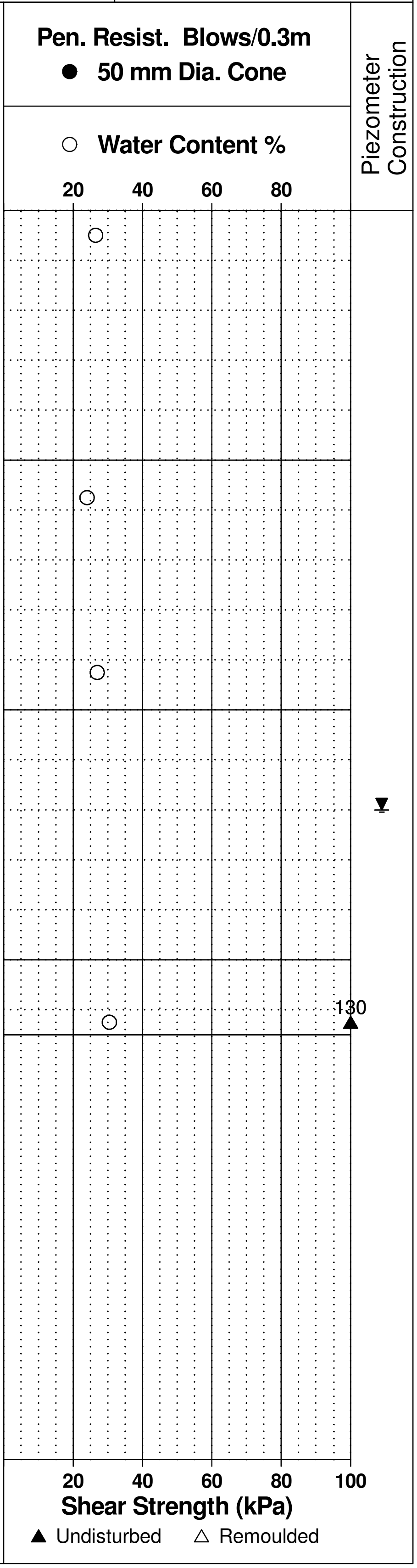
DATE 2022 March 25

FILE NO. PG6153

HOLE NO. TP 3-22

SOIL DESCRIPTION	Depth to base (m)	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
TOPSOIL	0.18	G	1		
FILL: Brown silty clay with sand, occasional cobbles, trace topsoil	1.80	G	2		
Loose to compact, brown **SILTY SAND to SANDY SILT,** trace to some clay	3.30	G G	3 4		
End of Test Pit (Groundwater infiltration at 2.4m depth)					

DEPTH (m)	ELEV. (m)
0	95.71
1	94.71
2	93.71
3	92.71



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SOIL PROFILE AND TEST DATA

Geotechnical and Hydrogeological Investigation
Proposed Commercial Development
30 Frank Nighbor Place, Kanata, Ontario

DATUM Geodetic

REMARKS

BORINGS BY Excavator

DATE 2022 March 25

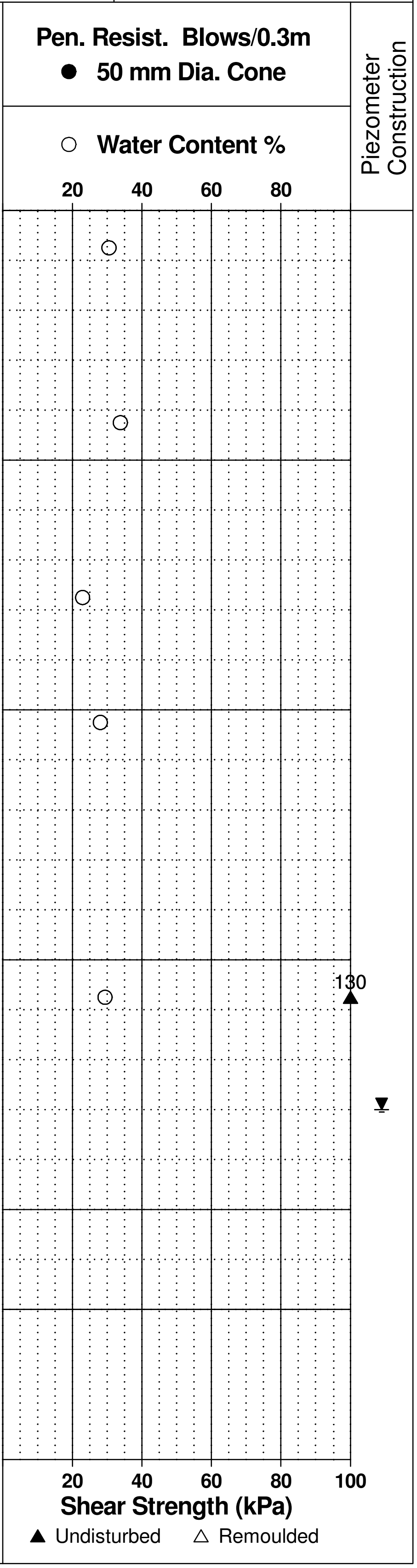
FILE NO. PG6153

HOLE NO. TP 4-22

SOIL DESCRIPTION	
GROUND SURFACE	
TOPSOIL	0.20
FILL: Brown silty clay with crushed stone, gravel and cobbles	1.05
FILL: Brown silty clay, trace sand	1.80
TOPSOIL	1.90
Loose to compact, brown **SILTY SAND to SANDY SILT**	2.10
Hard to ver stiff, brown **SILTY CLAY,** some to trace sand	4.40
End of Test Pit (Groundwater infiltration at 3.6m depth)	

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
G	1		
G	2		
G	3		
G	4		
G	2		

DEPTH (m)	ELEV. (m)
0	95.50
1	94.50
2	93.50
3	92.50
4	91.50



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SOIL PROFILE AND TEST DATA

Geotechnical and Hydrogeological Investigation
Proposed Commercial Development
30 Frank Nighbor Place, Kanata, Ontario

DATUM Geodetic
REMARKS
BORINGS BY Excavator
DATE 2022 March 25
FILE NO. PG6153
HOLE NO. TP 5-22

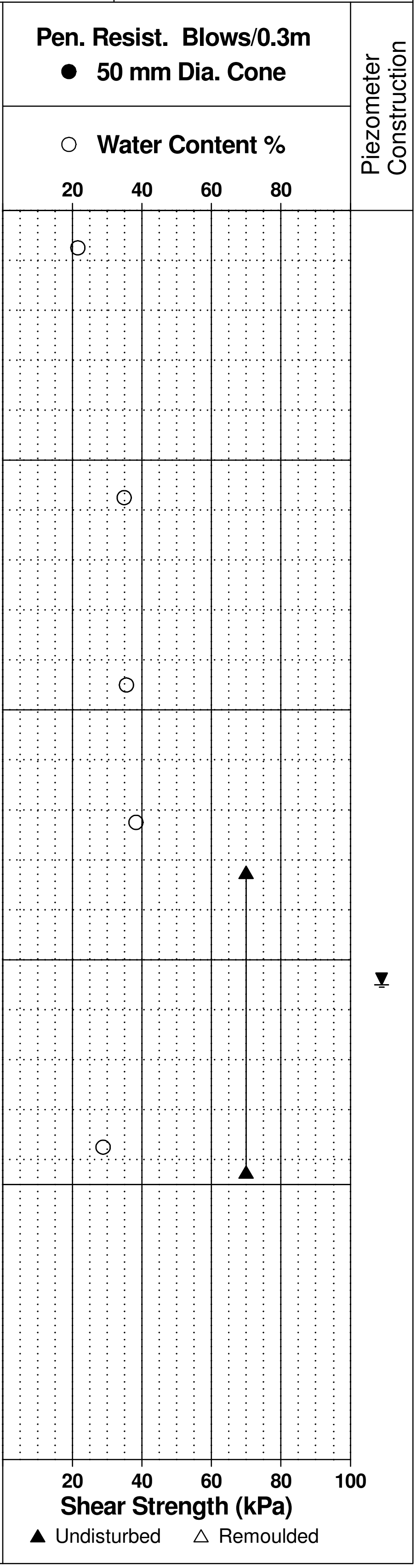
SOIL DESCRIPTION	Depth (m)
GROUND SURFACE	
TOPSOIL	0.30
FILL: Brown silty clay, some gravel, cobbles and crushed stone, trace sand and topsoil	1.70
TOPSOIL	1.80
Compact, brown **SILTY SAND to SANDY SILT**	2.50
Stiff, brown **SILTY CLAY,** trace sand	3.90

End of Test Pit

(Groundwater infiltration at 3.1m depth)

SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
G	1		
G	2		
G	3		
G	4		
G	5		

DEPTH (m)	ELEV. (m)
0	95.15
1	94.15
2	93.15
3	92.15



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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical and Hydrogeological Investigation
Proposed Commercial Development
30 Frank Nighbor Place, Kanata, Ontario

DATUM Geodetic

REMARKS

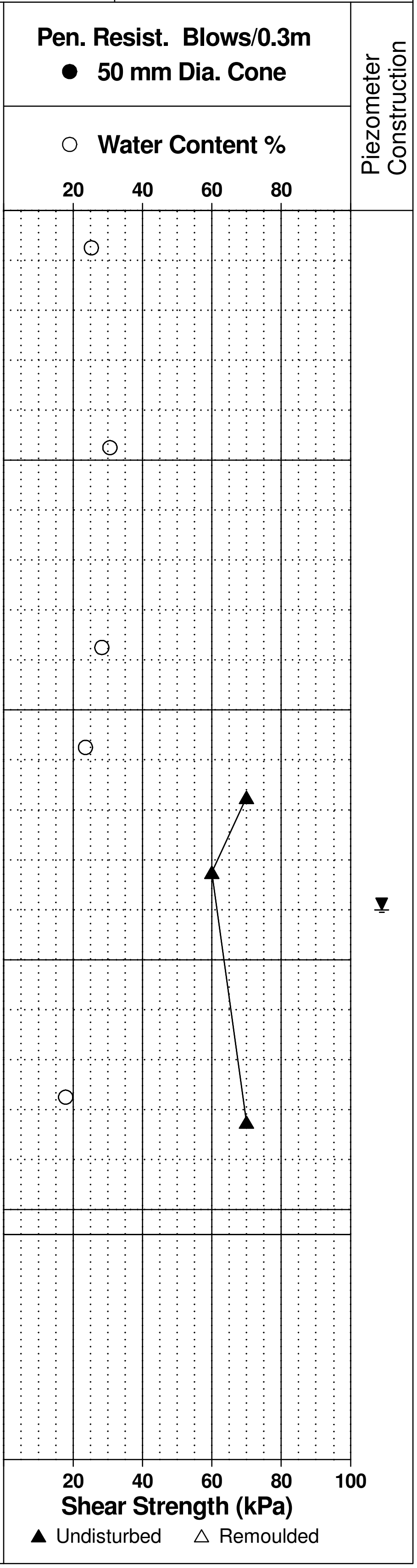
BORINGS BY Excavator

DATE 2022 March 25

FILE NO. PG6153

HOLE NO. TP 6-22

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	94.85
TOPSOIL 0.25	G	1				
FILL: Brown silty sand, some gravel, cobbles and crushed stone, trace sand and topsoil	G	2			1	93.85
1.65						
TOPSOIL 1.80	G	3				
Compact, brown **SILTY SAND to SANDY SILT** 1.90					2	92.85
Very stiff to stiff, brown **SILTY CLAY,** trace sand	G	4				
					3	91.85
- grey by 3.4m depth	G	5				
					4	90.85
4.10						
End of Test Pit (Groundwater infiltration at 2.8m depth)						



SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

The standard terminology to describe the relative strength of cohesionless soils is the compactness condition, usually inferred from the results of the Standard Penetration Test (SPT) ‘N’ value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm. An SPT N value of “P” denotes that the split-spoon sampler was pushed 300 mm into the soil without the use of a falling hammer.

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

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory shear vane tests, unconfined compression tests, or occasionally by the Standard Penetration Test (SPT). Note that the typical correlations of undrained shear strength to SPT N value (tabulated below) tend to underestimate the consistency for sensitive silty clays, so Paterson reviews the applicable split spoon samples in the laboratory to provide a more representative consistency value based on tactile examination.

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity, S_t, is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil. The classes of sensitivity may be defined as follows:

Low Sensitivity:	$S_t < 2$
Medium Sensitivity:	$2 < S_t < 4$
Sensitive:	$4 < S_t < 8$
Extra Sensitive:	$8 < S_t < 16$
Quick Clay:	$S_t > 16$

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube, generally recovered using a piston sampler
G	-	"Grab" sample from test pit or surface materials
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size BQ, NQ, HQ, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

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

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

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

CONSOLIDATION TEST

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

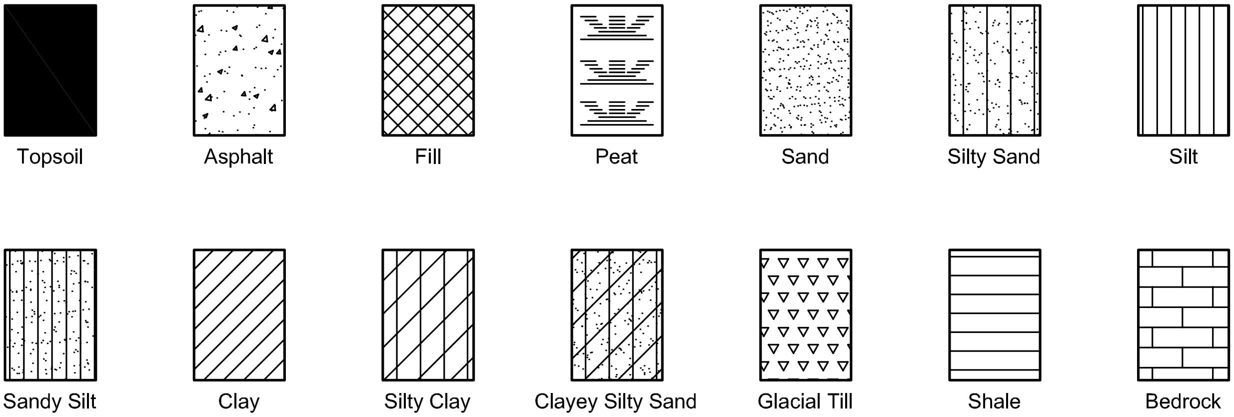
OC Ratio Overconsolidaton ratio = p'_c / p'_o
Void Ratio Initial sample void ratio = volume of voids / volume of solids
Wo - Initial water content (at start of consolidation test)

PERMEABILITY TEST

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

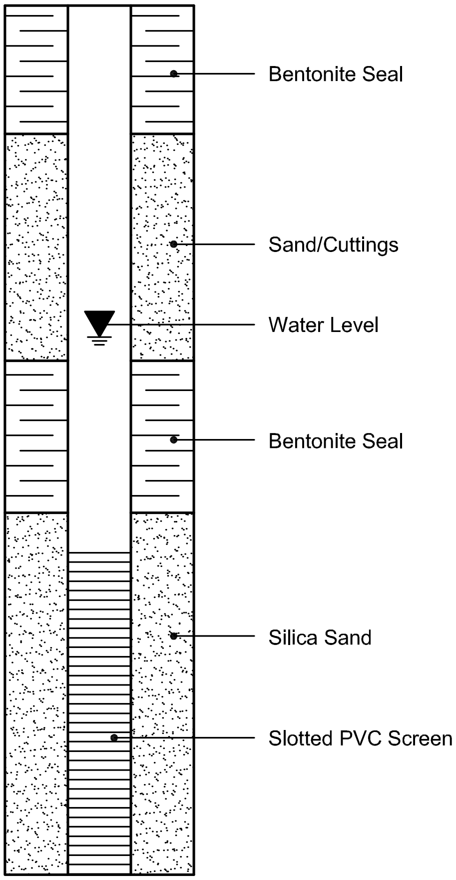
SYMBOLS AND TERMS (continued)

STRATA PLOT

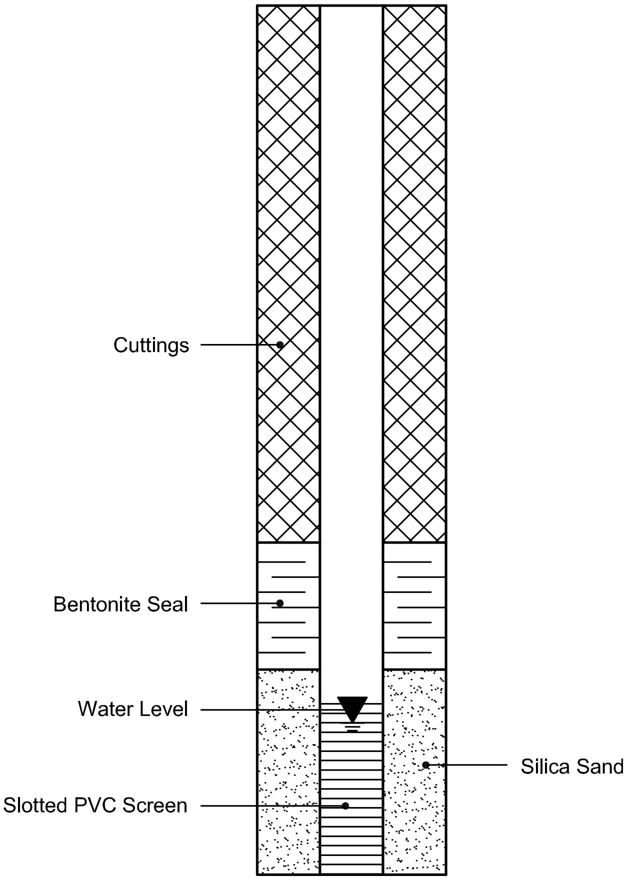


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE & TEST DATA

Geotechnical Investigation
Proposed Retail Building, 20 Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM TBM - Top spindle of fire hydrant (see plan). Approximate geodetic elevation = 95.64m.

REMARKS

BORINGS BY CME 45 Power Auger

DATE 23 MAR 05

FILE NO. PG0575

HOLE NO. BH 1

SOIL DESCRIPTION

GROUND SURFACE

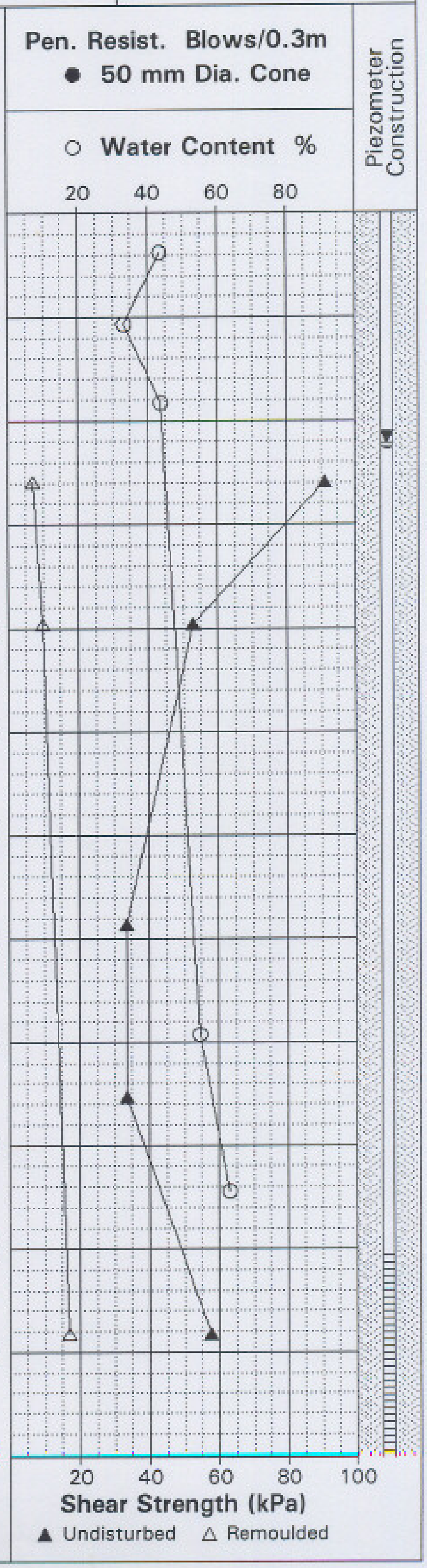
TOPSOIL 0.20

Very stiff to stiff, brown
SILTY CLAY

- grey-brown by 2.3m depth
- grey by 3.0m depth
- firm by 5.2m depth

TYPE	NUMBER	% RECOVERY	N VALUE or RQD
AU	1		
SS	2	83	3
SS	3	83	2
TW	4	100	
TW	5	100	
TW	6	100	
SS	7	100	1
SS	8	100	1

DEPTH (m)	ELEV. (m)
0	93.53
1	92.53
2	91.53
3	90.53
4	89.53
5	88.53
6	87.53
7	86.53
8	85.53
9	84.53
10	83.53
11	82.53
12	81.53



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SOIL PROFILE & TEST DATA

Geotechnical Investigation
Proposed Retail Building, 20 Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM TBM - Top spindle of fire hydrant (see plan). Approximate geodetic elevation = 95.64m.

REMARKS

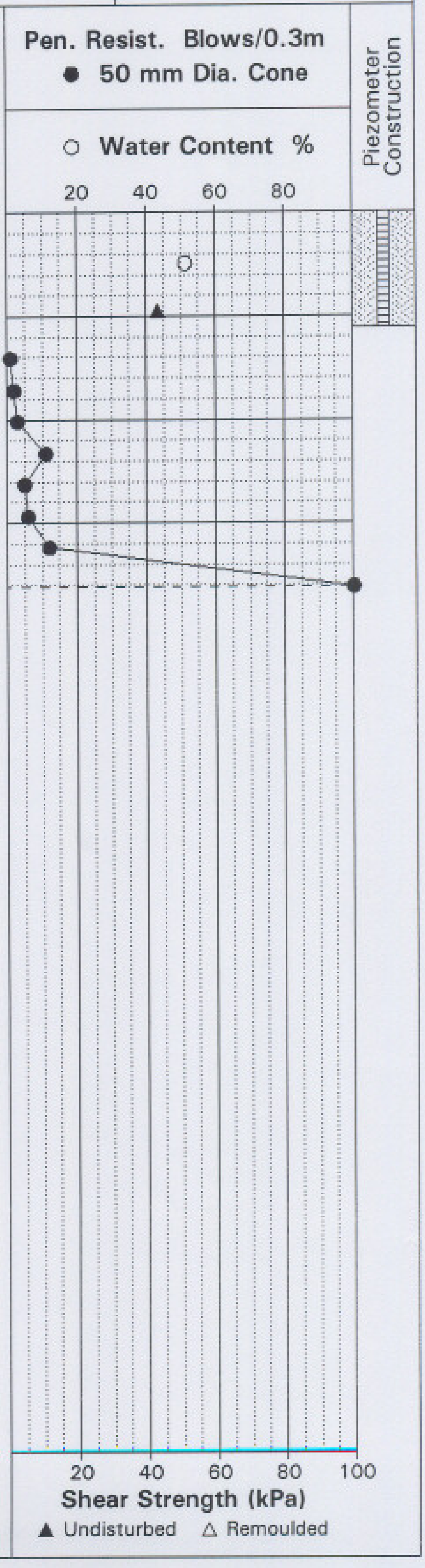
BORINGS BY CME 45 Power Auger

DATE 23 MAR 05

FILE NO. PG0575

HOLE NO. BH 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
						12	81.53
Stiff to firm, grey SILTY **CLAY**		SS	9	10	1		
13.10						13	80.53
Dynamic Cone Penetration Test commenced @ 13.11m depth Inferred SILTY CLAY						14	79.53
15.20						15	78.53
Inferred GLACIAL TILL 15.62							
End of Borehole DCPT refusal @ 15.62m depth (GWL @ 2.22m-Mar. 31/05)							



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28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE & TEST DATA

Geotechnical Investigation
Proposed Retail Building, 20 Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM TBM - Top spindle of fire hydrant (see plan). Approximate geodetic elevation = 95.64m.

REMARKS

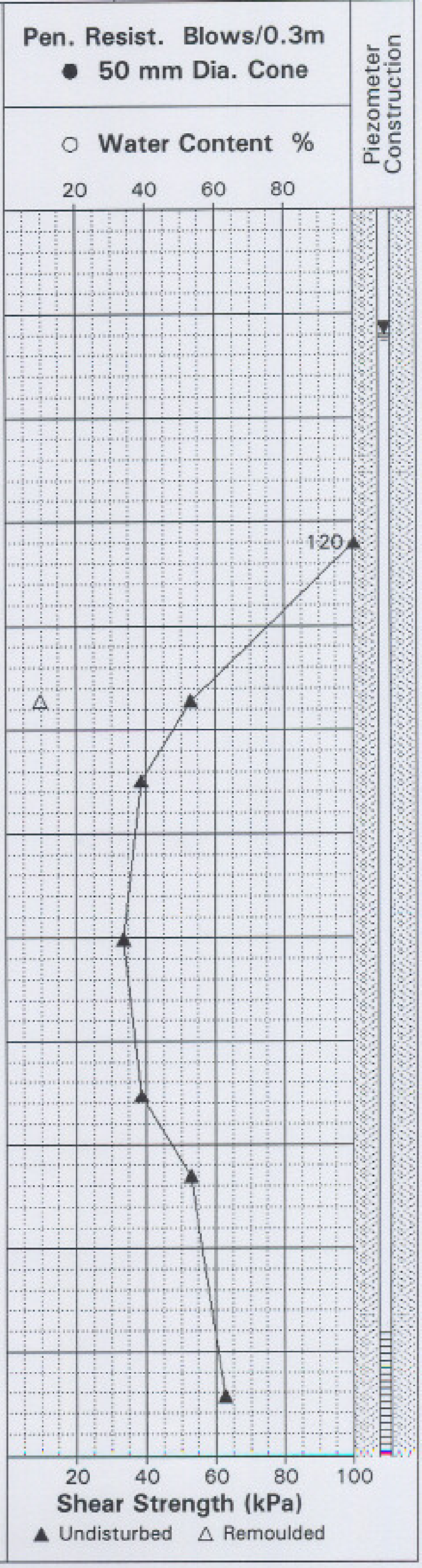
BORINGS BY CME 45 Power Auger

DATE 23 MAR 05

FILE NO. PG0575

HOLE NO. BH 2

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	93.13
TOPSOIL 0.25	AU	1				
	SS	2	100	7	1	92.13
	SS	3	83	5	2	91.13
Very stiff to stiff, grey-brown SILTY CLAY	SS	4	83	5		
					3	90.13
					4	89.13
- grey by 4.0m depth	TW	5	83			
- firm by 5.0m depth					5	88.13
					6	87.13
	SS	6	100	1		
					7	86.13
	TW	7	100		8	85.13
- stiff by 9.0m depth					9	84.13
					10	83.13
	SS	8	100	1	11	82.13
					12	81.13



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28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE & TEST DATA

Geotechnical Investigation
Proposed Retail Building, 20 Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM TBM - Top spindle of fire hydrant (see plan). Approximate geodetic elevation = 95.64m.

REMARKS

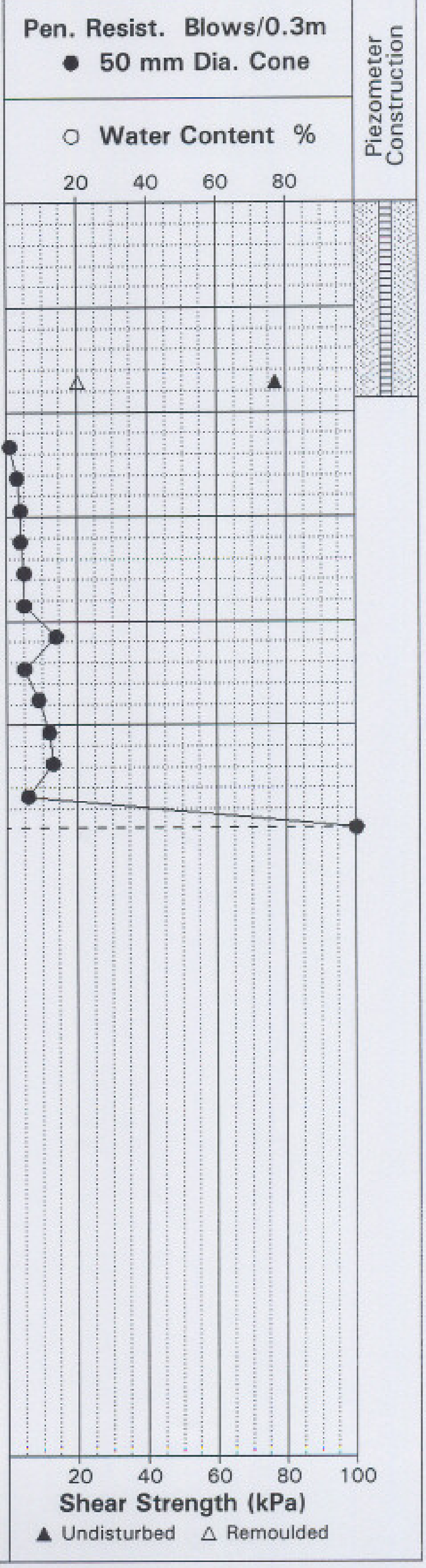
BORINGS BY CME 45 Power Auger

DATE 23 MAR 05

FILE NO. PG0575

HOLE NO. BH 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
						12	81.13
Stiff, grey SILTY CLAY		SS	9	100	1	13	80.13
13.87							
Dynamic Cone Penetration Test commenced @ 13.87m depth						14	79.13
Inferred SILTY CLAY						15 16	78.13 77.13
16.80							
Inferred GLACIAL TILL						17	76.13
17.98							
End of Borehole DCPT refusal @ 17.98m depth (GWL @ 1.20m-Mar. 31/05)							



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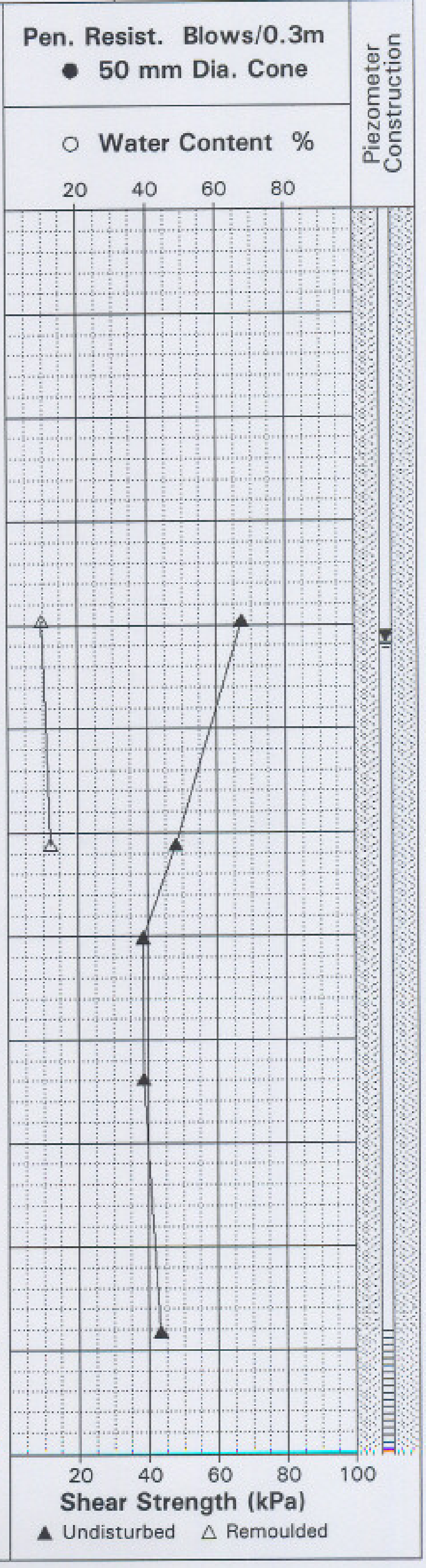
SOIL PROFILE & TEST DATA

Geotechnical Investigation
Proposed Retail Building, 20 Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM	TBM - Top spindle of fire hydrant (see plan). Approximate geodetic elevation = 95.64m.
REMARKS	
BORINGS BY	CME 45 Power Auger
DATE	22 MAR 05
FILE NO.	PG0575
HOLE NO.	BH 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD
GROUND SURFACE					
FILL: Brown silty clay with sand, gravel and cobbles		AU	1		
		SS	2	17	18
		SS	3	8	6
3.05		SS	4	0	5
Stiff, brown **SILTY CLAY**		SS	5	100	2
- grey by 4.6m depth		TW	6	4	
		TW	7	100	
- firm by 6.0m depth		TW	8	100	
		TW	9	100	
		SS	10	100	1

DEPTH (m)	ELEV. (m)
0	95.37
1	94.37
2	93.37
3	92.37
4	91.37
5	90.37
6	89.37
7	88.37
8	87.37
9	86.37
10	85.37
11	84.37
12	83.37



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28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE & TEST DATA

Geotechnical Investigation
Proposed Retail Building, 20 Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM TBM - Top spindle of fire hydrant (see plan). Approximate geodetic elevation = 95.64m.

REMARKS

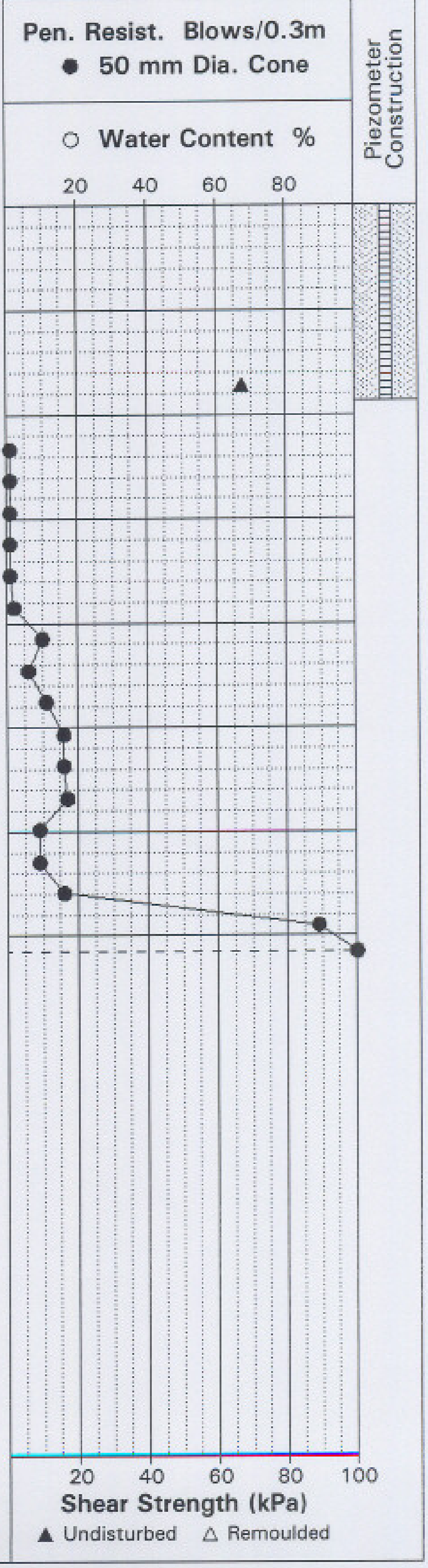
BORINGS BY CME 45 Power Auger

DATE 22 MAR 05

FILE NO. PG0575

HOLE NO. BH 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
						12	83.37
Firm, grey SILTY CLAY		SS	11		1		
		TW	12	100		13	82.37
13.87							
Dynamic Cone Penetration Test commenced @ 13.87m depth						14	81.37
Inferred SILTY CLAY						15	80.37
15.50							
						16	79.37
Inferred GLACIAL TILL						17	78.37
						18	77.37
						19	76.37
19.15							
End of Borehole DCPT refusal @ 19.15m depth (GWL @ 4.17m-Mar. 31/05)							



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28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE & TEST DATA

Geotechnical Investigation
Proposed Retail Building, 20 Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM TBM - Top spindle of fire hydrant (see plan). Approximate geodetic elevation = 95.64m.

REMARKS

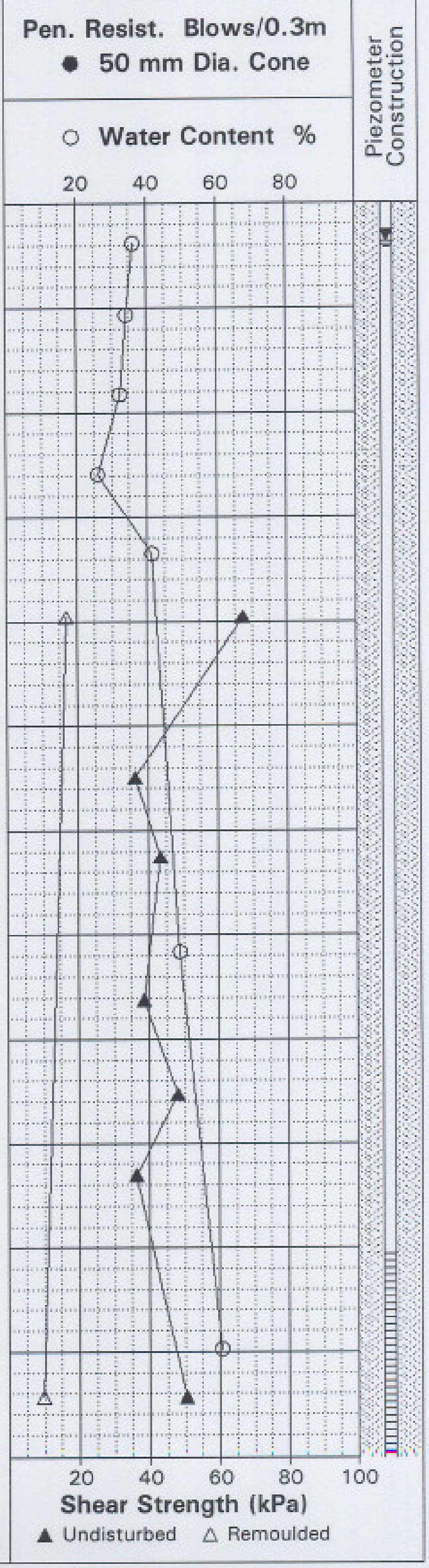
BORINGS BY CME 45 Power Auger

DATE 23 MAR 05

FILE NO. PG0575

HOLE NO. BH 4

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD		
GROUND SURFACE						0	95.59
		AU	1				
FILL: Brown silty clay with sand, gravel and cobbles							
						1	94.59
		SS	2	75	10		
1.68							
TOPSOIL 1.78		SS	3	67	21		
						2	93.59
Compact, brown **SILTY fine SAND/SANDY SILT** 1.83							
		SS	4	83	3		
						3	92.59
Stiff, brown **SILTY CLAY**		SS	5	83	3		
						4	91.59
- fine sand and sandy silt layers to 4.0m depth							
- firm and grey by 4.3m depth		TW	6	75			
						5	90.59
						6	89.59
						7	88.59
		SS	7	12	1		
						8	87.59
						9	86.59
						10	85.59
- stiff by 10.7m depth		SS	8	100	1	11	84.59
						12	83.59



SOIL PROFILE & TEST DATA

Geotechnical Investigation
Proposed Retail Building, 20 Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM TBM - Top spindle of fire hydrant (see plan). Approximate geodetic elevation = 95.64m.

REMARKS

BORINGS BY CME 45 Power Auger

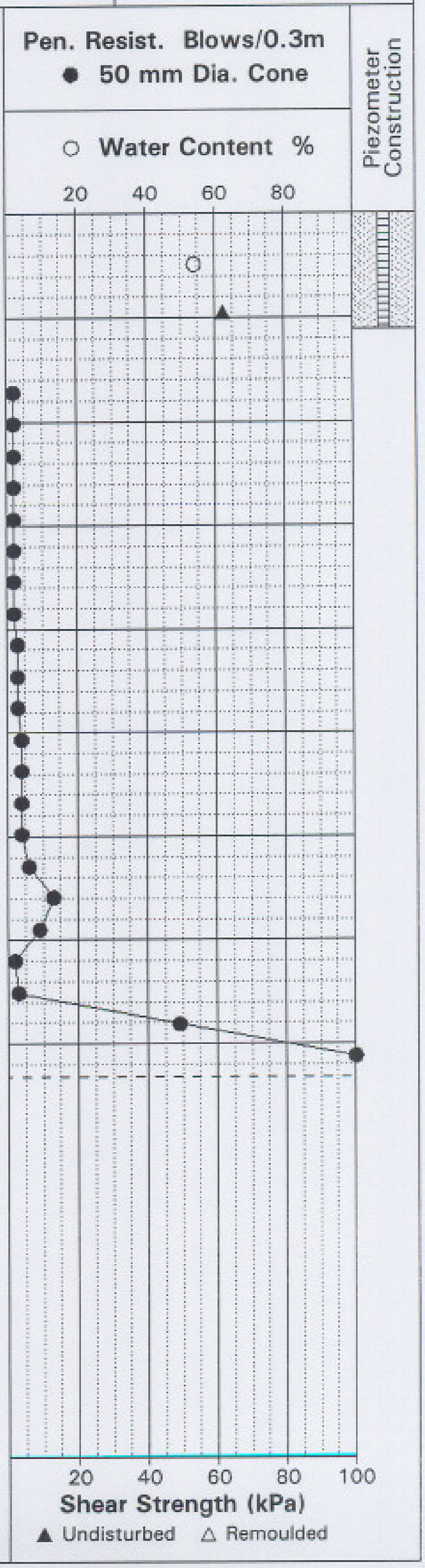
DATE 23 MAR 05

FILE NO. PG0575

HOLE NO. BH 4

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD
Stiff, grey SILTY CLAY	SS	9	100	1
13.11				
Dynamic Cone Penetration Test commenced @ 13.11m depth				
Inferred SILTY CLAY				
17.70				
Inferred GLACIAL TILL				
20.32				
End of Borehole DCPT refusal @ 20.32m depth (GWL @ 0.37m-Mar. 31/05)				

DEPTH (m)	ELEV. (m)
12	83.59
13	82.59
14	81.59
15	80.59
16	79.59
17	78.59
18	77.59
19	76.59
20	75.59



patersongroup Consulting Engineers
28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE & TEST DATA

Geotechnical Investigation
Proposed Retail Building, 20 Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM TBM - Top spindle of fire hydrant (see plan). Approximate geodetic elevation = 95.64m.

REMARKS

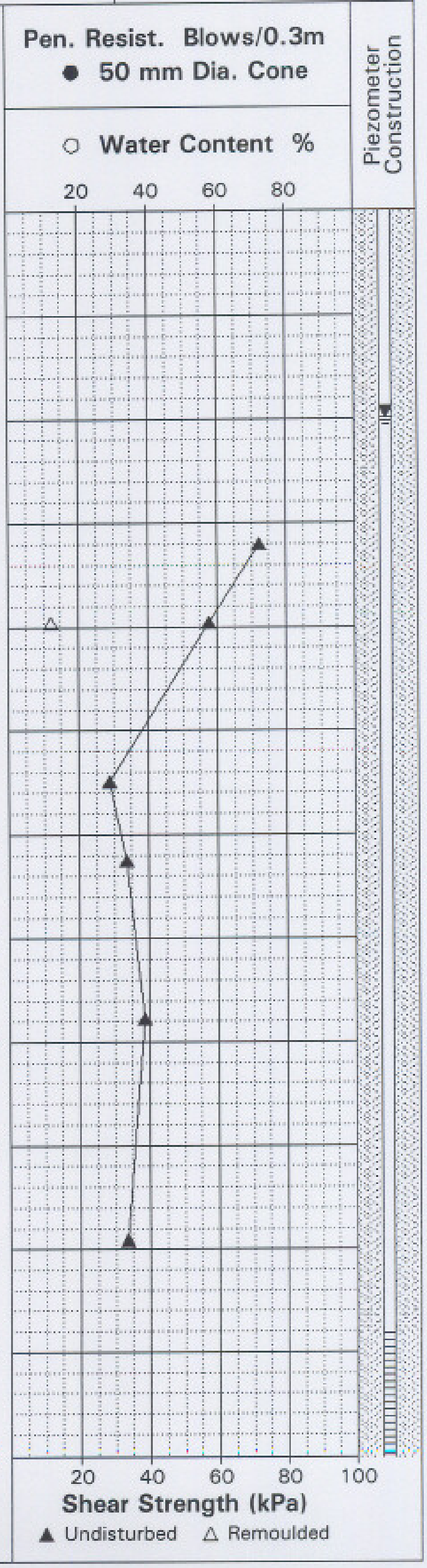
BORINGS BY CME 45 Power Auger

DATE 24 MAR 05

FILE NO. PG0575

HOLE NO. BH 5

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	94.18
TOPSOIL 0.18						
Loose, brown **SANDY SILT/SILTY SAND**	AU	1				
	SS	2	75	4	1	93.18
1.37						
	SS	3	83	3		
					2	92.18
Very stiff to stiff, brown **SILTY CLAY**	SS	4	83	2		
					3	91.18
- grey by 3.8m depth					4	90.18
	TW	5	100			
					5	89.18
- firm by 5.2m depth						
					6	88.18
					7	87.18
					8	86.18
					9	85.18
	SS	6	100	1		
					10	84.18
					11	83.18
					12	82.18



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SOIL PROFILE & TEST DATA

Geotechnical Investigation
Proposed Retail Building, 20 Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM TBM - Top spindle of fire hydrant (see plan). Approximate geodetic elevation = 95.64m.

REMARKS

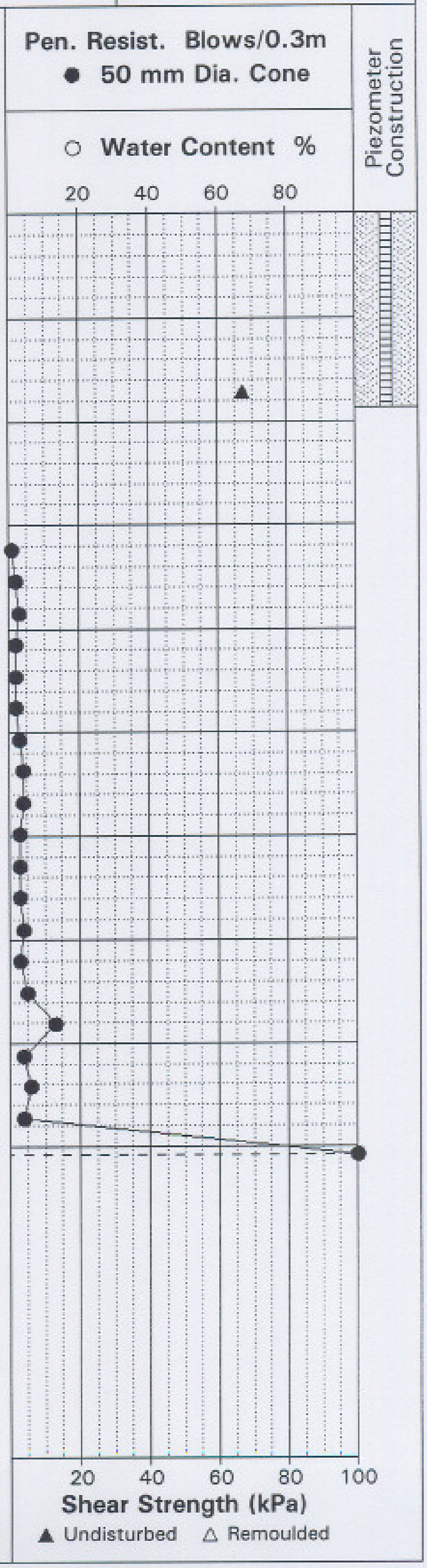
BORINGS BY CME 45 Power Auger

DATE 24 MAR 05

FILE NO. PG0575

HOLE NO. BH 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
	▨					12	82.18
Stiff, grey SILTY CLAY	▨	TW	7	100		13	81.18
13.87 Dynamic Cone Penetration Test commenced @ 13.87m depth	▨					14	80.18
	▨					15	79.18
Inferred SILTY CLAY	▨					16	78.18
	▨					17	77.18
	▨					18	76.18
	▨					19	75.18
	▨					20	74.18
21.08 End of Borehole DCPT refusal @ 21.08m depth (GWL @ 2.00m-Mar. 31/05)	▨					21	73.18



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Terry Fox Retail Centre, Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM Geodetic

FILE NO. G8733

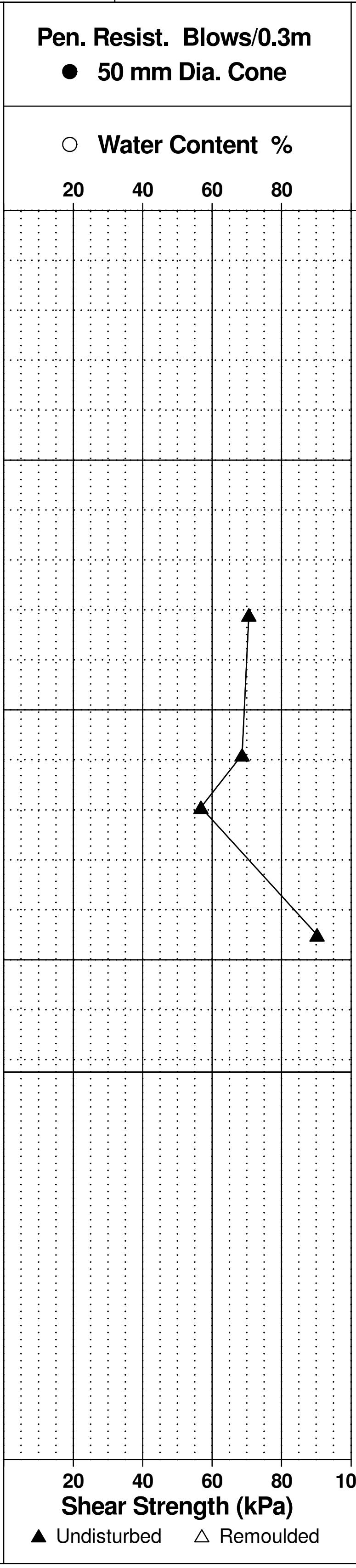
REMARKS

HOLE NO. TP 1

BORINGS BY Backhoe

DATE Sep 9, 02

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	95.11
Topsoil 0.05							
FILL: Brown silty fine sand with crushed stone, gravel and organic matter 0.84		G	1				
Brown **SILTY** fine **SAND** 1.12		G	2			1	94.11
Stiff, brown **SILTY CLAY/CLAYEY SILT**, trace sand - olive grey by 2.1m depth		G	3				
		G	4			2	93.11
						3	92.11
3.45		G	5				
End of Test Pit (Open hole GWL @ 2.6m depth)							



Piezometer Construction

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Terry Fox Retail Centre, Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM Geodetic

REMARKS

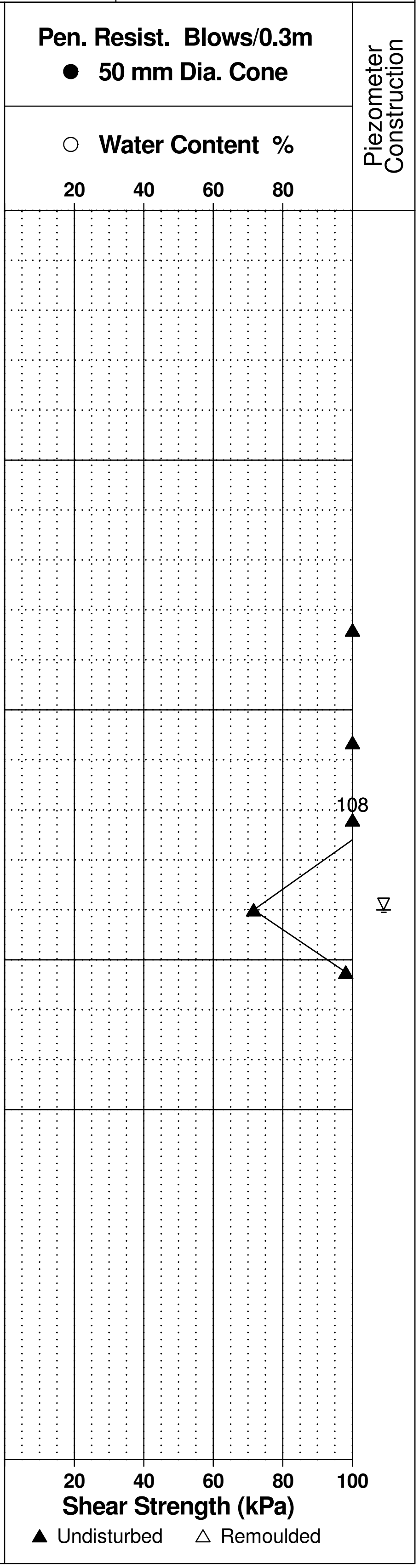
BORINGS BY Backhoe

DATE Sep 9, 02

FILE NO. G8733

HOLE NO. TP 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	95.55
Topsoil 0.05							
FILL: Brown silty fine sand with with crushed stone, gravel and organic matter 0.84		G	1				
						1	94.55
Stiff to very stiff, brown **SILTY CLAY/CLAYEY SILT** with trace sand and organic matter		G	2				
						2	93.55
		G	3				
- olive grey by 2.6m depth							
						3	92.55
3.35							
Grey **SILTY CLAY/CLAYEY SILT** with sand seams, shells and gravel 3.55		G	4				
End of Test Pit (Open hole GWL @ 3.0m depth)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Terry Fox Retail Centre, Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE Sep 9, 02

FILE NO. G8733

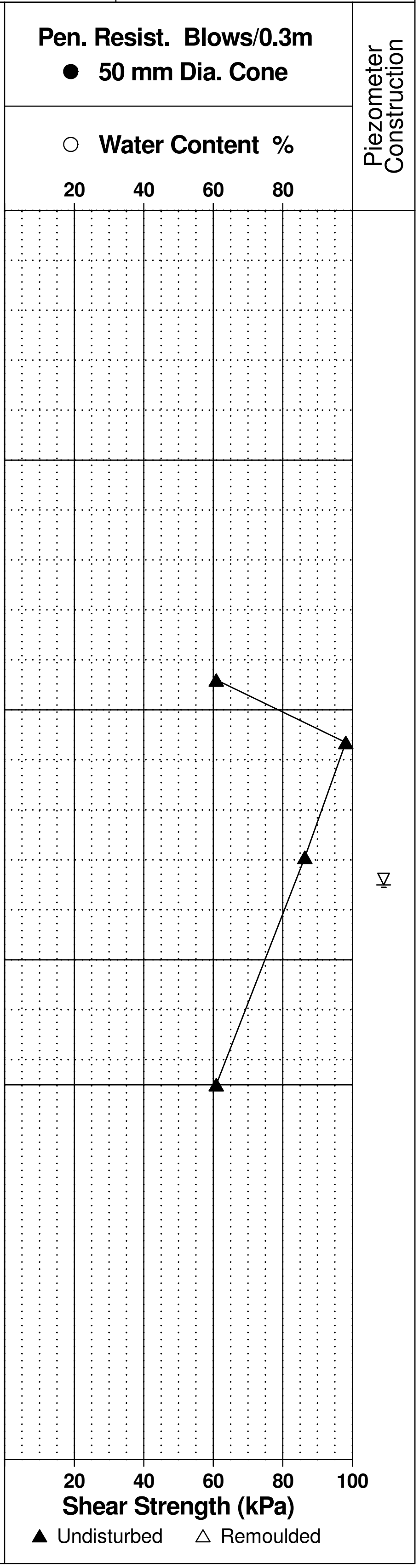
HOLE NO. TP 3

SOIL DESCRIPTION	Depth to base (m)	SAMPLE TYPE	SAMPLE NUMBER	% RECOVERY	N VALUE or RQD
GROUND SURFACE					
Topsoil	0.05				
FILL: Dark brown silty fine sand with gravel, occasional boulders	0.76	G	1		
Brown **SILTY** fine **SAND**	1.07	G	2		
Brown **CLAYEY SILT** to **SILTY CLAY** with sand - olive grey by 2.7m depth	3.35	G	3		
Grey **SILTY CLAY/CLAYEY SILT**, trace white shell pieces	3.50	G	4		

End of Test Pit

(Open hole GWL @ 2.7m depth)

DEPTH (m)	ELEV. (m)
0	95.25
1	94.25
2	93.25
3	92.25



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Terry Fox Retail Centre, Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM Geodetic

REMARKS

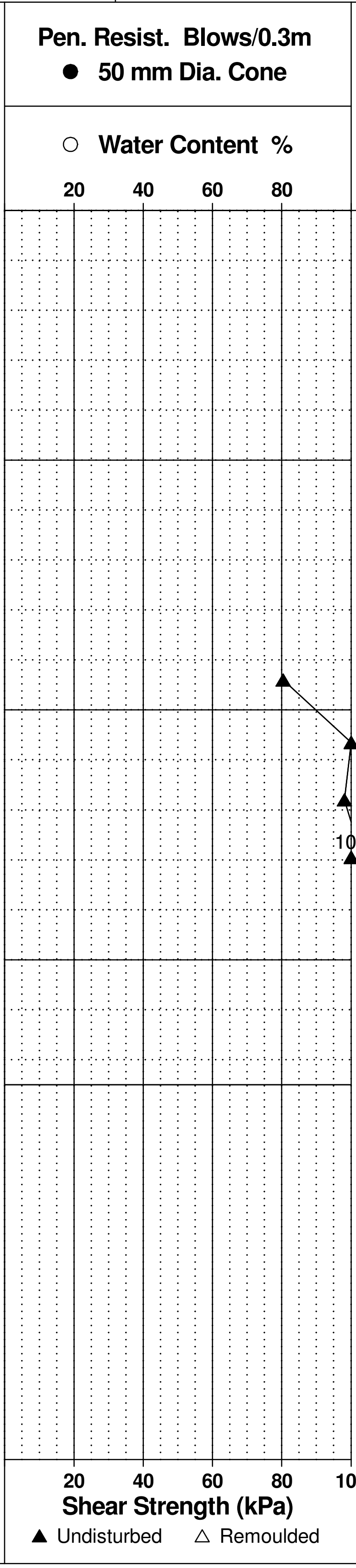
BORINGS BY Backhoe

DATE Sep 9, 02

FILE NO. G8733

HOLE NO. TP 4

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Piezometer Construction
GROUND SURFACE						0	94.98	
FILL: Brown silty fine sand with asphalt fragments, crushed stone, gravel, occasional cobbles								
		G	1			1	93.98	
1.22								
PEAT: Dark brown silt with organic matter 1.32		G	2					
Brown **SILTY** fine **SAND** 1.62		G	3					
Stiff to very stiff, brown **CLAYEY SILT** to **SILTY CLAY**, trace sand		G	4			2	92.98	
- olive grey by 2.7m depth								▽
						3	91.98	
3.50		G	5					
End of Test Pit (Open hole GWL @ 2.8m depth)								



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Terry Fox Retail Centre, Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

DATE Sep 10, 02

FILE NO. G8733

HOLE NO. TP 6

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Piezometer Construction
GROUND SURFACE					0	95.34	
25mm Topsoil over **FILL**: Brown silty clay with crushed stone and organic matter	G	1					
					1	94.34	
1.65							
TOPSOIL: Dark brown clayey silt with organic matter	G	2					
1.85							
					2	93.34	
Brown **CLAYEY SILT** to **SILTY CLAY**							
2.74							▽
Grey fine **SILTY** fine **SAND**, trace clay	G	3			3	92.34	
3.50							
End of Test Pit (Open hole GWL @ 2.8m depth)							

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

○ **Water Content %**

20 40 60 80

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

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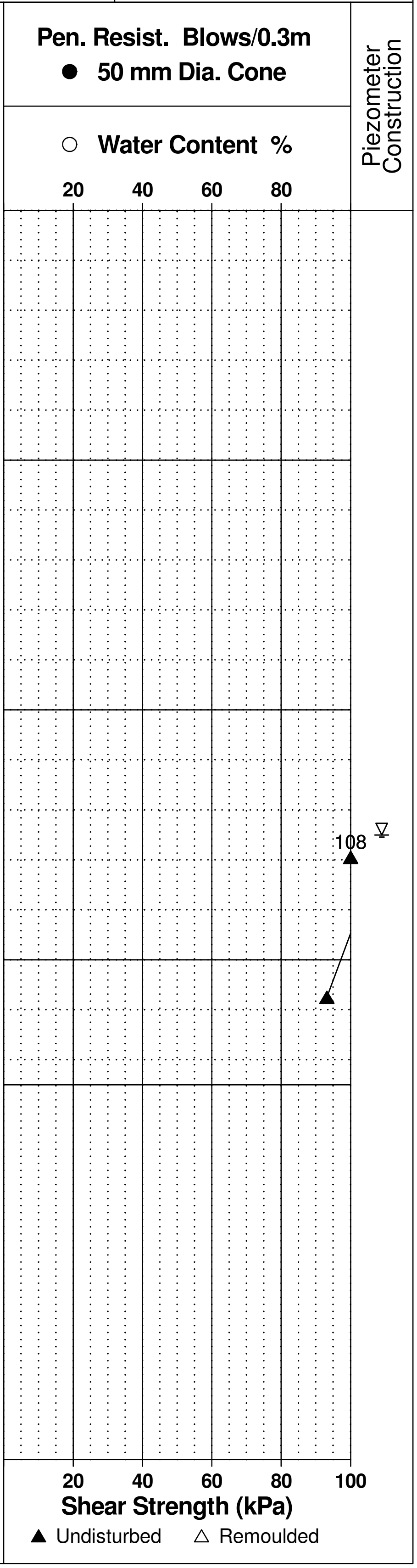
SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Terry Fox Retail Centre, Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM Geodetic
REMARKS
BORINGS BY Backhoe
DATE Sep 10, 02
FILE NO. G8733
HOLE NO. TP 7

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	95.46
25mm Topsoil over **FILL**: Brown clayey silt with occasional crushed stone and organic matter		G	1				
1.14						1	94.46
TOPSOIL: Dark brown clayey silt with organic matter							
1.37							
Stiff to very stiff, brown **CLAYEY SILT** to **SILTY CLAY**, trace sand		G	2			2	93.46
- grey by 2.3m depth		G	3			3	92.46
3.35							
End of Test Pit (Open hole GWL @ 2.5m depth)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Terry Fox Retail Centre, Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM Geodetic

REMARKS

BORINGS BY Backhoe

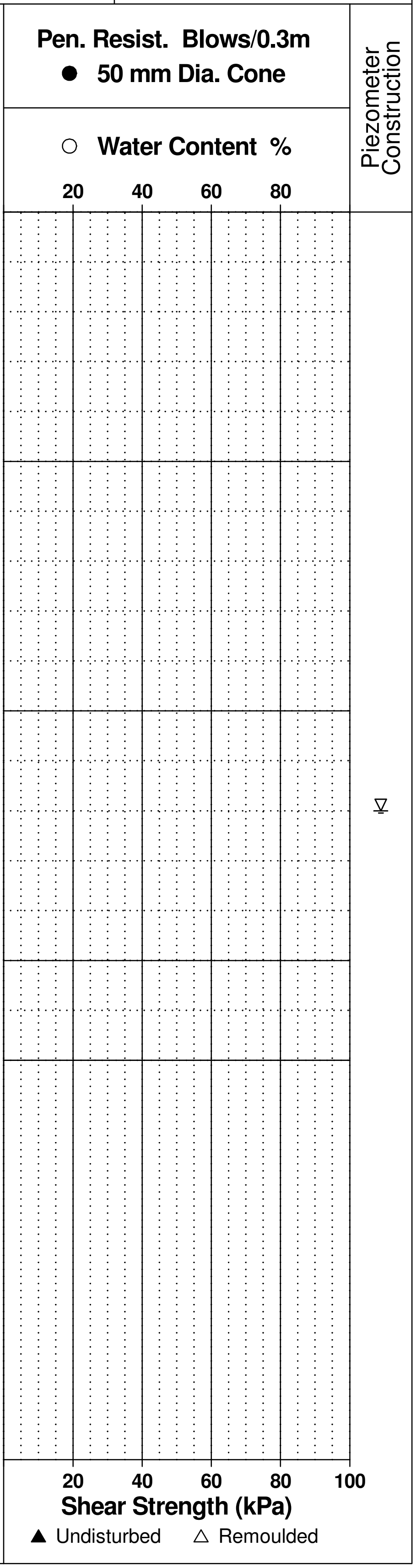
DATE Sep 9, 02

FILE NO. G8733

HOLE NO. TP 8

SOIL DESCRIPTION	Depth to base (m)	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	N VALUE or RQD
GROUND SURFACE					
25mm Topsoil over **FILL**: Brown clayey silt with occasional crushed stone	0.40				
TOPSOIL: Dark brown clayey silt with organic matter	0.51				
Brown **CLAYEY SILT** to **SILTY CLAY**	1.12	G	1		
Brown fine **SANDY SILTY** to **SILTY** fine **SAND**, trace clay	1.40	G	2		
Brown **SILTY CLAY/CLAYEY SILT**, trace sand - olive grey by 3.2m depth	3.40	G G	3 4		
End of Test Pit (Open hole GWL @ 2.4m depth)					

DEPTH (m)	ELEV. (m)
0	94.29
1	93.29
2	92.29
3	91.29



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Terry Fox Retail Centre, Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM Geodetic

FILE NO. G8733

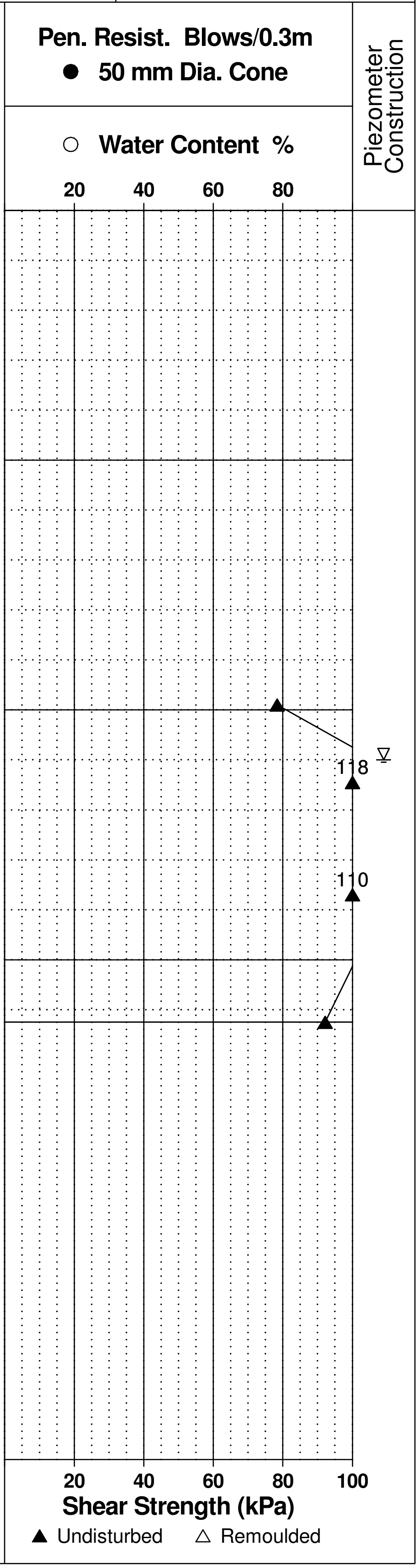
REMARKS

HOLE NO. TP 9

BORINGS BY Backhoe

DATE Sep 10, 02

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.37
TOPSOIL 0.36	■						
FILL: Brown sandy silt to silty sand, trace clay 0.71	▩	G	1				
Stiff to very stiff, olive grey **CLAYEY SILT** to **SILTY CLAY**	▨	G	2			1	92.37
- occasional thin fine to medium silty sand seams	▨						
	▨					2	91.37
	▨	G	3				
- grey-brown by 2.4m depth	▨						
3.25	▨					3	90.37
End of Test Pit (Open hole GWL @ 2.2m depth)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Terry Fox Retail Centre, Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM Geodetic

REMARKS

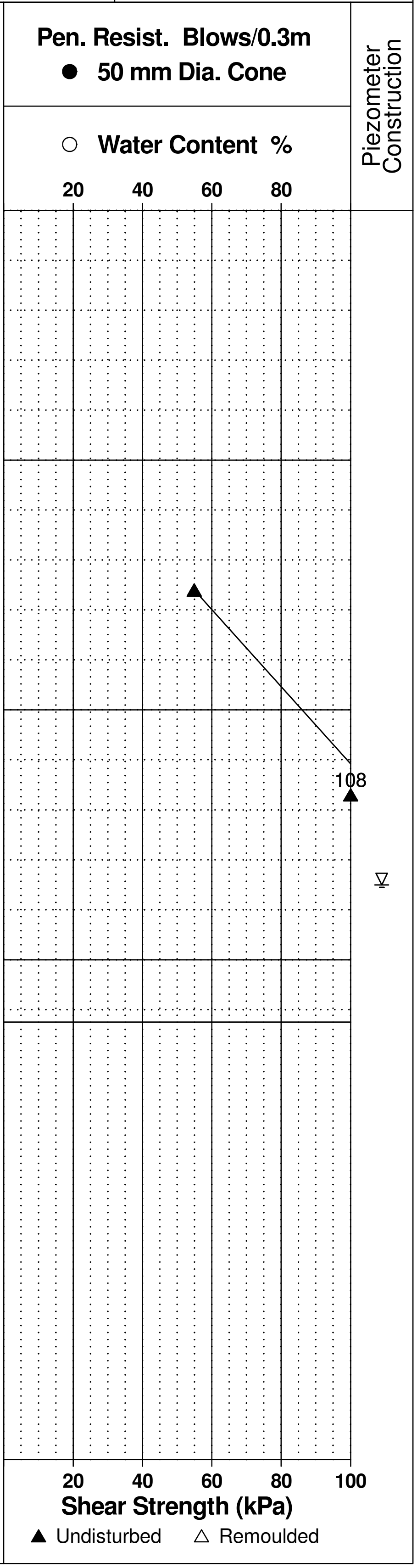
BORINGS BY Backhoe

DATE Sep 10, 02

FILE NO. G8733

HOLE NO. TP10

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.50
TOPSOIL 0.20	■						
Brown fine **CLAYEY SILT**, trace sand	▨	G	1				
1.07	▨					1	92.50
Stiff, grey **CLAYEY SILT** to **SILTY CLAY**, trace sand	▨	G	2				
- gravel and cobbles by 1.5m depth	▨					2	91.50
	▨					3	90.50
3.25	▨	G	3				
End of Test Pit (Open hole GWL @ 2.7m depth)							



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SOIL PROFILE & TEST DATA

Geotechnical Investigation
Terry Fox Retail Centre, Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM Geodetic

REMARKS

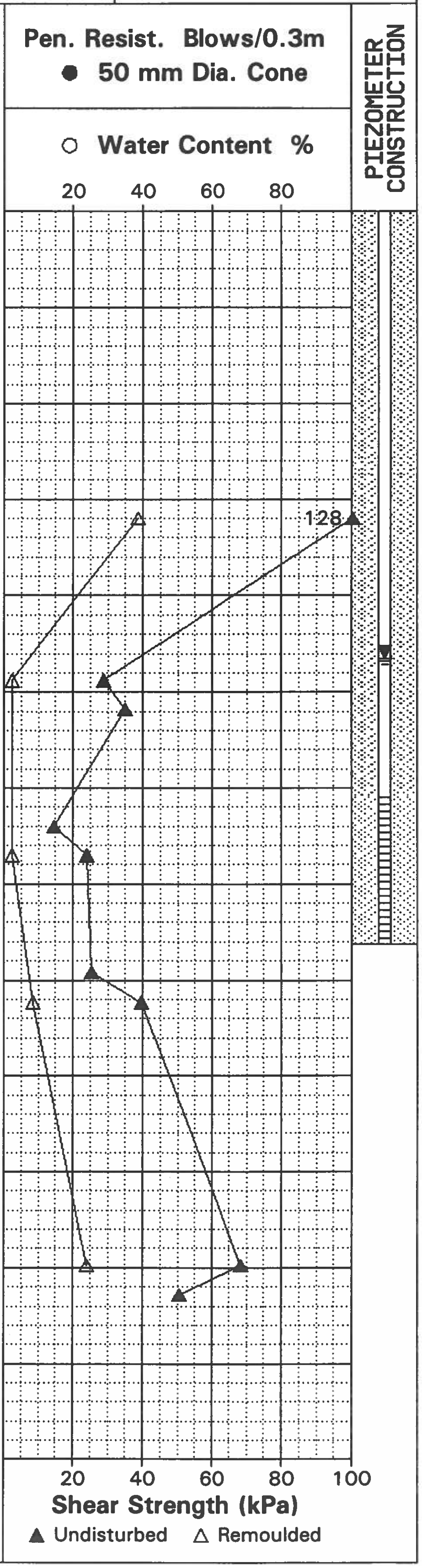
BORINGS BY CME 55 Power Auger

DATE 12 SEP 02

FILE NO. **G8733**

HOLE NO. **BH 1**

SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.08
Topsoil	0.35						
PEAT: Dark brown silt with organic matter		SS	1	21	5	1	92.08
	1.83	SS	2	42	6		
Loose grey fine **SANDY SILT** with trace clay	2.21					2	91.08
		SS	3	100	5		
						3	90.08
Very stiff grey **SILTY CLAY/CLAYEY SILT**		TW	4			4	89.08
- firm by 4.9m depth						5	88.08
		TW	5				
						6	87.08
- soft by 6.4m depth							
		TW	6			7	86.08
- firm by 8.2m depth						8	85.08
						9	84.08
		SS	7	100	2		
						10	83.08
- firm to stiff by 11.0m depth						11	82.08
						12	81.08
		SS	8	100	1		
	13.00					13	80.08



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SOIL PROFILE & TEST DATA

Geotechnical Investigation
Terry Fox Retail Centre, Frank Nighbor Place
Ottawa (Kanata), Ontario

DATUM Geodetic

REMARKS

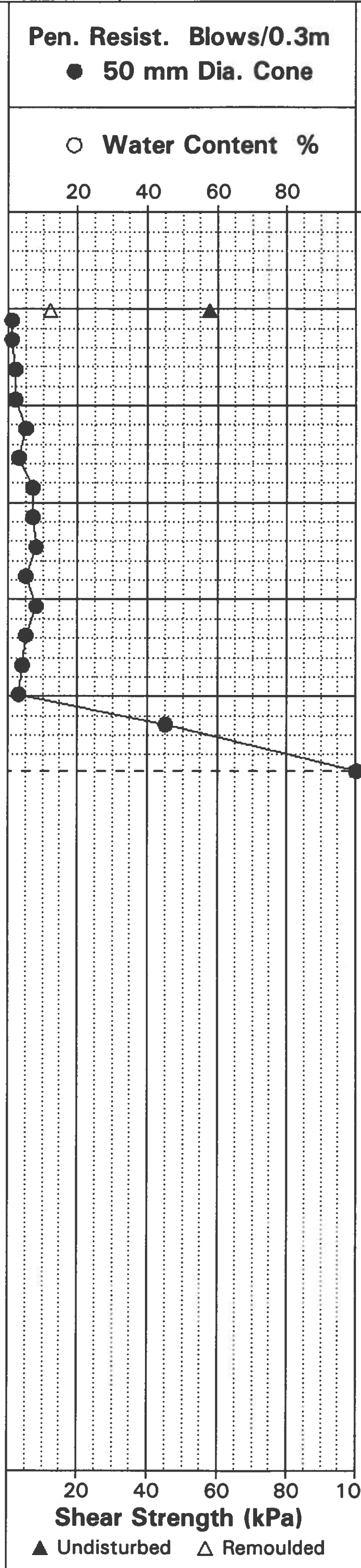
BORINGS BY CME 55 Power Auger

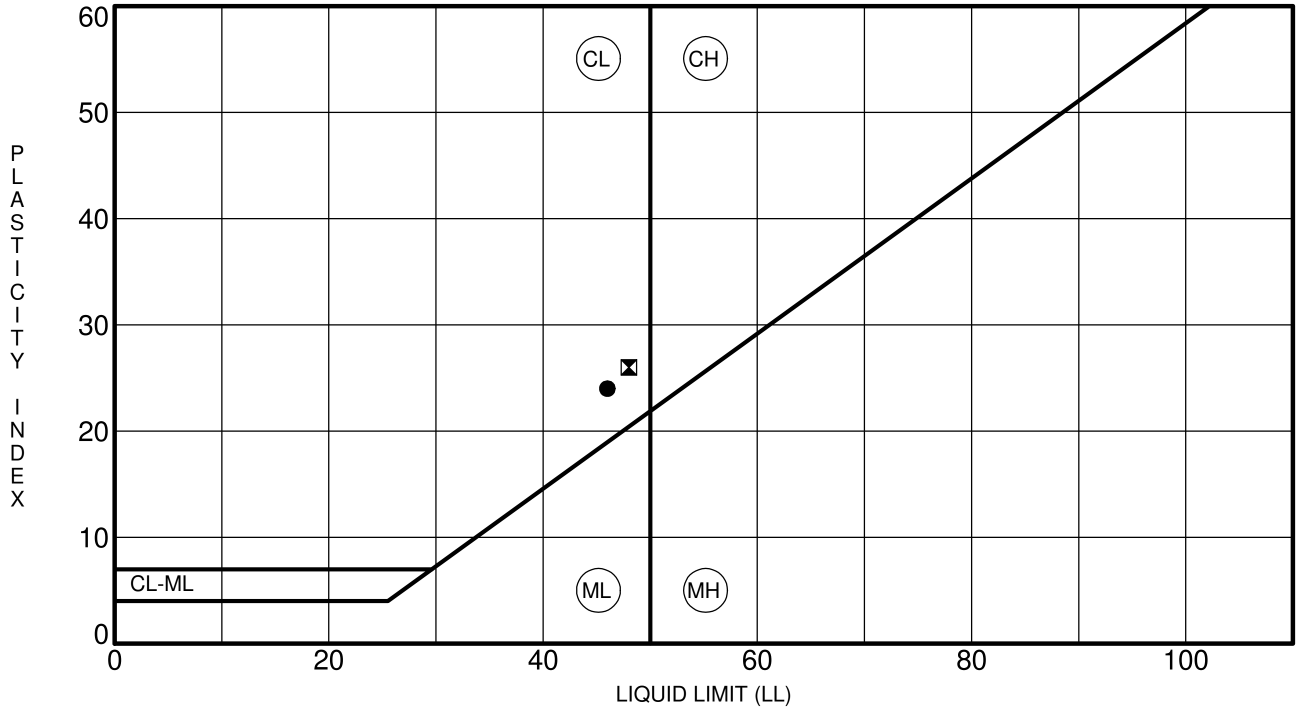
DATE 12 SEP 02

FILE NO. **G8733**

HOLE NO. **BH 1**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	PIEZOMETER CONSTRUCTION
	▨					13	80.08	
Stiff grey SILTY **CLAY/CLAYEY SILT** 14.12	▨							
Dynamic Cone Penetration Test commenced @ 14.12m						14	79.08	
						15	78.08	
						16	77.08	
						17	76.08	
						18	75.08	
18.77								
End of Borehole Inferred bedrock @ 18.77m depth (GWL @ 4.65m-Sept. 19/02)								





	Specimen Identification	LL	PL	PI	Fines	Classification
●	**TP 1-22 G3**	**46**	**22**	**24**		**CL = Inorganic Clays of Low Plasticity**
⧗	**TP 4-22 G5**	**48**	**22**	**26**		**CL = Inorganic Clays of Low Plasticity**

CLIENT **942073 Uhaul Co. Canada Ltd.**

PROJECT **Geotechnical and Hydrogeological Investigation - Proposed Commercial Development**

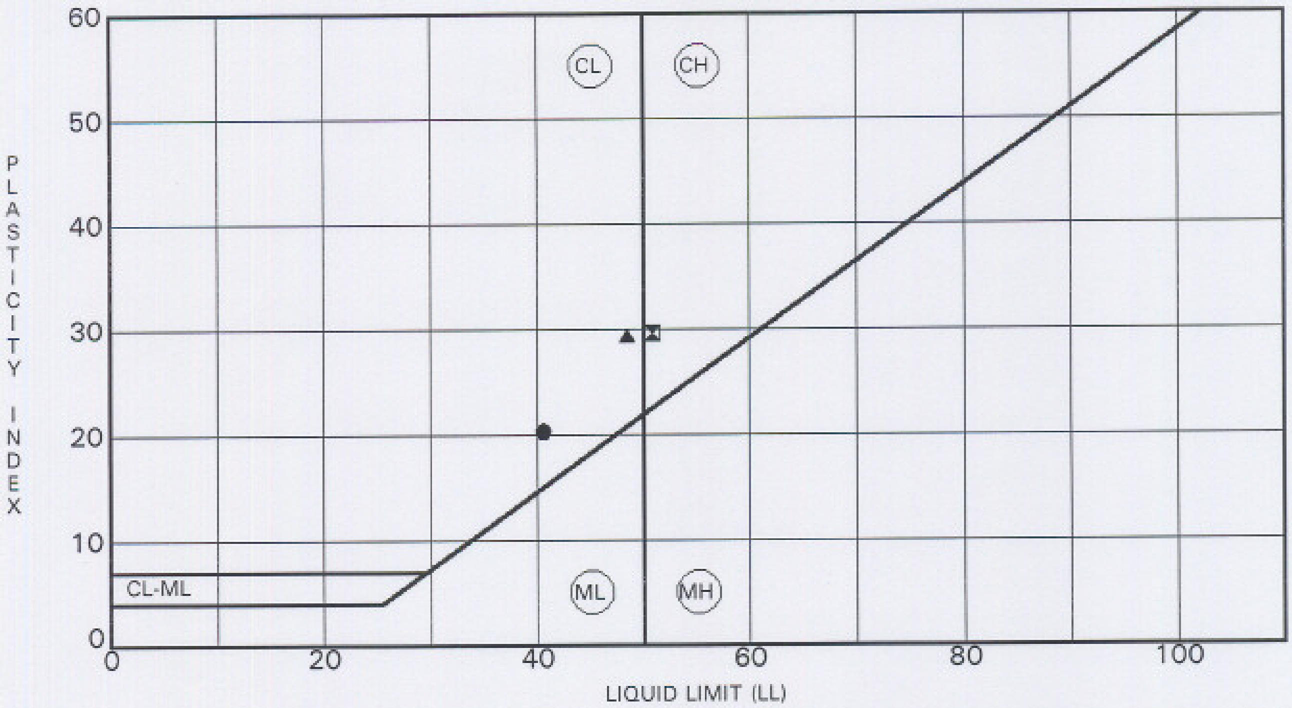
FILE NO. **PG6153**

DATE **25 Mar 22**

patersongroup **Consulting Engineers**

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

ATTERBERG LIMITS' RESULTS



	Specimen Identification		LL	PL	PI	Fines	Classification
●	BH 1	TW6	41	20	20		
⧗	BH 2	TW7	51	21	30		
▲	BH 4	TW6	49	19	29		

CLIENT **Sears Canada**

PROJECT **Geotechnical Investigation - Prop. Commercial Development, Frank Nighbor Place**

FILE NO. **PG0575**

DATE **23 MAR 05**

patersongroup **Consulting Engineers**

28 Concourse Gate, Unit 1, Ottawa, Ontario K2E 7T7

ATTERBERG LIMITS' RESULTS

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consulting engineers

Linear Shrinkage
ASTM D4943-02

CLIENT:	Uhaul	DEPTH	3.1 m to 3.2 m	FILE NO.:	PG6153
PROJECT:	301 Frank Nighbor	BH OR TP No:	TP4-22 GS5	DATE SAMPLED	25-Mar
LAB No:	32129	TESTED BY:	CP / AL / CS	DATE RECEIVED	25-Mar
SAMPLED BY:	PB	DATE REPORTED:	5-Apr-22	DATE TESTED	1-Apr

LABORATORY INFORMATION & TEST RESULTS

Moisture	No. of Blows(4)	Calibration (Two Trials)	Tin NO.(x22)	
Tare	5.08	Tin	4.93	4.93
Soil Pat Wet + Tare	66.44	Tin + Grease	5.13	5.12
Soil Pat Wet	61.36	Glass	48.97	48.97
Soil Pat Dry + Tare	42.6	Tin + Glass + Water	91.32	91.42
Soil Pat Dry	37.52	Volume	37.22	37.33
Moisture	**63.54**	**Average Volume**	**37.28**	

Soil Pat + String	37.67
Soil Pat + Wax + String in Air	40.76
Soil Pat + Wax + String in Water	16.57
Volume Of Pat (Vdx)	24.19

RESULTS:

Shrinkage Limit	**19.41**
Shrinkage Ratio	**1.811**
Volumetric Shrinkage	**79.915**
Linear Shrinkage	**17.778**

REVIEWED BY:	**Curtis Beadow**	**Joe Forsyth, P. Eng.**

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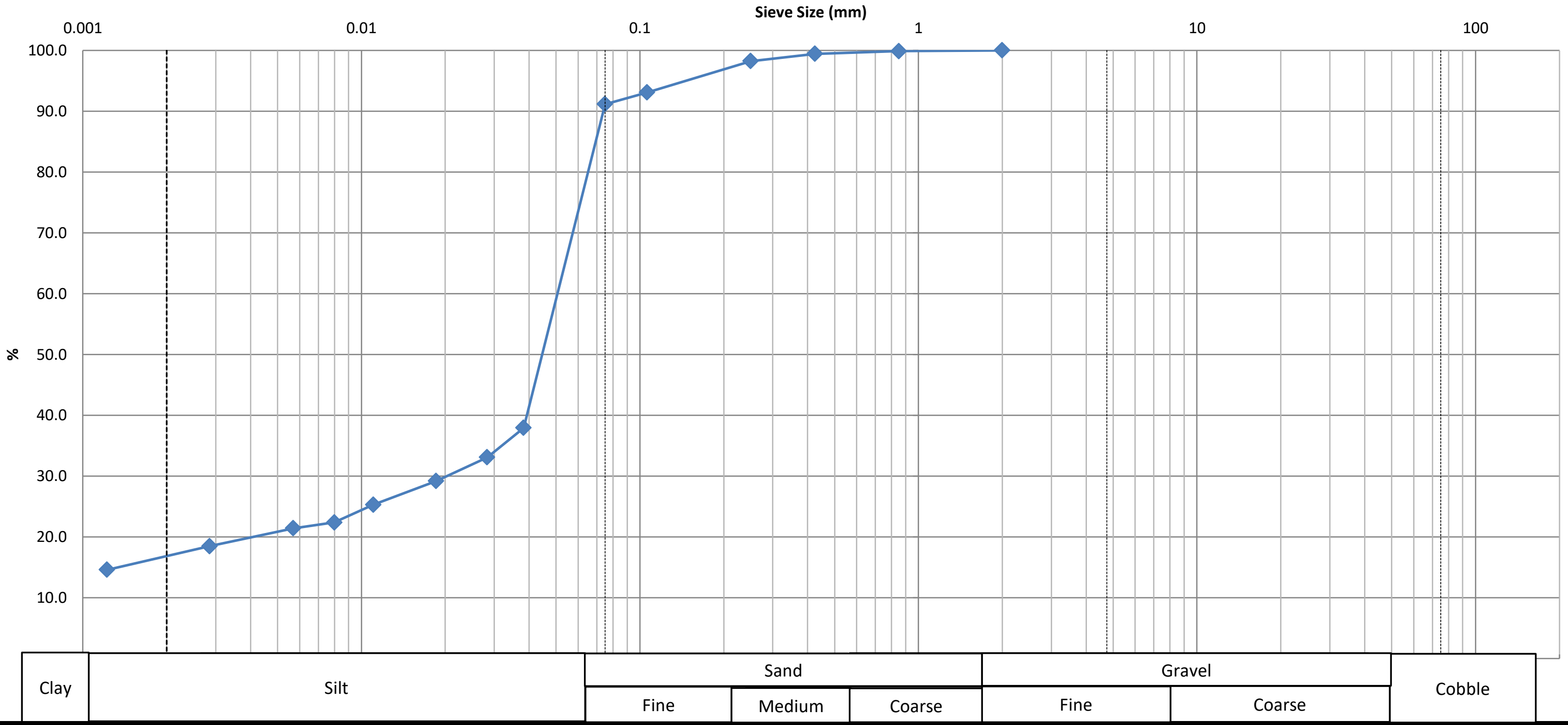
SIEVE ANALYSIS
ASTM C136

CLIENT:	Uhaul	DEPTH:	1.5 - 1.6 m	FILE NO:	PG6153
CONTRACT NO.:		BH OR TP No.:	TP1-22 GS3	LAB NO:	32127
PROJECT:	301 Frank Nighbor			DATE RECEIVED:	25-Mar-22
				DATE TESTED:	4-Apr-22
DATE SAMPLED:	25-Mar-22			DATE REPORTED:	5-Apr-22
SAMPLED BY:	P.B			TESTED BY:	CS

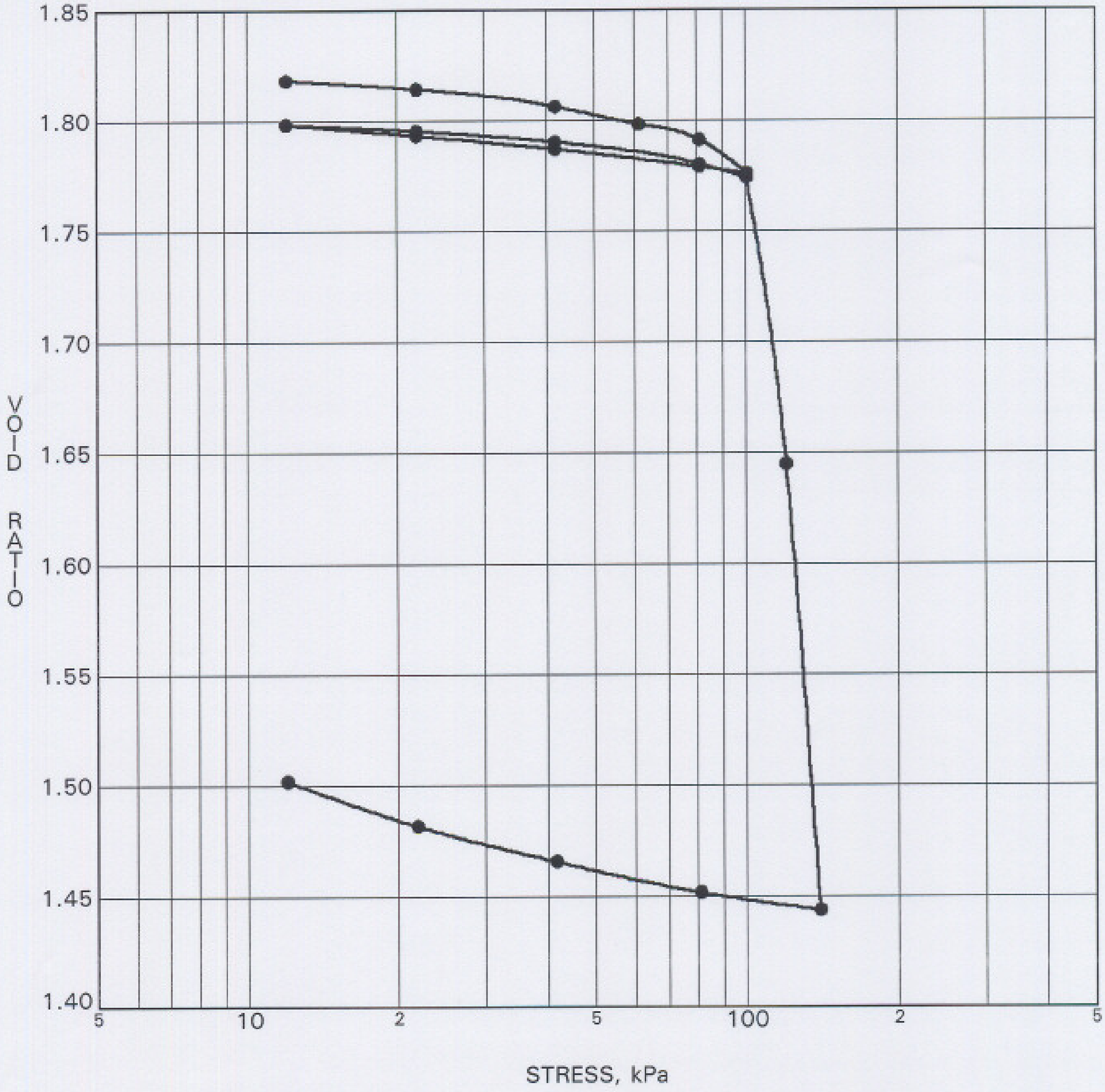


Identification	Soil Classification	MC(%)	LL	PL	PI	Cc	Cu
		21.5					

D100	D60	D30	D10	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
				0.0	8.9	74.1	17.0

Comments:

REVIEWED BY:	**Curtis Beadow**	**Joe Forsyth, P. Eng.**



CONSOLIDATION TEST DATA SUMMARY

Borehole No.	**BH 1**	p'_o	**68** kPa	Ccr	**0.024**
Sample No.	**TW 6**	p'_c	**110** kPa	Cc	**3.030**
Sample Depth	**6.60** m	OC Ratio	**1.6**	Wo	**66.4** %
Sample Elev.	**86.93** m	Void Ratio	**1.830**	Unit Wt.	**15.9** kN/m^3

CLIENT	**Sears Canada**	FILE NO.	**PG0575**
PROJECT	**Geotechnical Investigation - Proposed Retail Building, 20 Frank Nighbor Place**	DATE	**30/04/05**

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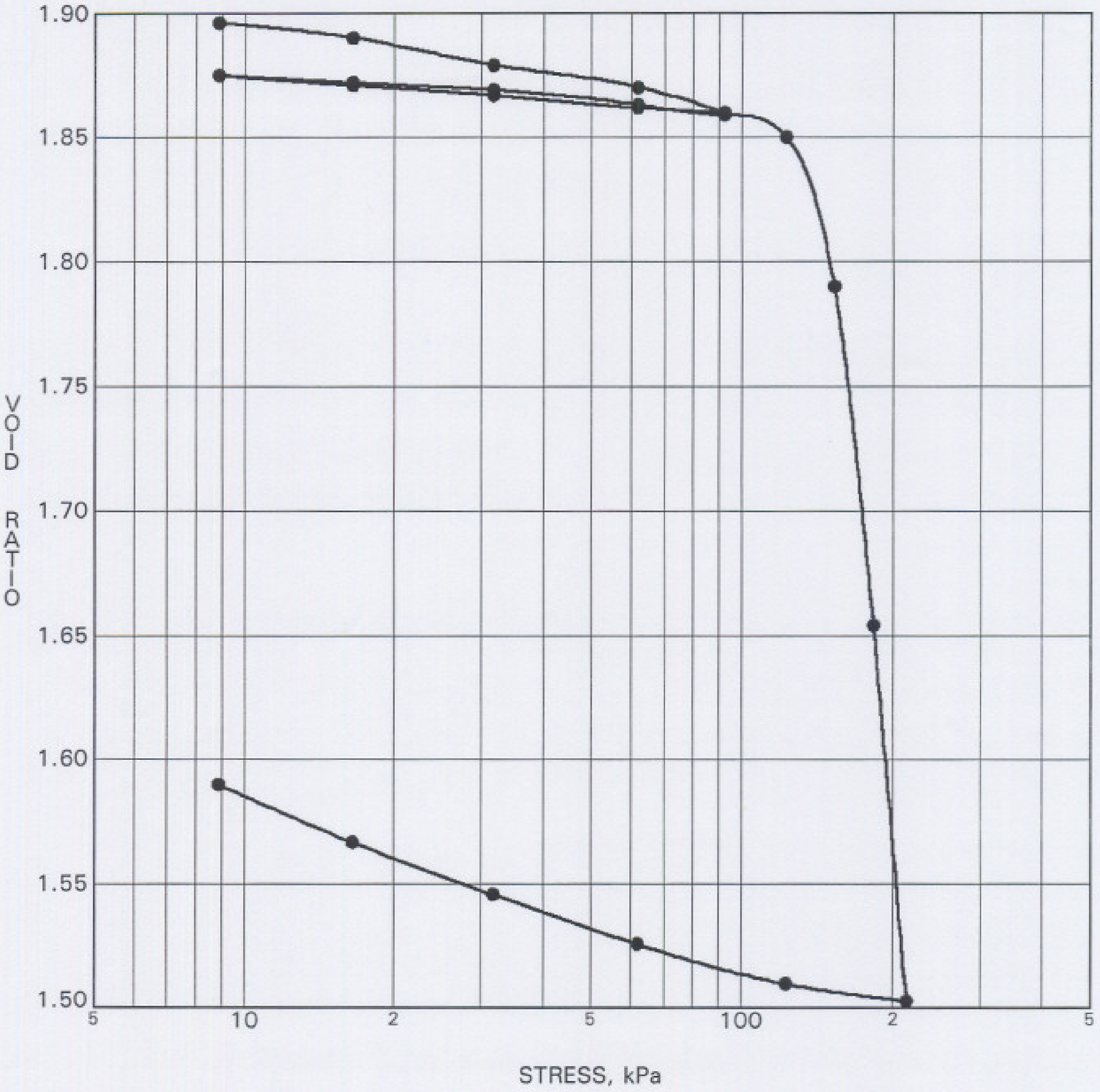
28 Concourse Gate, Unit 1, Ottawa, Ontario K2E 7T7

CONSOLIDATION TEST



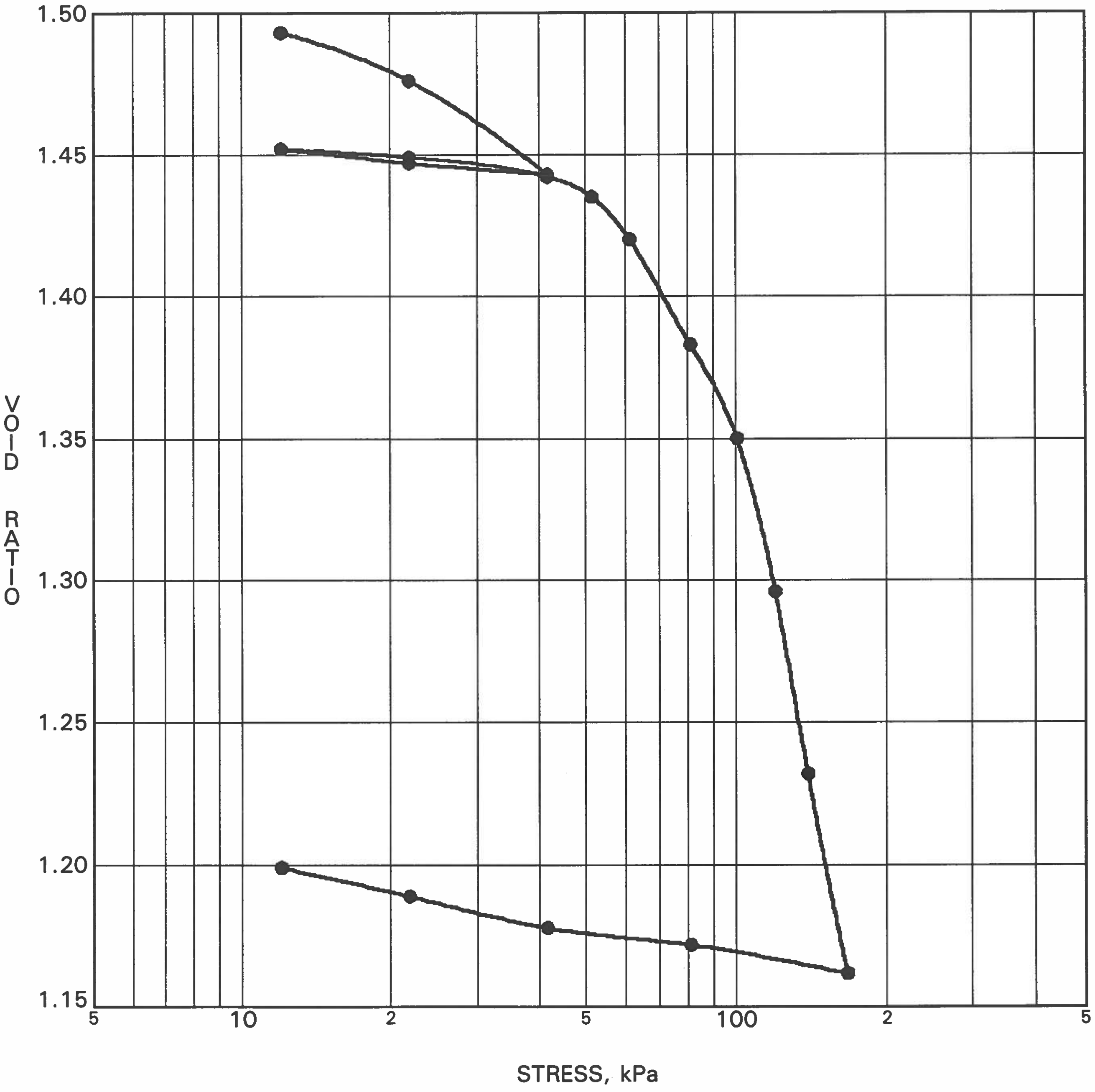
CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	BH 2	p'_o	83 kPa	Ccr	0.016
Sample No.	TW 7	p'_c	146 kPa	Cc	1.994
Sample Depth	8.10 m	OC Ratio	1.8	Wo	69.0 %
Sample Elev.	85.03 m	Void Ratio	1.900	Unit Wt.	15.8 kN/m^3

CLIENT	**Sears Canada**	FILE NO.	**PG0575**
PROJECT	**Geotechnical Investigation - Proposed Retail Building, 20 Frank Nighbor Place**	DATE	**30/04/05**

patersongroup Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, Ontario K2E 7T7

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	BH 1	p'_o	80 kPa	Ccr	0.020
Sample No.	TW 5	p'_c	87 kPa	Cc	0.861
Sample Depth	5.72 m	OC Ratio	1.1	Wo	54.8 %
Sample Elev.	87.36 m	Void Ratio	1.515	Unit Wt.	16.7 kN/m^3

CLIENT	Regional Group c/o Novatech Engineering Ltd.	FILE NO.	G8733
PROJECT	Geotechnical Investigation - Terry Fox Retail Centre, Frank Nighbor Place	DATE	23/09/02

CONSOLIDATION TEST

JOHN D. PATERSON & ASSOCIATES LTD.
Unit 1, 28 Concourse Gate, Nepean, Ontario K2E 7T7

Client: Paterson Group
28 Concourse Gate, Unit 1
Nepean, ON
K2E 7T7

Attention: **Mr. Miguel Larivière**

Report Number: 2505446
Date: 2005-04-11
Date Submitted: 2005-04-04

Project:

P.O. Number: 3213
Matrix: Soil

		LAB ID:	377141					GUIDELINE		
		Sample Date:	2005-03-23							
		Sample ID:	BH-1 SS2							
PARAMETER	UNITS	MDL						TYPE	LIMIT	UNITS
Chloride	%	0.001	0.062							
Electrical Conductivity	mS/cm	0.01	0.81							
pH			7.6							
Resistivity	ohm-cm	1	1230							
Sulphate	%	0.01	0.02							

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:

APPROVAL:
Lorna Wilson
Agriculture Lab Supervisor

APPENDIX 2

FIGURE 1 – KEY PLAN

DRAWING PG6153-1 – TEST HOLE LOCATION PLAN

DRAWING PG6153-2 – PERMISSIBLE GRADE RAISE PLAN

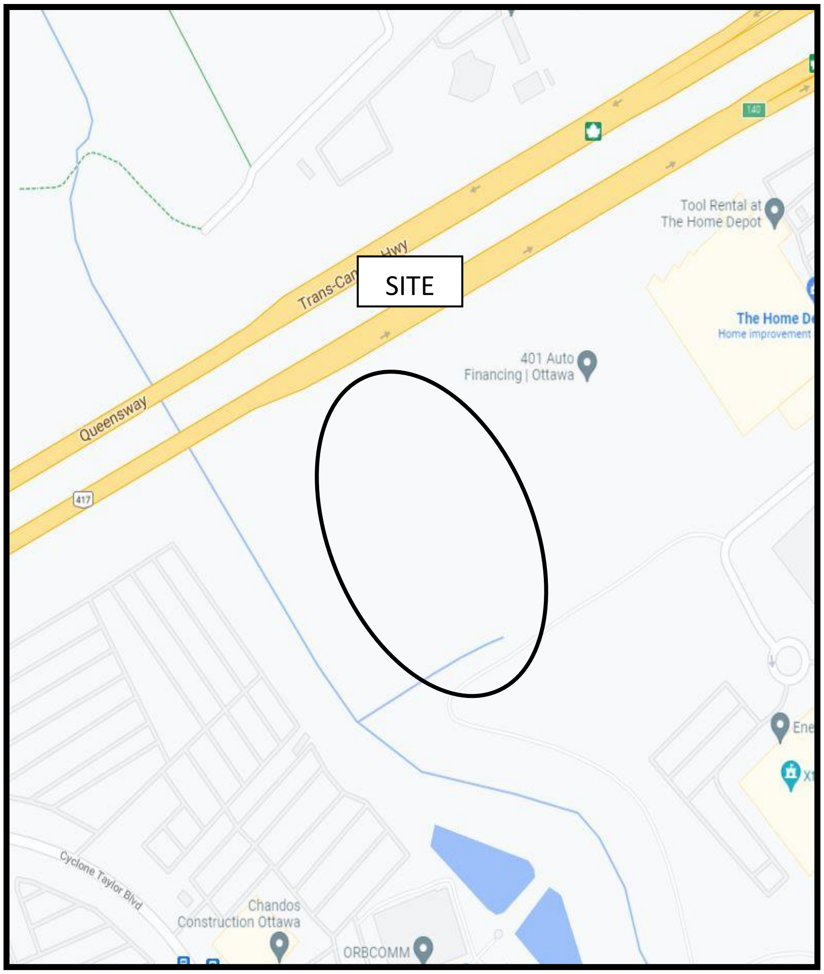
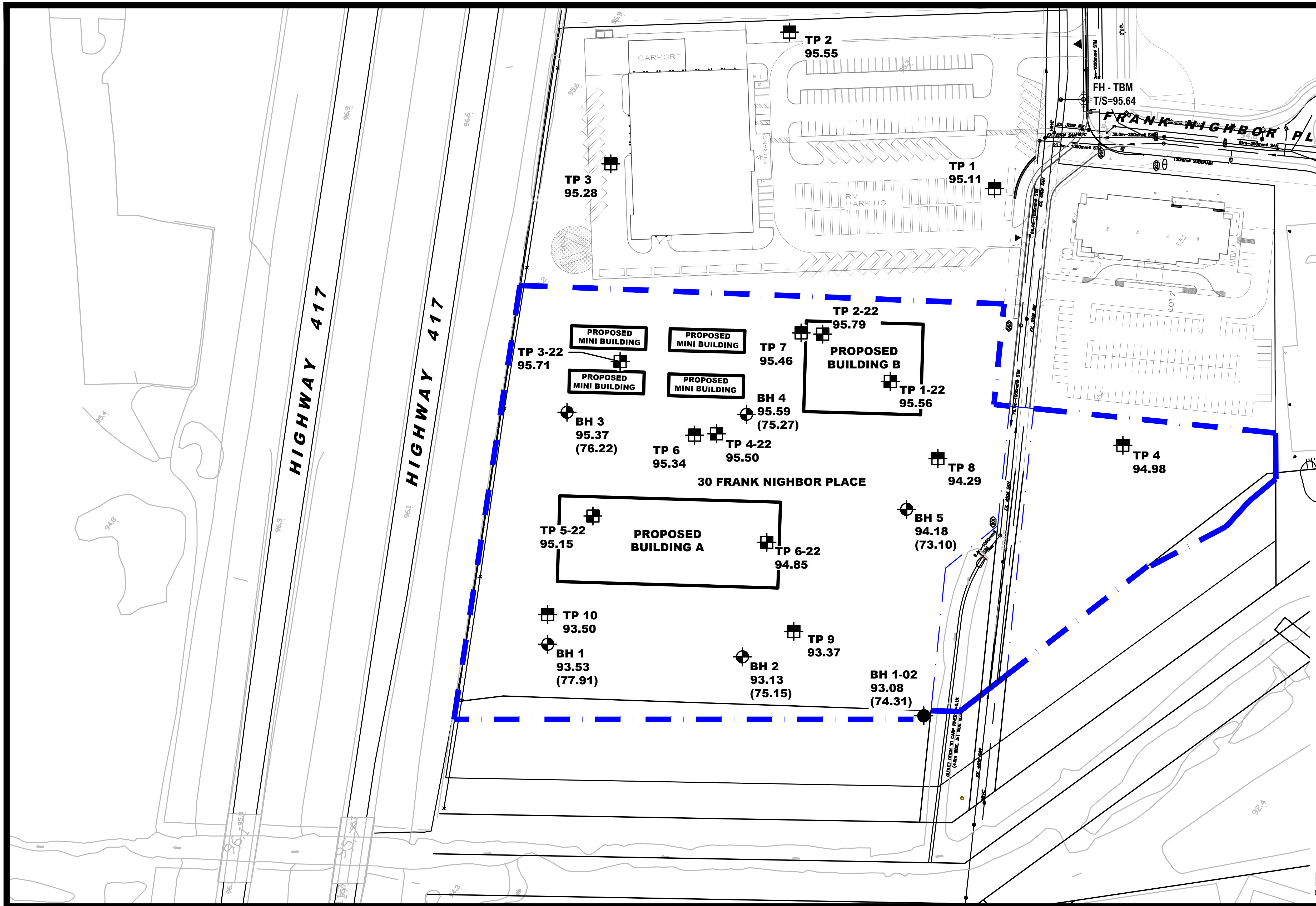


FIGURE 1

KEY PLAN

patersongroup



LEGEND:

- TEST PIT LOCATION (CURRENT INVESTIGATION)
- BOREHOLE LOCATION, PATERSON GROUP REPORT PG0575, 2005
- ● BOREHOLE LOCATION, PATERSON GROUP REPORT G8733, 2002
- TEST PIT LOCATION, PATERSON GROUP REPORT G8733, 2002

93.53 GROUND SURFACE ELEVATION (m)

(77.91) PRACTICAL DCPT REFUSAL ELEVAITON (m)

CONCEPTUAL PLAN PROVIDED BY AMERCO REAL ESTATE COMPANY.

TBM - TOP SPINDLE OF FIRE HYDRANT LOCATED ON THE NORTH SIDE OF FRANK NIGHBOR PLACE. GEODETIC ELEVATION = 95.64m.

SCALE: 1:1500

0 25 50 75 100m

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL

942073 UHAUL CO. CANADA LTD.

GEOTECHNICAL INVESTIGATION
PROPOSED DEVELOPMENT - 30 FRANK NIGHBOR PLACE

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:1500
Date: 04/2022
Drawn by: YA
Report No.: PG6153-1
Checked by: AB
Dwg. No.: PG6153-1
Approved by: JV
Revision No.:

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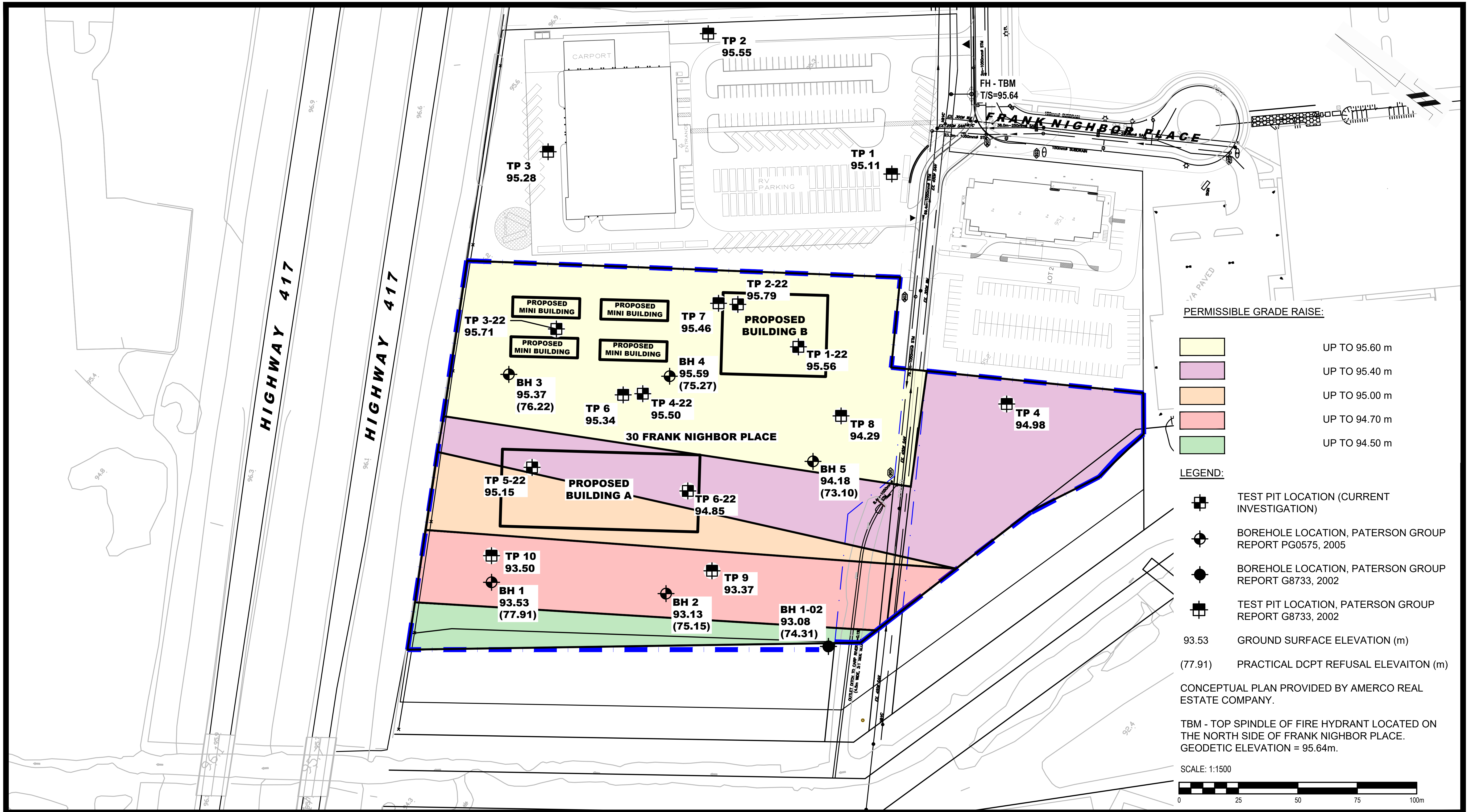

PERMISSIBLE GRADE RAISE:

🟨	UP TO 95.60 m
🟪	UP TO 95.40 m
🟧	UP TO 95.00 m
🟥	UP TO 94.70 m
🟩	UP TO 94.50 m

LEGEND:

⊞	TEST PIT LOCATION (CURRENT INVESTIGATION)
⊕	BOREHOLE LOCATION, PATERSON GROUP REPORT PG0575, 2005
●	BOREHOLE LOCATION, PATERSON GROUP REPORT G8733, 2002
⊞	TEST PIT LOCATION, PATERSON GROUP REPORT G8733, 2002
93.53	GROUND SURFACE ELEVATION (m)
(77.91)	PRACTICAL DCPT REFUSAL ELEVAITON (m)

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Approved by: JV
Revision No.:

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