

Conseil des écoles catholiques du Centre-Est (CECCE)

Geotechnical Investigation

Type of Document Final

Project Name Proposed Addition to New Horizon Jeunesse School 349 Olmstead Street, Ottawa, Ontario

Project Number OTT-00231875-A0

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Date Submitted May 18, 2016

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Executive Summary

Exp Services Inc. (**exp**) is pleased to present the results of the geotechnical investigation completed at the site of the existing New Horizon Jeunesse school situated at 349 Olmstead Street in the City of Ottawa, Ontario. Written authorization to proceed with this work was provided by the Conseil des écoles catholiques du Centre-Est in a letter dated February 29, 2015.

Our current understanding of the proposed school re-development is as per Edward J. Cuhaci and Associates Architects Site Plan A003A dated October 2015. Based on this site plan, it is proposed to demolish the two storey portion of the existing school (northern part) and to construct a new two-story addition on the west side of the remaining one storey school building. In addition, construction of a new bus drop loop and a new surface parking facility, extension of the existing surface parking lot, addition of portables and reconfiguration of the playgrounds are also proposed as part of the proposed school redevelopment. It is understood that the floor slab of the new addition will match the floor slab of the one-storey building of 64.91 m.

The fieldwork for this investigation was carried between March 10 and 18, 2016 and comprised the drilling of ten (10) boreholes and the excavation of eleven (11) test pits throughout the site at locations selected by the design team to depths ranging between 1.5 m and 7.5 m. Four of the test pits were excavated along the west building line in order to establish the depth and configuration of the footings of the existing school building to remain.

The borehole/test pits revealed the subsurface soil conditions to comprise of topsoil/asphalt underlain by fill at localized areas, fine silty sand to sand-silt overlain by silty sand to sandy silt shaley till. The till is loose to dense and underlain by shale bedrock contacted at depths of 3.7 to 4.3 m below the existing ground surface. The groundwater table at the site was established at depths of 3.5 to 4.0 m below the existing ground surface, i.e. Elevation 60.5 to 60.9 m.

Based on available information and proposed floor slab of the addition, it is concluded that the grades at the site will not be raised significantly. The geotechnical conditions at the site are considered suitable to found the proposed single-storey building addition on spread and strip footings set on engineered fill or on the compact to dense glacial as per the recommendation stated in this report. Footings founded on the engineered fill or compact to dense glacial till below any loose layers or seams may be designed for Serviceability Limit State (SLS) bearing pressure of 150 kPa and factored geotechnical resistance at Ultimate Limit State (ULS) of 225 kPa. Special considerations should be taken in areas close to the existing footings as per the recommendations stated in the report. Settlements of the footings designed according to the recommendations of this report and properly constructed are expected to be within the normally tolerated limits of 25 mm total and 19 mm differential movements.

The lowest level floor of the proposed structure may be constructed as a slab-on-grade provided it is set on the natural undisturbed soils or on engineered fill. Treatment of the on-site sand under the floor by recompaction should be completed as per the recommendations stated in Section 11.0. Perimeter and



underfloor drainage systems will not be required. The finished floor slab should be set at least 150 mm higher than the finished exterior grade.

Excavations for the construction of the building footings are anticipated to extend up to 2.0 m to 3.0 m depth below the existing ground surface and will be above or slightly below the groundwater level. Depth of excavation required for site services is not currently available. The excavation for the footings may be conducted as open cut provided they meet the requirements of the current Ontario Occupational Health and Safety Act 213/91 (OHSA). The on-site soils above the groundwater table are considered to be Type 3 soil and must be cut back at 1H:1V from the bottom of the excavation. In zones of concentrated seepage, the side slopes are expected to slough and will eventually stabilize at a slope of 2H:1V.

The soils to be excavated from the site will comprise of predominantly fill and silty sand. These soils are not considered suitable for backfilling purposes in the interior of the building but may be used as fill in the exterior of the building and foe general grading purposes provided that they are free of debris and their moisture content is maintained within +/- 2 percent of the optimum value. It is anticipated that the majority of the material required for backfilling purposes will need to be imported and should conform to the recommendations of this report.

The site has been classified as Class C for seismic design in accordance with 2012 Ontario Building Code. In addition, the on-site soils are not considered to be liquefiable in a seismic event.

Pavement structures for the proposed paved areas and recreational facilities are provided in Table 5 of the report.

Recommendations for the backfill of the areas of the building that will be demolished are provided in the main body of the report,

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



Legal Notification

This report was prepared by **exp** Services Inc. for the account of **Conseil des écoles catholiques du Centre-Est.**

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. **Exp** Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.



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1 Introduction

Exp Services Inc. (**exp**) is pleased to present the results of the geotechnical investigation recently completed for the New Horizon Jeunesse school to be situated at the existing school site located at 349 Olmstead Street in the City of Ottawa, Ontario (Figure 1). Written authorization to proceed with this work was provided by the Conseil des écoles catholiques du Centre-Est in a letter dated February 29, 2016.

Our current understanding of the proposed school re-development is as per Edward J. Cuhaci and Associates Architects Site Plan A003A dated October 2015. Based on the site plan, it is proposed to demolish the two storey portion of the existing school (northern part) and to construct a new two-story slab on grade addition on the west side of the remaining one storey school building. In addition, construction of a new bus drop loop and a new surface parking facility, extension of the existing surface parking lot, addition of portables and reconfiguration of the playgrounds are also proposed as part of the school redevelopment.

Final design grades for the proposed school building and facilities were not available at the time of preparation of this report. However, it is anticipated that the new addition will match the floor slab of the existing school (Elevation 64.91 m) and significant grade changes are not anticipated as part of the proposed construction/redevelopment.

This geotechnical investigation was undertaken to:

- (a) Assess the subsurface soil and groundwater conditions at the location of the boreholes and test pits;
- (b) Establish the footing depth and founding material of the existing school building portion to remain;
- (c) Provide comments and recommendations regarding foundation type, founding depth, bearing pressures and factored geotechnical resistances in limit states design of the founding soils for the proposed school addition and comment on anticipated total and differential settlements of the proposed foundations;
- (d) Discuss site grade raise restrictions;
- (e) Classify the site for seismic site response in accordance with the 2012 Ontario Building Code and discuss liquefaction potential of subsurface soils;
- (f) Comment on slab-on-grade construction and requirement for underfloor and perimeter drainage systems;
- (g) Provide pipe bedding requirements for underground services;
- (h) Discuss excavation conditions and de-watering requirements during construction;
- (i) Comment on backfilling requirements and the suitability of the on-site soils for backfilling purposes;
- (j) Provide recommendation for the re-instatement of the area of the site where the existing school building will be demolished;



- (k) Recommend pavement structure for the proposed light and heavy duty traffic areas and for the playground; and
- (I) Comment on subsurface concrete requirements.

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



2 Background Information

2.1 Available Structural Plans

A review of available structural plans dating back to 1965 revealed the existing school is founded on strip/spread footings at a depth of 2.0 m to 2.5 m below the existing ground surface. An addition to a music room in 1968 necessitated underpinning and founding the footings at lower levels to accommodate a basement. It is recommended that the designers review the available structural plans, which indicate that the existing building is founded on a combination of strip and spread footings at variable depths.

2.2 **Previous Geotechnical Reports**

A preliminary geotechnical report completed by **exp** in May 2015 and presented under Report OTT-00226176-A0 was reviewed. The investigation comprised the drilling of three boreholes numbered as 2015-BH1, 2015 BH2 and 2015 BH3 at the site to depths ranging between 4.4 m and 7.2 m.

A review of the results of the preliminary investigation revealed the site to be underlain by 2.0 m to 2.1 m of fine to medium sand to granular fill. This stratum is underlain by a layer of loose silty sand, which extends to 2.6 m depth. The fill and/or silty sand in all the boreholes is underlain by loose to dense sand and gravel till, which extends to 3.8 m to 4.6 m depth. The till is underlain by very poor to poor shale bedrock of the billings formation. The unit weight and unconfined compressive strength of intact rock cores sample tested varied from 2412 to 2590 kg/m³ and 53.0 MPa to 66.9 MPa respectively. The groundwater table at the site was measured at a depth of 3.5 m below the existing ground surface.

Logs of relevant boreholes drilled as part of this investigation are included in Appendix A.



3 Site Description

The subject site is the existing Horizon Jeunesse School situated at 349 Olmstead Avenue in the east end of the City of Ottawa, Ontario (Figure 1). The site measures approximately 5.62 hectares (13.9 acres) and is occupied by a two storey slab on grade school building that was initially constructed in 1949 and has undergone several expansions between 1965 and 1975. There are two separate partial basement areas within the school that are used for mechanical systems and storage.

The school site is bounded by Jeanne Mance Street to the north, McArthur Avenue to the south, residential development to the east and by Olmstead Avenue to the west

Surface parking facility, playgrounds and running tracks are situated on the east side of the school building. The bus loop drop-off is currently situated on the west side of the school.

The topography of the site is relatively flat with ground surface elevations at the location of the borehole and test pits ranging between Elevation 64.82 m and 63.21 m.



4 **Procedure**

The fieldwork for this investigation was carried out between March 15 and March 18, 2016 and comprised the drilling of ten (10) boreholes and the excavation of eleven (11) test pits throughout the site. Four of the test pits were excavated along the west wall of the existing building.

The locations and elevations of the test pits and boreholes were established in the field by a survey crew of **exp** and are presented in Figure 2.

The boreholes were drilled to the specified depths or to refusal to augers ranging between 1.8 m and 4.3 m (Borehole Nos. 1 to 10). In addition, Borehole Nos. 1 and 6 were cased and advanced further beyond the refusal depth into the bedrock using washboring and core drilling techniques to depths of 7.05 m to 7.5 m respectively. The test pits along the building line (Test Pit Nos. 1 to 4) were each excavated to the underside of the existing footings, i.e. 1.5 m to 2.1 m whereas the remaining test pits (Test Pit Nos. 5 to 11) were excavated to depths ranging between 1.25 m to 2.60 m.

The boreholes were undertaken with CME-55 track/truck mounted drill rigs. Standard penetration tests were performed in all the boreholes at 0.75 m and 1.5 m depth intervals, with soil samples retrieved by the split barrel sampler. The bedrock was core drilled using NQ core barrel. Standpipes were installed in Borehole Nos. 2, 3 and 6 for long term monitoring of the groundwater level. All the boreholes were backfilled on completion of the fieldwork.

The test pits were excavated using a rubber-tired backhoe. The test pits were logged. Grab samples were collected from selected depths in some of the test pits. Upon completion of the excavation, all test pits were backfilled and the backfill nominally packed with the backhoe bucket. The test pits excavated in the asphalt area were re-instated by a specialized contractor.

All the soil samples were visually examined in the field, logged, preserved in plastic bags and identified. Similarly, the rock cores were logged and stored in core boxes. On completion of the fieldwork, all the soil and rock samples were transported to the **exp** laboratory in Ottawa where they were examined by a geotechnical engineer. The engineer also assigned the laboratory testing, which consisted of performing the following tests:

| Natural Moisture Content (ASTM D2216-10) | 63 tests |
|---|----------|
| Unit Weight (ASTM D7263-09) | 13 tests |
| Grain-size Analyses (ASTM C1364 and D422) | 5 tests |
| pH, Sulphate, Chloride, Resistivity, and Conductivity | 2 tests |



5 Findings of Test Pits Along Existing School

A detailed description of the findings encountered in each of the four test pits excavated along the west line of the school building is presented in Table 1. Photographs of the test pits and summary of findings are also presented in Appendix B.

| Table 1: Summary of Findings in Test Pits along Building Line | | | | | | |
|---|--------------------------------|--|--|--|---|--|
| Test Pit No. and Location | Ground Surface Elev. (m) | Observations | Width of Exposed Footing (mm) | Thickness of exposed Footing (mm) | Elevation of Underside of Footing (m) | |
| TP-1 | 64.58 | Building is founded on strip footing at a depth of 1.2 m below the existing ground surface Existing footing is founded on compact Silty Sand | 140 | 300 | 63.38 | |
| TP-2 | 64.82 | Building is founded on spread footing at a depth of 1.50 m below the ground surface. Existing footing is founded on compact Silty Sand. | 125 | 200 | 63.32 | |
| TP-3 | 64.73 | Building is founded on strip footing (this portion with basement) at a depth of 2.20 m below the existing ground surface Existing footing is founded on compact Silty Sand glacial till | 140 | 650 | 62.53 | |
| TP4 64.70 Building is founded on strip footing at a depth of 1.45 m below the existing ground surface Existing footing is founded on compact Silty Sand. | | 200 | 200 | 63.25 | | |

The investigation has revealed that at the location of the test pits, the existing building is founded on strip and spread footings at depths ranging between 1.20 m and 2.20 m below the ground surface, i.e. Elevation 62.53 m to 63.38 m.

The designer should also review the available structural plans which show the existing building to be founded on combination of strip and spread footings at different depths. The test pits excavated along the



west building line revealed that at three of the locations investigated, the building is founded on strip footings set on a compact silty sand. At the fourth location, i.e. vicinity of the basement area, the building was founded on glacial till at a depth of 2.2. m below the ground surface. Based on these findings, the type of footing(s) and founding depth elsewhere along the west wall of the building is not known and should be investigated further prior to tendering.



6 Subsurface Soil and Groundwater Conditions

A detailed description of the subsurface soil and groundwater conditions encountered in the boreholes and test pits is given on the borehole and test pit logs, i.e. Figures 3 to 23. The borehole and test pits logs and related information depict subsurface conditions only at the specific locations and times indicated. Subsurface conditions and water levels at other locations may differ from conditions at the locations where sampling was conducted. The passage of time also may result in changes in the conditions interpreted to exist at the locations where sampling was conducted. Boreholes were drilled and test pits excavated to provide representation of subsurface conditions as part of a geotechnical exploration program and are not intended to provide evidence of potential environmental conditions.

It should be noted that the soil boundaries indicated on the borehole and test pit logs are inferred from noncontinuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. The "Notes on Sample Descriptions" preceding the logs forms an integral part of this report and should be read in conjunction with this report.

A review of the borehole and test pit logs indicates the following subsurface soil, bedrock and groundwater conditions.

6.1 Topsoil

A surficial topsoil layer ranging in thickness between 150 mm to 300 mm was encountered at all the test hole locations with the exception of Borehole No. 9 and Test Pit Nos. 5, 6, 7 and 11.

6.2 Asphalt

Asphaltic concrete ranging in thickness between 40 and 60 mm was contacted at the surface in Borehole No. 9 and in Test Pit Nos. 5, 6 and 7.

6.3 Granular Fill

Granular fill ranging in thickness between 200 mm to 260 mm was contacted below the asphaltic concrete in Borehole No. 9 and in Test Pit Nos. 5,6 and 7. In Test Pit No. 4, 500 mm of granular fill was encountered below the topsoil.

6.4 Fill

The pavement structure or topsoil in all the test holes with the exception of Borehole Nos. 4 and 5 is underlain by fill which extends to depths ranging between 0.5 m and 2.2 m below existing grade, Elevation 62.5 m to 63.8 m. The fill is heterogeneous in nature and varied from a silty sand to a gravelly sand with traces of clay and brick pieces. It is very loose to compact and has a natural moisture content ranging between 12 and 39 percent. Grain-size analysis completed on a soil sample from Borehole No. 8 and



shown on Figure No. 24 revealed a fill composition of 17 percent silt and clay, 43 percent sand and 40 percent gravel.

6.5 Silty Sand

Silty sand was encountered below the topsoil, fill or granular fill in all the test holes except in Borehole Nos, 6 to 9. The silty sand extends to the maximum depth investigated of 1.5 m to 2.1 in Borehole No. 10 and in Test Pit 1, 2 and 4, i.e. Elevation 62.2 m to 63.1 m and to depths ranging between 0.9 m and 2.4 m below the existing ground surface in the remaining test holes i.e. Elevation 61.6 m to 62.8 m The relative density of this deposit is very loose to compact, with SPT "N" values ranging between 3 and 12 blows for 300 mm penetration of the split spoon sampler. The sand is generally described as being fine grained, silty sand with some clay and trace gravel. This stratum has a moisture content ranging between 10 and 32 percent. Grain-size analysis completed on silty sand samples from Borehole Nos. 1 and 2 are shown on Figure Nos. 25 and 26. A review of these figures indicates a soil composition of 40 to 42 silt and clay, 50 to 60 percent sand and 0 to 8 percent gravel.

6.6 Glacial Till

The silty sand and /or fill is underlain by glacial till, which extends to the auger refusal depths of 3.7 m to 4.3 m, i.e. Elevation 60.0 to 60.8 m in Borehole Nos. 1 to 6 and to the maximum depth investigated of 1.2 m to 2.6 m, i.e. Elevation 61.3 m to 62.5 in the remaining testholes. The relative density of this deposit is compact to very dense, with SPT "N" values between 12 and 57 blows for 300 mm penetration of the split spoon sampler. Loose seams of the till were contacted in the upper levels of Borehole Nos. 2 and 5. The glacial till is generally described as a silty to gravelly sand with some shale fragments and traces of clay, and containing occasional cobbles and boulders. This stratum has a moisture content ranging between 6 and 25 percent. Grain-size analyses completed on glacial till samples retrieved from Borehole Nos. 1 and 3 indicated a soil composition of 22 to 27 percent silt and clay, 33 to 41 percent sand and 32 to 43 percent gravel. The grain-size distribution curves are shown on Figure Nos. 27 and 28.

6.7 Bedrock

Refusal to augers was contacted in Borehole Nos. 1 to 6 at depths ranging between 3.65 m and 4.3 m, i.e. Elevation 60.0 to 60.7 m. Borehole Nos. 1 and 6 were cased and advanced further into the bedrock using washboring and core drilling techniques to termination at depths of 7.50 m and 7.05 m respectively, i.e. Elevation 56.9 m and 57.4 m. Total Core Recovery (TCR) and Rock Quality Designation (RQD) of 100 percent and 13 to 52 percent respectively was obtained when core drilling the bedrock. On this basis, the bedrock quality within the depth investigated may be described as very poor quality (Photographs B5 and B6). The bedrock was also cored in one of the three boreholes (2015-BH-1) drilled by **exp** at the site in 2015 as shown in Appendix A.

Unit weight and unconfined compressive strength tests were performed on two intact rock cores. The tests results are presented on Table 2. Results of lab tests completed on rock samples from the 2015 investigation are also included in Table 2.



| Table 2: Unconfined Compressive Strength Tests on Rock Cores | | | | | | | |
|--|-------------|---------------------|---|--|--|--|--|
| Borehole No. | Depth (m) | Unit Weight (kg/m³) | Unconfined Compressive Strength (MPa) | | | | |
| 1 | 4.8 - 4.9 | 2350 | 59.1 | | | | |
| 3 | 4.4 - 4.5 | 2351 | 62.1 | | | | |
| 2015-1 | 4.2 - 4.32 | 2412 | 54.5 | | | | |
| 2015 -1 | 5.74 - 5.87 | 2532 | 66.9 | | | | |
| 2015 -1 | 6.66 - 6.84 | 2590 | 53.0 | | | | |

A review of Table 2 indicates that the unit weight of the bedrock varies from 2350 to 2590 kg/m³. Its unconfined compressive strength varies from 53.0 MPa to 66.9 MPa.

The bedrock underlying the site is described as highly fractured Shale bedrock of the Billings Formation, horizontally stratified, fissile to very thinly bedded and contains some near vertical joints. The Billings Shale is known to contain disseminated iron sulphide, which can be oxidized by autotrophic bacteria to produce secondary hydrous sulphates of greater volume. This type of oxidation is favoured by warm, drained, humid environment. The shale bedrock also weathers readily when exposed to the environment by parting along weakly bonded fissile bedding planes and disintegrates into debris.

Since the shale bedrock is prone to deterioration when exposed to the elements, it is recommended that in the event that shale bedrock excavation become necessary (not anticipated), a skim coat of concrete should be placed on top of the bedrock surface following excavation cleaning and approval.

6.8 Groundwater Conditions

Water level observations were made in the boreholes during drilling and in standpipes installed in the boreholes subsequent to completion of the drilling.

| Table 3: Groundwater Observations | | | | | | |
|-----------------------------------|---------------|----------------------------------|---------------|--|--|--|
| Borehole No. | Elapsed Time | Depth from Ground Surface (m) | Elevation (m) | | | |
| рц р | Completion | Dry | - | | | |
| BH 2 | April 6, 2016 | 4.0 | 60.5 | | | |
| DU 2 | Completion | Dry | - | | | |
| ВПЗ | April 6, 2016 | Blocked | - | | | |
| DUC | Completion | Dry | - | | | |
| ВП-0 | April 6, 2016 | 3.5 | 60.9 | | | |



A review of Table 3 indicates that the groundwater table at the site is at a depth of 3.5 to 4.0 m below the existing ground surface, i.e. Elevation 60.5 m to 60.9 m. It is considered that the groundwater table has not stabilized during the relatively short time interval over which the observations were made.

Water levels were determined in the boreholes at the times and under the conditions stated in the scope of services. Note that fluctuations in the level of groundwater may occur due to a seasonal variation such as precipitation, snowmelt, rainfall activities, and other factors not evident at the time of measurement and therefore may be at a higher level during wet weather periods.



7 Seismic Site Classification and Liquefaction Potential of On Site Soils

The subsurface soil and groundwater conditions at the site were reviewed in relation to Section 4.1.8.4 of the Ontario Building Code, 2012. Based on the geotechnical investigation, the subsurface conditions comprise of fill underlain by very loose to loose silty sand to a depth of 1.6 m to 2.4 m underlain by compact to dense silty to gravelly glacial till extending to auger refusal/bedrock depth of 3.7 m to 4.3 m. The groundwater table was encountered at 3.0 m to 4.0 m depth below the existing ground surface.

The standard penetration values (N) of the silty sand vary between 3 and 9 and those of glacial till vary between 12 and 57. The average shear-wave velocity value of the overburden and bedrock to 30 m below the proposed founding level was computed. For this purpose, the shear-wave velocity value of 360 to 760 m/s is assumed for bedrock. The shear-wave velocity (Vs) of the silty sand and silty to gravelly till can be correlated to the standard penetration values (SPT) using Seed et al. (1983) formula:

 $Vs(m/s) = 56.4 (N)^{0.5}$

An average shear-wave velocity to 30 m depth was computed based on the above assumptions as 395 m/s. On this basis, the site has been classified as Class C for seismic site response in accordance with Table 4.1.8.4 A of the Ontario Building Code, 2012. The on-site soils are not expected to be liquefiable during a seismic event.



8 Site Grade Raise Restrictions

The site contains surficial fill, which is underlain by silty sand, glacial till and shale bedrock. Clayey compressible soils were not encountered at the site. Based on the existing site topography and proposed development, significant grade raise is not anticipated at the subject site as part of the proposed development.

However, for design and compliance purposes, a maximum grade raise of 2 m may be used at the subject site.



9 Site Grading

Site grading within the footprint of the proposed building addition should consist of the excavation and removal of all topsoil and fill and unsuitable material as described in Section 10 from within the proposed building envelope. The exposed subgrade should be proofrolled in the presence of a geotechnical engineer. Any soft areas identified should be excavated and replaced with Ontario Provincial Standard Specification (MUNI.OPSS 1010) Granular B Type II compacted to 98 percent standard Proctor maximum dry density (SPMDD).

Following approval of the exposed subgrade, the grades may be raised to the founding level or to the underside of the floor slab, by the placement of engineered fill consisting of OPSS 1010 Granular B II compacted to 98 percent SPMDD.



10 Foundation Considerations

The geotechnical investigation has revealed that the subsurface condition in the area of the proposed addition, comprises of loose fill and silty sand, which extends to 1.6 m to 2.1 m depth, i.e. Elevation 62.8 m to 62.0 m. These soils are underlain by loose to dense till which extends to the surface of the shale bedrock contacted at depths of 3.7 to 4.3, i.e. Elevation 60.7 m to 60.2 m.

The floor slab of the proposed addition is expected to match the existing slab elevation of 64.91 m. The footings of the proposed addition without a basement are expected to be set at Elevation 63.41 m.

The existing fill and loose silty sand are not considered capable of supporting significant structural loads. In addition, the upper levels of the glacial till in some areas of the site is loose and also not considered suitable founding purposes. It is therefore considered that it would be necessary to remove all the loose soils identified from the underside of the proposed footings and to replace them with engineered fill as described below. The approximate depth and elevations of the required sub-excavation at each borehole location drilled within the proposed building addition is presented in Table 4 below:

| Table 4: Summary of Sub-Excavation Required for Addition | | | | | | |
|--|-----|---|--|--|--|--|
| Borehole No. Anticipated Sub- Excavation Depth (m) | | Anticipated Sub- Excavation Elevation (m) | Depth of Engineered Fill Required under Footings (m) | | | |
| 1 | 2.4 | 62.0 | 0.7 | | | |
| 2 | 2.5 | 62.0 | 0.7 | | | |
| 3 | 2.5 | 61.9 | 0.80 | | | |
| 4 | 2.0 | 62.2 | 0.50 | | | |
| 5 | 2.5 | 61.9 | 0.80 | | | |
| 6 | 2.0 | 62.5 | 0.20 | | | |

As indicated above, it is feasible to found the proposed building addition on spread and strip footings set on engineered fill, provided all the existing fill, silty sand and loose seams of glacial till are sub-excavated and replaced with engineered fill. The option would require undertaking excavation to a depth of 2.0 m to 2.5 m below the existing ground surface, compaction of the exposed subgrade and placement and compaction of the engineered fill to the founding level. The engineered fill should extend to a distance of 1.0 m beyond the edge of the footings and thereafter should be sloped at a gradient of 1H to 1V. The engineered fill should conform to OPSS 1010 for Granular B, Type II. It should be placed in maximum of 300 mm lift thicknesses and each lift compacted to 100 percent standard Proctor maximum dry density in accordance with AASTM 698-12e2 (SPMDD). The placement and compaction of the engineered fill can in this way be undertaken to the founding level and footings constructed. Confirmation of the degree of compaction of the engineered fill would be required by performing in-situ density tests on each lift. A



serviceability limit state (SLS) bearing pressure of 150 kPa is expected to be available when founding on engineered fill.

Close to the existing building, sub-excavation for removal of the loose material and replacement with engineered fill may not be feasible due to risk of damaging and/or undermining the existing footings. Therefore, close to the existing footings, the excavation should only extend to the underside of the existing footings; construction of the new footings may proceed as follows:

- In areas of shallow footings founded on the silty sand (strip footings), the footings of the proposed addition should be set at the same elevation as the existing footings for a distance of 2 to 3 m and designed for a lower SLS/ULS bearing pressure of 50 kPa to 75 kPa respectively. Beyond 3 m, excavation may be undertaken to remove the loose soils and to found on engineered fill, which is prepared and designed as per the recommendation stated above. Alternatively, the footings may be designed as cantilever along this section.
- In areas of deep footing set on the glacial till, the footings of the proposed addition should be set at the same elevation as the existing footings and designed for a lower SLS/ULS bearing pressure of 100 kPa respectively for a distance of 3 m beyond, which the footing may be placed on engineered fill which is prepared and designed as per the recommendation stated above.
- Review of the above recommendations should be completed once the structural designs are completed and the underside of the proposed footings are set.

Settlements of the footings constructed as above are expected to be within the normally tolerated limits of 25 mm total and 19 mm differential movements.

A minimum of 1.5 m of earth cover should be provided to the footings of a heated structure to protect them from damage due to frost penetration. The frost cover should be increased to 2.1 m for unheated structures if snow will not be removed from their vicinity. If snow will be removed from the vicinity of the unheated structures, the frost cover should be increased to 2.4 m.

All the footing beds should be examined by a geotechnical engineer to ensure that the founding surfaces are capable of supporting the design bearing pressure and that the footing beds have been properly prepared. Depending on the prevailing weather conditions at the time of construction, it may be necessary to protect the surface of the till following excavation by the placement of a concrete mud slab for footings set on the glacial till.

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

The recommended bearing pressures have been calculated by **exp** from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of underground conditions becomes available. For example, more specific information is available with



respect to conditions between boreholes, when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field monitoring provided by an experienced geotechnical engineer to validate the information for use during the construction stage.

A second option would be to found the proposed addition on pile foundations. **Exp** can provide recommendations regarding the design of piles if this option is to be considered.



11 Floor Slab Construction

The floor slab of the proposed addition may be set on a 200 mm thick bed of well compacted 19 mm clear stone placed on the engineered fill pad at least 300 mm thick constructed as recommended below and in Section 10 of the report. The clear stone would prevent the capillary rise of moisture from the sub-soil to the floor slab. A polyethylene vapour barrier should be placed over the clear stone pad, if a moisture sensitive finish is to be placed on the floor. Adequate saw cuts should be provided in the floor slab to control cracking.

The investigation has revealed that the site contains fill, loose silty sand and till, which extends to a depth of 2.0 m to 2.5 m below the existing ground surface. Therefore, if only localized trenches are excavated for construction of the new footings instead of a mass excavation, the floor slab may be constructed as slab on grade provided that the following recommendations are implemented:

- 1. All organic soil and fill should be removed from the building envelope as described in Section 10.
- The exposed silty sand surface should be compacted with a heavy vibratory roller. Any soft areas
 detected should be sub-excavated and replaced with engineered fill comprising of OPSS Granular
 B Type II placed in 300 mm lifts and each lift compacted to 98 percent of the SPMDD.
- 3. The grades should be raised to underside of the clear stone using OPSS 1010 Granular B Type II which should be placed in 300 mm lifts and each lift compacted to 98 percent of the SPMDD.

Perimeter and underfloor drainage will not be required for the proposed addition without a basement provided the floor slab is at least 150 mm higher than the surrounding finished exterior grade. The final grades should be sloped to promote drainage of surface water away from the building addition.



12 Pipe Bedding Requirements

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

For guidance, the pipe bedding may consist of 300 mm of well graded, crushed stone, such as MUNI.OPSS 1010 Granular A. The bedding material should be placed along the sides and on top of the pipe to provide a minimum cover of 300 mm. The bedding should be compacted to at least 95 percent SPMDD.



13 Excavations and De-Watering Requirements

Excavations for the building addition are expected to extend to a depth of up to 2.5 m below the existing ground surface and is expected to be above the prevailing groundwater table. These excavations will extend through the fill and into the silty sand and the upper levels of the glacial till.

Excavations may be undertaken as open cut provided they meet the requirements of the current Ontario Occupational Health and Safety Act (OHSA), i.e. they are cut back at 1H:1V from the bottom of the excavation above the groundwater table. Any excavation that extends below the groundwater table should be cut back at a slope of 3H:1V.

It is anticipated that excavations for the construction of the footings at the site will not penetrate the granular soils below the groundwater table. However, if this condition is encountered at any location, this office should be contacted to provide additional recommendations. Dewatering of the groundwater sites would require lowering of the groundwater table to below the final excavation level prior to proceeding with the excavation.

Many geologic materials deteriorate rapidly upon exposure to meteorological elements. Unless otherwise specifically indicated in this report, walls and floors of excavations must be protected from moisture, desiccation, and frost action throughout the course of construction.

Although this investigation has estimated the groundwater levels at the time of the field work, and commented on de-watering and general construction problems, conditions may be present that are difficult to establish from standard boring and excavating techniques. These conditions may affect the type and nature of de-watering procedures used by the contractor. These conditions include local and seasonal fluctuations in the groundwater table, erratic changes in the soil profile, thin layers of soil with large or small permeabilities compared with the soil mass, etc. Only carefully controlled tests using pumped wells and observation wells will yield the quantitative data on groundwater volumes and pressures that are necessary to adequately engineer construction de-watering systems.



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

The soils to be excavated from the site will comprise of topsoil, fill, loose silty sand and glacial till. The fill contains construction debris and therefore not considered suitable for backfilling in the interior of the building. It may be used outside the building and for general grading purposes. The silty sand may be also used exterior to the building as backfill provided its moisture content is maintained at all times within +/-2 percent of the optimum value as per ASTM D-698-12e2 (Natural moisture content is between 10 and 32 percent).

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

- Engineered fill under footings and underfloor fill including backfilling in service trenches inside the building – OPSS 1010 (November 2013) for Granular B Type II placed in 300 mm thick lifts with each lift compacted to 98 percent SPMDD beneath the floor slab and 100 percent SPMDD beneath footings;
- Backfill against exterior subsurface walls OPSS 1010 Granular B Type II placed in 300 mm thick lifts and compacted to 95 percent SPMDD; and
- Trench backfill outside building area, and fill placement to subgrade level for pavement and playgrounds OPSS 1010 Select Subgrade Material (SSM), free of organics, debris and with a natural moisture content within 2 percent of the optimum moisture content. It should be placed in 300 mm thick lifts compacted to minimum 95 percent SPMDD.



15 Backfilling Requirements Following the demolition of the School Building

As part of the redevelopment of the school property, it is understood that portion of the existing school structure will be demolished and the area backfilled. The following recommendations are provided for the re-instatement of these areas following the demolition process;

- 1. All structural elements, i.e. slabs, walls, footing, plumbing system, underground services, etc. should be demolished, removed and disposed of site.
- 2. The excavation should extend to the underside of the existing footings. The exposed surface should be examined by a geotechnician and any unsuitable material identified sub-excavated;
- 3. Following approval of the subgrade, any areas proposed for structural elements, such as footings, slabs, etc. should be backfilled with OPSS 1010 Granular B Type II material which should be placed in 300 mm lifts and each lift compacted to 100 percent of the SPMDD under footings and to 98 percent of the SPMDD under floor slabs.
- 4. In areas proposed to be constructed as parking lots, walkway, roadways, landscaped areas and following approval of the subgrade, OPSS 1010 Select Subgrade material should be used and should be placed in 300 mm lifts and each lift compacted to 95 percent of the SPMDD to sub grade level.



16 Pavement Structure

The recommended pavement structure for playground, parking areas and access roadways/bus loop are given on Table 5. The structures are based upon the assumption that the subgrade will be properly prepared and assuming a functional design life of eight to ten years. The proposed functional design life represents the number of years to the first rehabilitation, assuming regular maintenance is carried out.

| Table 5: Recommended Pavement Structure Thicknesses for Playground, Light & Heavy Duty Pavement | | | | | | |
|---|----------------------------|------------------------------------|---------------------------|--------------------------------------|--|--|
| | cture | | | | | |
| Pavement Layer | Compaction Requirements | Playground (No Vehicle Traffic) | Light Duty (Cars Only) | Heavy Duty (Bus and Truck Routes) | | |
| Asphaltic Concrete (PG 58-34) 92-96% MRD 50 mm SC 65 mm SC 40 mm S 50 mm F | | | | | | |
| OPSS 1010 Granular 'A' Base (crushed limestone) | 100% SPMDD* | 150 mm | 150 mm | 150 mm | | |
| OPSS 1010 Granular 100% SPMDD* 200 mm 400 mm 500 mm 'B' II Sub-base 100% SPMDD* 200 mm 400 mm 500 mm | | | | 500 mm | | |
| Subgrade Engineered Fill/approved Fill as per specifications | | | | | | |
| Notes: SPMDD denotes standard Proctor maximum dry density, ASTM, D-698-12e2 MRD denotes Maximum Relative Density, ASTM D2041. The upper 300 mm of the subgrade fill must be compacted to 98% SPMDD. SC Denotes Surface course asphalt and may compacted to 98% SPMDD. | | | | | | |

SC Denotes Surface course asphalt and may comprise of Marshall HL3 Mix of SP 12.5 mm (Cat B) Superpave Mi

BC Denotes Base course asphalt and may comprise of Marshall HL8 Mix or SP 19 mm (Cat B) Superpave Mix.

16.1 Additional Comments

The foregoing designs assume that construction is carried out during dry periods and that the subgrade is stable under the load of construction equipment. If construction is carried out during wet weather, and heaving or rolling of the subgrade is experienced, additional thickness of granular material and/or geotextile may be required.

Additional comments on the construction of areas to be paved are as follows:

 As part of the subgrade preparation, the new pavement areas should be stripped of all unsuitable topsoil and organic stained soils. Fill required to raise the grades to design elevations should be organic-free and at a moisture content that will permit compaction to the densities indicated. After



all the underground services have been installed, the subgrade should be properly shaped, crowned and proofrolled with a heavy roller in the full-time presence of a representative of this office. Any soft or spongy subgrade areas detected should be sub-excavated and properly replaced with suitable approved backfill compacted to 95 percent SPMDD. Wet soils should not be used to backfill the service trenches or as subgrade fill.

- 2. The long term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved. The need for adequate drainage cannot be over-emphasized. Due to the fine grained and frost susceptible nature of the subgrade soil, the pavement structure should be equipped with sub-drains. For guidance, subdrains should be installed at low points in the parking areas and on both sides of the fire route and should be continuous between catch basins to intercept excess surface and subsurface moisture and to prevent subgrade softening. This will ensure no water collects in the granular course, which could result in pavement failure during the spring thaw. The location and extent of subdrainage required within the paved areas should be reviewed by this office in conjunction with the proposed site grading.
- 3. To minimize the problems of differential movement between the pavement and catchbasins/manhole due to frost action, the backfill around the structures should consist of freedraining granular material preferably conforming to OPSS Granular B Type II material. Weep holes should be provided in the catchbasins and manholes to facilitate drainage of the granular fill.
- 4. The finished pavement surface should be free of depressions and should be sloped (preferably at a minimum cross fall of 2 percent) to provide effective surface drainage towards catch basins. Surface water should not be allowed to pond adjacent to the outside edges of paved areas.
- 5. The granular materials used for pavement construction should conform to OPSS 1010 for Granular A and Granular B Type II and should be compacted to 100 percent SPMDD. The asphaltic concrete used and its placement should meet OPSS 313 and 1150/1151 requirements.

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



17 Subsurface Concrete Requirement

Selected soil samples were submitted for pH, chloride, sulphate and electrical resistivity laboratory analysis. A summary of the laboratory test results is summarized in Table 6.

| Table 6: | Table 6: Results of pH, Chloride, Sulphate and Electrical Resistivity Tests on SoilSamples | | | | | | |
|---------------------------|--|------|---------------------|-----|-----------------|--------------|----------------------------------|
| Borehole No. Sample | Depth Soil | | Moisture Content | рН | Sulphate (%) | Chloride (%) | Electrical Resistivity Ohm.cm |
| Threshold Values | (m) | | (70) | <5 | >0.1 | >0.04 | <1500 |
| 2 -SS4 | 2.3 – 2.9 | Till | 15 | 7.7 | 0.0052 | 0.0102 | 2980 |
| 5 –SS4 | 3.0 – 3.7 | Till | 14 | 7.8 | 0.012 | 0.0012 | 5380 |

The results indicate an alkaline soil with a sulphate and chloride content of less than 0.1 and 0.04 percent respectively. These concentrations of sulphate and chloride in the soil would have a negligible potential of sulphate and chloride attack on subsurface concrete. The concrete should be designed in accordance with Table Nos. 3 and 6 of CSA A.23.1-14. However, the concrete should be dense, well compacted and cured.

The results also indicate the electrical resistivity of the soil to vary from 2980 ohm.cm and 5380 ohm.cm, which is indicative of moderately to strong potential corrosion attack on buried steel. Therefore, a corrosion specialist should be consulted for any additional recommendation regarding protection of any buried steel structures.

Certificate of the laboratory test results is attached in Appendix C.



18 General Closure

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

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

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.



exp Services Inc.

Client: CECCE Geotechnical Investigation Report Proposed Addition to New Horizon Jeunesse School 349 Olmstead Street, Ottawa, Ontario Project Number: OTT-00231875-A0 May 18, 2016

Figures





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| CATHOLIQUES DU CENTRE-EST | UTT-00231875-A0 |
| ON-JEUNESSE, 349 OLMSTEAD ST. OTTAWA | FIG 2 |
| | |
Client: CECCE Geotechnical Investigation Report Proposed Addition to New Horizon Jeunesse School 349 Olmstead Street, Ottawa, Ontario Project Number: OTT-00231875-A0 May 18, 2016

Notes On Sample Descriptions

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

| | | | | | | | SAND | 100 | | | CILT | | CLAV |
|----------|---------|----------------|------|----------|---------|----------------|--------|--------|-------|------|------------|----------------------|-----------------------|
| JUULDERS | CUBBLES | COARSE | DIUM | MED | FINE | COARSE | MEDIUM | FINE | DARSE | C | MEDIUM | FINE | CLAY |
| | 20 | 60 I | 20 | 6.0 I | 2.0 | 0.6 I | | 0.2 | 0.06 | 0.02 | 0.006 I | 002 | 1 |
| | | | S | METRES | N MILLI | DIAMETER | GRAIN | VALENT | EQU | | | | |
| | | OARSE | (| FINE | CRS. | MEDIUM | | FINE | | | | STIC) TO | CLAY (PL |
| | | OARSE /EL | GRA | FINE | CRS. | MEDIUM SAND | I | FINE | | | | STIC) TO PLASTIC) | CLAY (PL SILT (NOI |

- 2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.
- 3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.



| | | Log o | f Bo | D | rehole <u>B</u> | <u>H 1</u> | | Ωγ | 'n |
|------------------------|----------|--|---------------|-------|--|-------------------------------|--|-------------------------------|-------------------|
| Proje | ect No: | OTT-00231875-A0 | | | | | - N 2 | | ·M |
| Proje | ect: | Geotechnical Investigation. New Ecole | Element | air | e Horizon-Jeunesse | F | -igure No. <u>3</u> | | 1 |
| Loca | tion: | 349 Olmstead Avenue, City of Ottawa, O | Ontario | | | | Page. I of I | | |
| Date | Drilled: | 3/15/16 | | | Split Spoon Sample | \boxtimes | Combustible Vapour Reading | | |
| Drill 1 | Гуре: | CME 75 - truck mount | | | Auger Sample SPT (N) Value | | Natural Moisture Content Atterberg Limits | X | |
| Datur | m: | Geodetic | | | Dynamic Cone Test - | | Undrained Triaxial at % Strain at Failure | \oplus | |
| Logg | ed by: | A.N. Checked by: I.T. | | | Shear Strength by Vane Test | + s | Shear Strength by Penetrometer Test | | |
| G S W B L B L | | SOIL DESCRIPTION | Geodetic m | Depth | Standard Penetration Tes 20 40 60 Shear Strength 50 100 150 | t N Value 80 kPa 200 | Combustible Vapour Reading (ppm) 250 500 750 Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60 | A M P Unit L S | ural Wt. m³ |
| <u>, 1, 1,</u> | TOP | SOIL ~300mm | 64.1 | 0 | 3 | | × | M | |
| | | | | | | | | | |

| | <u>×1 //</u> | TOPSOIL ~300mm | 64.1 | 0 | 3 | | | | | | | | | M | |
|-------------|--------------|---|------|---|----------|---------------------------------------|----|-----------------|-------------------|-------------------------|-----------|---------------------------------------|---------------------------------------|---|-------|
| | | _ FILL | - | | | | | · · · · · · · · | | | | | | Д | |
| | | brick/concrete pieces in upper portion, _brown, moist, (very loose to loose) | - | 1 | | 2 | | | | | X | | | M | |
| | | | 62.9 | | | | | | | | | | | Д | |
| | | <u>SILTY SAND</u> Fine grained, trace clay, oxidized stains, | | | | 8 Э | | | | | × | | | M | |
| | | – brown, moist, (loose) – | | 2 | | · · · · · · · · · · · · · · · · · · · | | | | | | | · · · · · · · · · | Δ | |
| | | - GLACIAL TILL - | 02.0 | | | 15 0 | | ······ | | | X | · · · · · · · · · · | | М | |
| | | fragments, trace clay, dark brown, moist, | _ | 3 | | | | | | | | | | Д | |
| | | (compact) | | | | 14 O | | | | | × | | | M | |
| | | | 60.7 | | | | | | | | | | | | |
| | | Horizontally bedded, horizontal and vertical seams, some silty sand seams (Very poor | - | 4 | | | | | | | | | | | Run 1 |
| | Ŵ | quality) | - | | | | | ····· | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | 5 | | | | | | | | | | | D |
| 6/16 | | | - | | | ···· | | ······ | | | | | | | Run 2 |
| 3DT 4/ | | | - | 6 | | | | | | | | | | | |
| AWA.G | M | | | | | | | | | | | · · · · · · · · · · · · · · · · · · · | · · · · · · · · · · · · · · · · · · · | | |
| V OTT | | | | | | (* 1 *) (* 1 *) | | | | · · · · · · · · · · · · | | | | | Run 3 |
| TROV | | | - | 7 | | | | | | | | | | | |
| L.GPJ | | Borehole Terminated at 7.50 m Depth | 56.9 | | | | | | | | | | | | |
| СНОО | | | | | | | | | | | | | | | |
| ZON S | | | | | | | | | | | | | | | |
| HORIZ | | | | | | | | | | | | | | | |
| /ELLE | | | | | | | | | | | | | | | |
| NOU | | | | | | | | | | | | | | | |
| 31875 - | | | | | | | | | | | | | | | |
| s N N | | | 1 | I | <u> </u> | | 1: | | · : : : : | ı:::: Г | . : : : : | | | | |

| OGS. | NOTES: 1.Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECO | RDS | | CORE DR | ILLING RECOF | RD |
|----------|---|-----------------|--------------------|---------------------|-------------|--|------------------|----------------|
| ШШ | use by others 2 Borehole backfilled with cuttings upon completion | Elapsed Time | Water Level (m) | Hole Open To (m) | Run No. | Depth (m) | % Rec. | RQD % |
| BOREHOLE | 3. Field work supervised by an exp representative. 4. See Notes on Sample Descriptions | Completion | Core Water | 7.5 | 1 2 3 | 3.66 - 4.62 4.62 - 6.15 6.15 - 7.5 | 90 100 100 | 28 40 13 |
| LOG OF | 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |

| ect: | Geotechnical Investigation. New Ecole | e Elemen | taiı | re Horiz | on-Je | unesse | è | | Figure | No | 4 | <u> </u> | | |
|----------|--|-----------|------|------------------------|------------------|------------|----------|---------------------------------------|--------------------|----------------------------------|-----------------|--------------------|-------------------------|-------------------|
| ation: | 349 Olmstead Avenue, City of Ottawa, | Ontario | | | | | | | Pa | ige | <u>1</u> o | f <u>1</u> | | |
| Drilled: | 3/15/16 | | | Split Spo | on Sam | le | C | ন | Combu | stible Var | oour Rea | adina | | |
| Type: | CME 75 - truck mount | | - | Auger Sa | ample | | Ē | | Natural | Moisture | Conten | t | | × |
| im: (| Geodetic | | - | Dynamic | Value Cone Te | est | | - - | Atterbe Undrair | rg Limits ned Triaxi | al at | | | —О Ф |
| ied by: | A.N. Checked by: I.T. | | - | Shelby To Shear Str | ube renath b' | / | - | ■ +- | % Strai Shear S | n at Failu Strength t | re oy | | | |
| | · | | | Vane Tes | st | | : | Ś | Penetro | ometer Te | est | | | _ |
| | SOIL DESCRIPTION | Geodetic | Dep | Sta | ndard Pe | enetration | Test N V | alue 80 | Combu | ustible Va 250 atural Mois | pour Rea 500 | ading (ppm) 750 | | Natura |
| - | | m 64.5 | h | Shear S | Strength | 100 | 150 | kPa 200 | Atter | berg Limi | ts (% Dr 40 | y Weight) 60 | L E S | kN/m ³ |
| | <u>OIL</u> ~150mm | 64.4 | | 4 | | | | | | × | | | N | |
| Silty s | and with some gravel, trace clay, - red brick pieces, moist, brown, | 63.8 | | | | | | | | | | | -// | |
| | | | 1 | 6 | | | | | | × | | | \mathbb{N} | 20.2 |
| Fine g | prained, silty, trace to some clay, trace | | | | | | | | | | | | | |
| l (loose | | 62.6 | | 5 | | | | | | X | | | N | 20.6 |
| GLAC | IAL TILL | 02.0 | 2 | | | | | | | | | | | |
| fragm | ents, trace clay, dark brown, moist, | _ | | 11 | 3 | | | | | | | | $\overline{\nabla}$ | |
| (comp | act to dense) | | | | | | | | | | | | \square | |
| | - | | 3 | | 30 | | | | | | | | $\overline{\mathbf{N}}$ | |
| | - | _ | | | U. | | | | | | | | $-\Delta$ | |
| | - | 60.9 | 5 4 | | | 50 for 50r | nm | · · · · · · · · · · · · · · · · · · · | | | | | $\overline{\nabla}$ | |
| Bo | rehole Terminated at 4.30 m Depth | 60.2 | + | | | | | | | | | | | |
| | Upon Auger Refusal | | | | | | | | | | | | | |
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| Ő | 1.Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECO | RDS | | CORE DR | RILLING RECOP | RD |
|---------|---|---------------|---------------|-----------|------|--------------|---------------|-------|
| BHL | use by others | Elapsed | Water | Hole Open | Run | Depth (m) | % Rec. | RQD % |
| Щ | 2. Piezometer installed upon completion | Completion | dry | 4.1 | INU. | (11) | | |
| EHC | 3. Field work supervised by an exp representative. | April 4, 2016 | 4.0 | | | | | |
| BOR | 4. See Notes on Sample Descriptions | April 6, 2016 | 4.0 | | | | | |
| OG OF E | 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |

| roject NO. | Geotechnical Investigation. New Eco | ole Elemen | taiı | re Horiz | :on-Je | eune | esse | | I | Figure | No. | | 5 | - | | |
|--------------|---|------------|-------------|----------------------|-----------------|--------|--------------|----------|-----|--------------------|----------------------------|---------------|----------------------|------------------------|--------------|--------|
| ocation: | 349 Olmstead Avenue. City of Ottaw | a. Ontario | | | | | | | | Pa | ige. | _1 | _ of | _1_ | | |
| ate Drilled: | 3/16/16 | | | Split Spo | on Sam | nlo | | | | Combu | etible V | lanoi | ur Poadi | ina | | |
| rill Type: | CME 75 - truck mount | | - | Auger Sa | imple | pic | | | | Natural | Moistu | ire Co | ontent | ing | | × |
| atum: | Geodetic | | - | SPT (N) V Dynamic | √alue Cone T | est | | | | Atterbe Undrair | rg Limit ned Tria | ts axial : | at | H | | |
| paged by: | A N Checked by: LT | | - | Shelby Tu | ube | | | | | % Strai Shear S | n at Fa Strengtl | ilure h by | | | | • |
| | | | | Vane Tes | st | Jy | | S | | Penetro | ometer | Test | | | | |
| S Y M | | Geodetic | De | Sta | ndard P | enetra | ation T | ēst N Va | lue | Combu | ustible \ 250 | /apo 50 | ur Readi 0 7 | ng (ppm) '50 | S A M | Natura |
| B O L | SOIL DESCRIPTION | m | p t h | Shear S | trength | 40 | 11 | 50 2 | kPa | _ Na Atter | atural M rberg Li 20 | oistu mits | re Conte (% Dry V | ent % Veight) 80 | PLLQ | Unit W |
| | SOIL ~150mm | 64.3 | 0 | 4 | | | | | | | | Ĵ | | | Ň | |
| Silty | sand with some gravel, trace clay, | - | | | | | | | | | | | | | Ю | |
| | ι, διάψη, (ποίλε το λειλ ποιχεί) | 63.4 | 1 | 3 | | | | | | | | | | | \mathbb{N} | 10.0 |
| SILT Fine | Y SAND grained, trace clay, oxidized stains. | | | 0 | | | | | | | | | | | Å | 19.8 |
| brow | n, moist, (loose) | - | | 8 | | | | | | | | | | | | |
| | | | 2 | 0 | | | | | | | × | | | | \mathbb{N} | 20.4 |
| GLA | CIAL TILL | 62.2 | | 12 | | | | | | | | | | | M | |
| fragn | nents, trace clay, dark brown, moist, | | | ···· | | | | | | X | | | | | \mathbb{N} | |
| (com | pact) | - | 3 | | | | <u></u> | | | | | | | | | |
| | | _ | | |) | | | | | × | | | · · · · · · · · | | X | |
| | | | | | | 50 foi | 125 m | nm | | | | | | | ЙĽ | |
| 6//2- Bo | prehole Terminated at 4.10 m Depth | 60.3 | 4 | | | | | | | | | | | | + | |
| | Upon Auger Refusal | | | | | | | | | | | | | | | |
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| 000 | NOTES: 1.Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECO | RDS | | CORE DF | RILLING RECOF | RD |
|-----------|---|---------------|----------------|---------------|-----|------------|---------------|-------|
| BHL | use by others | Elapsed | Water | Hole Open | Run | Depth | % Rec. | RQD % |
| ш | 2. Piezometer installed upon completion | lime | Level (m) | <u>lo (m)</u> | NO. | <u>(m)</u> | | |
| EHOL | 3. Field work supervised by an exp representative. | April 6, 2016 | ary Blocked | 4.1 | | | | |
| R | 4. See Notes on Sample Descriptions | | | | | | | |
| LOG OF B(| 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |

| roject No: roject: | OTT-00231875-A0 Geotechnical Investigation. New Ecol | e Elemen | taiı | e Horiz | :on-Jeu | inesse | | F | igure l | No | 6 | - | - | |
|------------------------------|---|-----------|-------------|-----------|-------------------|------------------------|---------------|-----------|---------------------------------------|----------------------------|-------------------------|------------------|-------------------------|-------------------------------|
| ocation: | 349 Olmstead Avenue, City of Ottawa, | , Ontario | | | | | | | Pa | ge | 1_ of | _1_ | | |
| ate Drilled: : | 3/15/16 | | | Split Spo | on Sampl | e | | | Combus | tible Vapo | our Readi | na | | |
| rill Type: | CME 75 - truck mount | | - | Auger Sa | imple | | | | Natural | Moisture (| Content | | | × |
| atum: | Geodetic | | - | Dynamic | Value Cone Tes | st | | | Atterber Undrain | g Limits ed Triaxia | lat | F | | —— Ф |
| baaed by: | A N Checked by: I T | | - | Shelby To | ube | | ■ + | | % Strain Shear S | i at Failure trength by | e / | | | • |
| - <u>3</u> <u>3</u> <u>-</u> | | | | Vane Tes | st | | s | | Penetro | meter Tes | st | | | - |
| S Y | | Geodetic | De | Sta | ndard Per | netration ⁻ | Test N Val | ue | Combu: 2 | stible Vapo 50 5 | our Readi 00 7 | ng (ppm) 50 | S A M | Natural |
| BO | SOIL DESCRIPTION | m | p t h | Shear S | trength | <u>10 (</u> | <u>50 8</u> | 30 kPa | Nat Attert | ural Moist berg Limits | ure Conte s (% Dry V | ent % Veight) | PLE | Unit Wt. kN/m ³ |
| | OIL ~200mm | 64.2 | 0 | 4 | | | <u>50</u> 2 | | | | | | Ň | |
| SILTY ⊢Fine g | <u>SAND</u> rained, trace clay and gravel, | _ | | O. | | | | | | * | | | \mathbb{N} | |
| oxidiz | ed stains, brown, moist, (loose) | | | | | | | | | | | | | |
| | | | ľ | 0 | | | | | | × | | | ľ | 20.5 |
| | | 62.4 | | 5 | | | | | · · · · · · · · · · · · · · · · · · · | k | | | $\overline{\mathbf{N}}$ | |
| GLAC | IAL TILL | 02.4 | 2 | | | | 75 O | | | | | | Ŕ | |
| fragm | ents, trace clay, some silt and shale, | | | | | | | | | | | | 5 | |
| -prese | ence of cobbles and boulders | | | | | | | | × | | | | X | |
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| | | | | | 3 | 9 | | | × | | | | X | |
| | | | | | | | | | | | | | | |
| | | 60.0 | 4 | | | | 1 m . | | × | | | | X | |
| Во | rehole Terminated at 4.25 m Depth Upon Auger Refusal | | | | | | | | | | | | | |
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| 0 1.Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECO | RDS | | CORE DR | ILLING RECOF | RD |
|---|-----------------|--------------------|---------------------|------------|--------------|--------------|-------|
| use by others | Elapsed Time | Water Level (m) | Hole Open To (m) | Run No. | Depth (m) | % Rec. | RQD % |
| 의 3. Field work supervised by an exp representative. | Completion | dry | 4.3 | | | | |
| A.See Notes on Sample Descriptions | | | | | | | |
| 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |

| | Log o | of Bo | D | rehole BH | 15 | | avn |
|---------------|---------------------------------------|-----------------------|-----------------------|---|---------------------------|--|-----------------------------------|
| Project No: | OTT-00231875-A0 | | | | | 7 | $\sim \rho$ |
| Project: | Geotechnical Investigation. New Ecole | Element | aire | e Horizon-Jeunesse | | -igure No. / | I |
| Location: | 349 Olmstead Avenue, City of Ottawa, | Ontario | | | | Page OI _ I | |
| Date Drilled: | 3/16/16 | | _ | Split Spoon Sample | X | Combustible Vapour Reading | |
| Drill Type: | CME 75 - truck mount | | | Auger Sample [] SPT (N) Value () | 1 ວ | Natural Moisture Content Atterberg Limits | × —⊖ |
| Datum: | Geodetic | | | Dynamic Cone Test | - | Undrained Triaxial at % Strain at Failure | \oplus |
| Logged by: | A.N. Checked by: I.T. | | | Shear Strength by | + s | Shear Strength by Penetrometer Test | |
| GWL L | SOIL DESCRIPTION | Geodetic m 64.4 | D e p t h | Standard Penetration Test N V 20 40 60 Shear Strength 50 100 150 | /alue 80 kPa 200 | Combustible Vapour Reading (ppm) 250 500 750 Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60 | S M P Unit Wt. E S |
| TOP | SOIL ~200mm | 64 2 | 1,01 | | | | A / |

| - L | - | 1 | 64.4 | 0 | | 50 | 1 | 00 | 150 | 20 | 00 | 4 | 20 4 | 10 6 | 0 | S | |
|---------|--------------|---|-------|-----|-----------|-----------------|---|----------------------|---------|-------------------------------------|-----------|----------------|---------------------------|---|---------------------------------------|------|------|
| Γ | <u>× 1</u> / | <u>TOPSOIL</u> ~200mm | 64.2 | 0 | 3 | ÷ | | | | ÷ : · : · | | | · · · · · · · · | | · · · · · · · · | ٩V | |
| | | SILTY SAND | 7 | | Ō | 9¥. | | [| 94 | | | | 1 | K | | łΧ | |
| | | - Fine to coarse grained some silt trace | - | | | - | | | | <u></u> | | | | | | 4/ \ | |
| | | gravel oxidized stains brown moist (very | | | 1.5 2. 1. | | | | : 1:: | | | | 1.5.5.5.5 | | | H | |
| | | loose to loose) | | | | | | | | | | | | | | 17 | |
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| | | | 62.8 | | | : . | | | : 13 | | | | | | | | |
| | KAN | GLACIAL TILL | 7 | | -5 | 21: | :::::: | 1::::: | :1: | 2122 | | | 13363 | | 2222 | ŧV | |
| | 6 S S | Silty to gravelly sand with some shale | | 2 | | ÷ • • | : · > · · : · | · · · · · · · | : : | $\langle \cdot \cdot \cdot \rangle$ | \cdots | A | $\cdot : \cdot : \cdot :$ | $\cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot \cdot$ | (\cdot,\cdot,\cdot) | ·Λ | |
| | | fragments, trace clay, dark brown, moist, | 7 | 2 | | ; . | | | | ÷ ; · ; · | | | | | | Ъ | |
| | | (loose to very dense) | | | 13311 | 34 | | 13333 | 848 | | | | | | 13213 | H | |
| | | presence of cobbles and boulders | - | | 10 | 2 | <u> </u> | 1 | : 1 : 2 | <u>:::::</u> | | | 1.2.2.2.2.2 | 1 (· · · · · · · | | 4V/ | |
| | | | | | ·:•:0·· | 21: | : · 2 : · : : : | <u> : : : : :</u> : | 212 | <u></u> | | · · · X | 1.1.2.2.2.2 | | · · · · · · · · · · · · · · · · · · · | ١Ň | |
| | , Ala | | | | | ÷Ŀ. | : · > : · : : : : : : : : : : : : : : : | <u> </u> | 212 | ····· | | | 1.1.2.2.2.2 | | 0.000 | Ľ | |
| | | | - | 3 | | | | | | ÷ ; ; ; | | | 1 : : : : | | | | |
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| | | Borehole Terminated at 4.25 m Depth | | | ::: | : | : : : : | | : : | ::: | | 1 : : : : | | | | | |
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| ß | NOTES: | lo data requires interpretation bu sur hefere | WATER | 5 1 | FVFI F | | | s | _ | | | 0.0 | | | | _ | |
| 2 | | others | | | | | | - | | | | | | | | | |

| 068 | NOTES: 1.Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECC | | CORE DI | RILLING RECOF | RD | |
|----------|---|------------|---------------|---------------|---------|---------------|--------|-------|
| 표 | use by others | Elapsed | Water | Hole Open | Run | Depth | % Rec. | RQD % |
| | 2. Borehole backfilled with cuttings upon completion | lime | Level (m) | <u>lo (m)</u> | No. | (m) | | |
| OREHOLE | 3. Field work supervised by an exp representative.4. See Notes on Sample Descriptions | Completion | dry | 3.7 | | | | |
| LOG OF B | 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |

| Project No: | <u>OTT-00231875-A0</u> | of Bo | 0 | rehole | <u> </u> | BH | <u>6</u> | ïgure N | lo | 8 | *(| Э) | хр |
|---------------|--|----------|-------------|---|-------------|-------------------|----------------------------|--------------------------------|-----------------------------------|---|-----------------------------------|-------------------------|---------------------|
| Project: | Geotechnical Investigation. New Ecole | Element | air | e Horizon-Jeune | esse | | - | Igule I | NU | 1 | 1 | | |
| Location: | 349 Olmstead Avenue, City of Ottawa, | Ontario | | | | | _ | Paę | je | | <u> </u> | | |
| Date Drilled: | 3/16/16 | | | Split Spoon Sample | | \boxtimes | | Combus | tible Vapo | our Readir | ıg | I | |
| Drill Type: | CME 75 - truck mount | | | Auger Sample | | | | Natural M | Aoisture (| Content | F | | х С |
| Datum: | Geodetic | | _ | Dynamic Cone Test | - | | | Undraine | ed Triaxia | at | | ł | ⊕ |
| Logged by: | A.N. Checked by: I.T. | | | Shelby Tube Shear Strength by Vane Test | | + s | | Shear St Penetror | rength by neter Tes | t | | , | |
| G Y M B | SOIL DESCRIPTION | Geodetic | D e p | Standard Penetr | ation Te | est N Value 80 | e kPa | Combus 21 Nati Atterb | stible Vapo 50 5 ural Moist | our Readir 00 7! ure Conter (% Dry W | ig (ppm) 50 nt % /eight) | S A M P L | Natural Jnit Wt. |
| | SOII ~125mm | 64.4 | ĥ 0 | 50 100 | 15 | 0 200 | кга) | 2 | 0 4 | 0 6 | 0 | Ë S | KN/m ⁻ |
| Fill Fill | to coarse grained silty sand, some | | | | | | | > | « | | | Д | |
| | | _ | 1 | 6 | | | | X | | | | \square | |
| | | | | | | | | | | | | Д | |
| | - | 1 | | 14 | | | | ~ | | | | \mathbb{N} | |
| <u>GLA</u> | CIAL TILL | 62.5 | 2 | | ··· · · · · | • • • • • • • • | (+) (+ (+ (+) (+ (+) | | · · · · · · · · · · · | · · · · · · · · · · · | | Δ | |
| Silty | to gravelly sand with some shale nents, trace clay, dark brown, moist, _ | | | 22 | | | | | | | | \square | |
| H Com | pact to very dense) | | | O · · · · · · · · · · · · · · · · · · · | | | | ×. | | | | Ň | |
| -occa | asional cobbles and boulders – | - | 3 | | 57 | | | | | | | | |
| | - | 60.9 | | | Ö | | ······· | × | | | | M | |
| | | | | | or 75mn | n | | | | | | $\overline{\mathbf{H}}$ | ~ - |
| | | 60.2 | 4 | | Û | | ········ | * | | | | Å | 21.7 |
| Horiz | zontally bedded, horizontal and vertical – | - | | | | | | | | | | | Run 1 |
| quali | ity) | | 5 | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | - | - | | | | | ······· | | | | | | |
| | - | | 6 | | | | | | | | | | Run 2 |
| | | | | | | | | | | | | | |
| | - | 1 | | | | | | | | | | H | |
| | | 57.4 | 7 | | | | | | | | | | Run 3 |
| B | orehole Terminated at 7.05 m Depth | | | | | | | | | | | | |
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LOGS - 231875 - NOUVELLE HORIZON SCHOOL.GPJ TROW OTTAWA.GDT 4/6/16

| OGS | NOTES: 1.Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECO | RDS | | CORE DR | ILLING RECOF | RD |
|-----------|---|---------------|---------------|-----------|-----|-------------|--------------|-------|
| ЯНL | use by others | Elapsed | Water | Hole Open | Run | Depth | % Rec. | RQD % |
| | 2. Piezometer installed upon completion | Time | Level (m) | To (m) | No. | (m) | | |
| Ë | | Completion | Core Water | 7.1 | 1 | 4.2 - 5.08 | 81 | 29 |
| H | 3. Field work supervised by an exp representative. | April 4, 2016 | 3.5 | | 2 | 5.08 - 6.61 | 73 | 50 |
| OR | 4. See Notes on Sample Descriptions | April 6, 2016 | 3.5 | | 3 | 6.61 - 7.05 | 100 | 52 |
| LOG OF B(| 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |

| | Log | of Bo | OI | rehole | BH | 17 | | * ⊂ | nve |
|---------------------|-------------------------------------|---------------|-----------------------|----------------------------------|-----|-------------------|---|--------------------------------------|--|
| Project No | : <u>OTT-00231875-A0</u> | | | • | | | | C | ~p. |
| Project: | Geotechnical Investigation. New Eco | le Element | taire | e Horizon-Jeunes | se | | Bago 1 of | - 1 | 1 |
| Location: | 349 Olmstead Avenue, City of Ottawa | , Ontario | | | | | Page1_ of | | |
| Date Drille | d: <u>3/16/16</u> | | _ 8 | Split Spoon Sample | D | 3 | Combustible Vapour Read | ling | |
| Drill Type: | CME 75 - truck mount | | - 8 | Auger Sample SPT (N) Value | | | Natural Moisture Content Atterberg Limits | ⊢ | × ⊸⊙ |
| Datum: | Geodetic | | ء ج - | Dynamic Cone Test Shelby Tube | | - | Undrained Triaxial at % Strain at Failure | | \oplus |
| Logged by: | A.N. Checked by: I.T. | | 5 | Shear Strength by /ane Test | + | - | Shear Strength by Penetrometer Test | | A |
| G Y M B O L O | SOIL DESCRIPTION | Geodetic m | D e p t h | Standard Penetration | 60 | alue 80 kPa | Combustible Vapour Read 250 500 7 Natural Moisture Contr Atterberg Limits (% Dry V | ing (ppm) 750 ent % Weight) | Natural Unit Wt. kN/m ³ |
| | PSOIL ~300mm | 64.3 | 0 | 50 100 | 150 | 200 | | | 2 |

| | Ĺ | | 64.3 | 0 | | 50 | 0 10 | 00 1 | 50 2 | 00 | 2 | 20 | 40 | 6 | 0 | S | |
|----------|---------------------|--|------|---|-------------------------|---------------|---------------------------------------|------|-------------|-------------|---|-------------------------------------|--------------------|---------------------|------------------------|-----|--|
| | <u>. <u>. 1</u></u> | <u>TOPSOIL</u> ~300mm | 64.0 | ľ | 5 | | | | | | | | | | | М | |
| | | FILL | | | 0 | 131 | | | | | | X | | 33 | | Ň | |
| | | Silty sand, trace gravel, oxidized stains, | 1 | | | | • • • • • • • • | | | | | | | | | () | |
| | | brown, moist, (loose) | | | 6 | | | | | | | | | | | W | |
| | | | - | 1 | | | · · · · · · · · · · · · · · · · · · · | | | | | <u> </u> | | | | M | |
| | | | | | 1.00 | | | [| | | | 1 | | \sim | ·· · · · · · | H | |
| | \otimes | | 62.8 | | \cdot \cdot \cdot | 1.2.1 | | 43 | -2-0-0-2 | | | $ \cdot \cdot \cdot \cdot \rangle$ | | \cdot ; \cdot ; | ·> (· i · > · | W | |
| | | GLACIAL TILL | 62.5 | | | 1.2. | • • • • • • • • • • | | -2-2-2-2 | | | 1.2.2.3 | | ÷ ;; | -0-0-1-0- -0-0-1-0- | M | |
| | 6//22 | ר Silty to gravelly sand with some shale ∫ | 02.5 | | l÷÷ | :: | | | + • • • • • | + • • • • • | | + : : : | : : : | ÷÷ | **** | () | |
| | | (dame a) | | | | | | | | | | | | | | | |
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| | | Borehole Terminated at 1.80 m Depth | | | 1 : : | :: | :::: | | | 1 : : : : | | 1 : : : | : : : : | | :::: | | |
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| 3 NO | DTES: | | | | EVE | PE | | 2 | | | <u> </u> | | | | | | |

| OGS | NOTES: 1.Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECO | RDS | | CORE DF | RILLING RECOF | RD |
|----------|---|-----------------|--------------------|---------------------|------------|--------------|---------------|-------|
| BHL | use by others 2 Borehole backfilled with cuttings upon completion | Elapsed Time | Water Level (m) | Hole Open To (m) | Run No. | Depth (m) | % Rec. | RQD % |
| HOLE | 3. Field work supervised by an exp representative. | Completion | dry | 1.8 | | | | |
| ORE | 4. See Notes on Sample Descriptions | | | | | | | |
| LOG OF B | 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |

| Project I | No: <u>OTT-00231875-A0</u> | of Bo | 0 | reł | ol | e _ | <u>3H</u> | 8 | | | 10 | **(| эхр. |
|------------|--|--------------|-------------|------------------------------------|------------------------|-------------|-----------|-----------|----------------------|---------------------------|------------------------|-----------------|---------------------|
| Project: | Geotechnical Investigation. New Ecole | Element | air | e Horiz | on-Jeu | unesse | | | -igure N | 10. <u> </u> | 10 | | I |
| Location | a: <u>349 Olmstead Avenue, City of Ottawa,</u> | Ontario | | | | | | | Paç | ge1 | 01 | 1 | |
| Date Dril | lled: 3/16/16 | | | Split Spo | on Samp | le | | | Combus | tible Vapo | ur Readir | ng | |
| Drill Type | e: CME 75 - truck mount | | | Auger Sa | imple | | | | Natural M | <i>N</i> oisture C | Content | L | × |
| Datum: | Geodetic | | _ | Dynamic | Cone Te | st | | | Undraine | ed Triaxial | at | I | Ð |
| Logged I | by: <u>A.N.</u> Checked by: I.T. | | | Shelby Ti Shear Str Vane Tes | ube rength by st | | + s | | Shear St Penetror | rength by neter Test | t | | A |
| G Y | | Geodetic | De | Sta | ndard Pe | netration T | est N Val | ue | Combus 2 | tible Vapo 50 50 | our Readir 00 7 | ng (ppm) 50 | S A M Natural |
| | SOIL DESCRIPTION | m | p t h | Shear S | trength | <u>40 6</u> | 50 8 | 80 kPa | Atterb | ural Moistu erg Limits | ure Contei (% Dry W | nt % /eight) | P Unit Wt. |
| | TOPSOIL ~150mm | 64.2 64.1 | 0 | 5 | 0 1 | | 50 2 | | 2 | 0 4 | 0 6 | U | N N |
| | Fine grained gravelly sand, oxidized stains, - | - | | | | | | | | | | | Д |
| | -upper 0.6m frozen | | 1 | | | | | | | Χ. | | | X |
| | | 62.8 | | 14 | | | | | | | | | \ominus |
| | GLACIAL TILL – Silty to gravelly sand with some shale | 62.4 | | 0 | | | | | × | | | | X I |
| | fragments, trace clay, dark brown, moist, (compact) | | | | | | | | | | | | |
| | Borehole Terminated at 1.80 m Depth | | | | | | | | | | | | |
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|-----------|---|------------|---------------|---------------|-----|---------|---------------|-------|
| -OGS | NOTES: 1. Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECO | RDS | | CORE DF | RILLING RECOF | RD |
| Ĩ | use by others | Elapsed | Water | Hole Open | Run | Depth | % Rec. | RQD % |
| | 2. Borehole backfilled with cuttings upon completion | Time | Level (m) | <u>To (m)</u> | No. | (m) | | |
| EHOLE | 3. Field work supervised by an exp representative. | Completion | dry | 1.8 | | | | |
| ORI | 4. See Notes on Sample Descriptions | | | | | | | |
| LOG OF B(| 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |

| | Loa of E | Borehole BH | 9 | * <u> <u> </u> </u> |
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| Project No: | OTT-00231875-A0 | | | CAP. |
| Project: | Geotechnical Investigation. New Ecole Elem | nentaire Horizon-Jeunesse | Figure No. <u>11</u> | 1 |
| Location: | 349 Olmstead Avenue, City of Ottawa, Ontar | io | Page1_ of _ | <u> </u> |
| Date Drilled: | 3/16/16 | Split Spoon Sample | Combustible Vapour Readin | a 🗆 |
| Drill Type: | CME 75 - truck mount | Auger Sample | Natural Moisture Content Atterberg Limits | × ⊢⊸⊖ |
| Datum: | Geodetic | Dynamic Cone Test | Undrained Triaxial at | \oplus |
| Logged by: | A.N. Checked by: I.T. | Shear Strength by + Vane Test S | Shear Strength by Penetrometer Test | • |
| S | | Standard Penetration Test N Va | lue Combustible Vapour Readin | g (ppm) S A Natural |

| | G W L | т В О | SOIL DESCRIPTION | Geodetic m | e p t h | Shear | 20 Stre | 4 ngth | 06 | <u>30 8</u> | 30 kPa | Na Atter | tural Moist berg Limits | 00 ure (3 (% | 7: Conter Dry W | 50 nt % /eight) | MP L L | Unit Wt. kN/m ³ |
|---------|-------------|--------------|--|---------------|------------------|----------|------------|-----------|-----|-------------|-----------|-------------|----------------------------|---------------------|-----------------------|-----------------------|-----------|-------------------------------|
| ┢ | | L | PAVEMENT STRUCTURE | 64.3 | 0 | <u> </u> | 50 | 10 | 0 1 | 50 2 | 00 | | 20 4 | 10 | 6 | 0 | s /// | |
| | | | 240mm of Asphalt over 260mm of Granular | 64.0 | | | | | | | | × | | | | | Х | |
| | | | FILL Gravelly sand, dark brown, moist, (compact) | - | 1 | 10 O | | | | | | * | | | | | X | 21.9 |
| | | | · · · | 62.8 | | | 24 | | | | | | | | | | \square | 22.6 |
| | | \mathbb{Z} | <u>GLACIAL TILL</u> | 62.5 | | | Ĭ | | | | | | | | | | Λ | 22.0 |
| | | 2012 XX | Silty to gravely sand with some shale fragments, trace clay, dark brown, moist, | | | | | | | | | | | | | | | |
| | | | Borehole Terminated at 1.80 m Depth | | | | | | | | | | | | | | | |
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| OTTA | | | | | | | | | | | | | | | | | | |
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| 875 - N | | | | | | | | | | | | | | | | | | |
| 131 | | | | | | | | | | | | | | | | | | |

| 0 NOTES: 0 1. Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECC | RDS | | CORE DR | ILLING RECOF | RD |
|--|-----------------|--------------------|---------------------|------------|--------------|--------------|-------|
| Use by others | Elapsed Time | Water Level (m) | Hole Open To (m) | Run No. | Depth (m) | % Rec. | RQD % |
| 3. Field work supervised by an exp representative. 4. See Notes on Sample Descriptions | Completion | dry | 1.8 | | <u>`</u> | | |
| 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |

| Project No: | <u>OTT-00231875-A0</u> | f Bo |)ľ | eh | ole | e <u> </u> | <u> 8 H</u> | <u>10</u> | Figure | No | 12 | *(| Э | xp |
|---|---|---------------|-----------------------|---------------------------------|-------------------------------|------------|-----------------|-------------------|---------------------------|--|--|--------------------------------------|----------|--|
| Project: | Geotechnical Investigation. New Ecole | e Elemen | taiı | e Horiz | on-Jeu | inesse | ! | r | -iguie i | NU | 1 of | - 1 | | |
| Location: | 349 Olmstead Avenue, City of Ottawa, | Ontario | | | | | | | Pa | ge | 1_0 | <u> </u> | | |
| Date Drilled: | 3/16/16 | | _ | Split Spc | on Sampl | e | \boxtimes |] | Combus | stible Vap | our Read | ing | | |
| Drill Type: | CME 75 - truck mount | | _ | Auger Sa | ample Value | | |] | Natural Atterber | Moisture a Limits | Content | F | | × |
| Datum: | Geodetic | | _ | Dynamic | Cone Tes | st | | - | Undrain | ed Triaxi | al at | • | | ⊕ |
| Logged by: | A.N. Checked by: I.T. | | | Shelby I Shear St Vane Te | ube rength by st | | + s | | Shear S Penetro | trength b meter Te | y st | | | |
| GWL SYMBO- | SOIL DESCRIPTION | Geodetic m | D e p t h | Sta Shear | ndard Per 20 4 Strength | netration | Test N Va 60 | alue 80 kPa | Combu 2 Na Atter | stible Va 50 tural Mois berg Limi | oour Read 500 7 sture Conte ts (% Dry \ | ing (ppm) 750 ent % Weight) | SAMPLE | Natural Unit Wt. kN/m ³ |
| | SOIL ~250mm | 64 63.8 | 0 | 12 | 50 1 | 00 1 | 150 | 200 | | 20 | 40 | 60 | 5 :\/ | |
| FILL Grav (com | elly sand, dark brown, moist, | | | 0 10 | | | | | ×. | × | | | | 20.7 |
| SILT Fine | Y SAND grained, brown, oxidized stains, moist, ipact) | 63.0 | 1 | 12 | | | | | | × | | | | 20.3 |
| B | orehole Terminated at 1 80 m Denth | 62.2 | | | | | | | | | | | 1 | |
| 9- NOUVELLE HORIZON SCHOOL.GFJ I KOW OI LAWA.GD1 4/6/16 | | | | | | | | | | | | | | |

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| NOUVELLE HORIZON SCHOOL.GPJ | |
| BH LOGS - 231875 - | |

| SS SS SS SS SS SS SS SS SS SS SS SS SS | NOTES: 1.Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECC | RDS | | CORE DF | RILLING RECOF | ۶D |
|--|---|-----------------|--------------------|---------------------|------------|--------------|---------------|-------|
| 퓖 | use by others 2 Borehole backfilled with cuttings upon completion | Elapsed Time | Water Level (m) | Hole Open To (m) | Run No. | Depth (m) | % Rec. | RQD % |
| HOLE | 3. Field work supervised by an exp representative. | Completion | dry | 1.8 | | | | |
| SORE | 4. See Notes on Sample Descriptions | | | | | | | |
| L L L L | 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |
| ğ | | | | | | | | |

| | Log of Bo | orehole TP | 01 | | evn |
|---------------|---|------------------------------------|--------------|--|----------|
| Project No: | OTT-00231875-A0 | | | N 10 | CAP |
| Project: | Geotechnical Investigation, New Horizon-Jeune | esse Elementary School | Fig | ure No. <u>13</u> | 1 |
| Location: | 349 Olmstead Avenue, City of Ottawa, Ontario | | | Page I of _ I | _ |
| Date Drilled: | 'March 18, 2016 | _ Split Spoon Sample | 3 Ca | ombustible Vapour Reading | |
| Drill Type: | Backhoe | Auger Sample | Na Na | atural Moisture Content tterberg Limits | × ⊢−⊖ |
| Datum: | Geodetic | Dynamic Cone Test | – Ui ■ % | ndrained Triaxial at | . • |
| Logged by: | A.N. Checked by: I.T. | Shear Strength by + Vane Test S | ⊢ Si S Pe | near Strength by enetrometer Test | |
| s | | Standard Penetration Test N Va | alue C | Combustible Vapour Reading (p | opm) S |

| | Ģ | Y M | | Geodetic | De | | | 2 | 0 | | 4 | n | | 60 | | | 80 | | | | 2 | 50 | | 500 | 0.00 | 75 | | , | A M | Natural |
|---|------------|----------------------------------|--|----------|--------|-----|------|------|-------|------|-----------------|----|-------|-----|----------|---------------------------------------|----|-----------|---------------------------------------|----------|---------------------------------------|------|-------|-------|---------|---------------------------------------|---------------------------------------|----|------------------|-------------------|
| | Ľ | B O | SOIL DESCRIPTION | m | t h | | Shea | ar S | trer | ngth | יד ו | 0 | | 00 | | | 50 | kPa | 1 | A | ttert | berg | Limi | ts (% | | y We | eight) |) | Ē | kN/m ³ |
| \vdash | + | L \\ <i>I_V</i> .`. | TOPSOIL ~150mm | 64.6 | 0 | - | | 5 | 0 | | 10 | 00 | | 150 |) ::: | 2 | 00 | :: | - | <u>.</u> | ::2 | 20 | | 40 | | 60 |) ::: | :: | S | |
| | | . <u> </u> | | 64.5 | | | | ÷ | • • • | ÷ | ÷ | ÷ | • • • | ÷ŀ | ÷÷ | ÷ | 1 | ÷÷ | ÷ł | ÷÷ | ÷ | ŀ | • • • | 13 | ÷÷ | $\left \right $ | ÷÷ | | | |
| | | | FILL Silty sand, trace gravel, some asphalt pieces, brown, moist | | | | | | | | | | | | | · · · · · · · · · · · · · · · · · · · | | | · · · · · · · · · · · · · · · · · · · | | | | | | | | | | | |
| | ~~~~~~~~~~ | | | | | | | | | | | | | | | · · · · · · · · · · · · · · · · · · · | | | | | | × | | | | · · · · · · · · · · · · · · · · · · · | · · · · · · · · · · · · · · · · · · · | | 1 1 1 1 | |
| | | | -Underside of Footing at 1.2m depth (Elev. 63.38) | 63.4 | 1 | | | | | | | | | | | , | | · · · · · | | | · · · · · · · · · · · · · · · · · · · | | | | | | | | | |
| | | | SIL IY SAND Fine grained, oxidized staining, brown, moist | 63.1 | | | | | | | | | | | | | | | · · · · · | | | × | | | • • • • | | | | m | |
| 2318/5 - NOUVELLE HURIZON SCHOOL.GPJ IROW UTTAWA.GDT 4/6/16 | | | Test Pit Terminated at 1.50 m Depth | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 290 | NO 1. B | TES: orehol | e data requires interpretation by exp. before | WATEF | R L | .EV | /EL | RE | CC | DR | DS | 6 | | | | | | | _ | | со | RE | DR | ILLI | NG | RE | CO | RD | | |

| S 0GS | NOTES: 1.Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECO | RDS | | CORE DF | RILLING RECOF | RD |
|------------|--|-----------------|--------------------|---------------------|------------|--------------|---------------|-------|
| ⊒ , | use by others | Elapsed Time | Water Level (m) | Hole Open To (m) | Run No. | Depth (m) | % Rec. | RQD % |
| ; EHOLE | 3. Field work supervised by an exp representative. | Completion | dry | 1.5 | | <u>`</u> | | |
| BOR | 4. See Notes on Sample Descriptions | | | | | | | |
| LOG OF | OTT-00231875-A0 | | | | | | | |

| | | Log o | f Bc |)r | ehole <u>TP</u> | [,] 02 | | Δ | xn |
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| Ρ | roject No: | OTT-00231875-A0 | | | | | - 14 | | $\gamma \gamma$ |
| Ρ | roject: | Geotechnical Investigation, New Horizo | on-Jeunes | sse | e Elementary School | F | -igure No. 14 | | I |
| L | ocation: | 349 Olmstead Avenue, City of Ottawa, | Ontario | | | | Page. <u>1</u> of <u>1</u> | | |
| D | ate Drillec | l: <u>'March 18, 2016</u> | | | Split Spoon Sample | \boxtimes | Combustible Vapour Reading | | |
| D | rill Type: | Backhoe | | | Auger Sample SPT (N) Value | | Natural Moisture Content Atterberg Limits | | × ← |
| D | atum: | Geodetic | | | Dynamic Cone Test | _ | Undrained Triaxial at % Strain at Failure | | ⊕ |
| Lo | ogged by: | A.N. Checked by: I.T. | | | Shear Strength by Vane Test | + s | Shear Strength by Penetrometer Test | | |
| G W L | S Y B O L | SOIL DESCRIPTION | Geodetic m | D e p t h | Standard Penetration Test N 20 40 60 Shear Strength 50 100 150 | Value 80 kPa 200 | Combustible Vapour Reading (ppm) 250 500 750 Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60 | SA MP L L L S | Natural Unit Wt. kN/m ³ |
| | <u>N 1/</u> TO | PSOIL ~150mm | 64.7 | 0 | | | | | |

| | | | 64 | 4.8 la | | | 50 | | 00 1 | <u>50</u> | 200 | | 4 | 20 | 40 | <u> </u> | 0 | <u>د</u> |) |
|------------------|------------|---|---------|---------|-------------|------------|-----------|--------------|---|--|-------------|------------|--|----------|----------------|--|----------------|------------------|-------|
| <u></u> | <u>1,.</u> | TOPSOIL ~150mm | | ľ | Ĩ | ::: | | ÷÷ | | | | | | | | ::: | | | |
| i. | <u></u> | | 64 | 4.7 | | | 111 | <u>.</u> | | | 1111 | 11 | | | | | | | |
| | \otimes | <u>FILL</u> | | | | 0 i 0 | + i - i | ÷÷ | $\langle \cdot \cdot \cdot \cdot \rangle$ | · · · · · · · | + | i li i | $\dot{\cdot}\dot{\cdot}\dot{\cdot}\dot{\cdot}$ | 1.1.1.1 | | $\cdot \cdot \cdot \cdot$ | 1.5 | · · · · | |
| | ×. | Silty sand, some gravel, occasional | | | | | | | | | | | | | | | | | |
| | \otimes | boulders, brown, moist | | | 1 | : : : | 1 : : | ÷ ÷ | | | | : : | : : : | | ÷ ÷ | : : : | 1:: | | |
| | \otimes | | | | 12 | :::: | 111 | :::: | | | 1111 | 9 P P | ::::: | 1223 | 111 | ::::: | 122 | ::: | |
| $\mid \boxtimes$ | ≫- | | _ | | ÷ | ÷÷÷ | + : : | ÷÷ | | | ++++ | ÷÷ | | <u> </u> | | : : : : | : : | <u></u> | |
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| | XI. | | | | 1.5 | 24.2 | 1.1.5 | ÷.;. | | | 1.1.1.1. | 11 | 1.1.2 | 1.3.3.3 | | | 1.3.3. | | |
| | \otimes | | | | 1 | :::: | 1 : : | ÷ ÷ | | | 1::: | : : | ÷ ÷ ÷ | : : : | ÷ ÷ | ÷ ÷ ÷ | 1:: | :: | |
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| | \otimes | Underside of Easting at 1 5m death | | | - ÷ | ÷÷÷ | 1 i i i i | ÷÷ | +++++++ | $ \cdot \rangle \Leftrightarrow \langle \cdot \rangle$ | +++++ | ÷ŀ÷ | $\{\cdot\} \div$ | 1-2-2-3 | · · · · · · | ÷ ÷ ÷ · | 19 P | : ÷ • | |
| | \otimes | | | | 1.5 | ÷ | 1:3 | ÷. | | | 1.1.1.1.1 | :13 | ÷.;.;. | 1.: .: : | | ÷.;.;. | 133. | | |
| $\mid \boxtimes$ | \otimes | 05.52) | 63 | 3.3 | : | ::: | 1 : : | :: | | | 1 : : : | : : | ::: | 1 : : : | : : | ::: | 1 : : | :: | |
| 1 | 11 | SILTY SAND | | | Ē | | 1:: | ::: | | 1:::: | 1::: | :1: | | | | | | | |
| | | Fine grained, oxidized staining, brow | vn. | | - | ÷÷-> | · · · · · | ÷÷ | | \cdot | · · · · · · | ÷ ÷ | $\left\{\cdot\right\}$ | | •••• | • • • • | 1.0 | : ÷ +- | - |
| | | moist | , | | | | | | | | | | | | | | | | |
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| | | - Water Infiltration into the test pit at | 2.0 m | | 12 | :::: | 111 | ÷÷ | 12122 | 12222 | 1111 | 위험 | ::::: | 1223 | 111 | 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 122 | | |
| | | depth | | | | ÷÷÷ | 44.4 | ÷÷ | ÷: | | 44.54 | 24÷ | $\dot{\cdot}\dot{\cdot}\dot{\cdot}\dot{\cdot}$ | 1444 | · • • • • | ÷÷÷ | 166 | : - - - | - |
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| | | | 63 | 27 (| 2 ÷ | : : : : | 1 : : | : : : | | | 1 : : : | : : | : : : | 1 : : : | ÷ ÷ | : : : | 1 : : | | |
| | | Test Pit Terminated at 2.10 m De | epth | | 1: | *** | 1:: | <u>:</u> : : | | | 1::: | : : | ::: | 1::: | | *** | 1:: | | |
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| NOTE | S: |] | | | | | | | | | | | - | | | _ | | | |
| 1.Bore | ehole | data requires interpretation by exp. before | | WATER I | LEV | EL R | ECO | RDS | 5 | | | | CO | RE D | RILLII | NG R | ECO | RD | |
| use | by ot | hers | Elapsed | d l | W | ater | 1 | | Hole Op | en | Run | | Dep | th | 0 | % Re | C. | F | RQD % |
| 2. Tes | t Pit k | ackfilled and compacted upon completion | Time | | Leve | el (m) |) | | To (m) | | No. | | (m |) | | | | | |

| OGS | NOTES: 1.Borehole data requires interpretation by exp. before | WAT | ER LEVEL RECO | RDS | | CORE DF | RILLING RECOF | RD |
|---------|---|-----------------|--------------------|---------------------|------------|--------------|---------------|-------|
| ₽ | use by others 2 Test Pit backfilled and compacted upon completion | Elapsed Time | Water Level (m) | Hole Open To (m) | Run No. | Depth (m) | % Rec. | RQD % |
| HOLE | 3. Field work supervised by an exp representative. | Completion | dry | 2.1 | | | | |
| OREI | 4. See Notes on Sample Descriptions | | | | | | | |
| OG OF B | 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |

| Log | of Bo |)I | reho | ble | <u> </u> | P (| <u>03</u> | | | | * | 2 | xn |
|--|-------------|------------------|----------------------------|----------------|------------|------------|------------------|----------------------------------|--|---|--------------------------------------|-------------------|---------------------|
| Project No: <u>OTT-00231875-A0</u> | | | | | | | | iauro N | ~ | 15 | | | $\gamma \gamma$ |
| Project: Geotechnical Investigation, New Ho | rizon-Jeune | sse | e Elemen | tary So | chool | | Г | igure in | 0 | 15 | - | | |
| Location: <u>349 Olmstead Avenue</u> , City of Ottaw | /a, Ontario | | | | | | | Pag | e. <u>1</u> | _ of | _1_ | | |
| Date Drilled: 'March 18, 2016 | | _ | Split Spoon | Sample | | | | Combusti | ble Vapou | ır Read | ing | | |
| Drill Type: Backhoe | | | Auger Sam | ole | | | | Natural M | loisture Co | ontent | | | × |
| | | - | SPT (N) Val | lue Toot | | 0 | | Atterberg | Limits | | F | | Ð |
| Datum: <u>Geodetic</u> | | - | Shelby Tube | e rest | • | | | % Strain a | d Triaxial a at Failure | at | | | \oplus |
| Logged by: <u>A.N.</u> Checked by: I.T. | | | Shear Stren Vane Test | igth by | | + s | | Shear Str Penetrom | ength by leter Test | | | | A |
| | Geodetic | D e p t | Standa 20 Shear Stre | ard Pene 40 | tration Te | est N Val | lue 30 kPa | Combust 25 Natu Atterbe | ible Vapou 0 500 ral Moistur erg Limits (| ur Readi 0 7 re Conte '% Dry V | ing (ppm) 750 ent % Weight) | SA M P L | Natural Unit Wt. |
| | 64.7 | h 0 | 50 | 100 |) 15 | 0 2 | 00 | 20 | 40 | <u> </u> | 60 | E S | |
| TOPSOIL ~150mm FILL Sand, some silt and gravel, occasional pieces of concrete, occasional boulders, brown, moist | 64.6 | | | | | | | * | | | | | |

| | | FILL Sand, some silt and gravel, occasion pieces of concrete, occasional bould brown, moist | al ers, | | | | | | | |
|---|--|--|-------------------------------------|--------|---|-----------------------------------|------------|-------------------------|---------------|---------------------------------------|
| | | | | 1 | 1 | | | × | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| 9 | | -Underside of Footing at 2.2m depth 62.53) | (Elev | 2 | 2 | | | | | · · · · · · · · · · · · · · · · · · · |
| A.GDT 4/6/1 | | Silty to gravelly sand with some shale fragments, trace clay, dark brown, mo | e oist | | | | | x | | 21.1 |
| MATT N | | Test Pit Terminated at 2.10 m De | 62.1 | | | | | | | |
| CHOOL.GPJ TROW O | | | F | | | | | | | |
| - 231875 - NOUVELLE HORIZON S | | | | | | | | | | |
| 1 LOGS - 231875 - NOUVELLE HORIZON S | TES: orehole se by ot | data requires interpretation by exp. before | | ATER L | LEVEL RECO Water | RDS | Run | CORE DF | RILLING RECOP | D |
| LE TP LOGS - 231875 - NOUVELLE HORIZON S 1.8 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1 | TES: orehole se by ot est Pit t | data requires interpretation by exp. before hers | W/ Elapsed Time Completion | | LEVEL RECO Water Level (m) dry | RDS Hole Open To (m) 2.6 | Run No. | CORE DF Depth (m) | RILLING RECOF | D RQD % |

| | Log o | | | | | | | | | (| | |
|--------------------|--|----------|-------------|--------------------------------|------------|-------------|-------------------------|--------------------------|--|----------------|--|-------------------------------|
| Project No | OTT-00231875-A0 | | | | | | Eiguro No | | 16 | | | $\gamma \gamma$ |
| Project: | Geotechnical Investigation, New Horiz | on-Jeune | sse | e Elementary Scl | hool | | | , | 10 | | | |
| Location: | 349 Olmstead Avenue, City of Ottawa, | Ontario | | | | | Page | e. <u>1</u> | _ of _ | <u> </u> | | |
| Date Drilleo | I: 'March 18, 2016 | | _ | Split Spoon Sample | | | Combustib | le Vapou | ır Readir | g | | |
| Drill Type: | Backhoe | | | Auger Sample | | | Natural Mo | isture Co | ontent | | | × |
| D | | | - | SPT (N) Value | | 0 | Atterberg L | imits | | ŀ | | Ð |
| Datum: | Geodetic | | - | Shelby Tube | | | % Strain at | Failure | at | | | \oplus |
| Logged by: | A.N. Checked by: I.T. | | | Shear Strength by Vane Test | | — + s | Shear Stre Penetrome | ngth by ter Test | | | | |
| S | | | D | Standard Penetr | ation Test | N Value | Combustit | ble Vapou | ur Readin | g (ppm) | S | Natural |
| W B L O | SOIL DESCRIPTION | Geodetic | e p t | 20 40 Shear Strength | 60 | 80 kPa | Natura Atterber | al Moistur g Limits (| e Conter % Dry W | nt % eight) | PL | Unit Wt. kN/m ³ |
| | PSOIL ~100mm | 64.7 | 0 | 50 100 | 150 | 200 | 20 | 40 | 6 | 0 ::::: | ร | |
| | L sher-run, some brick pieces, brown | 64.6 | | | | | | | :::::::::::::::::::::::::::::::::::::: | | | |
| | | | | | | | | | | | | |
| | - | 64.1 | | | | | * | | | | : : : : : : : : : : : : | |
| FIL Silt bro | L y sand, trace gravel, some wood pieces, wn, moist | 64.1 | 1 | | | | * | | | | | |
| | L y sand, trace gravel, some wood pieces, wn, moist derside of Footing at 1.45m depth ₩. 62.53) TY SAND | 64.1 | 1 | | | | * | | | | | |

| 4/6/16 |
|-----------------|
| TROW OTTAWA.GDT |
| SCHOOL.GPJ |
| E HORIZON |
| 5 - NOUVELI |
| 0GS - 23187 |
| LE TP L |

Test Pit Terminated at 1.60 m Depth

| NOTES: 1. Borehole data requires interpretation by exp. before use by others 2. Test Pit backfilled and compacted upon completion 3. Field work supervised by an exp representative. | WAT Elapsed Time Completion | ER LEVEL RECO Water Level (m) dry | RDS Hole Open To (m) 1.6 | Run No. | CORE DF Depth (m) | RILLING RECOF | RD RQD % |
|---|--------------------------------------|--|-----------------------------------|------------|-------------------------|---------------|-------------|
| 4. See Notes on Sample Descriptions 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0 | | | | | | | |

| | | Log o | f Bo |) | rehole <u>TF</u> | 0 5 | *eyn | • |
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| Project | t No: | OTT-00231875-A0 | | | | | | • |
| Project | t: | Geotechnical Investigation, New Horizo | on-Jeune | sse | e Elementary School | | -igure No. 17 | |
| Locatio | on: | 349 Olmstead Avenue, City of Ottawa, | Ontario | | | | Page. 1 of 1 | |
| Date D | rilled: | 'March 18, 2016 | | _ | Split Spoon Sample | \boxtimes | Combustible Vapour Reading | |
| Drill Ty | pe: | Backhoe | | _ | Auger Sample SPT (N) Value | | Natural Moisture Content X Atterberg Limits | |
| Datum: | | Geodetic | | _ | Dynamic Cone Test — | | Undrained Triaxial at \oplus Strain at Failure | |
| Logged | l by: | A.N. Checked by: I.T. | | | Shear Strength by Vane Test | + s | Shear Strength by Penetrometer Test | |
| G Y M B O | | SOIL DESCRIPTION | Geodetic m | D e p t | Standard Penetration Test 20 40 60 Shear Strength | N Value 80 kPa | Combustible Vapour Reading (ppm) A 250 500 750 M Natural Moisture Content % Atterberg Limits (% Dry Weight) L KN/m ³ | |
| | PAV 50m fill | EMENT STRUCTURE m of asphalt over 200mm of granular | _63.4 _63.2 | 0 | 50 100 150 | 200 | | |
| | Sanc | and gravel, brown, moist | | | | | | |

| | | FILL Sand and gravel, brown, moist - | _ | | | | | | | | |
|---|------------------------------|---|---------------------|------------|----------------|------------|-------------|------------|--------------|---------------|-------|
| | | SILTY SAND Fine grained, oxidized staining, brow moist | 62.8 /n, 62.5 | | | | | | | | |
| | | <u>GLACIAL TILL</u> Silty to gravelly sand with some shale fragments, trace clay, dark brown, m | e oist 62.2 | 1 | | | | | * | | |
| 231875 - NOUVELLE HORIZON SCHOOL.GPJ TROW OTTAWA.GDT 4/6/16 | | Test Pit Terminated at 1.25 m De | <pre>>pth</pre> | | | | | | | | |
| so NO 1.B | TES: orehole | e data requires interpretation by exp. before | WAT | ER LEV | EL RECC | RDS | | | CORE | DRILLING RECO | RD |
| | se by o est Pit | tners | Elapsed Time | Wa Leve | ater el (m) | Hole To | Open (m) | Run No. | Depth (m) | % Rec. | RQD % |
| 의 3.F | ield wo | rk supervised by an exp representative. | Completion | d | ry | 1 | .3 | | | | |
| 4.S 5.T C | ee Not his Fig)TT-002 | es on Sample Descriptions ure is to read with exp. Services Inc. report 231875-A0 | | | | | | | | | |

| | Log of | Bc | orehole T | P 06 | 5 | avn |
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| Project No: | OTT-00231875-A0 | | | | - | CAP. |
| Project: | Geotechnical Investigation, New Horizon | -Jeunes | sse Elementary School | | Figure No. <u>18</u> Page 1 of 1 | I |
| Location: | 349 Olmstead Avenue, City of Ottawa, O | ntario | | | | _ |
| Date Drilled: | 'March 18, 2016 | | Split Spoon Sample | \boxtimes | Combustible Vapour Reading | |
| Drill Type: | Backhoe | | Auger Sample SPT (N) Value | | Natural Moisture Content Atterberg Limits | × ⊢⊸⊖ |
| Datum: | Geodetic | | Dynamic Cone Test | | Undrained Triaxial at % Strain at Failure | \oplus |
| Logged by: | A.N. Checked by: I.T. | _ | Shear Strength by Vane Test | + s | Shear Strength by Penetrometer Test | |
| G Y | | Geodetic | D Standard Penetration Te | est N Value | Combustible Vapour Reading (p 250 500 750 | ^{pm)} S M Natural |

| | G | Y | | Geodet | tic | e | | | ~ | | | | ~ | ~ | ~ | | | 2 | 50 | 5 | 500 | 7 | 50 | | м | Natural |
|-----------|------|------------------------------|--|---------------------------------------|-----|-----|-------|---------|--------------|---------------|------------------------|---|-------|---------------------------------|------------|------------------|-------|--------------------------|--------------|------------------|-------------------------------|--------------------------------|-----------------------------|--------|-----|---------|
| 1 | Ϋ́Ι | B | SUIL DESCRIPTION | m | | ₽⊢ | She | 2 | 2U Stroi | oath | 40 |) | 60 |) | 8 | 10 k Da | _ | Nati ∆tterb | ural | Moist | ture | Conte | ent % Veight | n | ۲I | |
| | - | Ľ | | 00.4 | 1 | ĥ | one | cai c | 50101 | iyui | 10 | ^ | 15 | 0 | 20 | кга 00 | | 7 (110) 0 | noig no | L | 40 | <i>C</i> , <i>y</i> , <i>i</i> | 20 | ., | Ĕ | KIN/M |
| H | | - | | 63.4 | | 0 - | | | <u></u> | | + 10 | <u>.</u> | 15 | | 2(| 1 | | ² | <u>1</u> | | 40 1 | | 1 | | 5 | |
| | | | PAVEIVIENT STRUCTURE | | | | ÷.; | ÷.: | Ŀ. | ÷.;. | ÷L | | | | | | | | Ŀ. | | | ÷.÷.;. | | ÷.:. | | |
| | | | 40mm of asphalt over 250mm of gra | nular | | Ľ | | 11 | 11 | | H | | | | | | | | 11 | | | | | | | |
| | | | fill | | | · · | é é i | 100 | ÷÷ | ÷÷ | $\left\{\cdot\right\}$ | $\dot{\cdot} \dot{\cdot} \dot{\cdot} \dot{\cdot}$ | ÷ ÷ + | $\cdot \cdot \cdot \cdot \cdot$ | • • • | \cdots | | ÷ (+) (+) | ÷ | 2423 | + | $i \leftrightarrow i$ | $ $ \cdot \cdot \cdot | ÷ • • | | |
| | | | | 63.1 | | | ÷ ÷. | ::: | <u> </u> ; . | ÷ ÷. | :1 | | | | | | | | L÷. | | 11. | : : : : : : | | ::: | | |
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| | ß | $\times\!\!\!\times$ | Gravelly sand brown moist | | | . | ÷÷ | : ÷ ÷ · | ł. i. | ÷÷ | ÷ł | | | | • • • | • • • • • • | | | .;. | 2.2.2 | ++++ | ÷÷÷ | 1.5.5 | ÷ ÷ • | | |
| | K | $\sim\!\!\sim$ | Craveny cana, brown, molec | | | | 11 | :: | | :: | : | | : : | ::: | | | | | | ::: | | ::: | 1 : : | :: | | |
| | R | $\times\!\!\times\!\!\times$ | — | | | | : : | : : | 1: | : : | 1 | ::: | | | | 1 : : : | | | 11 | :::: | 1: | ::: | 1:: | : : | | |
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| | - [: | | SILTY SAND | | | | ÷ ÷ . | ÷ ÷ | | :: | : | : : : | | : : : | : | 1 : : : | | :::: | | : : : | | : : : | | ÷ : | | |
| | - [- | | Fine grained, oxidized staining, brow | 'n, | | 1. | | :::: | 1:: | 2.2 | ÷ | | | 1111 | | | | | 1::: | ÷ ÷ ÷ | 11 | ::::: | 177 | : :: : | m | |
| | i. | | moist | | | 4. | | :.:. | . : . | : <i>:</i> . | :. | | | .:.:: | ·:. | | | . ^ | l.:. | | | :: | | :.:. | V | |
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| | K | YA) | Silty to gravely sand with some shale | e | | 1 | :: | :: | | :: | : | : : : | | ::: | : | | | × × | | : : : | | : : : | 1 : : | :: | nn2 | |
| | | 6/X | fragments, trace clay, dark brown, m | oist | | · · | ÷÷ | 1.2 | ł÷ | ÷÷. | ÷ł | | | | • • • | - : · : - : - : | ÷ | | ł÷ | : : · : | +÷ | : ÷ ÷ | 199 | ÷ | | |
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| 51 | | ES: | lo data requires interpretation by over before | W/AT | FR | ١E١ | VFI | R | FCO | OR | DS | | | | | | | CO | RF | DRI | 111 | NG R | FCO | RD | | |
| 31 | 1.00 | se hv | others | | | | | | | | | | | | ╡╏ | | | | | | | | | | - | 20.0/ |
| | ua | y | 0 | Elapsed | 1 | V | Vate | er | | 1 | - H | iole (| Ope | en | 1 | Run | 1 | Dep | th | | ¢ | % Re | c | 1 | RC | JD % |

LOG OF BOREHOLE TP 2. Test Pit backfilled and compacted upon completion 3. Field work supervised by an \boldsymbol{exp} representative.

4. See Notes on Sample Descriptions

5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0

| WAT | WATER LEVEL RECORDS | | | | CORE DR | ILLING RECOP | RD |
|-----------------|---------------------|---------------------|--|------------|--------------|--------------|-------|
| Elapsed Time | Water Level (m) | Hole Open To (m) | | Run No. | Depth (m) | % Rec. | RQD % |
| Completion | dry | 1.4 | | | | | |

| Log o | of Bo |) r | rehole | <u> </u> | P (| <u>07</u> | | | | * | 2 | xr |) |
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| OTT-00231875-A0 | | | | | | | -: NI | | 10 | | | \sim | • |
| Geotechnical Investigation, New Horiz | on-Jeunes | sse | e Elementary S | School | | F | |) | 19 | | | 1 | |
| 349 Olmstead Avenue, City of Ottawa | , Ontario | | | | | | Page | e. <u>1</u> | _ of _ | 1 | | | |
| 1: <u>'March 18, 2016</u> | | _ | Split Spoon Sampl | e | \boxtimes | | Combustib | le Vapou | ır Readin | ıg | | | |
| Backhoe | | | Auger Sample | | | | Natural Mo | isture Co | ontent | | | X | |
| Geodetic | | - | SPT (N) Value Dynamic Cone Tes | t | | | Atterberg L Undrained | Triaxial a | at | F | | € ⊕ | |
| A.N. Checked by: I.T. | | | Shelby Tube Shear Strength by Vane Test | | + s | | % Strain an Shear Stre Penetrome | ngth by eter Test | | | | | |
| SOIL DESCRIPTION | Geodetic | D e p t | Standard Per 20 4 Shear Strength | etration T | est N Va D { | lue 30 kPa | Combustit 250 Natura Atterber | ole Vapou 500 al Moistur g Limits (| ur Readin) 75 re Conter % Dry W | ig (ppm) 50 nt % 'eight) | S A M P L | Natural Jnit Wt. kN/m ³ | |
| VEMENT STRUCTURE nm of asphalt over 200mm of granular L avelly sand, brown, moist TY SAND e grained, oxidized staining, brown, ist | 63.2 63.0 62.7 | n 0 - | 50 11 | | | 00 | 20 | 40 | 6 | 0 | | | |
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4. See Notes on Sample Descriptions 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0

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| Project: | Geotechnical Investigation, New Horizo | n-Jeunes | sse | e Elementary School | F | Igure No. 20 | | I | |
| Location: | 349 Olmstead Avenue, City of Ottawa, | 49 Olmstead Avenue, City of Ottawa, Ontario | | | | | | | |
| Date Drilled: | 'March 18, 2016 | | | Split Spoon Sample | | Combustible Vapour Reading | | | |
| Drill Type: | Backhoe | | | Auger Sample SPT (N) Value | | Natural Moisture Content Atterberg Limits | | × ⊕ | |
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| 30RI | 4.S | ee Not | es on Sample Descriptions | | | | | | | | | | | | | | | | | | | | | | | | | |
| 비 | 5.T | his Fig | ure is to read with exp. Services Inc. report | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Date Drilled: | 'March 18, 2016 | Split Spoon Sample | Combustible Vapour Reading | |
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| | ģ | 11D) | GLACIAL TILL | | | | $\left \cdot \right $ | ÷÷ | | 2 | | + | $\left \cdot \right $ | | | + | \div | ÷÷÷ | ÷ | |
| | k | | _Silty to gravelly sand with some shale | | | | | | | | | | | X | | | | | n | 2 |
| | | 6/X | fragments, trace clay, occasional cob | obles, | | | | 11 | | | | | | | | | | | : N | 1 |
| | É | XX A | _dark brown, moist | 61.6 | | | | | | | · · · · · · · · · · · · · · · · · · · | | | | ***** | | | | | |
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| <u>، –</u> | | | | | | | | | | | | | | | | | | | | |
| ž ľ | ν01 Βά | ES: | e data requires interpretation by exp. before | WATER | R L | EVEL R | ECC | RDS | 3 | | | | | COF | CORE DRILLING RECORD | | | | | |
| - | us | e by c | others | Elapsed | | Water | | | Hole | Ope | n | Run | | Dept | th % Rec. | | | F | RQD % | |

LOG OF BOREHOLE TF 2. Test Pit backfilled and compacted upon completion 3. Field work supervised by an \boldsymbol{exp} representative.

4. See Notes on Sample Descriptions

5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0

| WAT | ER LEVEL RECO | RDS | | CORE DF | RILLING RECOR | ٦D |
|-----------------|--------------------|---------------------|------------|--------------|---------------|----|
| Elapsed Time | Water Level (m) | Hole Open To (m) | Run No. | Depth (m) | % Rec. | RQ |
| Completion | dry | 1.7 | | | | |

| adge Uninstead Avenue, City of Ottawa, Ontario Page: 1 of 1 bate Drilled: March 18, 2016 Split Spoon Sample Condustble Vapour Reading hill Type: Backhoe Split Spoon Sample Image: Split Sp | |
|---|-----------------|
| ate Drilled: March 18, 2016 Spit Spond Sample Image: Spit Spit Spit Spit Spit Spit Spit Spit | |
| An open service An open service <td< td=""><td></td></td<> | |
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| Soll DESCRIPTION Sold of the solution test in Value Conduction Test in Value Conductin Test in Value Conduction Tes | • |
| Bit SOL DESCRIPTION Convert Particular Strength Network Meeting Content N, Meeting M | A M Natura |
| 10PSOIL ~150mm 63.9 FILL 63.8 Silty sand, some gravel, brown, moist 63.8 Silty Sand, some gravel, brown, moist 62.7 Fine grained, oxidized staining, brown, moist 62.7 GLACIAL TILL 61.6 Silty ogravely sand with some shale 61.6 Test Pit Terminated at 2.60 m Depth 61.3 | Unit Wt |
| FILL 03.8 Silty sand, some gravel, brown, moist 62.7 Siltry SAND 62.7 Fine grained, oxidized staining, brown, moist 62.7 Silty sand, with some shale 61.6 Fragments, trace clay, dark brown, wet 61.3 Test Pit Terminated at 2.60 m Depth 61.3 | |
| Silty sand, some gravel, brown, moist | |
| - - - - × | |
| SILTY SAND Fine grained, oxidized staining, brown, moist GLACIAL TILL Silty to gravelly sand with some shale fragments, trace clay, dark brown, wet 61.3 Test Pit Terminated at 2.60 m Depth | 17.0 |
| 62.7 SILTY SAND Fine grained, oxidized staining, brown, moist | |
| 62.7 Fine grained, oxidized staining, brown, moist GLACIAL TILL Silty to gravelly sand with some shale fragments, trace clay, dark brown, wet Test Pit Terminated at 2.60 m Depth 61.3 Test Pit Terminated at 2.60 m Depth | |
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| Fragments, trace clay, dark brown, wet 61.3 Test Pit Terminated at 2.60 m Depth | |
| Test Pit Terminated at 2.60 m Depth | |
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| ES: ehole data requires interpretation by exp. before | WAT | ER LEVEL RECO | RDS | CORE DRILLING RECORD | | | | | | |
|---|-----------------|--------------------|---------------------|----------------------|--------------|--------|-------|--|--|--|
| by others | Elapsed Time | Water Level (m) | Hole Open To (m) | Run No. | Depth (m) | % Rec. | RQD % | | | |
| d work supervised by an exp representative. | Completion | dry | 2.6 | | | | | | | |
| e Notes on Sample Descriptions | | | | | | | | | | |
| s Figure is to read with exp. Services Inc. report T-00231875-A0 | | | | | | | | | | |

| | Log of B | orehole T | P 11 | 3 | ovn |
|---------------|--|---------------------------------|-------------|--|--------------------|
| Project No: | OTT-00231875-A0 | | | – | CAP. |
| Project: | Geotechnical Investigation, New Horizon-Jeun | esse Elementary School | | | 1 |
| Location: | 349 Olmstead Avenue, City of Ottawa, Ontario | | | Page. <u>1</u> of <u>1</u> | _ |
| Date Drilled: | 'March 18, 2016 | Split Spoon Sample | \boxtimes | Combustible Vapour Reading | |
| Drill Type: | Backhoe | Auger Sample — SPT (N) Value | | Natural Moisture Content Atterberg Limits | × ⊢−€ |
| Datum: | Geodetic | Dynamic Cone Test – | | Undrained Triaxial at % Strain at Failure | • • |
| Logged by: | A.N. Checked by: I.T. | Shear Strength by Vane Test | ■ + s | Shear Strength by Penetrometer Test | • |
| S | | D Standard Penetration Tes | st N Value | Combustible Vapour Reading (p | pm) S A Natural |

| | G | Y | | Geodetic | e | | | - | 250 50 | 0 750 | м | Natural | |
|----------------------------|--------|--------------|--|----------|--------------|----------------|-------|-----------------------|------------------|----------------|-------|----------|--|
| 1 | W | B | SOIL DESCRIPTION | - | p | 20 40 | 60 8 | 30 | Natural Moistu | re Content % | P | Unit Wt. | |
| | - | ò | | | h | Shear Strength | | kPa | Atterberg Limits | (% Dry weight) | È | kN/m° | |
| | - | | | 63.8 | 0 | 50 100 | 150 2 | 00 | 20 40 |) 60 | s | | |
| | | \bigotimes | FILL Silty sand to sand and gravel, brown, mo | ist | | | | | | | | | |
| | K | * | | | | | | | | | | | |
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| | | \bigotimes | | | | | | | | | | | |
| | K | \bigotimes | | | | | | | | | | | |
| | | \bigotimes | - SILTY SAND | 62.8 | 1 | | | | | | | | |
| | | | Fine grained, oxidized staining, brown, moist | | | | | | | | | | |
| | | | | | | | | | × | | m | 20.7 | |
| | | | _ | _ | | | | | | <u> </u> | | | |
| | | | GLACIAL TILL | 62.1 | | | | | | | | | |
| | L A L | | Silty to gravelly sand with some shale fragments, trace clay, dark brown, wet | | | | | | | | eson. | | |
| | ALC: N | j) SS | _ | _ | 2 | | | | | | | | |
| 91/0 | | H) H) | | | | | | | | | | | |
| 4 | | | Toot Dit Torminated at 2.40 m Donth | 61.4 | | | | | | | | | |
| AWA.G | | | Test Pit Terminated at 2.40 m Depti | | | | | | | | | | |
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| JUL.GP | | | | | | | | | | | | | |
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| 1- 9/8/2 | | | | | | | | | | | | | |
| 2 2 2 2 2 2 | | TES: | | WATER | <u>s I i</u> | | | •••• | CORE DRI | | | | |
| 2 | 1. D0 | se by | others | Flanad | | Motor Ho | | Pun Depth % Rec POD % | | | | | |

Water Level (m) dry Elapsed Time Completion lole Open <u>To (m)</u> 2.4 % Rec. RQD % Run No. Depth (m) LOG OF BOREHOLE TP 2. Test Pit backfilled and compacted upon completion 3. Field work supervised by an \boldsymbol{exp} representative. 4. See Notes on Sample Descriptions 5. This Figure is to read with exp. Services Inc. report OTT-00231875-A0



Method of Test for Sieve Analysis of Aggregate ASTM C-136 (LS-602)



| Exp Project No .: | OTT-00231875-AO | Project Name : | t Name : Geotechnical Investigation . New Horizon-Jeunesse Elementary School | | | | | | | | | | |
|----------------------|-----------------|--------------------|--|----------------|------|-------------|-------|--|--|--|--|--|--|
| Client : | CECCE | Project Location : | 349 Olmstead | Avenue, Ottawa | , ON | | | | | | | | |
| Date Sampled : | March 16, 2016 | Borehole: | 8 | Sample: | SS1 | Depth (m) : | 0-0.6 | | | | | | |
| Sample Description : | | Sand and Grav | el, Some Silt | | | Figure : | 24 | | | | | | |



Method of Test for Sieve Analysis of Aggregate ASTM C-136 (LS-602)



| Exp Project No.: | OTT-00231875-AO | O Project Name : Geotechnical Investigation . New Horizon-Jeunsse Elementary School | | | | | | | | | |
|----------------------|-----------------|---|-----------|------------------------|-----|-------------|---------|--|--|--|--|
| Client : | CECCE | Project Location : | 349 Oln | nstead Avenue, Ottawa, | ON | | | | | | |
| Date Sampled : | March 16, 2016 | Borehole: | 1 | Sample: | SS3 | Depth (m) : | 1.5-2.1 | | | | |
| Sample Description : | | Silty Sand, 1 | race Clay | | | Figure : | 25 | | | | |



Method of Test for Particle Size Analysis of Soil

MTO Test Method LS - 702, Rev. No. 19

Modified M.I.T. Classification



| Exp Project No.: | OTT-00231875-A0 | Project Name : | Geotechnical Investigation . New Horizon-Jeunesse Elementary School | | | | | | | | | |
|----------------------|-----------------|-------------------------|---|--------------------|-----|-------------|---------|--|--|--|--|--|
| Client : | CECCE | Project Location : | 349 Olmstead | Avenue, Ottawa, ON | | | | | | | | |
| Date Sampled : | March 15, 2016 | Bore Hole/Test Pit No.: | 2 | Sample No.: | SS3 | Depth (m) : | 1.5-2.1 | | | | | |
| Sample Description : | | Silty Sand, Some Clay, | Trace Gravel | | | Figure : | 26 | | | | | |



Method of Test for Sieve Analysis of Aggregate ASTM C-136 (LS-602)



| Exp Project No.: | OTT-00231875-AO | Project Name : | Project Name : Geotechnical Investigation . New Horizon-Jeunesse Elementary School | | | | | | | | | | |
|----------------------|-----------------|--------------------|--|-----------------|------|-------------|---------|--|--|--|--|--|--|
| Client : | CECCE | Project Location : | 349 Olmstead | Avenue, Ottawa, | , ON | | | | | | | | |
| Date Sampled : | March 16, 2016 | Borehole: | 1 | Sample: | SS5 | Depth (m) : | 3.0-3.6 | | | | | | |
| Sample Description : | | Silty Sand and | Gravel TILL | | | Figure : | 27 | | | | | | |



Method of Test for Particle Size Analysis of Soil

MTO Test Method LS - 702, Rev. No. 19

Modified M.I.T. Classification



| Exp Project No.: | OTT-00231875-A0 | Project Name : | Geotechnical I | se Elementary School | | | |
|----------------------|-----------------|--|----------------|----------------------|-----|-------------|---------|
| Client : | CECCE | CCE Project Location : 349 Olmstead Avenue, Ottawa, ON | | | | | |
| Date Sampled : | March 16, 2016 | Bore Hole/Test Pit No.: | 3 | Sample No.: | SS5 | Depth (m) : | 3.0-3.6 |
| Sample Description : | | Silty Gravelly Sand Ti | | Figure : | 28 | | |

exp Services Inc.

Client: CECCE Geotechnical Investigation Report Proposed Addition to New Horizon Jeunesse School 349 Olmstead Street, Ottawa, Ontario Project Number: OTT-00231875-A0 May 18, 2016

Appendix A:

Logs of Preliminary Geotechnical Investigation Completed by Exp - 2015



| | Log of | Borehole _ | 1 | 2 | eyn |
|---------------|--|---------------------------------|-------------|--|----------|
| Project No: | OTT-00226176-A0 | | _ | Ciauna Na 2 | CAP. |
| Project: | Preliminary Geotechnical Investigation. Horizo | on-Jeunesse School Re-Cons | truction | Figure No. <u>5</u> | |
| Location: | 349 Olmstead Street, Ottawa, Ontario | | | Page. 1 of 1 | _ |
| Date Drilled: | 'May 19th, 2015 | Split Spoon Sample | \boxtimes | Combustible Vapour Reading | |
| Drill Type: | CME-55 (truck mount) | Auger Sample — SPT (N) Value | | Natural Moisture Content Atterberg Limits | × ⊢−€ |
| Datum: | Depth Below Grade | Dynamic Cone Test | _ | Undrained Triaxial at % Strain at Failure | • |
| Logged by: | ML Checked by: SA | Shear Strength by Vane Test | + s | Shear Strength by Penetrometer Test | |

| | _ | s | | | Depth Belo | w D | Sta | andard P | enetration | Test N Va | lue | Combus | tible Vap | our Readir | ng (ppm |) S A | Natural |
|--|------|------------------------------|---|----------|------------|--------|---|-------------|---------------|---|-------------------|-----------|---|--------------------|----------|----------------|-------------------|
| | Ŵ | М В | SOIL DESCRIPTION | | Grade | р р | 2 | 20 | 40 | 60 | 80 | Natu | iral Moist | ure Conte | nt % | - M P | Unit Wt. |
| | - | 0 L | | | m | h | Shear | Strength | 100 1 | 50 2 | kPa | Atterb | | s (% Dry W 10 6 | (eight) | ES | kN/m [°] |
| | | · | TOPSOIL ~ 50 mm | | -0.1 | 0 | ` | 1 | | | 1 | | | | | : 17 | |
| D | ч Dч | \otimes | FILL | | | | 0 | | | 14844 | | × | · · · · · · · · · · · · · · · · · · · | | | ÷Ϊχ | |
| þ | | \otimes | Medium sand to sand and gravel, sor | me – | - | | | | | | | | | | | <u> - </u> // | |
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| P | | \otimes | | | 20 | | | 0 | | | | × | | | | ΞX | 21.0 |
| Ĕ | 9 14 | XXX | | | -2.0 | 2 | | | | | | | | | | <u>://</u> | |
| 8 | 8 | TD. | SAND & GRAVEL TILL | | | | 13333 | | | 13333 | | 12132 | | | | ÷ | |
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| Ĕ | ľ | TD) | (compact to very dense). | | | | | | | 13833 | | | | | | | |
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| þ | e he | 16/10 | SHALE BEDROCK | | -3.3 | | | | | 69 | | | | | | ٧ | |
| Ď | t h | | Billing's Formation. Horizontally strati | fied. | -3 | .5 | <u></u> | <u> </u> | + | | <u></u> | | | <u> </u> | | <u>-</u> / | |
| P h | | | fissile to very thinly bedded, nearly ve | ertical | | | | | | | | | | 13333 | | É | |
| ž | 9 19 | | joints, expansive, black, (very poor to | poor _ | - | 4 | | | | | | | ····· | | | ···· | Run 1 |
| 8 | 8 | | quality). | | | | | | | 13233 | 1 | | | | | :: | |
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| 61.9 | | | _ | _ | 1 | | | | | | | | | | | | Run 3 |
| 20 | | | | | | | | | | | | | | | | 5.5 | |
| Ξĺ | E | | _ | _ | 7.0 | 7 | | | | | | | | | | | |
| ין פ קו | H- | | Borehole Terminated at 7.2 m De | nth | -1.2 | - | | | + : : : : | + : : : : | + : : : : | | | | | H | |
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| 5 NOTES: (1) 1.Borehole data requires interpretation by exp. before | | | | WAT | ER L | EVEL R | ECORI |)S | | | CO | RE DRII | LLING RI | ECOR | D | | |
| 3 | u | se by (| others | Elaps | sed | | Water | | Hole Op | en | Run | Dept | h | % Re | C. | R | QD % |
| ц | 2.A | . 19 mr | n slotted standpipe was installed in the | Tim | 2015 | L | <u>evel (m)</u> |) | <u>To (m</u> |) | No. | (m) | 1 1 1 | 50 | | | 0 |
| 31 | a | 0161101 | e upon completion. | ividy ∠1 | , 2015 | | 3.5 | 1 | | | 1 1 | 3.01-4 | •. • • | 50 | | | U |

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5.67 - 7.2

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LOG OF BOREHOI 3. Field work supervised by an exp representative.

4. See Notes on Sample Descriptions

5. This Figure is to read with exp. Services Inc. report OTT-00226176-A0

| | Log of I | Borehole | 2 | | evn |
|---------------|--|--------------------------------|---------------|--|----------|
| Project No: | OTT-00226176-A0 | - | | | CAP. |
| Project: | Preliminary Geotechnical Investigation. Horizon- | Jeunesse School Re-Con | struction | Figure No. <u>4</u> | I |
| Location: | 349 Olmstead Street, Ottawa, Ontario | | | | _ |
| Date Drilled: | 'May 19th, 2015 | Split Spoon Sample | | Combustible Vapour Reading | |
| Drill Type: | CME-55 (truck mount) | Auger Sample SPT (N) Value | I 0 | Natural Moisture Content Atterberg Limits | × ⊢⊸⊙ |
| Datum: | Depth Below Grade | Dynamic Cone Test | - | Undrained Triaxial at % Strain at Failure | \oplus |
| Logged by: | ML Checked by: SA | Shear Strength by Vane Test | + s | Shear Strength by Penetrometer Test | A |

| | G W L | SY MBOL | SOIL DESCRIPTION | C | epth Below Grade m | D e p t h | Sta 2 Shear S | 20 Streng | 4(100 | | 60 | N Val | ue i0 kPa | Att | 250 Aatura erber | al Mois ng Limit | 500 Rea 500 ture Con ts (% Dry | tent % Weight) | n) A M P L | Natural Unit Wt. kN/m ³ |
|----------|-------------|------------------|---|----------------|--------------------------|-----------------------|---------------------|--------------|--------------|---------------|-------|-------------|-----------------|---|------------------------|--------------------------------|---|-------------------|---------------------|--|
| | | · . · . | TOPSOIL ~ 200 mm | 0 |) 0 2 | 0 | C | | | | | <u> </u> | | | 20 | | 40 | 60 | | / |
| 5 | | XXX | POSSIBLE FILL | | 0.2 | | 4 | | | | | | | | X | 2 - 2 - 2 - 2 2 - 2 - 2 - 2 | | | ÷Υ | |
| þ | | \bigotimes | - Medium sand, brown to dark brown, | moist - | | | | | | ÷ ; ; ; ; | | ÷ ÷ ÷ ÷ | | + | | · · · · · · · | | | /` | |
| P | | \bigotimes | to wet (very loose to loose). | | | | | | | | | | | | | · · · · · · · | | | | |
| Ĕ | | \bigotimes | _ | _ | | 1 | 5 | | ÷ ; . | ÷ ; · ; · ; · | : . ; | ÷ ; · ; · | • • • • • • • | • • • • • • | ÷ | ;; | | · · · · · · · | <u>.</u> | 1 |
| 8 | | \bigotimes | | | | | 0 | | | | | | | | 2 | × | | | X | |
| Q | e g | \boxtimes | | | | | 1.5 2.1 5 | | | | 345 | | | : : : : : | 30 | ; .:. ; . ; | | | :::¥_ | 4 |
| ő | | \otimes | | _ | | | 10 | | | | | ÷ ; · ; · | | | ÷. | | | | ÷A | 7 |
| R | | \otimes | | | | | 0 | | | | | | | | | X | | | ::::X | 21.5 |
| Ě | | \bigotimes | | | 2.1 | 2 | | | | | | · · · · · · | | | | <u></u> | | | <u>.</u> | 4 |
| 8 | 9 | Ŵ | SAND & GRAVEL TILL | -1- | | | 13 21 3 | | ::: | | ::: | | | | ::::: | | | | ÷L | |
| ģ | e de | | I race to some clay and slit, black sh | ale | | | 9 | | *** | ***** | | **** | • • • • • • • | · · · · · · | | <u>: :: : :</u> | | | ÷Ν | 1 |
| b | | 1H | (loose to compact) | moist, | | | 0 | | | | | | | | × | 2 - 2 - 2 - 2 2 - 2 - 2 - 2 | | | ÷ΪÅ | |
| Ê | | 1H | | | | 3 | | | | | | | | | ÷ | : ::::::: | | | <u> </u> | 4 |
| ě | 92 | 1)/ | | | | | | | | | | ÷::: | | | | | | | | 1 |
| | | ŰK) | | | | | 1 | 9.:] | ::: : | | 212 | :::::: | | | :1: | : :: : : : | | | ÷Ξ | 22.9 |
| | | 1H | _ | _ | | | | | | ÷ ; ; ; ; | | | | | | | | | ÷./^ | |
| | | 4/ <i>4/</i> | | | 3.8 | | | | | | | | | | 20 | : .: : : : | | | | 7 |
| ŀ | | | Sandy black weathered | _ | | 4 | | H | | 6 | 4/165 | mm_ | | × | | | | | ÷Ν | (|
| | | | currey, black, weathered. | | 4 4 | | -2.2.1.2 | | ÷: | <u></u> | | <u></u> | | | 21 | : -:- ; - ; | | | ::: ! / | |
| f | П. | | Borehole Terminated at auger re | fusal | | | | | | | | <u> </u> | | | | | | | ÷ | 1 |
| | | | depth of 4.4 m | | | | | 1 : : | | ::: | | ::: | | | : 1 | :::: | | | - | |
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| ß | 1.E u | soreho Ise by | le data requires interpretation by exp. before others | Flores | | | | | | | nor | | Dur | | | | | | | |
| 2 | 2 ^ | 10 m | m slotted standning was installed in the | Liapse Time | u | L | evel (m) | | F | To (n | n) | | Run No. | | eptn m) | ' | % Rec. | | RQD % | |
| 빗 | ۲.7 b | oreho | e upon completion. | 'May 21, 2 | 2015 | | Dry | | | | ., | | | | | | | | | |

2.A 19 mm slotted standpipe was installed in the borehole upon completion. LOG OF BOREHOLE

3. Field work supervised by an exp representative.

4. See Notes on Sample Descriptions

5. This Figure is to read with exp. Services Inc. report OTT-00226176-A0

| roject No: roject: | OTT-00226176-A0 Preliminary Geotechnical Investigation. Horizon-Jeunesse School Re-Construction | | | | | | | | Figure No. <u>5</u> | | | | | | | | | | | | | | | | | | |
|-----------------------|--|-------------|--------------------|------------------------------------|---------------------------|-----------|-----------|-----------|----------------------------------|---------------------------------------|-----------------------|------------------|---------------|------------------------------|------|------|----------------|--|--|--|--|--|---|--|--|----|--|
| ocation: | 349 Olmstead Street, Ottawa, Ontario | | | | | | | | Pa | ge | l_of | _1 | | | | | | | | | | | | | | | |
| ate Drilled: | 'May 19th, 2015 | | Split Spoon Sample | | | | | Combus | tible Vapo | our Readi | ing | | | | | | | | | | | | | | | | |
| rill Type: | CME-55 (truck mount) | | | | mple | | Π |] | Natural I | Moisture C | Content | - | 1 | × | | | | | | | | | | | | | |
| atum: | Depth Below Grade | | | Dynamic | Cone Tes | st | | - | Undraine | ed Triaxial | at | I | | | | | | | | | | | | | | | |
| ogged by: | ML Checked by: SA | | - | Shelby Tu Shear Str Vane Tes | ibe ength by t | | + s | | % Strain Shear Si Penetror | at Failure trength by meter Tes | e t | | | | | | | | | | | | | | | | |
| S Y | | Depth Below | , D | Sta | ndard Per | netration | Test N Va | alue | Combus | stible Vapo | our Readi | ing (ppm 750 |) S A | Natural | | | | | | | | | | | | | |
| M B O | SOIL DESCRIPTION | Grade m | p t h | 2 Shear S | 0 4 itrength | 0 | 60 | 80 kPa | Nat Atterb | ural Moistu erg Limits | ure Conte (% Dry V | ent % Veight) | – P L E | Unit Wt kN/m ³ | | | | | | | | | | | | | |
| | HALT ~ 50 mm | 0 0.1 | 0 | 5 | 0 1 | 00 | 150 2 | 200 | 2 | 4 | 0 | 60 | s | | | | | | | | | | | | | | |
| | NULAR A ~ 150 mm NULAR A ~ 200 mm | -0.4 | | 0 | | | | | × | | | | Ň | | | | | | | | | | | | | | |
| Crus | hed limestone D & GRAVEL FILL (Possible Fill) | | | | | | | | | | | | \square | | | | | | | | | | | | | | |
| some Some | e silt, light grey, moist. /n silty sand with some gravel below |] | | 0 | | | | | × | | | | | 21.5 | | | | | | | | | | | | | |
| 0.8 n | n depth (compact to loose). | - | | 7 | • • • • • • • • • | | | | | | | | Ħ | | | | | | | | | | | | | | |
| | | -2.1 | 2 | 0 | • • • • • • • • • • • • • | | | | | × | | | X | 21.0 | | | | | | | | | | | | | |
| SIL | TY SAND to Medium, light brown, moist (loose) | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| •••••• <u>SA</u> N | D & GRAVEL | -2.6 | -2.6 | | -2.6 | -2.6 | 2.6 | 2.6 | .6 | 3 | 2.6 | -2.6 | -2.6 | -2.6 | -2.6 | -2.6 | 8 ∵⊙ | | | | | | K | | | HX | |
| Trac | e to some clay and silt, black shale nents, scattered gravel, brown, moist | - | 3 | | | | | | | | | | | | | | | | | | | | | | | | |
| (com | pact to very dense). | | | 14 O | | | | | × | | | | M | | | | | | | | | | | | | | |
| | |] | | | • • • • • • • • • | | | | | | | | 4 | | | | | | | | | | | | | | |
| | | - | 4 | | | | | | × | | | | X | | | | | | | | | | | | | | |
| | | -4.6 | | | | | | | | | | | \square | | | | | | | | | | | | | | |
| | orenoie Terminated at auger refusal depth of 4.6 m | | | | | | | | | | | | | | | | | | | | | | | | | | |

| ĕ | | | | | | | | | | | | |
|-------|---|---------------|----------------|-----------|-----|----------------------|--------|-------|--|--|--|--|
| S OF | NOTES: 1.Borehole data requires interpretation by exp. before | WAT | TER LEVEL RECO | RDS | | CORE DRILLING RECORD | | | | | | |
| 8 | use by others | Elapsed | Water | Hole Open | Run | Depth | % Rec. | RQD % | | | | |
| _ | 2.A 19 mm slotted standpipe was installed in the | Time | Level (m) | To (m) | No. | (m) | | | | | | |
| OLE | borehole upon completion. | 'May 21, 2015 | Dry | | | | | | | | | |
| ШЩ. | 3. Field work supervised by an exp representative. | | | | | | | | | | | |
| BOI | 4. See Notes on Sample Descriptions | | | | | | | | | | | |
| OG OF | 5. This Figure is to read with exp. Services Inc. report OTT-00226176-A0 | | | | | | | | | | | |

exp Services Inc.

Client: CECCE Geotechnical Investigation Report Proposed Addition to New Horizon Jeunesse School 349 Olmstead Street, Ottawa, Ontario Project Number: OTT-00231875-A0 May 18, 2016

Appendix B:

Photographs: Test Pits and Cores





Photo B1: Strip Footing at Test Pit 1 – USF at 1.2 m below Grade – Elevation: **Founding Material: Silty Sand**





Photo B2: Strip Footing at Test Pit 2 – USF at 1.5 m below Grade – Elevation: **Founding Material: Silty Sand**





Photo No. B3: Test Pit No. 3- Spread Footing at a depth 2.2 m, i.e. Elevation: xx m (Partial length of Footing was exposed as shown)- **Founding Material: Glacial Till**



OTT-00231875-A0



Photo No. B4: Test Pit No. 4- Strip Footing at a depth 1.5 m, Elevation: Founding Material: Silty Sand


Geotechnical Investigation. New Horizon-Jeunesse Elementary School



Photo No. B5: Bedrock Cores from Borehole No. 1 –Run 1, Run 2 and Run 3



Geotechnical Investigation. New Horizon-Jeunesse Elementary School

OTT-00231875-A0



Photo No. B6: Bedrock Cores from Borehole No. 6 - Run 1 to 3



exp Services Inc.

Client: CECCE Geotechnical Investigation Report Proposed Addition to New Horizon Jeunesse School 349 Olmstead Street, Ottawa, Ontario Project Number: OTT-00231875-A0 May 18, 2016

Appendix C:

AGAT Laboratory Certificate





CLIENT NAME: EXP SERVICES INC 2650 QUEENSVIEW DRIVE, UNIT 100 OTTAWA, ON K2B8H6 (613) 688-1899

ATTENTION TO: Ismail M. Taki

PROJECT: OTT-231875

AGAT WORK ORDER: 16Z079086

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

DATE REPORTED: Mar 29, 2016

PAGES (INCLUDING COVER): 5

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

| *NOTES | |
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All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Member of: Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) Accrea Western Enviro-Agricultural Laboratory Association (WEALA) scope Environmental Services Association of Alberta (ESAA) Associate of Alberta (ESAA)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Page 1 of 5

Results relate only to the items tested and to all the items tested All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request



Certificate of Analysis

AGAT WORK ORDER: 16Z079086 PROJECT: OTT-231875 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: EXP SERVICES INC

SAMPLING SITE:349 Olmstead

ATTENTION TO: Ismail M. Taki

SAMPLED BY:A.N.

| | | | | | game onen | |
|-------------------------------|----------|--------------|---------|-----------|-----------|---------------------------|
| DATE RECEIVED: 2016-03-22 | | | | | | DATE REPORTED: 2016-03-29 |
| | : | SAMPLE DESCR | IPTION: | BH2 SS4 | BH5 SS4 | |
| | | SAMPLE | E TYPE: | Soil | Soil | |
| | | DATE SAM | MPLED: | 3/15/2016 | 3/15/2016 | |
| Parameter | Unit | G/S | RDL | 7455384 | 7455385 | |
| pH, 2:1 CaCl2 Extraction | pH Units | | | 7.72 | 7.75 | |
| Chloride (2:1) | µg/g | | 2 | 2 | 8 | |
| Sulphate (2:1) | µg/g | | 2 | 102 | 12 | |
| Electrical Conductivity (2:1) | mS/cm | | 0.005 | 0.336 | 0.186 | |
| Resistivity (2:1) | ohm.cm | | 1 | 2980 | 5380 | |
| | | | | | | |

Inorganic Chomistry (Soil)

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

7455384-7455385 EC/Resistivity, Chloride and Sulphate were determined on the extract obtained from the 2:1 leaching procedure (2 parts DI water: 1 part soil).pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By:



5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

Quality Assurance

CLIENT NAME: EXP SERVICES INC

PROJECT: OTT-231875

SAMPLING SITE:349 Olmstead

AGAT WORK ORDER: 16Z079086

ATTENTION TO: Ismail M. Taki

SAMPLED BY:A.N.

| Soil Ana | alysis | 5 |
|-----------|--------|-----------------|
| DUPLICATE | | REFERENCE MATER |

| RPT Date: Mar 29, 2016 | | | D | UPLICAT | E | | REFEREN | NCE MA | TERIAL | METHOD | BLANK | SPIKE | МАТ | RIX SPI | KE |
|-------------------------------|-----------|---------|--------|---------|------|-----------------|----------|-------------|----------------|----------|--------------|-------|----------|-------------|----------------|
| PARAMETER | Batch | Sample | Dup #1 | Dup #2 | RPD | Method Blank | Measured | Acce Lir | ptable nits | Recoverv | Accel Lin | | Recoverv | Acce Lir | ptable nits |
| | | Id | | | | | value | Lower | Upper | | Lower | Upper | | Lower | Upper |
| Inorganic Chemistry (Soil) | | | | | | | | | | | | | | | |
| pH, 2:1 CaCl2 Extraction | 7455384 7 | 7455384 | 7.72 | 7.74 | 0.3% | NA | 101% | 80% | 120% | NA | | | NA | | |
| Chloride (2:1) | 7457098 | | 194 | 188 | 3.1% | < 2 | 96% | 70% | 130% | 106% | 70% | 130% | 99% | 70% | 130% |
| Sulphate (2:1) | 7457098 | | 57 | 56 | 1.8% | < 2 | 103% | 70% | 130% | 103% | 70% | 130% | 99% | 70% | 130% |
| Electrical Conductivity (2:1) | 7457098 | | 0.581 | 0.579 | 0.3% | < 0.005 | 95% | 90% | 110% | NA | | | NA | | |

Comments: NA signifies Not Applicable.

Certified By:

Amanjot Bhela

AGAT QUALITY ASSURANCE REPORT (V1)

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.

Page 3 of 5



5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

Method Summary

CLIENT NAME: EXP SERVICES INC PROJECT: OTT-231875

AGAT WORK ORDER: 16Z079086 ATTENTION TO: Ismail M. Taki

SAMPLING SITE:349 Olmstead

ATTENTION TO: Ismail M. 1 SAMPLED BY:A.N.

| PARAMETER | AGAT S.O.P | LITERATURE REFERENCE | ANALYTICAL TECHNIQUE | | | | | | | | | |
|-------------------------------|--------------|---|----------------------|--|--|--|--|--|--|--|--|--|
| Soil Analysis | · | · | • | | | | | | | | | |
| pH, 2:1 CaCl2 Extraction | INOR-93-6031 | MSA part 3 & SM 4500-H+ B | PH METER | | | | | | | | | |
| Chloride (2:1) | INOR-93-6004 | McKeague 4.12 & SM 4110 B | ION CHROMATOGRAPH | | | | | | | | | |
| Sulphate (2:1) | INOR-93-6004 | McKeague 4.12 & SM 4110 B | ION CHROMATOGRAPH | | | | | | | | | |
| Electrical Conductivity (2:1) | INOR-93-6036 | McKeague 4.12, SM 2510 B | EC METER | | | | | | | | | |
| Resistivity (2:1) | INOR-93-6036 | McKeague 4.12, SM 2510 B,SSA #5 Part 3 | EC METER | | | | | | | | | |

| hain of C | ustody | Record | If this is a Dr | Inking Water | r sample, pieas | e use Drinking Water Chain of Cu | tody F | orm (p | otable v | vater i | intended | for humi | an cons | umplic | | A | linival | Tem | perati | ures: | 25 | 2.0 | 12 | 1.8 | 22- |
|---|---|----------------------------|---|----------------------|--|---|--------------------|--|-----------------|-----------------------------------|---------------|-------------------------------|------------------|--|--|---|---------|--------------------|-----------------------|-------------|--|--------------------------|----------------------------|------------------------|----------------------------|
| Report Information: Company: Exp. Scruces Enc. Contact: Isms. 1 Tak.: Address: 100 - 7650 Mucrostrian Aritics | | | | | Regulatory Requirements: No Regulatory Requirements: (Plasse theck all applicable boxes) Regulation 153/04 Sewer Use Regulation 55 | | | | | | | rem(8 | ent | Custody Seal Intact: Yes No No Notes: | | | | | | | | | | | |
| ddress: hone: eports to be sent to: | 100-2650 Overastien drive Othere Ont K2B SHG 613-688-1899 Fox Isneile Tak: @exp. con | | | | Table | □ Sanitary □ Storm | | | | CCME | | | | | Turnaround Time (TAT) Requi Regular TAT | | | | | | | Busine | i red: Iess Days | | |
| . Email: | <u> </u> | · Tak: @e | <u>exp.can</u> | | | Soil Texture (Check One) Coarse Fine | gion | Indicat | e One | - | | ither Indic | ate One | | | | | 3 Bu Days OR | isines 5 Date i | s Requir | ed (R | 2 Bus Days tush Si | iness urcharge | es May A | L Busine Day Apply): |
| roject Inform roject: ite Location: ampled By: | nation: | 231975 Clasterd | | | | Is this submission f Record of Site Condi Yes N | or a tion? O | | | Re Cer | Yes | Guide | line i Analy | on rsis NO | I | | | P * TAT | lease is exc | provie | de pri of we | ior not sekend | ification is and s | for rus | h TAT • holiday |
| GAT Quote #: nvoice Inform ompany: ontact: ddress: | Prease note: If qu nation: | ofation number is not pr | PO: ovided. client with be t Bill 1 | billed fuil price fo | ies 🌱 No 🗌 | Sample Matrix Legend B Biota GW Ground Water O Oil P Paint S Soil | ganics | | Metals | | FOC II NO/NO, | DNH, DTKN NO,NO, ONO,ON | ie) WHIC XIIIC (| t 01 T | | a state of the second se | | esticides | rganics | | - A Met will work use it remember as an i reast server for APM its inter-inter-many inter- | | and uct i sity |) form of a major sign | |
| mail: Samp'e ide | ntfication | Date Sampled | Time Sampled | # of Containers | Sample Matrix | 5D Sediment SW Surface Water Comments/ Special Instructions | Metals and Inorg | Metal Scan | Hydride Forming | Client Custom M OPP=- D p.41we | | Nutrients: DTP DNo, DNo, C | Volatiles: 🛛 voo | ABNs | PAHs | Chlorophenols | PCBs | Organochlorine F | TCLP Metals/Ino | Sewer Use | 51.1.12 | Chloride | Electo G | | |
| BH 2 BH S | 554 554 | 15[3]16 15 3]1 6 | NA | 150 | Suil | 23-97 2.3-2-7 | | administration of the second s | | | | | | | | | | er ette sonato | | | | 17 | 7 | | |
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exp Services Inc.

Client: CECCE Geotechnical Investigation Report Proposed Addition to New Horizon Jeunesse School 349 Olmstead Street, Ottawa, Ontario Project Number: OTT-00231875-A0 May 18, 2016

List of Distribution

Report Distributed To:

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