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Kingston, Ontario
K7M 8N2
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FINAL GEOTECHNICAL REPORT

Percy Lake Dam Access Road
5P201-17-5130 (45396098)

Parks Canada Agency

A/G Project 17555-1
February 13, 2019

Submitted To:
Parks Canada Agency
2155 Ashburnham Drive,
Peterborough, Ontario
K9J 6Z6

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1.0 INTRODUCTION

Ainley Group (Ainley) was retained by Parks Canada Agency, to carry out geotechnical consulting services in support of the design for an access road to support future rehabilitation works at the Percy Lake Dam location. Two (2) potential alignment options, Option 1 and Option 2, were presented to Parks Canada by the Ainley design team. It was decided by Parks Canada that Option 2 is the preferred alignment therefore the geotechnical recommendations are specific to Option 2.

The objectives of the geotechnical assignment were:

- To secure soils and groundwater information/data along the proposed access road that could affect the design, including the effects that the soil and groundwater may have on construction procedures.

- To prepare a geotechnical report addressing the requirements set out in the Project Description, based on the information obtained during the geotechnical site investigation and laboratory analysis completed.

2.0 SITE DESCRIPTION

The subject site is located near the end of Percy Lake Road, Eagle Lake, Ontario. The site is bound by Percy Lake and Gull River to the east, heavily treed undeveloped land to the north and south and Percy Lake Road to the west. The site is heavily treed with steep varying elevations with bedrock exposed at times. Drainage for the overall site appears to be towards the southeast in the direction of Percy Lake with a shallow creek running along the southeast side of the assignment area from the Percy Lake Dam to Haliburton Lake.

Prior to the field investigation Parks Canada cleared all trees along the proposed alignment for Option 2 and partially cleared the trees along the proposed alignment for Option 1.

3.0 FIELDWORK / METHODOLOGY

The fieldwork for the investigation was conducted in accordance with the Project Description. The field program consisted of the advancement of ten (10) test pits (TP Nos. 1 to 10) to investigate sub-surface conditions. Test Pit Nos. TP1 to TP8 were completed along proposed alignment Option 2 with TP9 and TP10 completed along proposed alignment Option 1. Parks Canada requested that as the Option One route was partially cleared if the soils within this area could also be investigated at the time of the field program, however Option 2 is the main focus of the assignment. Prior to commencing the geotechnical investigation program, Ainley contacted local utility companies in order to obtain clearances for all underground services in the immediate area of the proposed field program.

The test pit program was completed on February 1, 2018. All test pitting was completed under the constant supervision of a qualified member of Ainley's geotechnical team. A Site and Test Pit Location Plan showing test pit locations is attached to this report as **Figure No. 1**.

The test pits were advanced at approximately 20 m spacing along both proposed alignments. Test pits were advanced to depths ranging from 0.3 m to 1.5 m below existing ground surface. The test pits were advanced by means of a rubber track excavator provided by Parks Canada.

The location of each respective test pit location was surveyed with an ArcPad V.10.2 and data shape files were produced.

4.0 RESULTS OF THE INVESTIGATION

4.1 Sub-Surface Conditions

Full details of the subsurface conditions encountered at the test pit locations are presented on the individual test pit logs included in **Appendix A**. It is emphasized however, that the soil types, their sequence, thickness and physical properties may vary between test locations and samples both vertically and horizontally.

Representative samples of the subsoil materials encountered within the test pits were collected and returned to our office for further visual review by an engineer having experience with soil classification and identification. A total of ten (10) samples were selected and submitted to SNC Lavalin in Kingston, Ontario for gradation analysis and moisture content determination. Copies of the Grain Size Distribution results are included in **Appendix B**.

The subsoil conditions encountered throughout the site generally consisted of the following:

4.1.1 Topsoil

A surficial layer of topsoil consisting of sandy silt, trace of clay and rootlets was encountered in all the test pits. The topsoil layer thickness was found to range between 0.2 m to 0.45 m with an average thickness of 0.34 m.

4.1.2 Sand

A layer of sand with varying amounts of silt, gravel, clay, cobbles, boulders and rootlets was encountered in all test pits with the exception of TP6, TP7 and TP8. The sand with varying amounts of silt, gravel, clay, cobbles, boulders and rootlets material was encountered immediately underlying the surficial topsoil. This sand layer was found to be in a loose state of consistency at the time of the field investigation. This sand layer extended to depths ranging from 0.3 m to 0.9 m below existing site grades with an average thickness of approximately 0.32 m.

One (1) representative sample of the sand with varying amounts of silt, gravel, clay, cobbles, boulders and rootlets was submitted for gradation and moisture content determination. The

percentage of material passing the 4.75 mm and 75 µm sieves was found to be 81.2 and 40.5 respectively. The moisture content was found to be 17.6% at the time of the site investigation. The material does not meet the requirements for Select Subgrade specification in accordance with OPSS 1010.

4.1.3 Sand and Gravel

A layer of sand and gravel with varying amount of silt, clay, cobbles and boulders was encountered in all test pits with exception of TP3, TP6, TP7, TP8 and TP9. The sand and gravel with varying amount of silt, clay, cobbles and boulders material was encountered immediately underlying the sand with varying amounts of silt, gravel, clay, cobbles, boulders and rootlets layer. This sand and gravel layer was generally found to be in a compact state of consistency at the time of the field investigation. This sand and gravel layer extended to depths ranging from 1.15 m to 1.5 m below existing site grades with an average thickness of approximately 0.7 m.

Six (6) representative samples of the sand and gravel with varying amount of silt, clay, cobbles and boulders were submitted for gradation and moisture content determination. The percentage of material passing the 4.75 mm and 75 µm sieves was found to range between 46.2 to 73.9 and 9.2 to 24.9 respectively. The moisture content was found to range between 7.4% and 25.7% at the time of the site investigation. The material meets Select Subgrade specification in accordance with OPSS 1010.

4.1.4 Silt

A layer of silt with varying amounts of sand, clay, cobbles and boulders was found underlying the surficial layer of topsoil within TP6 and TP8. The silt layer was encountered at depths of 0.3 m and 0.4 m below existing site grades. The silt layer thickness was found to be 0.9 m. The granite bedrock was found directly beneath the silt layer.

Two (2) representative samples of the silt with varying amounts of sand, clay, cobbles and boulders were submitted for gradation and moisture content determination. The material was found to have a High Susceptibility to Frost Heaving (HSFH). The moisture contents were found to be 34.1% at the time of the site investigation.

4.1.5 Bedrock

Refusal to advance the soils equipment on the granite bedrock surface was encountered within test pits TP1, TP3, TP6 and TP7 at depths (elevations) ranging from 0.4 m to 1.2 m (378.46 masl to 385.84 masl) below existing grade.

4.1.6 Groundwater

Groundwater infiltration was not encountered at the time of the field investigation within all test pits, however, perched groundwater was encountered within TP6 and TP8 at depths (elevations) of 1.2 m and 1.5 m below existing site grades (376.79 m and 378.46 m). The perched groundwater was encountered overlaying the granite bedrock surface.

5.0 DISCUSSION AND RECOMMENDATIONS

It is our understanding based on the Design Brief provided with the SOW that the purpose of the geotechnical investigation and report is to provide analysis and recommendations of the subsoil conditions, engineering soil properties and roadway structure to assist with the design of the 160 m access road.

Based on the subsoil and groundwater conditions encountered at the test locations and considering them to be generally representative of the subsoil and groundwater conditions across the subject site, the following recommendations and comments are offered to advance the design and construction.

5.1 Pavement Design

Based on the existing soil conditions and the results of testing on the subsoil material, it is recommended that the following pavement structures be applied to the proposed access road and staging areas:

In Earth

150 mm	Granular ‘A’, over
300 mm	Granular ‘B’ Type I, over
	Acceptable Rock or Earth Fill

In Rock

150 mm	Granular ‘A’, over
300 mm	Rock Shatter

It should be noted however that the recommended pavement structure is based on all topsoil, organic and unsuitable materials being removed to reveal the underlying sand with silt and gravel subgrade and/or bedrock surface. It is recommended that the subgrade material be proof rolled prior to placement of the granular subbase to reveal any loose areas. Any areas exhibiting rutting or appreciable deflection should be excavated and replaced with suitable fill material compacted to a minimum of 95% SPMDD.

Granular ‘A’ and Granular ‘B’ Type I used for base and subbase material shall meet the requirements of OPSS 1010 and shall be compacted to 100% SPMDD. Granular ‘B’ Type I may be substituted for rock fill providing the surface of the roadway is chinked with rock fragments and spalls to form the subbase prior to placement of the base in order to minimize voids and prevent migration of the base material into the rock fill.

Inspection by qualified geotechnical personnel should be carried out during the construction process to verify the competence of the subgrade material and to verify the compaction densities of both the subbase and base course materials.

A silt deposit was encountered within the vicinity of Test Pit Nos. 6 and 8 immediately underlying the topsoil. The silt was found to have a High Susceptibility to Frost Heaving. As the purpose of the roadway is to provide construction access to the dam during the summer months removal of the silt below the subbase does not appear warranted. It is therefore recommended that the above pavement structure be applied, however additional granular and/or placement of geotextile (Mirafi HP270 or equivalent) may be required depending on the moisture content and workability of the silt at the time of construction.

A topsoil stripping depth of 300 mm may be assumed for this project. A frost depth of 1.8 m may be utilized for this area.

5.2 Groundwater Control/Subsurface Drainage

Based on the observations made during the field investigation and our knowledge of the local geologic conditions, perched groundwater infiltrations may be encountered within excavations within or near the bedrock surface, however it should be noted that groundwater levels will fluctuate seasonally and also during periods of drought and precipitation.

Development areas within the site should be graded in the early stages of construction to provide for positive runoff of all surface water. The nature of the sand and silt material encountered makes it prone to strength loss therefore, groundwater and moisture control during construction and post development is key to the workability and movement of this soil.

The pumping of groundwater may be required during excavation of the shallow overburden. Normal pumps should suffice but some sand filters may be required to prevent clogging of the pumps. The groundwater level should be controlled at all times and be kept below the excavation level during the construction period.

Excavations penetrating the bedrock formation may encounter increased groundwater flows that may result in the necessity for additional precautions and techniques.

5.3 Excavations

All excavations should be carried out in accordance with the provisions in the Occupational Health and Safety Act. At the time of the field investigations the sub-soil materials encountered across the site can be classified as follows:

- The native materials may be classified as Type 3 soil.

Shallow excavations into the soils and sound bedrock are considered straightforward and conventional excavation techniques and equipment appropriate. The quality of the bedrock encountered was not evaluated under the scope of this assignment and contractors should utilize appropriate hoe-ram or large excavators suitable to the bedrock conditions encountered for shallow excavations.

5.4 Suitability of Material

The native materials encountered across the site are generally considered suitable for reuse as subgrade material below access route areas or in trenches with exception to the silt material encountered within proximity to TP Nos. 6 and 8. It is recommended that moisture contents in the soils be closely monitored when they are to be used as select subgrade fill or as a founding soil during construction. Wet soils should not be placed as backfill, subgrade fill or utilized as a founding material under any circumstances.

5.5 Trenches

The construction of any proposed trenches should consist of removal of the existing overburden soils to achieve the required grades. Based on the soils information obtained from the site pipes will be installed in either fine-grained subsoil or bedrock trenches. Bedding for the pipes should consist of 150 mm Granular 'A' material. The bedding should be placed in lifts compatible with the compaction equipment used to achieve 100% SPMDD. Backfill around the pipes should consist of Granular 'A' material with a minimum cover thickness of 300 mm over the obvert of the pipe. The backfill should be compacted to 100% SPMDD.

5.6 Site Inspections

It is recommended that all subgrade materials be inspected by qualified geotechnical personnel to ensure that the materials and founding elevations are consistent with the recommendations of this report. It is also recommended that the placement and compaction of all fill soils be monitored and tested by qualified geotechnical personnel to ensure that the appropriate materials and compaction densities are achieved.

6.0 CLOSURE

The Limitations of Report attached, form an integral part of this report. We trust this report provides sufficient information for your present requirements in accordance with our Statement of Work. We trust this report is to your satisfaction. Should you have any questions concerning the above, please feel free to contact our office.

Sincerely,

AINLEY GRAHAM & ASSOCIATES LIMITED

Lois-Ann Hayes

Lois-Ann Hayes, P. Eng.
Senior Engineer

LICENSED PROFESSIONAL ENGINEER
L.-A.L. HAYES
100058128
Feb 13, 2019
PROVINCE OF ONTARIO

Limitations of Report

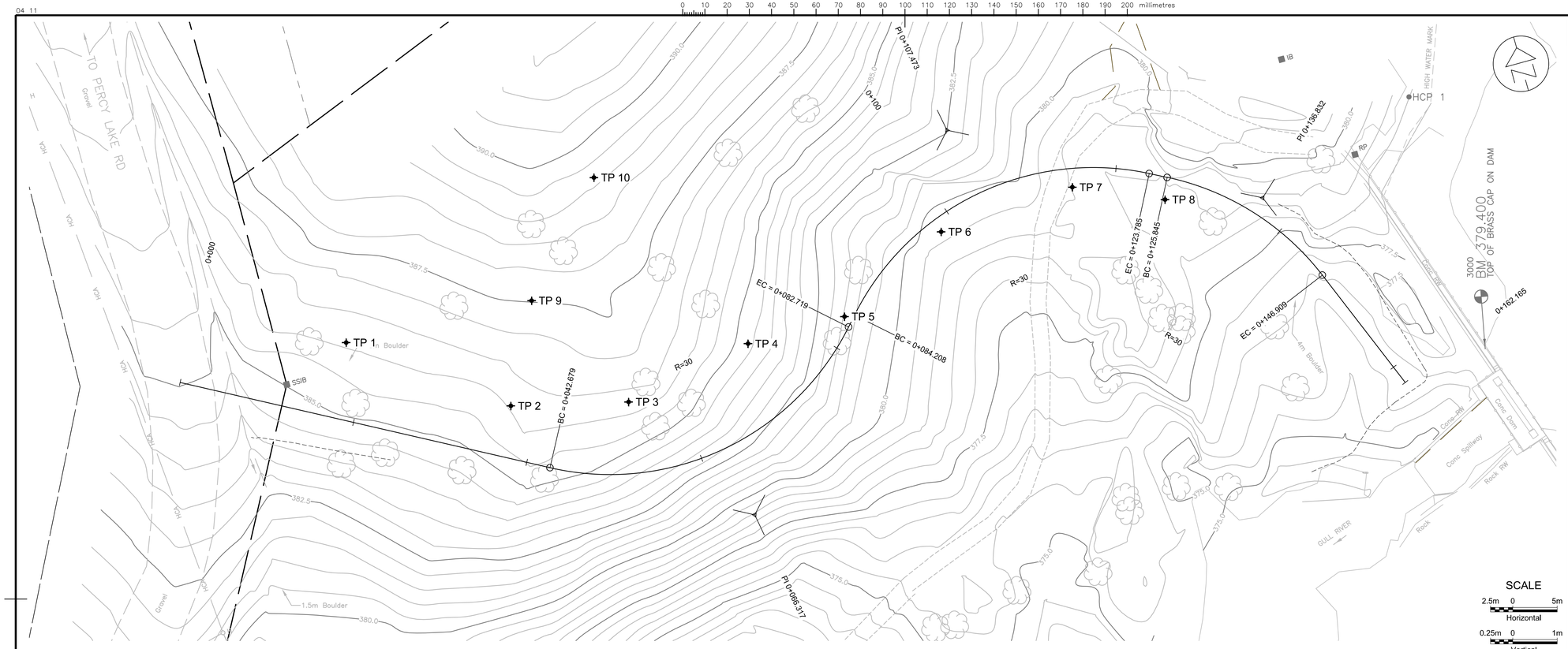
The conclusions and recommendations given in this report are based on information determined at the borehole locations. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Soils Engineer be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the boreholes.

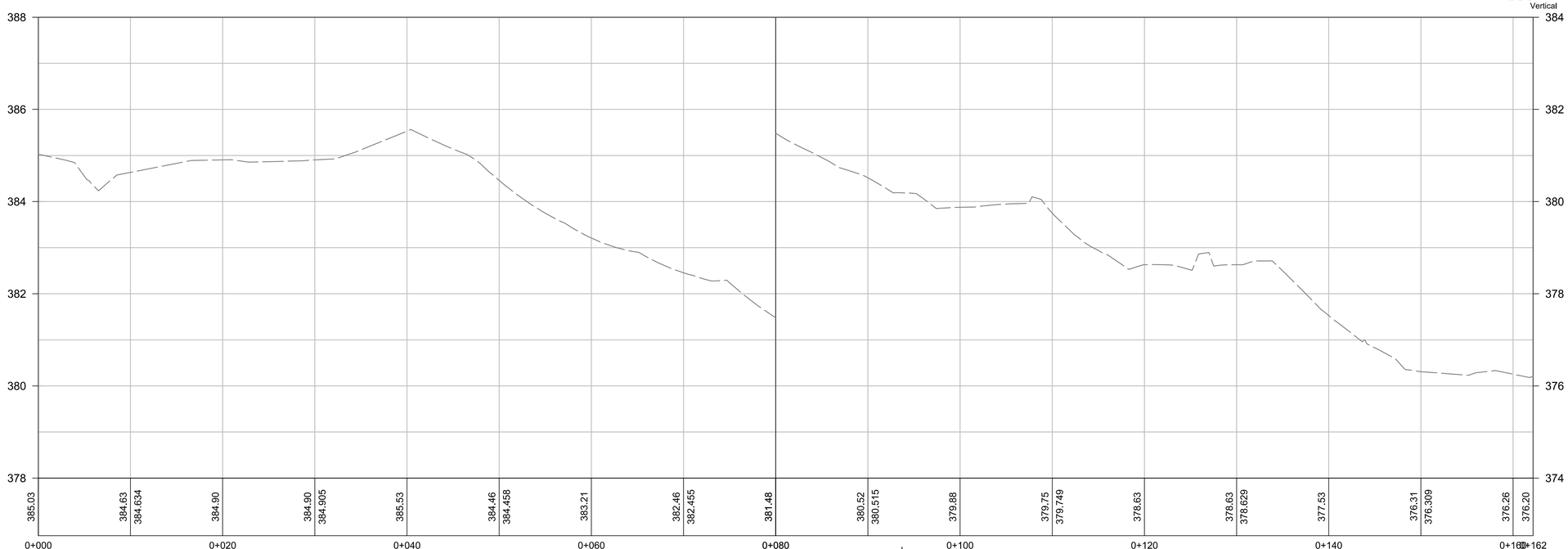
The comments made in this report are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all factors that may affect construction methods and costs. The contractors bidding on this project or undertaking the construction should therefore make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work.

This report has been prepared for design purposes, for the sole use of Parks Canada. Any uses, which a Third Party makes of this report, or any reliance or decisions to be made based on it, are the responsibilities of said Third Parties. Ainley Group accepts no responsibility for damages if any, suffered by any Third Party as a result of decisions made or actions based on this report.

Figure No. 1

Site and Test Pit Location Plan





Public Works and Government Services Canada
Architectural and Engineering Services
Ontario Region

Travaux publics et Services gouvernementaux Canada
Services d'architecture et de génie
Région de l'Ontario

Ainley GROUP
CONSULTING ENGINEERS PLANNERS

revision	description	date

Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
DYSART ET AL ONTARIO
PARKS CANADA
GEOGRAPHIC TWP. OF HARBURN
COUNTY OF HALIBURTON
PERCY LAKE DAM
ACCESS ROAD

drawing title / titre du dessin
TEST PIT LOCATIONS
STA. 0+000 TO 0+162

drawn by / dessine par: A.C.

designed by / conc par:

approved by / approuve par:

tender / soumission

project manager / administrateur de projets

project date / date du projet: 2017/12

project no. / no. du projet: R.076951.062

drawing no. / dessine no.: 1

GSC–A1 DATE PLOTTED: 2018/02/09 PLOT SCALE: 1:0.0394 CAD FILE: V:\17555–1 – Percy Lake Access Road Design\Drawings_civil\17555–1 Test Pit Locations.dwg

Appendix A

Test Pit Logs

Ainley Group
1-50 Grant Timmins Drive
Kingston, Ontario
K7M 8N2

Log of Test Pit: TP1

Project No.: 5P201-17-5130

Project: Percy Lake Dam Access Rd

Client: Parks Canada Agency

Location: 705189 E 5009411 N

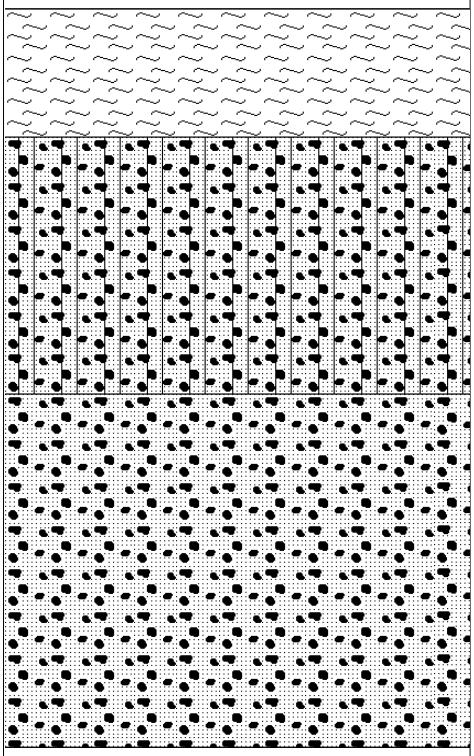
Location Cont: 0+017.2 8.6 m Lt

Ground Elevation (masl): 386.07

Water Elevation (masl): NA

Depth to Water (m): NA

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
	0.20	***Topsoil*** Silty sand, trace gravel, cobbles and rootlets, brown, frozen.				
1	0.60	***Sand*** Silty sand, some clay, trace of gravel, cobbles, boulders and rootlets, loose, brown. % Passing JC001 4.75 mm = 93.0 75 um = 46.0 5 um = 13.0 LSFH 2 um = 11.0 Moisture Content = 17.6%	JC001	G		
2	1.15	***Sand and Gravel*** Sand and gravel, some silt, cobbles and boulders, trace clay, compact, grey.				
3 / 1						
4		***End of Test Pit at 1.15 m below existing site grades upon granite bedrock.*** Note: Groundwater infiltration was not encountered during the test pit investigation.				
5						



Excavated By: Parks Canada Agency

Drill Method: Rubber Track Excavator

Drill Date: February 1, 2018

Project Engineer: Lois-Ann Hayes, P.Eng

Project Technician: Joshua Charlton

Sheet: 1 of 1

Ainley Group
1-50 Grant Timmins Drive
Kingston, Ontario
K7M 8N2

Log of Test Pit: TP2

Project No.: 5P201-17-5130

Project: Percy Lake Dam Access Rd

Client: Parks Canada Agency

Location: 705218 E 5009396 N

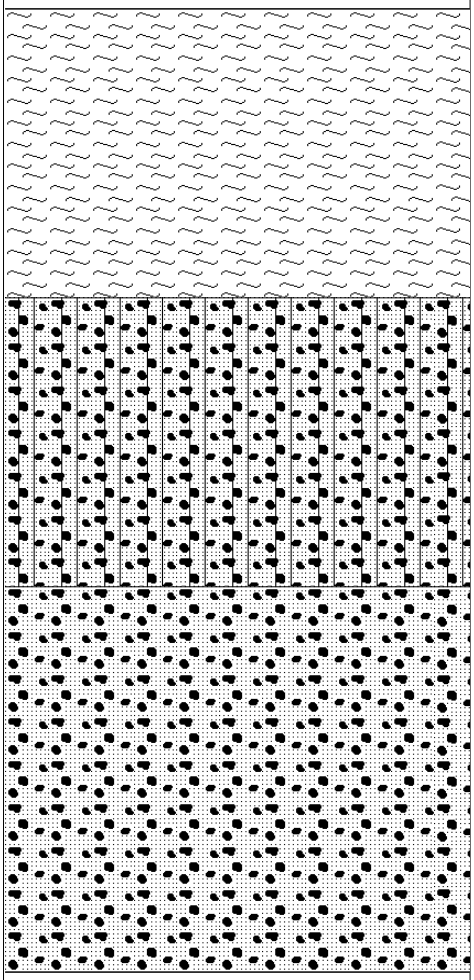
Location Cont: 0+036.8 5.8 m Lt

Ground Elevation (masl): 386.11

Water Elevation (masl): NA

Depth to Water (m): NA

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Topsoil Silty sand, trace gravel, cobbles and rootlets, brown, frozen.				
1	0.45					
		Sand Sand with silt and gravel, some clay, cobbles and boulders, trace rootlets, loose, brown.				
2	0.90					
3 / 1		***Sand and Gravel*** Gravelly sand, some silt, cobbles and boulders, trace clay, compact, brown. % Passing JC004 4.75 mm = 68.5 75 um = 20.9 Moisture Content = 10.9%	JC004	G		
4	1.50					
5		***End of Test Pit at 1.50 m below existing site grades.*** Note: Groundwater infiltration was not encountered during the test pit investigation.				



Excavated By: Parks Canada Agency

Drill Method: Rubber Track Excavator

Drill Date: February 1, 2018

Project Engineer: Lois-Ann Hayes, P.Eng

Project Technician: Joshua Charlton

Sheet: 1 of 1

Ainley Group
1-50 Grant Timmins Drive
Kingston, Ontario
K7M 8N2

Log of Test Pit: TP3

Project No.: 5P201-17-5130

Project: Percy Lake Dam Access Rd

Client: Parks Canada Agency

Location: 705233 E 5009399 N

Location Cont: 0+052.4 8.1 m Lt

Ground Elevation (masl): 386.24

Water Elevation (masl): NA

Depth to Water (m): NA

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
	0.25	***Topsoil*** Silty sand, trace gravel, cobbles and rootlets, brown, frozen.				
1	0.40	***Sand*** Sandy gravel, some cobbles and boulders, trace silt, clay and rootlets, loose, brown. % Passing JC005 4.75 mm = 46.2 75 um = 13.0 Moisture Content = 12.6%	JC005	G		
2		***End of Test Pit at 0.40 m below existing site grades upon granite bedrock.*** Note: Groundwater infiltration was not encountered during the test pit investigation.				
3 / 1						
4						
5						

Excavated By: Parks Canada Agency

Drill Method: Rubber Track Excavator

Drill Date: February 1, 2018

Project Engineer: Lois-Ann Hayes, P.Eng

Project Technician: Joshua Charlton

Sheet: 1 of 1

Ainley Group
1-50 Grant Timmins Drive
Kingston, Ontario
K7M 8N2

Log of Test Pit: TP4

Project No.: 5P201-17-5130

Project: Percy Lake Dam Access Rd

Client: Parks Canada Agency

Location: 705244 E 5009399 N

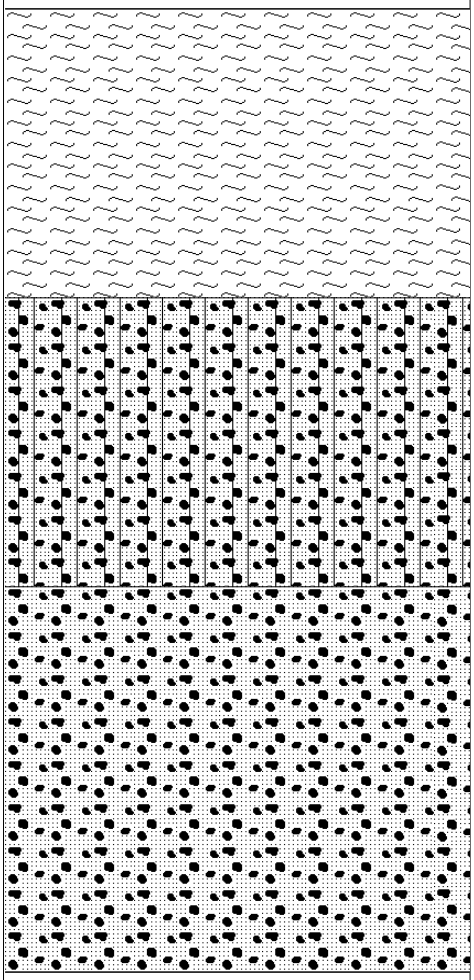
Location Cont: 0+073.3 8.2 m Lt

Ground Elevation (masl): 384.62

Water Elevation (masl): NA

Depth to Water (m): NA

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Topsoil Silty sand, trace gravel, cobbles and rootlets, brown, frozen.				
1	0.45					
		Sand Sand with silt and gravel, some clay, cobbles and boulders, trace rootlets, loose, brown.				
2	0.90					
3 / 1		***Sand and Gravel*** Gravelly sand, some silt, cobbles and boulders, trace clay, compact, grey. % Passing JC006 4.75 mm = 63.8 75 um = 20.2 Moisture Content = 9.0%	JC006	G		
4	1.50					
5		***End of Test Pit at 1.50 m below existing site grades.*** Note: Groundwater infiltration was not encountered during the test pit investigation.				



Excavated By: Parks Canada Agency

Drill Method: Rubber Track Excavator

Drill Date: February 1, 2018

Project Engineer: Lois-Ann Hayes, P.Eng

Project Technician: Joshua Charlton

Sheet: 1 of 1

Ainley Group
1-50 Grant Timmins Drive
Kingston, Ontario
K7M 8N2

Log of Test Pit: TP5

Project No.: 5P201-17-5130

Project: Percy Lake Dam Access Rd

Client: Parks Canada Agency

Location: 705257 E 5009405 N

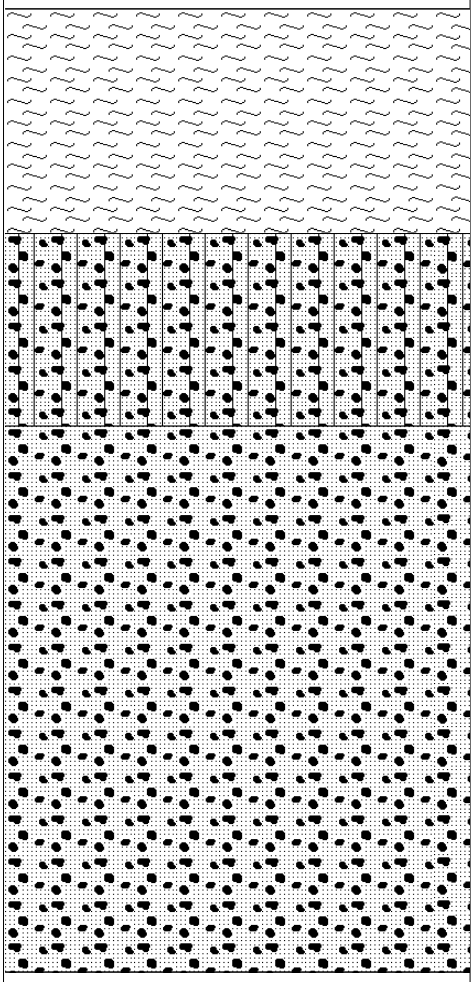
Location Cont: 0+083.6 0.9 m Lt

Ground Elevation (masl): 381.41

Water Elevation (masl): NA

Depth to Water (m): NA

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
	0.35	***Topsoil*** Silty sand, trace gravel, cobbles and rootlets, brown, frozen.				
1	0.65	***Sand*** Sand with silt and gravel, some clay, cobbles and boulders, trace rootlets, loose, brown.				
2 / 1	1.50	***Sand and Gravel*** Sandy gravel, some cobbles and boulders, trace silt and clay, compact, grey. % Passing JC007 4.75 mm = 48.7 75 um = 9.2 Moisture Content = 7.4%	JC007	G		
3 / 4 / 5		***End of Test Pit at 1.50 m below existing site grades.*** Note: Groundwater infiltration was not encountered during the test pit investigation.				



Excavated By: Parks Canada Agency

Drill Method: Rubber Track Excavator

Drill Date: February 1, 2018

Project Engineer: Lois-Ann Hayes, P.Eng

Project Technician: Joshua Charlton

Sheet: 1 of 1

Ainley Group
1-50 Grant Timmins Drive
Kingston, Ontario
K7M 8N2

Log of Test Pit: TP6

Project No.: 5P201-17-5130

Project: Percy Lake Dam Access Rd

Client: Parks Canada Agency

Location: 705272 E 5009406 N

Location Cont: 0+098.1 1.5 m Rt

Ground Elevation (masl): 379.66

Water Elevation (masl): 378.46

Depth to Water (m): 1.2

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Topsoil Silty sand, trace gravel, cobbles and rootlets, brown, frozen.				
	0.30					
1		***Silt*** Silt, some sand cobbles and boulders, trace clay and rootlets to 0.7 m, loose, moist, brown. % Passing JC008 4.75 mm = 100.0 75 um = 89.0 5 um = 13.0 HSFH 2 um = 9.0 Moisture Content = 34.1%	JC008	G		
2						
3 / 1	1.20				▼	
4		***End of Test Pit at 1.20 m below existing site grades upon granite bedrock.*** Note: Groundwater infiltration was encountered at 1.20 m below existing site grades during the test pit investigation.				
5						

Excavated By: Parks Canada Agency

Drill Method: Rubber Track Excavator

Drill Date: February 1, 2018

Project Engineer: Lois-Ann Hayes, P.Eng

Project Technician: Joshua Charlton

Sheet: 1 of 1

Ainley Group
1-50 Grant Timmins Drive
Kingston, Ontario
K7M 8N2

Log of Test Pit: TP7

Project No.: 5P201-17-5130

Project: Percy Lake Dam Access Rd

Client: Parks Canada Agency

Location: 705282 E 5009402 N

Location Cont: 0+114.9 2.1 m Rt

Ground Elevation (masl): 378.98

Water Elevation (masl): NA

Depth to Water (m): NA

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Topsoil Silty sand, trace gravel, cobbles and rootlets, brown, frozen.				
1	0.45					
		End of Test Pit at 0.45 m below existing site grades upon granite bedrock. Note: Groundwater infiltration was not encountered during the test pit investigation.				
2						
3 / 1						
4						
5						

Excavated By: Parks Canada Agency

Drill Method: Rubber Track Excavator

Drill Date: February 1, 2018

Project Engineer: Lois-Ann Hayes, P.Eng

Project Technician: Joshua Charlton

Sheet: 1 of 1

Ainley Group
1-50 Grant Timmins Drive
Kingston, Ontario
K7M 8N2

Log of Test Pit: TP8

Project No.: 5P201-17-5130

Project: Percy Lake Dam Access Rd

Client: Parks Canada Agency

Location: 705210 E 5009410 N

Location Cont: 0+126.2 2.5 m Rt

Ground Elevation (masl): 378.29

Water Elevation (masl): 376.79

Depth to Water (m): 1.5

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Topsoil Silty sand, trace gravel, cobbles and rootlets, brown, frozen.				
1	0.40					
2 / 3 / 1 / 4		***Silt*** Silt with sand, some cobbles and boulders, trace clay and rootlets to 0.75 m, loose, moist, brown. % Passing JC009 4.75 mm = 100.0 75 um = 70.0 5 um = 6.0 HSFH 2 um = 4.0 Moisture Content = 34.1%	JC009	G		
	1.50				▼	
5		***End of Test Pit at 1.50 m below existing site grades.*** Note: Groundwater infiltration was encountered at 1.50 m below existing site grades during the test pit investigation.				

Excavated By: Parks Canada Agency

Drill Method: Rubber Track Excavator

Drill Date: February 1, 2018

Project Engineer: Lois-Ann Hayes, P.Eng

Project Technician: Joshua Charlton

Sheet: 1 of 1

Ainley Group
1-50 Grant Timmins Drive
Kingston, Ontario
K7M 8N2

Log of Test Pit: TP9

Project No.: 5P201-17-5130

Project: Percy Lake Dam Access Rd

Client: Parks Canada Agency

Location: 705205 E 5009399 N

Location Cont: 0+036.4 17.9 m Lt

Ground Elevation (masl): 387.52

Water Elevation (masl): NA

Depth to Water (m): NA

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
	0.15	***Topsoil*** Silty sand, trace gravel, cobbles and rootlets, brown, frozen.				
	0.30	***Sand*** Sand with gravel, some silt, cobbles and boulders, trace clay and rootlets, loose, brown. % Passing JC002 4.75 mm = 72.1 75 um = 20.2 Moisture Content = 25.7%	JC002	G		
1						
2		***End of Test Pit at 0.30 m below existing site grades upon refusal on large boulder.*** Note: Groundwater infiltration was not encountered during the test pit investigation.				
3 / 1						
4						
5						

Excavated By: Parks Canada Agency

Drill Method: Rubber Track Excavator

Drill Date: February 1, 2018

Project Engineer: Lois-Ann Hayes, P.Eng

Project Technician: Joshua Charlton

Sheet: 1 of 1

Ainley Group
1-50 Grant Timmins Drive
Kingston, Ontario
K7M 8N2

Log of Test Pit: TP10

Project No.: 5P201-17-5130

Project: Percy Lake Dam Access Rd

Client: Parks Canada Agency

Location: 705221 E 5009422 N

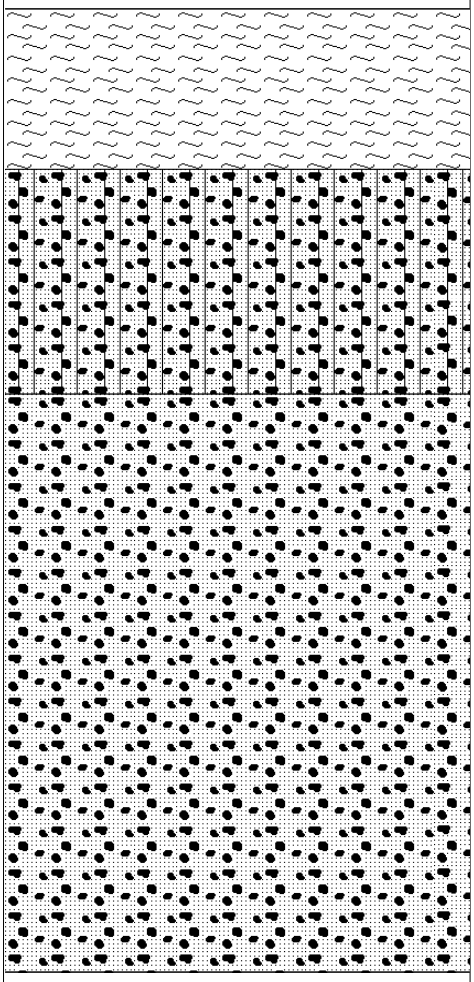
Location Cont: 0+040.2 32.9 m Lt

Ground Elevation (masl): 389.18

Water Elevation (masl): NA

Depth to Water (m): NA

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
	0.25	***Topsoil*** Silty sand, trace gravel, cobbles and rootlets, brown, frozen.				
1	0.60	***Sand*** Sand with silt and gravel, some clay, cobbles and boulders, trace rootlets, loose, brown.				
2 / 3 / 1 / 4	1.50	***Sand and Gravel*** Sand with gravel, some silt, cobbles and boulders, trace clay, compact, grey. % Passing JC003 4.75 mm = 73.9 75 um = 24.9 Moisture Content = 14.7%	JC003	G		
5		***End of Test Pit at 1.50 m below existing site grades.*** Note: Groundwater infiltration was not encountered during the test pit investigation.				



Excavated By: Parks Canada Agency

Drill Method: Rubber Track Excavator

Drill Date: February 1, 2018

Project Engineer: Lois-Ann Hayes, P.Eng

Project Technician: Joshua Charlton

Sheet: 1 of 1

Appendix B

Grain Size Distribution Results

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SNC-LAVALIN

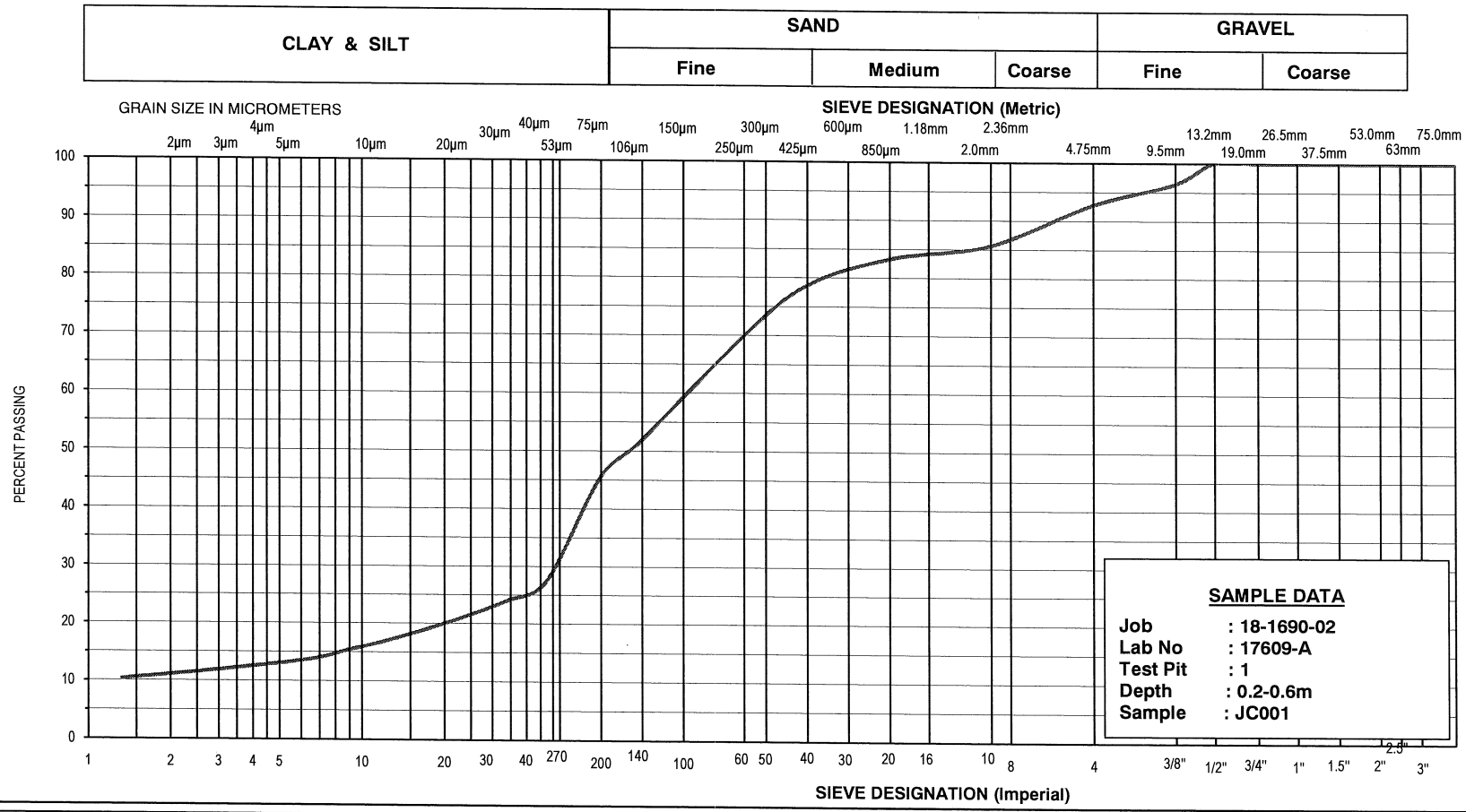
Lab # 17609 Client: Ainley

Project Name: 17555-1 Percy Lake Dam Access Road Date: February 12/2018

SAMPLE INFORMATION	SAMPLE	MASS OF SAMPLE WET & TARE (g)	MASS OF SAMPLE DRY & TARE (g)	MASS OF WATER (g)	MASS OF DRY SOIL (g)	MASS OF TARE (g)	MOISTURE CONTENT (%)
JC001	A	650.6	573.7	76.9	437.3	136.4	17.6
JC002	B	447.6	372.8	74.8	291.5	81.3	25.7
JC003	C	552.6	495.8	56.8	385.7	110.1	14.7
JC004	D	763.5	701.3	62.2	573	128.3	10.9
JC005	E	571	515.7	55.3	438	77.7	12.6
JC006	F	568.6	530.3	38.3	424.4	105.9	9.0
JC007	G	652.5	611.2	41.3	557.6	53.6	7.4
JC008	H	422.1	328.3	93.8	274.9	53.4	34.1
JC009	I	698.6	556	142.6	417.9	138.1	34.1

SNC-LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Course	Fine	Course	Medium	Fine	Silt	Clay
	0	7	7	7	33	35	11

SNC-LAVALIN 1164 Clyde Court Kingston, Ontario K7P 2E4	**GRAIN SIZE DISTRIBUTION**	**Client: Ainley**
		Project: 17555-1
	SILTY SAND	**Location: Percy Lake Dam Access Road**
	Some Clay,Trace Gravel	**Date: February 13,2018**

SNC·LAVALIN

SNC-Lavalin GEM Ontario Inc.
1164 Clyde Court
Kingston, Ontario K7P 2E4
(613) 389-178 (613) 389-4204

Grain Size Analysis Test Report

Project No.: 18-1690-02 **Project Description:** 17555-1 Percy Lake Dam Access Road **Date:** Feb 14, 2018

Project Location:

Contract No.:

SAMPLE DATA

Material: Sand with Gravel some Silt
Date Sampled: Feb 01, 2018
Time Sampled:
Sample Type: Borehole
Sample Location: JC002 TP#9, 0.15-0.3m
Lot: **Sublot:**
Source: On Site
Sampled By: Client

LAB DATA

Lab No.: 17609-B **Date Tested:** Feb 13, 2018

Specification: ,

PARTICLE ANALYSIS		
TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

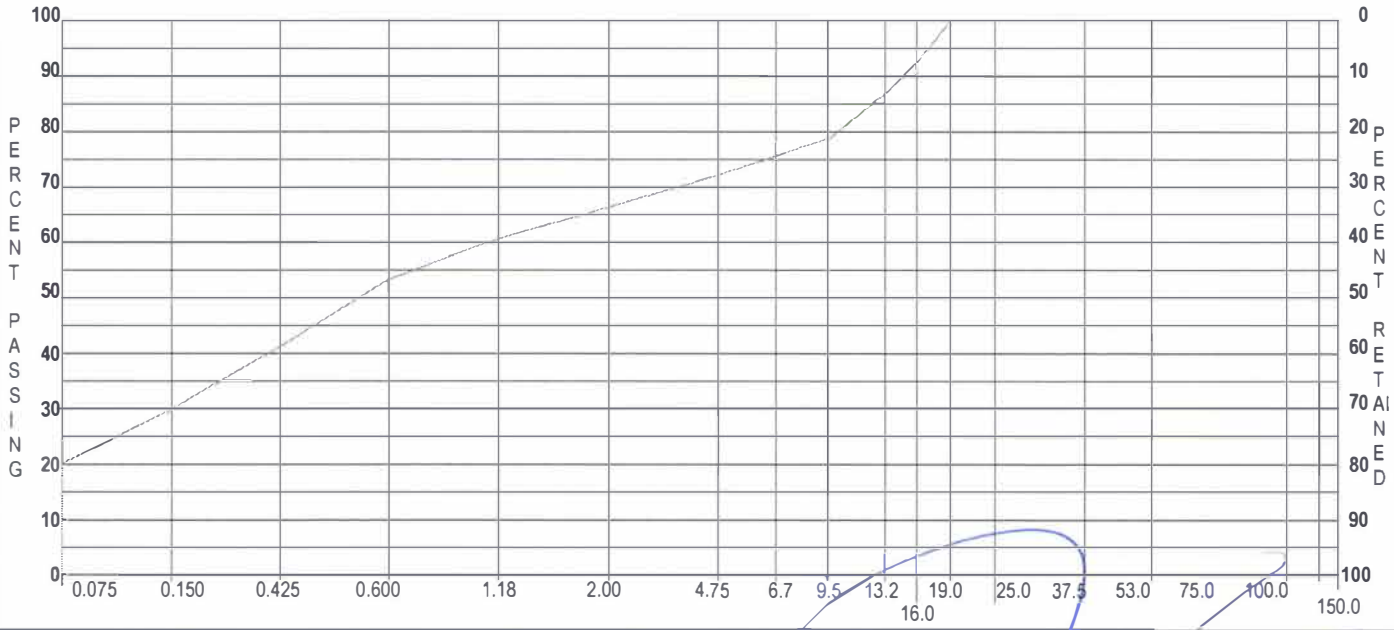
WASH PASS 0.075mm		
TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	2.64	

Comments:

Grain Size Analysis		
Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5		
26.5		
25.0		
19.0	100	
16.0	92.2	
13.2	86.7	
9.5	79	
6.7		
4.75	72.1	
2.36	66.4	
2.00		
1.18	60.6	
0.600	53.3	
0.425		
0.300	41.2	
0.150	29.8	
0.075	20.2	

* Indicates Out of Specification

Sample: _____ **Specs:** _____



Project Manager: Mark McClelland, C.E.T

SNC·LAVALIN

SNC-Lavalin GEM Ontario Inc.
1164 Clyde Court
Kingston, Ontario K7P 2E4
(613) 389-178 (613) 389-4204

Grain Size Analysis Test Report

Project No.: 18-1690-02 **Project Description:** 17555-1 Percy Lake Dam Access Road **Date:** Feb 14, 2018

Project Location:

Contract No.:

SAMPLE DATA

Material: Sand with Gravel trace Silt
Date Sampled: Feb 01, 2018
Time Sampled:
Sample Type: Borehole
Sample Location: JC003 TP#10, 0.6-1.5m
Lot: **Sublot:**
Source: On Site
Sampled By: Client

LAB DATA

Lab No.: 17609-C **Date Tested:** Feb 13, 2018
Specification: ,

PARTICLE ANALYSIS		
TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

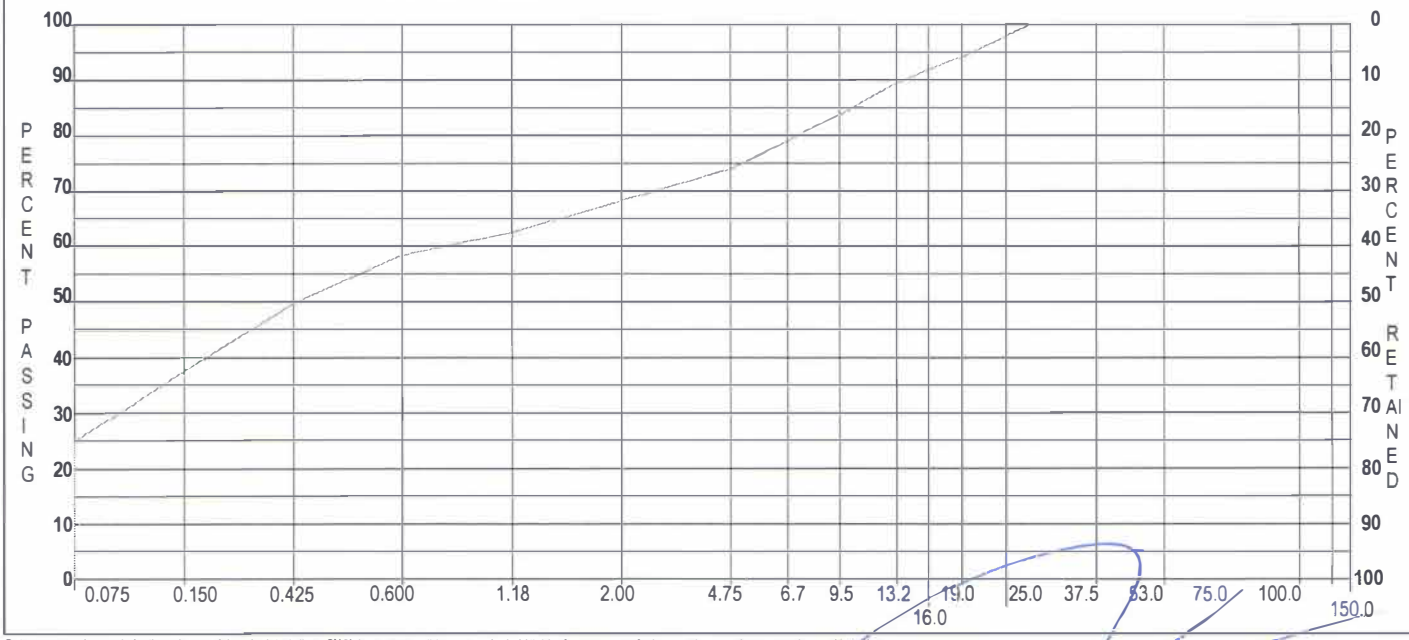
WASH PASS 0.075mm		
TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	2.40	

Comments:

Grain Size Analysis		
Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5		
26.5	100	
25.0		
19.0	94.1	
16.0	91.8	
13.2	89.4	
9.5	83.9	
6.7		
4.75	73.9	
2.36	66.8	
2.00		
1.18	62.5	
0.600	58.3	
0.425		
0.300	49.7	
0.150	37.4	
0.075	24.9	

* Indicates Out of Specification

Sample: _____ **Specs:** _____



Project Manager: Mark McClelland, C.E.T

SNC·LAVALIN

SNC-Lavalin GEM Ontario Inc.
1164 Clyde Court
Kingston, Ontario K7P 2E4
(613) 389-178 (613) 389-4204

Grain Size Analysis Test Report

Project No.: 18-1690-02 **Project Description:** 17555-1 Percy Lake Dam Access Road **Date:** Feb 14, 2018

Project Location: **Contract No.:**

SAMPLE DATA

Material: Sand with Gravel some Silt
Date Sampled: Feb 01, 2018
Time Sampled:
Sample Type: Borehole
Sample Location: JC004 TP#2, 0.9-1.5m
Lot: **Sublot:**
Source: On Site
Sampled By: Client

LAB DATA

Lab No.: **17609-D** **Date Tested:** Feb 13, 2018
Specification: ,

PARTICLE ANALYSIS

TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

WASH PASS 0.075mm

TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	2.86	

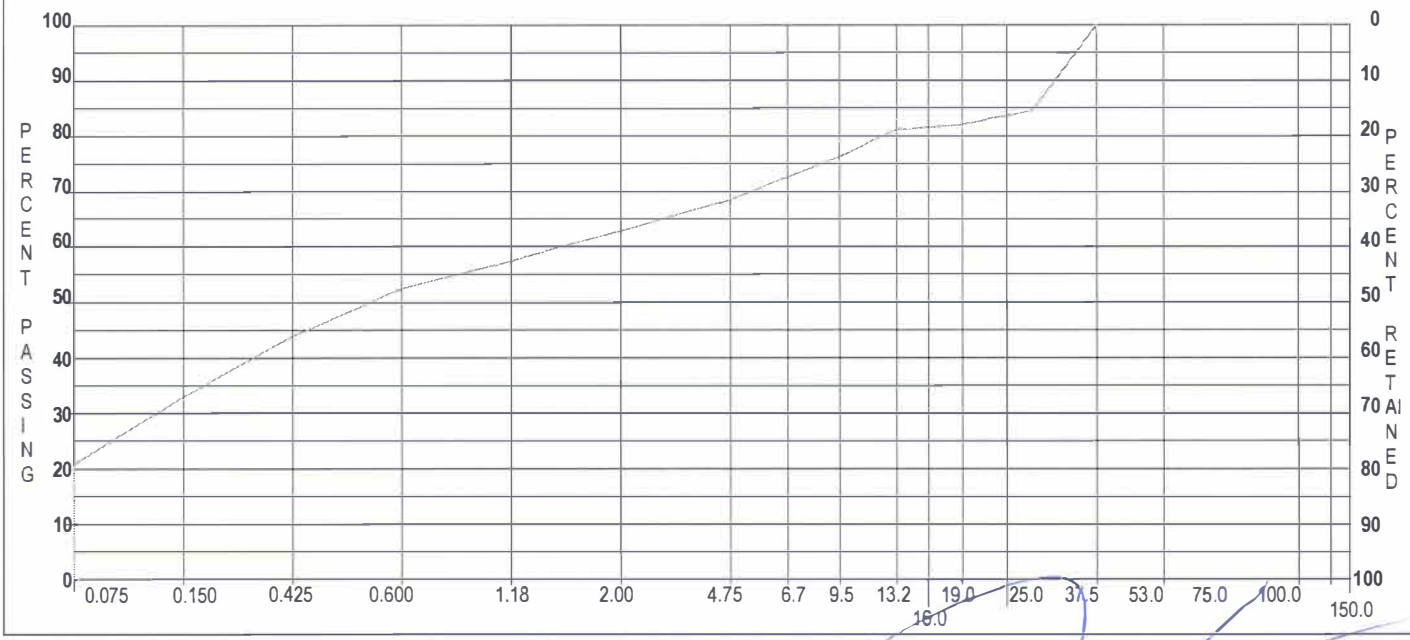
Comments:

Grain Size Analysis

Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5	**100**	
26.5	**84.6**	
25.0		
19.0	**82**	
16.0		
13.2	**81.2**	
9.5	**76.5**	
6.7		
4.75	**68.5**	
2.36	**62.4**	
2.00		
1.18	**57.3**	
0.600	**52.4**	
0.425		
0.300	**43.9**	
0.150	**32.9**	
0.075	**20.9**	

* Indicates Out of Specification

Sample: _____ **Specs:** _____



Project Manager: Mark McClelland, C.E.T

Infrastructure

SNC·LAVALIN

SNC-Lavalin GEM Ontario Inc.
1164 Clyde Court
Kingston, Ontario K7P 2E4
(613) 389-178 (613) 389-4204

Grain Size Analysis Test Report

Project No.: 18-1690-02 **Project Description:** 17555-1 Percy Lake Dam Access Road **Date:** Feb 14, 2018

Project Location: **Contract No.:**

SAMPLE DATA

Material: Sand with Gravel some Silt
Date Sampled: Feb 01, 2018
Time Sampled:
Sample Type: Borehole
Sample Location: JC005 TP#3, 0.25-0.4m
Lot: **Sublot:**
Source: On Site
Sampled By: Client

LAB DATA

Lab No.: 17609-E **Date Tested:** Feb 13, 2018
Specification:

PARTICLE ANALYSIS		
TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

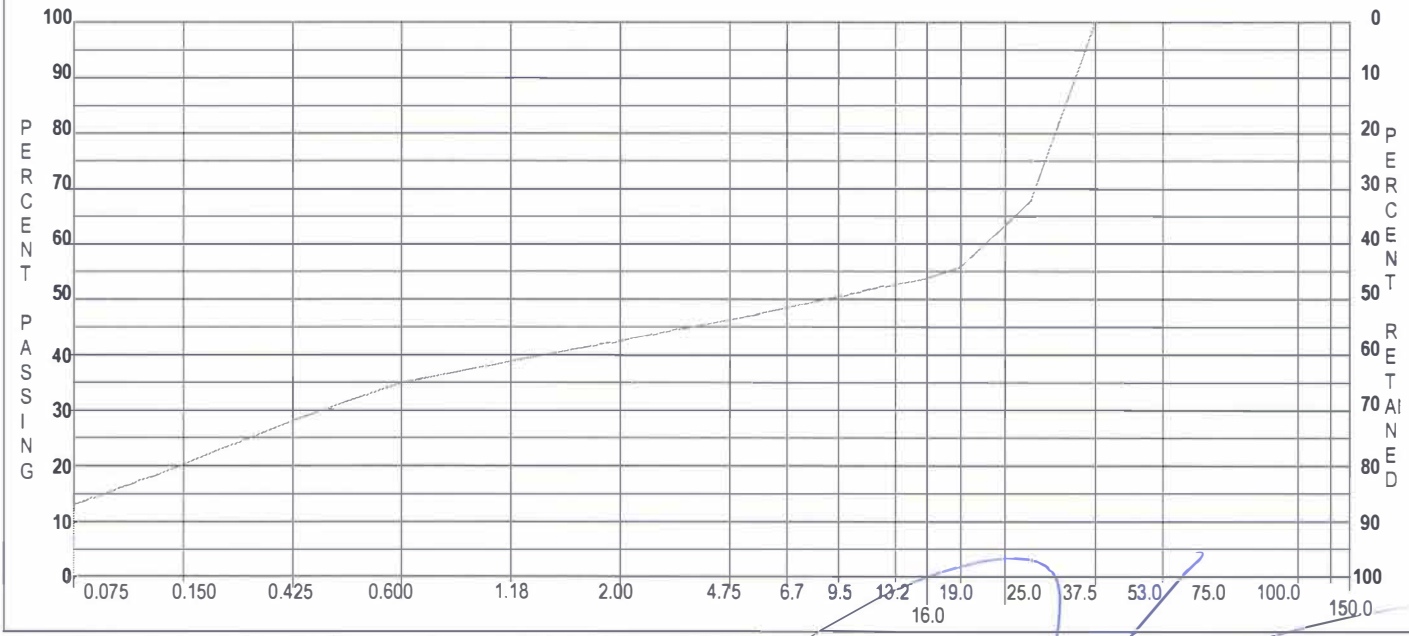
WASH PASS 0.075mm		
TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	4.25	

Comments:

Grain Size Analysis		
Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5	100	
26.5	67.9	
25.0		
19.0	55.8	
16.0	53.8	
13.2		
9.5	50.6	
6.7		
4.75	46.2	
2.36	42.2	
2.00		
1.18	38.8	
0.600	34.9	
0.425		
0.300	28.1	
0.150	20.2	
0.075	13	

* Indicates Out of Specification

Sample: _____ Specs: _____



Project Manager: Mark McClelland, C.E.T

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SNC-Lavalin GEM Ontario Inc.
1164 Clyde Court
Kingston, Ontario K7P 2E4
(613) 389-178 (613) 389-4204

Grain Size Analysis Test Report

Project No.: 18-1690-02 **Project Description:** 17555-1 Percy Lake Dam Access Road **Date:** Feb 14, 2018

Project Location: **Contract No.:**

SAMPLE DATA

Material: Sand with Gravel trace Silt
Date Sampled: Feb 01, 2018
Time Sampled:
Sample Type: Borehole
Sample Location: JC006 TP#4, 0.9-1.5m
Lot: **Sublot:**
Source: On Site
Sampled By: Client

LAB DATA

Lab No.: 17609-F **Date Tested:** Feb 13, 2018
Specification: ,

PARTICLE ANALYSIS

TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

WASH PASS 0.075mm

TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	2.62	

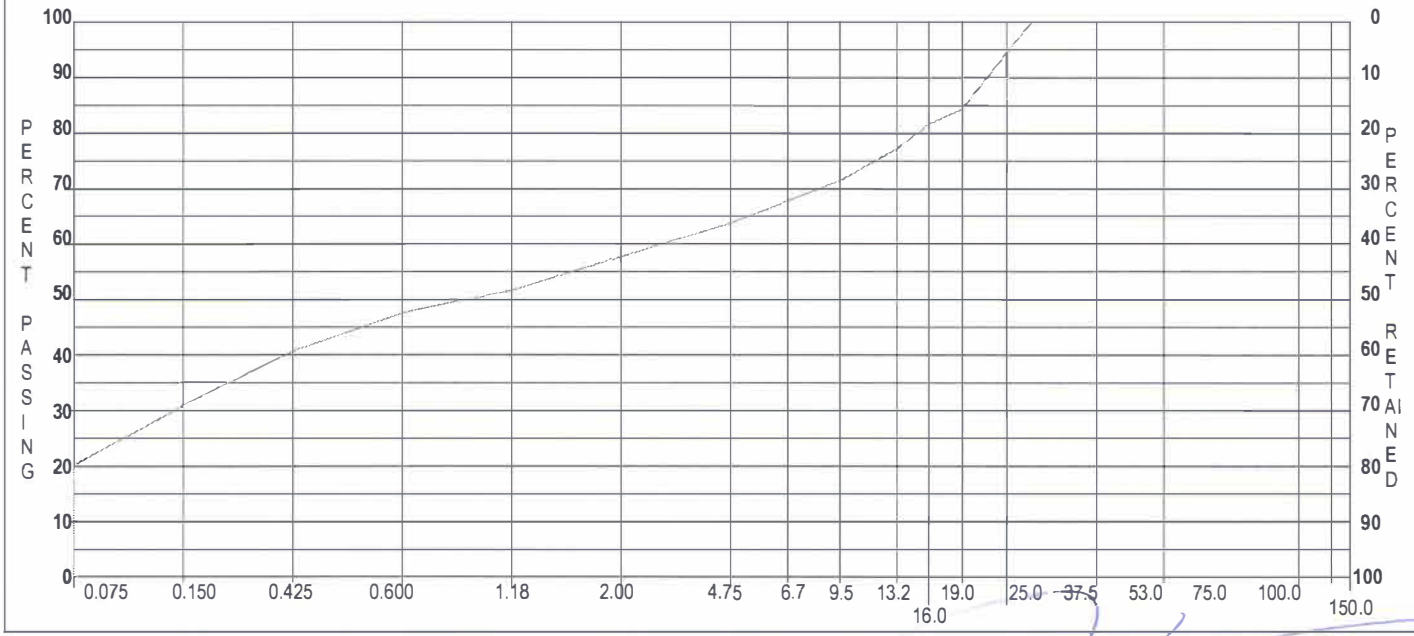
Comments:

Grain Size Analysis

Sieve Sizes (mm)	Percent Passing Sample	Percent Passing Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5		
26.5	100	
25.0		
19.0	84.4	
16.0	81.6	
13.2	77.2	
9.5	71.7	
6.7		
4.75	63.8	
2.36	56.4	
2.00		
1.18	51.6	
0.600	47.5	
0.425		
0.300	40.6	
0.150	30.9	
0.075	20.2	

* Indicates Out of Specification

Sample: _____ **Specs:** _____



Project Manager: Mark McClelland, C.E.T

SNC·LAVALIN

SNC-Lavalin GEM Ontario Inc.
1164 Clyde Court
Kingston, Ontario K7P 2E4
(613) 389-178 (613) 389-4204

Grain Size Analysis Test Report

Project No.: 18-1690-02 **Project Description:** 17555-1 Percy Lake Dam Access Road **Date:** Feb 14, 2018

Project Location: **Contract No.:**

SAMPLE DATA

Material: Sand with Gravel trace Silt
Date Sampled: Feb 01, 2018
Time Sampled:
Sample Type: Borehole
Sample Location: JC007 TP#5, 0.65-1.5m
Lot: **Sublot:**
Source: On Site
Sampled By: Joel Lockerbie

LAB DATA

Lab No.: 17609-G **Date Tested:** Feb 13, 2018
Specification: ,

PARTICLE ANALYSIS

TEST	Sample	Specification
Percent Crushed:		
% Asphalt Coated:		
% Flat and Elongated		

WASH PASS 0.075mm

TEST	Sample	Specs
Wash Pass 0.075 mm:		
FINENESS MODULUS	4.18	

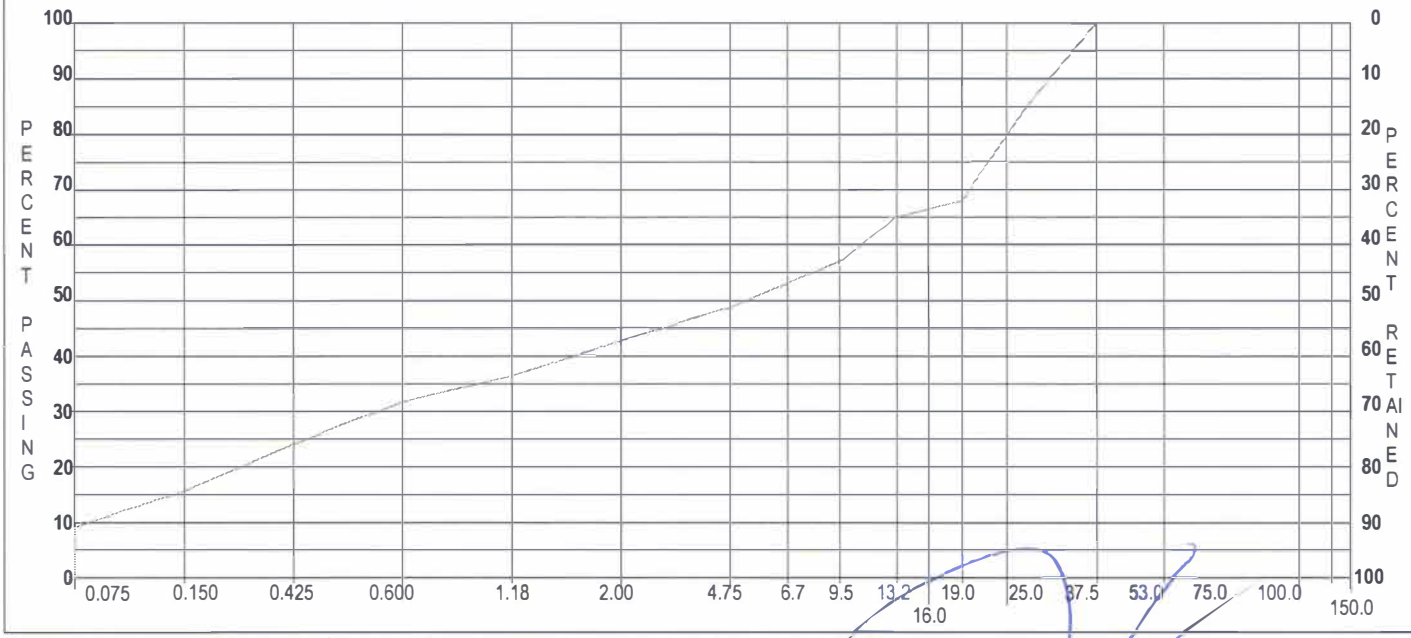
Comments:

Grain Size Analysis

Sieve Sizes (mm)	Percent Passing	
	Sample	Specification
150.0		
100.0		
75.0		
53.0		
50.0		
37.5	100	
26.5	86.3	
25.0		
19.0	68	
16.0		
13.2	65	
9.5	57.2	
6.7		
4.75	48.7	
2.36	41.7	
2.00		
1.18	36.4	
0.600	31.7	
0.425		
0.300	24.1	
0.150	15.7	
0.075	9.2	

* Indicates Out of Specification

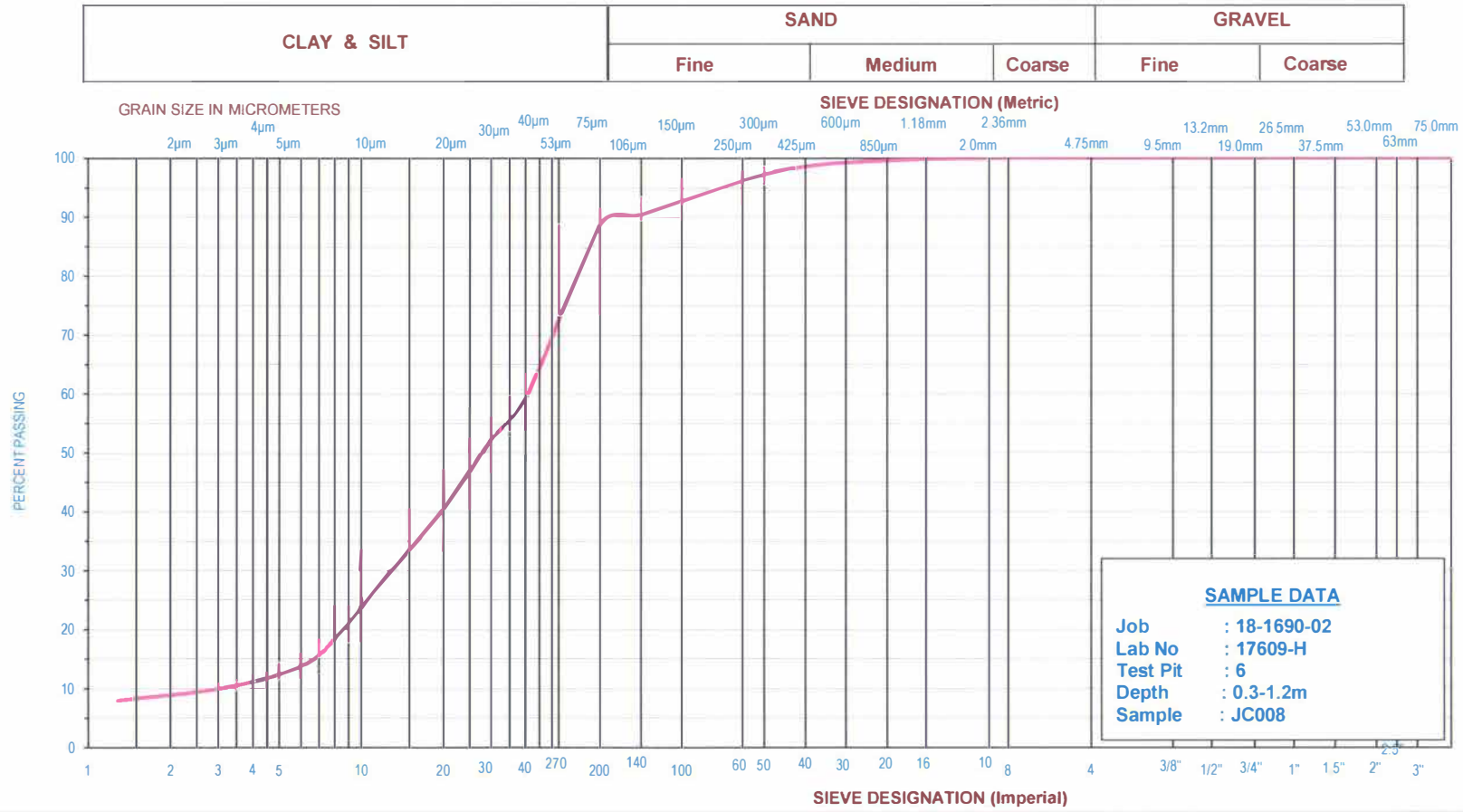
Sample: _____ **Specs:** _____



Project Manager: Mark McClelland, C.E.T

SNC-LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM

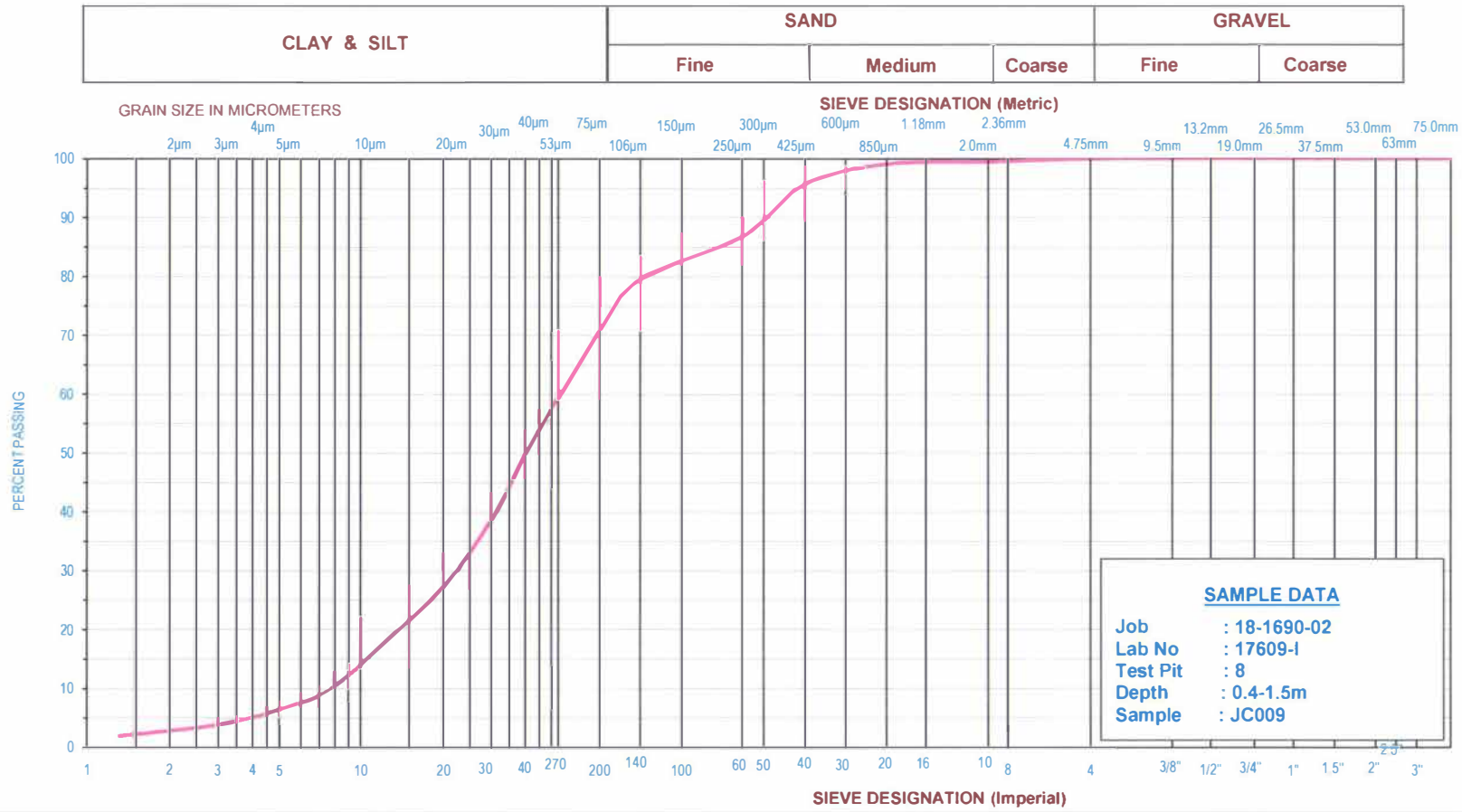


% +3"	% Gravel		% Sand			% Fines	
	Course	Fine	Course	Medium	Fine	Silt	Clay
	0	0	0	1	10	80	9

SNC-LAVALIN 1164 Clyde Court Kingston, Ontario K7P 2E4	**GRAIN SIZE DISTRIBUTION**	Client: Ainley	
		Project: 17555-1	
	SILT	Location: Percy Lake Dam Access Road	
	some Sand trace Clay	Date: February 13,2018	**Moisture Content 34.1%**

SNC-LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Course	Fine	Course	Medium	Fine	Silt	Clay
	0	0	1	4	25	67	4

SNC-LAVALIN 1164 Clyde Court Kingston, Ontario K7P 2E4	**GRAIN SIZE DISTRIBUTION**	Client: Ainley	
		Project: 17555-1	
	SILT	Location: Percy Lake Dam Access Road	
	With Sand trace Clay	Date: February 13,2018	**Moisture Content 34.1%**