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Professional services of consulting engineers Geotechnical study for the extension of the Commercial Facilities

2920 Sheffield Rd., Ottawa, Ontario

Ross and Anglin Limited

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March 15, 2022

Mr. Glenn Kavanagh
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Object : Professional Services of Consulting Engineers
Geotechnical study for the extension of the Commercial Facilities
2920 Sheffield Rd., Ottawa (Ontario
N/Dossier n° : 687902-EG-L01-00

Mr. Glenn,

Please find attached the geotechnical study carried out by SNC Lavalin Environment and Geosciences "SNC-Lavalin" as part of the project mentioned in title.

We hope this report is to your complete satisfaction and please accept, Mr. Glenn, the expression of our best feelings.

Gohe A. Metaferia, M.A.Sc., P.Eng.
Lead - Geoscience and Materials Engineering
Engineering Services Canada
Ingénierie, conception et gestion de projet[MG1]

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1 Introduction[MG2]

The professional services of SNC-Lavalin from the Geosciences and Materials unit (SNC-Lavalin) have been retained by Ross & Anglin Ltd. to complete a Geotechnical study on the vacant site located at 2920 Sheffield Rd., Ottawa, Ontario for an extension of the existing Commercial Facilities.

This study was conducted in accordance with the clauses attached to the Fixed Price or Lump-sum or Guaranteed Maximum Price (GMP) or Work Unit Rate Arrangements communicated on December 15, 2021.

The purpose of this geotechnical study was to perform a summary study to verify whether the subsurface parameters previously provided remain valid at the new site and that geotechnical recommendations are not adversely impacted.

This report describes the working method used and a detailed description of the results obtained. A section of the report is devoted to the discussion of the results and geotechnical recommendations relating to the design and construction works of the proposed extension building.

The environmental characterization of the subsurface condition and groundwater was excluded from this mandate. Consequently, the descriptions provided in the context of this study are only valid from a geotechnical point of view only.

This report has been prepared specifically and only for Ross & Anglin Ltd and the consultants collaborating on the project. Any modification to the project must be reported to SNC Lavalin so that the scope and relevance of the geotechnical investigation and recommendations contained in this report can be reviewed and modified, if necessary.

2 Site and Project Description

A previous geotechnical study was completed by Qualitas Outaouais in 2007 to support the construction of the now Existing Facility at 2920 Sheffield Rd, in Ottawa. SNC-Lavalin did perform a summary study of the subsurface condition verifying whether the geotechnical parameters previously provided remain valid at the new site and revise the associated geotechnical recommendations if required.

The extension of the commercial Facility is expected to consist of the construction of a single-story Building resting on an approximate footprint of 27 m X 23 m located West of the existing Infrastructure at 2920 Sheffield Rd, close to Walkley Rd and the HWY 417 in Ottawa, Ontario.

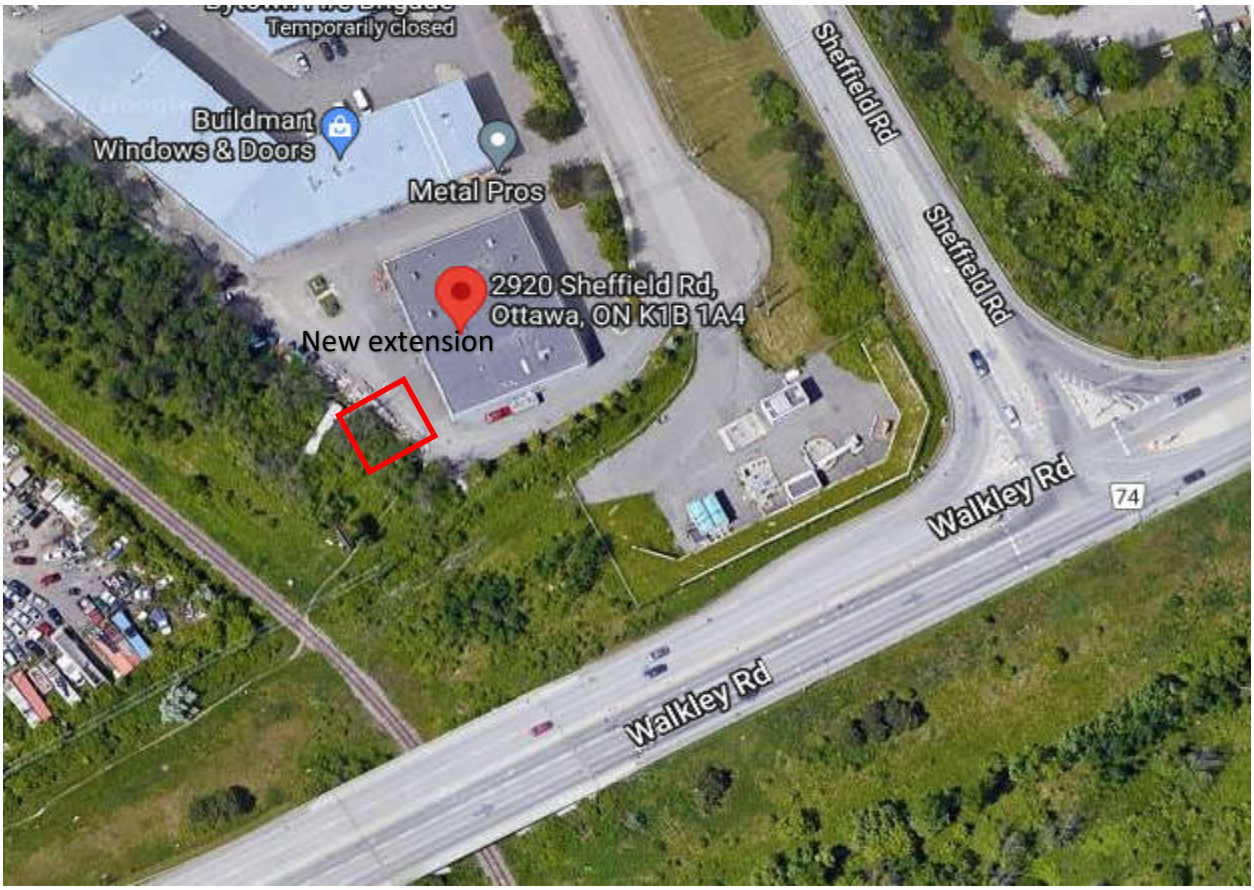


Figure 1 Site Description

3 Execution of the Project

3.1 Site Geology

In general, the overburden encountered at the site consists of a cohesive fill deposit down from 0.20 m to 1.52 m followed by a Silty Clay stratum from 4.20 to 6.70 m.

3.2 Geotechnical Investigation Program

Prior to commencement of the Geotechnical investigations, Ross and Anglin Ltd did proceed to the locates request using Ontario One call services to identify the presence of any underground utilities that may be damaged during the investigations and as such impede the works.

A total of (2) two Boreholes, B-01-22, and B-01-22, have been completed using track Mounted drill CME 75 with hallow stem auger. The Geotechnical Investigation did take one day of drilling on February 24,2022 under the supervision of an experienced Geotechnical Technician.

The undrained shear resistance within the clayey deposit was measured on each of the two Boreholes with the use of the Nilcon field vane shear Test equipment. Both Boreholes have been terminated with Nilcon Testing at 6.0 m.

3.3 Boreholes

The progress of the drilling was carried out by rotation of a hollow stem augers. The descents of the augers and the advancement of the drilling in the ground was done by successively driving split spoons. The soil samples were taken using a standardized split spoon sampler, with an outside diameter of 51 mm and a length of 610 mm, which meets the requirements of the ASTM D 1586 standard for the Standard Penetration Test (SPT). The SPT test is used to determine the penetration index "N", which indicates the degree of compactness of granular soils. Sampling was carried out continuously over the first two meters from the ground surface and continued with a spacing of 150 mm for the following samples. The samples have been collected from 0.0 to 6.00 m.

3.4 Survey

The Boreholes drilling location have been surveyed by Ross and Anglin Ltd and laid out at the right location of the planed extension of the commercials Facilities.

After completion of the Boreholes drilling, as built coordinates of the test locations have by SNC-Lavalin using the GPS Blue Mapper allowing a precision of ± 1.0 m.

The planimetric coordinates have been in reference to the system SCOPQ / NAD-83 / SCRS, Fuse 9. The Geodesic level of the ground are in metric system, altimetric datas - CGVD28, make géoïde HT-2.

The data from surveying the Boreholes are presented in Appendix 4

3.5 Laboratory Testing

The samples from the boreholes were collected and taken for Geotechnical testing in SNC-Lavalin laboratory for visual inspection, and analysis as well as description. Select soil samples deemed representative of the ground conditions have been subjected to a program of geotechnical testing and shown on the following table 1.

Table 1: Laboratory Testing

Description	Number
Geotechnical testing	
Atterberg Limit	2
Moisture Content	6

Any soil samples collected during the Geotechnical investigation and that has been saved from the Laboratory work will be stored for a 6-month period following the release of the report. After that period, the samples will be discarded unless otherwise instructed by the client.

4 Result of the Study

4.1 Subsurface Condition

The description of the encountered subsurface condition was based on the standard applied in the industry and mentioned on the CFEM (Canadian Foundation and Manual).

The description of the sol stratigraphy at the boreholes F-22-01 and F-22-02 is presented in the following table.

Table 2: Overburden

Boreholes n°	Silty Clay, trace Sand (Fill)		Silty Clay (Native)	
	Top of Layer (m)	Thickness (m)	Top of Layer (m) (m)	Thickness (m)
F-01-22	0	0.10	0.10	6.70
F-02-22	0	0.50	0.50	6.70

4.2 Fill

A thin layer of fill was encountered in both boreholes varying from 0.10 m to 0.50 m and located South-West of the existing Commercial Facilities. That layer of fill consisted of Silty Clay, trace to some Sand, trace of gravel.

4.3 Silty Clay (Native)

The Silty Clay layer was observed on each of the Boreholes F-01-22 and F-02-22 extending between 6.60 m to 6.20 m of thickness.

The measured undrained shear strength of the silty Clay layer was varying from 41 kPa to 91 kPa resulting of the Nilcon field vane shear testing.

It is important to note that a layer of weathered silty clay is interpreted from about 0.6m to 2.5 m depth based on undrained shear strength test results as well as we natural moist content values.

Table 3: Summary properties of the silty Clay layer

Borehole	Sample #	Depth (m)	Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plastic it Index
F-01-22	SS-01	0-0,61	39,47	-	-	-
F-01-22	SS-02	0,61-1,21	29,47	-	-	-
F-01-22	SS-03	1,21-1,82	31,89	-	-	-
F-01-22	SS-04	1,82-2,43	39.47	54.92	21.63	33.29
F-01-22	SS-05	2,43-3,05	49,37	-	-	-
F-02-22	SS-07	6,00-6,60	57.98	60.02	25.02	35.00

Based on the Atterberg limit test results obtained, the soil may be classified as CH (Inorganic clays of high plasticity) … according to the Unified Soil Classification Chart.

Following the correlation proposed by Leroueil et al (1983), the preconsolidation pressure of the silty clay deposit may be estimated as a function of the undrained shear strength and plasticity index. As such, an over-consolidation margin representing the difference between in-situ effective and pre-consolidation pressures may be deduces while taking note that the assumed ground water table elevation plays a significant role in determining this. Consequently, the governing design preconsolidation pressure computed is 100 kPa, located at about 3.0 m below grade surface.

5 Comments and Design Recommendations

5.1 General Remarks

The project involves the extension of the Commercial Facility, approximately 621 m2 and located west of the existing building as shown in the drawing in the appendix. The proposed foundations were not known at the time this report was released.
The extended Commercial Facility is to be designed according to the National Building Code of Canada 2015 (CNBC), including its foundations.

5.2 Site Seismic Classification

The site category based on seismic response have been determined according to the criteria in Table 4.1.8.4.A. of the 2015 National Building Code of Canada (NBCC) and we can confirm that in a reasonably conservative approach that the site would be classified as category “D”.

5.3 Protection against Frost

The proposed foundations must be protected against frost with a minimum depth of 1.50 m below existing ground when located inside heated building.

When the foundations are located on non-heated zone, the minimum depth of founding against the frost must be 1.80 m. The use of Styrofoam layers with the appropriate thickness will contribute to the protection of the foundations against frost if the founding depth could not be reached (1.80 m).

5.3.1 Allowable Bearing Capacity

As results of our Geotechnical Investigation and Laboratory testing, we recommended the foundations of the Commercial Facility to be founded on undisturbed soil with an allowable bearing capacity for vertical and concentric loading, as tabulated below.At SLS, the foundation designed should accommodate a maximum total settlement of 25 mm.

Table 4: Bearing capacity recommendations for Strip Footing foundation

Width (m)	Bearing Capacity at SLS (kPa)	
	1.50 m depth	1.80 m depth
0.6	160	170
1.0	150	160
2.0	130	140

Table 5: Bearing capacity recommendations for Square Footing foundation

Width (m) X Length (m)	Bearing Capacity at SLS [MG3](kPa)	
	1.50 m depth	1.80 m depth
1.20 x 1.20	180	200
2.00 x 2.00	160	165
3.00 x 3.00	140	140

Should any grade raise be anticipated as part of the future construction, the geotechnical engineers need to be consulted to obtained revised bearing capacity recommendations.

5.4 Drainage around the foundation

It is recommended to set up permanent peripheral drains at the base of the footings for the future expansion including basements. This drain should consist of a perforated plastic pipe of at least 150 mm in diameter, encased in clear stone of caliber 20 mm and 300 mm in minimum thickness (below, on the sides and above the plastic pipe). The drain and clear stone assembly must be surrounded by a separation geotextile of the Texel 909 type or equivalent.

It is recommended the finished grade outside the Facility to be sloped out of the building and draining any surface or Ground water away from the building.

Even though no groundwater was observed during the geotechnical investigation, any water leading into the Facility is to be drained outside the construction zone to always maintain dry working condition.

The foundation is planned to be built on the sensitive Silty Clay that could become remolded and susceptible to lose of its shear strength due to inflow of water and lack of acceptable drainage hence the need to ensure proper drainage at the Base.

When remolded, the Silty Clay must be sub-excavated before the construction of the foundation proceeds.

5.5 Foundation Backfilling

The exterior backfilling around the peripheral foundation walls must be done using an approved granular material conforming to OPSS.MUNI.1010 Granular-B Type II or equivalent. Exterior backfill soils must be placed in layers no more than 300 mm thick and uniformly compacted

to at least 95% Standard Proctor Maximum Dry Density (SPMDD). Slab On Grade

Any unsuitable material to be removed from the exposed subgrade before the granular base is backfilled supporting the Slab on Grade. The granular base to be OPSS.MUNI.1010 Granular-A compacted to a minimum of 100 % of SPMDD.

A modulus of Elasticity of the Slab on Grade of 24 000kN/m3 can be adopted for the S.O.G design.

5.6 Excavation of the Silty Clay

Given the nature of the materials encountered in the boreholes and the excavation depth to be between 1 and 2 m below existing ground. The excavation to be completed according to OHSA requirements.

5.7 Sloped excavations

It is recommended that the slopes of the temporary excavations required for the installation of the foundations comply with the requirements of the version in effect at the time of the works of the Safety referring to OHSA. In fact, since the work method that will be used is currently unknown and since it involves temporary excavations, the stability of the slopes and the safety of the workers, the works to be built as well as and the existing structures are under the entire liability of the contractor. Thus, it is up to the contractor to adopt the appropriate excavation methods and to proceed, if necessary, with the installation of adequate supports.

As an indication, for the temporary excavations required for the installation of the foundation elements, it is suggested that the slopes be profiled with an inclination of 1 V: 1 H or less steeply in the backfill soils.

The recommended slopes presumed that the silty Clay does not dry quickly during the excavation and avoiding shrinkage of the Silty Clay Bank that may affect the slope stability of the open excavation.

The inclination of the slopes of the excavations must be softened if there are signs of instability. The walls of the excavations must therefore be inspected regularly to detect any element likely to detach and constitute a danger for the workers. In addition, the circulation of vehicles and site machinery as well as the storage of construction materials and the piling of excavated soil must be avoided near the crest of the excavations, and this, over a distance at least equal to the depth of the excavations (distance measured from the crest of the excavation). The backfilling of the excavations must be carried out as soon as possible, to avoid degradation of the exposed slopes.

6 Road structure[MG4]

6.1 Road structure support

The road will be built on Silty Clay deposit considered sensitive to frost and with low conductivity Index.

The exposed subgrade must be adequately sloped ensuring proper drainage of the foundation layer with a minimum slope of 4% from centerline.

Any unsuitable soil must be removed from the road exposed subgrade before the road make-up is backfilled.

The material used to build the road must follow OPSS 1010 Standard

6.2 Parking and Access Road Structure design

The following Pavement structures design presented in Table 6 below covering the new development of planned parking and traffic areas was confirmed to be still valid and acceptable.

Table 6: Design Road structure for the Parking lot for the light traffic

Road structure	Material	Minimum thickness (mm)
Asphalt Pavement		
Unique layer	ESG-14 (PG 58H-34)	70
Granular		
Base	G.A 19mm	300
Sub-base	G.B type - II	Min 450
Subgrade	SIlty Clay	-
Total Thickness		**Min 445**
Note : 1- The exposed subgrade to be free from any unsuitable material		

Table 7: Design Road structure for the access road to Parking Lot

Road structure	Material	Minimum thickness (mm)
Asphalt Pavement		
Unique layer	ESG-14 (PG 58H-34)	100
Granular		
Base	G.A 19mm	300
Sub-base	G.B type - II	Min 450
Subgrade	SIlty Clay	-
Total Thickness		**Min 445**

Note :
1- The exposed subgrade (Silty Clay) to be free from any unsuitable material

Appendix 1

Scope of the report

1. Working with the report

a. Using the rapport

This report has been prepared and the work referred to therein has been carried out by SNC-Lavalin Inc. (SNC-Lavalin) exclusively for the client (the Client) to whom the report is addressed, who was involved in the development of the Statement of Work and understands its limitations. The methodology, conclusions, recommendations and results cited in this report are based solely on the Statement of Work and are subject to time and budget requirements as described in the service offering and/or contract under which this report was issued. The use of this report, the use of it or any decision based on its content by a third party is the exclusive responsibility of the latter. SNC-Lavalin is not responsible for any damage suffered by any third party as a result of the use of this report or any decision based on its content. The conclusions, recommendations and results cited in this report (i) have been developed in accordance with the level of competence normally demonstrated by professionals carrying out activities under similar conditions in this sector, and (ii) are determined in SNC-Lavalin's best judgment, taking into account the information available at the time of preparation of this report. The professional services provided to the Client and the conclusions, recommendations and results cited in this report are not subject to any other warranty, express or implied. The conclusions and results cited in this report are valid only as of the date of the report and may be based, in part, on information provided by third parties. In the event of inaccurate information, the discovery of new information or changes to project parameters, changes to this report may result in Necessary. The results of this study do not in any way constitute a guarantee that the study site is free from contamination. This report should be considered as a whole, and its sections or parts should not be seen or understood out of context. If differences were to arise between the draft version and the final version of this report, the latter would prevail. Nothing in this report is mentioned with the intention of providing or constituting legal advice. The content of this report is confidential and proprietary in nature. No person, other than the Client, may reproduce, distribute or use this report or make any decision based on its content, in whole or in part, without the express written permission of the Client and SNC-Lavalin.

b. Amendments to the project

The factual facts, interpretations and recommendations contained in this report relate to the specific project as described in the report and do not apply to any other project or site. If the project is modified from a design, sizing, location or level perspective, SNC-Lavalin will need to be consulted to confirm that the recommendations already provided remain valid and applicable.

c. Number of surveys

The recommendations given in this report are intended only to serve as a guide for the design engineer. The number of boreholes to determine all underground conditions that may affect the construction work (costs, techniques, equipment, schedule) should normally be higher than that for sizing purposes. The number of sampling points and chemical analyses as well as the sampling frequency and choice of parameters can influence the nature and scope of corrective actions as well as the techniques and costs of treatment or disposal. Contractors who bid or subcontract work should rely on their own studies as well as their own interpretations of the factual survey results to assess how underground conditions may affect their work and costs of work.

d. Data interpretation, comments and recommendations

Unless otherwise noted, the interpretation of the data and results, comments and recommendations contained in this report are based, to the best of our knowledge, on environmental policies, criteria and regulations in effective at the project site and on the date of report production. If these policies, criteria and regulations are amended after the report is submitted, SNC-Lavalin will need to be consulted to revise the recommendations in light of these changes. Where no policy, criteria or regulations are available to allow for the interpretation of data and analytical results, SNC-Lavalin's comments or recommendations are based on the best possible knowledge of the rules accepted in professional practice. The analyses, comments and recommendations contained in this report are based on data and observations collected on the site, which come from work sampling carried out on site. It is understood that only data collected directly at the location of the surveys, sampling sites and at the date of sampling are accurate and that any interpolation or extrapolation of these results to all or part of the site carries risks of errors that can themselves influence the nature and extent of the actions required on the site.

2. Sounding reports and interpretation of underground conditions

a. Description of soils and rock

The descriptions of soils and rock given in this report come from commonly accepted classification and identification methods used in geotechnical practice. The classification and identification of soil and rock requires judgment. SNC-Lavalin does not guarantee that the descriptions will be identical in all respects to those made by another geotechnician with the same knowledge of the rules of the art in geotechnics, but ensures accuracy only to what is commonly used in the practice of the geotechnics.

b. Soil and rock conditions at the borehole location

Survey reports provide only subsurface conditions at the borehole location only. The boundaries between the different layers on the sampling reports are often approximate, corresponding rather to transition zones, and have therefore been interpreted. The accuracy with whic underground conditions are indicated depends on the sampling method, the frequency and method of sampling, and the uniformity of the terrain encountered. The spacing between surveys, the frequency of sampling and the type of survey also reflect budget considerations and turnaround times that are beyond SNC-Lavalin's control.

c. Soil and rock conditions between boreholes

Soil and rock formations vary over a greater or lesser extent. The underground conditions between the boreholes are interpolated and can vary significantly both in plan and depth from the conditions encountered at the borehole site. SNC-Lavalin can only guarantee the results of the surveys conducted. Any interpretation of the conditions presented between surveys involves risks. These interpretations may lead to the discovery of conditions different from those that were intended. SNC-Lavalin cannot be held responsible for the discovery of soil and rock conditions different from those described elsewhere than at the location of the boreholes carried out.

d. Groundwater levels

The groundwater levels given in this report correspond only to those observed at the location and date indicated in the report and depending on the type of piezometric facility used. These conditions may vary seasonally or as a result of construction work on the site or on adjacent sites. These variations are beyond SNC-Lavalin's control.

3. Contamination levels

The contamination levels described in this report correspond to those detected at the location and date indicated in the report. These levels may vary with the seasons or as a result of activities at the study site or adjacent sites. These variations are beyond our control. Contamination levels are determined from the results of chemical analyses performed on a limited number of soil, surface water or groundwater samples. The nature and degree of contamination between sampling points can vary significantly from those at these points. The chemical composition of groundwater at each sampling point is subject to change due to groundwater flow, surface recharge conditions, stress on the formation investigated (i.e. pumping or injection wells near the site) and variability natural seasonal. The accuracy of groundwater contamination levels depends on the frequency and number of tests performed. The list of parameters analyzed is based on our better knowledge of the site history and contaminants that may be found on the site and is also a reflection of budget considerations and turnaround times. The fact that a parameter has not been analysed does not exclude that it is present at a concentration higher than the background noise or the detection limit of that parameter.

4. Follow-up of the study and the work

a. Final Phase Verification

Not all design and construction details are known at the time the report is issued. It is therefore recommended that SNC-Lavalin's services be retained to shed light on the impact that the construction work could have on the final structure.

b. Inspection during execution

It is recommended that SNC-Lavalin be retained during construction to verify and confirm that underground conditions throughout the site do not differ from those given in the report and that construction work will not adversely affect site conditions.

5. Changing conditions

The soil conditions described in this report are those observed at the time of the study. Unless otherwise indicated, these conditions form the basis of the report's recommendations. Soil conditions can be significantly altered by construction work (traffic, excavation, etc.) on the site or adjacent sites. An excavation can expose soils to changes due to moisture, drying or frost. Unless otherwise specified, the soil must be protected from such changes or alterations during construction. When the conditions encountered on the site differ significantly from those provided for in this report, due to the heterogeneous nature of the subsoil or to construction work, it is the responsibility of the Client and the user of this report to notify SNC-Lavalin of the changes and to provide SNC-Lavalin with the opportunity to revise the recommendations of this report. Recognizing a change in soil conditions requires some experience. It is therefore recommended that an experienced geotechnical engineer be dispatched to the site to check if conditions have changed significantly.

6. Drainage

Groundwater drainage is often required for both temporary and permanent project installations. Improper design or execution of drainage can have serious consequences. SNC-Lavalin cannot under any circumstances take responsibility for the effects of drainage unless SNC-Lavalin is specifically involved in the detailed design and monitoring of the construction of the drainage system.

7. Caractérisation environnementale – Phase I (Phase I)

This report has been prepared as a result of diligent research and an assessment of point data sources or information obtained from third parties that may contain uncertainties, gaps or omissions. These sources of information are subject to change over time, for example, depending on the evolution of activities in the field under study and those around. Phase I does not include any laboratory testing, sampling or characterization analysis. With some exceptions, Phase I is based on the observation of visible and accessible components on the property and those adjacent to the property that could cause environmental damage to the quality of the land under study. The title deeds mentioned in this report are used to identify the former owners of the site under study and they can in no way be considered as an official document for reproduction or other types of uses. Finally, any sketch, plan view or diagram appearing in the report or any statement specifying dimensions, capacities, quantities or distances are approximate and are included in order to assist the reader in visualizing the property.

Appendix 2

Survey Reports

SNC·LAVALIN

NOTES EXPLICATIVES
RAPPORT DE SONDAGE
(page 1 de 2)

Un rapport de sondage permet de résumer la stratigraphie des sols et du roc, leurs propriétés ainsi que les conditions d'eau souterraine. Cette note a pour but d'expliquer la terminologie, les symboles et abréviations utilisés.

COUPE STRATIGRAPHIQUE

1. PROFONDEUR – NIVEAU

La profondeur et le niveau des différents contacts stratigraphiques sont donnés par rapport à la surface du terrain à l'endroit des sondages au moment de leur exécution. Les niveaux sont indiqués en fonction d'un système indiqué dans l'entête du rapport de sondage.

2. DESCRIPTION DES SOLS

Les sols sont décrits selon leur nature et leurs propriétés géotechniques.

Les dimensions des particules constituant un sol sont les suivantes :

NOM	DIMENSION (mm)		
Argile		<	0,002
Silt	0,002	-	0,08
Sable	0,08	-	5
Gravier	5	-	80
Caillou	80	-	300
Bloc		>	300

La proportion des divers éléments de sol, définis selon la dimension des particules, est donnée d'après la terminologie descriptive suivante :

TERMINOLOGIE DESCRIPTIVE	PROPORTION DE PARTICULES (%)		
Traces	1	-	10
Un peu	10	-	20
Adjectif (ex. : sableux, silteux)	20	-	35
Et (ex. : sable et gravier)		>	35

2.1 COMPACITÉ DES SOLS PULVÉRULENTS

La compacité des sols pulvérulents est évaluée à l'aide de l'indice de pénétration « N » obtenu par l'essai de pénétration standard :

COMPACITÉ	INDICE DE PÉNÉTRATION « N » (coups / 300 mm)		
Très lâche		<	4
Lâche	4	-	10
Compacte ou moyenne	10	-	30
Dense	30	-	50
Très dense		>	50

2.2 CONSISTANCE ET PLASTICITÉ DES SOLS COHÉRENTS

La consistance des sols cohérents est évaluée à partir de la résistance au cisaillement. La résistance au cisaillement non drainé de l'argile intacte (s_u) et de l'argile remaniée (s_r) est mesurée en chantier ou en laboratoire.

CONSISTANCE	RÉSISTANCE AU CISAILLEMENT, s_u (kPa)		
Très molle		<	12
Molle	12	-	25
Ferme	25	-	50
Raide	50	-	100
Très raide	100	-	200
Dure		>	200

PLASTICITÉ	LIMITE DE LIQUIDITÉ, W_L %		
Faible		<	30
Moyenne	30	-	50
Élevée		>	50

3. DESCRIPTION DU ROC

Le roc est décrit en fonction de sa nature géologique, de ses caractéristiques structurales et de ses propriétés mécaniques.

L'indice de qualité du roc (RQD) est déterminé selon la norme ASTM D 6032.

CLASSIFICATION	INDICE DE QUALITÉ RQD (%)		
Très mauvaise qualité		<	25
Mauvaise qualité	25	-	50
Qualité moyenne	50	-	75
Bonne qualité	75	-	90
Excellente qualité	90	-	100

JOINTS	ESPACEMENT MOYEN (mm)		
Très rapprochés	0	-	60
Rapprochés	60	-	200
Moyennement espacés	200	-	600
Espacés	600	-	2000
Très espacés		>	2000

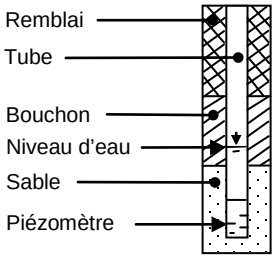
RÉSISTANCE	RÉSISTANCE À LA COMPRESSION UNIAXIALE, q_u (MPa)		
Extrêmement faible		<	1
Très faible	1	-	5
Faible	5	-	25
Moyennement forte	25	-	50
Forte	50	-	100
Très forte	100	-	250
Extrêmement forte		>	250

SNC·LAVALIN

NOTES EXPLICATIVES
RAPPORT DE SONDAGE
(page 2 de 2)

NIVEAU D'EAU

La colonne « Niveau d'eau » indique le niveau de l'eau souterraine mesuré dans un tube d'observation, un piézomètre, un puits d'observation ou directement dans un sondage. La date du relevé est également indiquée dans cette colonne. Le croquis ci-contre illustre les différents symboles utilisés.



ÉCHANTILLONS

1. TYPE ET NUMÉRO

La colonne « Type et numéro » correspond à la numérotation de l'échantillon. Il comprend deux lettres identifiant le type d'échantillonnage, suivi d'un chiffre séquentiel. Les types d'échantillonnage sont les suivants :

CF :	carottier fendu	CR :	carottier diamanté
CG :	carottier grand diamètre	VR :	prélèvement manuel
TM :	tube à paroi mince	ET :	tarière
TU :	tube échantillonneur en plastique (Geoprobe)		

2. ÉTAT

La profondeur, la longueur et l'état de chaque échantillon sont indiqués dans cette colonne. Les symboles suivants illustrent l'état de l'échantillon :

3. RÉCUPÉRATION

La récupération de l'échantillon correspond à la longueur récupérée de l'échantillon par rapport à la longueur de l'enfoncement de l'échantillonneur, exprimée en pourcentage.

ESSAIS IN SITU ET EN LABORATOIRE

Les résultats des essais effectués en chantier et en laboratoire sont indiqués dans les colonnes « Essais in situ et en laboratoire » à la profondeur correspondante.

La liste d'abréviations suivante sert à identifier ces essais.

ABRÉVIATIONS

A	Absorption, L/min-m (essai d'eau sous pression)
AC	Analyses chimiques
C	Essai de consolidation
C_c	Coefficient de courbure
C_U	Coefficient d'uniformité
s_u	Résistance au cisaillement à l'état intact, mesurée au scissomètre de chantier, kPa
s_{ur}	Résistance au cisaillement à l'état remanié, mesurée au scissomètre de chantier, kPa
s_{uc}	Résistance au cisaillement à l'état intact, mesurée au pénétromètre à cône (cône suédois), kPa
s_{urc}	Résistance au cisaillement à l'état remanié, mesurée au pénétromètre à cône (cône suédois), kPa
s_{up}	Résistance au cisaillement à l'état intact, mesurée au scissomètre portatif, kPa
s_{rp}	Résistance au cisaillement à l'état remanié, mesurée au scissomètre portatif, kPa
D_r	Densité relative des particules solides
E_M	Module pressiométrique, kPa ou MPa
G	Analyse granulométrique par tamisage et lavage
I_L	Indice de liquidité
I_p	Indice de plasticité, %
k_c	Coefficient de perméabilité (conductivité hydraulique) mesuré en chantier, m/s
k_L	Coefficient de perméabilité (conductivité hydraulique) mesuré en laboratoire, m/s
N_{dc}	Indice de pénétration (essai de pénétration dynamique au cône, DCPT)
N	Indice de pénétration (essai de pénétration standard, SPT)
P_{80}	Analyse granulométrique par lavage au tamis 80 μm
P_L	Pression limite de l'essai pressiométrique, kPa
P_r	Essai Proctor
γ	Poids volumique, kN/m^3
γ'	Poids volumique déjaugé, kN/m^3
q_u	Résistance à la compression uniaxiale du roc, MPa
R	Refus à l'enfoncement du carottier fendu
S	Analyse granulométrique par sédimentométrie
S_t	Sensibilité (s_u/s_r)
T.A.S.	Taux d'agressivité du sol
w	Teneur en eau, %
w_L	Limite de liquidité, %
w_p	Limite de plasticité, %

SNC·LAVALIN

BOREHOLE LOG

CLIENT : Ross & Anglin Ltée. (Limited.)
PROJECT : Sheffield Commerciale Build
LOCATION : 2920, Sheffiled Rd, Ottawa
FILE : 687902

BOREHOLE : F-01-22

DATE : 2022-02-04
COORDINATES : MTM 9 NAD 83
E : 375106.17 **N :** 5028791.44

DEPTH (m)	ELEVATION (m)	DESCRIPTION	WATER LEVEL	SAMPLES: TYPE AND NUMBER	SAMPLES: CONDITION	SAMPLES: RECOVERY (%)	IN SITU AND LABORATORY TESTS: N or RQD (%)	IN SITU AND LABORATORY TESTS: WATER CONTENT AND ATTERBERG LIMITS (%)	IN SITU AND LABORATORY TESTS: OTHER TESTS	IN SITU AND LABORATORY TESTS: S_u (kPa), S_{us} (kPa), S_r (kPa), S_{rs} (kPa), N_{dc} (blows/300 mm)
	67.00	Topsoil.						W_P — W — W_L		
		Fill: Silty clay traces of sand and gravel.		SS-01		58	92	21		
0.62	66.38	Silty clay, traces of gravel and sand.		SS-02		54	6	30		
				SS-03		54	9	32		
1.83	65.17	Silty clay.		SS-04		100	5	22 — 39 — 55		91
				SS-05		100	3	49		42
				SS-06		100	5			
				SS-07		100	4			46
				SS-08		100	3			69
6.71	60.29	**End of borehole**								65

REMARKS : The « Nilcon » vane test was made before the split spoon sampling.

DRILLING METHOD : Track mounted CME-85 drill rig ; hollow stem auger.

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SNC·LAVALIN

BOREHOLE LOG

CLIENT : Ross & Anglin Ltée. (Limited.)
PROJECT : Sheffield Commerciale Build
LOCATION : 2920, Sheffiled Rd, Ottawa
FILE : 687902

BOREHOLE : F-02-22

DATE : 2022-02-04
COORDINATES : MTM 9 NAD 83
E : 375077.42 **N :** 5028777.08

DEPTH (m)	ELEVATION (m)	DESCRIPTION	WATER LEVEL	SAMPLES: TYPE AND NUMBER	SAMPLES: CONDITION	SAMPLES: RECOVERY (%)	IN SITU AND LABORATORY TESTS: N or RQD (%)	IN SITU AND LABORATORY TESTS: WATER CONTENT AND ATTERBERG LIMITS (%)	IN SITU AND LABORATORY TESTS: OTHER TESTS	IN SITU AND LABORATORY TESTS: S_u (kPa), S_{us} (kPa), S_r (kPa), S_{rs} (kPa), N_{dc} (blows/300 mm)
	67.79							W_P — W — W_L; 20 40 60 80		50 100 150
		Fill: Silty clay, traces of sand and gravel.		SS-01		100	13			
0.61	67.18	Silty clay, traces of sand and gravel.		SS-02		100	14			
				SS-03		100	6			
1.83	65.96	Silty clay.		SS-04		100	5			
				SS-05		100	3			95
				SS-06		100	3			69
				SS-07		100	2	25, 60, 58		65
				SS-08		100	3			79
6.71	61.08	**End of borehole**								

REMARKS : The « Nilcon » vane test was made before the split spoon sampling.

DRILLING METHOD : Track mounted CME-85 drill rig ; hollow stem auger.

Appendix 3

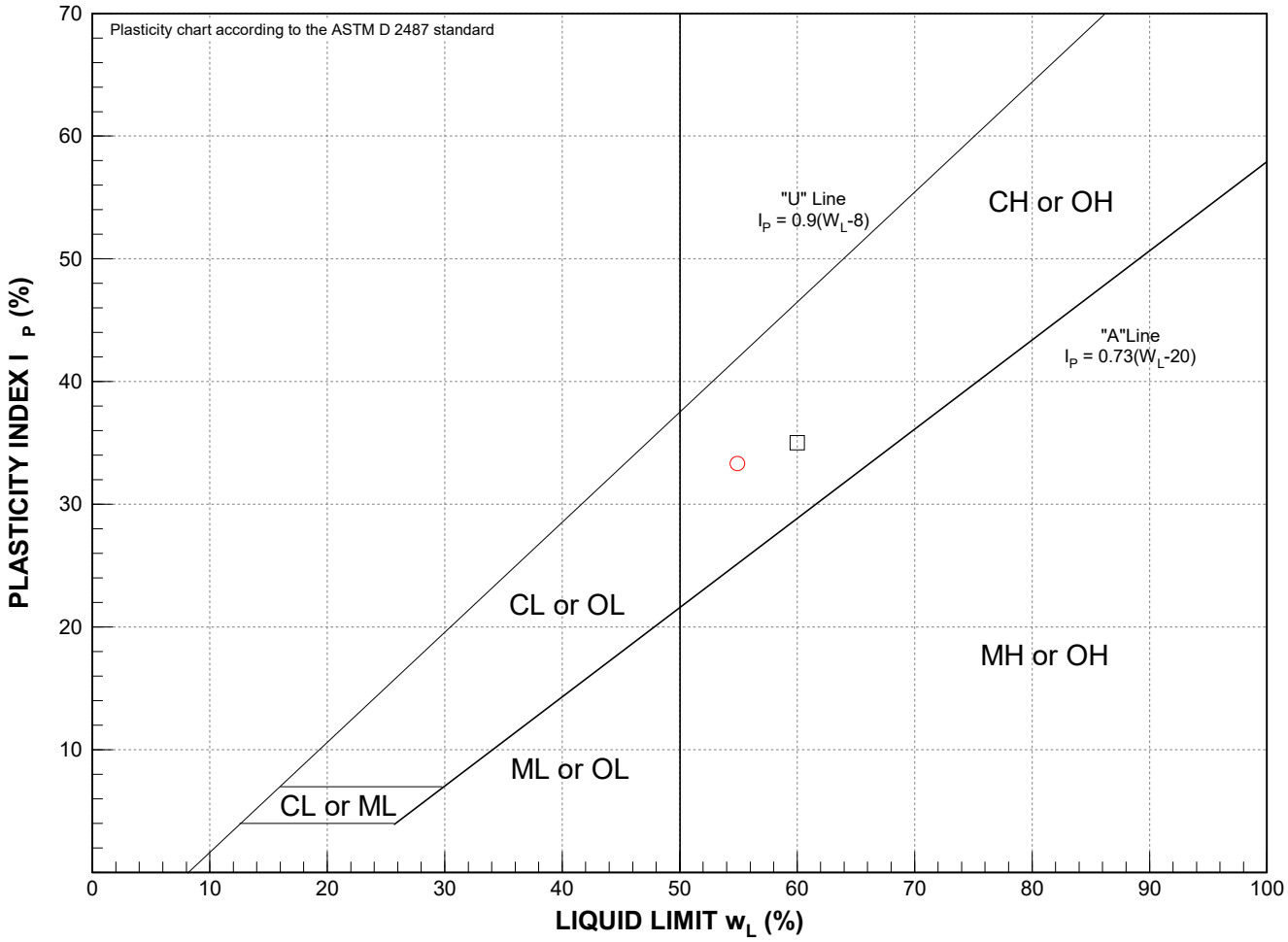
Laboratory testing

SNC·LAVALIN

PLASTICITY CHART

CLIENT : Ross & Anglin Ltée. (Limited.)
PROJECT : Sheffield Commerciale Build
LOCATION : 2920, Sheffiled Rd, Ottawa
FILE : 687902

Figure 1

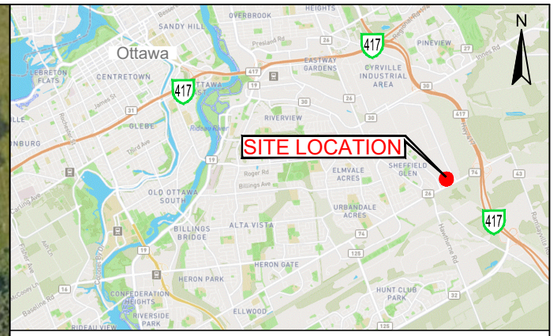


Symbol	Borehole	Sample	Depth (m)	w	w_L	w_P	I_L	I_P	USCS	Description
○	F-01-22	SS4	1,83 - 2,44	39	55	22	0,5	33	CH	- Silty Clay
□	F-02-22	SS7	4,57 - 5,18	58	60	25	0,9	35	CH	- Silty Clay

Remarque:

Appendix 4

Localisation of the boreholes



KEY PLAN

LEGEND

F-01-22 Borehole and number

BOREHOLE N^{O}	COORDINATES MTM 9, NAD 83		GEODETIC GROUND SURFACE ELEVATION (m)
	Easting (m)	Northing (m)	
F-01-22	375106.17	5028791.44	67.00
F-02-22	375077.42	5028777.08	67.79

NOTE:

This drawing originates from Google Earth Pro satellite photo database. The position of the borehole on the photo is imprecise, notably due to certain photographic distortions. For the precise placement of the borehole,reference to the table of coordinates is recommended..

CLIENT : Ross & Anglin Ltée. (Limited.)

SNC·LAVALIN

PROJECT : Sheffield Commerciale Build

LOCATION : 2920, Sheffiled Rd, Ottawa, Ontario

TITLE: Borehole location

SCALE: 1 : 750 — 0 5 10 15 20 25 30 m

DATE : 2022-03-14

FILE-DPT-LIVRABLE-DRAWING : 687902-EG-L01-D01

REV: 00

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FORMAT 11x17