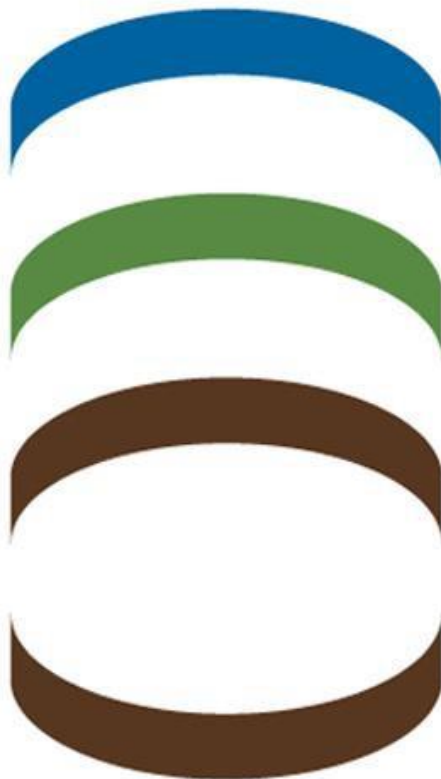
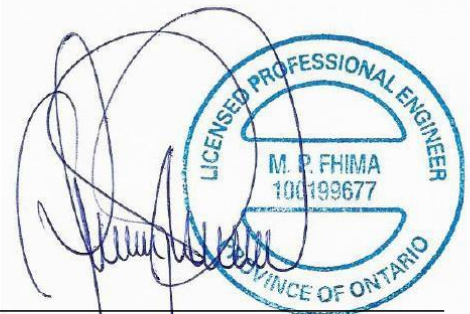


**1199NEWMARKET HOLDINGS INC.
GEOTECHNICAL INVESTIGATION**

Property located at 1195, Newmarket Street in Ottawa, Ontario
N/Ref.: 13340



Prepared by :



Pascal Fhima, Eng., P. Eng.
President and CEO

NOVEMBER 2019

Revised: **OCTOBER 2021**

Revised: October 25, 2021
Original: November 22nd 2019

Mr. Stanley Zipkin
1199 NEWMARKET HOLDINGS INC.
A-3488 Côte-des-Neiges Road
Montreal, Quebec
H3H 2M6

Object: GEOTECHNICAL STUDY
Commercial Building of one (1) storey without basement
Property located at 1195, Newmarket Street in Ottawa, Ontario

N/Ref: 13340

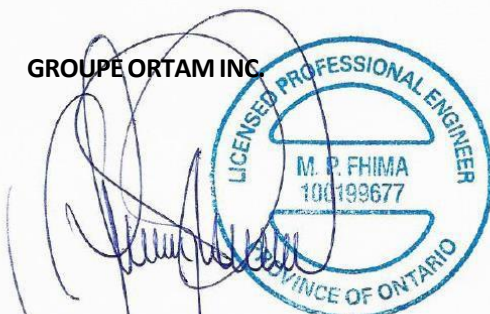
Mr. Zipkin,

Following the mandate you granted us, we are pleased to present you our report of the geotechnical study conducted for the Property mentioned above.

We thank you for giving us the opportunity to serve you and hope to engage in future collaborations. Should any further queries arise, please do not hesitate to communicate with us.

Trusting everything is to your complete satisfaction, we remain yours truly.

GROUPE ORTAM INC.



Pascal Fhima, Eng., P. Eng.
President and CEO

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1. INTRODUCTION

Mr. Stanley Zypkin of 1199 Newmarket Holdings INC. retained the services of GROUPE ORTAM Inc. (ORTAM), in order to carry out a geotechnical study for a commercial building construction project. The proposed site area for the project is located at property located at 1195, Newmarket Street in Ottawa, Ontario. The site location plan is presented in Appendix 1.

The proposed project consists in construction of a commercial building of one (1) storey without basement.

The objective of this geotechnical study in the framework of this mandate was to determine the nature and the properties of the soils as well as the bedrock and the groundwater level, if encountered, in view of the foundation design. This report describes the field and laboratory works conducted, presents the results obtained and provide geotechnical recommendations and general comments relating to the above mentioned project.

The report includes appendices as well: a borehole location plan (Appendix 1), boring log (Appendix 2), laboratory testing results (Appendix 3).

This report is subject to certain limiting conditions that result from the inherent nature of geological, geotechnical and hydrogeological profiles of the sites investigated using boreholes. The scope of the study undertaken and its limitations are elucidated at the end of this report. These limiting conditions make up an integral part of this report and the readers are encouraged to become familiar with these conditions in order to facilitate their understanding, interpretation and use of the present document.



2. SITE AND PROJECT DESCRIPTION

2.1 SITE DESCRIPTION

The site is located at 1195, Newmarket Street in Ottawa, Ontario. The site is trapezoidal in shape and covers an area of approximately 10 885 square meters (m²). The property is currently occupied by a commercial building. Considering the Newmarket Street as oriented East-West, the property is bordered to the North by the railway, to the South by Newmarket Street, to the East and to the West by commercial buildings.

One storey building with no basement is present on the eastern part of the property.

2.2 PROJECT DESCRIPTION

The project involves the construction of a commercial building with of one (1) floor without basement.

3. METHODS OF INVESTIGATION

3.1 FIELD INVESTIGATION

The field work, was carried out on August 27th , 2019 and involved the implementation of seven (7) boreholes identified as BH1 to BH7. The location of the boreholes is shown on the enclosed plan (Appendix 1). Boreholes were carried out by means of an auger drill rig to the maximum depth of 6.9 meters below the existing grades. The field work was carried out under the constant supervision of our geotechnical personnel.

The Standard Penetration Test (SPT) is performed by driving a standard split spoon sampler into the ground by blows from a drop hammer of mass 63.5 Kg falling 760 mm. The Sample is driven 600 mm into the soil at the bottom of the borehole, and the number of blows needed for the tube to penetrate each 150 mm up to a depth of 600 mm is recorded. The sum of the number of blows required for the second and third 150 mm of penetration is reported as the SPT blowcount value, commonly termed "Standard Penetration Resistance" or the "N-value". The N-value provides an indication of the relative density of the subsurface granular soil.

The soil samples have been carefully described on site as well as in our laboratory, by a soil specialist.



The field work included a survey of the boreholes and some important points of the site. The reference point (BM) of the survey is the top of the sump of the municipal sewer system located at the corner of Newmarket street and Bantree street. An arbitrary elevation of 30 m was given to this reference point (see Appendix 1).

All soil samples recovered from the boreholes not used for laboratory tests will be kept for a period of three (3) months from the date of this report, after which they will be destroyed unless otherwise requested by the client.

3.2 LABORATORY TESTING

In order to determine some of the geotechnical characteristics of the soils, and to complete the technical information gathered during fieldwork, the following laboratory testing was carried out on a representative soil sample recovered from the conducted surveys:

- ten (10) sieve analyses (BNQ 2501-025/2013);
- three (3) hydrometer analyses (BNQ 2501-025/2013);
- two (2) determinations of the liquid and plastic limits (ASTM D4318);

Test results are presented in section 4 of this report. All the geotechnical laboratory test reports are enclosed in appendix 3.

4. STRATIGRAPHY OF SUBSOIL AND GROUND WATER CONDITIONS

4.1 STRATIGRAPHY OF SUBSOIL

Details of different soil layers encountered in the borehole locations are presented in the borehole logs in Appendix 2.

In summary, the soils encountered (from the top to the bottom) are described as follows:

4.1.1 FILL MATERIALS

Fill materials encountered in the boreholes consist mostly of medium dense heterogeneous mixture of sand, silt and gravel. At the location of Borehole BH7, fill materials consist of crushed stone type MG-20. This fill



layer, with a thickness ranges between 0.3 m and 1.8 m, is wet and probably contains stones and blocks. It should be noted that, at some places, the fill material can be deeper or shallower

4.1.2 NATIVE SOIL

a) Organic soil

Directly below the fill materials at the location of boreholes BH5, an organic soil was encountered at the depth and elevation shown in table 2. This black layer, with a thickness of 0,3 m is humid.

b) Cohesive soil deposit

Beneath the fill layer at the location of boreholes BH1 and BH6, the native soil composed of a clayey silt with traces of sand (BH1) and of a clay and silt with traces of sand (BH6). This cohesive soil is wet, stiff in consistency and has a thickness of 0.5 and 1.9 m, at the location of BH6 and BH1 respectively. A summary of the geotechnical tests performed on the clay deposit are presented in the following Table 1 and 2, while the detailed laboratory results can be found in Appendix 3. This test includes particles size analysis, water content determination (Wn), Atterberg Limits (LL, PL, and IP, IL).

Table 1- Results of sieve and hydrometer analysis tests

Description	Water content (%)	Clay < 2 µm (%)	Silt < 80 µm and > 2 µm (%)	Sand < 5 mm and > 80 µm (%)	Gravel > 5 mm (%)	Sample	Borehole
Clayey silt, traces of sand	36	29	67	3	0	SS-3	BH1
Clay and silt, traces of sands		48	47	5	0	SS2B	BH6

Table 2- Laboratory test results

BOREHOLE N°	SAMPLE N°	DEPTH (M)	Wn (%)	ATTERBERG LIMITS (%)			
				LL	PL	IP	IL
BH2	SS-3	1.20 – 1.80	25	33	22	11	0,2
BH6	CF-2B	1.10 – 1.20	30	51	23	28	02



Based on the Atterberg limits, the deposit has the characteristics of **a clay with low plasticity (CL)**.

c) Granular soil deposit

Directly under the cohesive soil at the location of borehole BH1 and BH6, under the organic soil layer at the location of borehole BH5 and directly under the fill materials at the location of the other boreholes, the native soil encountered at the depth and elevation shown in table 4 is composed mainly of sand and silt with some gravel and traces of clay. This granular soil is saturated and compact to dense in density and has a thickness ranges between 0.5 (BH6) and 2.6 m (BH4).

Locally at the location of boreholes BH2 and BH3, the upper part of the granular soil is saturated and loose in density. A summary of the geotechnical tests performed on the clay deposit are presented in the following Table 3, while the detailed laboratory results can be found in Appendix 3. This tests include water content and particles size analysis by sieve and by hydrometer.

Table 1 below recapitulates the results obtained and details are presented in Appendix 3 of this report.

Table 3- Results of sieve and hydrometer analysis tests

Borehole	Sample	Gravel > 5 mm (%)	Sand < 5 mm and > 80 µm (%)	Silt < 80 µm and > 2 µm (%)	Clay < 2 µm (%)	Water content, Wn (%)	Description
BH1	SS-4B	0	40	46	14	11.8	Silt and sand, some clay
BH2	SS-4	15	46		40	9.6	Sand and silt, some gravel
BH2	SS-5	30	32		38	7.9	Sandy gravelly silt
BH3	SS-3	2	84		14	16.3	Sand some silt, traces of
BH4	SS-4	4	45		51	11.9	Silt and sand, traces of gravel
BH5	SS-3	15	47		38	8.3	Sand and silt, some gravel
BH6	SS-2A	0	91		9	11.6	Sand, traces of silt
BH7	SS3	15	49		36	-	Sand and silt, some gravel



4.1.3 BEDROCK

The bedrock was encountered at the depth and elevation presented in table 1. Samples of the rock recovered as cores are composed of clay limestone with a rock quality designation index (RQD) ranging between 55% and 90%, corresponding to a rock of poor quality to excellent quality.

It should be noted that the bedrock elevations may vary across the site due to irregularity of the bedrock surface.

Table 4 below presents an overview of the depth and elevation of each subsoil stratum encountered at the borehole location.

Table 4- Stratigraphic Summary

BOREHOLE/ ELEVATION	DEPTH AND ELAVATION (m)					END OF BOREHOLE
	FILL DEPOSIT	ORGANIC SOIL	NATURAL INORGANIC SOIL		DEPTH OF BEDROCK	
			COHESIVE SOIL	GRANULAR SOIL (TILL)		
BH1/28.8	0.0 – 0.3 (28.8 – 28.5)	-	0.3 – 2.2 (28.5 – 26.6)	2.2 – 4.0 (26.6 – 24.8)	4,0 (24.8)	6.9 (21.9)
BH2/29.0	0.0 – 0.3 (29.0 – 28.7)	-	-	0.3 – 2.8 (28.7 – 26.2)	2.8 (26.2)	4.5 (24.5)
BH3/28.8	0.0 – 1,8 (28.8 – 27.0)	-	-	1.8 – 2.4 (27.0 – 26.4)	2.4 (26.4)	5.4 (23.4)
BH4/29.0	0.0 – 0.6 (29.0 – 28.4)	-	-	0.6 – 3.2 (28.4 – 25.8)	3.2 (25.8)	4.5 (24.5)
BH5/28.2	0.0 – 0.9 (28.2 – 27.3)	0.9 – 1.2 (27.3 – 27.0)	-	1.2 – 1.8 (27.0 – 26.4)	1.8 (26.4)	3.0 (25.2)
BH6/28.9	0.0 – 1,1 (28.9 – 27.8)	-	1.1 – 1.6 (27.8 – 27.3)	1.6 – 2.1 (27.3 – 26.8)	2.1 (26.8)	2.1 (26.8)
BH7/28.7	0.0 – 1,8 (28.7 – 26.9)	-	-	1.8 – 2.7 (26.9 – 26.0)	2.7 (26.0)	2.7 (26.0)



4.2 GROUNDWATER CONDITIONS

For measuring groundwater levels, five (5) piezometers were installed in boreholes BH1 to BH5. Table 2 below shows the depths and the elevations of water table measured in boreholes BH1 to BH5, on August 2019.

Table 5- Depth and elevation of water table

	WATER LEVEL MEASURED AUGUST, 2019	
	DEPTH (m)	ELEVATION (m)
BH1 (28.8)	1.6	27.1
BH2 (29.0)	2.0	27.0
BH3 (28.8)	1.8	27.0
BH4 (29.0)	2.1	26.9
BH5 (28.9)	1.9	27.0

It should be noted that groundwater levels are, however, expected to fluctuate and can be found at higher or lower elevations during other periods of the year according to the prevailing weather conditions.



5. DISCUSSION AND RECOMMANDATIONS

It is understood that the proposed project will consist of the construction of commercial building of one (1) floor without basement. Based upon the results obtained from the borehole location and assuming them to be representative at subsurface conditions across the entire site, the following recommendations are offered for the proposed project.

5.1 ELEVATIONS

Taking into account the topography of the site and architecture plans, the following elevations are proposed:

▪ Ground level around the building:	29.0m
▪ Finished ground floor:	29.3 m
▪ Base of the foundations:	27,5 m
▪ Groundwater level (August 2019):	27.1 m
▪ Groundwater level (for calculation):	27.5 m
▪ Depth of bedrock:	between 24.8 and 26.8 m

5.2 SPECIFIC GEOTECHNICAL CONCERNS RELATED TO THE SITE

5.2.1 ESSENTIAL PROBLEMS

Specific geotechnical problems related to the site are as follow:

1. The Site is covered with backfill materials that reaches a thickness of 1.8 m at the location of boreholes BH3 and BH7.
2. Presence of an organic soil at the depth of 0.9 m (elevation 27.3 m), in borehole BH5.
3. The bedrock is shallow and at the depth ranging between 1.8 and 4.0 m.
4. The soil at the base of the foundations is heterogeneous. Part of the foundations will be on controlled backfill materials, another part on clayey silt and another again on till deposit.



5.3 FOUNDATIONS SYSTEM

Given the characteristics of the soil encountered at the location of the boreholes, and assuming these soil conditions are representative of the overall subsurface conditions of the Site, the Site is suitable to support conventional Spread and Strip footing foundations. Part of these foundations will be placed on the a clayey silt layer, another one on a till layer or on a controlled backfill layer.

5.3.1 SHALLOW FOUNDATIONS

Shallow foundations are the very first choice of foundation. They are, first and foremost, cheap and easy to construct compared to other alternatives, such as pile foundations and mat foundations.

5.3.1.1 Bearing capacity

Section 4.1.3 of the "National Building Code 2010" (NBC 2010) requires that the design of foundations is achieved using the limit states method, namely the ultimate limit states (ULS) and serviceability limit states (SLS).

The ultimate limit state defines a limiting stress that should not be exceeded by any conceivable or anticipated loading during the design life of a foundation. The serviceability limit states define a limiting deformation or settlement of a foundation, which, if exceeded, will impair the function of the structure that is supports.

At the ultimate limit state, stresses at the base of foundations, due to factored loads " $\alpha_n S_n$ " should be less than the weighted soil resistance " ΦR " ($\alpha_n S_n < \Phi R$).

The coefficients α_n are greater than 1 and the coefficient Φ is less than 1.

a) Bearing capacity at the ultimate limit state

The bearing capacity at the ultimate limit state was calculated using the shear test parameters of cohesion and angle of internal friction and the soil density of the specimens extracted from the boreholes. The following well known Terzaghi equation with correction terms can be used to calculate the ultimate bearing capacity of conventional spread and strip footing foundations.

$$q_{ult} = C N_c S_c + \gamma_o D_f N_q S_q + 0.5 \gamma_1 B N_\gamma S_\gamma$$



$$S_c = S_q = 1 + (B/L)(N_q/N_c) \text{ and}$$

$$S_\gamma = 1 - 0.4(B/L)$$

Where:

γ_o - Unit weight of soil above foundation level in kN/m^3 .

γ_1 - Unit weight of soil below foundation level in kN/m^3 .

C, ϕ - Strength parameters of the soil below foundation level in KN/m^2 and degrees respectively.

B - Width of foundation in (m).

L - Length of foundation in (m).

D_f - Depth of foundation (m)

N_c, N_q, N_γ - Bearing capacity coefficients dependent on the angle of internal friction of the soil below foundation level.

S_c, S_q, S_γ - Correction terms dependent on the geometry of foundations.

The ultimate bearing capacity should be calculated using the following geotechnical parameters.

- $\gamma_o = 18 \text{ KN/m}^3$.
- $\gamma_1 = 18 \text{ KN/m}^3$.
- $C_u = 0 \text{ kPa}$
- $\phi = 32^\circ$.
- $D_f = 1.5 \text{ m}$
- $N_c - N_q - N_\gamma = 34.3 - 22.1 - 19.5$

The ultimate bearing capacity values presented in table 6 are provided as a guideline for the structural engineer. In Ultimate Limit States design (ULS), the factored ultimate bearing capacity obtained with the factor Φ equal to **0.5** must be compared to the design ultimate load combinations. The structural engineer should verify that the design factored load (ultimate load combinations) does not exceed the factored geotechnical resistance (ΦQ_{ult}).

Table 3 below shows the values of the bearing capacity at the ULS and SLS, depending on the width of the foundations.

b) Bearing capacity at the serviceability limit state

In general, the bearing capacity at the serviceability limit state is the pressure that limits settlements to 25 mm. However, taking into account the homogeneous of the soil layers, for this specific project, the bearing



capacity at the serviceability limit state indicated in the table 6 below is the stresses that will cause settlements of 30 mm, with differential settlement less than 19 mm.

Table 6 - Bearing capacity in the Ultimate Limit State (ULS) and Serviceability Limit State (SLS)

Type of footing	Width (m)	Ultimate limit state (kPa)		Serviceability limit state (kPa)
		$q_{ultimate}$	ULS ($\phi q_{ultimate}$)	
Strip footing	0.6	350	175	200
	0.9	370	190	160
	1.2	400	200	140
	1.5	430	215	125
	1.8	490	245	110
Spread footing	1.0	544	270	330
	1.2	554	277	275
	1.5	570	285	230
	2.0	596	295	185
	2.5	620	310	160

Notes: It is important to note that only the axial loads are considered for these stress levels at the base of the foundation. In the case of the eccentric loads, the eccentricity "e" must be less than one sixth of the width "B" of the foundations ($e < B/6$) and the maximum stress at the base of the foundation must be lower than the bearing capacity in SLS. The bearing capacity is checked by taking into account the fictitious width B equal to: $B' = B - 2Xe$.

5.3.1.2 Total and differential settlement

For the bearing capacities at the Serviceability Limit State given in Table 3 above, the total settlement could be lower than 25 mm. However, differential settlement will be lower than the allowable value of 19 mm.

5.3.1.3 Minimum width of the footing

The minimum width of footings is as follow:



Strip footing : $B_{\min} = 0.6 \text{ m}$

Spread footing : $B_{\min} = 1.0 \text{ m}$

5.3.1.4 Reinforced concrete foundations

Due to the characteristics of soil deposits under the foundations and the presence of the clay layer, footings will be of reinforced concrete with reinforcing steel percentage minimum ρ_{\min} equal to:

$$\rho_{\min} = \frac{(A_s)_{\min}}{A_c} = \frac{1.4}{f_y}$$

f_y is the ultimate strength of the steel.

A_s and A_c are respectively the total area of the reinforcement steel and the area of the concrete.

5.4 SLAB ON GRADE

A conventional concrete slab, built on the ground and structurally separated from the foundation walls, can be used in the framework of this project. We recommend the following procedures for the preparation of the ground underneath the slab:

- The fill materials and the organic soils in place should be removed. All disturbed soil beneath the floor slab should also be removed.
- The slab on grade will be brought to the required elevation (see section 5.1) using only well grade granular materials placed in a thin layer not exceeding 300 mm, compacted to at least 95% of the Modified Proctor (PM) of the dry density. The last layer (base course) under the slab will be composed of crushed stones MG-20 of minimal thickness of 300 mm and compacted to a minimum of 95% of the PM.
- The granular materials that will be used as foundation under the slab will have to be DB certified. It should respect the requirements of the Bureau de Normalisation du Québec (BNQ) Standard 2560-500, should not contain any sulphurous minerals such as pyrite and should not consist of shale.
- Before pouring the concrete slab, a polyethylene membrane (0.15 mm thick) should be placed between the concrete and the granular backfill.
- Before pouring the concrete, the exposed grade should be inspected by a qualified soil engineer. Any soft spots or areas of disturbed soil must be removed and replaced with suitable compacted materials.

Following the above recommendation, the slab on grade could be design using a reaction modulus of 45MN/m.



5.5 FROST PROTECTION

The method recommended in the Canadian Foundation Engineering Manual 4th Edition (2013) was used to estimate the depth of frost penetration in the Ottawa area. This method involves the following modified Bergrenn equation, described by Aldrich (1956), Sanger (1963) and Johnston (1981):

$$X = \lambda \frac{\sqrt{2k_f I_s}}{L_s}$$

Where :

- X = frost penetration deptn;
- Is = freezing index;
- kf = thermal conductivity of the frozen ground;
- Ls = latent heat of the soil;
- λ = coefficient without unit.

The freezing index for Ottawa has been estimated to be 1000 degrees-days Celcius with a standard deviation of 143 degrees-days Celcius, obtained from BNQ 1809-300/2018. Base on this data, the calculated depth of frost will be in order of 1.80 m.

5.5.1 Building foundation

To limit the effects of frost penetration, a minimum depth of soil cover of 1.5 m is required for perimeter footings of heated structures.

5.5.2 Underground services

The underground services should be located below the depth of frost penetration of 1,8m in accordance with City of Ottawa specifications.



5.6 EXCAVATION AND SLOPE STABILITY

- The contractor will have to take all necessary precautions in order to ensure the stability of the excavation slopes. Based on the borehole results, stable temporary slopes above the groundwater level in the clayey silt soil or fill materials layer could be excavated with slopes of **1V:2H**.
 - Note: For submerged soil, the slope should be **1V:4H**.
- During the excavation, no excavated materials should be piled, nor machinery or equipment be placed, closer than the distance equivalent to the depth of the excavations.
- No vertical un-braced excavations should be performed in the soil.
- The exposed subsoil should be protected against erosion from water runoff or rain.
- An examination of the slopes should be carried out by a qualified geotechnical engineer during the construction. The stability of the slopes remains the responsibility of the contractor.

Given the fact that the basement will occupy almost the entire area of the property, it will not be possible to respect the safe excavation slopes. Table 5 below shows the Soil parameters for the calculation of the retaining walls.

5.7 SITE DRAINAGE

All grades must provide effective drainage away from the building during and after construction. This report is based on effective drainage for the life of the building and cannot be relied upon if effective drainage is not maintained. To maintain effective drainage, the contractor should respect the short-term and long-term drainage recommendations.

5.7.1 DEWATERING

Based on the boreholes results, it is anticipated that excavation will be below the groundwater. underground water problems are foreseen for excavations that could exceed 1.6 m below existing grades. Groundwater control during excavation may be achieved by conventional sump pump techniques. However, it should be left to the contractor to determine the methods of dewatering necessary to meet the project requirements.

Dewatering effort will depend on number of factors such as excavation depth, season and weather conditions, the length of time the excavation will be open.



5.7.2 LONG-TERM DRAINAGE

Since there is no basement, the French drain on the perimeter of the foundation is not required. However, the trench excavation will be backfilled with a free-draining granular material, which may contain less than **5% of fine grained and erodible materials.**

5.8 PROJECT SITE SEISMICITY AND LIQUEFACTION

5.8.1 SITE SEISMIC CONSIDERATION

As defined by Table 4.1.8.4.A “Site Classification for Seismic Site Response” of the CNBC 2010, the Site classification for seismic response is “C”.

5.8.2 LIQUEFACTION POTENTIAL OF SUB-SOILS

Granular saturated soils tend to lose strength and turn into a liquid-like state when subjected to vibration caused by an earthquake, pile driving or installation of anchors. Given the characteristics of the soil at the base of the foundation, this compact to dense layer of Silt and Till has a low risk of liquefaction.

5.8.3 SWELLING AND SHRINKAGE OF THE CLAY LAYER

During the long periods of dry season, the presence of trees on the site and its surroundings could cause the shrinkage of the clay layer. This will cause differential settlements of shallow foundations. For shallow foundations, the trees should not be planted near the structures (buildings and parking lots).

5.9 WINTER CONSTRUCTION

The subsoils encountered across the site are frost susceptible and freezing conditions could cause problems for the structure. The following recommendations are presented as preventive measures:

- During winter construction, exposed surfaces meant to support floor slabs must be protected against freezing by means of heating, loose straw and tarpaulins, etc.
- Care must be taken so that the sidewalks or asphalt pavement do not interfere with the opening of doors when the soils are subject to frost heave. This problem may be minimized by any one of several means such as:
 - keeping the doors well above the outside grade,
 - installing a structural slab at the doors,
 - using well-graded backfill and positive drainage.



- The trenches for exterior underground services should be excavated with shallow transition slopes in order to minimize the abrupt change in density between the granular backfill, which is relatively not frost-susceptible, and the more frost-susceptible native soils.

5.10 PARKING LOT

5.10.1 Excavation

At the location of the parking areas, all organic soils and fill materials should be excavated, and the structure of pavement must be built in accordance with the recommendations below.

5.10.2 FLEXIBLE PAVEMENT

- a) **Subgrade layer:** In order to reach the level of the Subgrade line, a backfill of granular materials of MG-112 type should be put in place, in a layer 300 mm thick (maximum) and compacted at 95% of the Modified Proctor (P.M.).
- b) **Base course:** the subgrade layer (in accordance with section a) should be followed (above) by a layer of crushed stone (MG-20 type) of minimal thickness of **300 mm** (light vehicles traffic or parking area) or **450 mm** (heavy vehicles traffic or parking area) and compacted to a minimum of **95% of the PM**.
- c) **Surface course:** the surface course is the top course of an asphalt pavement. For light vehicles traffic or parking area, this wearing course should be constructed by dense graded hot mix asphalt (HMA), ESG-14 type of minimal thickness of 70 mm and compacted to a minimum of 98% of the maximum density.

For heavy vehicles traffic or parking area, this wearing course should be constructed by binder course GB-20 type of minimal thickness of 100 mm and compacted to a minimum of 98% of the maximum density, followed by a surface course constructed by dense graded hot mix asphalt (HMA), ESG-10 type of minimal thickness of 60 mm and compacted of 98% of the maximum density.

Note:

- 1) ***The granular materials of the base course and the wearing course should conform to OPSS 1003 and OPSS 1150 and the hot mix asphalt should be formulated according to MTO Laboratory Testing Manual.***



- 2) *Trenches for the construction of sumps should be closed with granular materials free from excessive dust (including coatings), clay or silt, and deleterious materials, such as organics, shale, wood etc.*

5.10.3 LONG TERM DRAINAGE OF PAVEMENT

- To minimize the infiltration of surface water into the pavement, a good surface drainage is required. The pavement should be constructed so as to give to the surface of the pavement, a slope of at least 2% to allow drainage of rainwater to sumps.
- The sumps should be installed at appropriate locations and connected to the municipal sewer system.
- Manholes should be installed whenever the drain lines are changed.

5.10.4 FROST PROTECTION

The minimum total thickness of the pavement structures proposed is 770 mm. This structure will provide the recommended partial protection against frost in the Ottawa area for a local type pavement according to the AASHTO criteria.

6. QUALITATIVE CONTROL

It is recommended to proceed with a qualitative control of the various steps of the construction in order to ensure the quality of the project.

The excavation work, backfilling and compacting should be supervised in order to ensure that all disturbed soils are adequately excavated at the location of the building and that the controlled fill material is adequate to support the floor slab.

During the construction, vibrations must be controlled to ensure that they are not exceeding the safe limits beyond which liquefaction of the clay layer may cause structural damage to the existing buildings in the vicinity of the construction works.

ORTAM should be retained to provide supervision and testing services during grading, excavation, foundation construction and other geotechnical construction phases of the project.



7. LIMITATIONS OF THE INVESTIGATION

The conclusions of the geotechnical investigation are based on the results of the surveys conducted as well as on our present comprehension of the project.

It is important to emphasize that a geotechnical study consists of point sampling of a site and that the recommendations provided derive from the results obtained at the locations of the surveys only.

It is therefore presumed that these soil conditions are representative of the overall subsurface conditions of the site. Consequently, in the event that the conditions encountered during the work differ from those observed at the location of the surveys, we would appreciate to be immediately informed in order to allow us to modify our recommendations accordingly.

It is also recommended that ORTAM be permitted to review the final shop drawings and specifications in order to verify the items of construction related to geotechnical aspects. If not given the privilege of making such a review, ORTAM will assume no responsibility for misinterpretation of the recommendations of this report.

The information contained in this report is meant for geotechnical purposes only and has no bearing on the environmental aspect of the site.

8. PERSONNEL

Field work has been performed by J. Martin. This report was written by Pascal Fhima, Senior Engineer.

9. QUALIFICATIONS OF THE PERSONNEL

As President, CEO, Mr. Pascal Fhima, Eng., possesses over 21 years' experience in Environmental Site Assessments Phase I, Environmental Site Characterizations Phase II, Environmental Site Rehabilitation Phase IV, Environmental Audit of asbestos/mold/pyrite, Geotechnical studies, Cost evaluation, Building appraisals, Thermography, etc. His credentials include over 150 projects in geotechnical engineering and materials science, beyond 1000 projects in building science and over 5,000 environmental projects, completed since the establishment of ORTAM GROUP INC. (ORTAM).



10. REFERENCES

1. Canadian Foundation Engineering Manuel, 4th edition, 2006";
2. Code national du bâtiment
3. Denis Leboeuf, cours GCI-10199, Reconnaissance des sols, Conception et calcul des fondations superficielles, Université Laval, Département de génie civil, septembre 2002.
4. Richard D. Woods, Dynamic Effets of Pile Installations on Adjacent Structures, National academy press, Washington D.C., 1997
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8. Serges Leroueil, Tavenas, F. et Bihan, J-P, *Propriétés caractéristiques des argiles de l'Est du Canada*, Revue canadienne de géotechnique, vol. 4, novembre 1983, pp 681-705;
9. Silvestri Vincenzo, Cours 3420, Fondation et mécanique des sols, École Polytechnique de Montréal, Département de génie civil, janvier 1984;
10. Ontario Provincial Standard Specifications, Material
 - OPSS 1003 Aggregates - Hot Mix Asphalt
 - OPSS 1101 Performance Graded Asphalt Cement
 - OPSS 1103 Emulsified Asphalt
 - OPSS 1150 Hot Mix Asphalt
 - OPSS 1151 Superpave and Stone Mastic Asphalt Mixtures
11. Ontario Ministry of Transportation Publications
 - MTO Laboratory Testing Manual:**
 - LS-261 Preparation of Marshall Specimens
 - LS-262 Bulk Relative Density of Compacted Bituminous Mixtures
 - LS-263 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
 - LS-264 Theoretical Maximum Relative Density of Bituminous Paving Mixtures
 - LS-265 Percent Air Voids in Compacted Dense Bituminous Pavement Mixtures
 - LS-282 Quantitative Extraction of Asphalt Cement and Analysis of Extracted Aggregate from Bituminous Paving Mixtures
 - LS-287 The Determination of Percent Compaction of Compacted Bituminous Paving Mixture (MRD Method)
 - LS-292 Quantitative Determination of Asphalt Cement Content by Ignition and Analysis of Remaining Aggregate from Bituminous Paving Mixtures
 - LS-306 Bulk Relative Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
12. ASTM International
 - D 6752-03e1 Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method



13. American Association of State Highway and Transportation Officials (AASHTO)

M320-05 Standard Specification for Performance Graded Asphalt Binder

M323-07 Standard Specification for Superpave Volumetric Mix Design

T166-07 Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens

T209-05 Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

T275-07 Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens



APPENDICES



APPENDIX 1

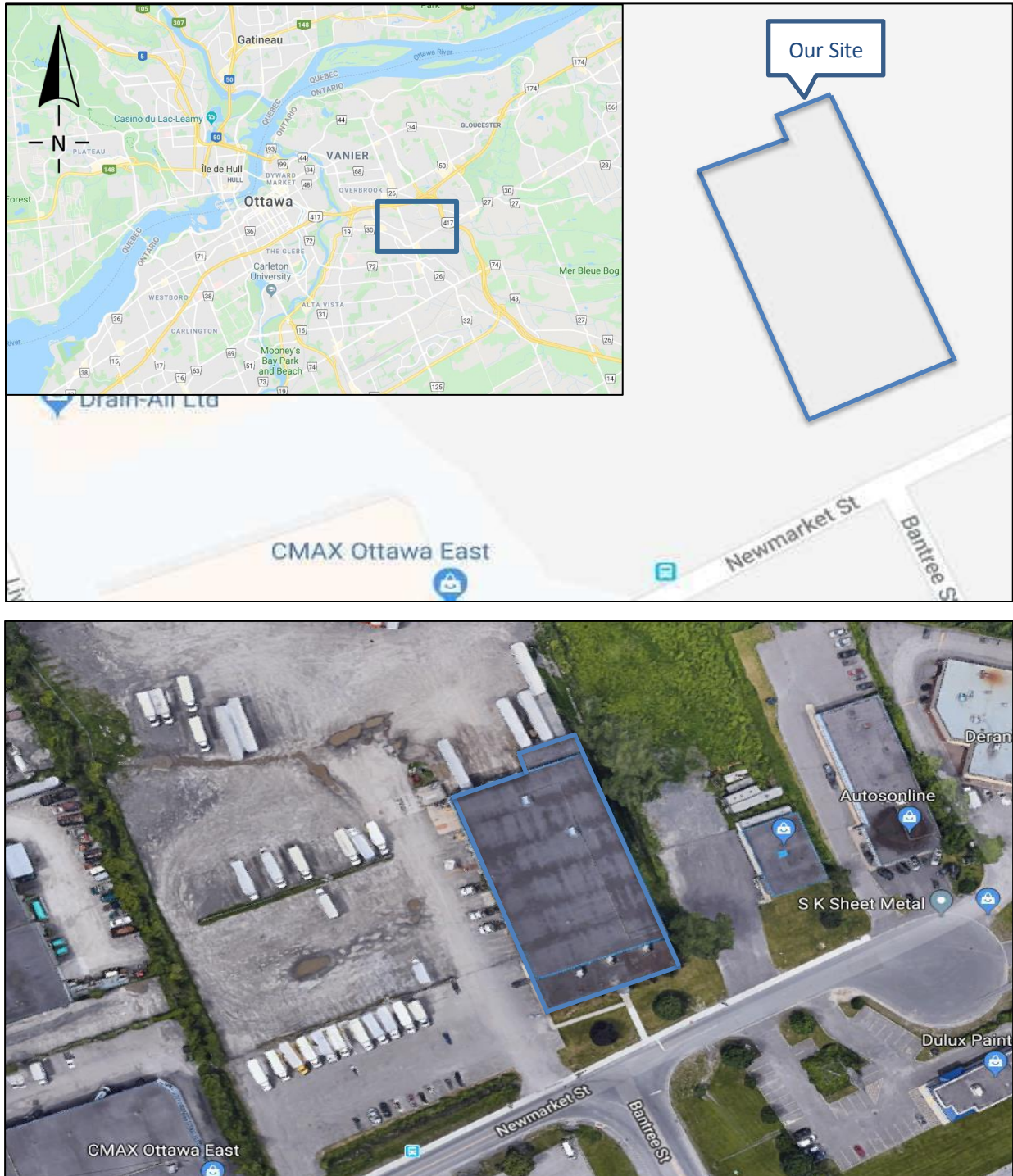
- ❖ Site location
- ❖ Location of boreholes



SITE LOCATION



GENERAL SITE LOCATION

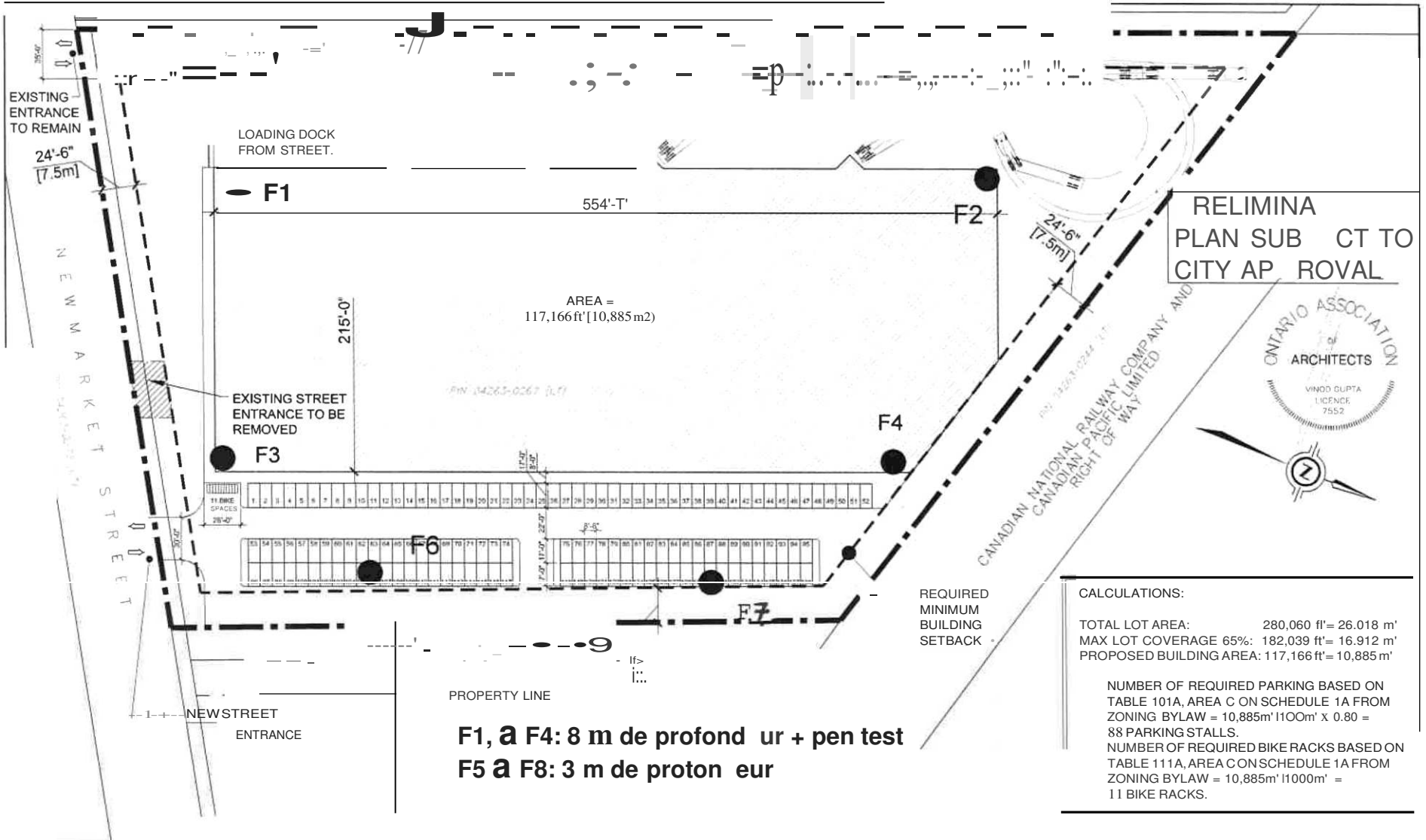


GEOTECHNICAL INVESTIGATION
O/Ref. : 13340

Source: Google Map

LOCATION OF BOREHOLES





CALCULATIONS:

TOTAL LOT AREA: 280,060 ft² = 26,018 m²
 MAX LOT COVERAGE 65%: 182,039 ft² = 16,912 m²
 PROPOSED BUILDING AREA: 117,166 ft² = 10,885 m²

NUMBER OF REQUIRED PARKING BASED ON TABLE 101A, AREA C ON SCHEDULE 1A FROM ZONING BYLAW = 10,885m² / 100m² x 0.80 = 88 PARKING STALLS.
 NUMBER OF REQUIRED BIKE RACKS BASED ON TABLE 111A, AREA C ON SCHEDULE 1A FROM ZONING BYLAW = 10,885m² / 1000m² = 11 BIKE RACKS.

F1, F4: 8 m de profondeur + pen test
F5 à F8: 3 m de profondeur

	PAS POUR CONSTRUCTION NOT FOR CONSTRUCTION	DRAWN FOR: INFORMATION	16116 r-AW 00 2018-12-21	PROPOSED SITE PLAN	18630	2018-07-12
		1199 NEWMARKET STREET OTTAWA, ONTARIO.	MM VG	1164"=1'-0" A02		

APPRIETER UN FUSILLE 11x17/10 PRINT ON 11x17 SHEET

APPENDIX 2

❖ Boreholes

Logs











Projet : Warehouse Newmarket
Site : 1199, Newmarket street, Ottawa

Forage no.: F-1

Date : 2019-08-27

Équipement : Foreuse à tarière Mobile Drill

Supervisé par : D. Héon

Type d'échantillon CF : Cuillère fendue TM : Tube à paroi mince TE : Tube d'échantillonnage CR : Carottage au diamant VR : Manuel	État de l'échantillon  Remanié  Intact  Perdu  Forage au diamant	Graphique ▲ : N (pen. standard) △ : Nc (pen. dynamique) ▼ : C _u (laboratoire) ▽ : C _w (laboratoire) ● : C _u (chantier) ○ : C _w (chantier)	Évidence de contamination Olfactive/Visuelle  Inexistant  Faible  Moyen  Fort	Coordonnées Arbitraire X : --- Y : --- Z : 28,8 m	Niveau d'eau <table border="1"> <tr> <th>Date</th> <th>Niveau</th> <th>Élev.</th> </tr> <tr> <td>2019-09-02</td> <td>1,6 m</td> <td>27,1 m</td> </tr> </table>			Date	Niveau	Élev.	2019-09-02	1,6 m	27,1 m
				Date	Niveau	Élev.							
2019-09-02	1,6 m	27,1 m											

PROFONDEUR - m	STRATIGRAPHIE		SYMBOLE	NIVEAU D'EAU - m	ÉCH. INTILLONS						N ou Nc (coups/300 mm) 50 100	RÉSISTANCE AU CISAILEMENT NON-DRAINÉ (kPa) 50 100	ESSAIS DE LABORATOIRE et RÉSULTATS IN SITU	TENEUR EN EAU et LIMITES (%) w _p w w _L 20 40 60 80
	NIVEAU - m	PROF. - m			DESCRIPTION	TYPE et NUMÉRO	ÉTAT	SOUS-ÉCHANTILLON	RÉCUPÉRATION	N. Nc ou RQD				
28,8	0,0	28,8	Surface du sol actuel											
	0,0	28,6	Asphalte (120 mm).											
	0,1	28,5	Remblai : Sable avec un peu de silt, d'argile et de gravier. Traces de sols organiques.		CF-1	A	50	20						
	0,3	28,5	Silt argileux avec traces de sable. Turquoise. Oxydé. Humide. Consistance ferme.		CF-2			100	9					
1					CF-3			100	11					
2	26,6	2,2	Till : Silt et sable avec un peu d'argile. Gris. Saturé. Compacité moyenne à très dense.		CF-4	A	65	24					IP = 11 AG	
					CF-5	B		50	22				AG	
3					CF-6			100	R					
4	24,8	4,0	Roc : Calcaire argileux. Bonne à excellente qualité.		CF-7			100	R					
5					CR-1			90	85					
6					CR-2			100	90					
7	21,9	6,9	Fin du forage.											

REMARQUES : Tube ouvert installé à 6,6 m de profondeur.









Projet : Warehouse Newmarket
Site : 1199, Newmarket street, Ottawa

Forage no.: F-2

Date : 2019-08-27

Équipement : Foreuse à tarière Mobile Drill

Supervisé par : D. Héon

Type d'échantillon CF : Cuillère fendue TM : Tube à paroi mince TE : Tube d'échantillonnage CR : Carottage au diamant VR : Manuel	État de l'échantillon  Remanié  Intact  Perdu  Forage au diamant	Graphique ▲ : N (pen. standard) △ : Nc (pen. dynamique) ▼ : C _u (laboratoire) ▽ : C _u (laboratoire) ● : C _u (chantier) ○ : C _u (chantier)	Évidence de contamination Olfactive/Visuelle  Inexistant  Faible  Moyen  Fort	Coordonnées Arbitraire X : --- Y : --- Z : 29,0 m			Niveau d'eau <table border="1"> <tr> <th>Date</th> <th>Niveau</th> <th>Élev.</th> </tr> <tr> <td>2019-09-02</td> <td>2,0 m</td> <td>27,0 m</td> </tr> </table>			Date	Niveau	Élev.	2019-09-02	2,0 m	27,0 m
				Date	Niveau	Élev.									
2019-09-02	2,0 m	27,0 m													

PROFONDEUR - m	STRATIGRAPHIE			ÉCH. INTILLONS						N ou Nc (coups/300 mm)	ESSAIS DE LABORATOIRE et RÉSULTATS IN SITU	TENEUR EN EAU et LIMITES (%)		
	NIVEAU - m	DESCRIPTION	SYMBOLE	TYPE et NUMÉRO	ÉTAT	SOUS-ÉCHANTILLON	RÉCUPÉRATION	N, Nc ou RQD	OLFACTIF				VISUEL	RÉSISTANCE AU CISAILEMENT NON-DRAINÉ (kPa)
29,0	0,0	Surface du sol actuel												
28,7	0,3	Remblai de till : Sable et silt graveleux. Brun. Compacité très dense.		CF-1	A		85	66						
27,8	1,2	Sable et silt avec traces d'argile et de gravier. Brun. Oxydé. Humide. Compacité lâche.		CF-2	B		65	8						
27,2	1,8	Till : Sable et silt avec un peu de gravier. Gris. Humide et localement saturé. Compacité moyenne à très dense.		CF-3			85	24						
26,6	2,4	Deviend gris.		CF-4			85	42			AG			
26,2	2,8	Deviend silt sableux et graveleux.		CF-5			100	R			AG			
24,5	4,5	Roc : Calcaire argileux. Mauvaise à moyenne qualité.		CR-1			90	55						
				CR-2			100	45						
		Fin du forage.												

REMARQUES : Tube ouvert installé à 4,2 m de profondeur.





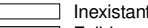


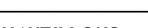
Projet : Warehouse Newmarket
Site : 1199, Newmarket street, Ottawa

Forage no.: F-3

Date : 2019-08-27

Équipement : Foreuse à tarière Mobile Drill

Supervisé par : D. Héon

Type d'échantillon	État de l'échantillon	Graphique	Évidence de contamination	Coordonnées	Niveau d'eau		
CF : Cuillère fendue TM : Tube à paroi mince TE : Tube d'échantillonnage CR : Carottage au diamant VR : Manuel	 Remanié  Intact  Perdu  Forage au diamant	▲ : N (pen. standard) △ : Nc (pen. dynamique) ▼ : C _u (laboratoire) ▽ : C _w (laboratoire) ● : C _u (chantier) ○ : C _w (chantier)	Olfactive/Visuelle  Inexistant  Faible  Moyen  Fort	Arbitraire X : --- Y : --- Z : 28,8 m	Date	Niveau	Élév.
					2019-09-02	1,8 m	27,0 m

PROFONDEUR - m	STRATIGRAPHIE		SYMBOLE	NIVEAU D'EAU - m	ÉCH. INTILLONS					N ou Nc (coups/300 mm)	RÉSISTANCE AU CISAILEMENT NON-DRAINÉ (kPa)	ESSAIS DE LABORATOIRE et RÉSULTATS IN SITU	TENEUR EN EAU et LIMITES (%)
	NIVEAU - m	PROF. - m			DESCRIPTION	TYPE et NUMÉRO	ÉTAT	SOUS-ÉCHANTILLON	RÉCUPÉRATION				
	28,8	0,0	Surface du sol actuel										
		27,6	Remblai probable : Sable avec un peu de silt et traces de gravier. Brun. Humide. Traces de sols organiques.		CF-1			50	8				
1		27,6	Deviend très humide.		CF-2			35	6				
		27,0			CF-3			65	6				
2		26,9	Silt et sable avec un peu d'argile. Brun. Oxydé. Humide. Compacité lâche.		CF-4	A		50	R				
		26,4	Till : Sable et silt avec un peu de gravier et traces d'argile. Gris. Saturé. Compacité moyenne à très dense.			B							
		2,4	Roc : Calcaire argileux. Moyenne à excellente qualité.		CR-1			90	65				
3													
4													
5		23,4			CR-2			90	90				
6		5,4	Fin du forage.										
7													

REMARQUES : Tube ouvert installé à 5,1 m de profondeur.









Projet : Warehouse Newmarket
Site : 1199, Newmarket street, Ottawa

Forage no. : F-4

Date : 2019-08-27

Équipement : Foreuse à tarière Mobile Drill

Supervisé par : D. Héon

Type d'échantillon CF : Cuillère fendue TM : Tube à paroi mince TE : Tube d'échantillonnage CR : Carottage au diamant VR : Manuel	État de l'échantillon  Remanié  Intact  Perdu  Forage au diamant	Graphique ▲ : N (pen. standard) △ : Nc (pen. dynamique) ▼ : C _u (laboratoire) ▽ : C _w (laboratoire) ● : C _u (chantier) ○ : C _w (chantier)	Évidence de contamination Olfactive/Visuelle  Inexistant  Faible  Moyen  Fort	Coordonnées Arbitraire X : --- Y : --- Z : 29,0 m	Niveau d'eau <table border="1"> <tr> <th>Date</th> <th>Niveau</th> <th>Élev.</th> </tr> <tr> <td>2019-09-02</td> <td>2,1 m</td> <td>26,9 m</td> </tr> </table>			Date	Niveau	Élev.	2019-09-02	2,1 m	26,9 m
				Date	Niveau	Élev.							
2019-09-02	2,1 m	26,9 m											

PROFONDEUR - m	STRATIGRAPHIE		SYMBOLE	NIVEAU D'EAU - m	ECHANTILLONS					N ou Nc (coups/300 mm)	RÉSISTANCE AU CISAILEMENT NON-DRAINÉ (kPa)	ESSAIS DE LABORATOIRE et RÉSULTATS IN SITU	TENEUR EN EAU et LIMITES (%)
	NIVEAU - m	PROF. - m			DESCRIPTION	TYPE et NUMÉRO	ÉTAT	SOUS-ÉCHANTILLON	RÉCUPÉRATION				
	29,0	0,0	Surface du sol actuel										
		28,4	Remblai granulaire : Sable et gravier silteux. Brun. Compacité très dense.		CF-1	×	100	76					
1		0,6	Sable et silt avec traces d'argile et de gravier. Brun. Oxydé. Humide à très humide. Compacité moyenne.		CF-2	×	65	12					
		27,8	Till : Silt et sable avec traces de gravier. Gris. Saturé. Compacité moyenne à très dense.		CF-3	×	50	23					
2		27,2	Deviens très humide.		CF-4	×	65	40			AG		
		1,8			CF-5	×	100	61					
3		25,8	Partie supérieure du roc. Friable.		CF-6	×	100	R					
		3,2			CF-7	×	35	R					
4		24,5	Fin du forage. Refus sur le roc sain probable.		CF-8	×	100	R					
5		4,5											

REMARQUES : Tube ouvert installé à 4,2 m de profondeur.









Projet : Warehouse Newmarket
Site : 1199, Newmarket street, Ottawa






Forage no. : F-5

Date : 2019-08-27

Équipement : Foreuse à tarière Mobile Drill

Supervisé par : D. Héon

Type d'échantillon CF : Cuillère fendue TM : Tube à paroi mince TE : Tube d'échantillonnage CR : Carrotage au diamant VR : Manuel	État de l'échantillon  Remanié  Intact  Perdu  Forage au diamant	Graphique ▲ : N (pen. standard) △ : Nc (pen. dynamique) ▼ : C _u (laboratoire) ▽ : C _w (laboratoire) ● : C _u (chantier) ○ : C _w (chantier)	Évidence de contamination Olfactive/Visuelle  Inexistant  Faible  Moyen  Fort	Coordonnées Arbitraire X : --- Y : --- Z : 28,2 m			Niveau d'eau Date Niveau Élev.		
				Niveau d'eau Date Niveau Élev.					

PROFONDEUR - m	STRATIGRAPHIE			SYMBOLE	NIVEAU D'EAU - m	ÉCH. INTILLONS					N ou Nc (coups/300 mm) 50 100	RÉSISTANCE AU CISAILEMENT NON-DRAINÉ (kPa) 50 100	ESSAIS DE LABORATOIRE et RÉSULTATS IN SITU	TENEUR EN EAU et LIMITES (%) w _p w w _L 20 40 60 80
	NIVEAU - m	PROF. - m	DESCRIPTION			TYPE et NUMÉRO	ÉTAT	SOUS-ÉCHANTILLON	RÉCUPÉRATION	N, Nc ou RQD				
	28,2	0,0	Surface du sol actuel											
		0,0	Remblai granulaire : Sable et silt graveleux. Brun. Compacité très dense.			CF-1		65	64					
	27,3	0,9	Terre végétale. Brun foncé.			CF-2		35	9					
	27,0	1,2	Till : Sable et silt avec un peu de gravier. Gris. Saturé. Compacité moyenne à très dense.			CF-3		85	R				AG	
	26,4	1,8	Partie supérieure du roc.		1,5	CF-4		50	R					
						CF-5		50	R					
	25,2	3,0	Fin du forage.											

REMARQUES : Nappe phréatique estimée : 1,5 m (élévation : 26,7 m).









Projet : Warehouse Newmarket
Site : 1199, Newmarket street, Ottawa

Forage no. : F-6

Date : 2019-08-27

Équipement : Foreuse à tarière Mobile Drill

Supervisé par : D. Héon

Type d'échantillon CF : Cuillère fendue TM : Tube à paroi mince TE : Tube d'échantillonnage CR : Carottage au diamant VR : Manuel	État de l'échantillon  Remanié  Intact  Perdu  Forage au diamant	Graphique ▲ : N (pen. standard) △ : Nc (pen. dynamique) ▼ : C _u (laboratoire) ▽ : C _w (laboratoire) ● : C _u (chantier) ○ : C _w (chantier)	Évidence de contamination Olfactive/Visuelle  Inexistant  Faible  Moyen  Fort	Coordonnées Arbitraire X : --- Y : --- Z : 28,9 m	Niveau d'eau		
					Date 2019-09-02	Niveau 1,9 m	Élev. 27,0 m

PROFONDEUR - m	STRATIGRAPHIE			ÉCH. INTILLONS						N ou Nc (coups/300 mm) 50 100	RÉSISTANCE AU CISAILLEMENT NON-DRAINÉ (kPa) 50 100	ESSAIS DE LABORATOIRE et RÉSULTATS IN SITU	TENEUR EN EAU et LIMITES (%) w _p w w _L 20 40 60 80	
	NIVEAU - m	PROF. - m	DESCRIPTION	SYMBOLE	NIVEAU D'EAU - m	TYPE et NUMÉRO	ÉTAT	SOUS-ÉCHANTILLON	RÉCUPÉRATION					N, Nc ou RQD
	28,9	0,0	Surface du sol actuel											
	28,6	0,3	Remblai : Sable fin à moyen graveleux avec un peu de silt. Humide.			CF-1	A	85	18					
			Remblai probable : Sable avec traces de silt. Oxydé. Humide. Compacité moyenne.			CF-2	A	65	10					
1	27,8	1,1	Argile et silt avec traces de sable. Turquoise. Oxydé. Humide. Compacité moyenne.			CF-3	A	100	19				AG	
			Till : Sable et silt avec un peu de gravier et traces d'argile. Gris. Saturé. Compacité moyenne à très dense.			CF-4	B						IP = 28 AG	
2	26,8	2,1	Fin du forage. Refus sur le roc probable.		1,9									

REMARQUES : Tube ouvert installé à la base du forage.









Projet : Warehouse Newmarket
Site : 1199, Newmarket street, Ottawa

Forage no.: F-7

Date : 2019-08-27

Équipement : Foreuse à tarière Mobile Drill

Supervisé par : D. Héon

Type d'échantillon CF : Cuillère fendue TM : Tube à paroi mince TE : Tube d'échantillonnage CR : Carottage au diamant VR : Manuel	État de l'échantillon  Remanié  Intact  Perdu  Forage au diamant	Graphique ▲ : N (pen. standard) △ : Nc (pen. dynamique) ▼ : C _u (laboratoire) ▽ : C _w (laboratoire) ● : C _u (chantier) ○ : C _w (chantier)	Évidence de contamination Olfactive/Visuelle  Inexistant  Faible  Moyen  Fort	Coordonnées Arbitraire X : --- Y : --- Z : 28,7 m			Niveau d'eau Date Niveau Élev.		

PROFONDEUR - m	STRATIGRAPHIE			SYMBOLE	NIVEAU D'EAU - m	ÉCH. INTILLONS						N ou Nc (coups/300 mm) 50 100	RÉSISTANCE AU CISAILEMENT NON-DRAINÉ (kPa) 50 100	ESSAIS DE LABORATOIRE et RÉSULTATS IN SITU	TENEUR EN EAU et LIMITES (%) w _p w w _L 20 40 60 80
	NIVEAU - m	PROF. - m	DESCRIPTION			TYPE et NUMÉRO	ÉTAT	SOUS-ÉCHANTILLON	RÉCUPÉRATION	N, Nc ou RQD	OLFACTIF				
	28,7	0,0	Surface du sol actuel			CF-1	Remanié		100		R				
	28,1	0,6	Remblai : Sable et silt avec un peu de gravier. Brun. Humide. Compacité dense.			CF-2	Intact		50		36				
1					1,5	CF-3	Remanié		100		37			AG	
	26,9	1,8	Till : Sable et silt avec un peu de gravier. Gris. Humide. Compacité très dense.			CF-4	Intact		85		51				
2						CF-5	Remanié		100		R				
	26,0	2,7	Fin du forage. Refus sur le roc probable.												
3															
4															
5															
6															
7															

REMARQUES : Nappe phréatique estimée : 1,5 m (élévation : 27,2 m).

DESCRIPTION ET CLASSIFICATION DES SOLS ET DU ROC :

CLASSIFICATION

Argile	<0,002 mm
Silt	0,002 a 0,08 mm
Sable	0,08 a 5 mm
Gravier	5 a 80 mm
Cailloux	80 a 300 mm
Blocs	> 300 mm

TERMINOLOGIE

"traces"	< 10 %
"un peu"	10-20 %
adjectif (silteux, sableux)	20-35 %
nom (silt, sable)	> 35 %

COMPACTITE DES SOLS GRANULAIRES **INDICE DE PENETRATION STANDARD "N"**
(coups/300 mm)

Tres lache	< 4
Lache	4-10
Compact ou moyenne	10-30
Dense	30-50
Tres dense	> 50

CONSISTANCE DES SOLSCOHERENTS **RESISTANCE AU CISAILLEMENT C_u**
(kPa)

Tres molle	< 12
Molle	12-25
Ferme	25-50
Raide	50-100
Tres raide	100-200
Dure	> 200

INDICE DE LA QUALITE DU ROC

VALEUR "RQD"	QUALITATIF
< 25	tres mauvais
25-50	mauvais
50-75	moyen
75-90	bon
> 90	excellent

ELEVATION :

Niveau geodesique ou arbitraire du terrain a l'emplacement du sondage. Le point geodesique ou arbitraire utilise est defini dans le rapport.

PROFONDEUR :

Profondeur des differents contacts geologiques a partir de la surface du terrain.

STRATIGRAPHIE :

Chaque formation geologique est decrite selon la terminologie d'usage. Le contact entre les formations geologiques est identifie par une ligne pleine lorsque la profondeur est bien definie ou par une ligne en pointille. La precision du contact est relatif a la methode d'echantillonnage et le pourcentage de recuperation.

ECHANTILLONS :

ETAT

La position, la longueur et l'etat de chaque echantillon sont montres dans cette colonne. Les symboles suivants sont utilises pour definir l'etat de l'echantillon.



: Remanie



: Intact



: Perdu



: Carotte de roc

TYPE ET NUMERO

Le type d'echantillonneur utilise est defini par l'abreviation indique ci-apres. La numerotation est continuee pour chacun des types.

CF : Cuillere fendue

TM : Tube a paroi mince

VR : Vrac

TE : Tube d'echantillonnage

CR : Carottier diamante

CFE, VRE, TEE : Echantillonnage environnemental

ESSAIS DE CHANTIER :

N : Indice de penetration standard

N_C : Indice de penetration dynamique au cone

R : Refus a l'enfoncement

C_u : Resistance au cisaillement non draine

k : permeabilite

RQD : Indice de la qualite du roc

RECUPERATION :

La recuperation de l'echantillon est le rapport exprime en pourcentage de la longueur recuperee dans l'echantillonneur a la longueur enfoncee.

RESULTATS DES ESSAIS :

Cette colonne contient a la profondeur correspondante, les essais effectues au chantier ou en laboratoire. Les resultats de ces essais sont soit presentes dans cette colonne, dans le rapport ou dans les certificats des essais de laboratoire.

ESSAIS DE LABORATOIRE :

I_p : Indice de plasticite

AG : Analyse granulo-sedimentometrique

CS : Cone Suedois

w_L : Limite liquide

w : Teneur en eau

CHIM : Analyse chimique

w_p : Limite plastique

γ : Poids volumique

σ_p' : Pression de preconsolidation

APPENDIX 3

❖ Laboratory testing results



CLIENT: 1199 NEWMARKET HOLDINGS INC.

DOSSIER: 13340

PROJET: 1199, Newmarket street, Ottawa

ANALYSE NO: 19-478-1

DONNÉES GÉNÉRALES

Description: Silt argileux avec traces de sable	Prélevé le: 2019-08-27	Par: D. H.
Provenance: F-1 / CF-3	Analysé le: 2019-09-11	Par: A. P.

ANALYSE GRANULOMÉTRIQUE		SÉDIMENTOMÉTRIE		
		TEMPS (MIN)	DIAMÈTRE (MM)	% PASSANT
112 mm	100			
80 mm	100	0,5	0,057	95,9
56 mm	100	1	0,041	94,1
40 mm	100	2	0,029	91,0
28 mm	100	5	0,019	82,3
20 mm	100	15	0,011	68,7
14 mm	100	30	0,008	57,5
10 mm	100	60	0,006	48,9
5 mm	100	120	0,004	41,5
2,5 mm	100	240	0,003	34,7
1,25 mm	100	480	0,002	31,6
630 µm	100	1440	0,001	24,1

COURBE GRANULOMÉTRIQUE



RÉSUMÉ DES ESSAIS

Argile %	29
Silt %	67
Sable %	3
Gravier %	0

REMARQUES

Teneur en eau : 36 %

CLIENT: 1199 NEWMARKET HOLDINGS INC.
PROJET: 1199, Newmarket street, Ottawa

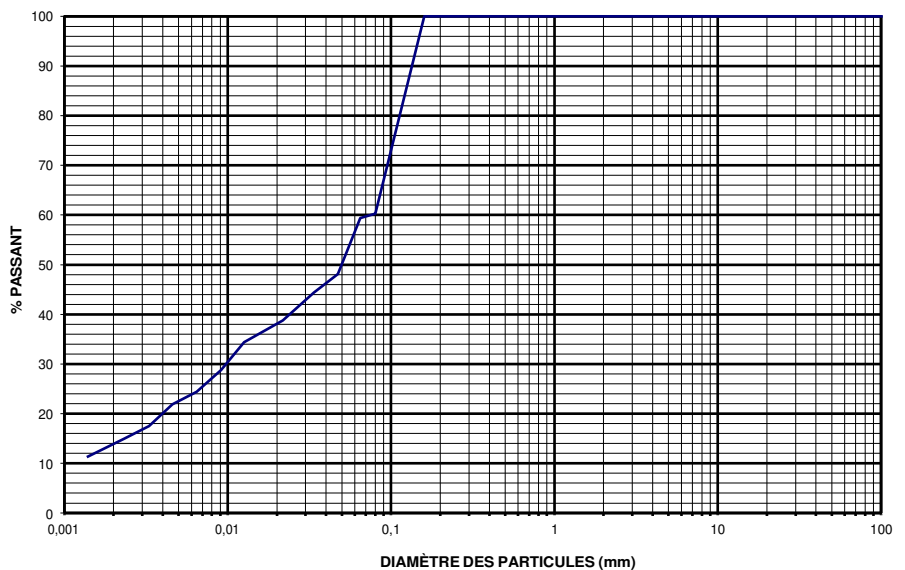
DOSSIER: 13340
ANALYSE NO: 19-478-2

DONNÉES GÉNÉRALES

Description: Silt et sable avec un peu d'argile	Prélevé le: 2019-08-27	Par: D. H.
Provenance: F-1 / CF-4B	Analysé le: 2019-09-11	Par: A. P.

ANALYSE GRANULOMÉTRIQUE		SÉDIMENTOMÉTRIE		
		TEMPS (MIN)	DIAMÈTRE (MM)	% PASSANT
112 mm	100			
80 mm	100	0,5	0,065	59,4
56 mm	100	1	0,047	48,1
40 mm	100	2	0,034	44,4
28 mm	100	5	0,022	38,8
20 mm	100	15	0,013	34,4
14 mm	100	30	0,009	28,8
10 mm	100	60	0,006	24,4
5 mm	100	120	0,005	21,9
2,5 mm	100	240	0,003	17,5
1,25 mm	100	480	0,002	15,0
630 µm	100	1440	0,001	11,3
315 µm	100			
160 µm	100			
80 µm	60,3			

COURBE GRANULOMÉTRIQUE



RÉSUMÉ DES ESSAIS

Argile %	14
Silt %	46
Sable %	40
Gravier %	0

REMARQUES

Teneur en eau : 11,8 %

CLIENT: 1199 NEWMARKET HOLDINGS INC.

DOSSIER: 13340

PROJET: 1199, Newmarket street, Ottawa

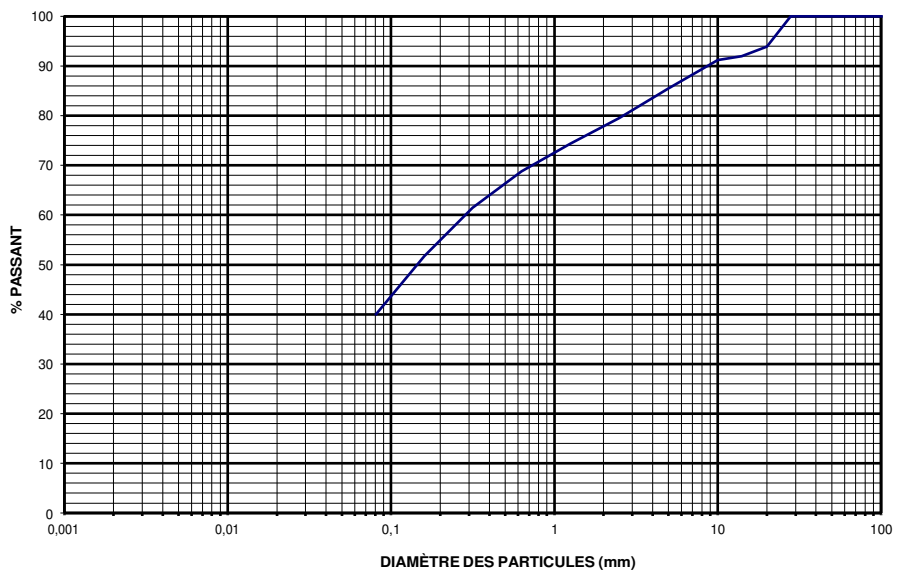
ANALYSE NO: 19-478-3

DONNÉES GÉNÉRALES

Description: Sable et silt avec un peu de gravier	Prélevé le: 2019-08-27	Par: D. H.
Provenance: F-2 / CF-4	Analysé le: 2019-09-11	Par: A. P.

ANALYSE GRANULOMÉTRIQUE		SÉDIMENTOMÉTRIE		
		TEMPS (MIN)	DIAMÈTRE (MM)	% PASSANT
112 mm	100			
80 mm	100	0,5		
56 mm	100	1		
40 mm	100	2		
28 mm	100	5		
20 mm	94	15		
14 mm	92	30		
10 mm	91	60		
5 mm	85	120		
2,5 mm	80	240		
1,25 mm	74	480		
630 µm	69	1440		

COURBE GRANULOMÉTRIQUE



RÉSUMÉ DES ESSAIS

Argile %	0
Silt %	40
Sable %	46
Gravier %	15

REMARQUES

Teneur en eau : 9,6 %

CLIENT: 1199 NEWMARKET HOLDINGS INC.
PROJET: 1199, Newmarket street, Ottawa

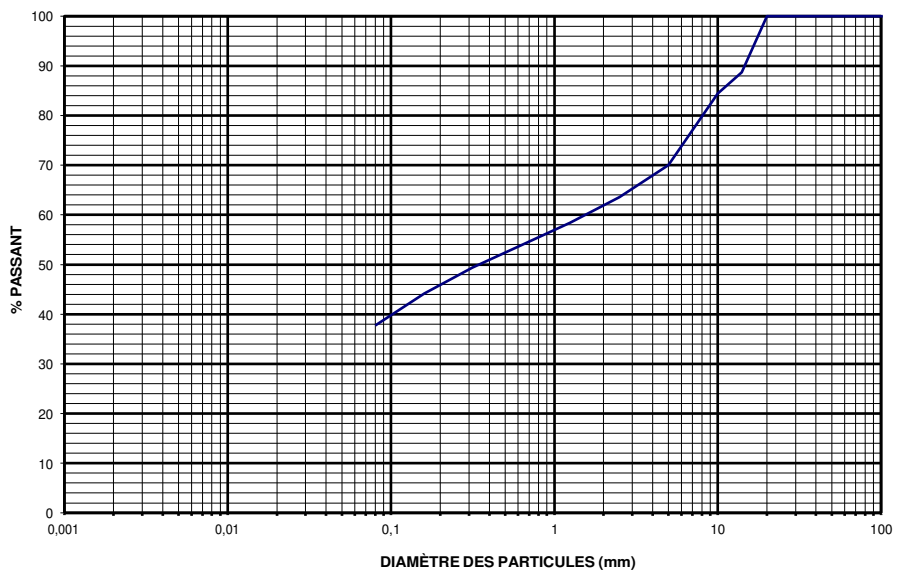
DOSSIER: 13340
ANALYSE NO: 19-478-4

DONNÉES GÉNÉRALES

Description: Silt sableux et graveleux	Prélevé le: 2019-08-27	Par: D. H.
Provenance: F-2 / CF-5	Analysé le: 2019-09-11	Par: A. P.

ANALYSE GRANULOMÉTRIQUE		SÉDIMENTOMÉTRIE		
		TEMPS (MIN)	DIAMÈTRE (MM)	% PASSANT
112 mm	100			
80 mm	100	0,5		
56 mm	100	1		
40 mm	100	2		
28 mm	100	5		
20 mm	100	15		
14 mm	89	30		
10 mm	84	60		
5 mm	70	120		
2,5 mm	64	240		
1,25 mm	58	480		
630 µm	54	1440		

COURBE GRANULOMÉTRIQUE



RÉSUMÉ DES ESSAIS

Argile %	0
Silt %	38
Sable %	32
Gravier %	30

REMARQUES

Teneur en eau : 7,9 %

CLIENT: 1199 NEWMARKET HOLDINGS INC.

DOSSIER: 13340

PROJET: 1199, Newmarket street, Ottawa

ANALYSE NO: 19-478-5

DONNÉES GÉNÉRALES

Description: Sable avec un peu de silt et traces de gravier	Prélevé le: 2019-08-27	Par: D. H.
Provenance: F-3 / CF-3	Analysé le: 2019-09-11	Par: A. P.

ANALYSE GRANULOMÉTRIQUE		SÉDIMENTOMÉTRIE		
		TEMPS (MIN)	DIAMÈTRE (MM)	% PASSANT
112 mm	100			
80 mm	100	0,5		
56 mm	100	1		
40 mm	100	2		
28 mm	100	5		
20 mm	100	15		
14 mm	100	30		
10 mm	99	60		
5 mm	98	120		
2,5 mm	96	240		
1,25 mm	93	480		
630 µm	83	1440		
315 µm	62			
160 µm	31			
80 µm	13,8			

COURBE GRANULOMÉTRIQUE



RÉSUMÉ DES ESSAIS

Argile %	0
Silt %	14
Sable %	84
Gravier %	2

REMARQUES

Teneur en eau : 16,3 %

CLIENT: 1199 NEWMARKET HOLDINGS INC.

DOSSIER: 13340

PROJET: 1199, Newmarket street, Ottawa

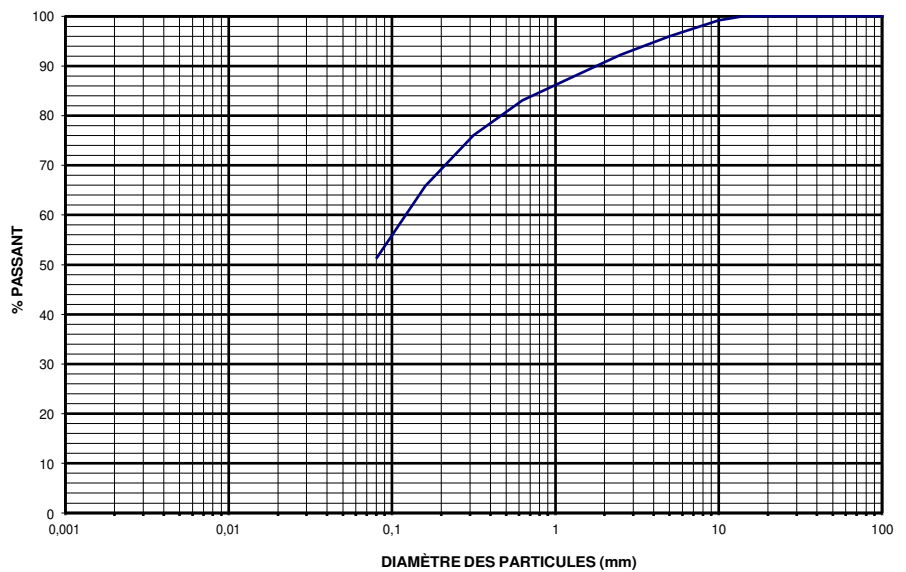
ANALYSE NO: 19-478-6

DONNÉES GÉNÉRALES

Description: Silt et sable avec traces de gravier	Prélevé le: 2019-08-27	Par: D. H.
Provenance: F-4 / CF-4	Analysé le: 2019-09-11	Par: A. P.

ANALYSE GRANULOMÉTRIQUE		SÉDIMENTOMÉTRIE		
		TEMPS (MIN)	DIAMÈTRE (MM)	% PASSANT
112 mm	100			
80 mm	100	0,5		
56 mm	100	1		
40 mm	100	2		
28 mm	100	5		
20 mm	100	15		
14 mm	100	30		
10 mm	99	60		
5 mm	96	120		
2,5 mm	92	240		
1,25 mm	88	480		
630 µm	83	1440		
315 µm	76			
160 µm	66			
80 µm	51,2			

COURBE GRANULOMÉTRIQUE



RÉSUMÉ DES ESSAIS

Argile %	0
Silt %	51
Sable %	45
Gravier %	4

REMARQUES

Teneur en eau : 11,9 %

CLIENT: 1199 NEWMARKET HOLDINGS INC.

DOSSIER: 13340

PROJET: 1199, Newmarket street, Ottawa

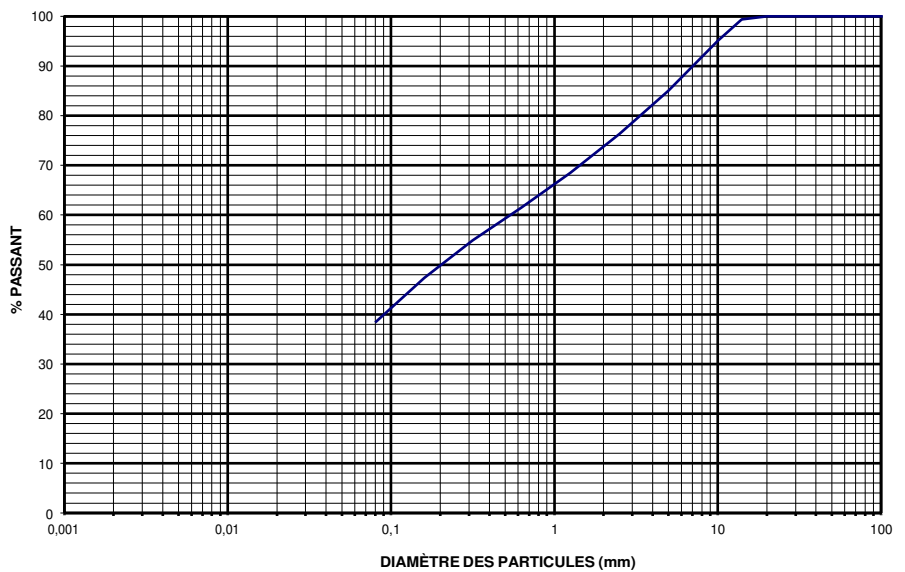
ANALYSE NO: 19-478-7

DONNÉES GÉNÉRALES

Description: Sable et silt avec un peu de gravier	Prélevé le: 2019-08-27	Par: D. H.
Provenance: F-5 / CF-3	Analysé le: 2019-09-11	Par: A. P.

ANALYSE GRANULOMÉTRIQUE		SÉDIMENTOMÉTRIE		
		TEMPS (MIN)	DIAMÈTRE (MM)	% PASSANT
112 mm	100			
80 mm	100	0,5		
56 mm	100	1		
40 mm	100	2		
28 mm	100	5		
20 mm	100	15		
14 mm	99	30		
10 mm	95	60		
5 mm	85	120		
2,5 mm	76	240		
1,25 mm	68	480		
630 µm	62	1440		
315 µm	55			
160 µm	47			
80 µm	38,4			

COURBE GRANULOMÉTRIQUE



RÉSUMÉ DES ESSAIS

Argile %	0
Silt %	38
Sable %	47
Gravier %	15

REMARQUES

Teneur en eau : 8,3 %

CLIENT: 1199 NEWMARKET HOLDINGS INC.
PROJET: 1199, Newmarket street, Ottawa

DOSSIER: 13340
ANALYSE NO: 19-478-8

DONNÉES GÉNÉRALES

Description: Sable avec traces de silt	Prélevé le: 2019-08-27	Par: D. H.
Provenance: F-6 / CF-2A	Analysé le: 2019-09-11	Par: A. P.

ANALYSE GRANULOMÉTRIQUE		SÉDIMENTOMÉTRIE		
		TEMPS (MIN)	DIAMÈTRE (MM)	% PASSANT
112 mm	100			
80 mm	100	0,5		
56 mm	100	1		
40 mm	100	2		
28 mm	100	5		
20 mm	100	15		
14 mm	100	30		
10 mm	100	60		
5 mm	100	120		
2,5 mm	100	240		
1,25 mm	100	480		
630 µm	99	1440		
315 µm	90			
160 µm	39			
80 µm	8,6			

COURBE GRANULOMÉTRIQUE



RÉSUMÉ DES ESSAIS

Argile %	0
Silt %	9
Sable %	91
Gravier %	0

REMARQUES

Teneur en eau : 11,6 %

CLIENT: 1199 NEWMARKET HOLDINGS INC.

DOSSIER: 13340

PROJET: 1199, Newmarket street, Ottawa

ANALYSE NO: 19-478-9

DONNÉES GÉNÉRALES

Description: Argile et silt avec traces de sable	Prélevé le: 2019-08-27	Par: D. H.
Provenance: F-6 / CF-2B	Analysé le: 2019-09-11	Par: A. P.

ANALYSE GRANULOMÉTRIQUE		SÉDIMENTOMÉTRIE		
		TEMPS (MIN)	DIAMÈTRE (MM)	% PASSANT
112 mm	100			
80 mm	100	0,5	0,058	95,0
56 mm	100	1	0,042	88,1
40 mm	100	2	0,030	85,0
28 mm	100	5	0,019	80,6
20 mm	100	15	0,011	73,8
14 mm	100	30	0,008	70,6
10 mm	100	60	0,006	66,9
5 mm	100	120	0,004	61,9
2,5 mm	100	240	0,003	56,3
1,25 mm	100	480	0,002	50,0
630 µm	100	1440	0,001	39,4

COURBE GRANULOMÉTRIQUE



RÉSUMÉ DES ESSAIS

Argile %	48
Silt %	47
Sable %	5
Gravier %	0

REMARQUES

Teneur en eau : 29,5 %

CLIENT: 1199 NEWMARKET HOLDINGS INC.
PROJET: 1199, Newmarket street, Ottawa

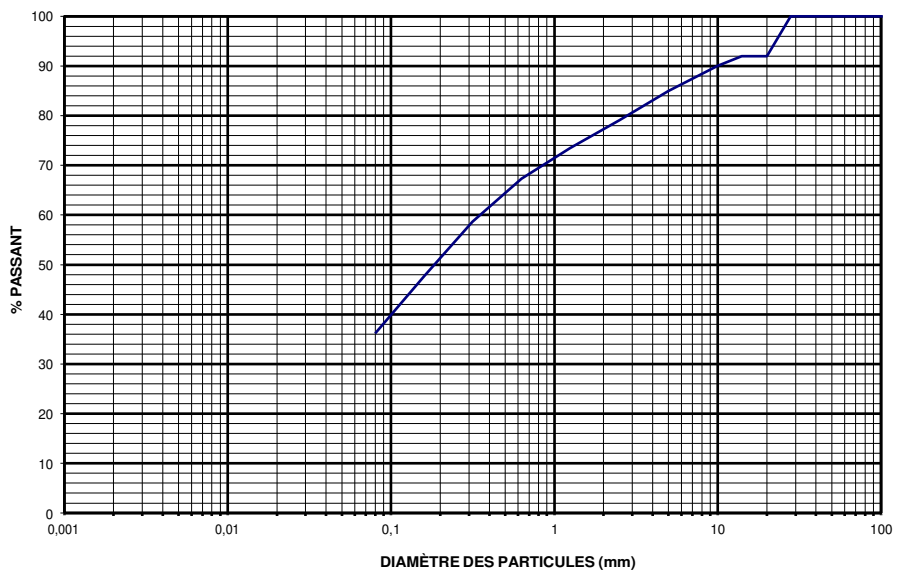
DOSSIER: 13340
ANALYSE NO: 19-478-10

DONNÉES GÉNÉRALES

Description: Sable et silt avec un peu de gravier	Prélevé le: 2019-08-27	Par: D. H.
Provenance: F-7 / CF-3	Analysé le: 2019-09-11	Par: A. P.

ANALYSE GRANULOMÉTRIQUE		SÉDIMENTOMÉTRIE		
		TEMPS (MIN)	DIAMÈTRE (MM)	% PASSANT
112 mm	100			
80 mm	100	0,5		
56 mm	100	1		
40 mm	100	2		
28 mm	100	5		
20 mm	92	15		
14 mm	92	30		
10 mm	90	60		
5 mm	85	120		
2,5 mm	79	240		
1,25 mm	73	480		
630 µm	67	1440		
315 µm	59			
160 µm	48			
80 µm	36,1			

COURBE GRANULOMÉTRIQUE



RÉSUMÉ DES ESSAIS

Argile %	0
Silt %	36
Sable %	49
Gravier %	15

REMARQUES

ABAQUE DE PLASTICITÉ (Compilation des résultats)

CLIENT: 1199 NEWMARKET HOLDINGS INC.
PROJET: Warehouse Newmarket
SITE: 1199, Newmarket street, Ottawa
DOSSIER: 13340

