Ainley GROUP CONSULTING ENGINEERS PLANNERS

Ainley Graham & Associates Limited
1-50 Grant Timmins Drive, Kingston, Ontario K7M 8N2
Tel: (343) 266--0002 ▪ Fax: (343) 266-0028
E-mail kingston@ainleygroup.com

January 15, 2018

AG File No. 15550-2

Public Works Government Canada
4900 Yonge Street, 12th Floor
Toronto, Ontario
M2N 6A6

Att: **Luc Beriault, Project Manager**

Ref: **Little Brother Dam Access Road – Final Geotechnical Report**
Project No. R.076951065

Dear Luc:

Further to your request, we are pleased to present you with the Final Geotechnical Investigation Report for the above noted assignment. Please find attached to this cover letter the following:

- One (1) hard copy of the Finla Geotechnical Investigation Report
- One (1) digital PDF copy of the Final Geotechnical Investigation Report

We trust the attached information meets your needs and please do not hesitate to contact our office should you have any questions or concerns.

Yours very truly,
AINLEY GRAHAM & ASSOCIATES LIMITED

Lois-Ann Hayes

Lois-Ann Hayes, P.Eng.
Branch Manager

1-50 Grant Timmins Drive
Kingston, Ontario
K7M 8N2
Tel: (343) 266-0002
Fax: (343) 266-0028

FINAL GEOTECHNICAL REPORT

Little Brother Dam Access Road
R.076951065

1169 Road 13,
Algonquin Highlands,
Ontario

Public Works Government Canada

A/G Project 15550-2
January, 2018

Submitted To:
Public Works Government Canada
4900 Yonge Street, 12th Floor
Toronto, Ontario
M2N 6A6

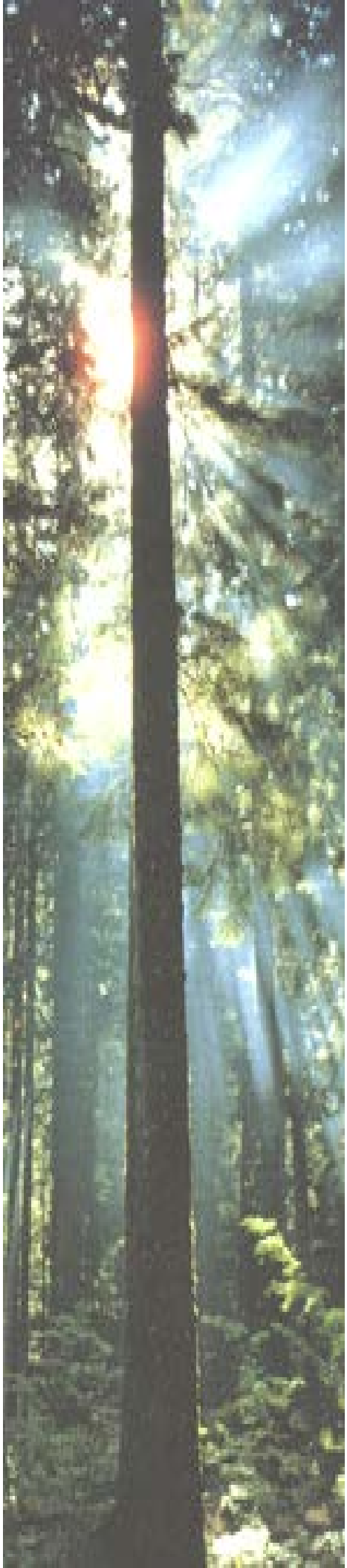


TABLE OF CONTENTS

PAGE NO.

FIGURES

APPENDICES

1.0 INTRODUCTION

Ainley Group (Ainley) was retained by Public Works Government Services Canada (PWGSC), to carry out geotechnical consulting services in support of the design and upgrade to the current access road to support future rehabilitation works at the Little Brother Dam location.

The objectives of the geotechnical assignment were:

- To secure soils and groundwater information/data along the current access road that could affect the design, including the effects that the soil and groundwater may have on construction procedures.
- To determine the physical properties of the soil along the current access road.
- 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 at 1169 Road 13, Algonquin Highlands, Ontario and is bound by Little Hawk Lake to the north, Road 13 to the south and neighboring residential properties to both the east and west. The existing access road is infrequently maintained and is used for light duty vehicles for maintenance and operational use of the dam. The road is also used as a snowmobile trail in the winter. There are several corrugated steel culverts throughout the access road to assist with site drainage ranging in size from 150 mm to 400 mm.

The site is heavily treed with steep varying elevations with bedrock exposed at times. Drainage for the overall site appears to be towards the south in the direction of Halls Lake with a shallow creek running along the west side of the property from the Little Brother Dam to Halls Lake. During the site investigation ponding water was noted crossing the roadway at Station 0+060 and beside the roadway at multiple other locations.

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 thirty-five (35) boreholes (BH Nos. 1 to 35) to investigate sub-surface conditions. Borehole Nos. BH1 to BH17 and BH32 to BH35 were completed along the existing access road with BH18 to BH31 completed along the newly proposed alignment. 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 borehole program was completed on October 31 and November 1, 2017. All drilling was completed under the constant supervision of a qualified member of Ainley's geotechnical team.

A Site and Borehole Location Plan showing borehole location is attached to this report as **Figure No. 1**.

The boreholes were advanced at approximately 50 m spacing along the existing alignment and approximately 25 m along the proposed alignment. Boreholes were advanced to depths ranging from 0.1 m to 2.7 m below existing ground surface. The boreholes were advanced by means of a track-mounted CME-55 drill rig equipped for soil sampling.

The location and ground surface elevations at each respective borehole location were surveyed using a Sokkia SRX3 Robotic Total Station with real time sub-centimeter accuracy, and referenced to the MTM Geodetic Coordinate system.

4.0 RESULTS OF THE INVESTIGATION

4.1 Sub-Surface Conditions

Full details of the subsurface conditions encountered at the borehole locations are presented on the individual borehole 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 boreholes 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 boreholes completed along the newly proposed alignment, BH18 to BH31. Topsoil was not encountered in any of the remaining boreholes. The topsoil layer thickness was found to range between 0.1 m to 1.0 m.

4.1.2 Sand

A surficial layer of sand with varying amounts of silt, gravel and cobbles was encountered in all boreholes completed along the existing trail alignment, BH1 to BH17 and BH32 to BH35. The sand with varying amounts of silt, gravel and cobbles was found to be in a loose state of consistency, but becoming compact with depth, at the time of the field investigation. This sand layer extended to depths ranging from 0.45 to 1.2 m below existing site grades with and average thickness of approximately 0.78 m.

Three (3) representative samples of the sand with varying amounts of silt, gravel and cobbles was submitted for gradation and moisture content determination. The percentage of material passing the 4.75 mm and 75 µm sieves was found to range from 54.5 to 98.6 and 6.9 to 30.2 respectively. The moisture content was found to range from 6.4 to 17.3% at the time of the site investigation. The material is slightly fine in accordance OPSS 1010 in regards to Select Subgrade specification.

4.1.3 Sand and Silt

A layer of sand and silt with varying amounts of gravel and clay was encountered in all boreholes with exception to BH1 to BH5, BH8, BH14, BH15 and BH18. The sand and silt with varying amounts of gravel and clay material was encountered immediately underlying the peat layer in BH6 and BH7, and immediately underlying the topsoil layer in BH19 to BH22, BH26 to BH31, and immediately underlying the sand layer in BH9 to BH13, BH16, BH17, BH32 to BH35. The sand and silt with varying amounts of gravel and clay was found to be in a compact state of consistency at the time of the field investigation except in BH19 and BH30 where it was loose. The sand fill extended to depths ranging from 0.75 m to 2.7 m below existing site grades with an average thickness of approximately 0.52 m.

Seven (7) representative samples of the sand and silt with varying amounts of gravel and clay were submitted for gradation and moisture content determination. The material was generally found to have a Low Susceptibility to Frost Heaving (LSFH) with exception to the soils encountered in BH7, BH26 and BH35. The soil material within these three boreholes was found to have a Medium Susceptibility to Frost Heaving (MSFH). The moisture contents were found to range from 7.3 - 28.1 % at the time of the site investigation.

4.1.4 Peat

A layer of peat was found underlying the sand with varying amounts of silt, gravel and cobble material within BH5, BH6 and BH7. The peat was encountered at a depth of 0.62 m to 1.2 m below existing site grades. The peat thickness was found to range between 0.32 m to 1.0 m. The sand and silt with varying amounts of clay and gravel layer was found directly beneath the peat layer.

4.1.5 Bedrock

Refusal to advance the soils equipment on the inferred bedrock surface was encountered within all boreholes with exception to BH5, BH10 and BH35 at depths (elevations) ranging from surface to 2.7 m (334.74 masl to 365.86 masl) below existing grade.

4.1.6 Groundwater

Groundwater infiltration was encountered at the time of the field investigation within all boreholes except BH1, BH8, BH10, BH14, BH15, BH16, BH18, BH25, BH29, BH31, BH32 at depths (elevations) ranging from surface to 1.2 m below existing site grades (334.89 m to 365.96 m).

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 2000 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 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.

Where peat was encountered (Station 0+220± to Station 0+275±) it is recommended that the pavement structure consist of the following:

150 mm	Granular ‘A’, over
300 mm	Granuar ‘B’ Type I, over
	Existing sand with silt subgrade

Prior to placing the Granular ‘B’ Type I it is recommended that the existing sand with silt subgrade be overlaid with a geotextile from Station 0+200± to Station 0+280± in accordance

with the manufacturers specifications. It is recommended that a Mirafi HP270 or equivalent be placed.

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 topsoil stripping depth of 300 mm may be assumed for this project.

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 fill and 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 fill and native materials encountered across the site are considered suitable for reuse as subgrade material below paved areas or in trenches. 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.
Branch Manager

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.

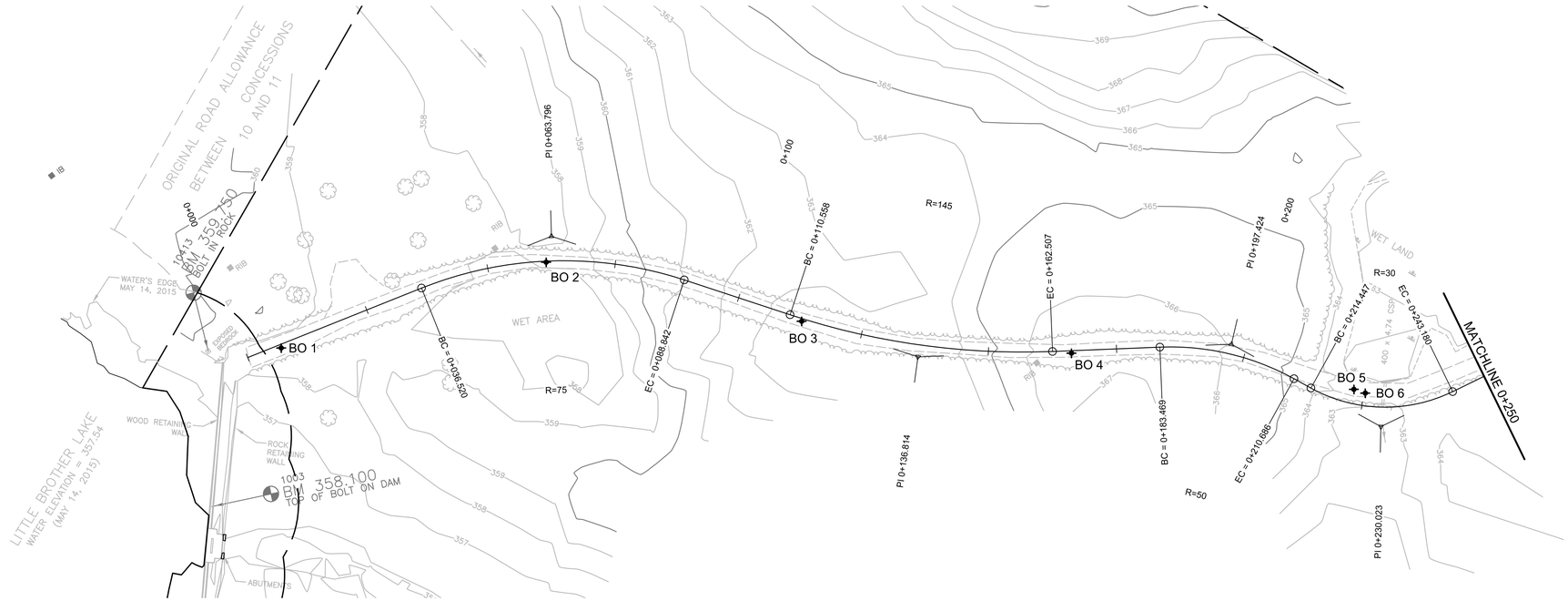
This report has been prepared for design purposes, for the sole use of PWGSC. Any uses, which a Third Party makes of this report, or any reliance or decisions to be made based on it, are the responsibilities of said Third Parties. Ainley Group accepts no responsibility for damages if any, suffered by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

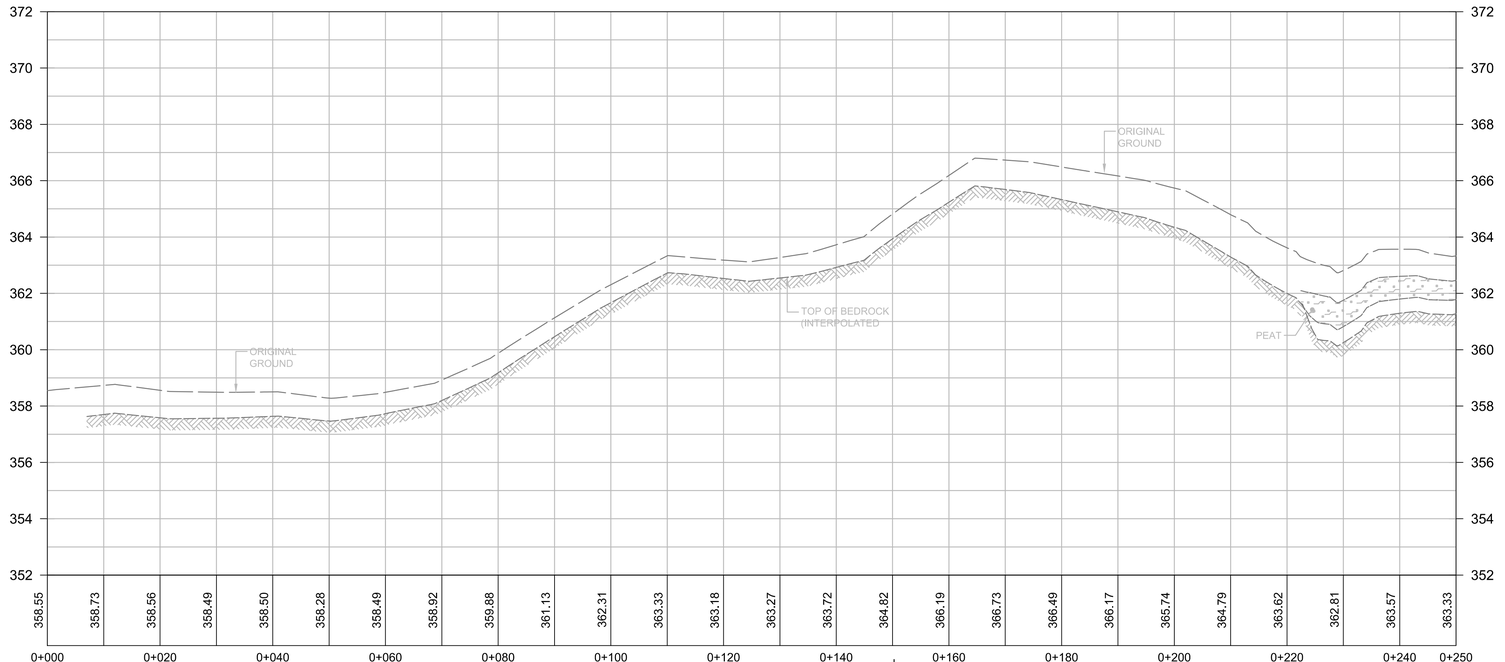
Figure No. 1

Site and Borehole Location Plan

04 11

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres





SCALE

5m 0 10m Horizontal

0.5m 0 2m Vertical

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
MINDEN ONTARIO
PARKS CANADA AGENCY
TWP. OF ALGONQUIN HIGHLANDS
COUNTY OF HALIBURTON
LITTLE BROTHER DAM ACCESS ROAD

drawing title / titre du dessin
BOREHOLE LOCATIONS
STA. 0+000 TO 0+250

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: 2017/11

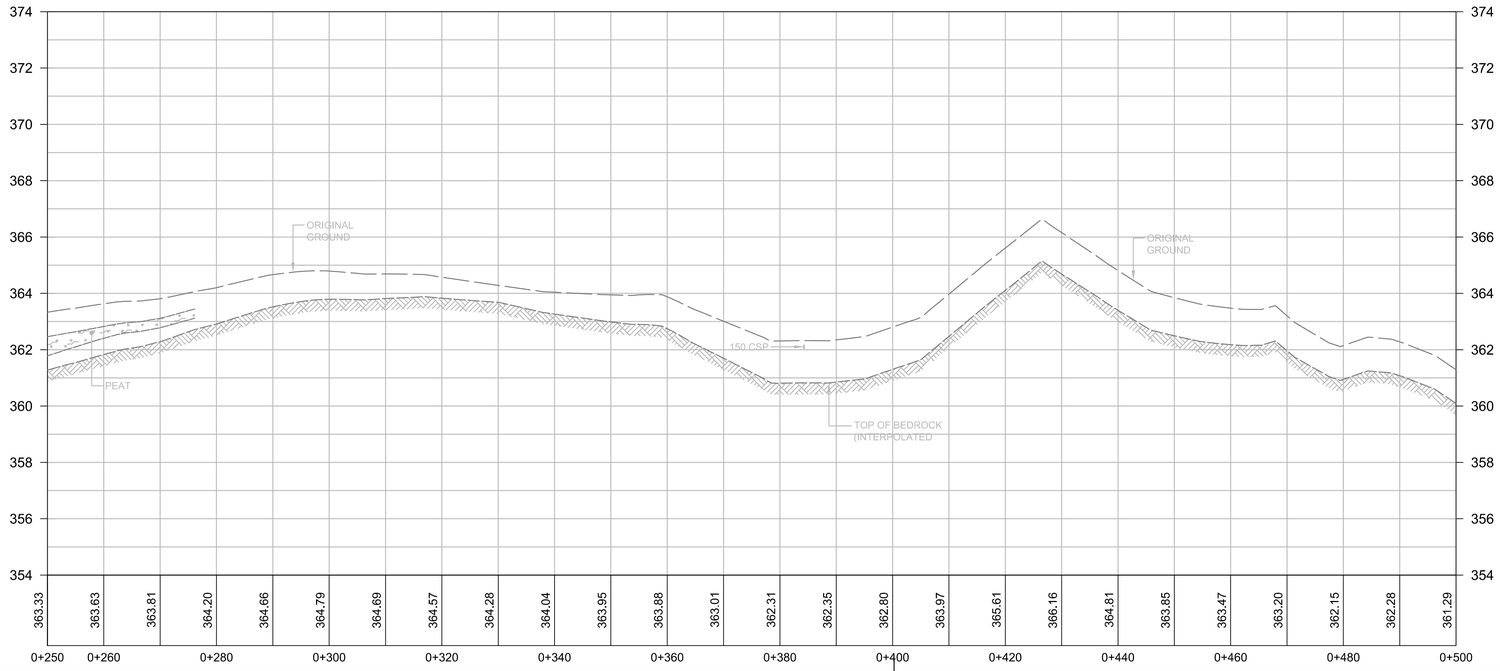
project no. / no. du projet: R0.76951.065

drawing no. / dessine no.: 1

GSC-A1 DATE PLOTTED: 2018/01/11 PLOT SCALE: 1:0.0394 CAD FILE: V:\15550-2 Little Brother Dam Access Road Design\Drawings_civil\Exhibits\15550-2 Borehole Locations.dwg

04 11

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres



SCALE
5m 0 10m
Horizontal
0.5m 0 2m
Vertical

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
MINDEN ONTARIO
PARKS CANADA AGENCY
TWP. OF ALGONQUIN HIGHLANDS
COUNTY OF HALIBURTON
LITTLE BROTHER DAM ACCESS ROAD

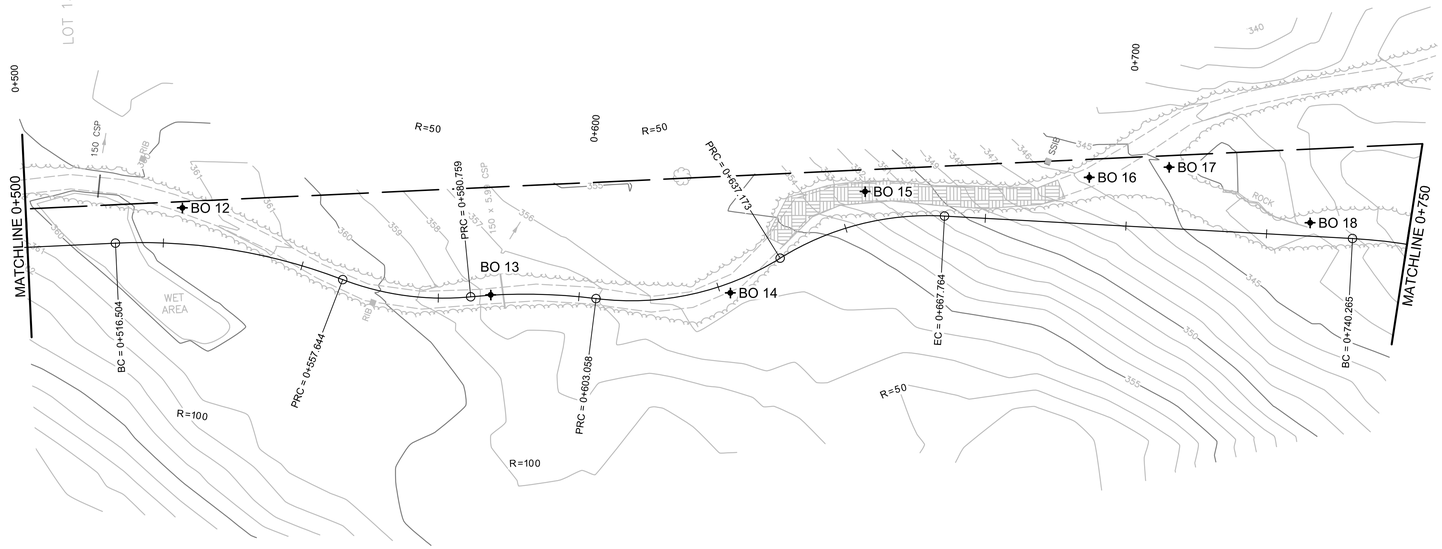
drawing title / titre du dessin
BOREHOLE LOCATIONS
STA. 0+250 TO 0+500

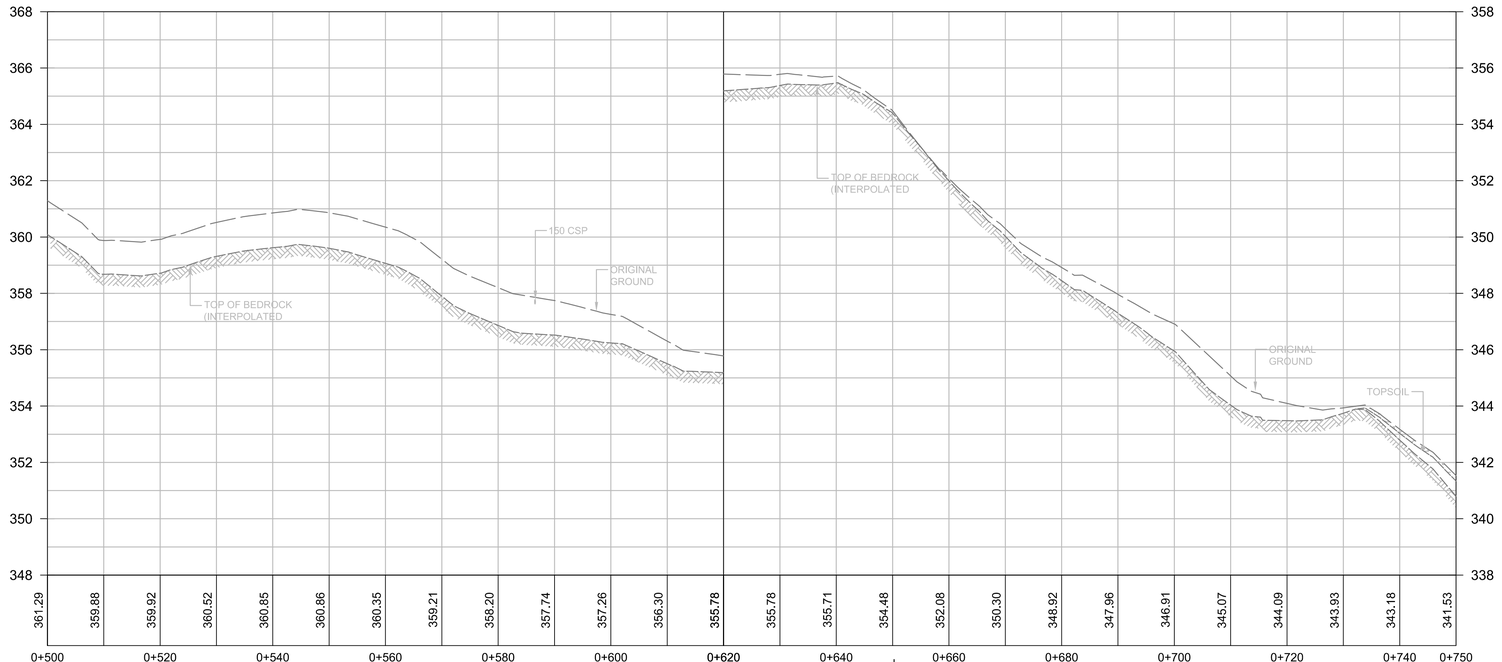
drawn by / dessine par: A.C.
designed by / conc par:
approved by / approuve par:
tender / soumission
project manager / administrateur de projets
project date / date du projet: 2017/11
project no. / no. du projet: R0.76951.065
drawing no. / dessine no.: 2

GSC-A1 DATE PLOTTED: 2018/01/11 PLOT SCALE: 1:0.0394 CAD FILE: V:\15550-2 Little Brother Dam Access Road Design\Drawings_civil\Exhibits\15550-2 Borehole Locations.dwg

04 11

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres





SCALE
5m 0 10m
Horizontal
0.5m 0 2m
Vertical

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
MINDEN ONTARIO
PARKS CANADA AGENCY
TWP. OF ALGONQUIN HIGHLANDS
COUNTY OF HALIBURTON
LITTLE BROTHER DAM ACCESS ROAD

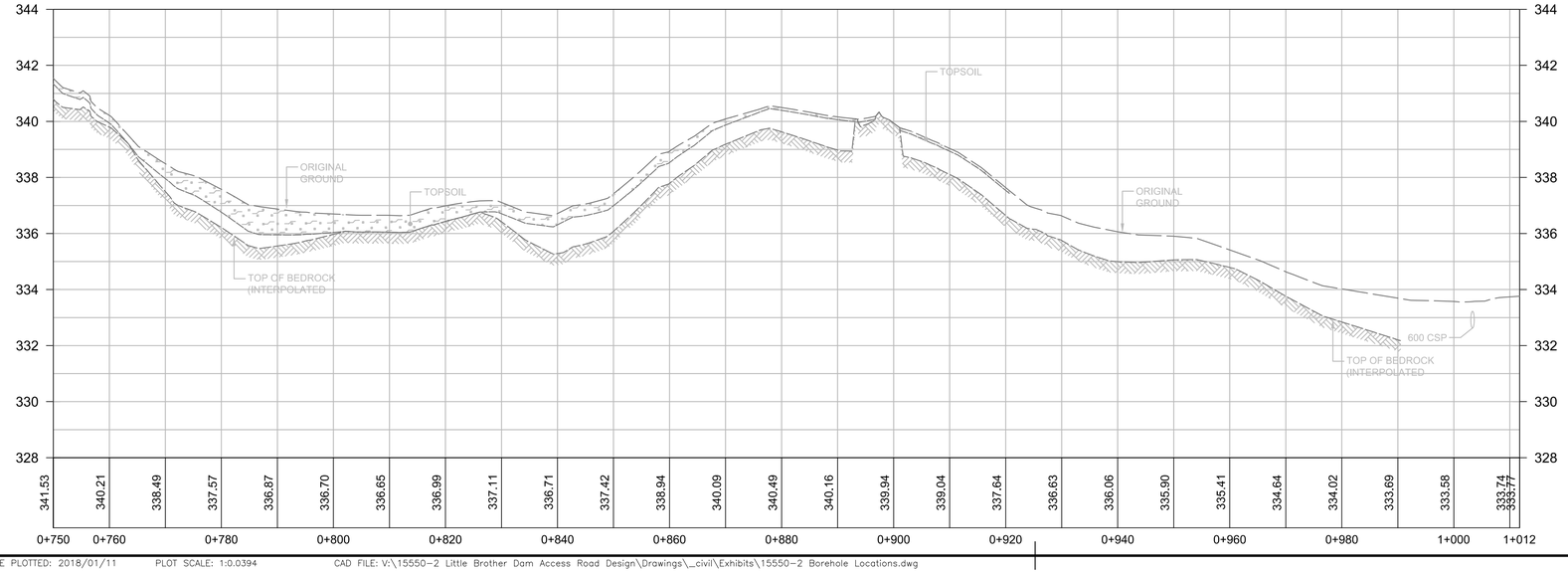
drawing title
titre du dessin
BOREHOLE LOCATIONS
STA. 0+500 TO 0+750

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: 2017/11
project no. / no. du projet: R0.76951.065
drawing no. / dessine no.: 3

GSC-A1 DATE PLOTTED: 2018/01/11 PLOT SCALE: 1:0.0394 CAD FILE: V:\15550-2 Little Brother Dam Access Road Design\Drawings_civil\Exhibits\15550-2 Borehole Locations.dwg

04 11

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres



SCALE

5m 0 10m
Horizontal

0.5m 0 2m
Vertical

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
MINDEN ONTARIO
PARKS CANADA AGENCY
TWP. OF ALGONQUIN HIGHLANDS
COUNTY OF HALIBURTON
LITTLE BROTHER DAM ACCESS ROAD

drawing title
titre du dessin
BOREHOLE LOCATIONS
STA. 0+750 TO 1+012

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: 2017/11
project no. / no. du projet: R0.76951.065
drawing no. / dessine no.: 4

GSC-A1 DATE PLOTTED: 2018/01/11 PLOT SCALE: 1:0.0394 CAD FILE: V:\15550-2 Little Brother Dam Access Road Design\Drawings_civil\Exhibits\15550-2 Borehole Locations.dwg

Appendix A

Borehole Logs

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

Log of Borehole: BH1

Project No.: *R.076951065*

Project: *Little Brother Dam Access Rd*

Client: *PWGSC/Parks Canada*

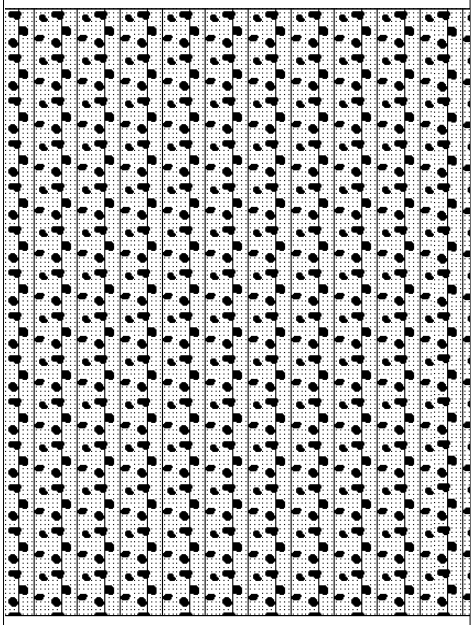
Location: 676216.6 E 4999946.0 N

Location Cont: 0+006.8 0.7 m Rt

Ground Elevation (masl): 358.82

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				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.35 m, brown. % Passing JC001 4.75 mm = 83.2 75 um = 26.4 Moisture Content = 9.0 %	JC001	G		
1 / 1	1.05	***End of Borehole at 1.05 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was not encountered during the borehole investigation.				

Drilled By: *G.E.T Drilling Ltd.*

Drill Method: *Track Mounted CME 55*

Drill Date: *October 31 - November 1, 2017*

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 Borehole: BH2

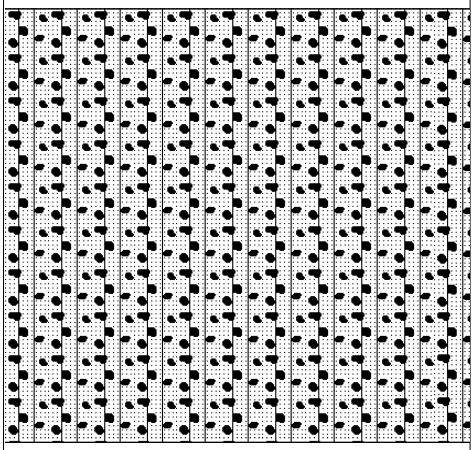
Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 358.54

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 357.94

Location: 676267.9 E 4999928.0 N ***Depth to Water (m):*** 0.6

Location Cont: 0+061.5 0.2 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.35 m, brown.			▼	
	0.75	***End of Borehole at 0.75 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was encountered at 0.6 m below existing site grades during the borehole investigation.				
1 / 1						
2						
3						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH3

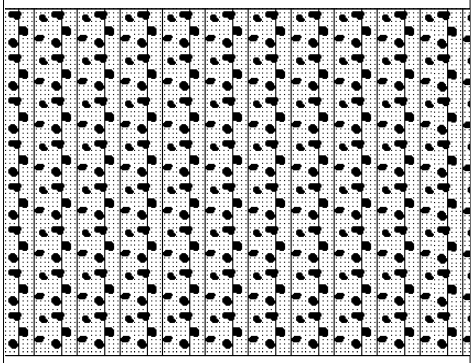
Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 363.34

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 362.74

Location: 676300.7 E 4999889.0 N ***Depth to Water (m):*** 0.6

Location Cont: 0+113.1 0.5 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.35 m, brown.	JC002	G	▼	
2	0.60	***End of Borehole at 0.60 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was encountered at 0.6 m below existing site grades during the borehole investigation.				
1						
3						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH4

Project No.: *R.076951065*

Project: *Little Brother Dam Access Rd*

Client: *PWGSC/Parks Canada*

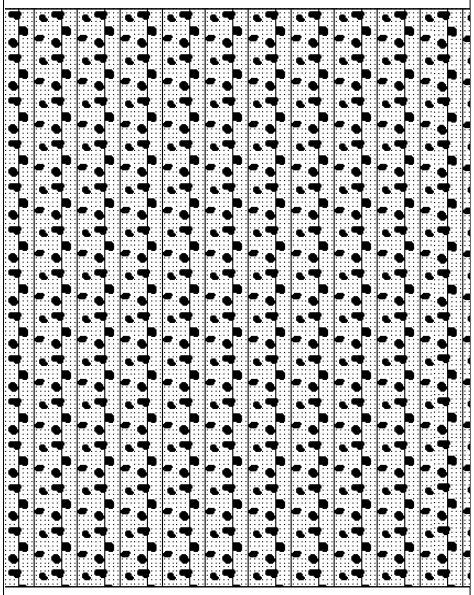
Location: 676339.0 E 4999853.0 N

Location Cont: 0+116.2 0.5 m Rt

Ground Elevation (masl): 366.85

Water Elevation (masl): 365.95

Depth to Water (m): 0.9

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.40 m, brown.			▼	
3 / 1	1.00	***End of Borehole at 1.00 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was encountered at 0.9 m below existing site grades during the borehole investigation.				
6						

Drilled By: *G.E.T Drilling Ltd.*

Drill Method: *Track Mounted CME 55*

Drill Date: *October 31 - November 1, 2017*

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 Borehole: BH5

Project No.: *R.076951065*

Project: *Little Brother Dam Access Rd*

Client: *PWGSC/Parks Canada*

Location: 676378.6 E 4999814.0 N

Location Cont: 0+222.8 2.8 m Lt

Ground Elevation (masl): 363.51

Water Elevation (masl): 362.51

Depth to Water (m): 1.0

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.60 m, brown.			▼	
4 / 1	1.20	***Peat***				
5 / 1	1.65	***End of Borehole at 1.65 m below existing site grades upon refusal on Cobbles.*** Note: Groundwater infiltration was encountered at 1.0 m below existing site grades during the borehole investigation.				
7 / 2						

Drilled By: *G.E.T Drilling Ltd.*

Drill Method: *Track Mounted CME 55*

Drill Date: *October 31 - November 1, 2017*

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 Borehole: BH6

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 363.41

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 362.51

Location: 676380.0 E 4999812.0 N ***Depth to Water (m):*** 0.9

Location Cont: 0+225.3 2.5 m Lt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.60 m, brown.			▼	
3 / 1	1.10					
		Peat				
6 / 2	2.10					
		Silt and Sand Silt and sand, trace of clay and gravel, compact, grey.				
8 / 2.5	2.70					
9 / 3		***End of Borehole at 2.7 m below existing site grades upon inferred Bedrock.*** Note: Groundwater infiltration was encountered at 0.9 m below existing site grades during the borehole investigation.				
11						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH7

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 363.99

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 363.09

Location: 676422.2 E 4999788.0 N ***Depth to Water (m):*** 0.9

Location Cont: 0+276.1 0.1 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose, brown.				
	0.62					
		Peat				
	0.94				▼	
1		***Sand and Silt*** Sand and silt, trace of clay, compact, brown. % Passing JC003 4.75 mm = 100.0 75 um = 51.0 5 um = 11.0 MSFH 2 um = 5.0 Moisture Content = 24.6%	JC003	G		
	1.35					
		End of Borehole at 1.35 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was encountered at 0.9 m below existing site grades during the borehole investigation.				

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH8

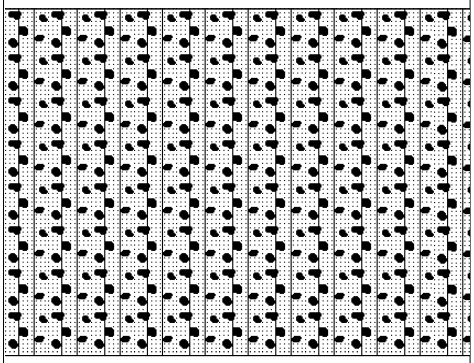
Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 364.23

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** NA

Location: 676427.1 E 4999736.0 N ***Depth to Water (m):*** NA

Location Cont: 0+330.7 0.5 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose becoming compact at 0.35 m, brown.				
	0.60	***End of Borehole at 0.6 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was not encountered during the borehole investigation.				
1 / 1						
2						
3						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH9

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 362.34

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 361.14

Location: 676425.9 E 4999689.0 N ***Depth to Water (m):*** 1.2

Location Cont: 0+379.2 1.2 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles and wood, loose becoming compact at 0.40 m, brown.				
2	0.65					
		Sand with Silt Sand with silt, some gravel, trace of cobbles, compact, brown.				
4 / 1	1.20				▼	
		Sand and Silt Sand and silt, trace of clay, compact, brown.				
5	1.50					
		End of Borehole at 1.5 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was encountered at 1.20 m below existing site grades during the borehole investigation.				
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH10

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 366.41

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** NA

Location: 676465.9 E 4999668.0 N ***Depth to Water (m):*** NA

Location Cont: 0+424.6 0.3 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose, brown.				
2	0.60					
		Silty Sand Silty sand, trace of gravel, compact, grey. % Passing JC004 4.75 mm = 93.5 75 um = 30.1 Moisture Content = 9.5%	JC004	G		
5 / 1	1.50					
		End of Borehole at 1.5 m below existing site grades. Note: Groundwater infiltration was not encountered during the borehole investigation.				
10 / 3						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH11

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 361.57

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 360.37

Location: 676504.1 E 4999634.0 N ***Depth to Water (m):*** 1.2

Location Cont: 0+475.9 4.7 m Lt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose, brown.				
	1.00				▼	
1		***Sand and Gravel*** Sand and gravel, trace of silt and cobbles, compact, red.				
	1.20					
4		***End of Borehole at 1.20 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was encountered at 1.0 m below existing site grades during the borehole investigation.				
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH12

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 360.59

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 359.59

Location: 676525.0 E 4999585.0 N ***Depth to Water (m):*** 1.0

Location Cont: 0+528.0 6.4 m Lt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose, brown.				
	1.00				▼	
1		***Sand and Gravel*** Sand and gravel, trace of silt and cobbles, compact, red.				
	1.20					
2		***End of Borehole at 1.20 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was encountered at 1.0 m below existing site grades during the borehole investigation.				
3						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH13

Project No.: *R.076951065*

Project: *Little Brother Dam Access Rd*

Client: *PWGSC/Parks Canada*

Location: 676528.9 E 4999528.0 N

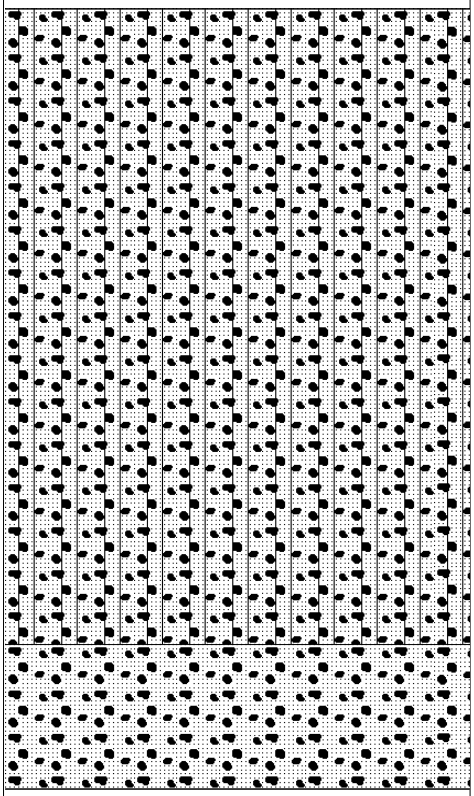
Location Cont: 0+584.3 0.1 m Lt

Ground Elevation (masl): 357.87

Water Elevation (masl): 356.77

Depth to Water (m): 1.1

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand with Silt Sand with silt, some gravel, trace of cobbles, loose, brown.				
1 / 1	1.10				▼	
		Sand and Gravel Sand and gravel, trace of silt and cobbles, compact, red.	JC005	G		
4	1.35					
		End of Borehole at 1.35 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was encountered at 1.10 m below site grades during the borehole investigation.				
5						
6						



Drilled By: *G.E.T Drilling Ltd.*

Drill Method: *Track Mounted CME 55*

Drill Date: *October 31 - November 1, 2017*

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 Borehole: BH14

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd***

Client: ***PWGSC/Parks Canada***

Location: 676543.6 E 4999489.0 N

Location Cont: 0+626.7 1.7 m Rt

Ground Elevation (masl): 355.88

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				
		Sand and Gravel Sand and gravel, trace of cobbles, loose, brown. % Passing JC006 4.75 mm = 54.5 75 um = 6.9 Moisture Content = 6.4%	JC006	G		
1	0.45					
		End of Borehole at 0.45 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was not encountered during the borehole investigation.				
2						
3 / 1						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.***

Drill Method: ***Track Mounted CME 55***

Drill Date: ***October 31 - November 1, 2017***

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 Borehole: BH15

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 351.97

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** NA

Location: 676568.6 E 4999472.0 N ***Depth to Water (m):*** NA

Location Cont: 0+654.7 5.5 m Lt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Bedrock at surface. Borehole not completed. Note: Groundwater infiltration was not encountered during the borehole investigation.				
1						
2						
3 / 1						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH16

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd***

Client: ***PWGSC/Parks Canada***

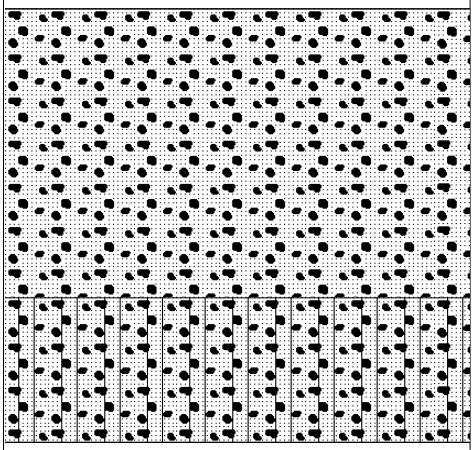
Location: 676584.4 E 4999436.0 N

Location Cont: 0+693.0 8.3 m Lt

Ground Elevation (masl): 345.70

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				
		Sand and Gravel Sand and gravel, trace of cobbles, loose, brown.				
	0.50					
		Silty Sand Silty sand, some gravel, loose, brown.				
	0.75					
1		***End of Borehole at 0.75 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was not encountered during the borehole investigation.				
2						
3						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.***

Drill Method: ***Track Mounted CME 55***

Drill Date: ***October 31 - November 1, 2017***

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 Borehole: BH17

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 344.89

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 343.99

Location: 676590.9 E 4999423.0 N ***Depth to Water (m):*** 0.9

Location Cont: 0+707.1 10.9 m Lt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Sand and Gravel Sand and gravel, trace of cobbles, loose, brown.				
	0.60					
2		***Silty Sand*** Silty sand, some gravel, trace of silt and cobbles, compact, brown. % Passing JC007 4.75 mm = 87.8 75 um = 32.2 Moisture Content = 17.9%	JC007	G	▼	
3 / 1	1.20					
4		***End of Borehole at 1.20 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was encountered at 0.9 m below site grades during the borehole investigation.				
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH18

Project No.: ***R.076951065***

Project: Little Brother Dam Access Rd ***Ground Elevation (masl):*** 343.85

Client: PWGSC/Parks Canada ***Water Elevation (masl):*** 343.85

Location: 676590.0 E 4999396.0 N ***Depth to Water (m):*** Surface

Location Cont: 0+732.6 2.4 m Lt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface			▼	
	0.10	***Topsoil*** Sandy silt, trace of clay and rootlets, loose, brown.				
1		***End of Borehole at 0.10 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was encountered at surface during the borehole investigation.				
2						
3 / 1						
4						
5						
6						

Drilled By: G.E.T Drilling Ltd. ***Project Engineer: Lois-Ann Hayes, P.Eng***

Drill Method: Track Mounted CME 55 ***Project Technician: Joshua Charlton***

Drill Date: October 31 - November 1, 2017 ***Sheet:*** 1 of 1

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

Log of Borehole: BH19

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 341.37

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 341.37

Location: 676595.8 E 4999378.0 N ***Depth to Water (m):*** Surface

Location Cont: 0+751.1 3.5 m Lt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface			▼	
	0.20	***Topsoil*** Sandy silt, trace of clay and rootlets, loose, brown.				
1		***Sand some Gravel*** Sand some gravel and silt, trace of cobbles, loose, wet, brown.				
2	0.75					
3 / 1		***End of Borehole at 0.75 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was encountered at surface during the borehole investigation.				
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH20

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 339.94

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 339.94

Location: 676591.3 E 4999365.0 N ***Depth to Water (m):*** Surface

Location Cont: 0+763.0 2.5 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface			▼	
		Topsoil Sandy silt, trace of clay and rootlets, loose, brown.				
1	0.30	***End of Borehole Log at 0.30 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was encountered at surface during the borehole investigation.				
2						
3 / 1						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH21

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 338.13

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 336.93

Location: 676593.0 E 4999357.0 N ***Depth to Water (m):*** 1.2

Location Cont: 0+771.9 1.1 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Topsoil Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
	0.60					
		Sand Sand with silt, trace of gravel, compact, brown. % Passing JC008 4.75 mm = 99.9 75 um = 24.4 Moisture Content = 28.1%	JC008	G	▼	
1	1.20					
		End of Borehole at 1.20 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was encountered at 1.20 m below existing site grades during the borehole investigation.				

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH22

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 336.82

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 335.82

Location: 676610.8 E 4999334.0 N ***Depth to Water (m):*** 1.0

Location Cont: 0+802.2 3.4 m Lt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Topsoil Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
	1.00				▼	
		Sand Sand with silt, trace of gravel, compact, brown.				
	1.50					
		End of Borehole at 1.50 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was encountered at 1.00 m below existing site grades during the borehole investigation.				

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH23

Project No.: *R.076951065*

Project: *Little Brother Dam Access Rd*

Client: *PWGSC/Parks Canada*

Location: 676623.5 E 4999322.0 N

Location Cont: 0+816.9 7.0 m Lt

Ground Elevation (masl): 337.63

Water Elevation (masl): 337.18

Depth to Water (m): 0.45

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Topsoil Sandy silt, trace of clay, cobbles and rootlets, loose, brown.			▼	
	0.60					
		End of Borehole at 0.60 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was encountered at 0.45 m below existing site grades during the borehole investigation.				
1 / 1						
2						
3						
4						
5						
6						

Drilled By: *G.E.T Drilling Ltd.*

Drill Method: *Track Mounted CME 55*

Drill Date: *October 31 - November 1, 2017*

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 Borehole: BH24

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 337.16

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** NA

Location: 676624.2 E 4999309.0 N ***Depth to Water (m):*** NA

Location Cont: 0+827.5 5.1 m Lt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Topsoil Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
	0.60	***End of Borehole at 0.60 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was not encountered during the borehole investigation.				
1 / 1						
2						
3						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH25

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd***

Client: ***PWGSC/Parks Canada***

Location: 676616.2 E 4999296.0 N

Location Cont: 0+841.0 0.8 m Rt

Ground Elevation (masl): 336.63

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 Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
1	0.40					
		End of Borehole at 0.40 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was not encountered during the borehole investigation.				
2						
3 / 1						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.***

Drill Method: ***Track Mounted CME 55***

Drill Date: ***October 31 - November 1, 2017***

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 Borehole: BH26

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 338.59

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 337.74

Location: 676616.5 E 4999279.0 N ***Depth to Water (m):*** 0.85

Location Cont: 0+857.5 0.3 m Lt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Topsoil Sandy silt, trace of clay, cobbles and organincs, loose, brown.				
1	0.40					
		Sandy Silt Sandy silt, trace of clay, cobbles and organincs, loose, brown. % Passing JC009 4.75 mm = 100.0 75 um = 66.0 5 um = 14.0 MSFH 2 um = 7.0 Moisture Content = 24.6%	JC009	G	▼	
2 / 1						
3	1.20					
		Till Sand with silt, some gravel, compact, brown.				
4	1.50					
		End of Borehole at 1.5 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was encountered at 0.85 m below existing site grades during the borehole investigation.				
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH27

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 340.49

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 339.39

Location: 676624.1 E 4999262.0 N ***Depth to Water (m):*** 1.1

Location Cont: 0+876.3 0.4 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Topsoil Sandy sily, trace of clay cobbles and rootlets, loose, brown.				
1	0.45					
		Till Sand with silt, some gravel, compact, brown. % Passing JC010 4.75 mm = 85.3 75 um = 21.2 Moisture Content = 13.9%	JC010	G	▼	
2 / 3 / 1	1.20					
4		***End of Borehole at 1.2 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was encountered at 1.10 m below existing site grades during the borehole investigation.				
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH28

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 340.11

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** 339.51

Location: 676632.1 E 4999250.0 N ***Depth to Water (m):*** 0.6

Location Cont: 0+890.6 0.7 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
	0.10	***Topsoil*** Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
1		***Till*** Sand with silt, some gravel, loose becoming compact at 0.6 m, brown.			▼	
2	0.75					
3 / 1		***End of Borehole at 0.75 m below existing site grades upon inferred bedrock.*** Note: Groundwater infiltration was encountered at 0.6 m below existing site grades during the borehole investigation.				
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH29

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd***

Client: ***PWGSC/Parks Canada***

Location: 676642.9 E 4999240.0 N

Location Cont: 0+905.5 0.4 m Lt

Ground Elevation (masl): 339.47

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				
	0.10	***Topsoil*** Sandy silt, trace of clay cobbles and rootlets, loose, brown.				
1		***Till*** Sand with silt, some gravel, loose becoming compact at 0.6 m, brown.				
2						
3 / 1	1.00					
		Weathered Bedrock				
4	1.20	***End of Borehole at 1.20 m below existing site grades within inferred bedrock.*** Note: Groundwater infiltration was not encountered during the borehole investigation.				
5						
6						

Drilled By: ***G.E.T Drilling Ltd.***

Drill Method: ***Track Mounted CME 55***

Drill Date: ***October 31 - November 1, 2017***

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 Borehole: BH30

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd***

Client: ***PWGSC/Parks Canada***

Location: 676652.8 E 4999229.0 N

Location Cont: 0+920.6 0.6 m Lt

Ground Elevation (masl): 337.43

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				
	0.10	***Topsoil*** Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
1		***Till*** Sand with silt, some gravel, loose, brown.	JC011	G		
2						
	0.90					
3 / 1		***End of Borehole at 0.90 m below existing site grades within inferred bedrock.*** Note: Groundwater infiltration was not encountered during the borehole investigation.				
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.***

Drill Method: ***Track Mounted CME 55***

Drill Date: ***October 31 - November 1, 2017***

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 Borehole: BH31

Project No.: ***R.076951065***

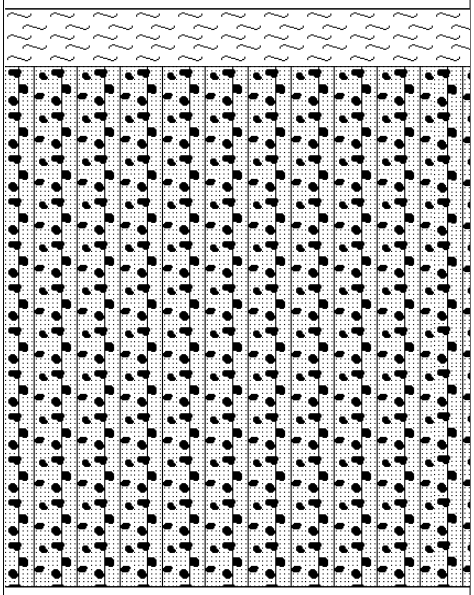
Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 336.90

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** NA

Location: 676658.3 E 4999226.0 N ***Depth to Water (m):*** NA

Location Cont: 0+924.9 4.3 m Lt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
	0.10	***Topsoil*** Sandy silt, trace of clay, cobbles and rootlets, loose, brown.				
1		***Till*** Sand with silt, some gravel, loose becoming compact at 0.45 m, brown.				
2						
3 / 1	1.00	***End of Borehole at 1.00 m below existing site grades within inferred bedrock.*** Note: Groundwater infiltration was not encountered during the borehole investigation.				
4						
5						
6						



Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH32

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 336.08

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** NA

Location: 676657.4 E 4999211.0 N ***Depth to Water (m):*** NA

Location Cont: 0+938.5 0.0 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Silty Sand Silty sand, trace of gravel and cobbles, loose, brown.	JC012	G		
1	0.50					
		Silt and Sand Silt and sand, trace of clay and gravel, compact, brown.	JC013	G		
2	0.75					
		End of Borehole at 0.75 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was not encountered during the borehole investigation.				
3 / 1						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

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

Log of Borehole: BH33

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd***

Client: ***PWGSC/Parks Canada***

Location: 676662.5 E 4999190.0 N

Location Cont: 0+961.0 0.2 m Rt

Ground Elevation (masl): 335.24

Water Elevation (masl): 334.14

Depth to Water (m): 1.1

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Silty Sand Silty sand, trace of gravel and cobbles, loose, brown.				
2	0.65					
		Silt and Sand Silt and sand, trace of gravel and clay, compact, brown.				
3 / 1	1.10				▼	
		End of Borehole at 1.10 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was encountered at 1.10 m below site grades during the borehole investigation.				
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.***

Drill Method: ***Track Mounted CME 55***

Drill Date: ***October 31 - November 1, 2017***

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 Borehole: BH34

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd***

Client: ***PWGSC/Parks Canada***

Location: 676672.8 E 4999162.0 N

Location Cont: 0+990.5 0.1 m Rt

Ground Elevation (masl): 333.54

Water Elevation (masl): 333.09

Depth to Water (m): 0.45

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Silty Sand Silty sand, trace of gravel and cobbles, loose, brown.				
1	0.45				▼	
		Silt and Sand Silt and sand, trace of gravel and clay, compact, brown.				
2	0.60					
		End of Borehole at 0.60 m below existing site grades upon inferred bedrock. Note: Groundwater infiltration was encountered at 0.45 m below site grades during the borehole investigation.				
3 / 1						
4						
5						
6						

Drilled By: ***G.E.T Drilling Ltd.***

Drill Method: ***Track Mounted CME 55***

Drill Date: ***October 31 - November 1, 2017***

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 Borehole: BH35

Project No.: ***R.076951065***

Project: ***Little Brother Dam Access Rd*** ***Ground Elevation (masl):*** 333.54

Client: ***PWGSC/Parks Canada*** ***Water Elevation (masl):*** NA

Location: 676672.75 E 4999161.92 N ***Depth to Water (m):*** NA

Location Cont: 1+005 0.0 m Rt

SUBSURFACE PROFILE			SAMPLE			
Depth (ft / m)	Elevation	Description	Number	Type	Groundwater	Symbol Log
0 / 0	0.00	Ground Surface				
		Silty Sand Silty sand, trace of gravel and cobbles, loose, brown. % Passing JC014 4.75 mm = 98.6 75 um = 30.2 Moisture Content = 17.3%	JC014	G		
2	0.60					
		Silt and Sand Silt and sand, trace of gravel and clay, compact, brown. % Passing JC015 4.75 mm = 100.0 75 um = 51.0 5 um = 11.0 MSFH 2 um = 5.0 Moisture Content = 7.3 %	JC015	G		
5 / 1	1.50					
		End of Borehole at 1.50 m below existing site grades. Note: Groundwater infiltration was not encountered during the borehole investigation.				

Drilled By: ***G.E.T Drilling Ltd.*** ***Project Engineer:*** ***Lois-Ann Hayes, P.Eng***

Drill Method: ***Track Mounted CME 55*** ***Project Technician:*** ***Joshua Charlton***

Drill Date: ***October 31 - November 1, 2017*** ***Sheet:*** 1 of 1

Appendix B

Grain Size Distribution Results

SNC·LAVALIN

SNC-LAVALIN

Lab # 17287 Client: Ainley

Project Name: 15550-2 Little Brother Dam Date: October 31,2017

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	647.6	605.4	42.2	467.5	137.9	9.0
JC003	B	523.2	440.9	82.3	335	105.9	24.6
JC004	C	425.2	388.6	36.6	384.5	78.6	9.5
JC006	D	680.3	647.3	33	512.9	134.4	6.4
JC007	E	478.9	426.4	52.5	293.2	133.2	17.9
JC008	F	578.6	476.1	102.5	365.3	110.8	28.1
JC009	G	674.6	568.3	106.3	432.8	135.5	24.6
JC010	H	621.9	562.1	59.8	431.5	130.6	13.9
JC014	I	510.1	450.7	59.4	343.2	107.5	17.3
JC015	J	565.4	535.9	29.5	404.9	131	7.3

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.: 17-1690-20 **Project Description:** Little Brother Dam 15550-2 **Date:** Nov 20, 2017

Project Location: **Contract No.:**

SAMPLE DATA

Material: Subsoil
Date Sampled: Oct 31, 2017
Time Sampled:
Sample Type: Borehole
Sample Location: JC001 BH#1 0.1-0.5M
Lot: **Sublot:**
Source: Ainley
Sampled By: Client

LAB DATA

Lab No.: 17287-A **Date Tested:** Nov 20, 2017

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	1.95

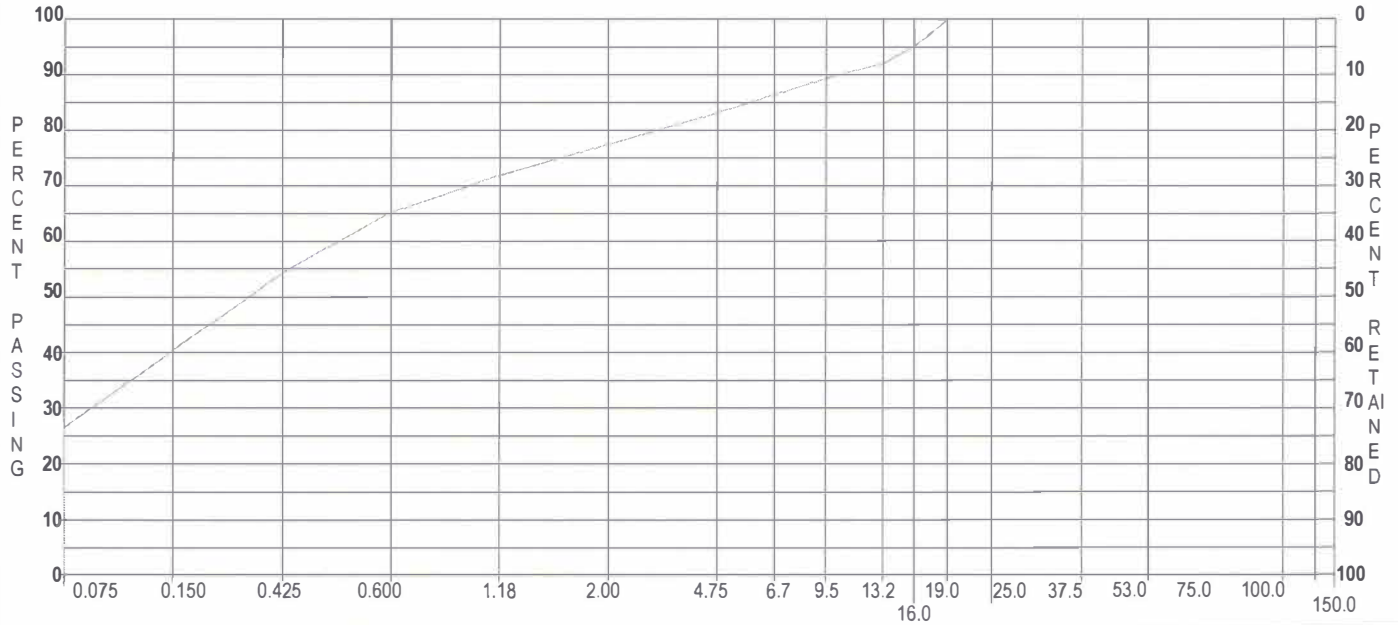
Comments: Moisture Content is 9.0%

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	**95.3**	
13.2	**92.1**	
9.5	**89.6**	
6.7		
4.75	**83.2**	
2.36	**78.3**	
2.00		
1.18	**71.9**	
0.600	**65.3**	
0.425		
0.300	**54.3**	
0.150	**40.4**	
0.075	**26.4**	

* Indicates Out of Specification

Sample: **Specs:**



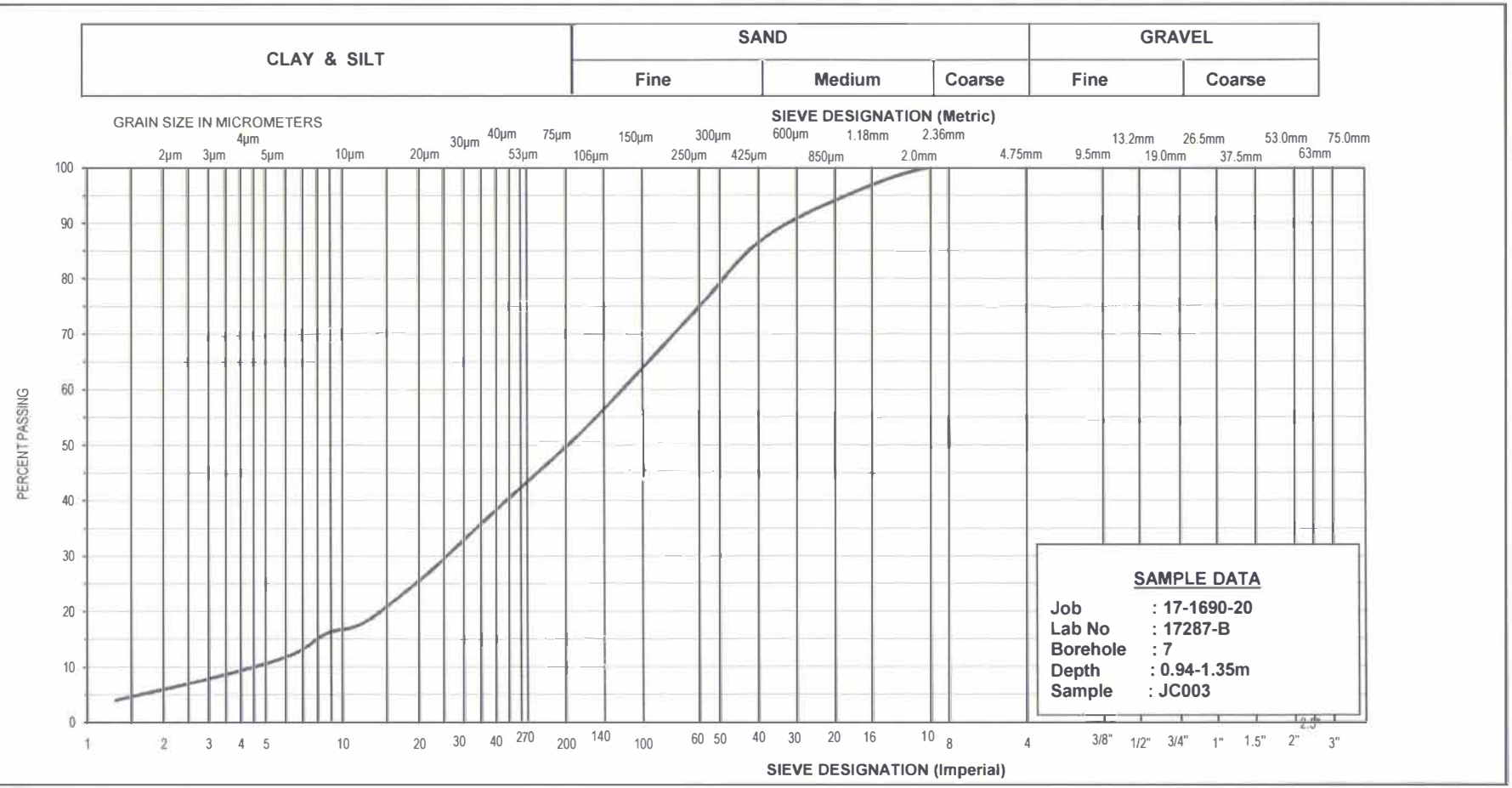
Project Manager: Mark McClelland, C.E.T

Infrastructure

SNC·LAVALIN

SNC-LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Course	Fine	Course	Medium	Fine	Silt	Clay
	0	0	0	14	37	45	5

SNC-LAVALIN
1164 Clyde Court
Kingston, Ontario K7P 2E4

GRAIN SIZE DISTRIBUTION

SILT SAND

Trace Clay

Client: Ainley

Project: 15550-2

Location: Litte Brother Dam

Date: October 31,2017

Moisture Content is 24.6%

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.: 17-1690-20 **Project Description:** Little Brother Dam 15550-2 **Date:** Nov 20, 2017

Project Location: **Contract No.:**

SAMPLE DATA

Material: Subsoil
Date Sampled: Oct 31, 2017
Time Sampled:
Sample Type: Borehole
Sample Location: JC004 BH#10 0.6-1.5M
Lot: **Sublot:**
Source: Ainley
Sampled By: Client

LAB DATA

Lab No.: 17287-C **Date Tested:** Nov 20, 2017

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	1.45

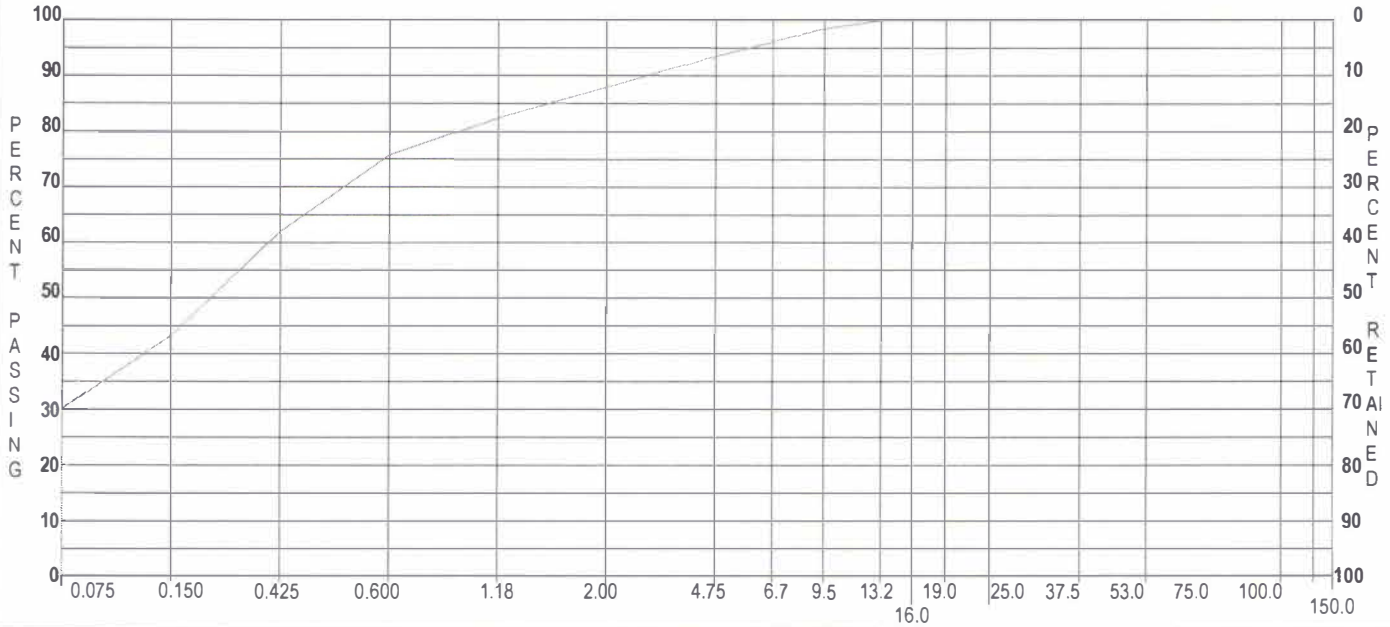
Comments: Moisture Content is 9.5%

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		
16.0		
13.2	**100**	
9.5	**98.6**	
6.7		
4.75	**93.5**	
2.36	**88.9**	
2.00		
1.18	**82.4**	
0.600	**75.7**	
0.425		
0.300	**62**	
0.150	**43.1**	
0.075	**30.1**	

* 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.: 17-1690-20 **Project Description:** Little Brother Dam 15550-2 **Date:** Nov 20, 2017

Project Location: **Contract No.:**

SAMPLE DATA

Material: Subsoil
Date Sampled: Oct 31, 2017
Time Sampled:
Sample Type: Borehole
Sample Location: JC006 BH#14 0-0.45
Lot: **Sublot:**
Source: Ainley
Sampled By: Client

LAB DATA

Lab No.: 17287-D **Date Tested:** Nov 20, 2017

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	4.03

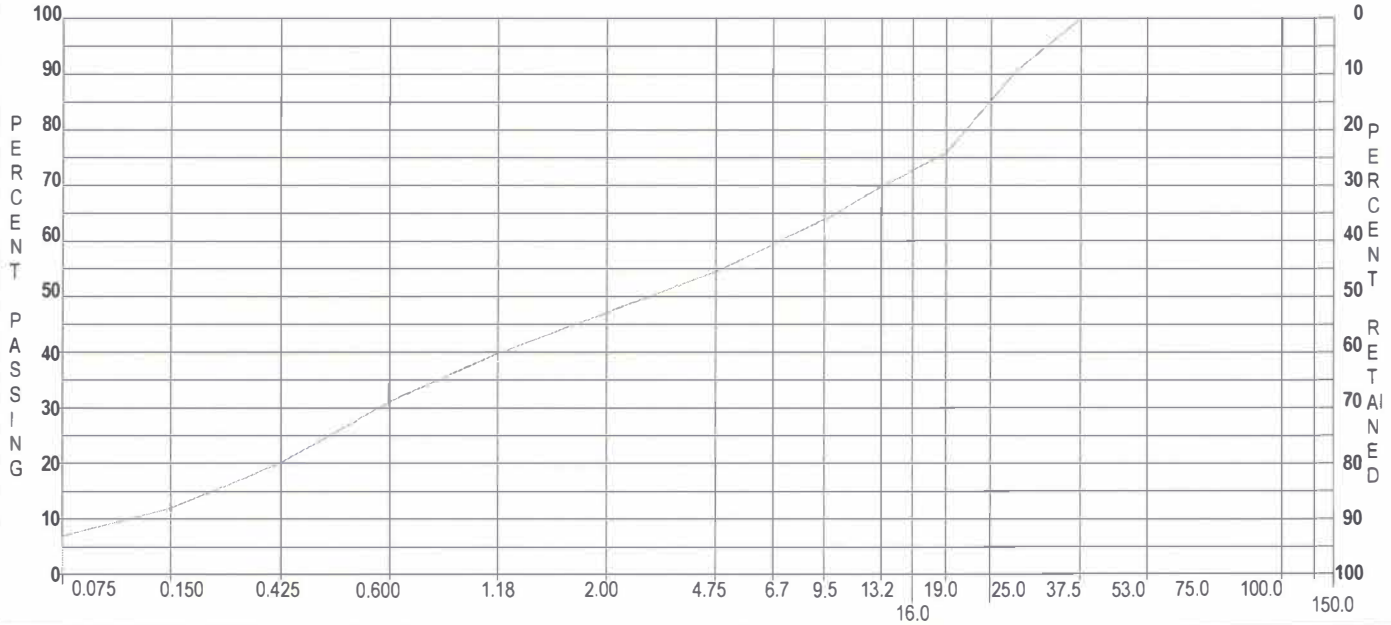
Comments: Moisture Content is 6.4%

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	90.7	
25.0		
19.0	75.9	
16.0	72.8	
13.2	69.9	
9.5	64.1	
6.7		
4.75	54.5	
2.36	48	
2.00		
1.18	39.7	
0.600	31	
0.425		
0.300	20.1	
0.150	11.9	
0.075	6.9	

* 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.: 17-1690-20 **Project Description:** Little Brother Dam 15550-2 **Date:** Nov 20, 2017

Project Location:

Contract No.:

SAMPLE DATA

Material: Subsoil
Date Sampled: Oct 31, 2017
Time Sampled:
Sample Type: Borehole
Sample Location: JC007 BH#17 0.6-1.2M
Lot: **Sublot:**
Source: Ainley
Sampled By: Client

LAB DATA

Lab No.: 17287-E **Date Tested:** Nov 20, 2017

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	1.80	

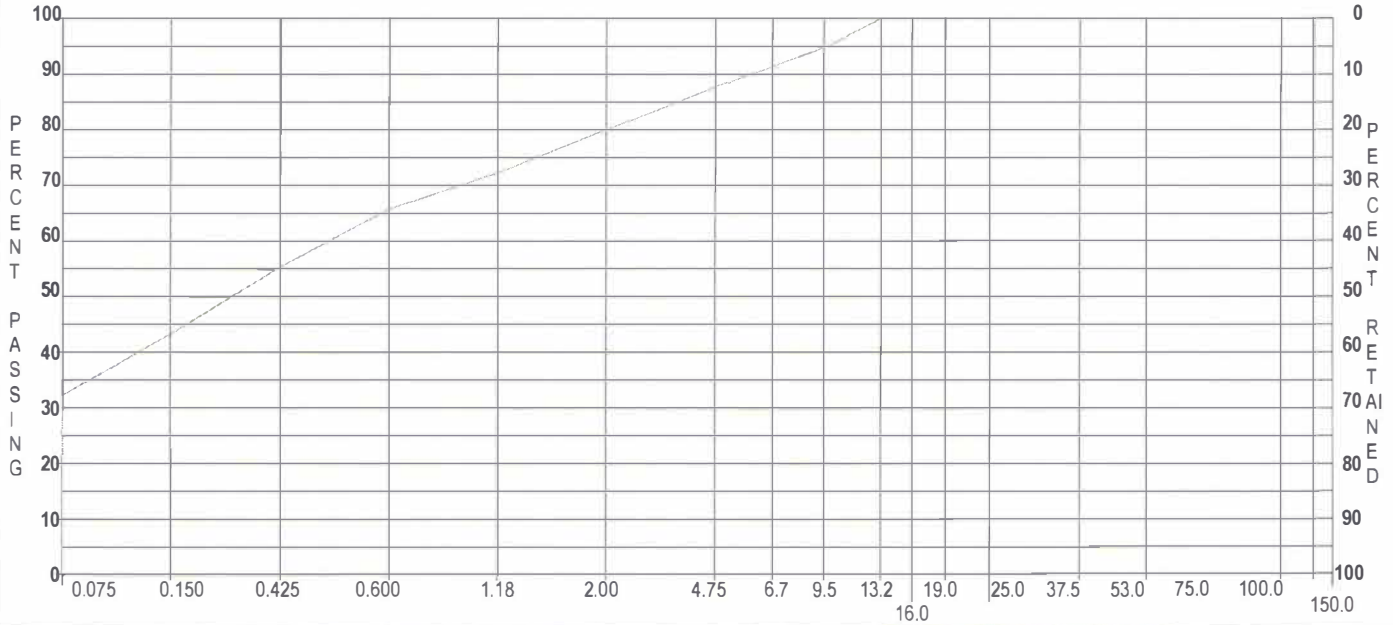
Comments: Moisture Content is 17.9%

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		
16.0		
13.2	100	
9.5	95.1	
6.7		
4.75	87.8	
2.36	80	
2.00		
1.18	72.3	
0.600	65.8	
0.425		
0.300	55.4	
0.150	43.3	
0.075	32.2	

* 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.: 17-1690-20 **Project Description:** Little Brother Dam 15550-2 **Date:** Nov 20, 2017

Project Location: **Contract No.:**

SAMPLE DATA

Material: Subsoil
Date Sampled: Oct 31, 2017
Time Sampled:
Sample Type: Borehole
Sample Location: JC008 BH#21 0.6-1.2M
Lot: **Sublot:**
Source: Ainley
Sampled By: Client

LAB DATA

Lab No.: **17287-F** **Date Tested:** Nov 20, 2017

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	0.81	

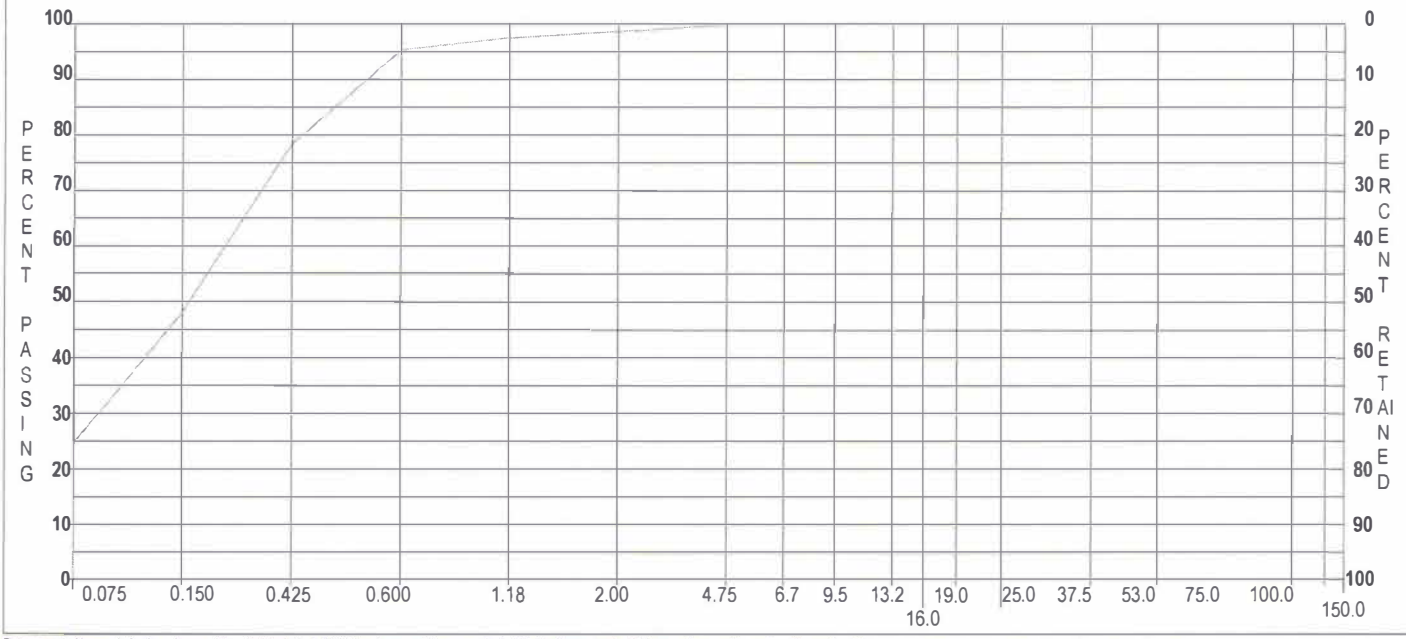
Comments: Moisture Content is 28.1%

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		
16.0		
13.2		
9.5	**100**	
6.7		
4.75	**99.9**	
2.36	**99.8**	
2.00		
1.18	**97.5**	
0.600	**95.3**	
0.425		
0.300	**78.5**	
0.150	**48.1**	
0.075	**24.4**	

* Indicates Out of Specification

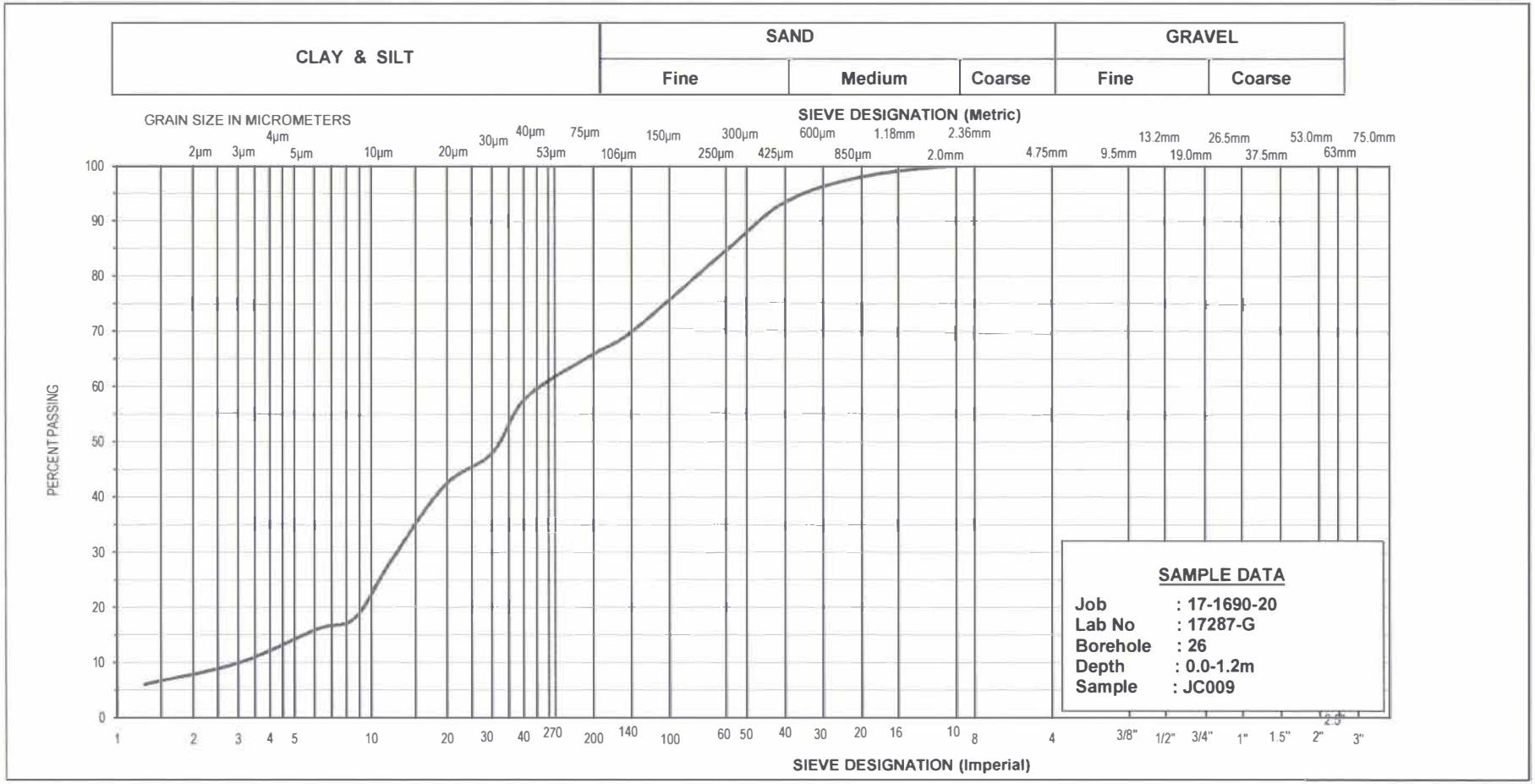
Sample: **Specs:**



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	7	28	59	7

SNC-LAVALIN
1164 Clyde Court
Kingston, Ontario K7P 2E4

GRAIN SIZE DISTRIBUTION

SANDY SILT

Trace Clay

Client: Ainley

Project: 15550-2

Location: Litte Brother Dam

Date: October 31,2017

Moisture Content is 24.6%

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.: 17-1690-20 **Project Description:** Little Brother Dam 15550-2 **Date:** Nov 20, 2017

Project Location:

Contract No.:

SAMPLE DATA

Material: Subsoil
Date Sampled: Oct 31, 2017
Time Sampled:
Sample Type: Borehole
Sample Location: JC010 BH#27 0.45-1.2M
Lot: **Sublot:**
Source: Ainley
Sampled By: Client

LAB DATA

Lab No.: **17287-H** **Date Tested:** Nov 20, 2017

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	2.02	

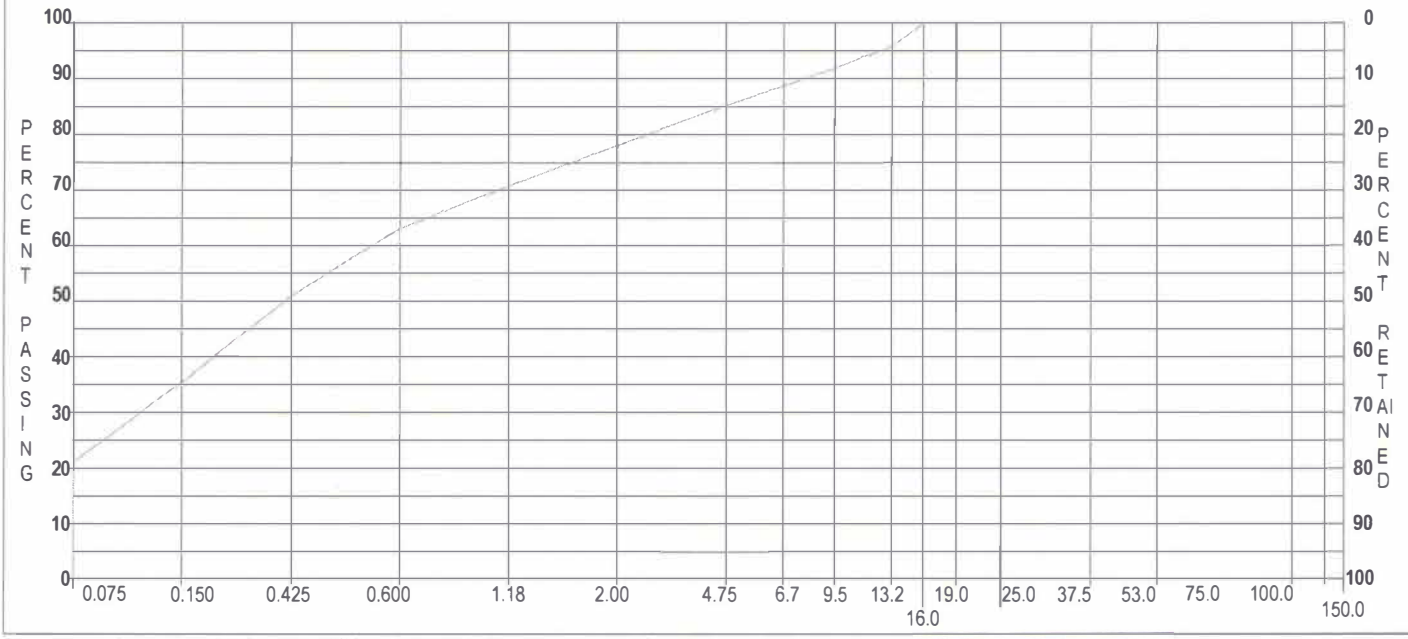
Comments: Moisture Content is 13.9%

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		
16.0	**100**	
13.2	**95.9**	
9.5	**92.2**	
6.7		
4.75	**85.3**	
2.36	**79.1**	
2.00		
1.18	**70.8**	
0.600	**63.2**	
0.425		
0.300	**50.9**	
0.150	**35.4**	
0.075	**21.2**	

* 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.: 17-1690-20 **Project Description:** Little Brother Dam 15550-2 **Date:** Nov 20, 2017

Project Location: **Contract No.:**

SAMPLE DATA

Material: Subsoil
Date Sampled: Oct 31, 2017
Time Sampled:
Sample Type: Borehole
Sample Location: JC014 BH#35 0.0-0.6M
Lot: **Sublot:**
Source: Ainley
Sampled By: Client

LAB DATA

Lab No.: 17287-I **Date Tested:** Nov 20, 2017

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	1.06	

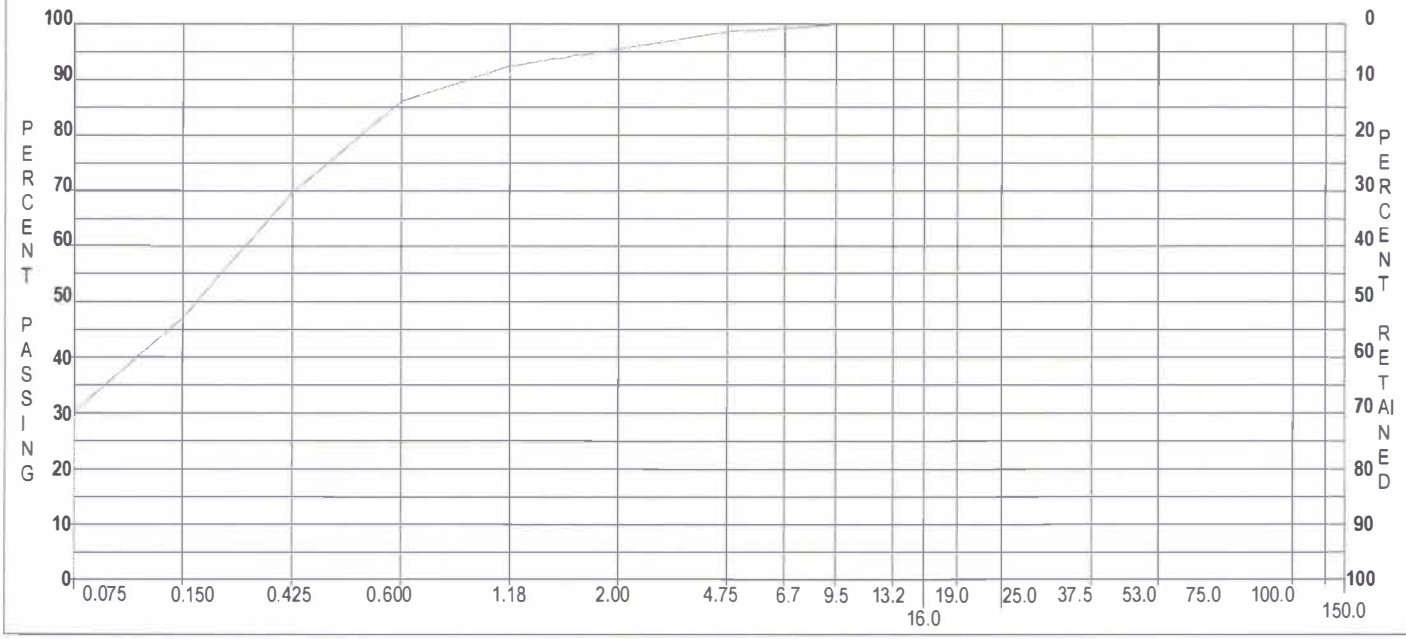
Comments: Moisture Content is 17.3%

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		
16.0		
13.2		
9.5	100	
6.7		
4.75	98.6	
2.36	96.4	
2.00		
1.18	92.5	
0.600	86.2	
0.425		
0.300	69.7	
0.150	47.1	
0.075	30.2	

* Indicates Out of Specification

Sample: **Specs:**

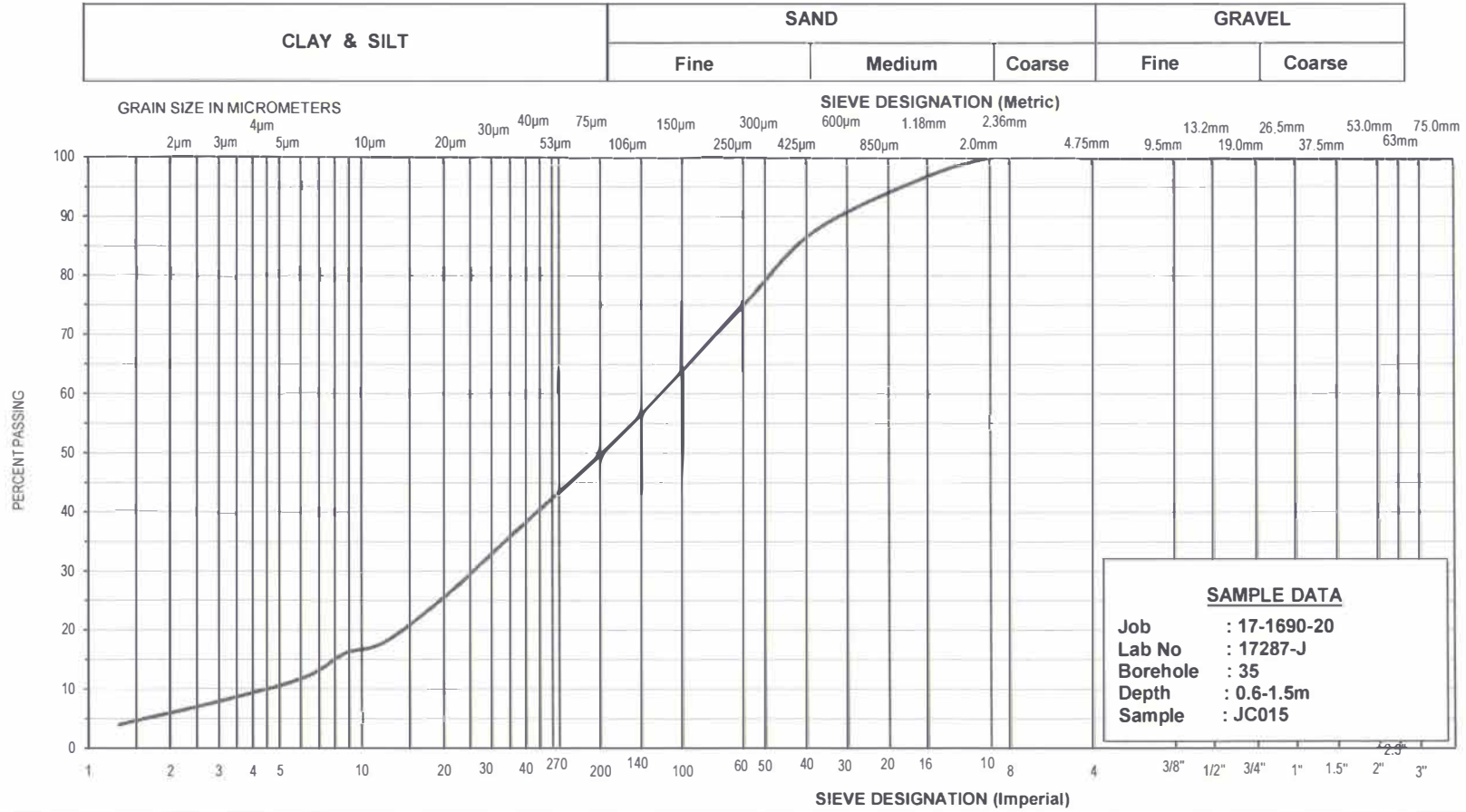


Project Manager: Mark McClelland, C.E.T

Infrastructure

SNC-LAVALIN

UNIFIED SOIL CLASSIFICATION SYSTEM



% +3"	% Gravel		% Sand			% Fines	
	Course	Fine	Course	Medium	Fine	Silt	Clay
	0	0	0	14	37	45	5

SNC-LAVALIN 1164 Clyde Court Kingston, Ontario K7P 2E4	**GRAIN SIZE DISTRIBUTION**	Client: Ainley
		Project: 15550-2
	SILT SAND	Location: Litte Brother Dam
	Trace Clay	Date: October 31,2017 — **Moisture Content is 7.3%**