Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Noise and Vibration Studies

patersongroup

Geotechnical Investigation
Proposed Multi-Storey Building
627 Kirkwood Avenue
Ottawa, Ontario

Prepared For
Dolyn Developments Inc. and
Dolyn Construction Ltd.

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April 30, 2021

Report: PG5684-1

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Appendices

1.0 Introduction

Paterson Group (Paterson) was commissioned by Dolyn Developments Inc. and Dolyn Construction Ltd. to conduct a geotechnical desktop review of the existing soils information for the proposed multi-storey building to be located at 627 Kirkwood Avenue, in the City of Ottawa, Ontario (refer to Figure 1 - Key Plan presented in Appendix 2).

The objective of the investigation was to:

☐ determine the subsoil and groundwater conditions using existing soils information within the immediate area of the site.

☐ provide geotechnical recommendations for the design of the proposed redevelopment including construction considerations which may affect its design.

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

Investigating the presence or potential presence of contamination on the subject property was not part of the scope of work of this investigation.

2.0 Proposed Project

Specific details of the proposed multi storey building are not currently available. However, it is expected that the building will occupy the majority of the property. It is further anticipated that the subject site will be municipally serviced.

3.0 Existing Geotechnical Information

3.1 Previous Investigations

The first field program for the geotechnical investigation was carried out by WSP between July 7, 2019 and December 3, 2019. At that time, two boreholes were advanced to a maximum depth of 11.3 m below existing ground surface. The boreholes were drilled with a Geoprope 7822DT automatic drop hammer drill.

A second field program was conducted by WSP on December 3, 2020. At that time, two additional boreholes were advanced to a maximum depth of 7.3 m below the existing ground surface. The boreholes were drilled with a Geoprobe 420M hydraulic drill.

The borehole locations are shown on Drawing PG5684-1 - Test Hole Location Plan in Appendix 2.

Sampling and In Situ Testing

Soil samples from the borehole were recovered using a 50 mm split-spoon sampler or 57 mm diameter macro sampler. The depths at which the split-spoon and macro core samples were recovered from the test hole are shown as SS and MC, respectively, on the Soil Profile and Test Data sheets presented in Appendix 1.

Standard Penetration Testing (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.

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

Groundwater

A 25 mm diameter monitoring well was installed in boreholes BH20-1 and BH20-2 to permit monitoring of the groundwater levels subsequent to the completion of the sampling program.

3.2 Surface Conditions

The subject site is currently occupied by an asphalt surfaced parking area, a two storey residential building and a two storey synagogue. The site is bordered to the north, east and south by residential buildings, and to the west by Kirkwood Avenue. The site is generally flat and at grade with Kirkwood Avenue.

3.3 Subsurface Profile

Overburden

Generally, the subsurface profile encountered at the test hole locations consists of topsoil, overlying fill consisting of silty sand to sand with some silt, extending to a maximum depth of 4.0 m. A loose, sand to silty sand layer was encountered underlying the fill, extending to a maximum depth of 6.9 m. A soft, grey clay to silty clay was encountered underlying the sand layer at a depth ranging from 2.3 to 6.9 m and extended to a maximum depth of 11.3 m below the existing ground surface.

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

Bedrock

Based on available geological mapping, the local bedrock consists of limestone and dolomite, interbedded of the Gull River formation. The overburden thickness is expected to range from 5 to 15 m.

3.4 Groundwater

Groundwater levels were measured in the monitoring wells installed in the boreholes upon completion of the sampling program. The GWL readings are presented on the Soil Profile and Test Data sheets in Appendix 1.

Long-term groundwater levels can also be estimated based on the observed colour and consistency of the recovered soil samples. Based on these observations, it is estimated that the long-term groundwater table can be expected at approximately 2 to 3 m below ground surface. It should be noted that groundwater levels can be influenced by surface water infiltrating the backfilled boreholes. It should also be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater level could vary at the time of construction.

4.0 Discussion

4.1 Geotechnical Assessment

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

Due to the presence of the sensitive silty clay layer, the subject site will be subjected to the grade raise restrictions discussed in Subsection 4.3.

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

4.2 Site Grading and Preparation

Stripping Depth

Asphalt, topsoil and fill, containing deleterious materials, should be stripped from under any buildings and other settlement sensitive structures. It is anticipated that existing fill, free of deleterious material and significant amounts of organics, can be left in place below the proposed building footprint, outside of lateral support zones for the footings, and below any proposed paved areas. However, it is recommended that the existing fill layer be proof-rolled by a vibratory roller making several passes **under dry conditions and above freezing temperatures** and approved by the geotechnical consultant at the time of construction. Any poor performing areas noted during the proof-rolling operation should be removed and replaced with an approved fill. Existing foundation walls and other construction debris should be entirely removed from within the building perimeter. Under paved areas, existing construction remnants, such as foundation walls, should be excavated to a minimum of 1 m below final grade.

Care should be taken not to disturb adequate bearing soils below the subgrade level during site preparation activities. Consideration should be given to placing a lean concrete mud slab over the exposed clay subgrade to help prevent disturbance due to work traffic

Fill Placement

Fill used for grading beneath the building areas should consist, unless otherwise specified, of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material should be tested and approved prior to delivery to the site. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness.

Fill placed beneath the building should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD). It is recommended that a mud slab be poured prior to the placement of the fill in order to prevent any disturbance of the bearing surface.

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

4.3 Foundation Design

Conventional Shallow Footings

Footings placed on a silty clay bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **100 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **150 kPa**, incorporating a geotechnical resistance factor of 0.5.

Footings designed using the above noted bearing resistance values at SLS will be subjected to potential post construction total and differential settlements of 25 mm 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, have been removed priot to the placement of concrete footings.

Raft Foundation

Based on the expected loads from the proposed building, a raft foundation should be considered for foundation support of the proposed building. For one basement level, it is expected that the excavation will extend approximately 4 to 5 m below existing ground surface.

The amount of settlement of the raft slab will be dependent on the sustained raft contact pressure. The loading conditions for the contact pressure are based on sustained loads, that are generally taken to be 100% Dead Load and 50% Live Load. The contact pressure provided considers the stress relief associated with the soil removal required for one basement level.

A bearing resistance value at SLS (contact pressure) of **150 kPa** will be considered acceptable for a raft supported on the undisturbed, stiff silty clay. The factored bearing resistance (contact pressure) at ULS can be taken as **225 kPa**. For this case, the modulus of subgrade reaction was calculated to be **6 MPa/m** for a contact pressure of **150 kPa**.

The raft foundation design is required to consider the relative stiffness of the reinforced concrete slab and the supporting bearing medium.

Protection of Subgrade (Raft Foundation)

Since the subgrade material will consist of a silty clay deposit, it is recommended that a minimum 75 mm thick lean concrete mud slab be placed on the undisturbed silty clay subgrade shortly after the completion of the excavation. The main purpose of the mudslab is to reduce the risk of disturbance of the subgrade under the traffic of workers and equipment.

The final excavation to the raft bearing surface level and the placing of the mud slab should be done in smaller sections to avoid exposing large areas of the silty clay to potential disturbance due to drying.

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 silty clay above the groundwater table when a plane extending horizontally and vertically from the underside of the footing at a minimum of 1.5H:1V passing through in situ soil of the same or higher bearing capacity as the bearing medium soil.

Permissible Grade Raise

A permissible grade raise restriction of **2.0 m** can be used for design purposes. If greater permissible grade raises are required, preloading with or without a surcharge, lightweight fill, and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction total and differential settlements.

4.4 Design for Earthquakes

The site class for seismic site response can be taken as **Class D** for the foundations considered at this site. A higher seismic site class such as **Class C** may be applicable. However, the higher site class would have to be confirmed by site specific shear wave velocity testing. Such testing may be considered once more detailed plans are available for the proposed redevelopment.

The soils underlying the proposed shallow foundations are not susceptible to liquefaction. Reference should be made to the latest revision of the 2012 Ontario Building Code for a full discussion of the earthquake design requirements.

4.5 Slab-on-Grade/Basement Slab Construction

With the removal of all topsoil and deleterious fill, containing organic matter, within the footprint of the proposed building, the native soil surface will be considered to be an acceptable subgrade surface on which to commence backfilling for basement floor slab or floor slab construction.

Provisions should be made for proof-rolling the existing fill layer by a vibratory roller, making several passes **under dry conditions and above freezing temperatures** and approved by the geotechnical consultant at the time of construction, prior to placing the sub-slab fill.

Any soft areas should be removed and backfilled with appropriate backfill material. OPSS Granular B Type II is recommended for backfilling below the basement slab. All backfill materials within the footprint of the proposed building should be placed in maximum 300 mm loose lifts and compact to at least 98% of the material’s SPMDD.

For structures with slab-on-grade construction, the upper 200 mm of sub-slab fill is recommended to consist 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 a minimum of 98% of the SPMDD

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

4.6 Basement Wall

There are several combinations of backfill materials and retained soils that could be applicable for the basement walls of the subject structure. However, in our opinion, the conditions can be well-represented by assuming the retained soil consists of a material with an angle of internal friction of 30 degrees and a dry unit weight of 20 kN/m^3. The applicable effective unit weight of the retained soil can be estimated as 13 kN/m^3, where applicable. A hydrostatic pressure should be added to the total static earth pressure when calculating the effective unit weight.

The total earth pressure (P_{AE}) includes both the static earth pressure component (P_o) and the seismic component (ΔP_{AE}).

Static Earth Pressures

The static horizontal earth pressure (P_o) can be calculated by a triangular earth pressure distribution equal to $K_o \cdot \gamma \cdot H$ where:

K_o = at-rest earth pressure coefficient of the applicable retained soil, 0.5
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H = height of the wall (m)

An additional pressure having a magnitude equal to $K_o \cdot q$ and acting on the entire height of the wall should be added to the above diagram for any surcharge loading, q (kPa), that may be placed at ground surface adjacent to the wall. The surcharge pressure will only be applicable for static analyses and should not be used in conjunction with the seismic loading case.

Actual earth pressures could be higher than the "at-rest" case if care is not exercised during the compaction of the backfill materials to maintain a minimum separation of 0.3 m from the walls with the compaction equipment.

Seismic Earth Pressures

The seismic earth pressure (ΔP_{AE}) can be calculated using the earth pressure distribution equal to $0.375 \cdot a_c \cdot \gamma \cdot H^2/g$ where:

a_c = $(1.45-a_{max}/g)a_{max}$
γ = unit weight of fill of the applicable retained soil (kN/m^3)
H = height of the wall (m)
g = gravity, 9.81 m/s^2

The peak ground acceleration, (a_{max}), for the Ottawa area is 0.32g according to OBC 2012. The vertical seismic coefficient is assumed to be zero.

The earth force component (P_o) under seismic conditions could be calculated using $P_o = 0.5\ K_o \gamma\ H^2$, where $K_o = 0.5$ for the soil conditions presented above.

The total earth force (P_{AE}) is considered to act at a height, h (m), from the base of the wall, where:

$h = \{P_o \cdot (H/3)+\Delta P_{AE} \cdot (0.6 \cdot H)\}/P_{AE}$

The earth forces calculated are unfactored. For the ULS case, the earth loads should be factored as live loads, as per OBC 2012.

4.7 Pavement Design

For design purposes, the pavement structure presented in the following tables could be used for the design of car only parking areas, access lanes and heavy truck parking areas. It is anticipated that the pavement structure provided in Table 2 would be adequate for use as a fire route.

Table 1 - Recommended Pavement Structure - Car Only Parking Areas

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

Table 2 - Recommended Pavement Structure - Access Lanes and Heavy Truck Parking Areas

Thickness (mm)	Material Description
40	**Wear Course -** HL-3 or Superpave 12.5 Asphaltic Concrete
50	**Binder Course** - HL-8 or Superpave 19.0 Asphaltic Concrete
150	**BASE** - OPSS Granular A Crushed Stone
450	**SUBBASE** - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill	

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

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

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 98% of the material’s SPMDD using suitable vibratory equipment.

Pavement Structure Drainage

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

Due to the impervious nature of the subgrade materials consideration should be given to installing subdrains during the pavement construction. These drains should extend in four orthogonal directions or longitudinally when placed along a curb. The clear crushed stone surrounding the drainage lines or the pipe, should be wrapped with suitable filter cloth. The subdrain inverts should be approximately 300 mm below subgrade level. The subgrade surface should be shaped to promote water flow to the drainage lines.

5.0 Design and Construction Precautions

5.1 Foundation Drainage and Backfill

Perimeter Drainage System

A perimeter foundation drainage system is recommended for the proposed structure. The system should consist of a 150 mm diameter, geotextile-wrapped, perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 19 mm clear crushed stone, placed at the footing level around the exterior perimeter of the structure. The pipe should have a positive outlet, such as a gravity connection to the storm sewer. A waterproofing system should be provided to the basement level for the proposed buildings, if applicable, and elevator pit (pit bottom and walls).

Underfloor Drainage

It is anticipated that underfloor drainage will be required to control water infiltration below the basement level, if applicable. The spacing of the underfloor drainage system should be confirmed at the time of completing the excavation when water infiltration can be better assessed. It is typically recommended that a 150 mm diameter geotextile-wrapped, perforated corrugated plastic pipe, surrounded on all sides by 150 mm of 10 mm clear crushed stone be placed within each bay. The drainage pipe should direct water to the sump pit(s) within the lower basement area.

Foundation Backfill

Where space is available, 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 composite drainage system, such as Delta Drain 6000 or an approved equivalent. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should otherwise be used for this purpose.

5.2 Protection of Footings Against Frost Action

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

Exterior unheated footings, such as those for isolated piers, are more prone to deleterious movement associated with frost action than the exterior walls of the structure proper and require additional protection. The recommended minimum thickness of soil cover is 2.1 m (or equivalent).

5.3 Excavation Side Slopes

The side slopes of 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 anticipated that sufficien room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations).

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

Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept at least 4 to 6 m away from the excavation face depending on the excavation depth and soil consistency.

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

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

Unsupported Excavation

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. The subsurface soil is considered to be mainly a Type 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects. Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

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

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

5.4 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 sewer and water pipes should consist of at least 150 mm of OPSS Granular A material. Where the bedding is located within the grey silty clay, the thickness of the bedding material should be increased to a minimum of 300 mm. The material should be placed in maximum 300 mm thick lifts and compacted to a minimum of 95% of its SPMDD. The bedding material should 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 300 mm thick loose lifts and compacted to a minimum of 95% of its SPMDD.

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

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

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

5.5 Groundwater Control

Groundwater Control for Building Construction

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

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

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

Long-term Groundwater Control

Our recommendations for the proposed building's long-term groundwater control are presented in Subsection 5.1. Any groundwater which encounters the building's perimeter groundwater infiltration control system will be directed to the proposed building's sump pit. It is expected that groundwater flow will be low (i.e. less than 10,000 L/day with peak periods noted after rain events. It is anticipated that the groundwater flow will be controllable using conventional open sumps.

Impacts on Neighbouring Structures

Based on the existing groundwater level and low permeability of the adjacent soils, the extent of any significant groundwater lowering will take place within a limited range of the proposed building. Based on the proximity of neighbouring buildings and minimal zone impacted by the groundwater lowering, the proposed development will not negatively impact the neighbouring structures.

It should be noted that no issues are expected with respect to groundwater lowering that would cause long term damage to adjacent structures surrounding the proposed building.

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

Trench excavations and pavement construction are also difficult activities to complete during freezing conditions without introducing frost 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.

6.0 Recommendations

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

- ❑ Complete a site specific geotechnical investigation
- ❑ A review of the site grading plan(s) from a geotechnical perspective, once available.
- ❑ Observation of all bearing surfaces prior to the placement of concrete.
- ❑ A review of the groundwater control system and waterproofing design.
- ❑ Sampling and testing of the concrete and fill materials used.
- ❑ 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.
- ❑ Field density tests to determine the level of compaction achieved.
- ❑ Sampling and testing of the bituminous concrete including mix design reviews.

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

7.0 Statement of Limitations

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

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

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

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Dolyn Construction Ltd. and Dolyn Developments Inc. or their agent(s) is not authorized without review by Paterson Group for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

LICENSED PROFESSIONAL ENGINEER
April 30-2021
D. J. GILBERT
100116130
PROVINCE OF ONTARIO

Owen Canton, E.I.T.

David J. Gilbert, P.Eng.

Report Distribution:

- ☐ Dolyn Construction Ltd. and Dolyn Developments Inc. (Digital copy)
- ☐ Paterson Group

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SOIL PROFILE AND TEST DATA SHEETS BY OTHERS

SYMBOLS AND TERMS

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
627 Kirkwood Avenue
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger

DATE December 6, 2019

FILE NO. PG5684

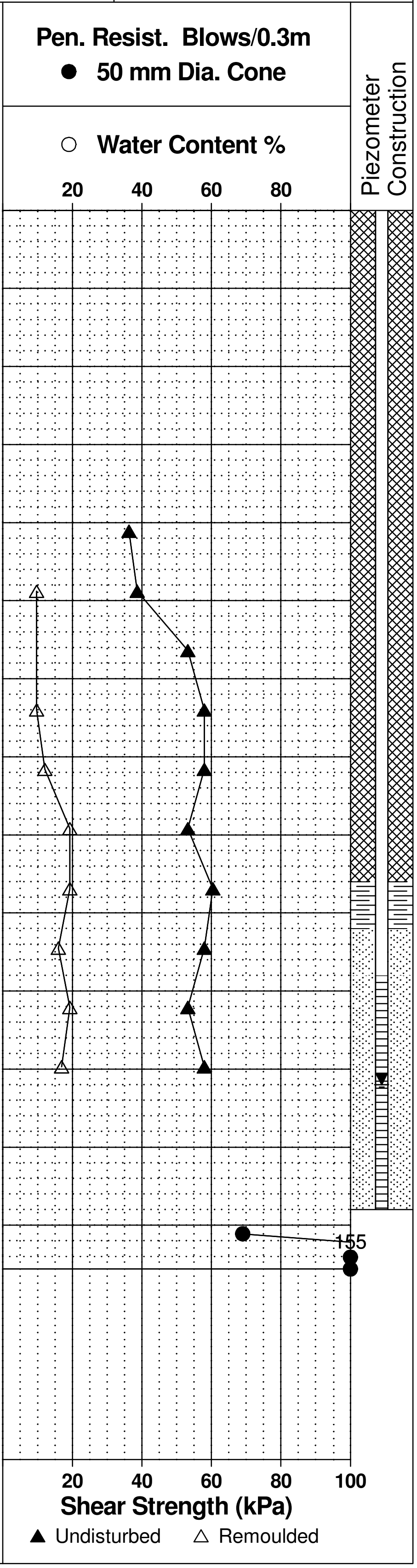
HOLE NO. BH 1

SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE					0	79.77
TOPSOIL 0.25	AU	1				
Loose, brown **SAND,** trace silt	SS	2	58	7	1	78.77
	SS	3	79	10	2	77.77
	SS	4	83	8		
3.05					3	76.77
Firm, brown **SILTY CLAY** 3.40	SS	5	96	1		
					4	75.77
					5	74.77
					6	73.77
Firm to stiff, grey **SILTY CLAY**					7	72.77
					8	71.77
					9	70.77
					10	69.77
					11	68.77
11.40						
GLACIAL TILL: Dense to compact, grey sandy silt with clay and gravel	SS	6	33	46		
					12	67.77
12.80	SS	7	75	14		
Dynamic Cone Penetration Test commenced at 12.80m depth. 13.56					13	66.77
Inferred **GLACIAL TILL**						

End of Borehole

Practical DCPT refusal at 13.56m depth

(GWL @ 11.20m - Dec. 11, 2019)



MONITORING WELL DRILLING RECORD : **BH19-1**

Page 1 of 1

Prepared by: **Genevieve Rancourt**
Reviewed by: **Adrian Menyhart**

Date (Start): **03/12/2019**
Date (End): **17/07/2019**

Project Name:	**Glenview Homes**
Site:	**Glenview Homes - 627 Kirkwood**
Sector:	**Ottawa**
Client:	**Glenview Homes**
Project Number:	**191-13873-00**
Geographic Coordinates:	X = W Y = N
Surface Elevation:	Not measured
Plunge / Azimuth:	

Drilling Company:	Strata Soil
Drilling Equipment:	Géoprobe 7822DT
Drilling Method:	Automatic Drop Hammer / HQ Casing
Borehole Diameter:	50 mm
Drilling Fluid:	N/A

WELL DETAILS
COPING Elevation :
SCREEN Bottom Depth :
Length :
Opening :
WATER Elevation:
WATER Date:
⊻ Water Level ▼ Free Phase

SAMPLE TYPE
DC - Diamond Core
SS - Split Spoon
PS - Piston Sample
TC - Hollow Tube
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TT - DT-32 Liner

ANALYSIS
AL - Atterberg Limits
GSA - Grain Size Analysis
PENTEST - Blow Counts/300mm
PL - Point Load Test
Sg - Specific Gravity
SPT - N Value (Blow Counts/300mm)
UCS - Uniaxial Compressive Strength
w - Moisture Content
wL - Liquidity Limit
wP - Plasticity Limit

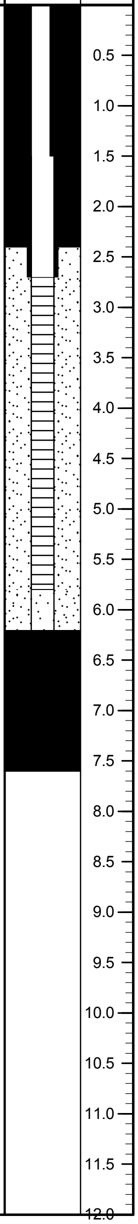
SAMPLE STATE
▨ Undisturbed
☒ Remoulded
■ Lost
◧ Cored

GEOTECHNICAL: R □ Shear (kPa) I ■ 30 60 90 120; SPT=N Value ▲; PENTEST △; RQD (%) ⊙; PLASTIC LIMIT w (%) ● LIQUID; 20 40 60 80

DEPTH ELEVATION (m)	DESCRIPTION
	Ground surface.
0.00 – 3.05	Silty sand, brown, loose, humid black staining at 1.77 m , hydrocarbon odour
3.05 – 4.57	Clay trace of silty sand, grey soft, humid
4.57 – 10.50	Clay, grey, soft, wet
10.50 – 11.27	Silty clay with trace of gravel, grey, loose, saturated
11.27	End of borehole at 11.30 m.

TYPE & NO.	STATE	% RECOVERY (RQD)	Blows Counts/6"	(N Value = SPT)
SS-1		82	5 2 2 2	(4)
SS-2		28	0 1 1 1	(2)
SS-3		77	1 0 0 0	(0)
SS-4		78	1 2 2 4	(4)
SS-5		100	0 0 0 0	(0)
SS-6		100	0 0 0 0	(0)
SS-7		100	0 0 0 0	(0)
SS-8		100	0 0 0 0	(0)
SS-9		100	0 0 0 0	(0)
SS-10		100	0 0 0 0	(0)
SS-11		100	0 0 0 0	(0)
SS-12		100	0 0 0 0	(0)
SS-13		100	0 0 0 0	(0)
SS-14		100	0 0 0 0	(0)
SS-15		100	0 0 0 0	(0)

WELL DIAGRAM



MONITORING WELL DRILLING RECORD : **BH19-2**

Page 1 of 1

Prepared by: **Genevieve Rancourt**
Reviewed by: **Adrian Menyhart**

Date (Start): **03/12/2019**
Date (End): **17/07/2019**

Project Name: **Glenview Homes**
Site: **Glenview Homes - 627 Kirkwood**
Sector: **Ottawa**
Client: **Glenview Homes**

Project Number: **191-13873-00**
Geographic Coordinates: X = W
Y = N
Surface Elevation: Not measured
Plunge / Azimuth:

Drilling Company: Strata Soil
Drilling Equipment: Géoprobe 7822DT
Drilling Method: Automatic Drop Hammer / HQ Casing
Borehole Diameter: 50 mm
Drilling Fluid: N/A

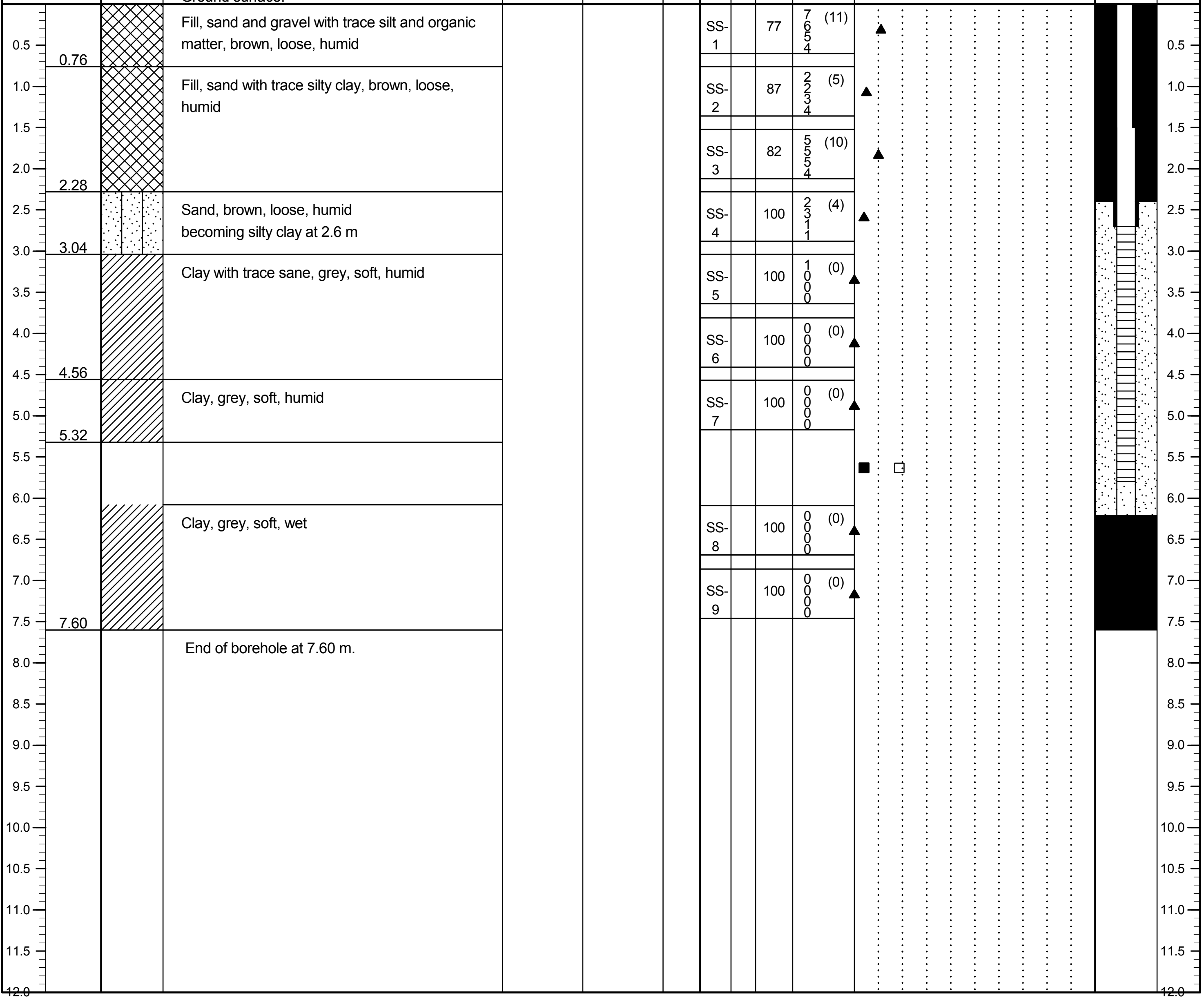
WELL DETAILS
COPING Elevation :
SCREEN Bottom Depth :
Length :
Opening :
WATER Elevation:
WATER Date:
⊻ Water Level ⊻ Free Phase

SAMPLE TYPE
DC - Diamond Core
SS - Split Spoon
PS - Piston Sample
TC - Hollow Tube
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TT - DT-32 Liner

ANALYSIS
AL - Atterberg Limits
GSA - Grain Size Analysis
PENTEST - Blow Counts/300mm
PL - Point Load Test
Sg - Specific Gravity
SPT - N Value (Blow Counts/300mm)
UCS - Uniaxial Compressive Strength
w - Moisture Content
wL - Liquidity Limit
wP - Plasticity Limit

SAMPLE STATE
▨ Undisturbed
☒ Remodulled
■ Lost
◧ Cored

DEPTH ELEVATION (m)	STRATIGRAPHY	DESCRIPTION	NUMBER	LABORATORY TESTING	DUPLICATE	TYPE & NO.	STATE	% RECOVERY (RQD)	Blows Counts/6" (N Value = SPT)
		Ground surface.							
0.76	▩	Fill, sand and gravel with trace silt and organic matter, brown, loose, humid				SS-1		77	7 6 5 4 (11)
2.28	▩	Fill, sand with trace silty clay, brown, loose, humid				SS-2		87	2 2 3 4 (5)
						SS-3		82	5 5 5 4 (10)
3.04	⁘	Sand, brown, loose, humid becoming silty clay at 2.6 m				SS-4		100	2 3 1 1 (4)
4.56	▨	Clay with trace sane, grey, soft, humid				SS-5		100	1 0 0 0 (0)
						SS-6		100	0 0 0 0 (0)
5.32	▨	Clay, grey, soft, humid				SS-7		100	0 0 0 0 (0)
7.60	▨	Clay, grey, soft, wet				SS-8		100	0 0 0 0 (0)
						SS-9		100	0 0 0 0 (0)
		End of borehole at 7.60 m.							



Projet : GLENVIEW - 191-13873-00_12112019.GPJ Type rapport : WSP_EN_WELL-GEOTECHNICAL ONLY Data Template : WSP_TEMPLATE_GEOTECH.GDT 11/12/2019

MONITORING WELL DRILLING RECORD : **BH19-3**

Page 1 of 1

Prepared by: **Genevieve Rancourt**
Reviewed by: **Adrian Menyhart**

Date (Start): **03/12/2019**
Date (End): **17/07/2019**

Project Name: **Glenview Homes**
Site: **Glenview Homes - 627 Kirkwood**
Sector: **Ottawa**
Client: **Glenview Homes**

Project Number: **191-13873-00**
Geographic Coordinates: X = W
Y = N
Surface Elevation: Not measured
Plunge / Azimuth:

Drilling Company: Strata Soil
Drilling Equipment: Géoprobe 7822DT
Drilling Method: Automatic Drop Hammer / HQ Casing
Borehole Diameter: 50 mm
Drilling Fluid: N/A

WELL DETAILS
COPING Elevation :
SCREEN Bottom Depth :
Length :
Opening :
WATER Elevation:
WATER Date:
▽ Water Level ▼ Free Phase

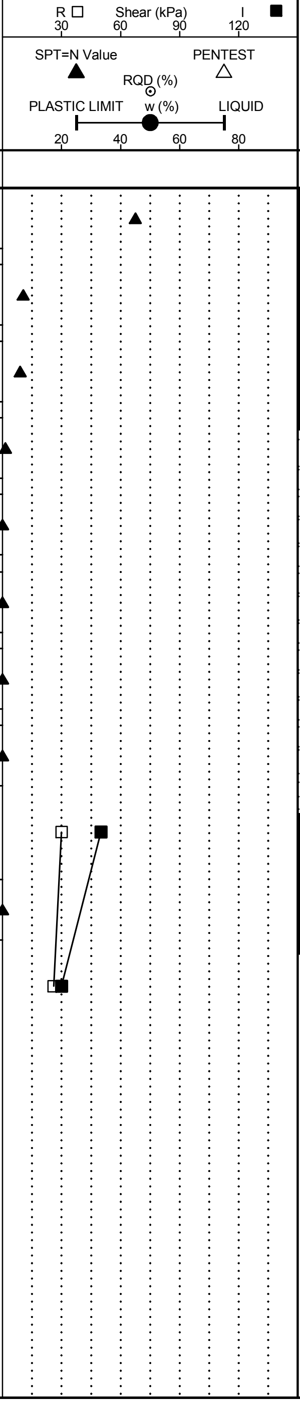
SAMPLE TYPE
DC - Diamond Core
SS - Split Spoon
PS - Piston Sample
TC - Hollow Tube
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
TT - DT-32 Liner

ANALYSIS
AL - Atterberg Limits
GSA - Grain Size Analysis
PENTEST - Blow Counts/300mm
PL - Point Load Test
Sg - Specific Gravity
SPT - N Value (Blow Counts/300mm)
UCS - Uniaxial Compressive Strength
w - Moisture Content
wL - Liquidity Limit
wP - Plasticity Limit

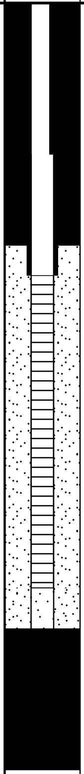
SAMPLE STATE
▨ Undisturbed
☒ Remoulded
■ Lost
◧ Cored

DEPTH ELEVATION (m)	DESCRIPTION	NUMBER	LABORATORY TESTING	DUPLICATE	TYPE & NO.	STATE	% RECOVERY (RQD)	Blows Counts/6" (N Value = SPT)
	Ground surface.							
0.76	Fill, Gravel and sand, brown, dense, humid				SS-1		77	35 35 10 8 (45)
1.50	Sand with trace silty gravel, brown, loose, humid				SS-2		93	3 3 4 5 (7)
2.29	Sand with some silty sand, brown, loose, humid				SS-3		74	3 3 3 5 (6)
3.02	Silty clay, brown-grey, soft, humid				SS-4		100	0 1 0 0 (1)
					SS-5		100	0 0 0 0 (0)
					SS-6		100	0 0 0 0 (0)
7.60	Clay, grey, soft, humid				SS-7		100	0 0 0 0 (0)
					SS-8		100	0 0 0 0 (0)
					SS-9		100	0 0 0 0 (0)
	End of borehole at 7.60 m.							

GEOTECHNICAL



WELL



DRILLING RECORD : **BH20-1**

Project Number: **201-10687-00**

637 Kirkwood Avenue, Ottawa, Ontario
Supplemental Soil Sampling
Dolyn Developments Inc.

DRILLING DETAILS

Date (Start):	2020-12-03
Date (End):	2020-12-03
Drilling Company:	Strata Drilling Group
Drilling Equipment:	Géoprobe 420M
Drilling Method:	Hydraulic drill
Borehole Diameter:	57.2 mm
Drilling Fluid:	N/A

SURVEY DETAILS

Easting:	441978.98 m
Northing:	5026175.81 m
Surface Elevation:	78.915 masl
Top of Well Elevation:	78.805 masl

ODOUR

L - Light
M - Medium
S - Strong

VISUAL

D - Dispersed with Product
S - Saturated with Product

SAMPLE TYPE

DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
DT - Dual Tube
MC - Macro Core
NR - No Recovery

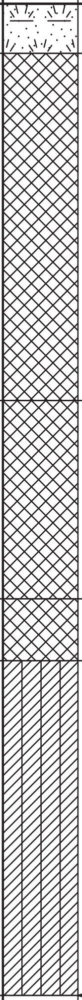
CHEMICAL ANALYSIS

Metals	Sb As Ba Be B Cd Cr Co Cu Pb Mo Ni Se Ag Tl U V Zn
Inorg.	Inorganic Compounds
PHC	Petroleum Hydrocarbons (F1-F4)
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
VOC	Volatile Organic Compounds
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
D/F	Dioxins & Furans
Phenol	Phenolic Compounds
GSA	Grain-size Analysis

LITHOLOGY / GEOLOGY

(m) DEPTH / *ELEVATION* (masl)	DESCRIPTION
78.92	
0.30 *78.61*	**TOPSOIL** : Approximately 0.15 meters of leaf litter over 0.15 m of Silty Sand some organics/roots, dark brown, damp (TOPSOIL) **FILL** : Silty Sand, trace organics, dark brown to brown, dry to damp (FILL)
2.44 *76.48*	**FILL** : Silt and Sand, trace Clay, grey and brown, some orange staining, damp to moist (FILL)
3.66 *75.26*	**FILL** : Sand some Silt, brown, moist to wet (FILL)
4.04 *74.88*	**SILT AND CLAY**: Silt and Clay, bluish grey, wet
6.10	*END OF BOREHOLE*

77.06

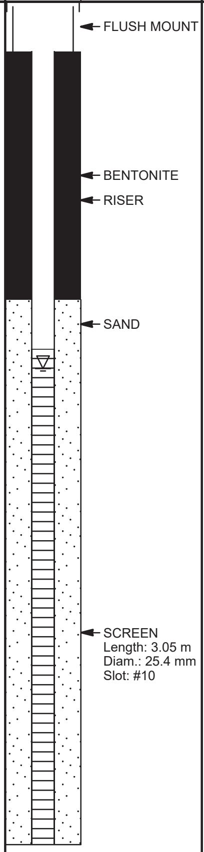


Notes:
1. Borehole terminated at approximately 6.1 meters in depth
2. Borehole instrumented with monitoring well

OBSERVATIONS / SAMPLES

PID / *CGD* (ppm)	ODOUR (L M S)	VISUAL (D S)	SAMPLE TYPE & No.	% RECOVERY	N (Blow/15cm)	CHEMICAL ANALYSIS	DUPLICATE
0 / *0*			MC1	36%			
0 / *0*			MC2A	100%			
0 / *2*			MC2B	100%			
10 / *0*			MC3	31%		PHC PAH	
10 / *0*			MC4A	100%			
0 / *0*			MC4B	73%		PHC PAH	
0 / *0*			MC5A	100%			
0 / *2*			MC5B	100%			

MONITORING WELL



WATER MARKER
Depth : 2.27 m
Elev. : 76.645 m
Date : 2020-12-04

REMARKS

Depth scale (m): 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0

Prepared by: S. Wheeler
Reviewed by:

DRILLING RECORD : **BH20-2**

Project Number: **201-10687-00**

637 Kirkwood Avenue, Ottawa, Ontario
Supplemental Soil Sampling
Dolyn Developments Inc.

DRILLING DETAILS

Date (Start):	2020-12-03
Date (End):	2020-12-03
Drilling Company:	Strata Drilling Group
Drilling Equipment:	Géoprobe 420M
Drilling Method:	Hydraulic drill
Borehole Diameter:	57.2 mm
Drilling Fluid:	N/A

SURVEY DETAILS

Easting:	441983.54 m
Northing:	5026177.11 m
Surface Elevation:	78.87 masl
Top of Well Elevation:	78.77 masl

ODOUR

L - Light
M - Medium
S - Strong

VISUAL

D - Dispersed with Product
S - Saturated with Product

SAMPLE TYPE

DC - Diamond Corer
SS - Split Spoon
MA - Manual Auger
TR - Trowel
ST - Shelby Tube
DT - Dual Tube
MC - Macro Core
NR - No Recovery

CHEMICAL ANALYSIS

Metals	Sb As Ba Be B Cd Cr Co Cu Pb Mo Ni Se Ag Tl U V Zn
Inorg.	Inorganic Compounds
PHC	Petroleum Hydrocarbons (F1-F4)
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
VOC	Volatile Organic Compounds
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
D/F	Dioxins & Furans
Phenol	Phenolic Compounds
GSA	Grain-size Analysis

LITHOLOGY / GEOLOGY

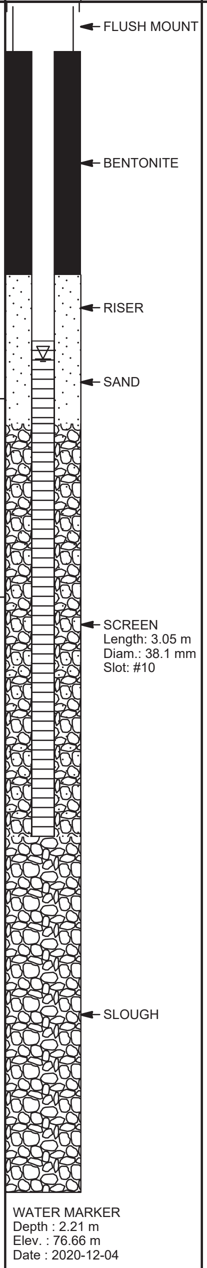
(m) DEPTH / *ELEVATION* (masl)	DESCRIPTION
78.87	**TOPSOIL**: Approximately 0.15 meters of leaf litter over 0.15 m of Silty Sand some organics/roots, dark brown, damp (TOPSOIL)
0.30 / *78.57*	**FILL** : Sand some Silt, trace organics, brown, damp (FILL)
1.83 / *77.04*	**SILTY SAND**: Silty Sand, brown, moist to wet
76.64	
4.27 / *74.60*	**SILT AND SAND**: Silt and Sand some Clay, grey, wet
4.88 / *73.99*	**SAND SOME SILT**: Sand some Silt, brown, wet
6.91 / *71.96*	**SILTY CLAY**: Silty Clay, grey, wet
7.32	*END OF BOREHOLE*

Notes:
1. Borehole terminated at approximately 7.3 meters in depth
2. Borehole instrumented with monitoring well

OBSERVATIONS / SAMPLES

PID / *CGD* (ppm)	ODOUR (L M S)	VISUAL (D S)	SAMPLE TYPE & No.	% RECOVERY	N (Blow/15cm)	CHEMICAL ANALYSIS	DUPLICATE
0 / *0*			MC1	53%			
5 / *0*			MC2A	71%			
0 / *0*			MC2B	71%			
220 / *0*			MC3	29%		PHC BTEX PAH	BH20-DUP
0 / *0*			MC4	29%			
10 / *0*			MC5	13%		PHC PAH	
0 / *0*			MC6A	67%			
0 / *0*			MC6B	67%			

MONITORING WELL



REMARKS

Prepared by: S. Wheeler
Reviewed by:

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

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

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

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

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

CONSOLIDATION TEST

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

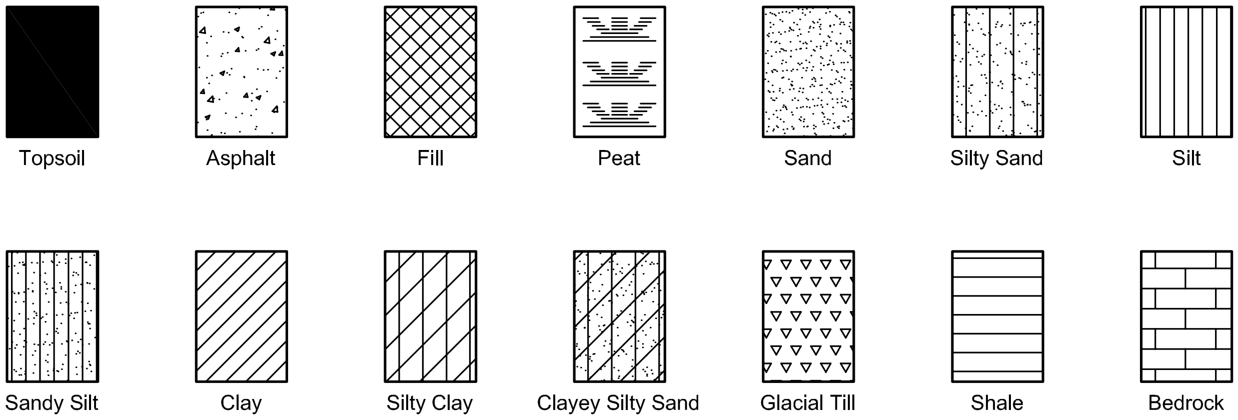
OC Ratio Overconsolidaton ratio = p'_c / p'_o
Void Ratio Initial sample void ratio = volume of voids / volume of solids
Wo - Initial water content (at start of consolidation test)

PERMEABILITY TEST

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

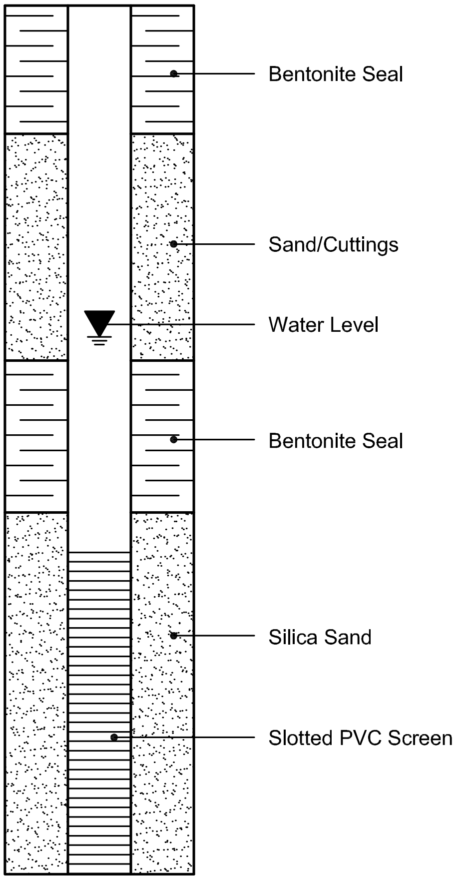
SYMBOLS AND TERMS (continued)

STRATA PLOT

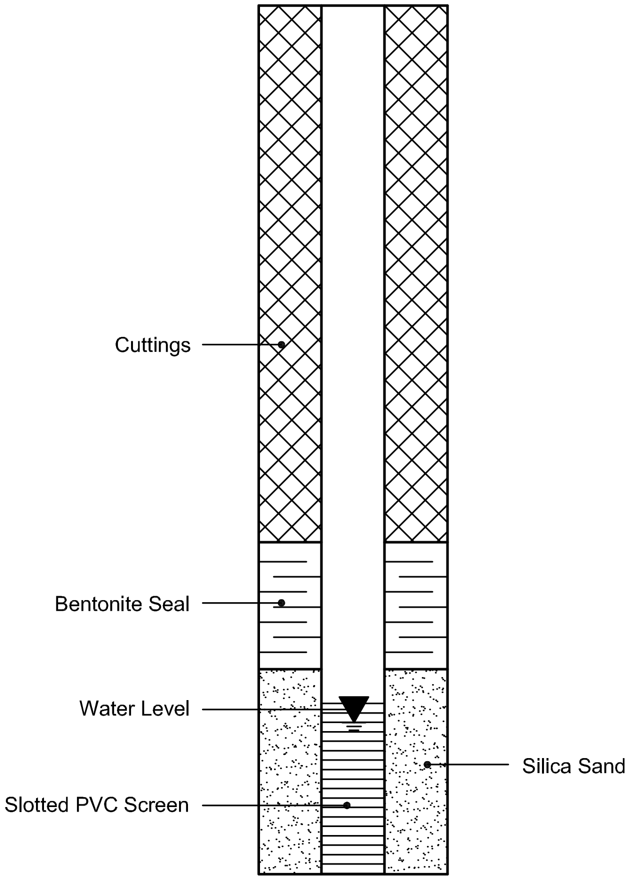


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



APPENDIX 2

FIGURE 1 - KEY PLAN

DRAWING PG5684-1 - TEST HOLE LOCATION PLAN

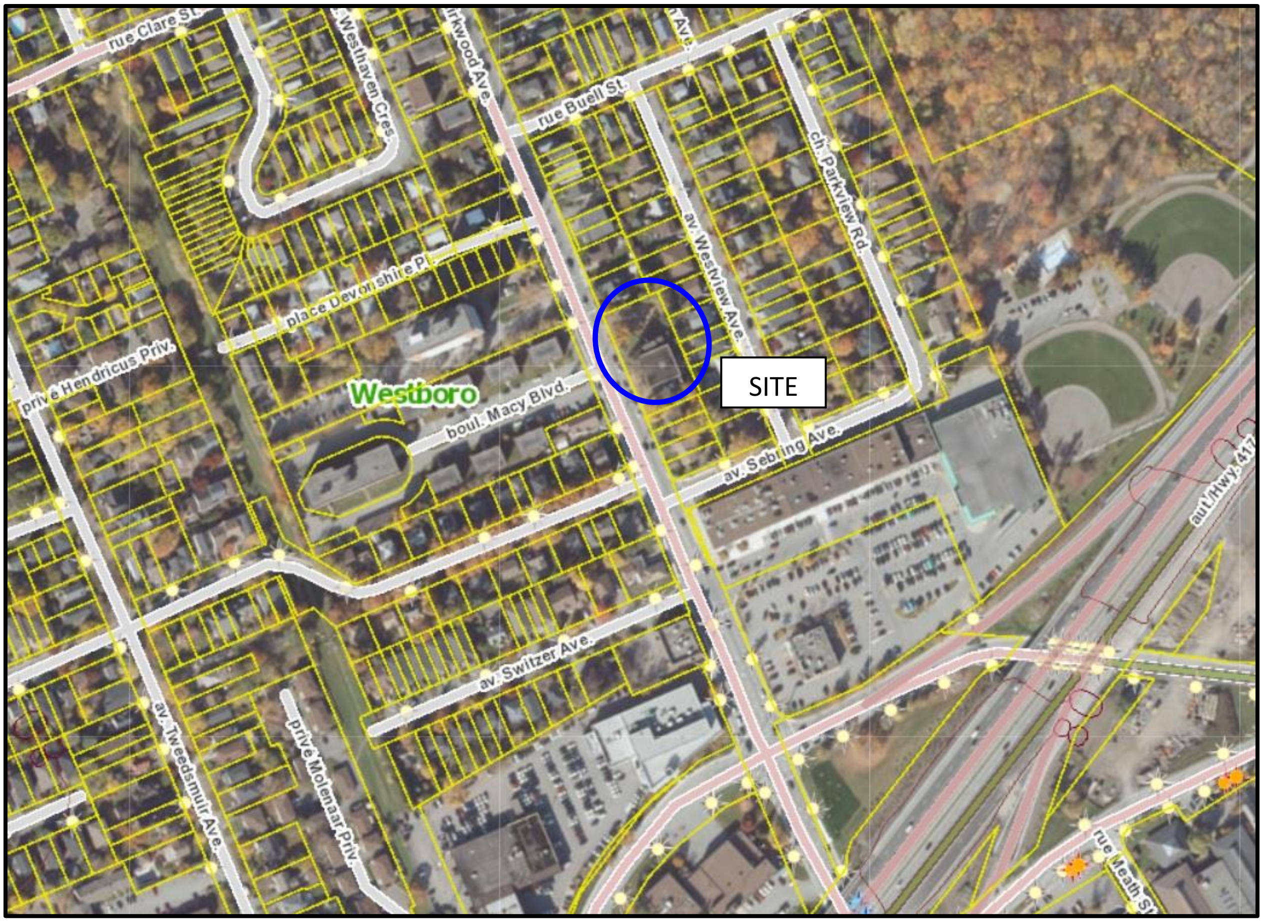
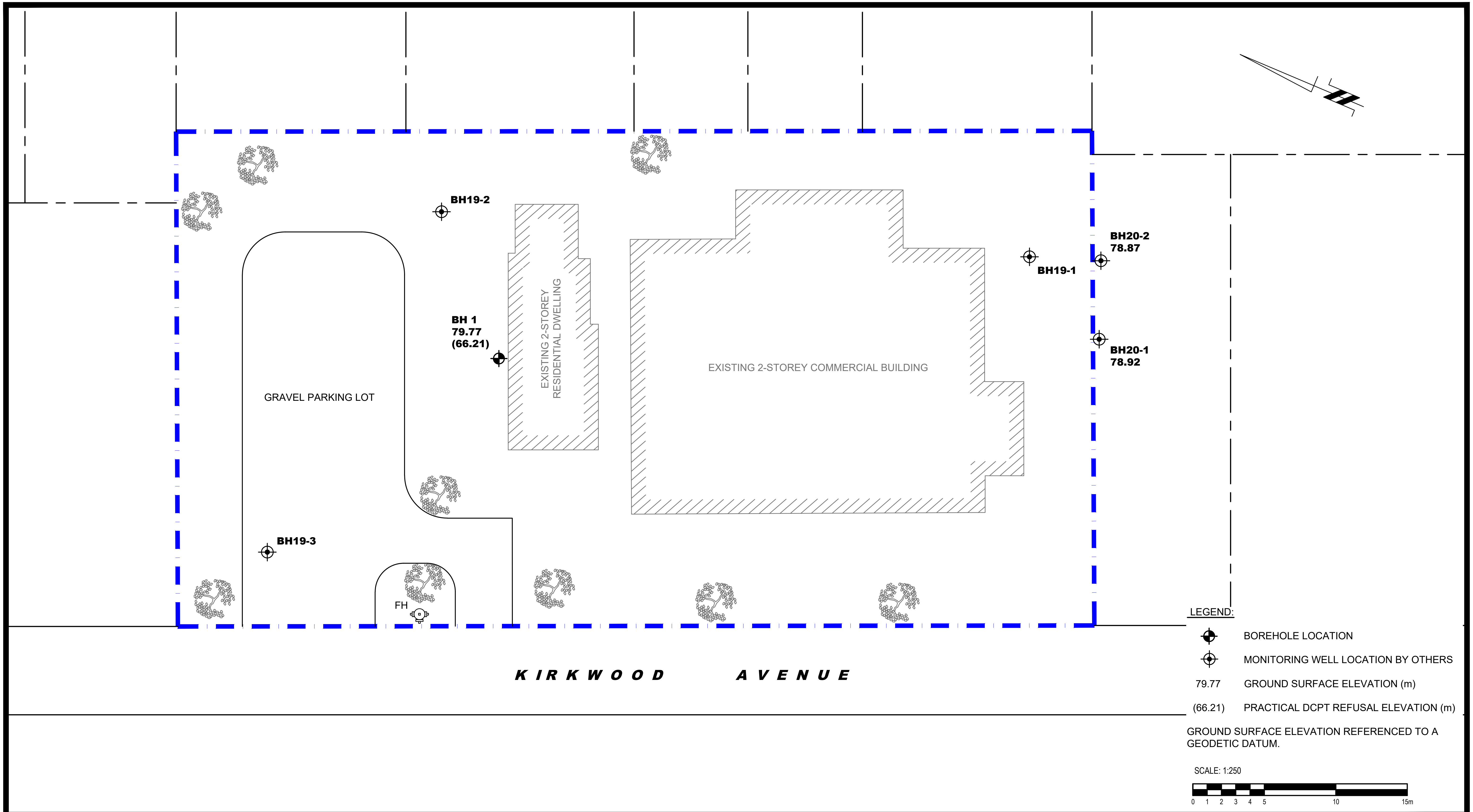


FIGURE 1

KEY PLAN



LEGEND:

●	BOREHOLE LOCATION
⊕	MONITORING WELL LOCATION BY OTHERS
79.77	GROUND SURFACE ELEVATION (m)
(66.21)	PRACTICAL DCPT REFUSAL ELEVATION (m)

GROUND SURFACE ELEVATION REFERENCED TO A GEODETIC DATUM.

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL

DOLYN DEVELOPMENTS INC.

GEOTECHNICAL INVESTIGATION
627 KIRKWOOD AVENUE

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:250
Date: 04/2021
Drawn by: MPG
Report No.: PG5684-1
Checked by: OC
Dwg. No.: **PG5684-1**
Approved by: DJG
Revision No.:

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