PATERSON GROUP

Geotechnical Investigation

Proposed School Development

620 Triangle Street
Ottawa, Ontario

Prepared for Ottawa Catholic School Board

Report PG7249-1 dated September 9, 2024

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by the Ottawa Catholic School Board to conduct a geotechnical investigation for the proposed school development to be located at 620 Triangle Street in the City of Ottawa (reference should be made 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 test holes.
- ❑ 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. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the subject development as they are understood at the time of writing this report.

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

2.0 Proposed Development

Based on the available drawings, it is understood that the proposed development will consist of a one-storey school building of slab-on-grade construction along the southern portion of the subject site.

It is further understood that associated asphalt-paved access lanes, parking areas, portable classrooms, exterior play structures, a rear play yard and associated hardscaping will be located throughout the remainder of the subject site. It is understood the proposed building will be municipally serviced.

3.0 Method of Investigation

3.1 Field Investigation

Field Program

The current geotechnical investigation was carried out between August 19 and August 22, 2024, and consisted of a total of twenty (20) boreholes (BH 1-24 through BH 20-24) advanced to a maximum depth of 6.1 m below the existing grade and twenty (20) test pits (TP 1-24 through TP 20-24) advanced to a maximum depth of 1.9 m. Previous field investigations were undertaken by Paterson within the immediate vicinity of the subject site on May 7, 2013, which consisted of one borehole advanced to a maximum depth of 7.8 m below ground surface. Previous test holes were undertaken by others on July 11, 2007, and were advanced to a maximum depth of 6.7 m below the ground surface.

The test hole locations were distributed in a manner to provide general coverage of the subject site, taking into consideration underground services and available access. The locations of the test holes are shown on Drawing PG7249-1 - Test Hole Location Plan included in Appendix 2.

The boreholes were drilled using a track-mounted drill rig operated by a two-person crew and the test pit procedure consisted of excavating to the required depths at the selected locations and sampling the overburden using a backhoe. All fieldwork was conducted under the full-time supervision of Paterson personnel under the direction of a senior engineer.

Sampling and In Situ Testing

The soil samples were collected from the boreholes using a 50 mm diameter split-spoon (SS) sampler or from the drill auger flights. Test pit samples were collected at selected intervals from the test pit sidewalls. The samples were initially classified on site, placed in sealed plastic bags, and transported to our laboratory. The depths at which the drill auger, split-spoon and grab samples were recovered from the boreholes and test pits are shown as AU, SS and G, 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.

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 each borehole completed during the current field program. 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. Due to the low resistance exerted by the silty clay in some boreholes, the cone was often pushed using the hydraulic head of the drill rig until resistance to penetration was encountered. The hammer was then used to further advance the cone to practical refusal.

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

Groundwater

Flexible polyethylene standpipes were installed in BH 2-24, BH 3-24, BH 4-24, BH 5-24, BH 6-24, and BH 7-24, to permit monitoring of the groundwater levels subsequent to the completion of the sampling program. Open hole groundwater infiltration levels were observed at the time of excavation at each test pit location. The groundwater observations are discussed in Section 4.3 and presented in the Soil Profile and Test Data Sheets in Appendix 1.

3.2 Field Survey

The test hole locations were selected by Paterson to provide general coverage of the proposed development taking into consideration the existing site features and underground utilities.

The test hole locations, and the ground surface elevation at each test hole location, were surveyed by Paterson using a GPS unit with respect to a geodetic datum. The locations of the test holes, and ground surface elevation at each test hole location, are presented on Drawing PG7249-1 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Review

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

A total of one (1) grain-size distribution and hydrometer analysis, and two (2) Atterberg limit tests were completed on selected soil samples. Moisture content testing was completed on all recovered soil samples.

The results are presented in Subsection 4.2 and on Grain Size Distribution and Hydrometer Testing, and Atterberg Limit Results presented in Appendix 1.

3.4 Analytical Testing

One (1) soil sample was submitted for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. The sample was submitted to determine the concentration of sulphate and chloride, the resistivity, and the pH of the 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 a vacant grassed area and based on our review of historical aerial images, the subject site had been formerly used as agricultural lands, and most recently for stockpiling soil fill during the construction phases for the subdivisions surrounding the subject site.

The site is bordered by residential buildings to the north, by Honeylocust Avenue to the east, by Triangle Street to the south and by Cranesbill Road to the west. The ground surface across the site is flat and approximately 200 mm higher than the surrounding streets.

4.2 Subsurface Profile

Generally, the subsurface profile at the subject site consists of topsoil and/or fill underlain by a discontinuous layer of sand and further by a deposit of brown to grey silty clay.

The topsoil layers thickness was observed to range between 80 to 280 mm. Fill, consisting of brown silty clay with variable amounts of sand, crushed stone, organics, and cobbles, was encountered at BH 5-24, BH 6-24, BH 9-24, BH 10-24, BH 14-24 through BH 18-24, and TP 1-24 through TP 20-24. The fill layer was observed to start at either ground surface, or below the topsoil layer, and would extend to depths ranging from 0.2 to 0.8 m below ground surface.

A brown silty sand deposit was encountered at BH 2-24 through BH 9-24, TP 7-24, TP 9-24, and TP 10-24. The sand layer was observed at depths ranging between 130 mm to 1.45 m below ground surface. The above-noted layers were underlain by a deposit of brown to grey stiff to firm silty clay. The grey silty clay layer was observed to begin at depths ranging between 2.1 to 3.0 m and is inferred to extend down to the bedrock surface due to the low resistance observed during the DCPT.

A DCPT was conducted at boreholes BH 1-24 through BH 20-24. Practical refusal to the DCPT was encountered at each borehole location ranging between 9.1 and 12.9 m below ground surface.

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

Bedrock

Based on available geological mapping, bedrock in the area of the subject site consists of interbedded limestone and dolomite of the Gull River Formation with a drift thickness ranging between 5 to 10 m.

Atterberg Limits Testing

Atterberg limits testing was completed on select silty clay samples recovered throughout the subject site during the current investigation. The results of the Atterberg Limits testing are presented in Table 1 and on the Atterberg Limits Results sheet in Appendix 1.

Table 1 – Atterberg Limits Results

Borehole	Sample	Depth (m)	LL (%)	PL (%)	PI (%)	w (%)	Classification
TP 7-24	G4	1.7 – 1.8	31	18	13	31	CL
TP 10-24	G4	1.7 – 1.8	35	17	18	36	CL

Notes: LL: Liquid Limit; PL: Plastic Limit; PI: Plastic Index; CH: Inorganic Clay of Low Plasticity.

Grain-Size Distribution and Hydrometer Testing

One (1) grain-size distribution and hydrometer test was completed to classify selected soil samples according to the Unified Soil Classification System (USCS). The results are summarized in Table 2.

Table 2 – Grain-Size Distribution and Hydrometer Testing Results

Sample	Depth (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
TP 1-24 – G3	1.1 – 1.2	0.0	12.5	75.9	11.6

Note: The ground surface elevation at each borehole location was surveyed using a handheld GPS using a geodetic datum.

4.3 Groundwater

Groundwater levels were measured in the standpipe piezometers on August 26, 2024. Groundwater levels encountered by others have been provided in Table 3. The measured groundwater levels are presented on the Soil Profile and Test Data sheets in Appendix 1, and in Table 3 below.

Table 3 – Measured Groundwater Levels

Test Hole Number	Method	Ground Surface Elevation (m)	Measured Groundwater Level		Date
			Depth (m)	Elevation (m)	
BH 2-24	Piezometer	99.05	3.24	95.81	August 26, 2024
BH 3-24	Piezometer	99.19	Dry	-	August 26, 2024
BH 4-24	Piezometer	99.10	1.45	97.65	August 26, 2024
BH 5-24	Piezometer	99.34	3.26	96.08	August 26, 2024
BH 6-24	Piezometer	99.30	4.12	95.18	August 26, 2024
BH 7-24	Piezometer	99.21	3.43	95.78	August 26, 2024

NOTE: The ground surface elevations at the test hole location of the current investigation were surveyed by Paterson using a high precision GPS unit and was referenced to a geodetic datum.

It should be noted that surface water can become trapped within a backfilled borehole, which can lead to higher than typical groundwater level observations. Similarly, it is our experience that surface water generated by snowmelt and rainfall events may sheet drain into the borehole column given the relatively impermeable nature of the silty clay soil surface.

The long-term groundwater level can also be estimated based on the observed colour, moisture content, and consistency of the recovered samples. Based on these observations, the long-term groundwater level is expected at approximate depths of **2 to 3 m** below the existing ground surface.

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

5.0 Discussion

5.1 Geotechnical Assessment

From a geotechnical perspective, the subject site is suitable for the proposed development. Based on the results of the field investigation, the proposed one-storey school building and portable structures may be founded on conventional spread footings placed on an undisturbed, very stiff to hard silty clay bearing surface. If building design loads for the school structure exceed the recommended bearing resistance values for conventional shallow foundations, consideration may alternatively be given to supporting the structure using an end-bearing deep foundation.

Due to the presence of a deposit of silty clay, the proposed development will be subject 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 fill, such as those containing organic or deleterious materials, should be stripped from under any buildings and other settlement sensitive structures. Care should be taken not to disturb adequate bearing soils below the founding level during site preparation activities. Disturbance of the subgrade may result in having to sub-excavate the disturbed material and the placement of additional suitable fill material.

Vibration Considerations

Construction operations could cause vibrations, and possibly, sources of nuisance to the community. Therefore, means to reduce the vibration levels as much as possible should be incorporated into the construction operations to maintain a cooperative environment with the residents.

The following construction equipment could cause vibrations: piling equipment, hoe ram, compactor, dozer, crane, truck traffic, etc. The construction of a shoring system with soldier piles or sheet piling will require these pieces of equipment. Vibrations, caused by blasting or construction operations could cause detrimental vibrations on the adjoining buildings and structures. Therefore, it is recommended that all vibrations be limited.

Two parameters determine the recommended vibration limit, the maximum peak particle velocity and the frequency. For low frequency vibrations, the maximum allowable peak particle velocity is less than that for high frequency vibrations. As a guideline, the peak particle velocity should be less than 15 mm/s between frequencies of 4 to 12 Hz, and 50 mm/s above a frequency of 40 Hz (interpolate between 12 and 40 Hz). These guidelines are for current construction standards.

Considering there are several sensitive buildings in close proximity to the subject site, consideration to lowering these guidelines is recommended. These guidelines are above perceptible human level and, in some cases, could be very disturbing to some people, a pre-construction survey is recommended to minimize the risks of claims during or following the construction of the proposed building.

Fill Placement

Fill placed for grading beneath the building footprints 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 to the site. The fill should be placed in maximum 300 mm thick loose lifts and compacted by suitable compaction equipment. Fill placed beneath the buildings should be compacted to a minimum of 98% of the standard Proctor maximum dry density (SPMDD).

Non-specified existing fill along with site-excavated soil could be placed as general landscaping fill and beneath exterior parking areas where settlement of the ground surface is of minor concern. These materials should be spread in lifts with a maximum thickness of 300 mm and compacted by the tracks of the spreading equipment to minimize voids.

If this material is to be used to build up the subgrade level for areas to be paved or below other settlement sensitive structures, it should be compacted in thin lifts to at least 95% of the material's SPMDD using a suitably sized vibratory sheepsfoot roller and under the full-time supervision of Paterson field personnel.

A representative from Paterson should be on-site periodically to observe placement of the fill and excavated native soils and to conduct compaction testing on each lift of fill placed.

Compacted Granular Fill Working Platform (Piled Foundation)

If consideration is given to supporting the proposed school building on a pile foundation, the use of heavy equipment would be required to install the piles (i.e., pile driving crane). It is conventional practice to install a compacted granular fill layer, at a convenient elevation, to allow the equipment to access the site without getting stuck and causing significant disturbance to the underlying soil.

It is recommended that a minimum 600 mm thick layer of OPSS Granular B Type II crushed stone be placed as working platform throughout the building footprint which will be supported by piles. The working pad granular should be compacted to a minimum of 98% of its standard Proctor maximum dry density (SPMDD) in maximum 300 mm thick lifts. The existing stone fill surface can be used as the subgrade for this purpose provided it is re-compacted in place using a smooth-drum roller.

Once the piles have been driven and cut off, the working platform can be re-graded, and soil tracked in, or soil pumping up from the pile installation locations, can be bladed off and the surface can be topped up, if necessary, and re-compacted to act as the substrate for further fill placement for the slab structure.

5.3 Foundation Design

Bearing Resistance Values – Conventional Spread Footings

Strip footings, up to 3 m wide, and pad footings, up to 5 m wide, placed on an undisturbed, very stiff to hard silty clay bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **150 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **225 kPa**.

Conventional shallow spread footing foundations placed on an undisturbed, compact silty sand 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**.

A geotechnical resistance factor of 0.5 is applied to the above noted bearing resistance values at ULS. The above-noted bearing resistance values at SLS for soil bearing surfaces will be subjected to potential post-construction total and differential settlements of 25 and 20 mm, respectively.

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, in the dry, prior to the placement of concrete for footings.

Proof Rolling and Subgrade Improvement for Loose Sand Below Footings

Where the sand bearing surface for footings is considered loose by Paterson at the time of construction, it would be recommended to proof roll (i.e., re-comapct) the bearing surface prior to forming for footings. Proof-rolling is recommended to be undertaken in **dry conditions and above freezing temperatures** by an adequately sized vibratory roller making several passes to achieve optimal compaction levels.

The proof rolling compaction program should be reviewed and approved by Paterson at the time of construction. Depending on the looseness and degree of saturation of loose sandy soils at the time of construction, other measures (additional compaction, sub-excavation and reinstatement of crushed stone fill, mud slab) may be recommended to accommodate site conditions at the time of construction. However, these considerations would be evaluated at the time of design by Paterson on a footing-specific basis.

Deep Foundation – End Bearing Piles

A deep foundation method, such as end bearing piles, may also be considered for the foundation support of the proposed school building. For deep foundations, concrete-filled steel pipe piles are generally utilized in the Ottawa area. Applicable pile resistance at SLS values and factored pile resistance at ULS values are given in Table 4. A resistance factor of 0.4 has been incorporated into the factored ULS values. Note that these are all geotechnical axial resistance values.

The geotechnical pile resistance values were estimated using the Hiley dynamic formula, to be confirmed during pile installation with a program of dynamic monitoring. For this project, the dynamic monitoring of two (2) to four (4) piles would be recommended.

This is considered to be the minimum monitoring program, as the piles under shear walls may be required to be driven using the maximum recommended driving energy to achieve the greatest factored resistance at ULS values.

Re-striking of all piles, at least once, will also be required after at least 48 hours have elapsed since initial driving. A full-time field review program should be conducted by Paterson field personnel during the pile driving operations to record the pile lengths, ensure that the refusal criteria is met and that piles are driven within the location tolerances (within 75 mm of proper location and within 2% of vertical).

Table 4 - Pile Foundation Design Data

Pile Outside Diameter (mm)	Pile Wall Thickness (mm)	Geotechnical Axial Resistance		Final Set (blows/ 12 mm)	Transferred Hammer Energy (kJ)
		SLS (kN)	Factored at ULS (kN)		
245	9	925	1,100	9	27
245	11	1,050	1,250	9	31
245	13	1,200	1,400	9	35

The minimum recommended centre-to-centre pile spacing is 3 times the pile diameter. The closer the piles are spaced, however, the more potential that the driving of subsequent piles in a group could have influence on piles in the group that have already been driven. These effects, primarily consisting of uplift of previously driven piles, are checked as part of the field review of the pile driving operations.

Prior to the commencement of production pile driving, a limited number of indicator piles should be installed across the site. It is recommended that each indicator pile be dynamically load tested to evaluate pile stresses, hammer efficiency, pile load transfer, and end-of-driving criteria for end-bearing in the bedrock. It is recommended that Paterson undertake the associated pile testing efforts in conjunction with the piling subcontractor at the construction stage.

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 silty clay bearing medium 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 or engineered fill of the same or higher capacity as the bearing soil.

Permissible Grade Raise

Due to the presence of the silty clay deposit, a permissible grade raise restriction of **1.8 m** is recommended for grading within 6 m of building footprints and using soil fill, and up to **1.5 m** using stone fill to raise the subgrade for slab-on-grade structures. The permissible grade raise restriction may be considered up to **2.0 m** for the remainder of the subject site.

If higher than permissible grade raises are required, preloading with or without a surcharge, lightweight fill, and/or other measures may be advised by Paterson during the preliminary and detailed design stages to mitigate the risks of unacceptable long-term post construction total and differential settlements amongst settlement sensitive structures.

5.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class E**. A higher seismic site class, such as Site Class D, can be confirmed for applicability by undertaking a site-specific shear wave velocity test. Soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the Ontario Building Code for a full discussion of the earthquake design requirements.

5.5 Slab on Grade Construction

With the removal of all topsoil and fill, containing significant amounts of deleterious or organic materials, the native soil subgrade approved by Paterson field personnel at the time of excavation will be considered an acceptable subgrade surface on which to commence backfilling for slab-on-grade construction.

In the piled foundation scenario, since the subgrade will consist of the pile equipment working mat, it is recommended to ensure the working mat is cleared of loose soil debris and contaminated granulars prior to the placement of additional granulars for raising the subgrade throughout the building footprint.

It is recommended that the upper 200 mm sub-floor fill consists of OPSS Granular A crushed stone. All backfill material within the footprint of the proposed buildings should be placed in maximum 300 mm thick loose layers and compacted to at least 98% of its SPMDD.

Any poor performing areas should be removed and reinstated with an engineered fill, such as OPSS Granular B Type II and compacted to a minimum of 98% of the materials SPMDD.

5.6 Pavement Design

Car only parking, bus turning areas and access lanes are proposed at this site. The proposed pavement structures are presented in Table 6 and Table 7. It is anticipated the pavement structure provided in Table 7 would be adequate for use as a fire route.

Table 5 – Recommended Pavement Structure – Paved Playground Areas	
Thickness (mm)	**Material Description**
50	**Wear Course –** HL-3 or Superpave 12.5 Asphaltic Concrete
300	**BASE –** OPSS Granular A Crushed Stone
SUBGRADE – Either fill, in-situ soil, or OPSS Granular B Type I or II material placed over fill or in-situ soil.	

Table 6 – Recommended Pavement Structure – Parking Stalls and Light-Duty Traffic Area	
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 fill or in-situ soil.	

Table 7 – Recommended Pavement Structure – Heavy-Duty Traffic Areas, Bus Drop-Off Lanes, Garbage and Fire Truck Access Routes	
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 placedover fill or in situ soil.	

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

Hardscaping Surface Structures

The pavement structures provided in Table 8 on the following page are recommended where associated hardscaping will be located throughout the subject site.

Table 8 – Recommended Pavement Structure – Brick/Stone Pathways	
Thickness (mm)	**Material Description**
Specified by Others	**Wear Course** – Interlocking Stones/Brick Pavers
25 - 40	**Leveling Course** – Bedding Sand
450	**SUBBASE** – OPSS Granular A
SUBGRADE – Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill.	

Due to the low permeability of the subgrade materials consideration should be given to installing subdrains during at the subgrade level of the above-noted pavement structures. The subdrain inverts should be approximately 300 mm below subgrade level and consist of a minimum 100 mm diameter perforate drainage pipe fitted with a geosock and surrounded by a minimum of 100 mm of clear crushed stone on all of its sides.

The pipe should discharge to either a catch-basins, connected to the drainage pipe, and/or become in contact with the geotextile face of the foundation drainage board that would be provided to the buried portions of the school structure. All remaining sidewalks and pathways provided throughout the subject site should be provided with a minimum 300 mm thick layer of OPSS Granular A and provided with a subdrain at the subgrade level as noted herein. Paterson may provide detailed recommendations and advise on recommended subdrain footprints once site plan and site servicing/grading details are known.

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.

For areas where silty clay is encountered at subgrade level, it is recommended that subdrains be installed during the pavement construction as per City of Ottawa standards. The subdrain inverts should be approximately 300 mm below subgrade level.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

Foundation Drainage

Since hardscaping is anticipated around the perimeter of the proposed slab-on-grade structure, it is recommended to implement a perimeter foundation drainage system around the entire building perimeter. The system should consist of a 100 to 150 mm diameter perforated corrugated plastic pipe wrapped in a geosock and surrounded on all sides by 150 mm of 10 mm clear crushed stone. The pipe should be placed at the footing level around the exterior perimeter of the structure. The clear stone should be wrapped in a non-woven geotextile. 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.

Soccer Field Drainage

It is also recommended that drainage be provided for the proposed soccer field if an irrigation system is planned for the soccer field. The drainage system should consist of 10 m centre-to-centre spaced, 150 mm diameter, geotextile, corrugated perforated PVC pipe surrounded by a minimum of 150 mm of 19 mm clear crushed stone around all of its sides. The pipes are recommended to be placed 1 m below finished grade and have a positive outlet, such as a gravity connection, to the storm sewer.

Concrete Sidewalks Adjacent to Buildings

It is recommended that the upper 600 mm of backfill placed below the concrete sidewalks adjacent to the building footprints to consist of non-frost susceptible material such as OPSS Granular A or Granular B Type II. The sidewalks should be underlain by a layer of rigid insulation at entranceways to minimize the potential for the sidewalks to raise in response to frost migration within the subgrade soils.

The granular material should be placed in maximum 300 mm loose lifts and compacted to a minimum of 98% of the material's SPMDD using suitable compaction equipment. The subgrade material should be shaped to promote positive drainage towards the building's perimeter drainage system. Consideration should be given to placing a layer of rigid insulation below the granular fill layer, however, should be detailed by Paterson once design drawings are being complete by others.

6.2 Protection Against Frost Action

Foundation Structures

Perimeter footings and/or pile caps and grade beams of heated structures are required to be insulated against the deleterious effects of frost action. A minimum 1.5 m thick soil cover, or an equivalent thickness of soil cover and foundation insulation, should be provided for adequate frost protection of heated structures.

Exterior unheated footings, such as those for isolated exterior piers, are more prone to deleterious movement associated with frost action. These should be provided with a minimum 2.1 m thick soil cover, or an equivalent thickness of soil cover and foundation insulation.

Frost Protection at Building Entrances

If consideration is given to placing rigid insulation below hardscaping at building entrances to mitigate heave and settlement due to freezing cycles within the underlying subgrade, the following insulation detail is recommended for building entrances:

- The sidewalk pavement structure is recommended to consist of 150 mm of OPSS Granular A and 450 mm of OPSS Granular B Type II crushed stone, all placed in maximum 300 mm thick loose lifts and compacted to a minimum of 98% of the materials SPMDD.
- Place a minimum 100 mm thick layer of rigid insulation consisting of extruded polystyrene, such as DOW Chemical High-Load HI-40, below the layer of crushed stone. The rigid insulation layer is recommended to extend a minimum horizontal distance of 1.2 m from all sides of the entrance.
- Provide a transition for the next 600 mm beyond the 1.2 m horizontal extension using a 50 mm layer of extruded polystyrene rigid insulation.

- The thickness and applicability of the insulation layer would be dependant on the nature of the soils used to build up the subgrade (i.e., can be reduced if free-draining non-frost susceptible crushed stone is used to build up the subgrade and as advised by Paterson during the design phase).

Implementation of the above-noted detail should be reviewed at the time of construction (placement of insulation, compaction testing on each lift of stone fill, etc.) by Paterson personnel.

6.3 Excavation Side Slopes

The side slopes of the excavations in the soil and fill overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is expected that sufficient room will be available for the greater part of the excavation to be undertake by open-cut methods (i.e., unsupported excavations).

Unsupported Excavations

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

It is recommended that a trench box be used at all times to protect personnel working in trenches. Based on this, trench boxes should be considered for all sewer pipe installations undertaken throughout the subject site.

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 expected that services will be installed by “cut and cover” methods and excavations will not be left open for extended periods of time.

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

6.4 Pipe Bedding and Backfill

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

The pipe bedding for the sewer and water pipes should consist of at least 150 mm of OPSS Granular A. The bedding layer thickness should be increased to a minimum of 300 mm where the subgrade will consist of grey silty clay. The material should be placed in a maximum 225 mm thick loose lifts and compacted to a minimum of 99% of its SPMDD. The bedding material should extend 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 225 mm thick lifts and compacted to a minimum of 99% of its SPMDD.

Reinstatement of the trench located above the pipe cover layer should consist of placing trench-generated workable soil fill (i.e., grey clay is not expected to be workable) in maximum 300 mm thick loose lifts and compacted using a suitably sized vibratory sheepsfoot roller to a minimum of 95% of the materials SPMDD. Each lift of soil fill placed within the service trenches should be reviewed and approved at the time of construction by Paterson personnel. Wet site-generated fill, such as the grey silty clay, will be difficult to re-use, as the high-water contents make compacting impractical without an extensive drying period.

To reduce long-term lowering of the groundwater level at this site, clay seals should be provided in the service trenches. The clay seals should be at least 1.5 m long in the trench direction and should extend from trench wall to trench wall. Generally, the clay seals should extend from the frost line and fully penetrate the bedding, sub-bedding and cover material.

The clay seals 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. Paterson field personnel should review the placement of all clay seals undertaken at the time of construction.

6.5 Groundwater Control

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

Groundwater Control for Building Construction

A temporary Ministry of Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required if more than 400,000 L/day of ground and/or surface water are to be pumped during the construction phase. At least 4 to 5 months should be allowed for completion of the application and issuance of the permit by the MECP. For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Persons as stipulated under O.Reg. 63/16.

6.6 Winter Construction

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

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

Trench excavations and pavement construction are also difficult activities to complete during freezing conditions without introducing frost into the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions. Provisions should also be carried for accommodating spring-thaw conditions when subgrade conditions for pavements and other works are impacted by higher degrees of soil saturation. Additional information should be provided by Paterson for planning winter construction and pavement works.

Under winter conditions, if snow and ice is present within imported fill below future building slabs, or if fill is subject to freezing conditions, then settlement of the fill should be expected, and support of a future building slab will be negatively impacted and could undergo settlement during spring and summer time conditions. Paterson should complete periodic inspections during fill placement to ensure that snow and ice quantities do not impact fill placed in settlement-sensitive areas.

6.7 Corrosion Potential and Sulphate

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

6.8 Landscaping Considerations

Tree Planting Considerations

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 the recovered silty clay samples at selected locations throughout the subject site. The soil samples were recovered from elevations below the anticipated design underside of footing elevation and 3.5 m depth below anticipated finished grade. The results of our testing are presented in Table 1 in Subsection 4.2 and in Appendix 1.

Based on the results of the Atterberg limit testing mentioned above, the plasticity index was found to be less than 40% in all the tested clay samples. In addition, based on the clay content found in the clay samples from the grain size distribution test results, moisture level and consistency, the silty clay across the subject site is considered to be a clay of low to medium potential for soil volume change.

The following tree planting setbacks are recommended for the low to medium sensitivity silty clay deposit and where trees are located near buildings founded on cohesive soils. It should be noted that footings supported by a deep foundation consisting of end-bearing piles will not be subject to tree planting setbacks restrictions.

- Large trees (mature height over 14 m) can be planted within these areas provided that a tree to foundation setback equal to the full mature height of the tree can be provided.

- Tree planting setback limits may be reduced to 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 conditions noted below are met.

- A small tree must be provided with a minimum of 25 m^3 of available soils 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.

- Grading surrounding 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 Grading Plan.

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

Soccer Field Grading

It is anticipated the project landscape architect (or other project consultant) will advise on a recommended cross-section for constructing the proposed soccer field. The fill used to raise the subgrade in support of the proposed soccer field may consist of workable soil fill as briefly described in Section 5.2 of this report.

The workable soil fill should not be wet/saturated and should be in a workable state for being able to support the weight of the earthworks equipment. The material should be compacted by a combination of the tracks of the earthworks equipment and a vibratory sheepsfoot roller making several passes to achieve a minimum of 95% of the materials SPMDD. It is recommended that Paterson field personnel review the placement of subgrade fill at the time of construction.

7.0 Recommendations

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

- ❑ Review the preliminary and detailed grading and servicing plans, from a geotechnical perspective.
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ Sampling and testing of the concrete and fill materials.
- ❑ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ❑ Observation of all subgrades prior to backfilling and follow-up field density tests to determine the level of compaction achieved.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

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

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

8.0 Statement of Limitations

The recommendations provided 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 the Ottawa Catholic School Board, 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.

Killian Bell, B.Eng.

Drew Petahtegoose, P.Eng.

Report Distribution:

❑ Ottawa Catholic School Board
❑ Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

GRAIN SIZE DISTRIBUTION

ATTERBERGS TESTING RESULTS

ANALYTICAL TESTING RESULTS

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352168.83 **NORTHING:** 5016146.21 **ELEVATION:** 99.18

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 19, 2024

FILE NO. : PG7249

HOLE NO. : BH 1-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) / PL (%) WATER CONTENT (%) LL (%)	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0					20 40 60 80		99
TOPSOIL and organics			AU 1			18.23			
0.18m [99.00m]									
Firm, brown **SILTY CLAY**		1	SS 2	62	2-2-3-3 5	32.6			98
1.45m [97.73m]									
Stiff to firm, brown **SILTY CLAY**		2	SS 3	100	P	37.17			97
- Grey by 3.0 m depth			SS 4	100	P	30.25			
3.05m [96.13m]		3							96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
		10							89
		11							88
		12							87
12.42m [86.76m]									
End of Borehole		13							86
Practical refusal to DCPT at 12.42 m depth		14							85
DCPT pushed from 3.05 m to 12.42 m depth		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352185.64 **NORTHING:** 5016160.89 **ELEVATION:** 99.05

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 19, 2024

FILE NO. : PG7249

HOLE NO. : BH 2-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
TOPSOIL and organics, with gravel 0.15m [98.90m]			AU 1			13.7			
Brown **SILTY SAND**, trace cobbles 0.69m [98.36m]		1	SS 2	100	5-3-3-4	23.56			98
Brown **SILTY CLAY** 0.94m [98.11m]					6	33.29			
Very stiff to firm, brown **SILTY CLAY**		2	SS 3	100	1-1-1-1	34.24			97
					2				
- Grey by 3.0 m depth		3					106.0	3.2 m 2027-08-06	96
		4							95
		5							94
6.10m [92.95m]		6							93
Dynamic Cone Penetration Test commenced at 6.10 m depth		7							92
		8							91
		9							90
		10							89
		11							88
		12							87
12.90m [86.15m]		13							86
End of Borehole		14							85
Practical refusal to DCPT at 12.90 m depth		15							
DCPT pushed from 6.10 m to 12.80 m depth									
(GWL at 3.24 m depth - August 26, 2024)									

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352181.36 **NORTHING:** 5016129.70 **ELEVATION:** 99.19

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 19, 2024

FILE NO. : PG7249

HOLE NO. : BH 3-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
TOPSOIL and organics, some cobbles 0.15m [99.04m]			AU 1			12.65			
Brown **SILTY SAND**, with clay and gravel 0.69m [98.50m]		1	SS 2	100	6-3-3-2 6	29.85			98
Stiff to firm, brown **SILTY CLAY**		2	SS 3	100	2-1-1-1 2	39.5			97
- Grey by 3.0 m depth		3							96
6.10m [93.09m]		4							95
Dynamic Cone Penetration Test commenced at 6.10 m depth		5							94
		6							93
		7							92
		8							91
		9							90
		10							89
11.51m [87.68m]		11							88
End of Borehole Practical refusal to DCPT at 11.43 m depth DCPT pushed from 6.10 m to 10.97 m depth (Borehole dry - August 26, 2024)		12							87
		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352228.28 **NORTHING:** 5016136.00 **ELEVATION:** 99.10

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 19, 2024

FILE NO. : PG7249

HOLE NO. : BH 4-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
TOPSOIL and orgaics 0.15m [98.95m]			AU 1			14.0			
Loose, Brown **SILTY SAND**, with gravel, trace clay 0.69m [98.41m]		1	SS 2	0	5-3-4-4 7				98
Stiff to firm, brown **SILTY CLAY**		2	SS 3	100	1-1-2-1 3	39.8			97
- Grey by 3.0 m depth		3							96
		4							95
		5							94
6.10m [93.00m]		6							93
Dynamic Cone Penetration Test commenced at 6.10 m depth		7							92
		8							91
		9							90
		10							89
		11							88
12.34m [86.76m]		12							87
End of Borehole Practical refusal to DCPT at 12.34 m depth DCPT pushed from 6.10 m to 10.97 m depth (GWL at 1.45 m depth - August 26, 2024)		13							86
		14							85
		15							

1.4 m 2024-08-26

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352223.75 **NORTHING:** 5016089.88 **ELEVATION:** 99.34

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 20, 2024

FILE NO. : PG7249

HOLE NO. : BH 5-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
FILL: Coarse to medium gravel			AU 1			12.72			
0.30m [99.04m]									
Loose, brown **SILTY SAND**, with gravel, trace clay		1	SS 2	100	2-2-3-3 5	28.59			98
0.69m [98.65m]									
Stiff, brown **SILTY CLAY**		2	SS 3	100	2-1-2-2 3	34.68			97
- Grey by 3.0 m depth		3						3.3 m 2024-08-26	96
		4							95
		5							94
6.10m [93.24m]		6							93
Dynamic Cone Penetration Test commenced at 6.10 m depth		7							92
		8							91
		9							90
9.40m [89.94m]									
End of Borehole		10							89
Practical refusal to DCPT at 9.40 m depth		11							88
DCPT pushed from 6.10 m to 9.40 m depth		12							87
(GWL at 3.26 m depth - August 26, 2024)		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352239.44 **NORTHING:** 5016103.22 **ELEVATION:** 99.30

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 20, 2024

FILE NO. : PG7249

HOLE NO. : BH 6-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
FILL: Coarse gravel, with cobbles 0.25m [99.05m]			AU 1			13.45			
Loose, brown **SILTY SAND**, trace gravel 0.69m [98.61m]		1	SS 2	92	2-1-2-3 3	32.48			98
Stiff to firm, brown **SILTY CLAY**		2	SS 3	83	2-2-3-2 5	43.41			97
- Grey by 3.0 m depth		3							96
6.10m [93.20m]		4						4.1 m 2024-08-26	95
Dynamic Cone Penetration Test commenced at 6.10 m depth		5							94
10.87m [88.43m]		6							93
End of Borehole		7							92
Practical refusal to DCPT at 10.87 m depth		8							91
DCPT pushed from 6.10 m to 10.87 m depth		9							90
(GWL at 4.12 m depth - August 26, 2024)		10							89
		11							88
		12							87
		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352211.96 **NORTHING:** 5016119.71 **ELEVATION:** 99.21

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 20, 2024

FILE NO. : PG7249

HOLE NO. : BH 7-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
TOPSOIL and organics, trace cobbles 0.23m [98.98m]			AU 1			16.87			
Loose, brown **SILTY SAND**, with clay, trace gravel 0.69m [98.52m]		1	SS 2	100	6-4-5-4 9	30.81			98
Stiff to firm, brown **SILTY CLAY**		2	SS 3	100	1-1-2-1 3	37.7			97
- Grey by 3.0 m depth		3						3.4 m 2024-08-26	96
6.10m [93.11m]		4							95
Dynamic Cone Penetration Test commenced at 6.10 m depth		5							94
		6							93
10.62m [88.59m]		7							92
End of Borehole		8							91
Practical refusal to DCPT at 10.62 m depth		9							90
DCPT pushed from 6.10 m to 10.62 m depth		10							89
(GWL at 3.43 m depth - August 26, 2024)		11							88
		12							87
		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352183.08 **NORTHING:** 5016148.14 **ELEVATION:** 99.16

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 20, 2024

FILE NO. : PG7249

HOLE NO. : BH 8-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
TOPSOIL and organics 0.13m [99.03m]			AU 1			15.94			
Loose, brown **SILTY SAND**, trace clay and gravel 0.69m [98.47m]		1	SS 2	75	4-3-3-4	31.29			98
Loose, brown **SILTY SAND**, with clay 1.45m [97.70m]					6				
Stiff to firm, brown **SILTY CLAY**		2	SS 3	100	2-1-1-1	37.08			97
- Grey by 3.0 m depth 3.05m [96.11m]					2				
Dynamic Cone Penetration Test commenced at 3.05 m depth		3							96
		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
		10							89
		11							88
		12							87
12.47m [86.69m] End of Borehole		13							86
Practical refusal to DCPT at 12.47 m depth		14							85
DCPT pushed from 6.10 m to 12.47 m depth		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352196.54 **NORTHING:** 5016145.96 **ELEVATION:** 99.14

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 20, 2024

FILE NO. : PG7249

HOLE NO. : BH 9-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
FILL: Cobbles and boulders 0.18m [98.96m]			AU 1			13.15			
Loose, brown **SILTY SAND**, some gravel, trace clay 0.69m [98.45m]		1	SS 2	83	4-2-2-2 4	34.9			98
Loose, brown **SILTY SAND** 1.45m [97.69m]			SS 3	100	2-2-2-1 4	26.55			
Stiff to firm, brown **SILTY CLAY**		2							97
- Grey by 3.0 m depth 3.05m [96.09m]		3							96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
		10							89
		11							88
12.19m [86.95m]		12							87
End of Borehole Practical refusal to DCPT at 12.19 m depth DCPT pushed from 3.05 m to 12.19 m depth		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352214.00 **NORTHING:** 5016132.98 **ELEVATION:** 99.22

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : BH 10-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
TOPSOIL and organics 0.20m [99.02m]			AU 1			12.49			
FILL: Compact, brown silt, trace clay and cruhsed stone 0.69m [98.53m]		1	SS 2	75	2-2-1-1 3	35.75			98
Stiff to firm, brown **SILTY CLAY**		2	SS 3	100	2-1-1-2 2	29.13	17 35		97
- Grey by 3.0 m depth 3.05m [96.17m]		3							96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
		10							89
11.28m [87.94m]		11							88
End of Borehole		12							87
Practical refusal to DCPT at 11.28 m depth		13							86
DCPT pushed from 3.05 m to 11.28 m depth		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352227.80 **NORTHING:** 5016116.50 **ELEVATION:** 99.26

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : BH 11-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) / PL (%) WATER CONTENT (%) LL (%)	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0					20 40 60 80		99
TOPSOIL and organics, trace gravel 0.28m [98.98m]			AU 1			17.63	○		
Stiff, brown **SILTY CLAY** 0.69m [98.57m]		1	SS 2	100	1-1-1-1 2	36.55	○		98
Stiff to firm, brown **SILTY CLAY**		2	SS 3	100	1-1-1-1 2	28.4	○		97
- Grey by 3.0 m depth 3.05m [96.21m]		3					▲		96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
		10							89
10.92m [88.34m]		11							88
End of Borehole		12							87
Practical refusal to DCPT at 10.92 m depth		13							86
DCPT pushed from 3.05 m to 10.92 m depth		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352243.47 **NORTHING:** 5016118.58 **ELEVATION:** 99.10

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : BH 12-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) / PL (%) WATER CONTENT (%) LL (%)	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE							20 40 60 80		
TOPSOIL and organics		0	AU 1			14.75	○		99
0.15m [98.95m]									
Stiff to firm, brown **SILTY CLAY**		1	SS 2	79	3-2-3-2 5	37.26	○		98
		2	SS 3	100	2-2-2-2 4	32.01	○		97
- Grey by 3.0 m depth									
3.05m [96.05m]		3					▲		96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
		10							89
		11							88
11.89m [87.21m]		12							87
End of Borehole									
Practical refusal to DCPT at 11.89 m depth		13							86
DCPT pushed from 3.05 m to 11.89 m depth		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352254.87 **NORTHING:** 5016103.62 **ELEVATION:** 99.26

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : BH 13-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
TOPSOIL 0.20m [99.06m]			AU 1			20.17			
Stiff to firm, brown **SILTY CLAY**		1	SS 2	100	2-2-2-2 4	30.63			98
		2	SS 3	100	1-1-2-1 3	31.02			97
- Grey by 3.0 m depth 3.05m [96.21m]		3							96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
		10							89
10.90m [88.36m]		11							88
End of Borehole		12							87
Practical refusal to DCPT at 10.90 m depth		13							86
DCPT pushed from 3.05 m to 10.9 m depth		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352237.03 **NORTHING:** 5016089.92 **ELEVATION:** 99.34

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : BH 14-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Coarse to medium crushed stone		0	AU 1			12.74			99
0.33m [99.01m]									
Stiff, brown **SILTY CLAY**		1	SS 2	100	3-2-2-2 4	34.16			98
0.69m [98.65m]									
Stiff to firm, brown **SILTY CLAY**		2	SS 3	100	2-1-1-2 2	40.41			97
- Grey by 3.0 m depth									
3.05m [96.29m]		3							96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
10.01m [89.33m]		10							89
End of Borehole		11							88
Practical refusal to DCPT at 10.01 m depth		12							87
DCPT pushed from 3.05 m to 10.01 m depth		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352225.69 **NORTHING:** 5016077.28 **ELEVATION:** 99.35

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : BH 15-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	RECOVERY (%)	N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
FILL: Loose silty sand, with crushed stone 0.25m [99.10m]			AU 1			19.29			
Stiff, brown **SILTY CLAY** 0.69m [98.66m]		1	SS 2	100	2-2-3-4 5	32.25			98
Stiff to firm, brown **SILTY CLAY**		2	SS 3	100	2-1-2-2 3	30.44			97
- Grey by 3.0 m depth 3.05m [96.30m]		3							96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
9.14m [90.21m]		9							90
End of Borehole Practical refusal to DCPT at 9.14 m depth DCPT pushed from 3.05 m to 9.14 m depth		10							89
		11							88
		12							87
		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352224.72 **NORTHING:** 5016103.69 **ELEVATION:** 99.26

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : BH 16-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) / PL (%) WATER CONTENT (%) LL (%)	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
FILL: Compact, brown silty clay, with crushed stone			AU 1			21.49			
0.25m [99.01m]									
Stiff to firm, brown **SILTY CLAY**		1	SS 2	100	2-2-3-2 5	31.26			98
		2	SS 3	100	1-1-1-1 2	31.77			97
- Grey by 3.0 m depth									
3.05m [96.21m]		3							96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
10.52m [88.74m]		10							89
End of Borehole		11							88
Practical refusal to DCPT at 10.52 m depth		12							87
DCPT pushed from 3.05 m to 10.52 m depth		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352211.10 **NORTHING:** 5016102.88 **ELEVATION:** 99.23

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : BH 17-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
FILL: Brown silty sand, with crushed stone, trace clay			AU 1			17.77			
0.25m [98.98m]									
Stiff to firm, brown **SILTY CLAY**		1	SS 2	100	3-3-3-2 6	29.77			98
		2	SS 3	100	2-2-1-1 3	36.7			97
- Grey by 3.0 m depth									
3.05m [96.19m]		3							96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
		10							89
10.19m [89.05m]									
End of Borehole		11							88
Practical refusal to DCPT at 10.19 m depth		12							87
DCPT pushed from 3.05 m to 10.19 m depth		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352195.56 **NORTHING:** 5016105.27 **ELEVATION:** 99.30

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : BH 18-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
TOPSOIL and organics 0.08m [99.22m]			AU 1			17.84			
FILL: Brown silty sand, with crushed stone 0.28m [99.02m]		1	SS 2	100	3-3-4-3 7	21.98			98
Stiff to firm, brown **SILTY CLAY**		2	SS 3	100	2-2-3-2 5	33.64			97
- Grey by 3.0 m depth 3.05m [96.25m]		3							96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
		10							89
10.59m [88.71m]									
End of Borehole		11							88
Practical refusal to DCPT at 10.59 m depth		12							87
DCPT pushed from 3.05 m to 10.59 m depth		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352197.18 **NORTHING:** 5016118.92 **ELEVATION:** 99.25

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : BH 19-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
TOPSOIL and organics 0.25m [99.00m]			AU 1			19.04			
Stiff, brown **SILTY CLAY** 0.69m [98.56m]		1	SS 2	92	2-3-3-3 6	29.93			98
Stiff to firm, brown **SILTY CLAY**			SS 3	100	2-1-2-2 3	37.38			97
- Grey by 3.0 m depth 3.05m [96.20m]		2							
Dynamic Cone Penetration Test commenced at 3.05 m depth		3							96
		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
		10							89
11.07m [88.18m]		11							88
End of Borehole									
Practical refusal to DCPT at 11.07 m depth		12							87
DCPT pushed from 3.05 m to 11.07 m depth		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352195.88 **NORTHING:** 5016131.91 **ELEVATION:** 99.20

PROJECT: Proposed School Development

BORINGS BY: Track-Mount Drill Rig

REMARKS:

DATE: August 22, 2024

FILE NO. : PG7249

HOLE NO. : BH 20-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / △ REMOULDED SHEAR STRENGTH, Cur (kPa) ▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
TOPSOIL and organics 0.18m [99.02m]			AU 1			17.24	○		
Stiff, brown **SILTY CLAY** 0.69m [98.51m]		1	SS 2	67	2-3-6-4 9	27.41	○		98
Stiff to firm, brown **SILTY CLAY**		2	SS 3	100	2-1-2-2 3	34.57	○		97
- Grey by 3.0 m depth 3.05m [96.15m]		3					△ ▲		96
Dynamic Cone Penetration Test commenced at 3.05 m depth		4							95
		5							94
		6							93
		7							92
		8							91
		9							90
9.91m [89.29m]		10							89
End of Borehole		11							88
Practical refusal to DCPT at 9.91 m depth		12							87
DCPT pushed from 3.05 m to 9.91 m depth		13							86
		14							85
		15							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352247.98 **NORTHING:** 5016096.31 **ELEVATION:** 99.29

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 1-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Brown silty clay, with crushed stone and sand		0	G 2			18.21			99
0.25m [99.04m]			G 1						
Stiff to firm, brown **SILTY CLAY**						7.39			
		1	G 3			30.62			98
1.80m [97.49m]									
End of Test Pit		2							97
No groundwater infiltration was observed upon completion of the test pit		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352231.21 **NORTHING:** 5016095.79 **ELEVATION:** 99.35

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 2-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
FILL: Brown silty clay, with crushed stone, sand and organics			G 1						
0.20m [99.15m]			G 2			19.45	○		
Stiff to firm, brown **SILTY CLAY**						13.14	○		
		1	G 3						98
			G 4			35.91	○		
1.80m [97.55m]									97
End of Test Pit		2							
No groundwater infiltration was observed upon completion of the test pit		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352216.09 **NORTHING:** 5016110.68 **ELEVATION:** 99.18

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 3-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Compact, brown, silty clay, with crushed stone and organics		0	G 1			20.23			99
0.50m [98.68m]									
Stiff to firm, brown **SILTY CLAY**			G 2			18.25			
		1	G 3			32.05			98
1.80m [97.38m]									
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		2							97
		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352203.01 **NORTHING:** 5016102.44 **ELEVATION:** 99.34

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 4-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / △ REMOULDED SHEAR STRENGTH, Cur (kPa) ▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
FILL: Compact, brown silty clay, with crushed stone and organics			G 1			12.15	○		
0.50m [98.84m]									
Stiff to firm, brown **SILTY CLAY**			G 2			14.79	○		
		1	G 3			28.72	○		98
1.80m [97.54m]			G 4			29.58	○		
End of Test Pit		2							97
No groundwater infiltration was observed upon completion of the test pit		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352188.31 **NORTHING:** 5016124.61 **ELEVATION:** 99.26

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 5-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Compact, brown silty clay, with organics, some crushed stone		0	G 1			16.99			99
0.80m [98.46m]									
Stiff to firm, brown **SILTY CLAY**			G 2			16.19			
		1	G 3			31.73			98
1.80m [97.46m]									
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		2							97
		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352205.09 **NORTHING:** 5016132.16 **ELEVATION:** 99.21

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 6-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
FILL: Compact, brown silty clay, with gravel and organics			G 1			15.25			
0.40m [98.81m]									
FILL: Compact, brown silty sand, with crushed stone			G 2			14.52			
0.80m [98.41m]									
Stiff to firm, brown **SILTY CLAY**		1	G 3			19.64			98
			G 4			30.34			
1.80m [97.41m]									
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		2							97
		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352224.06 **NORTHING:** 5016127.85 **ELEVATION:** 99.21

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 7-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
FILL: Compact, brown silty clay, with crushed stone, some to trace sand			G 1			11.35			
0.40m [98.81m]									
Dense, brown **SILTY** fine **SAND**, trace clay -Geotextile/cloth between 0.4 m 0.5 m depth			G 2			16.34			
0.90m [98.31m]									
Stiff to firm, brown **SILTY CLAY**		1	G 3			32.11			98
1.80m [97.41m]			G 4			30.71	18 31		
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		2							97
		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352228.51 **NORTHING:** 5016156.89 **ELEVATION:** 98.98

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 8-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Compact, brown silty clay, with organics, some crushed stone, trace sand		0	G 1			19.37			98
0.40m [98.58m]			G 2			18.2			
Stiff to firm, brown **SILTY CLAY**		1	G 3			32.83			97
1.80m [97.18m]		2							96
End of Test Pit Groundwater infiltration was observed upon completion of the test pit		3							95
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352238.98 **NORTHING:** 5016127.15 **ELEVATION:** 99.18

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 9-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Compact, brown silty clay, with organics and crushed stone		0	G 1			15.88			99
0.60m [98.58m]									
Compact, brown **SAND**, trace clay			G 2			16.78			
0.90m [98.28m]									
Stiff to firm, brown **SILTY CLAY**		1	G 3			20.59			98
1.80m [97.38m]			G 4			27.9			
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		2							97
		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352237.37 **NORTHING:** 5016112.60 **ELEVATION:** 99.26

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 10-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							99
FILL: Brown, silty clay, with crushed stone, some organics			G 1			13.54			
0.40m [98.86m]									
Compact, brown fine **SAND**, trace clay -Geotextile/cloth at 0.4 m depth			G 2			17.49			
0.90m [98.36m]									
Stiff to firm, brown **SILTY CLAY**		1	G 3			32.3			98
1.80m [97.46m]			G 4			35.68	17 35		
End of Test Pit Groundwater infiltration was observed upon completion of the test pit		2							97
		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352279.22 **NORTHING:** 5016143.29 **ELEVATION:** 98.93

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 11-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Compact, brown silty clay, with organics		0	G 1			24.95			
0.40m [98.53m]									
Stiff to firm, brown **SILTY CLAY**			G 2			16.85			
		1	G 3			23.71			98
1.80m [97.13m]			G 4			29.94			
End of Test Pit Minimal groundwater infiltration was observed upon completion of the test pit		2							97
		3							96
		4							95

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352230.51 **NORTHING:** 5016197.43 **ELEVATION:** 98.79

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 12-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Compact, brown silty clay, with organics		0	G 1			19.59			
0.50m [98.29m]									
Stiff to firm, brown **SILTY CLAY**			G 2			15.82			98
		1	G 3			28.44			
1.80m [96.99m]			G 4			30.31			97
End of Test Pit Groundwater infiltration was observed upon completion of the test pit		2							96
		3							95
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352181.40 **NORTHING:** 5016240.50 **ELEVATION:** 98.58

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 13-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / △ REMOULDED SHEAR STRENGTH, Cur (kPa) ▲ PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Compact, brown silty clay, with organics, trace crushed stone		0	G 1			18.25	○		
0.60m [97.98m]									98
Stiff to firm, brown **SILTY CLAY**			G 2			18.03	○ 156.0 ▲		
		1							
			G 3			30.78	○		97
1.80m [96.78m]									
End of Test Pit		2							96
No groundwater infiltration was observed upon completion of the test pit		3							95
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352144.14 **NORTHING:** 5016210.45 **ELEVATION:** 98.94

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 14-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							98.94
FILL: Compact, brown silty clay, with crushed stone, trace organics			G 1			8.35			
0.50m [98.44m]									
Stiff, brown **SILTY CLAY** -Geotextile/cloth at 0.5 m depth		1	G 2			16.76			98
1.80m [97.14m]			G 3			27.8			
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		2							97
		3							96
		4							95

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352133.74 **NORTHING:** 5016182.12 **ELEVATION:** 99.11

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 15-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Compact, brown silty clay, with organics, trace crushed stone		0	G 1			18.55			99
0.60m [98.51m]									
Stiff to firm, brown **SILTY CLAY**			G 2			17.67			
		1	G 3			31.13			98
1.80m [97.31m]									
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		2							97
		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352157.97 **NORTHING:** 5016181.68 **ELEVATION:** 98.94

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 16-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							98
FILL: Brown silty clay, with organics and crushed stone 0.30m [98.64m]			G 1			18.56			
FILL: Brown silty clay, with sand and crushed stone 0.70m [98.24m]			G 2			12.7			
Stiff to firm, brown **SILTY CLAY**			G 3			19.36			
		1	G 4			46.55			97
End of Test Pit Minimal groundwater infiltration was observed upon completion of the test pit 1.80m [97.14m]		2							96
		3							95
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352176.57 **NORTHING:** 5016155.26 **ELEVATION:** 99.06

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 17-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Brown silty clay, with organics, some crushed stone		0	G 1						99
0.30m [98.76m]			G 2			14.5			
FILL: Brown silty clay, with sand, trace crushed stone						21.58			
0.60m [98.46m]			G 3			19.22			
Stiff to firm, brown **SILTY CLAY**		1							98
1.90m [97.16m]			G 4			32.32			
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		2							97
		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352188.59 **NORTHING:** 5016140.61 **ELEVATION:** 99.19

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 18-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Crushed stone		0							99
0.60m [98.59m]									
Stiff to firm, brown **SILTY CLAY**		1	G 1			27.57	○		98
1.80m [97.39m]			G 2			38.64	○		
End of Test Pit Groundwater infiltration from sidewalls was observedat 0.6 m depth		2							97
		3							96
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352178.02 **NORTHING:** 5016272.39 **ELEVATION:** 98.44

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 19-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE		0							98
FILL: Brown silty clay, with organics, trace crushed stone									
0.60m [97.84m]									
Stiff to firm, brown **SILTY CLAY**		1	G 1			22.21			97
1.80m [96.64m]			G 2			28.92			
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		2							96
		3							95
		4							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

620 Triangle Street, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 352252.66 **NORTHING:** 5016111.69 **ELEVATION:** 99.25

PROJECT: Proposed School Development

BORINGS BY: Backhoe

REMARKS:

DATE: August 21, 2024

FILE NO. : PG7249

HOLE NO. : TP 20-24

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N, Nc OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH, Cur (kPa) / PEAK SHEAR STRENGTH, Cu (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
FILL: Brown silty clay, with crushed stone, trace sand and organics		0							99
0.60m [98.65m]									
Stiff to firm, brown **SILTY CLAY**			G 1			16.84	○		
		1							98
1.80m [97.45m]			G 2			32.9	○		
End of Test Pit No groundwater infiltration was observed upon completion of the test pit		2							97
		3							96
		4							

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic Limit, % (water content above which soil behaves plastically)
PI	-	Plasticity Index, % (difference between LL and PL)
Dxx	-	Grain size at which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2$ / (D10 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

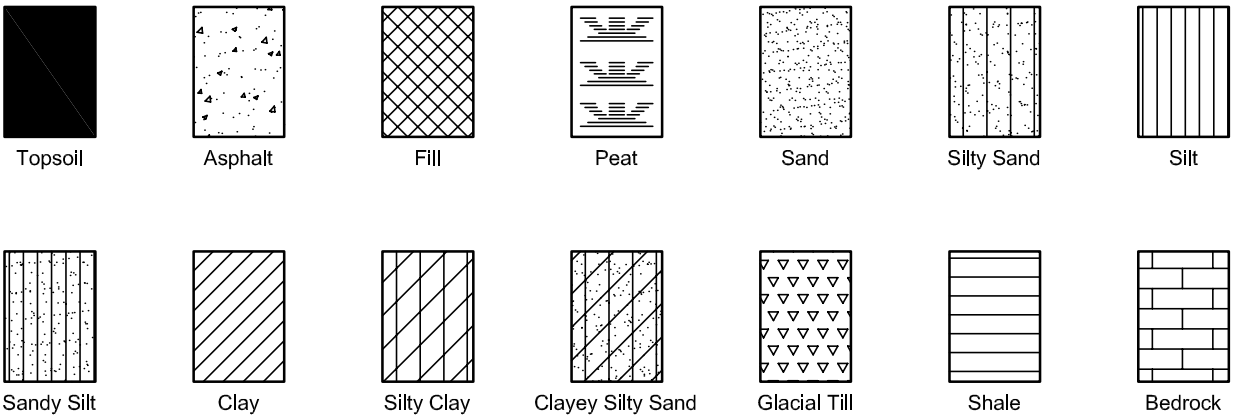
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

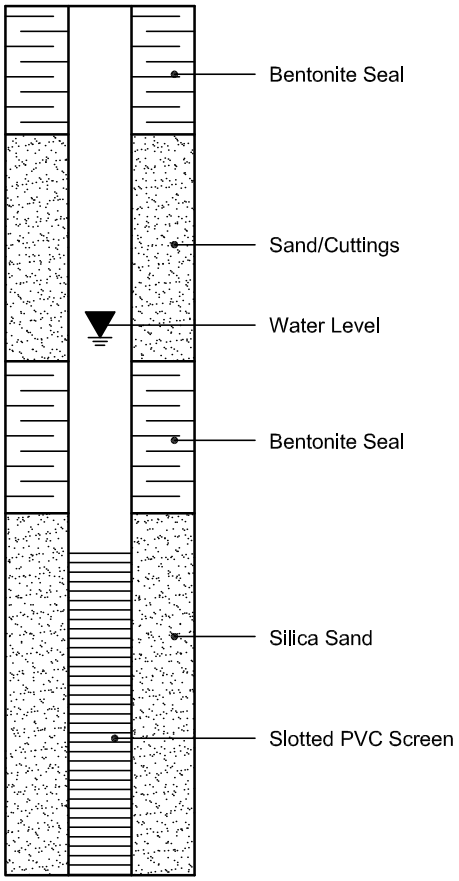
SYMBOLS AND TERMS (continued)

STRATA PLOT

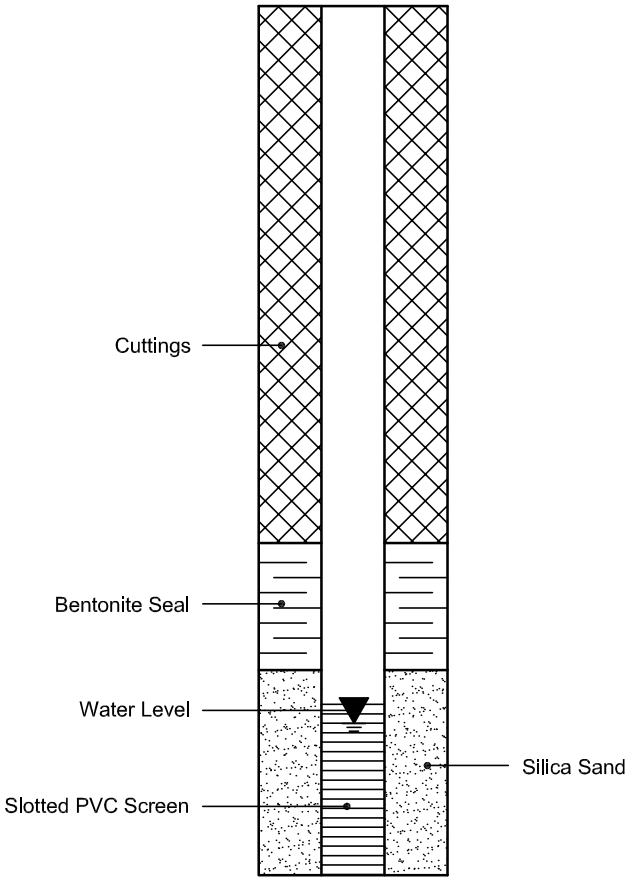


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



patersongroup

Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Hazeldean Road
Ottawa, Ontario

DATUM Ground surface elevations provided by Annis, O'Sullivan, Vollebekk Limited

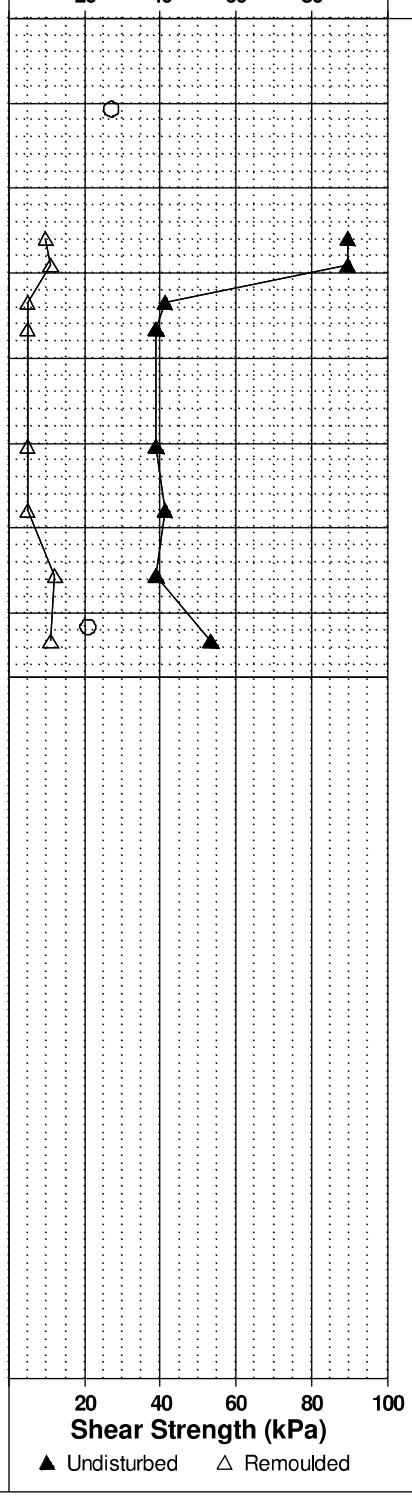
FILE NO. PG2930

REMARKS N 5016046.478; E 352214.286

HOLE NO. BH 7-13

BORINGS BY CME 55 Power Auger **DATE** May 7, 2013

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
UNDERSIDE OF FOOTING									
TOPSOIL 0.30		AU	1			0	99.49		
Brown **SILTY SAND** with clay 0.69		SS	2	96	2	1	98.49		
		SS	3	100	2	2	97.49		
Brown **SILTY CLAY** with sand									
2.97						3	96.49		
		TW	4	79		4	95.49		
Stiff to firm, grey **SILTY CLAY**						5	94.49		
						6	93.49		
		SS	5	38	W	7	92.49		
7.75		SS	6		50+				
End of Borehole									
Practical refusal to augering at 7.75m depth									
Based on field observations GWL @ 2.0m depth									



Jacques Whitford

BOREHOLE RECORD

BH07-9

CLIENT Mattamy Homes

LOCATION Proposed Subdivision, Hazeldean Rd. at Terry Fox Dr., Ottawa, ON

DATES: BORING July 3, 2007 WATER LEVEL July 11, 2007

BOREHOLE No. BH07-9

PROJECT No. 1027107

DATUM Local

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N-VALUE OR RQD
0	101.26							
	101.0	TOPSOIL: silty sand with high organic content						
		Very loose brown sandy SILT (ML)		▽	SS	1	25	4
1				▼	SS	2	25	2
2	99.1							
		Firm to soft grey sandy lean CLAY (CL)			SS	3	500	1
3					ST	4	650	1
	97.6							
		Firm to soft dark grey lean CLAY (CL)						
4								
5					SS	5	600	1
6	94.6							
7		End of Borehole						
		Standpipe Installed						
8								
9								
10								

UNDRAINED SHEAR STRENGTH - kPa

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90

▽ Inferred Groundwater Level

▼ Groundwater Level Measured in Standpipe

□ Field Vane Test, kPa

□ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

App'd CM

Date 07/07

JWL-OLD 1027107.GPJ SMART.GDT 07/07/12

Jacques Whitford

TEST PIT RECORD

TP07-12

CLIENT Mattamy Homes

LOCATION Proposed Subdivision, Hazeldean Rd. at Terry Fox Dr., Ottawa, ON

DATES: BORING June 25, 2007 WATER LEVEL June 25, 2007

BOREHOLE No. TP07-12

PROJECT No. 1027107

DATUM Local

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY (mm)	SAMPLES N-VALUE OR RQD
0	101.85							
	101.6	TOPSOIL: silty sand with high organic content			BS	1		
		Compact brown and grey sandy SILT (ML)			BS	2		
1					BS	3		
2	99.5							
		Firm greyish brown sandy lean CLAY (CL)			BS	4		
3					BS	5		
4	97.2				BS	6		
		End of Test Pit						
5								
6								
7								
8								
9								
10								

UNDRAINED SHEAR STRENGTH - kPa

50 100 150 200

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

DYNAMIC PENETRATION TEST, BLOWS/0.3m ★

STANDARD PENETRATION TEST, BLOWS/0.3m ●

10 20 30 40 50 60 70 80 90

▽ Inferred Groundwater Level

▼ Groundwater Level Measured in Standpipe

■ Field Vane Test, kPa

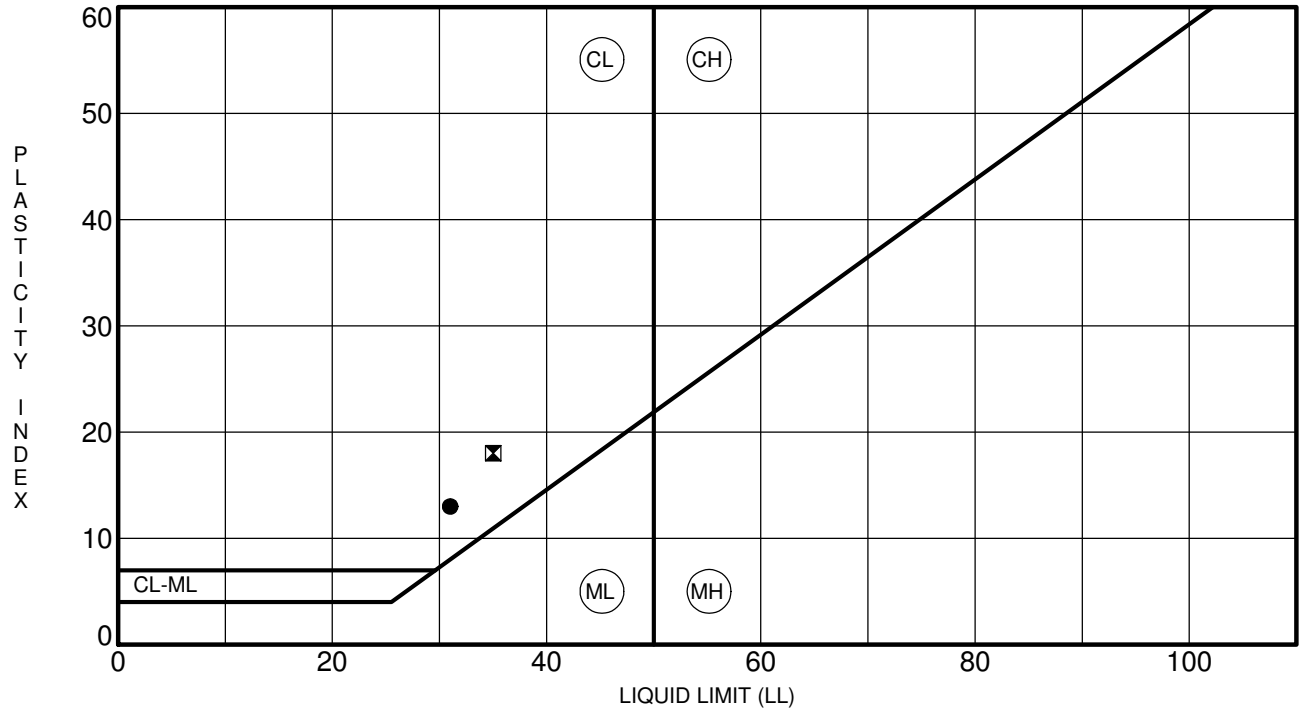
□ Remoulded Vane Test, kPa

△ Pocket Penetrometer Test, kPa

App'd CN

Date 07/07

JWL-OLD 1027107.GPJ SMART.GDT 07/07/12

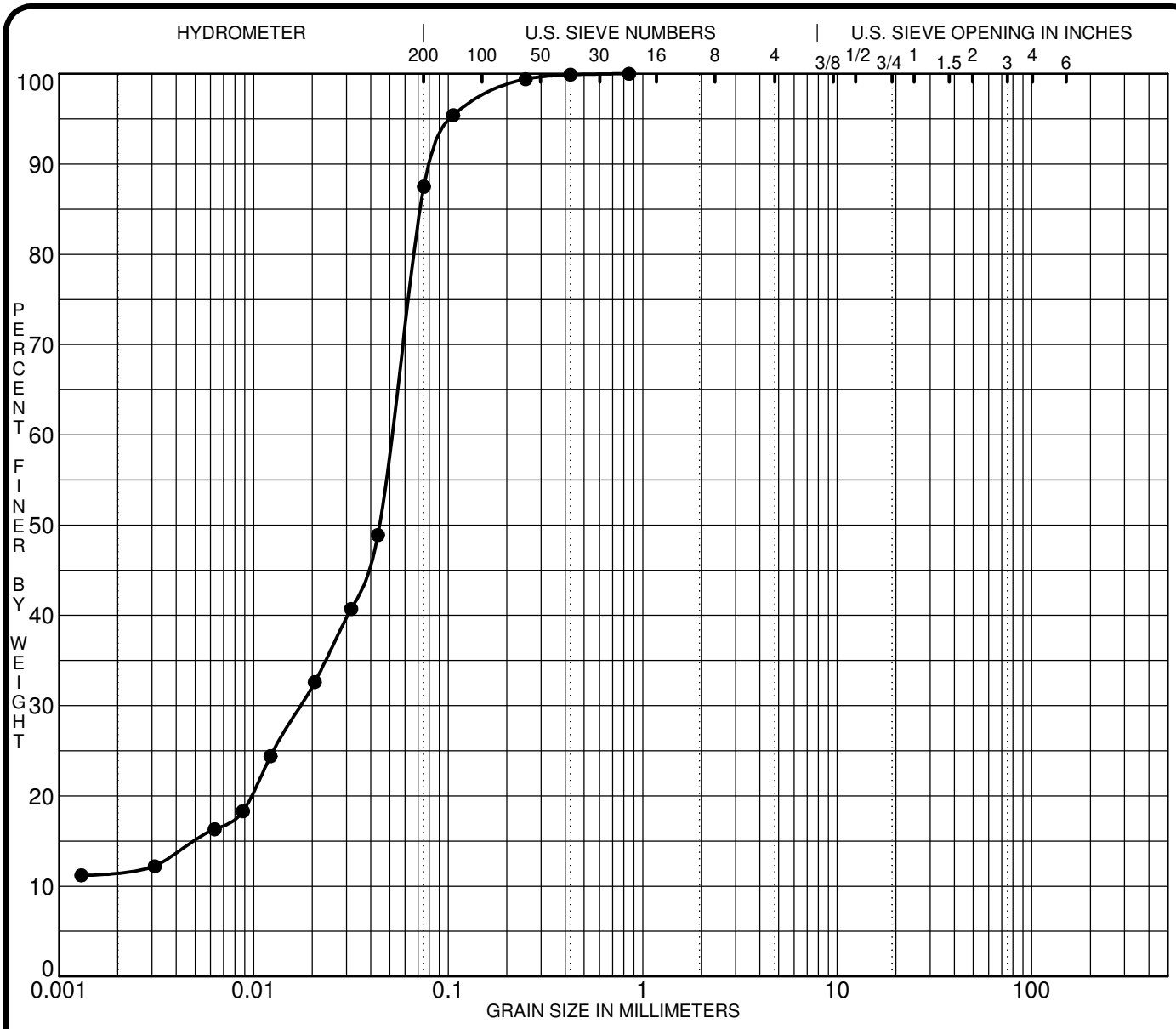


	Specimen Identification	LL	PL	PI	Fines	Classification
●	**TP 7-24 G4**	**31**	**18**	**13**		**CL= Inorganic Clays of Low Plasticity**
⧓	**TP10-24 G4**	**35**	**17**	**18**		**CL= Inorganic Clays of Low Plasticity**

CLIENT	**Ottawa Catholic School Board**	FILE NO.	**PG7249**
PROJECT	**Geotechnical Investigation - Proposed School Development - 620 Triangle Street**	DATE	**21 Aug 24**

PATERSON GROUP
9 Auriga Drive
Ottawa, Ontario
K2E 7T9
TEL: (613) 226-7381

ATTERBERG LIMITS' RESULTS



CLAY	SILT	SAND			GRAVEL		COBBLES
		fine	medium	coarse	fine	coarse	

	Specimen Identification	Classification	MC%	LL	PL	PI	Cc	Cu
●	**TP 1-24 G3**		**28.9**					
⊠								
▲								
★								

	Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**TP 1-24 G3**	**0.85**	**0.05**	**0.017**		**0.0**	**12.5**	**75.9**	**11.6**
⊠									
▲									
★									

CLIENT **Ottawa Catholic School Board**

PROJECT **Geotechnical Investigation - Proposed School Development - 620 Triangle Street**

FILE NO. **PG7249**

DATE **21 Aug 24**

PATERSON GROUP

9 Auriga Drive
Ottawa, Ontario
K2E 7T9
TEL: (613) 226-7381

GRAIN SIZE DISTRIBUTION

Certificate of Analysis

Report Date: 29-Aug-2024

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

Order Date: 26-Aug-2024

Client PO: 61115

Project Description: PG7249

	Client ID:	BH15-24 SS3	-	-	-		
	Sample Date:	26-Aug-24 09:00	-	-	-	-	-
	Sample ID:	2435096-01	-	-	-		
	Matrix:	Soil	-	-	-		
	MDL/Units						
Physical Characteristics							
% Solids	0.1 % by Wt.	73.7	-	-	-	-	-
General Inorganics							
pH	0.05 pH Units	7.06	-	-	-	-	-
Resistivity	0.1 Ohm.m	28.4	-	-	-	-	-
Anions							
Chloride	10 ug/g	<10	-	-	-	-	-
Sulphate	10 ug/g	171	-	-	-	-	-

APPENDIX 2

FIGURE 1 - KEY PLAN

DRAWING PG7249 - 1 - TEST HOLE LOCATION PLAN

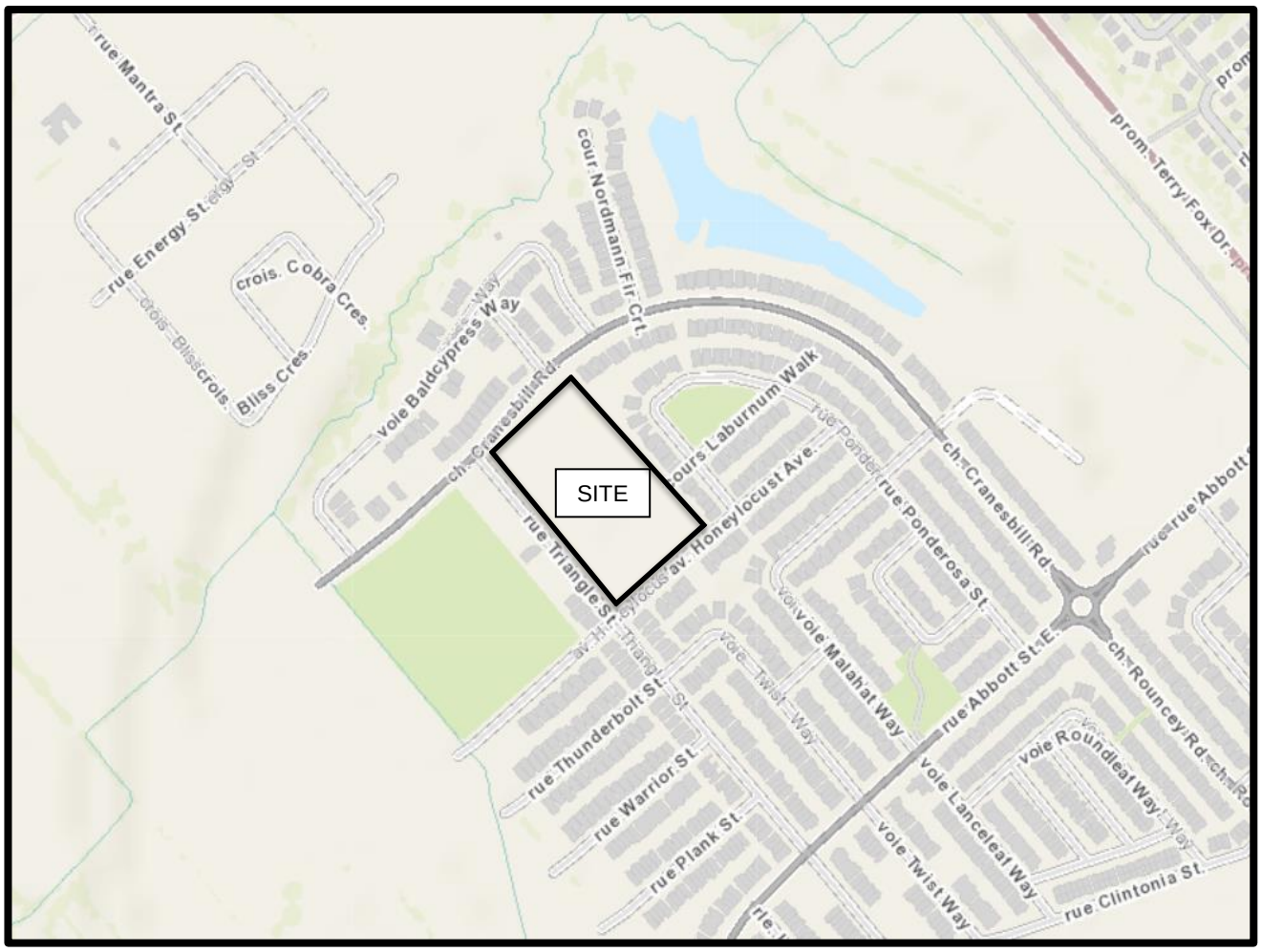
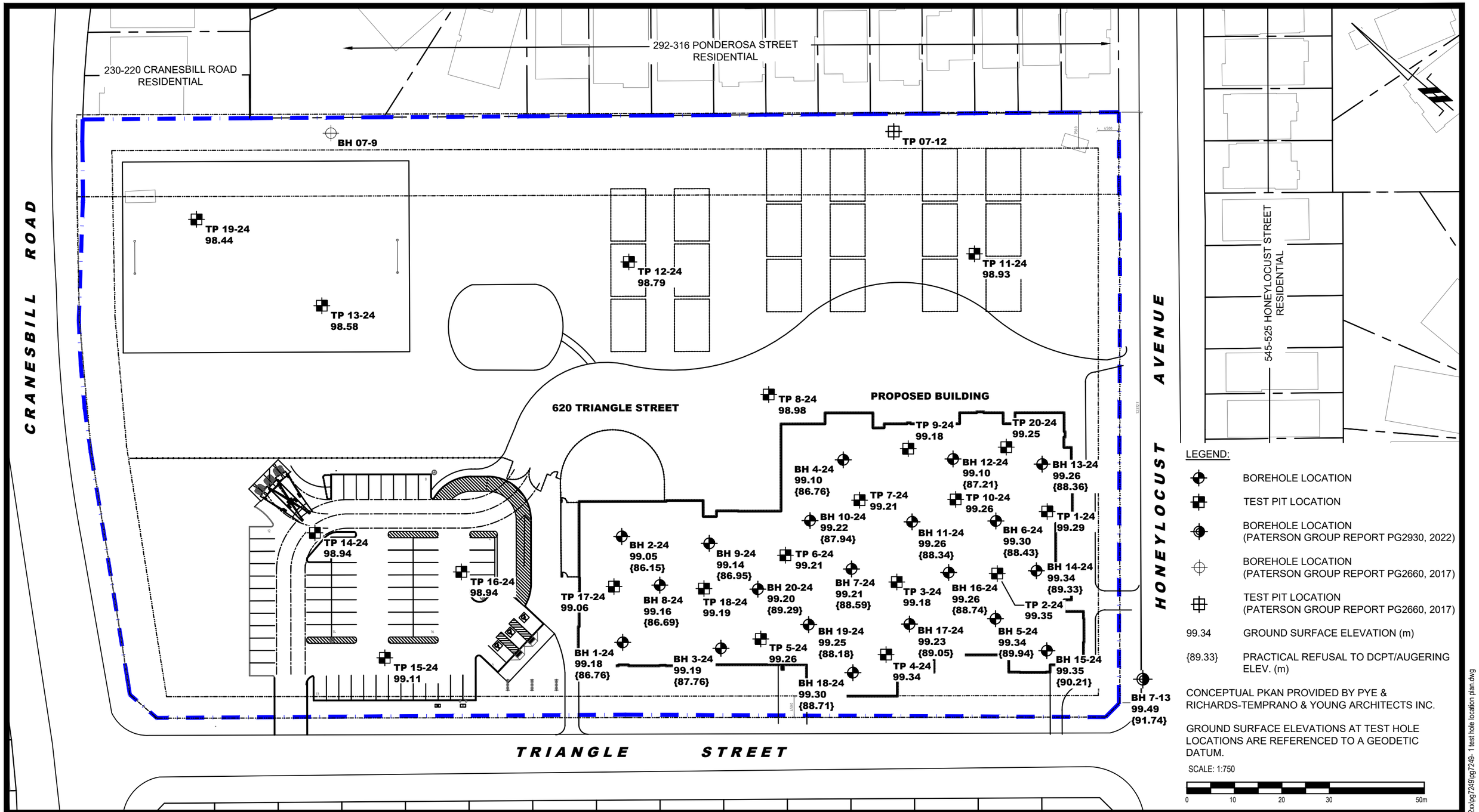


FIGURE 1

KEY PLAN

PATERSON GROUP



LEGEND:

- BOREHOLE LOCATION
- TEST PIT LOCATION
- BOREHOLE LOCATION (PATERSON GROUP REPORT PG2930, 2022)
- BOREHOLE LOCATION (PATERSON GROUP REPORT PG2660, 2017)
- TEST PIT LOCATION (PATERSON GROUP REPORT PG2660, 2017)
- 99.34 GROUND SURFACE ELEVATION (m)
- {89.33} PRACTICAL REFUSAL TO DCPT/AUGERING ELEV. (m)

CONCEPTUAL PKAN PROVIDED BY PYE & RICHARDS-TEMPRANO & YOUNG ARCHITECTS INC.

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

SCALE: 1:750

0 10 20 30 50m

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

NO.	REVISIONS	DATE	INITIAL

OTTAWA CATHOLIC SCHOOL BOARD
GEOTECHNICAL INVESTIGATION
PROPOSED SCHOOL DEVELOPMENT
620 TRIANGLE STREET
OTTAWA, ONTARIO

Title:
TEST HOLE LOCATION PLAN

Scale: 1:750	Date: 08/2024
Drawn by: GK	Report No.: PG7249-1
Checked by: KB	Dwg. No.: PG7249-1
Approved by: DP	Revision No.:

p:\autocad drawings\geotechnical\pg72xx\pg7249\pg7249- 1 test hole location plan.dwg

11x17