



Foundation Investigation Report

*New Material Storage Facility at Hearst Patrol Yard,
Hearst, ON*

Agreement No. 5018-E-0012

Assignment No. 14

Latitude: 49.690653; Longitude: -83.691094

GWP 5234-18-00

Geocres No. 42G-76

Type of Document:

Final Report

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2021-10-21

*Ministry of Transportation Ontario
Northeastern Region Geotechnical Section*

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ADM-00257843-N0

Issue and Revised Record

Rev.	Date	Format	Prepared by	Reviewed by	Approved by	Description
A	July 9, 2021	pdf	S. Anandakumar S. Micic	T.C. Kim	S. Gonsalves	Draft Report
B	October 21, 2021	pdf	S. Anandakumar S. Micic	T.C. Kim	S. Gonsalves	Final Report

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1 FOUNDATION INVESTIGATION REPORT

1.1 Introduction

This report presents the results of a geotechnical investigation carried out by EXP Services Inc. (EXP) for the proposed new winter sand/salt storage facility at the Hearst Patrol Yard, located in Hearst, Cochrane, Northeastern Ontario. The work was undertaken under Agreement # 5018-E-0012, Work Item No. 14. The terms of reference (TOR) were as presented in the Ministry of Transportation (MTO) email received on April 12, 2021.

The purpose of this investigation is to establish existing subsurface conditions at the proposed location of the patrol yard structure within construction limits defined by MTO and modelled after a recently constructed facility at the Powassan Patrol Yard in Powassan, ON. Similarly as the Powassan building, the new building at the Hearst Patrol Yard will be 82' x 160' (25 m x 48.8 m) and 41' (12.5 m) high building and it will include a 27.5' x 51' (8.4 m x 15.5 m) and 32'10" (10 m) high truck loading area. This Hearst Patrol Yard building will not include the brine storage area. The site-specific geotechnical investigation consisted of field investigation including visual inspection, drilling, soil sampling, and laboratory testing.

This foundation investigation report has been prepared specifically and solely for the project described herein. It contains the factual results of the investigation and the laboratory testing completed for this project.

1.2 Site Description and Geological Setting

1.2.1 Site Description

The Hearst Patrol Yard is located on Trans-Canada Highway 11, approximately 250 m west of the Highway 11 and Fontaline Drive junction in Hearst, Cochrane District, Northeastern Ontario (Key Map on Drawing 1, Appendix B). The site is bound by Highway 11 to the north, a barren land followed by commercial space to the east and west, and surrounded by bush and mature trees to the south.

A paved roadway and parking area lead from the site entrance on Highway 11 to two buildings, a five-bay maintenance garage and a four-bay maintenance garage, located approximately 70 m east, and facility and salt sheds, located approximately 125 m west of entrance gate. Two existing dome structures, sand dome and salt dome, are located approximately 45 m southeast from the storage shed and approximately 165 m south from the site entrance. The new storage building will be placed mostly at the location of existing salt dome. The finish floor (FF) elevations of the existing buildings are between Elev. 246.66 m and 247.06 m.

The topography of the site is considered generally flat lying with borehole elevations ranging from 246.1 to 246.6 m. The ground surface of Hearst Patrol Yard is paved around the existing buildings and has sand and gravel in the other areas. Photographs of the site are included in Appendix A.

1.2.2 Geological Setting

According to the Ministry of Northern Development and Mines Map 2555, Quaternary Geology of Ontario, East Central Sheet, the site generally consists of glaciolacustrine deposits: silt and clay, minor sand; basin and quiet water deposits. According to the Ministry of Northern Development and Mines Map 25434, Bedrock Geology of Ontario, East Central Sheet, the bedrock at the site consists of muscovite-bearing granitic rocks with mafic and ultramafic intrusive rocks: muscovite-biotite and cordierite-biotite granite, granodiorite-tonalite, with Matachewan and Hearst swarms.

1.3 Available Documents of Previous Investigations

The nearest available previous investigation report in the MTO GEOCRES library for the Hearst Patrol Yard location is about 2 km east from the site location:

Geocres No. 42G-25: "Geotechnical Investigation Report for Sewer Construction, Highway 11, Hearst, Ontario" W.P. 722-89-00 prepared by Peto MacCallum Ltd. For Stanley Consulting Group Ltd., May 1998.

1.4 Investigation Procedures

1.4.1 Fieldwork

The site reconnaissance was completed on June 7, 2021 and field investigation was performed between June 7 and June 10, 2021. The field program consisted of drilling four (4) sampled boreholes (BH21-1 to BH21-4). The boreholes were strategically located at the proposed location of the new building (i.e. at each corner of the building) to provide the subsurface information for the design of the proposed material storage facility. The borehole locations are shown on Drawing 1 in Appendix B.

The borehole locations (referenced to the MTM NAD83 coordinate system) and their ground surface elevations were surveyed by EXP personnel by EXP personnel using a GPS (Magellan 316XS Hand Held) and a basic level and survey rod, respectively, having an accuracy of 2 m in the horizontal directions and 0.1 m in the vertical direction, with reference to the benchmark (BM) established on the FF of salt shed located in front of the existing domes at the yard. The elevation of the BM was considered as Elev. 246.72 m based on the Patrol Facility Site Plan (H-325-11-2) from January 2011, provided by MTO with the TOR. The BM location is shown on Drawing 1, in Appendix B.

The boreholes were advanced using a truck mounted CME 55 and/or CME 75 drill rig (i.e. the CME 55 drill rig, which was initially used, broke down during drilling operation; therefore, another drill rig had to be mobilized to site), equipped with a hollow stem augers and diamond bit NW casing. All borehole drilling and sampling operations were performed by a specialist drilling contractor, Landcore Drilling Services. The locations, elevations and depths of boreholes are shown below in Table 1.1.

Table 1.1. Locations, elevations and depths of boreholes completed by EXP Services Inc.

BH #	Location	MTM NAD83 Northing	MTM NAD83 Easting	Ground Elevation (m)	Borehole Depth (m)
BH21-1	Northwest corner of existing dome	5505962	327077	246.40	9.1
BH21-2	Northeast corner of existing dome	5505957	327102	246.18	11.5
BH21-3	Southeast corner of existing dome	5505912	327090	246.12	9.8
BH21-4	Southwest corner of existing dome	5505916	327064	246.63	13.1

During the drilling of the boreholes, soil samples were obtained using a 51 mm outside diameter (O.D.) split-spoon sampler in accordance with Standard Penetration Test (SPT) procedures (ASTM D 1586), at intervals shown on the attached borehole logs (Appendix C). The original field (uncorrected) SPT "N" values were recorded on the borehole logs as recommended in the Canadian Foundation Engineering Manual (CFEM pg. 40) and used to provide an assessment of in-situ consistency of cohesive soils or relative density of non-cohesive soils. When a hard stratum was

reached sampling of hard material was performed by diamond core drilling, using a 1.5 m long NQ double tube wireline core barrel. The water supply from the site was used for soil sampling and rock coring.

To obtain undisturbed cohesive soil samples for consolidation tests the Shelby tube samplers were driven in boreholes BH21-2 and BH21-4 at depth ~2.6 m. However, no recovery was achieved.

As wash boring technique was used during sampling of dense material, groundwater levels could not be measured in the open holes. The boreholes were decommissioned by bentonite/cement mixtures in accordance with the Ministry of the Environment Regulation 903, as amended by Regulation 128/03 (the well regulation under the Ontario Water Resources Act).

The fieldwork was supervised by an EXP geotechnical representative who directed the drilling and sampling operation, logged borehole data in accordance with MTO and/or ASTM standards for soils classification, and retrieved soil samples for subsequent laboratory testing and identification.

All the recovered soil samples were placed in labelled moisture-proof bags and returned to EXP's Sudbury and Brampton laboratory for additional visual, textual and olfactory examination, and sampling for laboratory testing.

1.4.2 Laboratory Testing

All samples recovered from boreholes undertaken by EXP during this investigation were returned to the laboratory and subjected to visual examination and classification. The laboratory testing program on soil samples included the determination of natural moisture content, particle size distribution and Atterberg Limits tests for approximately 25% of the collected soil samples. On four (4) rock cores, UCS tests were carried out. Soil chemical (Corrosivity and Contamination) package tests were performed on two soil samples, while one (1) soil sample was analyzed for metals and general inorganics parameters and BTEX/ Petroleum Hydrocarbons (PHCs) – (F1-F4). All the laboratory tests were carried out in accordance with MTO and/or ASTM standards as appropriate.

The laboratory test results are provided on the attached borehole log sheets in Appendix C. The results of the grain size analyses are presented graphically in Appendix D. Appendix D also contains the results of chemical and environmental tests.

1.5 Subsurface Conditions

The detailed subsurface conditions encountered in the boreholes advanced during this investigation are presented on the borehole log sheets in Appendix C. Laboratory test results of grain size analyses tests are provided in Appendix D. The "Explanation of Terms Used in Report" preceding the borehole logs in Appendix C forms an integral part of and should be read in conjunction with this report.

A borehole location plan and cross section subsurface profiles are provided in Appendix B. It should be noted that the stratigraphic boundaries indicated on the borehole log and cross section stratigraphic profiles are inferred from semi-continuous sampling, observations of drilling progress and results of Standard Penetration Tests. These boundaries typically represent transitions from one soil type to another and should not be regarded as exact planes of geological change. Furthermore, subsurface conditions may vary between and beyond the borehole locations.

In general, the stratigraphic sequence at the proposed structure site consists of pavement structure or sand and gravel to sand fill on the ground surface followed by the firm to very stiff clayey silt to silty clay layer, then the compact silt layer underlain by the compact to very dense sandy silt till layer followed by bedrock.

A detailed description of the subsurface conditions encountered is discussed further in subsequent sections. It should be noted that the following sections are based on the geotechnical investigation conducted by EXP.

1.5.1 Surface Treatment

Asphalt was encountered at the surface of boreholes BH21-1 and BH21-2, and ranged in thickness from approximately 65 mm to 75 mm. Asphalt thicknesses may further vary beyond the borehole locations.

1.5.2 Fill: Sand and Gravel to Sand

A sand and gravel/gravelly sand/sand fill layer was encountered in all boreholes, below pavement structure in boreholes BH21-1 and BH21-2 and at the surface of boreholes BH21-3 and BH21-4. The approximate elevations of the surface and base of the fill and the thickness of fill as encountered in boreholes are summarized in Table 1.2 below:

Table 1.2. Summary of sand and gravel to sand fill layer

Borehole	Elevation (m)		Layer Surface Depth (m)	Layer Thickness (m)
	Top	Bottom		
BH21-1	246.4	244.9	0.075	1.5
BH21-2	246.2	245.4	0.065	0.8
BH21-3	246.1	245.4	0.0	0.8
BH21-4	246.6	245.1	0.0	1.5

This layer consists of sand and gravel with trace to some silt and clay. The material is brown to grey in color, and moist to wet. The SPT “N” values within this layer is ranged from 7 to 32 blows per 300 mm penetration suggesting loose to dense compactness condition.

Laboratory testing performed on selected samples consisted of moisture content and grain size distribution tests. The test results are as follows:

Moisture Content:

- 6.2% to 14.3%

Grain Size Distribution:

- 2% to 21% gravel;
- 71% to 86% sand;
- 9% to 12% silt and clay

The results of the moisture content and grain size distribution tests are provided on the record of borehole sheets in Appendix C. The results of the grain size distribution test is also provided on Figure 1 in Appendix D.

1.5.3 Peat

A thin layer of peat (~0.3 m thick) was encountered below the gravelly sand fill in borehole BH21-3. The material is black in color, and wet. The SPT “N” values within this layer is about 10 blows per 300 mm penetration suggesting compact compactness condition.

The moisture content of this layer is about 23.9%. The result of the moisture content test is provided on the record of borehole sheets in Appendix C.

1.5.4 Clayey Silt to Silty Clay

A layer of native clayey silt to silty clay was encountered below the fill and peat in all boreholes BH21-1 to BH21-4. The approximate elevations of the surface and base of the deposit and the thickness of deposit as encountered in boreholes are summarized in Table 1.3 below:

Table 1.3. Summary of clayey silt to silty clay

Borehole	Elevation (m)		Layer Surface Depth (m)	Layer Thickness (m)
	Top	Bottom		
BH21-1	244.9	241.8	1.5	3.1
BH21-2	245.4	242.4	0.8	3.0
BH21-3	245.1	243.8	1.1	1.2
BH21-4	245.1	243.7	1.5	1.4

The composition of this layer is silt and clay, trace organics, trace gravel, trace to some sand. The material is dark brown/grey to brown in color and moist to wet. The SPT “N” values within this layer ranged from 6 to 18 blows per 300 mm penetration, suggesting firm to very stiff consistency. Boreholes BH21-2 and BH21-4 has organics present in the top 0.8m of this layer.

Laboratory testing performed on selected sample consisted of moisture content, grain size distribution and Atterberg Limit tests. The test results are as follow:

Moisture Content:

- 20.8% to 37.3%

Grain Size Distribution:

- 0% to 1% gravel;
- 4% to 14% sand;
- 29% to 75% silt; and
- 21% to 67% clay

Atterberg limits:

- Liquid Limit: 22% to 46%
- Plastic Limit: 13% to 20%
- Plasticity Index: 8% to 29%

The results of the moisture content grain size distribution and Atterberg Limit tests are provided on the record of borehole sheets in Appendix C. The results of the grain size distribution test and Atterberg Limit tests are also provided on Figures 2 and 5, respectively, in Appendix D.

1.5.5 Silt

A layer of native silt was encountered in all boreholes, BH21-1 to BH21-4 below the native clayey silt to silty clay layer. The approximate elevations of the surface and base of the deposit and the thickness of deposit as encountered in boreholes are summarized in Table 1.4 below:

Table 1.4. Summary of silt layer

Borehole	Elevation (m)		Layer Surface Depth (m)	Layer Thickness (m)
	Top	Bottom		
BH21-1	241.8	240.3	4.6	1.5
BH21-2	242.4	240.1	3.8	2.3
BH21-3	243.8	241.6	2.3	2.3
BH21-4	243.7	241.3	2.9	2.4

The composition of this layer is silt, with trace gravel, trace to some sand, trace to some clay. The material is brown in color, and moist to wet. The SPT “N” values within this layer were between 0 and 25 blows per 300 mm penetration, suggesting very loose to compact, but generally compact compactness condition.

Laboratory testing performed on selected sample consisted of moisture content and grain size tests. The test results are as follow:

Moisture Content:

- 13.1% to 24.8%

Grain Size Distribution:

- 0% to 3% gravel;
- 1% to 14% sand;
- 75% to 89% silt; and
- 9% to 12% clay

The results of the moisture content and grain size distribution tests are provided on the record of borehole sheets in Appendix C. The result of grain size distribution tests performed is also provided on Figures 3 in Appendix D.

1.5.6 Sandy Silt Till

A layer of native sandy silt till was encountered in all boreholes, BH21-1 to BH21-4, below the native silt layer. The borehole BH21-3 was terminated within this layer. The approximate elevations of the surface and base of the deposit and the thickness of deposit as encountered in boreholes are summarized in Table 1.5 below:

Table 1.5. Summary of sandy silt till layer

Borehole	Elevation (m)		Layer Surface Depth (m)	Layer Thickness (m)
	Top	Bottom		
BH21-1	240.3	238.4	6.1	1.9
BH21-2	240.1	237.7	6.1	2.4
BH21-3	241.6	236.4	4.6	5.2
BH21-4	241.3	236.7	5.3	4.7

The composition of this layer is sand and silt, with trace to some gravel and trace clay. The material is brown to grey in color, and moist. The SPT “N” values within this layer were between 13 and 100 blows per 300 mm penetration, suggesting compact to very dense compactness condition.

Laboratory testing performed on selected sample consisted of moisture content and grain size distribution tests. The test results are as follow:

Moisture Content:

- 7.6% to 19.4%

Grain Size Distribution:

- 3% to 4% gravel;
- 24% to 28% sand;
- 69% to 73% silt and clay

The results of the moisture content and grain size distribution tests are provided on the record of borehole sheets in Appendix C. The result of grain size distribution tests performed is also provided on Figure 4, in Appendix D.

1.5.7 Bedrock

The bedrock was encountered below the sandy silt till deposit in boreholes BH21-1, BH21-2 and BH21-4 at depths ranging from 8 to 10 m below the ground surface with elevation ranging from 238.4 m to 236.7 m. The bedrock was confirmed by coring. These boreholes are terminated within bedrock. The bedrock surface depth and elevation are summarized in Table 1.6 below:

Table 1.6. Depth and elevation of bedrock surface

Borehole	Depth Below Ground Surface (m)	Elevation (m)	Description
BH21-1	8.0	238.4	Bedrock Cored
BH21-2	8.5	237.7	Bedrock Cored
BH21-4	10.0	236.7	Bedrock Cored

Based on the bedrock cores recovered, the bedrock is identified as granitic rocks with mafic and ultramafic intrusive rocks. In general, the bedrock sample is described as grey groundmass with coarse grained with slightly weathered to fresh and intensively to very slightly fractured bedrock. The Rock Quality Designation (RQD) measured on the core samples ranges from 32.1% to 93.3%, indicating a rock mass of poor to very good, mostly good quality. Based on the International Society for Rock Mechanics and Rock Engineering classification (ISRM 1980) the rock can be described as very strong strength (R5 grade) having the measured Uniaxial Compressive Strength (UCS) of between 112.1 MPa and 146.5 MPa. Results of UCS tests are included in Appendix D. Photographs of rock cores are included in Appendix E.

1.6 Groundwater Conditions

The groundwater levels in the boreholes were not measured in open hole upon completion of drilling, since water was used to advance boreholes, during EXP’s investigation in June 2021. However, based on observation on the site during the drilling and observed moisture condition of split spoon samples it is estimated that the groundwater table could be approximately 1.1 m below the existing ground corresponding to approximate Elev. 245 m.

Seasonal variations in the water table should be expected, with higher levels occurring during wetter periods of the year and lower levels during drier periods.

1.7 Chemical Analyses

One (1) soil sample was selected for chemical analyses, and were sent via courier, in a secure cooler under chain of custody, to SGS Canada Inc., a CALA-certified and accredited laboratory in Lakefield, Ontario.

The sample SS4 from borehole BH21-3 was subjected to corrosivity chemical analyses. The analytical results are summarized in Table 1.7 below and are presented in Appendix D.

Table 1.7. Corrosivity chemical analysis

Sample Identification	pH (unitless)	Soluble Chloride (ppm)	Soluble Sulphate (ppm)	Resistivity (ohm-cm)	Conductivity (mS/cm)	Redox Potential (mV)
BH21-3-SS4 Silt	7.82	3200	11	319	3.13	222

1.8 Environmental Analyses

In addition to corrosivity testing, one (1) sample SS3 from boreholes BH21-2 was analyzed for metals and general inorganics parameters and BTEX/ Petroleum Hydrocarbons (PHCs) – (F1-F4). The analytical results are summarized in Table 1.8 below and Certificate of Analysis are compiled in Appendix D.

Table 1.8. Environmental analysis

Parameter (µg/g)	Result (µg/g)
BH21-2-SS3 Clayey Silt to Silty Clay	
BTEX:	
Benzene	< 0.02
Ethylbenzene	< 0.05
Toluene	< 0.05
Zylene (total)	< 0.05
m/p-zylene	< 0.05
o-xylene	< 0.05
PHCs:	
F1 (C6 – C10)	< 10
F1 BTEX (C6 – C10)	< 10
F2 (C10 – C16)	< 10
F3 (C16 – C34)	< 50
F4 (C34 – C50)	< 50

2 CLOSURE

A subsurface investigation is a limited sampling of a site; the subsurface conditions have been established only at the test hole locations. Should conditions at the site be encountered which differ from those reported at the test locations, we require that we be notified immediately in order to assess this additional information and our recommendations, as appropriate. It may then be necessary to perform additional investigation and analysis.

Contractors bidding on or undertaking any proposed work at this site should, relative to the subsurface conditions, decide on their own investigations, if deemed necessary, as well as their own interpretations of the factual results provided herein, so they may draw their own conclusions as to how the subsurface conditions may affect them.

This Foundation Investigation Report has been prepared by Sugitha Anandakumar, M.Eng., P.Eng., PMP and Silvana Micic, Ph.D., P.Eng., and reviewed by TaeChul Kim, M.E.Sc., P.Eng. and Stan E. Gonsalves, M.Eng., P.Eng., MTO Designated Foundation Contact. The field investigation was conducted by Shane Tobias.

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Encl.

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Hvorslev, M.J., 1951. Time Lag and Soil Permeability in Ground-Water Observations, Bull. No. 36, Waterways Exper. Sta. Corps of Engrs, U.S. Army, Vicksburg, Mississippi, p 1-50.

Ministry of Northern Development and Mines, Map 2555. Quaternary Geology of Ontario, East-Central Sheet, 1991

Ministry of Northern Development and Mines Map 2543. Bedrock Geology of Ontario, East-Central Sheet, 1991

ASTM International:

ASTM D1586 Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils

ASTM D2573-08 Standard Test Method for Field Vane Shear Test in Cohesive Soil

ASTM D3966-90 Standard Test Method for Piles Under Lateral Loads

ASTM D4044-15 Standard Test Method for (Field Procedure) for Instantaneous Change in Head (Slug) Tests for Determining Hydraulic Properties of Aquifers

Ontario Water Resources Act:

R.R.O 1990, Regulation 903 Wells, under Ontario Water Resources Act, R.S.O. 1990, c. O.40

Ontario Occupational Health and Safety Act (OHSA):

Ontario Regulation 213/91 Construction Projects

4 LIMITATIONS AND USE OF REPORT

BASIS OF REPORT

This report (“Report”) is based on site conditions known or inferred by the geotechnical investigation undertaken as of the date of the Report. Should changes occur which potentially impact the geotechnical condition of the site, or if construction is implemented more than one year following the date of the Report, the recommendations of EXP may require re-evaluation.

The Report is provided solely for the guidance of design engineers and on the assumption that the design will be in accordance with applicable codes and standards. Any changes in the design features which potentially impact the geotechnical analyses or issues concerning the geotechnical aspects of applicable codes and standards will necessitate a review of the design by EXP. Additional field work and reporting may also be required.

Where applicable, recommended field services are the minimum necessary to ascertain that construction is being carried out in general conformity with building code guidelines, generally accepted practices and EXP’s recommendations. Any reduction in the level of services recommended will result in EXP providing qualified opinions regarding the adequacy of the work. EXP can assist design professionals or contractors retained by the Client to review applicable plans, drawings, and specifications as they relate to the Report or to conduct field reviews during construction.

Contractors contemplating work on the site are responsible for conducting an independent investigation and interpretation of the borehole results contained in the Report. The number of boreholes necessary to determine the localized underground conditions as they impact construction costs, techniques, sequencing, equipment and scheduling may be greater than those carried out for the purpose of the Report.

Classification and identification of soils, rocks, geological units, contaminant materials, building envelopment assessments, and engineering estimates are based on investigations performed in accordance with the standard of care set out below and require the exercise of judgment. As a result, even comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations or building envelope descriptions involve an inherent risk that some conditions will not be detected. All documents or records summarizing investigations are based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated. Some conditions are subject to change over time. The Report presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, these should be disclosed to EXP to allow for additional or special investigations to be undertaken not otherwise within the scope of investigation conducted for the purpose of the Report.

RELIANCE ON INFORMATION PROVIDED

The evaluation and conclusions contained in the Report are based on conditions in evidence at the time of site inspections and information provided to EXP by the Client and others. The Report has been prepared for the specific site, development, building, design or building assessment objectives and purpose as communicated by the Client. EXP has relied in good faith upon such representations, information and instructions and accepts no responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of any misstatements, omissions, misrepresentation or fraudulent acts of persons providing information. Unless specifically stated otherwise, the applicability and reliability of the findings, recommendations, suggestions or opinions expressed in the Report are only valid to the extent that there has been no material alteration to or variation from any of the information provided to EXP.

STANDARD OF CARE

The Report has been prepared in a manner consistent with the degree of care and skill exercised by engineering consultants currently practicing under similar circumstances and locale. No other warranty, expressed or implied, is made. Unless specifically stated otherwise, the Report does not contain environmental consulting advice.

COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment form part of the Report. This material includes, but is not limited to, the terms of reference given to EXP by its client ("Client"), communications between EXP and the Client, other reports, proposals or documents prepared by EXP for the Client in connection with the site described in the Report. In order to properly understand the suggestions, recommendations and opinions expressed in the Report, reference must be made to the Report in its entirety. EXP is not responsible for use by any party of portions of the Report.

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The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. No other party may use or rely upon the Report in whole or in part without the written consent of EXP. Any use of the Report, or any portion of the Report, by a third party are the sole responsibility of such third party. EXP is not responsible for damages suffered by any third party resulting from unauthorised use of the Report.

REPORT FORMAT

Where EXP has submitted both electronic file and a hard copy of the Report, or any document forming part of the Report, only the signed and sealed hard copy shall be the original documents for record and working purposes. In the event of a dispute or discrepancy, the hard copy shall govern. Electronic files transmitted by EXP have utilize specific software and hardware systems. EXP makes no representation about the compatibility of these files with the Client's current or future software and hardware systems. Regardless of format, the documents described herein are EXP's instruments of professional service and shall not be altered without the written consent of EXP.

Appendix A – Site Photographs



Photo 1. Hearst Patrol Yard - Drilling borehole BH21-1, facing southwest (June 9, 2021)




Photo 2. Hearst Patrol Yard - - Drilling borehole BH21-4, facing northeast (June 10, 2021)

Appendix B – Drawings



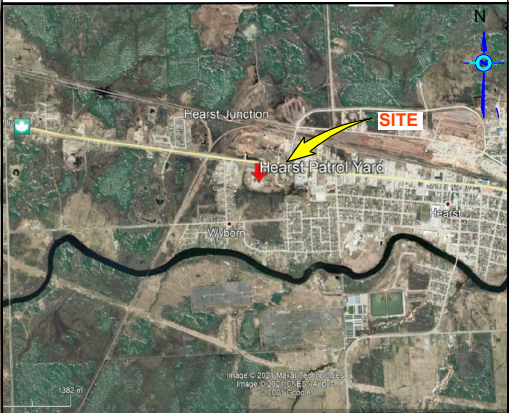
METRIC

DIMENSIONS ARE IN METERS AND/OR MILLIMETERS UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETERS +METERS

CONT. No. 5018-E-0012 GWP No. - Assignment No. 14	
HEARST PATROL YARD, HIGHWAY 11 HEARST, ON (Latitude: 49°41'26.35", Longitude: 83°41'27.94") BOREHOLE LOCATION PLAN AND SOIL STRATA	SHEET 1

exp.	EXP Services Inc.
------	-------------------

KEY PLAN



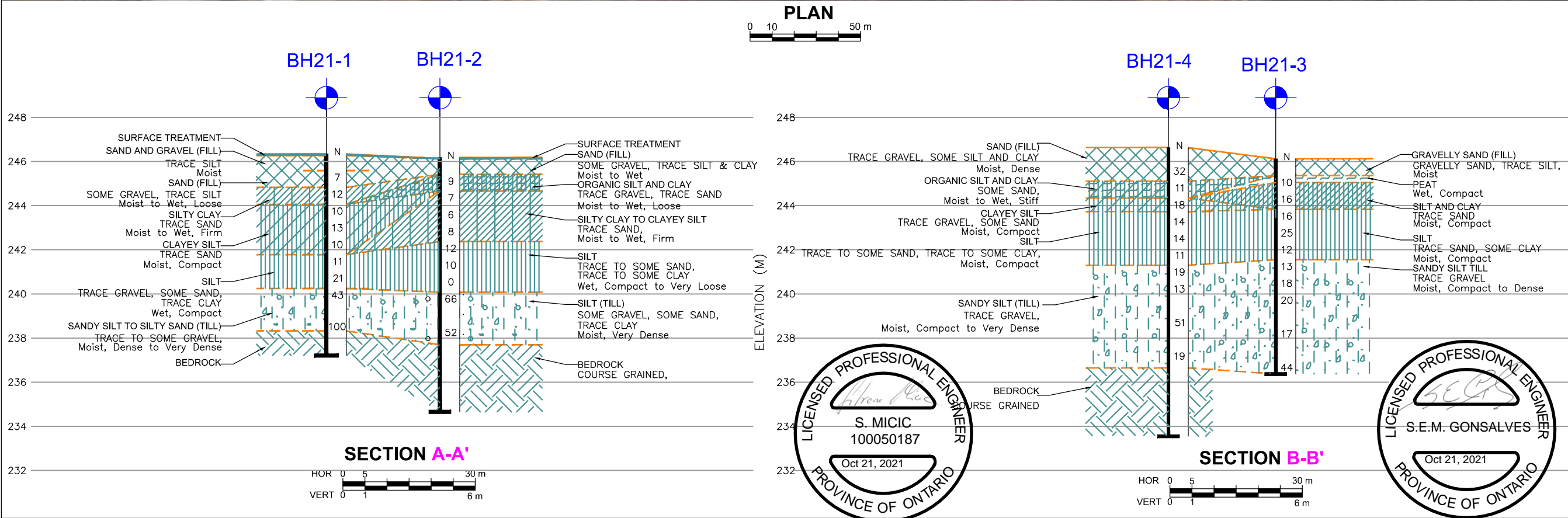
LEGEND	
	Borehole Location
	Standard Penetration Test (Blows/0.3 m)
	Groundwater level measured in open hole
	Bench Mark Location (Elev. 246.72 m)

SOIL STRATA SYMBOLS					
	SURFACE TREATMENT		FILL		PEAT
	SILTY CLAY		CLAYEY SILT		SILT
	SANDY SILT TO SILTY SAND/ SILT (TILL)		ORGANIC CLAYEY SILT		ORGANIC SILT & CLAY
	BEDROCK				

BH No.	ELEV.	MTM CO-ORDINATES NAD 83 (ZONE ON-13)	
		NORTHING	EASTING
BH21-1	246.4	5505962	327077
BH21-2	246.2	5505957	327102
BH21-3	246.1	5505912	327090
BH21-4	246.6	5505916	327064

NOTES		
This drawing is for subsurface information only. The proposed structure details/ works are shown for illustration purposes only and may not be consistent with the final design configuration as shown elsewhere in the Contracts Documents		
The complete foundation investigation and design report for this project and other related documents may be examined at the Materials Engineering and Research Office, Downsview. Information contained in the report and related documents are specifically excluded in accordance with the conditions of Section GC 2.01 of OPS Gen. Cond.		

	SM	SUBMISSION FOR MTO REVIEW	
DATE	BY	DESCRIPTION	
		GEOCRES NO. 42G-76	
		PROJECT NO. ADM-00257843-N0	
SUBM'D SH	CHECKED SM	DATE	Oct. 21, 21
DRAWN SH	CHECKED SM	APPROVED SG	DWG. 1






METRIC

DIMENSIONS ARE IN METERS AND/OR MILLIMETERS UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETERS +METERS

Proposed Structure

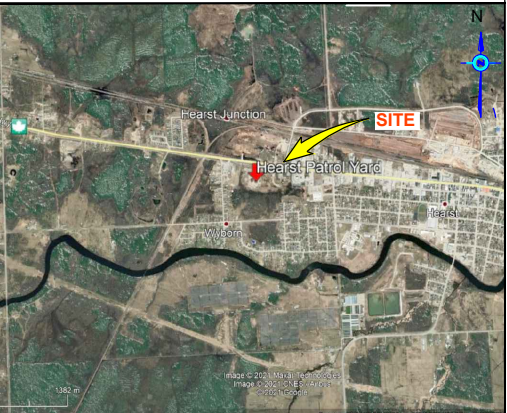
CONT. No. 5018-E-0012
GWP No. -
Assignment No. 14


SHEET
2

HEARST PATROL YARD, HIGHWAY 11
HEARST, ON
(Latitude: 49°41'26.35", Longitude: 83°41'27.94")
BOREHOLE LOCATION PLAN AND SOIL STRATA


exp. **EXP Services Inc.**


KEY PLAN





HEARST PATROL YARD
HEARST, ON
HEARST JUNCTION
HEARST RIVER

LEGEND


 Borehole Location


 Standard Penetration Test (Blows/0.3 m)

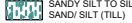
 Groundwater level measured in open hole


 Bench Mark Location (Elev. 246.72 m)


SOIL STRATA SYMBOLS

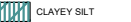
 SURFACE TREATMENT

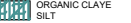
 SILT CLAY


 SANDY SILT TO SILTY SAND (TILL)


 BEDROCK

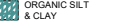
 FILL

 CLAYEY SILT

 ORGANIC CLAYEY SILT

 PEAT

 SILT

 ORGANIC SILT & CLAY

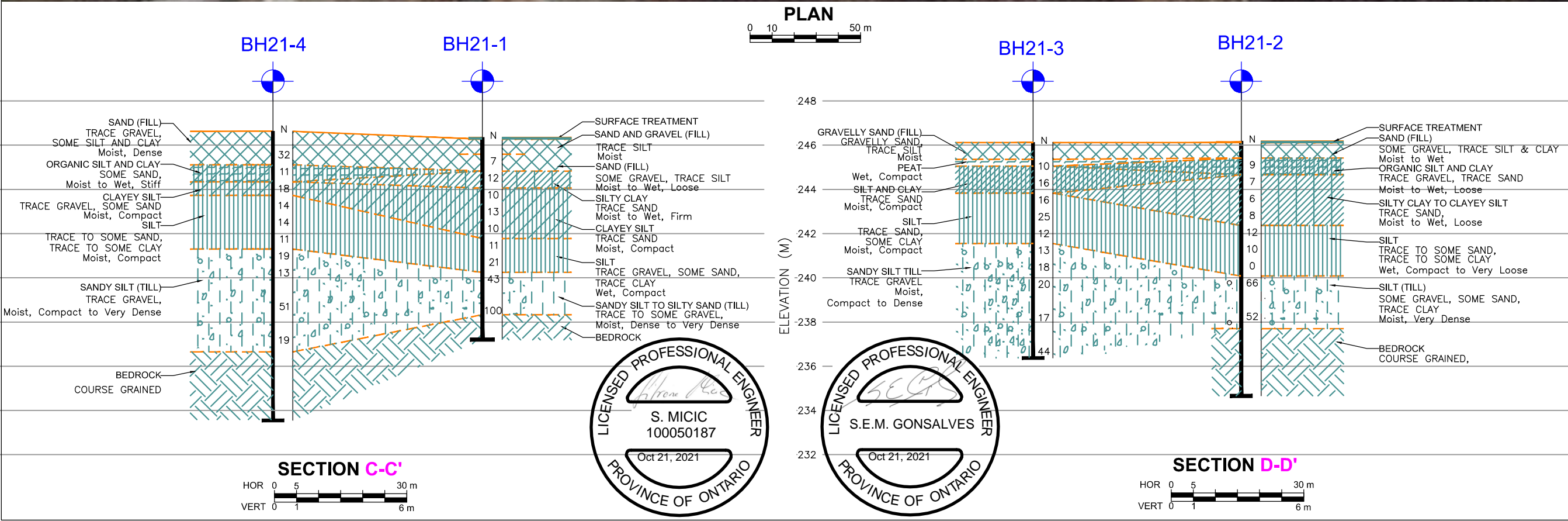
BH No.	ELEV.	MTM CO-ORDINATES NAD 83 (ZONE ON-13)	
		NORTHING	EASTING
BH21-1	246.4	5505962	327077
BH21-2	246.2	5505957	327102
BH21-3	246.1	5505912	327090
BH21-4	246.6	5505916	327064

NOTES

This drawing is for subsurface information only. The proposed structure details/ works are shown for illustration purposes only and may not be consistent with the final design configuration as shown elsewhere in the Contracts Documents

The complete foundation investigation and design report for this project and other related documents may be examined at the Materials Engineering and Research Office, Downsview. Information contained in the report and related documents are specifically excluded in accordance with the conditions of Section GC 2.01 of OPS Gen. Cond.

	SM	SUBMISSION FOR MTO REVIEW
DATE	BY	DESCRIPTION
		GEOCRE NO. 42G-76
		PROJECT NO. ADM-00257843-NO
SUBM'D SH	CHECKED SM	DATE Oct. 21, 21
DRAWN SH	CHECKED SM	APPROVED SG DWG. 2



Appendix C - Borehole Logs

Explanation of Terms Used on Borehole Records

SOIL DESCRIPTION

Terminology describing common soil genesis:

Topsoil: mixture of soil and humus capable of supporting good vegetative growth.

Peat: fibrous fragments of visible and invisible decayed organic matter.

Fill: where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc.; none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

Till: the term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Terminology describing soil structure:

Desiccated: having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.

Stratified: alternating layers of varying material or color with the layers greater than 6 mm thick.

Laminated: alternating layers of varying material or color with the layers less than 6 mm thick.

Fissured: material breaks along plane of fracture.

Varved: composed of regular alternating layers of silt and clay.

Slickensided: fracture planes appear polished or glossy, sometimes striated.

Blocky: cohesive soil that can be broken down into small angular lumps which resist further breakdown.

Lensed: inclusion of small pockets of different soil, such as small lenses of sand scattered through a mass of clay; not thickness.

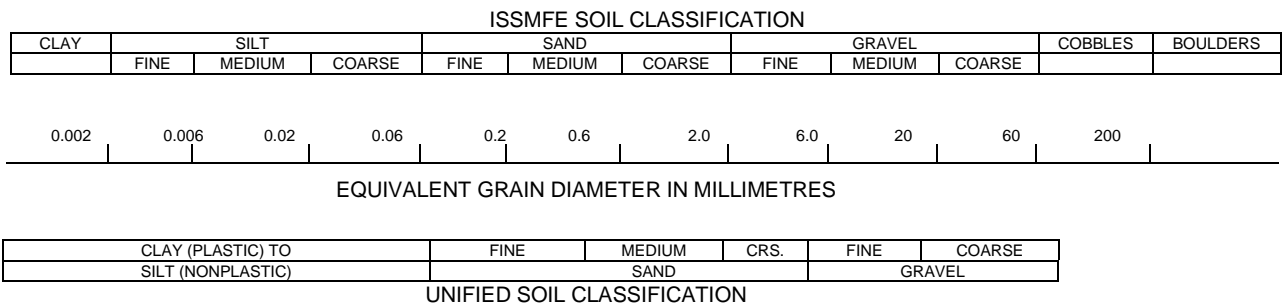
Seam: a thin, confined layer of soil having different particle size, texture, or color from materials above and below.

Homogeneous: same color and appearance throughout.

Well Graded: having wide range in grain sized and substantial amounts of all predominantly on grain size.

Uniformly Graded: predominantly on grain size.

All soil sample descriptions included in this report follow generally the ASTM D2487-11 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) with some modification to reflect current MTO practices. The system divides soils into three major categories: (1) coarse grained, (2) fine-grained, and (3) highly organic. The soil is then subdivided based on either gradation or plasticity characteristics. The system provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification. The classification excludes particles larger than 76 mm. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually in accordance with ASTM D2488-09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems. Others may use different classification systems; one such system is the ISSMFE Soil Classification.



Terminology describing materials outside the USCS, (e.g. particles larger than 76 mm, visible organic matter, construction debris) is based upon the proportion of these materials present and as described below in accordance with Canadian Foundation Engineering Manual (CFEM):

Table a: Percent or Proportion of Soil

Term	Description	Criteria
"trace"	trace gravel, trace sand, etc.	1% - 10%
"some"	some gravel, some sand, etc.	10% - 20%
Adjective	gravelly, sandy, silty and clayey	20% - 35%
"and"	and gravel, and sand, etc.	>35%
Noun	gravel, sand, silt, clay	>35% and main fraction

The standard terminology to describe cohesionless soils includes the compactness as determined by the Standard Penetration Test 'N' value:

Table b: Apparent Density of Cohesionless Soil

	'N' Value (blows/0.3 m)
Very Loose	N<5
Loose	5≤N<10
Compact	10≤N<30
Dense	30≤N<50
Very Dense	50≤N

The standard terminology to describe cohesive soils includes consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer tests, unconfined compression tests or similar field and laboratory analysis, Standard Penetration Test 'N' values can also be used to provide an approximate indication of the consistency and shear strength of fine grained, cohesive soils:

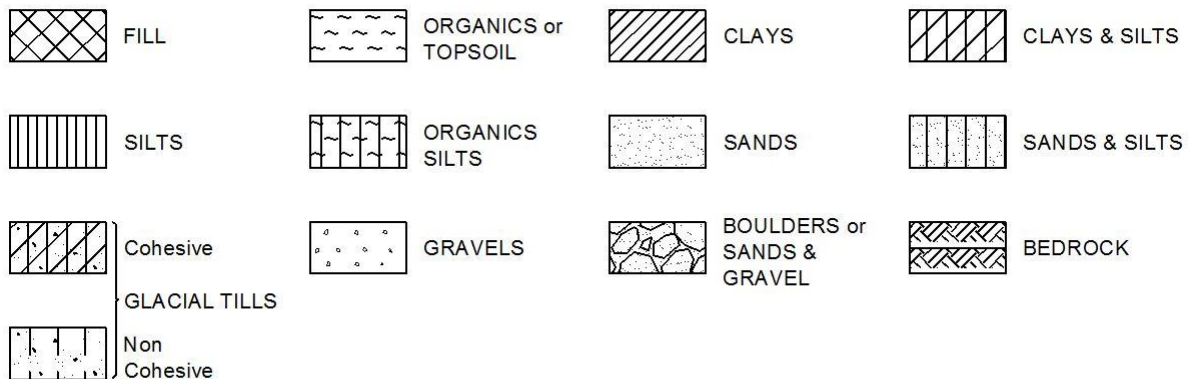
Table c: Consistency of Cohesive Soil

Consistency	Vane Shear Measurement (kPa)	'N' Value
Very Soft	<12.5	<2
Soft	12.5-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

Note: 'N' Value - The Standard Penetration Test records the number of blows of a 140 pound (64kg) hammer falling 30 inches (760mm), required to drive a 2 inch (50.8mm) O.D. split spoon sampler 1 foot (305mm). For split spoon samples where full penetration is not achieved, the number of blows is reported over the sampler penetration in meters (e.g. 50/0.15).

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols:



WATER LEVEL MEASUREMENT



Open Borehole or Test Pit



Monitoring Well, Piezometer or Standpipe

ABBREVIATIONS AND SYMBOLS

FIELD SAMPLING

SS	Split spoon sample (obtained from the Standard Penetration Test)
WS	Wash sample
BS	Bulk sample
TW	Thin wall sample or Shelby tube
PS	Piston sample
AS	Auger sample
VT	Vane test
GS	Grab sample
HQ, NQ, etc.	Rock core samples obtained with the use of standard size diamond drilling bits

STRESS AND STRAIN

u_w	kPa	Pore water pressure
r_u	1	Pore pressure ratio
σ	kPa	Total normal stress
σ'	kPa	Effective normal stress
τ	kPa	Shear stress
$\sigma_1, \sigma_2, \sigma_3$	kPa	Principal stresses
ε	%	Linear strain
$\varepsilon_1, \varepsilon_2, \varepsilon_3$	%	Principal strains
E	kPa	Modulus of linear deformation
G	kPa	Modulus of shear deformation
μ	1	Coefficient of friction

MECHANICAL PROPERTIES OF SOIL

m_v	kPa ⁻¹	Coefficient of volume change
c_c	1	Compression index
c_s	1	Swelling index
c_r	1	Recompression index
c_v	m ² /s	Coefficient of consolidation
H	m	Drainage path
T_v	1	Time factor
U	%	Degree of consolidation
σ'_{v0}	kPa	Effective overburden pressure
σ'_p	kPa	Preconsolidation pressure
τ_f	kPa	Shear strength
c'	kPa	Effective cohesion intercept
ϕ'	—°	Effective angle of internal friction
c_u	kPa	Apparent cohesion intercept
ϕ_u	—°	Apparent angle of internal friction
τ_R	kPa	Residual shear strength
τ_r	kPa	Remoulded shear strength
S_t	1	Sensitivity = c_u/τ_r

PHYSICAL PROPERTIES OF SOIL

P_s	kg/m ³	Density of solid particles
γ_s	kN/m ³	Unit weight of solid particles
ρ_w	kg/m ³	Density of water
γ_w	kN/m ³	Unit weight of water
ρ	kg/m ³	Density of soil
γ	kN/m ³	Unit weight of soil
ρ_d	kg/m ³	Density of dry soil
γ_d	kN/m ³	Unit weight of dry soil
ρ_{sat}	kg/m ³	Density of saturated soil
γ_{sat}	kN/m ³	Unit weight of saturated soil
ρ'	kg/m ³	Density of submerged soil
γ'	kN/m ³	Unit weight of submerged soil
e	1, %	Void ratio
n	1, %	Porosity
w	1, %	Water content
S_r	%	Degree of saturation
W_L	%	Liquid limit
W_P	%	Plastic limit
W_s	%	Shrinkage limit
I_p	%	Plasticity index = $(W_L - W_P)$
I_L	%	Liquidity index = $(W - W_P)/I_p$
I_C	%	Consistency index = $(W_L - W)/I_p$
e_{max}	1, %	Void ratio in loosest state
e_{min}	1, %	Void ratio in densest state
I_D	1	Density index = $(e_{max} - e)/(e_{max} - e_{min})$
D	mm	Grain diameter
D_n	mm	N percent - diameter
C_u	1	Uniformity coefficient
h	m	Hydraulic head or potential
q	m ³ /s	Rate of discharge
v	m/s	Discharge velocity
i	1	Hydraulic gradient
k	m/s	Hydraulic conductivity
j	kN/m ³	Seepage force














Brampton, Ontario

RECORD OF BOREHOLE No BH21-1

1 OF 1

METRIC

W.P. Agreement No. 5018-E-0012, WO No. 14 LOCATION Hearst Patrol Yard, 327077 E, 5505962 N NAD83 MTM Zone 13 ORIGINATED BY ST
 DIST Cochrane HWY 11 BOREHOLE TYPE Continuous Flight HSA, NW Casing, NQ Core Barrel (CME 55) COMPILED BY SA
 DATUM Local (Non-Geodetic) DATE 2021.06.08 - 2021.06.08 LATITUDE 49.69089338 LONGITUDE -83.69123298 CHECKED BY SM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								WATER CONTENT (%)		
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL P. PENETROMETER										
246.4 0.1	SURFACE TREATMENT (~ 75mm thick asphalt) FILL , sand and gravel to sand, some gravel, trace silt, brown, moist to wet, loose		AG1	AUGER			246											
			SS2	SS	7													
244.9 1.5	CLAYEY SILT TO SILTY CLAY , trace sand, brown, moist to wet, stiff		SS3	SS	12		245								0 9 30 61			
	- attempted shelby, no recovery		SS4	SS	10		244											
			SS5	SS	13		243								0 4 75 21 Non-plastic			
			SS6	SS	10		242											
241.8 4.6	SILT , trace gravel, some sand, trace clay, brown, wet, compact		SS7	SS	11		241								3 14 75 9 Non-plastic			
			SS8	SS	21													
240.3 6.1	SANDY SILT TILL , trace to some gravel, brown to grey, moist, dense to very dense		SS9	SS	43		240								4 27 (69)			
							239											
238.4 8.0	BEDROCK , course grained, grey coloured granitic rocks with mafic and ultramafic intrusive rocks		SS10	SS	100													
	Length RQD Recovery (m) (%) (%)		R1	NQ			238											
237.3 9.1	Run 1 1.1 41.0 86.4 BOREHOLE TERMINATED AT ~ 9.1 m DEPTH Groundwater Level: Since water was used to advanced borehole, no groundwater level was measured in open hole.																	

+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MTO ADM-00257843-NO - HIGHWAY 11.GPJ ONTARIO MTO.GDT 7/11/21

Brampton, Ontario

RECORD OF BOREHOLE No BH21-2

1 OF 2

METRIC

W.P. Agreement No. 5018-E-0012, WO No. 14 LOCATION Hearst Patrol Yard, 327102 E, 5505957 N NAD83 MTM Zone 13 ORIGINATED BY ST
 DIST Cochrane HWY 11 BOREHOLE TYPE Continuous Flight HSA, NW Casing, NQ Core Barrel (CME 75) COMPILED BY SA
 DATUM Local (Non-Geodetic) DATE 2021.06.09 - 2021.06.09 LATITUDE 49.69085651 LONGITUDE -83.69088426 CHECKED BY SM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL LIQUID LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL P. PENETROMETER		WATER CONTENT (%) W _P W W _L					
246.2								20	40	60	80	100			
246.1	SURFACE TREATMENT (~ 65mm thick asphalt) FILL , sand, some gravel, trace silt and clay, brown to grey, moist to wet		AG1	AUGER			246							○	17 74 (10)
245.4															
0.8	CLAYEY SILT TO SILTY CLAY , trace ORGANICS, trace gravel, trace sand, dark grey to brown, moist to wet, stiff		SS2	SS	9		245							○	1 10 41 49
244.7															
1.5	CLAYEY SILT TO SILTY CLAY , trace sand, brown, moist to wet, firm to stiff		SS3	SS	7		244							○	
	- attempted shelly, no recovery		SS4	SS	6		243							○	0 4 29 67
			SS5	SS	8		242							○	
242.4															
3.8	SILT , trace to some sand, trace to some clay, brown, wet, compact to very loose		SS6	SS	12		241							○	
			SS7	SS	10		240							○	
			SS8	SS	0		239							○	
240.1															
6.1	SANDY SILT TILL , some gravel, some sand, trace clay, grey, moist, very dense		SS9	SS	66		238							○	
			SS10	SS	52		237							○	
237.7															
8.5	BEDROCK , coarse grained, grey coloured granitic rocks with mafic and ultramafic intrusive rocks														
	Length (m) RQD (%) Recovery (%)		R1	NQ			236								
	Run 1 1.5 93.3 100														
	Run 2 1.5 93.3 91.6														
			R2	NQ											

Continued Next Page

+ 3, X 3: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

ONTARIO MTO ADM-00257843-N0 - HIGHWAY 11.GPJ ONTARIO MTO GDT 7/11/21

Brampton, Ontario

RECORD OF BOREHOLE No BH21-2

2 OF 2

METRIC

W.P. Agreement No. 5018-E-0012, WO No. 14 LOCATION Hearst Patrol Yard, 327102 E, 5505957 N NAD83 MTM Zone 13 ORIGINATED BY ST
 DIST Cochrane HWY 11 BOREHOLE TYPE Continuous Flight HSA, NW Casing, NQ Core Barrel (CME 75) COMPILED BY SA
 DATUM Local (Non-Geodetic) DATE 2021.06.09 - 2021.06.09 LATITUDE 49.69085651 LONGITUDE -83.69088426 CHECKED BY SM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL & P. PENETROMETER									
							20	40	60	80	100						
234.7							235										
11.5	BOREHOLE TERMINATED AT ~ 11.5 m DEPTH Groundwater Level: Since water was used to advanced borehole, no groundwater level was measured in open hole.																

Brampton, Ontario

RECORD OF BOREHOLE No BH21-3

1 OF 1

METRIC

W.P. Agreement No. 5018-E-0012, WO No. 14 LOCATION Hearst Patrol Yard, 327090 E, 5505912 N NAD83 MTM Zone 13 ORIGINATED BY ST
 DIST Cochrane HWY 11 BOREHOLE TYPE Continuous Flight HSA, NW Casing, NQ Core Barrel (CME 75) COMPILED BY SA
 DATUM Local (Non-Geodetic) DATE 2021.06.10 - 2021.06.10 LATITUDE 49.69044825 LONGITUDE -83.69105073 CHECKED BY SM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60	W _P W W _L	GR SA SI CL			
246.1														
0.0	FILL, gravelly sand, trace silt, brown, moist		AG1	AUGER			246							21 71 (9)
245.4														
0.8	PEAT, black, wet, compact													
245.1			SS2	SS	10		245							
1.1	CLAYEY SILT TO SILTY CLAY, trace sand, brown, moist, stiff to very stiff													
			SS3	SS	16									0 8 44 48
243.8							244							
2.3	SILT, trace sand, some clay, brown, moist, compact		SS4	SS	16									
							243							0 1 88 12 Non-plastic
			SS5	SS	25									
							242							
			SS6	SS	12									
241.6														
4.6	SANDY SILT TILL, trace gravel, grey, moist, compact to dense		SS7	SS	13		241							3 24 (73)
			SS8	SS	18		240							
			SS9	SS	20									
							239							
			SS10	SS	17		238							
							237							
			SS11	SS	44									
236.4														
9.8	BOREHOLE TERMINATED AT ~ 9.8 m DEPTH Groundwater Level: Since water was used to advanced borehole, no groundwater level was measured in open hole.													

+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MTO ADM-00257843-NO - HIGHWAY 11.GPJ ONTARIO MTO.GDT 7/11/21





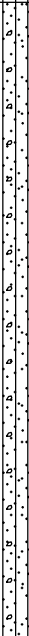

Brampton, Ontario

RECORD OF BOREHOLE No BH21-4

1 OF 2

METRIC

W.P. Agreement No. 5018-E-0012, WO No. 14 LOCATION Hearst Patrol Yard, 327064 E, 5505916 N NAD83 MTM Zone 13 ORIGINATED BY ST
 DIST Cochrane HWY 11 BOREHOLE TYPE Continuous Flight HSA, NW Casing, NQ Core Barrel (CME 75) COMPILED BY SA
 DATUM Local (Non-Geodetic) DATE 2021.06.10 - 2021.06.10 LATITUDE 49.69048518 LONGITUDE -83.69141087 CHECKED BY SM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT		NATURAL MOISTURE CONTENT		LIQUID LIMIT		UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL P. PENETROMETER		W _P	W	W _L	WATER CONTENT (%)				
246.6 0.0	FILL, sand, trace gravel, some silt and clay, brown, moist, dense		AG1	AUGER													
			SS2	SS	32												
245.1 1.5	CLAYEY SILT TO SILTY CLAY, trace ORGANICS, some sand, dark brown to brown, moist to wet, stiff		SS3	SS	11												
			SS4	SS	18												
244.3 2.3	CLAYEY SILT TO SILTY CLAY, trace gravel, some sand, brown, moist to wet, very stiff																
			SS5	SS	14												
243.7 2.9	SILT, trace to some sand, trace to some clay, brown, moist, compact																
			SS6	SS	14												
			SS7	SS	11												
241.3 5.3	SANDY SILT TILL, trace gravel, grey, moist, compact to very dense		SS8	SS	19												
			SS9	SS	13												
			SS10	SS	51												
			SS11	SS	19												
236.7 10.0	BEDROCK, coarse grained, grey coloured granitic rocks with mafic and ultramafic intrusive rocks		R1	NQ													
235.6																	

Continued Next Page

+ 3, X 3: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

ONTARIO MTO ADM-00257843-NQ - HIGHWAY 11.GPJ ONTARIO MTO.GDT 7/11/21

Brampton, Ontario

RECORD OF BOREHOLE No BH21-4

2 OF 2

METRIC

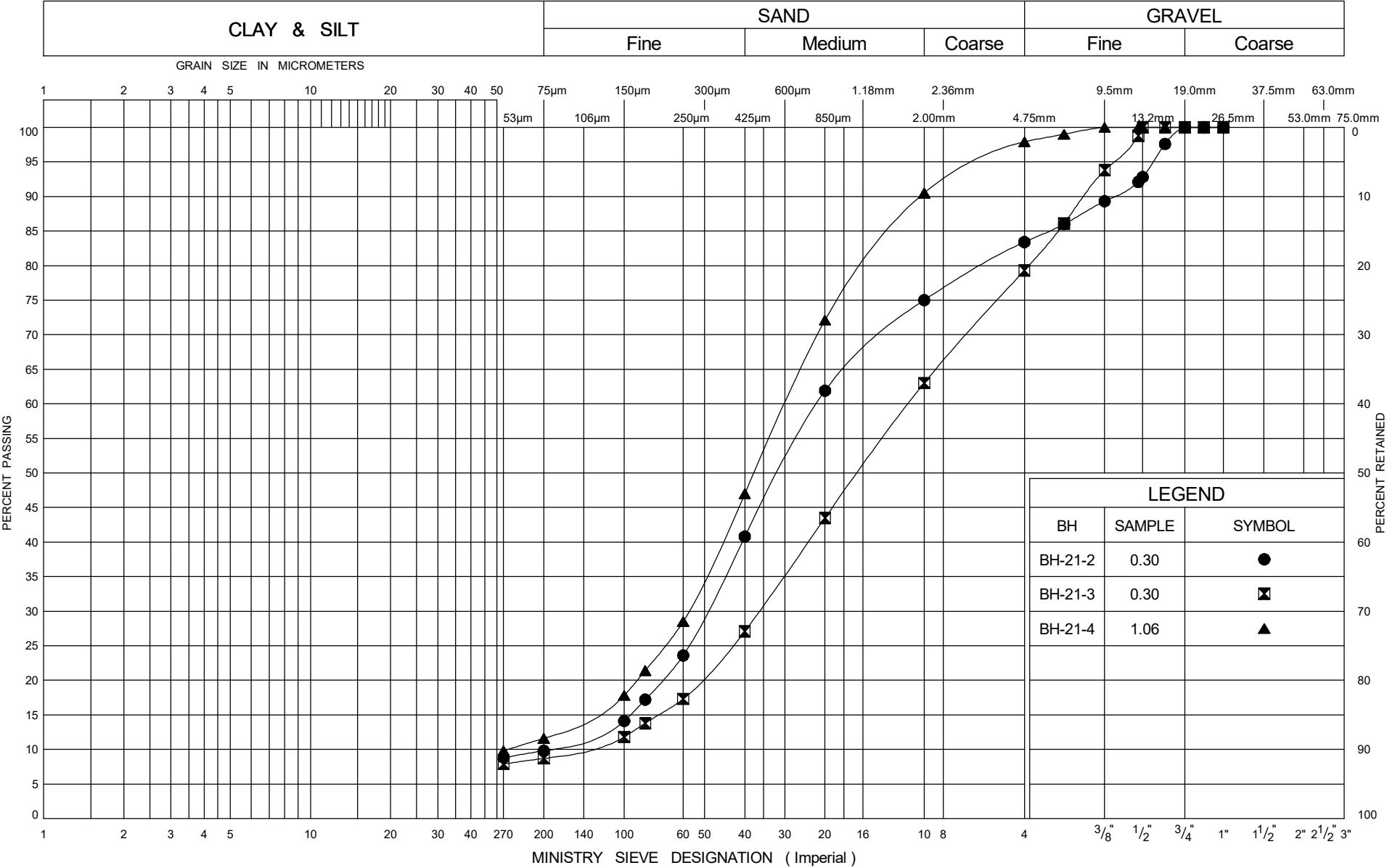
W.P. Agreement No. 5018-E-0012, WO No. 14 LOCATION Hearst Patrol Yard, 327064 E, 5505916 N NAD83 MTM Zone 13 ORIGINATED BY ST
 DIST Cochrane HWY 11 BOREHOLE TYPE Continuous Flight HSA, NW Casing, NQ Core Barrel (CME 75) COMPILED BY SA
 DATUM Local (Non-Geodetic) DATE 2021.06.10 - 2021.06.10 LATITUDE 49.69048518 LONGITUDE -83.69141087 CHECKED BY SM

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			SHEAR STRENGTH kPa					W _p	W	W _L		
				"N" VALUES			20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL P. PENETROMETER					WATER CONTENT (%)				
							20	40	60	80	100	20	40	60		
11.0	Length RQD Recovery (m) (%) (%) Run 1 0.7 32.1 57.2 Run 2 1.5 55.0 76.7 Run 3 0.9 85.3 85.3		R2	NQ		235										
			R3	NQ		234										
233.6																
13.1	BOREHOLE TERMINATED AT ~ 13.1 m DEPTH Groundwater Level: Since water was used to advanced borehole, no groundwater level was measured in open hole.															

+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

Appendix D - Laboratory Data

UNIFIED SOIL CLASSIFICATION SYSTEM



Ministry of
Transportation

GRAIN SIZE DISTRIBUTION

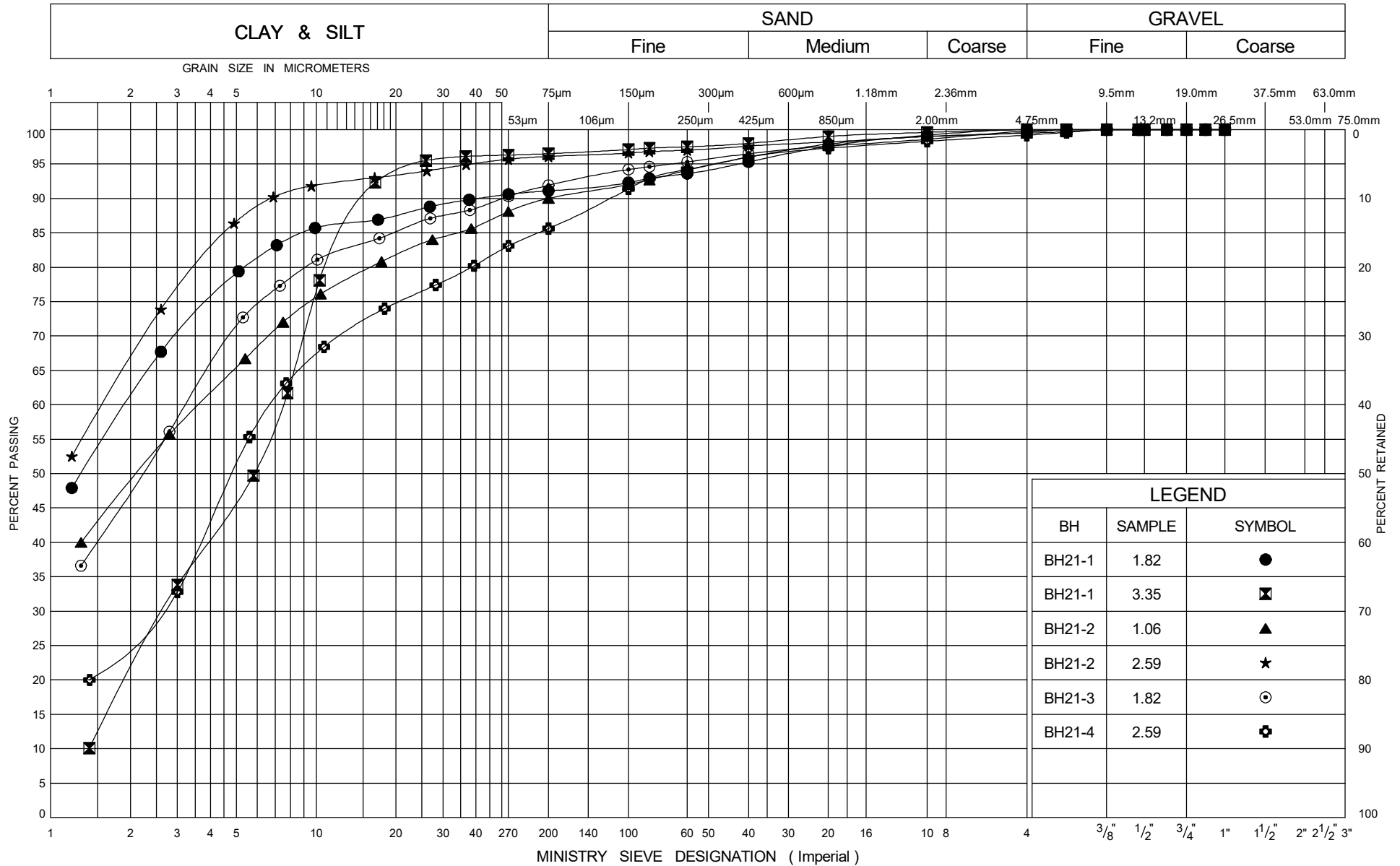
Fill: Sand and Gravel to Sand

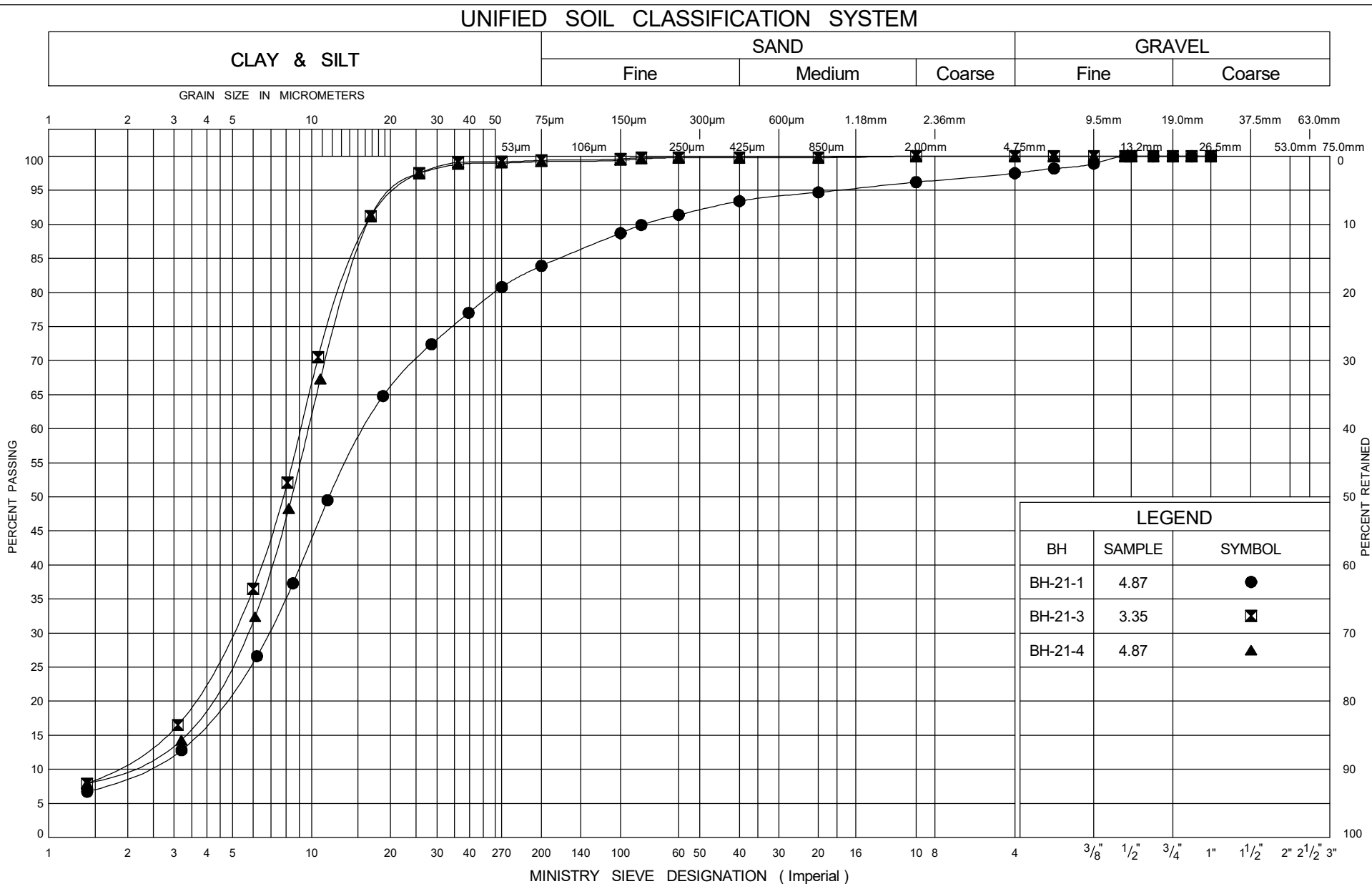
FIG No 1

W P Agreement No. 5018-E-0012, W

Hearst Patrol Yard, Highway 11, Coc

UNIFIED SOIL CLASSIFICATION SYSTEM





GRAIN SIZE DISTRIBUTION

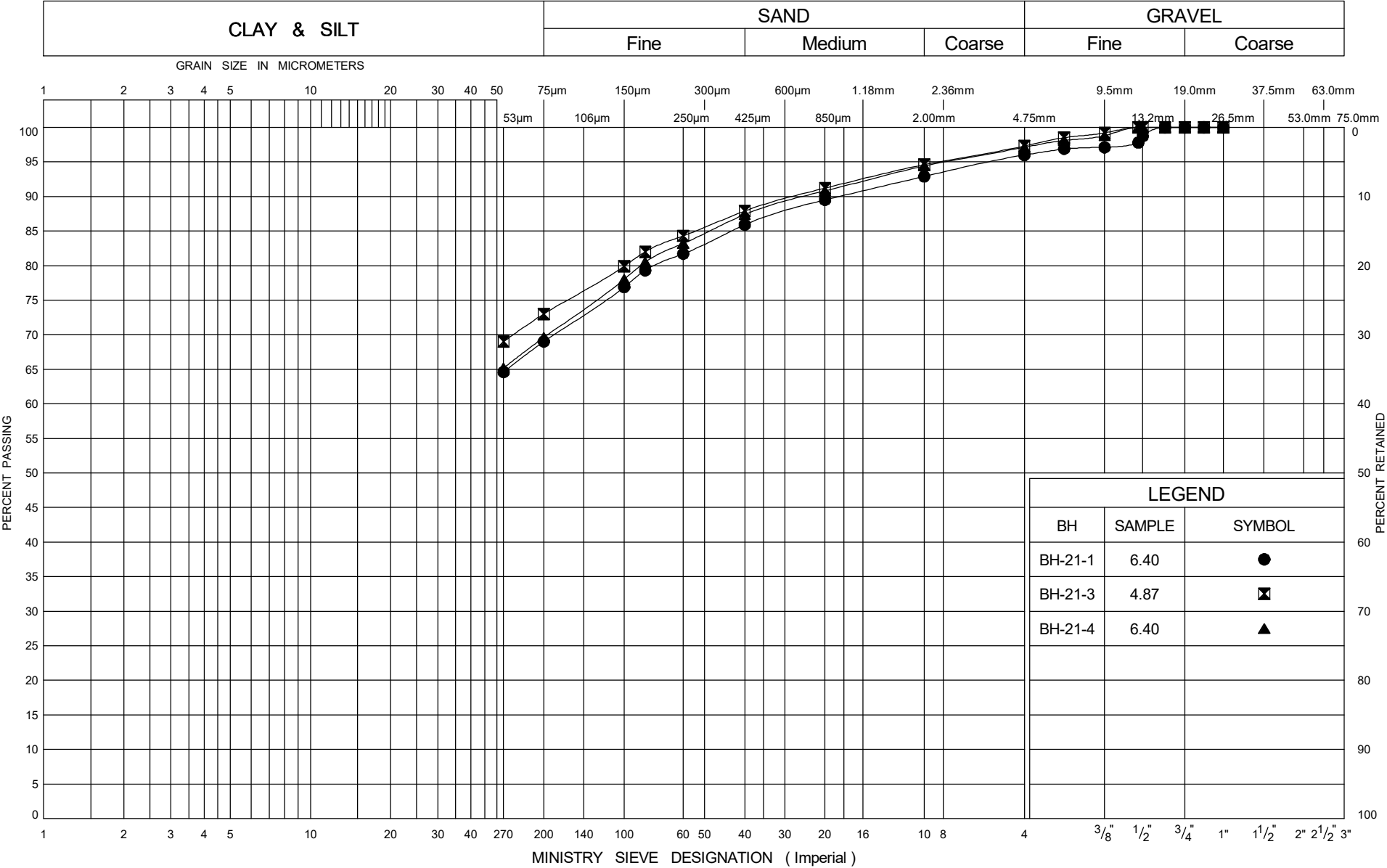
Silt

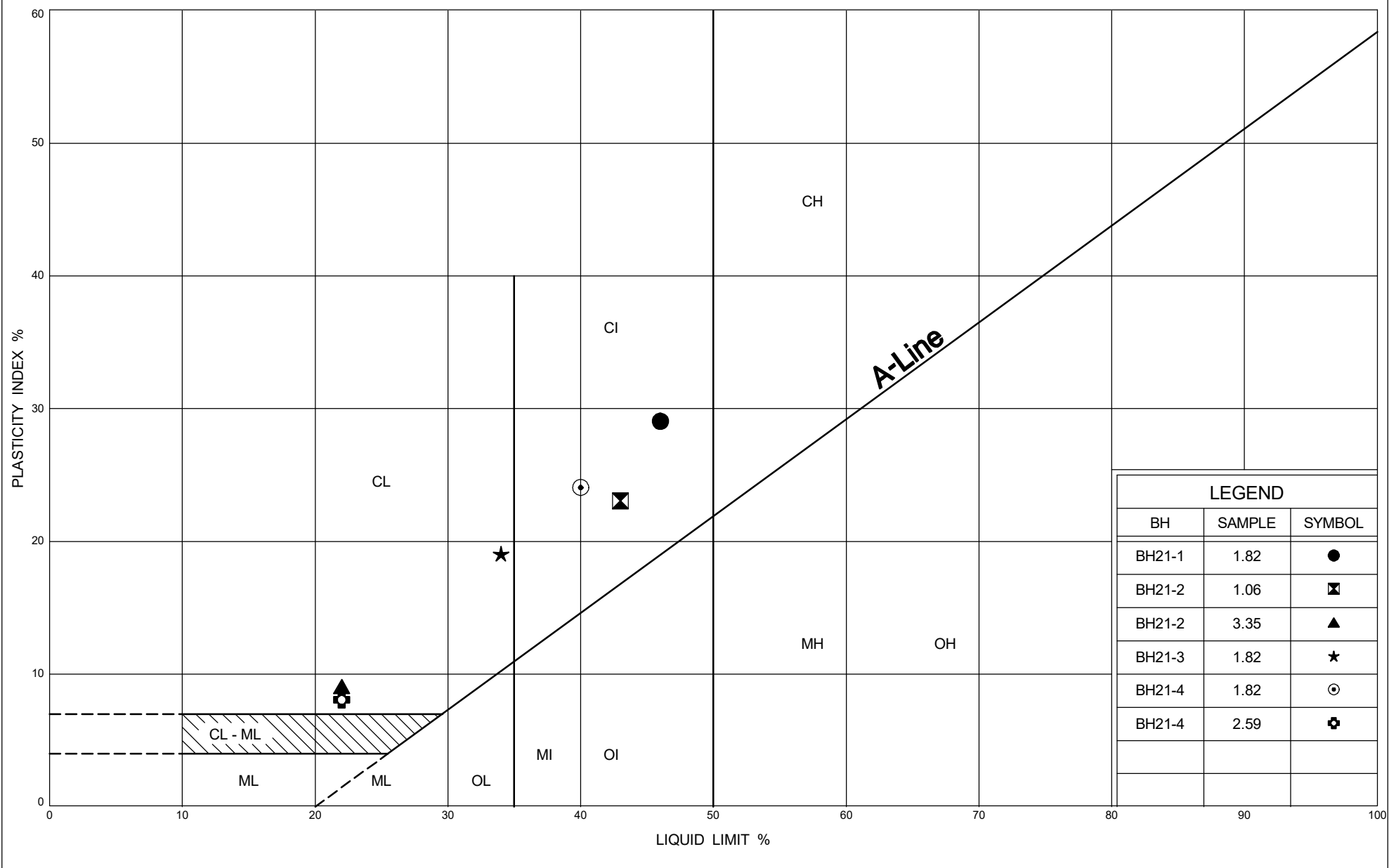
FIG No 3

W P Agreement No. 5018-E-0012, W

Hearst Patrol Yard, Highway 11, Coc

UNIFIED SOIL CLASSIFICATION SYSTEM







FINAL REPORT

CA14216-JUN21 R1

757843

Prepared for

EXP Services Inc.

First Page

CLIENT DETAILS

Client EXP Services Inc.

Address 885 Reagent Street
Sudbury, Ontario
P3E 5M4, Canada

Contact Ian MacMillan

Telephone 705-674-9681

Facsimile 705-674-5583

Email ian.macmillan@exp.com

Project 757843

Order Number

Samples Soil (1)

LABORATORY DETAILS

Project Specialist Jill Campbell, B.Sc.,GISAS

Laboratory SGS Canada Inc.

Address 185 Concession St., Lakefield ON, K0L 2H0

Telephone 2165

Facsimile 705-652-6365

Email jill.campbell@sgs.com

SGS Reference CA14216-JUN21

Received 06/15/2021

Approved 06/21/2021

Report Number CA14216-JUN21 R1

Date Reported 06/21/2021

COMMENTS

Temperature of Sample upon Receipt: 2 degrees C

Cooling Agent Present:Yes

Custody Seal Present:Yes

Chain of Custody Number:NA

Corrosivity Index is based on the American Water Works Corrosivity Scale according to AWWA C-105. An index greater than 10 indicates the soil matrix may be corrosive to cast iron alloys.

SIGNATORIES

Jill Campbell, B.Sc.,GISAS





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FINAL REPORT

CA14216-JUN21 R1

Client: EXP Services Inc.

Project: 757843

Project Manager: Ian MacMillan

Samplers: Phil Laframboise

PACKAGE: - Corrosivity Index (SOIL)

Sample Number 5
Sample Name 21-3, SS4
Sample Matrix Soil
Sample Date 09/06/2021

Parameter	Units	RL	Result
Corrosivity Index			
Corrosivity Index	none	1	11
Soil Redox Potential	mV	-	222
Sulphide (Na ₂ CO ₃)	%	0.04	< 0.04
pH	pH Units	0.05	7.82
Resistivity (calculated)	ohms.cm	-9999	319

PACKAGE: - General Chemistry (SOIL)

Sample Number 5
Sample Name 21-3, SS4
Sample Matrix Soil
Sample Date 09/06/2021

Parameter	Units	RL	Result
General Chemistry			
Conductivity	uS/cm	2	3130

PACKAGE: - Metals and Inorganics (SOIL)

Sample Number 5
Sample Name 21-3, SS4
Sample Matrix Soil
Sample Date 09/06/2021

Parameter	Units	RL	Result
Metals and Inorganics			
Moisture Content	%	0.1	17.7
Sulphate	µg/g	0.4	11



FINAL REPORT

CA14216-JUN21 R1

Client: EXP Services Inc.

Project: 757843

Project Manager: Ian MacMillan

Samplers: Phil Laframboise

PACKAGE: - Other (ORP) (SOIL)

Sample Number 5
Sample Name 21-3, SS4
Sample Matrix Soil
Sample Date 09/06/2021

Parameter	Units	RL	Result
Other (ORP)			
Chloride	µg/g	0.4	3200



FINAL REPORT

CA14216-JUN21 R1

QC SUMMARY

Anions by IC
Method: EPA300/MA300-Ions1.3 | Internal ref.: ME-CA-IENVIIC-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Chloride	DIO0269-JUN21	µg/g	0.4	<0.4	NV	20	97	80	120	94	75	125
Sulphate	DIO0269-JUN21	µg/g	0.4	<0.4	13	20	93	80	120	103	75	125

Carbon/Sulphur
Method: ASTM E1915-07A | Internal ref.: ME-CA-IENVIARD-LAK-AN-020

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Sulphide (Na2CO3)	ECS0043-JUN21	%	0.04	< 0.04	8	20	108	80	120			

Conductivity
Method: SM 2510 | Internal ref.: ME-CA-IENVIEWL-LAK-AN-006

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Conductivity	EWL0320-JUN21	uS/cm	2	< 2	0	20	100	90	110	NA		



QC SUMMARY

pH
Method: SM 4500 | Internal ref.: ME-CA-|ENVIEWL-LAK-AN-001

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
pH	EWL0320-JUN21	pH Units	0.05	NA	0		100			NA		

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.

RL Reporting Limit.

↑ Reporting limit raised.

↓ Reporting limit lowered.

NA The sample was not analysed for this analyte

ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

This report must not be reproduced, except in full. This report supersedes all previous versions.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

Laboratory Information Section - Lab use only

Received By: Ryan Lawrence
Received Date: 06/14/21 (mm/dd/yy)
Received Time: 16:00 (hr : min)Received By (signature):
Custody Seal Present: Yes ☒ No ☐
Custody Seal Intact: Yes ☒ No ☐Cooling Agent Present: Yes ☒ No ☐ Type: Ice
Temperature Upon Receipt (°C): 22.2

LAB LIMS #:

CA14215-16 Jan 21

REPORT INFORMATION

Company: EXP
Contact: Ian McMillan
Address: 885 Regent St
Sudbury P3E 5M4
Phone: 705 674 9681
Fax: _____
Email: ian.mcmillan@exp.com

INVOICE INFORMATION

Company: ☒ (same as Report Information)
Contact: _____
Address: _____
Phone: _____
Email: _____

REGULATIONS

☐ O.Reg 153/04 ☐ O.Reg 406/19
Soil Volume: ☒ <350m3 ☐ >350m3
Soil Texture: ☐ Res/Park ☐ Ind/Com ☐ Poarse
Table 2: ☐ Ind/Com ☐ Poarse
Table 3: ☐ Agr/Other ☐ Medium/Fine
Table: ☐ MISA
Other Regulations: ☐ Reg 347/558 (3 Day min TAT)
☐ PWQO ☐ JMWER
☐ CCME ☐ Piber:
Municipality: _____
Sewer By-Law: ☐ Sanitary ☐ Storm
☐ ODWS Not Reportable *See note

RECORD OF SITE CONDITION (RSC)

☐ YES ☐ NO

SAMPLE IDENTIFICATION

DATE SAMPLED	TIME SAMPLED	# OF BOTTLES	MATRIX
21-2-553	6/4/21 AM	3	S
21-3-554	6/4/21 AM	1	S
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

ANALYSIS REQUESTED

M & I	SVOC	PCB	PHC	VOC	Pest	Other (please specify)
Field Filtered (Y/N)						
Metals & Inorganics incl CrVI, CN, Hg, pH, B(HWS), EC, SAR-soil) (Cl, Na-water)						
Full Metals Suite ICP metals plus 5 (HWS-soil only) Hg, CrVI						
ICP Metals only Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Pb, Mo, Ni						
PAHs only						
SVOCs all incl PAHs, ABNs, CPs						
PCBs: <input type="checkbox"/> Total <input type="checkbox"/> Aroclor						
F1-F4 + BTEX						
F1-F4 only no BTEX						
VOCs all incl BTEX						
BTEX only						
Pesticides Organochlorine or specify other						
Corrosivity						
Appendix 2: 406/19 Leachate Screening Levels Table:						
Sewer Use: Specify pkg:						
Water Characterization Pkg General <input type="checkbox"/> Extended <input type="checkbox"/>						
TCLP Specify TCLP tests <input type="checkbox"/> M81 <input type="checkbox"/> VOC <input type="checkbox"/> PCB <input type="checkbox"/> Biap <input type="checkbox"/> ABN <input type="checkbox"/> Ignit						

COMMENTS:

Bagged Sample

Observations/Comments/Special Instructions

332979918544 99

Sampled By (NAME): PHIL LAFRAMBOISESignature: Phil LaframboiseDate: 06-14-21 (mm/dd/yy)

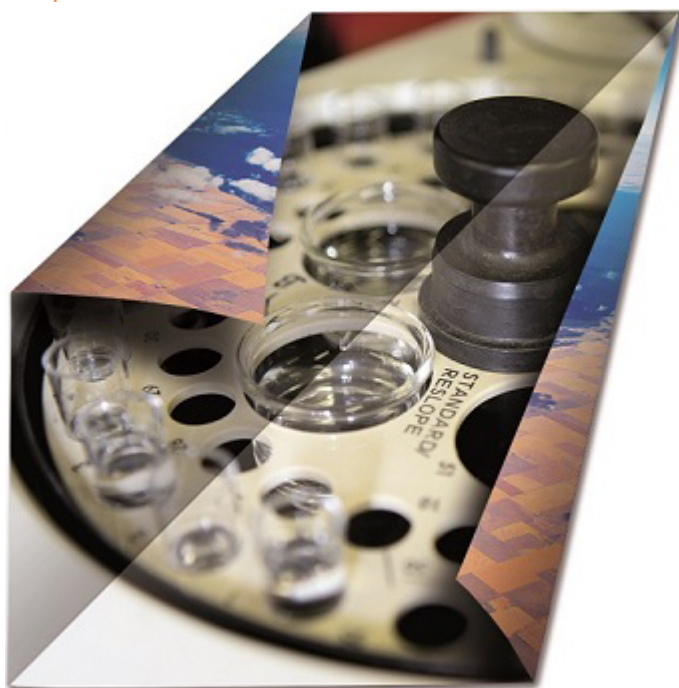
Pink Copy - Client

Relinquished By (NAME): PHIL LAFRAMBOISESignature: Phil LaframboiseDate: 06-14-21 (mm/dd/yy)

Yellow & White Copy - SGS

Revision #: 1.4

Note: Submission of samples to SGS is acknowledgment that you have been provided direction on sample collection, handling and transportation of samples. (2) Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be retained on file in the contract, or in an alternative format (e.g. shipping documents). (3) Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at: http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request.) Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.



FINAL REPORT

CA14215-JUN21 R

757843

Prepared for

EXP Services Inc.

First Page

CLIENT DETAILS

Client EXP Services Inc.

Address 885 Reagent Street
Sudbury, Ontario
P3E 5M4, Canada

Contact Ian MacMillan

Telephone 705-674-9681

Facsimile 705-674-5583

Email ian.macmillan@exp.com

Project 757843

Order Number

Samples Soil (1)

LABORATORY DETAILS

Project Specialist Jill Campbell, B.Sc.,GISAS

Laboratory SGS Canada Inc.

Address 185 Concession St., Lakefield ON, K0L 2H0

Telephone 2165

Facsimile 705-652-6365

Email jill.campbell@sgs.com

SGS Reference CA14215-JUN21

Received 06/15/2021

Approved 06/18/2021

Report Number CA14215-JUN21 R

Date Reported 06/18/2021

COMMENTS

CCME Method Compliance: Analyses were conducted using analytical procedures that comply with the Reference Method for the CWS for Petroleum Hydrocarbons in Soil and have been validated for use at the SGS laboratory, Lakefield, ON site.

Hydrocarbon results are expressed on a dry weight basis.

Temperature of Sample upon Receipt: 2 degrees C

Cooling Agent Present:Yes

Custody Seal Present:Yes

Chain of Custody Number:NA

SIGNATORIES

Jill Campbell, B.Sc.,GISAS





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FINAL REPORT

CA14215-JUN21 R

Client: EXP Services Inc.
Project: 757843
Project Manager: Ian MacMillan
Samplers: Phil Laframboise

PACKAGE: REG153 - BTEX (SOIL)

Sample Number 8
Sample Name 21-2, SS3
Sample Matrix Soil
Sample Date 09/06/2021

L1 = REG153 / SOIL / COARSE - TABLE 3 - Industrial/Commercial - UNDEFINED
L2 = REG153 / SOIL / COARSE - TABLE 3 - Residential/Parkland - UNDEFINED

Parameter	Units	RL	L1	L2	Result
BTEX					
Benzene	µg/g	0.02	0.32	0.21	< 0.02
Ethylbenzene	µg/g	0.05	9.5	2	< 0.05
Toluene	µg/g	0.05	68	2.3	< 0.05
Xylene (total)	µg/g	0.05	26	3.1	< 0.05
m/p-xylene	µg/g	0.05			< 0.05
o-xylene	µg/g	0.05			< 0.05

PACKAGE: REG153 - Metals and Inorganics (SOIL)

Sample Number 8
Sample Name 21-2, SS3
Sample Matrix Soil
Sample Date 09/06/2021

L1 = REG153 / SOIL / COARSE - TABLE 3 - Industrial/Commercial - UNDEFINED
L2 = REG153 / SOIL / COARSE - TABLE 3 - Residential/Parkland - UNDEFINED

Parameter	Units	RL	L1	L2	Result
Metals and Inorganics					
Moisture Content	%	-			20.2



FINAL REPORT

CA14215-JUN21 R

Client: EXP Services Inc.

Project: 757843

Project Manager: Ian MacMillan

Samplers: Phil Laframboise

PACKAGE: REG153 - PHCs (SOIL)

Sample Number 8
Sample Name 21-2, SS3
Sample Matrix Soil
Sample Date 09/06/2021

L1 = REG153 / SOIL / COARSE - TABLE 3 - Industrial/Commercial - UNDEFINED

L2 = REG153 / SOIL / COARSE - TABLE 3 - Residential/Parkland - UNDEFINED

Parameter	Units	RL	L1	L2	Result
PHCs					
F1 (C6-C10)	µg/g	10	55	55	< 10
F1-BTEX (C6-C10)	µg/g	10			< 10
F2 (C10-C16)	µg/g	10	230	98	< 10
F3 (C16-C34)	µg/g	50	1700	300	< 50
F4 (C34-C50)	µg/g	50	3300	2800	< 50
Chromatogram returned to baseline at nC50	Yes / No	-			YES

EXCEEDANCE SUMMARY

No exceedances are present above the regulatory limit(s) indicated



FINAL REPORT

CA14215-JUN21 R

QC SUMMARY

Petroleum Hydrocarbons (F1)
Method: CCME Tier 1 | Internal ref.: ME-CA-IENVIGC-LAK-AN-010

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
F1 (C6-C10)	GCM0309-JUN21	µg/g	10	<10	ND	30	102	80	120	92	60	140

Petroleum Hydrocarbons (F2-F4)
Method: CCME Tier 1 | Internal ref.: ME-CA-IENVIGC-LAK-AN-010

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
F2 (C10-C16)	GCM0304-JUN21	µg/g	10	<10	ND	30	90	80	120	88	60	140
F3 (C16-C34)	GCM0304-JUN21	µg/g	50	<50	ND	30	90	80	120	88	60	140
F4 (C34-C50)	GCM0304-JUN21	µg/g	50	<50	ND	30	90	80	120	88	60	140



FINAL REPORT

CA14215-JUN21 R

QC SUMMARY

Volatile Organics

Method: EPA 5035A/5030B/8260C | Internal ref.: ME-CA-IENVIGC-LAK-AN-004

Parameter	QC batch Reference	Units	RL	Method Blank	Duplicate		LCS/Spike Blank			Matrix Spike / Ref.		
					RPD	AC (%)	Spike Recovery (%)	Recovery Limits (%)		Spike Recovery (%)	Recovery Limits (%)	
								Low	High		Low	High
Benzene	GCM0308-JUN21	µg/g	0.02	< 0.02	ND	50	102	60	130	94	50	140
Ethylbenzene	GCM0308-JUN21	µg/g	0.05	< 0.05	ND	50	101	60	130	95	50	140
m/p-xylene	GCM0308-JUN21	µg/g	0.05	< 0.05	ND	50	103	60	130	91	50	140
o-xylene	GCM0308-JUN21	µg/g	0.05	< 0.05	ND	50	102	60	130	91	50	140
Toluene	GCM0308-JUN21	µg/g	0.05	< 0.05	ND	50	101	60	130	93	50	140

Method Blank: a blank matrix that is carried through the entire analytical procedure. Used to assess laboratory contamination.

Duplicate: Paired analysis of a separate portion of the same sample that is carried through the entire analytical procedure. Used to evaluate measurement precision.

LCS/Spike Blank: Laboratory control sample or spike blank refer to a blank matrix to which a known amount of analyte has been added. Used to evaluate analyte recovery and laboratory accuracy without sample matrix effects.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate laboratory accuracy with sample matrix effects.

Reference Material: a material or substance matrix matched to the samples that contains a known amount of the analyte of interest. A reference material may be used in place of a matrix spike.

RL: Reporting limit

RPD: Relative percent difference

AC: Acceptance criteria

Multielement Scan Qualifier: as the number of analytes in a scan increases, so does the chance of a limit exceedance by random chance as opposed to a real method problem. Thus, in multielement scans, for the LCS and matrix spike, up to 10% of the analytes may exceed the quoted limits by up to 10% absolute and the spike is considered acceptable.

Duplicate Qualifier: for duplicates as the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Matrix Spike Qualifier: for matrix spikes, as the concentration of the native analyte increases, the uncertainty of the matrix spike recovery increases. Thus, the matrix spike acceptance limits apply only when the concentration of the matrix spike is greater than or equal to the concentration of the native analyte.



FINAL REPORT

CA14215-JUN21 R

QC SUMMARY

LEGEND

FOOTNOTES

NSS Insufficient sample for analysis.

RL Reporting Limit.

↑ Reporting limit raised.

↓ Reporting limit lowered.

NA The sample was not analysed for this analyte

ND Non Detect

Samples analysed as received. Solid samples expressed on a dry weight basis. "Temperature Upon Receipt" is representative of the whole shipment and may not reflect the temperature of individual samples.

Analysis conducted on samples submitted pursuant to or as part of Reg. 153/04, are in accordance to the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" published by the Ministry and dated March 9, 2004 as amended.

SGS provides criteria information (such as regulatory or guideline limits and summary of limit exceedances) as a service. Every attempt is made to ensure the criteria information in this report is accurate and current, however, it is not guaranteed. Comparison to the most current criteria is the responsibility of the client and SGS assumes no responsibility for the accuracy of the criteria levels indicated. This document is issued, on the Client's behalf, by the Company under its General Conditions of Service available on request and accessible at http://www.sgs.com/terms_and_conditions.htm. The Client's attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any other holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents.

This report must not be reproduced, except in full. This report supersedes all previous versions.

-- End of Analytical Report --

Request for Laboratory Services and CHAIN OF CUSTODY

CA 1425-16 Jan 21

Received By: Kary Lawrence
Received Date: 06/17/12 (mm/dd/yy)
Received Time: 16:00 (hr : min)

Received By (signature): _____		
Custody Seal Present:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Custody Seal Intact:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Cooling Agent Present: Yes ☒ No ☐ Type: ice
Temperature Upon Receipt (°C) 2, 2, 2

LAB LIMS #

REPORT INFORMATION

Company: EXP
Contact: Ian MacMillan
Address: BB5 Regent St
Suburb: PSE SM4
Phone: 05 674 9681
Fax:
Email: ianmacmillan@exp.com

☒ (same as Report Information)

Company: _____

Contact: _____

Address: _____

Phone: _____

Email: _____

Quotation # 5-0A
Project #: 757843-ND
TURNAROUND
☒ Regular TAT (5-7-days)
RUSH TAT (Additional Charges May Apply): ☐ 1 Day ☐
PLEASE CONFIRM RUSH FEASIBILITY WITH SGS REPRESENTATIVE
Specify Due Date: _____
*NOTE: DRINKING F/

P.O. #. _____

Site Location/ID: _____

DATA REQUIRED

DATA's are quoted in business days (exclude statutory holidays & weekends).
Examples received after 4pm or on weekends: TAT begins next business day.

☐ 3 Days ~~5~~ ~~7~~ ~~10~~ ~~15~~ ~~20~~ ~~30~~ ~~45~~ ~~60~~ ~~75~~ ~~90~~ ~~105~~ ~~120~~ ~~135~~ ~~150~~ ~~165~~ ~~180~~ ~~195~~ ~~210~~ ~~225~~ ~~240~~ ~~255~~ ~~270~~ ~~285~~ ~~300~~ ~~315~~ ~~330~~ ~~345~~ ~~360~~ ~~375~~ ~~390~~ ~~405~~ ~~420~~ ~~435~~ ~~450~~ ~~465~~ ~~480~~ ~~495~~ ~~510~~ ~~525~~ ~~540~~ ~~555~~ ~~570~~ ~~585~~ ~~600~~ ~~615~~ ~~630~~ ~~645~~ ~~660~~ ~~675~~ ~~690~~ ~~705~~ ~~720~~ ~~735~~ ~~750~~ ~~765~~ ~~780~~ ~~795~~ ~~810~~ ~~825~~ ~~840~~ ~~855~~ ~~870~~ ~~885~~ ~~900~~ ~~915~~ ~~930~~ ~~945~~ ~~960~~ ~~975~~ ~~990~~ ~~1005~~ ~~1020~~ ~~1035~~ ~~1050~~ ~~1065~~ ~~1080~~ ~~1095~~ ~~1110~~ ~~1125~~ ~~1140~~ ~~1155~~ ~~1170~~ ~~1185~~ ~~1200~~ ~~1215~~ ~~1230~~ ~~1245~~ ~~1260~~ ~~1275~~ ~~1290~~ ~~1305~~ ~~1320~~ ~~1335~~ ~~1350~~ ~~1365~~ ~~1380~~ ~~1395~~ ~~1410~~ ~~1425~~ ~~1440~~ ~~1455~~ ~~1470~~ ~~1485~~ ~~1500~~ ~~1515~~ ~~1530~~ ~~1545~~ ~~1560~~ ~~1575~~ ~~1590~~ ~~1605~~ ~~1620~~ ~~1635~~ ~~1650~~ ~~1665~~ ~~1680~~ ~~1695~~ ~~1710~~ ~~1725~~ ~~1740~~ ~~1755~~ ~~1770~~ ~~1785~~ ~~1800~~ ~~1815~~ ~~1830~~ ~~1845~~ ~~1860~~ ~~1875~~ ~~1890~~ ~~1905~~ ~~1920~~ ~~1935~~ ~~1950~~ ~~1965~~ ~~1980~~ ~~1995~~ ~~2010~~ ~~2025~~ ~~2040~~ ~~2055~~ ~~2070~~ ~~2085~~ ~~2100~~ ~~2115~~ ~~2130~~ ~~2145~~ ~~2160~~ ~~2175~~ ~~2190~~ ~~2205~~ ~~2220~~ ~~2235~~ ~~2250~~ ~~2265~~ ~~2280~~ ~~2295~~ ~~2310~~ ~~2325~~ ~~2340~~ ~~2355~~ ~~2370~~ ~~2385~~ ~~2400~~ ~~2415~~ ~~2430~~ ~~2445~~ ~~2460~~ ~~2475~~ ~~2490~~ ~~2505~~ ~~2520~~ ~~2535~~ ~~2550~~ ~~2565~~ ~~2580~~ ~~2595~~ ~~2610~~ ~~2625~~ ~~2640~~ ~~2655~~ ~~2670~~ ~~2685~~ ~~2700~~ ~~2715~~ ~~2730~~ ~~2745~~ ~~2760~~ ~~2775~~ ~~2790~~ ~~2805~~ ~~2820~~ ~~2835~~ ~~2850~~ ~~2865~~ ~~2880~~ ~~2895~~ ~~2910~~ ~~2925~~ ~~2940~~ ~~2955~~ ~~2970~~ ~~2985~~ ~~3000~~ ~~3015~~ ~~3030~~ ~~3045~~ ~~3060~~ ~~3075~~ ~~3090~~ ~~3105~~ ~~3120~~ ~~3135~~ ~~3150~~ ~~3165~~ ~~3180~~ ~~3195~~ ~~3210~~ ~~3225~~ ~~3240~~ ~~3255~~ ~~3270~~ ~~3285~~ ~~3300~~ ~~3315~~ ~~3330~~ ~~3345~~ ~~3360~~ ~~3375~~ ~~3390~~ ~~3405~~ ~~3420~~ ~~3435~~ ~~3450~~ ~~3465~~ ~~3480~~ ~~3495~~ ~~3510~~ ~~3525~~ ~~3540~~ ~~3555~~ ~~3570~~ ~~3585~~ ~~3600~~ ~~3615~~ ~~3630~~ ~~3645~~ ~~3660~~ ~~3675~~ ~~3690~~ ~~3705~~ ~~3720~~ ~~3735~~ ~~3750~~ ~~3765~~ ~~3780~~ ~~3795~~ ~~3810~~ ~~3825~~ ~~3840~~ ~~3855~~ ~~3870~~ ~~3885~~ ~~3900~~ ~~3915~~ ~~3930~~ ~~3945~~ ~~3960~~ ~~3975~~ ~~3990~~ ~~4005~~ ~~4020~~ ~~4035~~ ~~4050~~ ~~4065~~ ~~4080~~ ~~4095~~ ~~4110~~ ~~4125~~ ~~4140~~ ~~4155~~ ~~4170~~ ~~4185~~ ~~4200~~ ~~4215~~ ~~4230~~ ~~4245~~ ~~4260~~ ~~4275~~ ~~4290~~ ~~4305~~ ~~4320~~ ~~4335~~ ~~4350~~ ~~4365~~ ~~4380~~ ~~4395~~ ~~4410~~ ~~4425~~ ~~4440~~ ~~4455~~ ~~4470~~ ~~4485~~ ~~4500~~ ~~4515~~ ~~4530~~ ~~4545~~ ~~4560~~ ~~4575~~ ~~4590~~ ~~4605~~ ~~4620~~ ~~4635~~ ~~4650~~ ~~4665~~ ~~4680~~ ~~4695~~ ~~4710~~ ~~4725~~ ~~4740~~ ~~4755~~ ~~4770~~ ~~4785~~ ~~4800~~ ~~4815~~ ~~4830~~ ~~4845~~ ~~4860~~ ~~4875~~ ~~4890~~ ~~4905~~ ~~4920~~ ~~4935~~ ~~4950~~ ~~4965~~ ~~4980~~ ~~4995~~ ~~5010~~ ~~5025~~ ~~5040~~ ~~5055~~ ~~5070~~ ~~5085~~ ~~5100~~ ~~5115~~ ~~5130~~ ~~5145~~ ~~5160~~ ~~5175~~ ~~5190~~ ~~5205~~ ~~5220~~ ~~5235~~ ~~5250~~ ~~5265~~ ~~5280~~ ~~5295~~ ~~5310~~ ~~5325~~ ~~5340~~ ~~5355~~ ~~5370~~ ~~5385~~ ~~5400~~ ~~5415~~ ~~5430~~ ~~5445~~ ~~5460~~ ~~5475~~ ~~5490~~ ~~5505~~ ~~5520~~ ~~5535~~ ~~5550~~ ~~5565~~ ~~5580~~ ~~5595~~ ~~5610~~ ~~5625~~ ~~5640~~ ~~5655~~ ~~5670~~ ~~5685~~ ~~5700~~ ~~5715~~ ~~5730~~ ~~5745~~ ~~5760~~ ~~5775~~ ~~5790~~ ~~5805~~ ~~5820~~ ~~5835~~ ~~5850~~ ~~5865~~ ~~5880~~ ~~5895~~ ~~5910~~ ~~5925~~ ~~5940~~ ~~5955~~ ~~5970~~ ~~5985~~ ~~6000~~ ~~6015~~ ~~6030~~ ~~6045~~ ~~6060~~ ~~6075~~ ~~609~~

REGULATIONS

<input type="checkbox"/> O.Reg 153/04	<input type="checkbox"/> O.Reg 406/19	Other Regulations:	Sewer By-Law:
<input type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	Soil Texture:	<input type="checkbox"/> Sanitary
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Com	<input type="checkbox"/> Poarse	<input type="checkbox"/> Storm
<input checked="" type="checkbox"/> Table 3	<input type="checkbox"/> Agr/Other	<input type="checkbox"/> Medium/Fine	Municipality:
<input type="checkbox"/> Table _____			
Soil Volume <input checked="" type="checkbox"/> <350m3	<input type="checkbox"/> >350m3		
		<input type="checkbox"/> Reg 241/556 (3 Day min TAT)	
		<input type="checkbox"/> PWOO	<input type="checkbox"/> JMER
		<input type="checkbox"/> CCME	<input type="checkbox"/> Pherr:
		<input type="checkbox"/> MISA	
		<input type="checkbox"/> ODWS Not Reportable *See note	

RECORD OF SITE CONDITION (RSC)

☐ YES ☐ NO

Sewer By-Law:

☐ Sanitary

☐ Storm

Municipality: _____

See note

Y/N)		
anics (S),EC,SAR-soil)	M & I	
ite (only) Hg, Cr/Vl		
,Pb,Mo,Ni.		
	SVOC	
<input type="checkbox"/> Aroclor	PCB	
	PHC	
	VOC	
Other	<input type="checkbox"/>	Pe



Other (please specify)					
9 Leachate table :					
Authorization Pkg					
Extended	<input type="checkbox"/>				
Specify	<input type="checkbox"/>	TCLP	tests	<input type="checkbox"/>	VOCs

COMMENTS:

SAMPLE IDENTIFICATION

	UNIT LBS	UNIT LBS	BOTTLES	
1	21-2, 553	6/9/21	AM	3
2	21-3, 554	6/9/21	AM	1
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Observations/Comments/Special Instructions

Sampled By (NAME): PHIL LAFFAMBOISE	Signature: 	Date: 06.14.21	Pink Copy - Client
Relinquished by (NAME): PHIL LAFFAMBOISE	Signature: 	Date: 06.14.21	Yellow & White Copy - SGS
<p>Revision # 1.4</p> <p>Date of Issue: 22 May, 2020</p> <p>Note: Submission of samples to SGS is acknowledgment that you have been provided direction on sample collection/handling and transportation of samples. (2) Submission of samples to SGS is considered authorization for completion of work. Signatures may appear on this form or be obtained on the contract, or in an alternative format (e.g. shipping documents). (3) Results may be sent by email to an unlimited number of addresses for no additional cost. Fax is available upon request. This document is issued by the Company under its General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm. (Printed copies are available upon request). Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.</p>			



exp Services Inc.
885 Regent Street
Sudbury, Ontario
P3E 5M4
Telephone: (705) 674-9681
Facsimile: (705) 674-8271

SUMMARY OF ROCK CORE TEST DATA
ASTM D7012 - 14 (Method C)

CLIENT: Ministry of Transportation
JOB NUMBER: ADM-257843-N0
JOB NAME: Hearst MTO Yard

DATE: June 16, 2021

LAB No.	21150	21151	21152	21153
CORE LOCATION	BH 21-2 (Run 1)	BH 21-2 (Run 2)	BH 21-4 (Run 2)	BH 21-4 (Run 2)
DEPTH	27'-27'9"	36'7"-37'10"	35'6"-35'10"	42'5"-42'11"
DATE TESTED	16-Jun-21	16-Jun-21	16-Jun-21	16-Jun-21
LENGTH (mm)	115.0	109.0	106.0	116.0
DIAMETER (mm)	47.0	47.0	47.0	47.0
DENSITY (kg/m ³)	2696	2824	2730	2723
COMPRESSIVE STRENGTH (MPa)	112.1	136.2	118.2	146.5
TYPE OF FRACTURE	SHEAR	SHEAR	SHEAR	SHEAR
CONDITION AT TIME OF TESTING	DRY	DRY	DRY	DRY

COMMENTS:

DISTRIBUTION:

Appendix E – Rock Core Photographs



Figure E1. Rock core from BH21-1

Project No: ADM 00257843-N0
BH No: 21-1
Sample Depth: 8.0 m to 9.1 m
Elevation: 238.4 m to 237.3 m
Description: Granitic rocks with mafic and
ultramafic intrusive rocks
Date: June 8, 2021



Figure E2. Rock core from BH21-2

Project No: ADM 00257843-N0
BH No: 21-2
Sample Depth: 8.5 m to 11.5 m
Elevation: 237.7 m to 234.7 m
Description: Granitic rocks with mafic and
ultramafic intrusive rocks
Date: June 9, 2021



Figure E3. Rock core from BH21-4

Project No: ADM 00257843-N0
BH No: 21-4
Sample Depth: 10.0 m to 13.1 m
Elevation: 236.7 m to 233.6 m
Description: Granitic rocks with mafic and
ultramafic intrusive rocks
Date: June 10, 2021