GEOTECHNICAL INVESTIGATION REPORT:

GEOTECHNICAL INVESTIGATION
NOVA INSTITUTION
TRURO, NOVA SCOTIA

Prepared for:

Public Works and
Government Services Canada
Real Property Services
1045 Main Street
Unit 100
Moncton, NB
E1C 1H1

May 2012

Prepared by:

FUNDY Engineering

Fundy Engineering
27 Wellington Row
Saint John, NB
E2L 4S1

www.fundyeng.com

Project No: 9175

EXECUTIVE SUMMARY

Fundy Engineering & Consulting Ltd. (Fundy Engineering) was contracted by Public Works and Government Services Canada (PWGSC) to complete a geotechnical investigation for the construction of a new building at the Nova Institution in Truro, Nova Scotia. The purpose of this geotechnical investigation was to identify the soils within the area of the proposed structure, determine the properties of the soils and to provide earthwork recommendations for the construction of a new structure. The geotechnical investigation consisted of eleven (11) boreholes in a cleared area in the fenced Northern end of the existing facility, see Drawing S1 (Appendix 1). A skid mount drilling rig supplied and operated by Logan Drilling Ltd, of Stewiacke, NS was used to complete the boreholes. The boreholes were extended through the overburden material to an average depth of 7.4 metres.

Soils encountered in this geotechnical investigation can generally be described as a Firm to Very Stiff Reddish Brown Sandy Clay Till with Some Gravel over a Very Stiff to Hard Reddish Brown Sandy Clay Till with Some Cobbles. Sand seams were occasionally found running through various stratum. A soft area was found in a low area in the North East corner near the proposed location for BH 06. There is a thin layer of topsoil and vegetation with roots at the ground surface that overlays the Till material in all locations that were not on the gravel pathway. Groundwater was encountered in all boreholes, with an average depth of 1.7 metres. Bedrock was not encountered during the investigation.

The following recommendations may be used for the earthwork in the construction of the new structure:

- Footings should be founded on Structural Fill placed in a compacted 300mm lift and may be designed with an allowable bearing capacity of 300 kPa while maintaining a minimum 900 mm footing width. Total and differential settlements under the proposed loading will be less than 25 mm and 15 mm, respectively.
- Any surface water should be directed away from the excavated areas to prevent any disturbance of the Till which is susceptible to water softening. Traffic should also be minimized during construction to prevent the mobilization of the Till material at the surface.
- The building pad (*i.e.*, Structural Fills used to bring site up to grade), if required, must be constructed with a minimum slope of 1:1 from the edge of the pad to the insitu bearing soils and must extend beyond the edge of the footing a minimum distance of 0.5 m from the top of the pad slope.
- The minimum grade of material used to cover structural Fill is to be a 2:1 slope away from the building with a minimum soil cover of 1.2 metres for frost protection of the footings.
- All engineered Fills placed should be inspected on-site by a Geotechnical Engineer.

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1.0 INTRODUCTION

Fundy Engineering was contracted by PWGSC to complete a geotechnical investigation for the construction of a new building at the Nova Institution in Truro, Nova Scotia. The purpose of this geotechnical investigation was to identify the soils within the area of the proposed structure, determine the properties of the soils and to provide earthwork recommendations for the construction of a new structure. The geotechnical investigation consisted of eleven (11) boreholes in a cleared grass yard area in the fenced Northern end of the existing facility. A skid mount drilling rig supplied and operated by Logan Drilling Ltd, of Stewiacke, NS was used to complete the boreholes.

The boreholes were extended through the overburden material. All locations and elevations are noted on the attached Site Plan (see Sheet S1, Appendix I).

1.1 Scope of Work Completed

The following scope of work was performed by Fundy Engineering as part of our geotechnical investigation:

- Eleven (11) geotechnical boreholes;
- Identification of soils and Bedrock encountered within boreholes and respective parameters for each material determined from laboratory testing; and
- Geotechnical report with findings and recommendations pertaining to the earthwork in the construction of a new structure.

1.2 Limitations

The observations made and facts presented in this report are based on the site visit carried out in April 2012. While every effort has been made to comprehensively catalogue geotechnical concerns pertaining to the site in Truro, NS, discovery or development of other geotechnical problems cannot be precluded. Further investigation may reveal additional information that may have some bearing on the recommendations included herein. Should such information be revealed, Fundy Engineering should be notified in a timely fashion so that any required amendments to our recommendations can be made.

These results are reported confidentially to the client, who is advised to take appropriate action to rectify any areas of concern. No professional responsibility is assumed for the use or interpretation of these findings by others.

2.0 SITE DESCRIPTION

2.1 Area of Interest

The proposed building site is a relatively flat and open yard which is located to the north of the existing facility buildings that make up the Nova Institution. The facility is located to the South of the Truro city center and is accessed from a parking area off James St. The facility is located in a residential area.

Figure 1 - Location of proposed building in northern yard.

2.2 Location and Property Ownership

The subject property is the location of the Nova Institution in Truro, Colchester County, NS. This facility contains numerous administrative and housing structures as well as parking area. The property is identified by Service Nova Scotia as PID# 20243598. The registered owner of the 19.13 acre site is the Government of Canada Department of Public Works. The property is accessible via James Street.

2.3 Geotechnical Setting

The bedrock in the area of the investigation consists of sedimentary rocks belonging to the Cumberland Group, which date to the late Phanerozoic period. This bedrock can be described as lower, fine, coal-bearing facies: grey sandstone, shale, coal (Nova Scotia Department of Mines and Energy, Geological Map of the Province of Nova Scotia, 1979).

Surficial sediments in the area consist of Ground Moraine and Streamlined Drift of the Last Glaciation, Wisconsinian period namely silty till plain and drumlins, derived from both local and distant sources generally ranging in thickness from 3 m to 30 m (Nova Scotia Department of Natural Resources, Surficial Geology of the Province of Nova Scotia, Map 92-3, 1992).

3.0 SITE WORK COMPLETED

3.1 Borehole Investigation

The purpose of the borehole investigation was to assess the underlying soils and bedrock in the proposed building area in the central section of the existing facilities in order to provide recommendations for the earthwork required in the construction of a new structure. On April 17th, 18th and 19th, 2012, eleven (11) geotechnical boreholes were put down to obtain such information via a skid mounted drill provided by Logan Drilling Ltd under the direction of Cameron Ough, EIT, of Fundy Engineering. The boreholes were extended through the overburden materials a minimum of 6 metres, of which, at least 3 consecutive metres had N values greater than 20. Continuous samples of the overburden soils were obtained using a split spoon sampler. The approximate Borehole locations and site elevation details were provided by PWGSC.

3.2 Soils Encountered

Soils encountered in this geotechnical investigation can generally be described as a Firm to Very Stiff Reddish Brown Sandy Clay Till with Some Gravel over a Very Stiff to Hard Reddish Brown Sandy Clay Till with Some Cobbles. Sand seams were occasionally found running through various stratum. A Soft area was found in the low area in the North East corner near the proposed location for BH 06. There is a thin layer of topsoil and vegetation with roots at the ground surface that overlays the Till material in all locations that were not on the gravel pathway.

Further details of the soils encountered in the geotechnical investigation can be found in the borehole logs that are appended to this report (see Appendix III).

3.3 Bedrock Encountered

Bedrock was not encountered during the investigation.

3.4 Groundwater Encountered

Groundwater was encountered in all boreholes, with depths ranging from 0.6m to 2.4m and an average depth of 1.7m.

3.5 Radon Testing

One (1) borehole was sampled for radon gas. The representative borehole (BH07) was selected on site and was within the footprint of the proposed structure.

Radon samples were collected using Electret Ion Chambers (EIC). The EIC's were obtained from and analyzed by RPC Laboratory in Fredericton, NB. The EIC's were placed, collected, and shipped following the recommendations of RPC Laboratory. The sample collection procedure was as follows:

<u>Placement of EIC Sampling Kit</u>
The placement and collection of the EIC was conducted by our geotechnical technologist supervising the drilling operation.

1. The EIC was placed in a perforated housing and lowered into the borehole to a depth of approximately 0.7 metre below existing grade. The EIC was suspended from the top of the borehole casing.
2. The top of the borehole was then sealed airtight with a plug.
3. The EIC remained in the borehole for a total of 48 hours.

Collection of EIC Sampling Kit

The collection of the EIC was conducted by our senior air quality technologist.

1. Following the 48 hour sampling period, the EIC was removed from the borehole and properly prepared for shipment to the laboratory.
2. The analysis was completed by a third party laboratory (RPC Laboratory).

Results of Radon Testing

Sample Identification	Radon Detected (Bq/m^3)
Borehole 07	5,934

Health Canada recommends remedial action is taken if a radon concentration in an occupied indoor space exceeds the threshold limit value (TLV) of 200 Bq/m3 (Becquerels per cubic meter). However, when testing in a subsoil condition as in a borehole, the concentration of radon is expected to be approximately 100 times higher than what it would be inside a building located in that same place. Therefore, a radon concentration collected from a borehole, with a concentration ≤20,000 Bq/m3 would be considered acceptable. The radon concentration identified during this testing procedure was measured at a concentration well below the recommended subsoil threshold limit value. Based on these sampling results, no action is required. However, Section 9.13.4 of the 2010 National Building Code of Canada requires newly constructed buildings to be provided with a rough-in for the future connection of a subfloor depressurization system.

3.6 Moisture Content

The moisture content of selected soil samples from each borehole was determined. Moisture content of the Reddish Brown Sandy Clay and Gravel Till ranged from 11.0 to 15.9 percent by weight.

3.7 Atterberg Limits

Fine grained soil samples recovered from field program were tested to determine the Plastic Limit, Liquid Limit and Plasticity Index of the soil. The Plasticity Index of a fine grained soil indicates the magnitude of water content range over which the soil remains plastic.

The underlying Sandy Clay soil is relatively homogeneous throughout the site therefore only 5 samples from Boreholes 2, 5, 6, 9 and 11, at varying depths, were tested and the Plasticity Index of each was determined. These samples were confirmed to be a low plasticity Clay with a Plasticity Index ranging from 15 to 24. Detailed laboratory results illustrating the results of the Atterberg Limit testing are attached in Appendix IV.

4.0 RECOMMENDATIONS

Based on our observations made in the field, the recommended foundation design for the new facility is a standard concrete wall on strip footings to be founded on the Stiff to Hard Reddish Brown Sandy Clay Till with Gravel and Cobbles. At the time of this report the design of the foundations was not known to us. Some assumptions have been made based on the underground conditions.

4.1 Site Preparation

Any development in the area will require the removal of all Organic material and Gravel Fill from the existing walkway and grassed areas. The excavation to prepare the site for foundation footings should extend into the Stiff to Hard Sandy Clay Till and precautions should be taken to limit equipment travel and standing water on the exposed surface which could soften the insitu soils.

4.2 Footings Founded on Very Stiff to Hard Sandy Clay Till

The Till bearing stratum should be proof rolled with a large highway type vibratory roller and approved by a Geotechnical Engineer. Soft areas identified should be removed and replaced with compacted structural Fill. Any surface water should be directed away from the excavated areas to prevent any disturbance of the Till which is susceptible to water softening. Traffic should also be minimized in the building footprint as building grade is approached to prevent the mobilization of the Till material at the surface.

After the removal of all unsuitable materials a minimum of 300 mm of compacted structural Fill should be placed on the Till material under all footing areas. If additional material is required to bring the building footings or slabs up to grade, it should be done so using a structural Fill. Structural Fill should consist of an approved material which is free from organics and deleterious materials, such as a pit run or other approved inorganic soil.

All structural Fill placed within the building area should be placed and compacted in lifts to 100 percent of its Standard Proctor density. The lift thickness must be compatible with the compaction equipment used. A maximum lift thickness of 0.30 m is recommended for structural Fill material placed under the building.

It is recommended that removal of all unsuitable materials and the placement of structural Fills be monitored by a Geotechnical Engineer. This will ensure that all unwanted materials that are susceptible to excessive settlements are removed and replaced with suitable load bearing materials, and that the required degree of compaction is attained.

Footings founded on Very Stiff to Hard Till and structural Fill may be designed with an allowable bearing capacity of 300 kPa and should be a minimum of 900 mm wide. Total and differential settlements under the proposed loading will be less than 25 mm and 15 mm, respectively.

The building pads (*i.e.*, structural Fills used to bring site up to grade), where required, must be constructed with a minimum slope of 1:1 from the edge of the pad to the insitu bearing soils. All footings should have a minimum of 1.5 m of soil cover or equivalent in insulation for frost protection.

4.3 Material Reuse

Any overburden material removed from the site has limited reuse application. Due to the high fines content, these materials shall not be used as a bedding sand, roadway sub-base or roadway base.

5.0 CONCLUSIONS AND CLOSING REMARKS

The purpose of this geotechnical investigation was to identify the soils within the area of the proposed structure, determine the properties of the soils and to provide earthwork recommendations for the construction of a new structure. The geotechnical investigation consisted of eleven (11) boreholes in a cleared area in the center of the existing facility.

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- The minimum grade of material used to cover structural Fill is to be a 2:1 slope away from the building with a minimum soil cover of 1.2 metres for frost protection of the footings.
- All engineered Fills placed should be inspected on-site by a Geotechnical Engineer.

We trust this is sufficient for your present needs, please feel free to contact the undersigned for any additional information or clarification that may be required.

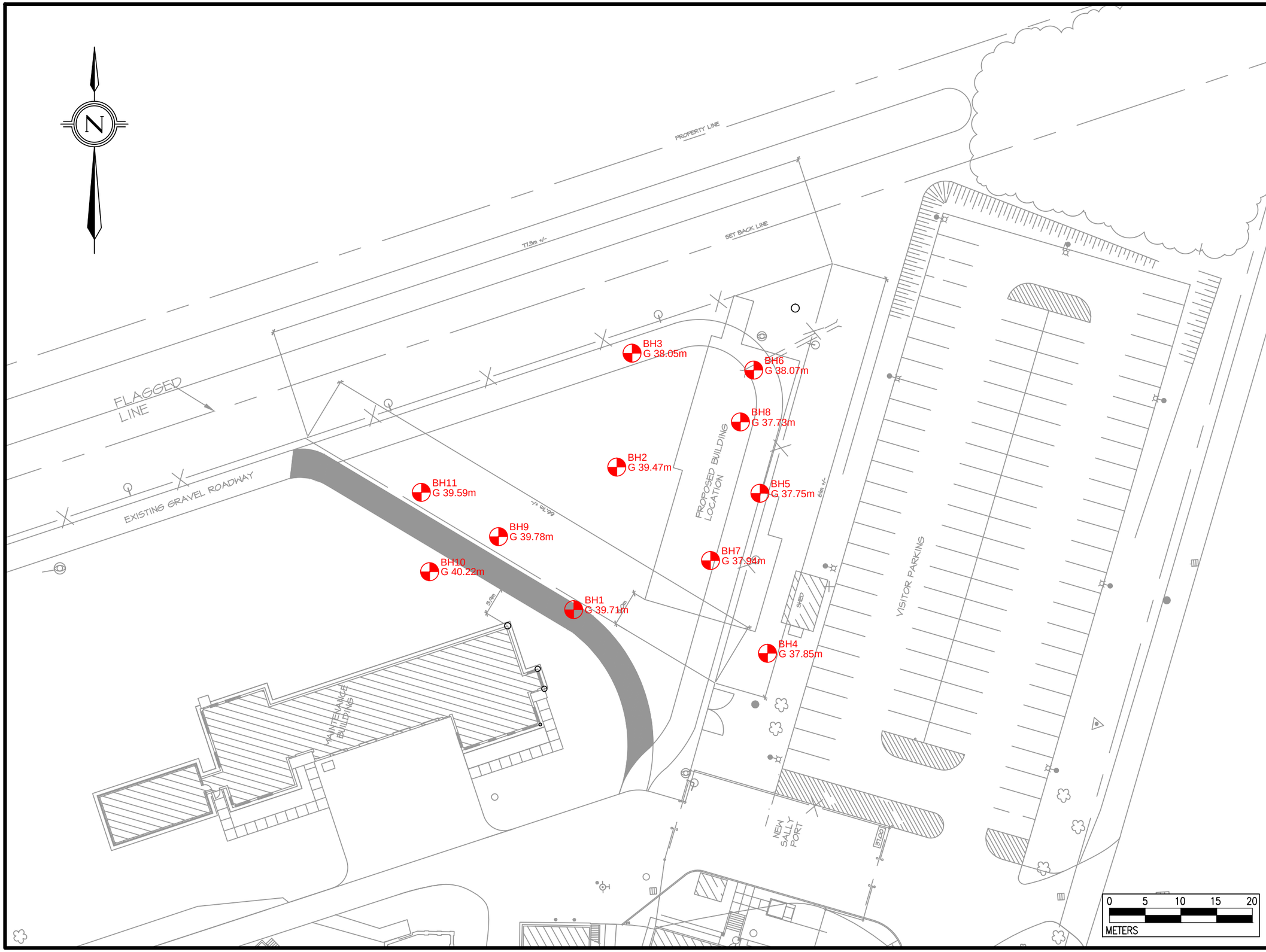
Sincerely,

Fundy Engineering & Consulting Ltd.

Mr. Gordon Mouland, *M.Eng., P.Eng.*

APPENDIX I

SITE PLAN



GENERAL NOTES

1. All dimensions in millimeters unless otherwise specified.
2. Elevations in meters and based on NAD83 (CSRS) Datum.
3. Site Plan (underlay) provided by others and depicted for reference use only and not for construction.

BH Bore Hole
G Grade

No.	REVISION/ISSUE	DATE

FUNDY Engineering

27 Wellington Row
P.O. Box 6626
Saint John, NB
E2L 4S1

Tel. (506) 635-1566
Fax. (506) 635-0206
fundy@fundyeng.com
www.fundyeng.com

Serving Our Clients' Needs First

Project:
GEOTECHNICAL INVESTIGATION
NOVA INSTITUTION
TRURO, NS

Drawing:
BOREHOLE LOCATION PLAN

Project No.	Designed	Date (yy/mm/dd)
9175	AM	12/05/02
Scale	Drawn	Rev.
2:1_XREF	RTH	

Sheet
S1

APPENDIX II

SYMBOLS AND TERMS

FUNDY ENGINEERING SYMBOLS AND TERMS
Borehole, Test Pit, and Monitoring Well Logs

SOIL DESCRIPTION

Behavioural properties (i.e. plasticity, permeability) take precedence over particle gradation in describing soils.

Terminology describing soil structure:

Desiccated.....having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured..... having cracks, and hence a blocky structure
Varved..... .....composed of regular alternating layers of silt and clay
Stratified.....composed of alternating layers of different soil types, e.g. silt and sand or silt and clay
Well Graded.....having wide range in grain sizes and substantial amounts of all intermediate particle sizes
Uniformly Graded.....predominantly of one grain size

Terminology used for describing soil strata based upon the proportion of individual particle sizes present:

Trace, or occasional.....less than 10%
Some.....10-20%
Adjective (e.g. silty or sandy).....20-35%
And (e.g. silt or sand.....35-50%

The standard terminology to describe cohesionless soils includes the relative density, as determined by laboratory test or by the Standard Penetration Test 'N' - value: the number of blows of 140 pound (64kg) hammer falling 30 inches (50.8mm) O.D. split spoon sampler one foot (305mm) into the soil.

RELATIVE DENSITY	N' VALUE	RELATIVE DENSITY %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

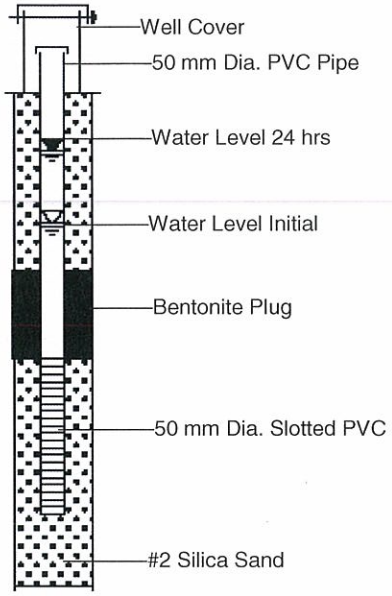
The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer test, unconfined compression tests, or occasionally by standard penetration tests.

CONSISTENCY	UNDRAINED SHEAR STRENGTH		'N' VALUE
	kips/sq.ft.	kPa	
Very Soft	<0.25	<12.5	<2
Soft	0.25-0.5	12.5-25	2-4
Firm	0.5-1.0	25-50	4-8
Stiff	1.0-2.0	50-100	8-15
Very Stiff	2.0-4.0	100-200	15-30
Hard	>4.0	>200	>30

SOILS GRAPHIC LEGEND

- Clay
- Silt
- Sand
- Gravel
- Boulders & Cobbles
- Asphalt
- Topsoil & Root Mat
- Till
- Peat & Organic Silts
- Fill

MONITORING WELL SCHEMATIC



BEDROCK GRAPHIC LEGEND

- Sandstone
- Limestone
- Mudstone
- Shale
- Granite/Igneous
- Metamorphic

SAMPLER SYMBOLS

- Standard Penetration Test / Split Spoon
- Rock Core
- Auger / Grab

LABORATORY TESTS

MC	Moisture Content	P	Field Permeability	CD	Consolidation Drained Triaxial
SG	Specific Gravity	PF	Permeability Falling Head	CU	Consolidation Undrained Triaxial
HA	Hydrometer Analysis	PC	Permeability Constant Head	UU	Unconsolidated Undrained Triaxial
SA	Sieve Analysis	PR	Proctor	DS	Direct Shear

BEDROCK DESCRIPTION

The description of bedrock is based on the rock quality designation (RQD).

The classification is based on a modified core recovery percentage in which all pieces of sound core over 100mm long are expressed as a percentage of total recovery. The small pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. In most cases RQD is measured on NXL core.

RQD	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

APPENDIX III

BOREHOLE LOGS

FUNDY Engineering

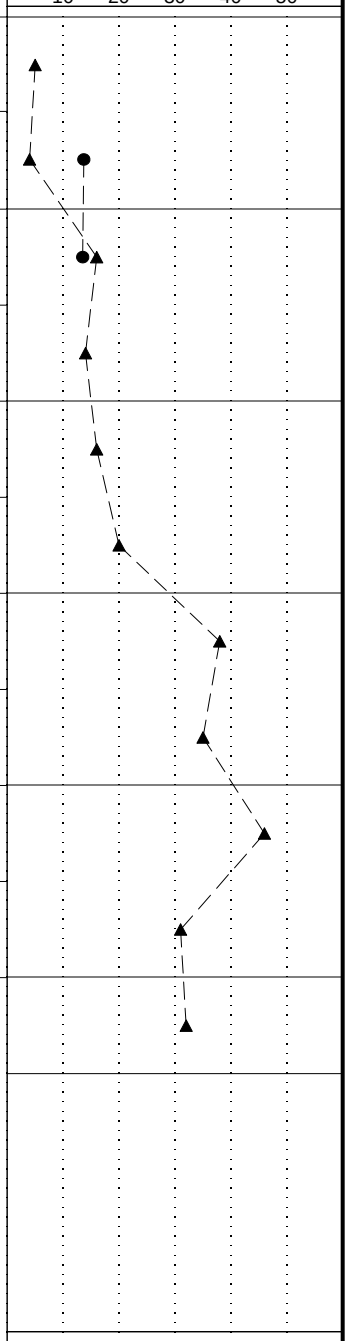
BOREHOLE LOG No. BH01

PROJECT: Geotechnical Investigation
CLIENT: PWGSC **DATUM:** Geodetic
PROJECT LOCATION: Nova Institute, Truro, NS **ELEVATION (m):** 39.71
DRILLING CONTRACTOR: Logan Drilling **PROJECT #** 9175
LOGGED BY: C.Ough **CHECKED BY:** A.Mouland
DRILLING METHOD: Skid Mount Drill **DATE:** April 17, 2012
DEPTH TO WATER (m): INITIAL: 1.22 **24 hrs.**

Depth (meters)	Depth (feet)	Description	Elevation (m)	Groundwater	Graphic	Sample Type	Sample No.	Lab Tests	Sample Rec (cm)	Blow Counts (N Value)	% < #200
0	0	Firm to Very Stiff Reddish Brown Sandy Clay with Some Gravel	39.71				1		45	2-2-3-3 (5)	
0.8	2.67						2		27	2-2-2-6 (4)	39
1.6	5.33						3		30	4-8-8-6 (16)	40
							4		45	6-6-8-10 (14)	
2.4	8						5		38	6-9-7-8 (16)	
3.2	10.67						6		50	6-10-10-11 (20)	
4	13.33	Hard Reddish Brown Sandy Clay with Some Gravel and Cobbles	36.05				7		30	9-16-22-22 (38)	
							8		42	15-15-20-16 (35)	
4.8	16						9		43	10-23-23-26 (46)	
5.6	18.67						10		38	18-15-16-14 (31)	
6.4	21.33						11		60	13-16-16-14 (32)	
		Borehole Terminated at 6.71 m (Elevation = 33.00m)									

TEST RESULTS

Plastic Limit ⊢⊣ Liquid Limit
Water Content - ●
SPT N-Value - ▲



FUNDY Engineering

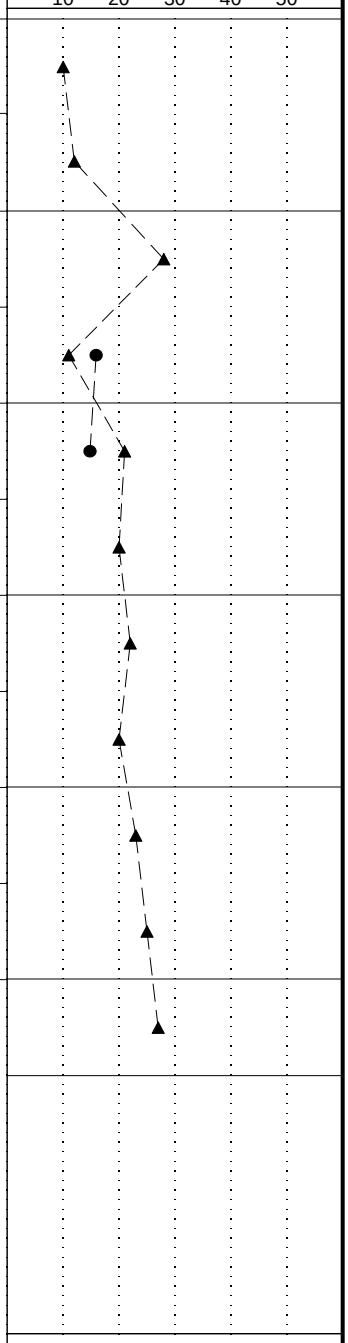
BOREHOLE LOG No. BH02

PROJECT: Geotechnical Investigation
CLIENT: PWGSC **DATUM:** Geodetic
PROJECT LOCATION: Nova Institute, Truro, NS **ELEVATION (m):** 39.47
DRILLING CONTRACTOR: Logan Drilling **PROJECT #** 9175
LOGGED BY: C.Ough **CHECKED BY:** A.Mouland
DRILLING METHOD: Skid Mount Drill **DATE:** April 18, 2012
DEPTH TO WATER (m): INITIAL: 2.44 **24 hrs.**

Depth (meters)	Depth (feet)	Description	Elevation (m)	Groundwater	Graphic	Sample Type	Sample No.	Lab Tests	Sample Rec (cm)	Blow Counts (N Value)	% < #200
0	0	Stiff to Very Stiff Reddish Brown Sandy Clay with Some Gravel	39.47				12		39	4-5-5-6 (10)	
0.8	2.67						13		43	4-3-9-9 (12)	
1.6	5.33						14		45	8-9-19-8 (28)	
							15		38	4-5-6-7 (11)	62
2.4	8			▽			16		50	7-8-13-14 (21)	70
3.2	10.67						17		48	6-12-8-8 (20)	
4	13.33						18		60	9-11-11-12 (22)	
		Very Stiff Reddish Brown Sandy Clay with Some Gravel and Cobbles	35.20				19		60	10-10-10-10 (20)	
4.8	16						20		60	10-11-12-13 (23)	
5.6	18.67						21		60	9-12-13-13 (25)	
6.4	21.33						22		60	10-13-14-12 (27)	
		Borehole Terminated at 6.71 m (Elevation = 32.76m)									

TEST RESULTS

Plastic Limit ⊢⊣ Liquid Limit
Water Content - ●
SPT N-Value - ▲



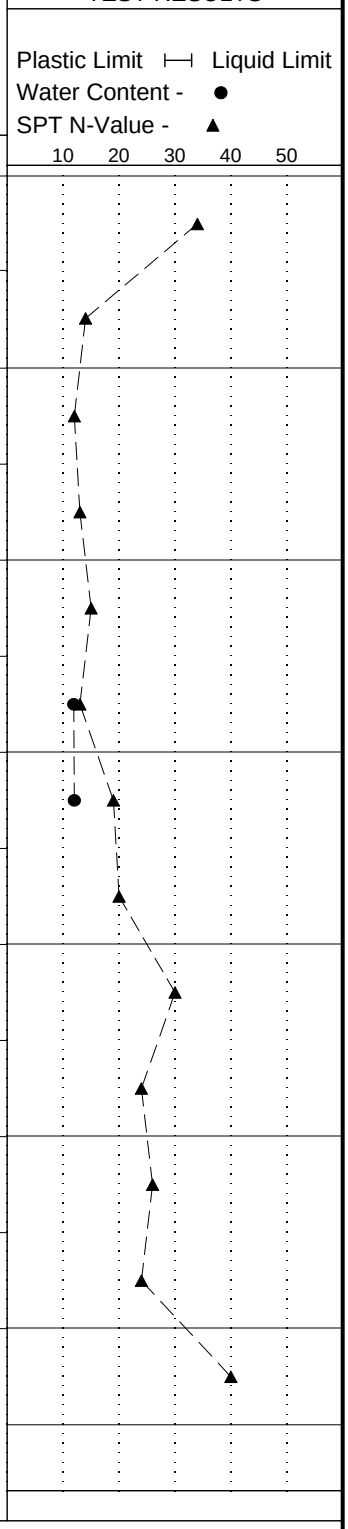
FUNDY Engineering

BOREHOLE LOG No. BH03

PROJECT: Geotechnical Investigation
CLIENT: PWGSC **DATUM:** Geodetic
PROJECT LOCATION: Nova Institute, Truro, NS **ELEVATION (m):** 38.05
DRILLING CONTRACTOR: Logan Drilling **PROJECT #** 9175
LOGGED BY: C.Ough **CHECKED BY:** A.Mouland
DRILLING METHOD: Skid Mount Drill **DATE:** April 19, 2012
DEPTH TO WATER (m): INITIAL: 1.83 **24 hrs.**

Depth (meters)	Depth (feet)	Description	Elevation (m)	Groundwater	Graphic	Sample Type	Sample No.	Lab Tests	Sample Rec (cm)	Blow Counts (N Value)	% < #200
0	0	Stiff to Very Stiff Reddish Brown Sandy Clay with Some Gravel	38.05				23		35	7-17-17-14 (34)	
0.8	2.67						24		42	6-8-6-7 (14)	
1.6	5.33						25		45	7-6-6-5 (12)	
							26		52	4-6-7-8 (13)	
2.4	8						27		55	7-7-8-10 (15)	
3.2	10.67						28		45	5-6-7-9 (13)	83
4	13.33						29		50	6-10-9-10 (19)	69
							30		57	8-8-12-11 (20)	
4.8	16						31		52	15-17-13-16 (30)	
5.6	18.67						32		20	12-11-13-13 (24)	
6.4	21.33						33		60	10-14-12-13 (26)	
							34		25	9-11-13-15 (24)	
7.2	24						35		47	12-21-19-22 (40)	
		Borehole Terminated at 7.93 m (Elevation = 30.12m)									

TEST RESULTS



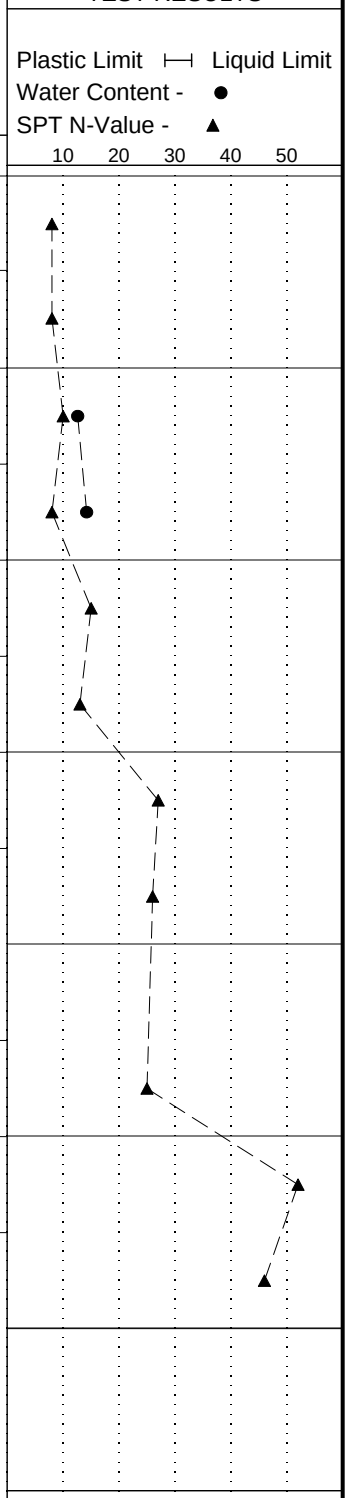
FUNDY Engineering

BOREHOLE LOG No. BH04

PROJECT: Geotechnical Investigation
CLIENT: PWGSC **DATUM:** Geodetic
PROJECT LOCATION: Nova Institute, Truro, NS **ELEVATION (m):** 37.85
DRILLING CONTRACTOR: Logan Drilling **PROJECT #** 9175
LOGGED BY: C.Ough **CHECKED BY:** A.Mouland
DRILLING METHOD: Skid Mount Drill **DATE:** April 18, 2012
DEPTH TO WATER (m): INITIAL: 1.83 **24 hrs.**

Depth (meters)	Depth (feet)	Description	Elevation (m)	Groundwater	Graphic	Sample Type	Sample No.	Lab Tests	Sample Rec (cm)	Blow Counts (N Value)	% < #200
0	0	Firm to Very Stiff Reddish Brown Sandy Clay with Some Gravel	37.85				36		30	3-4-4-4 (8)	
0.8	2.67						37		40	5-5-3-4 (8)	
1.6	5.33						38		35	4-5-5-5 (10)	47
							39		55	4-3-5-8 (8)	51
2.4	8						40		60	7-8-7-12 (15)	
3.2	10.67						41		40	4-6-7-13 (13)	
4	13.33						42		10	10-12-15-14 (27)	
		Very Stiff to Hard Reddish Brown Sandy Clay with Some Gravel and Cobbles	33.58				43		22	9-11-15-20 (26)	
4.8	16	Auger through Cobbles to 5.5m									
5.6	18.67						44		60	6-11-14-21 (25)	
6.4	21.33						45		25	20-21-31-44 (52)	
7.2	24						46		60	21-22-24-19 (46)	
		Borehole Terminated at 7.32 m (Elevation = 30.53m)									

TEST RESULTS



FUNDY Engineering

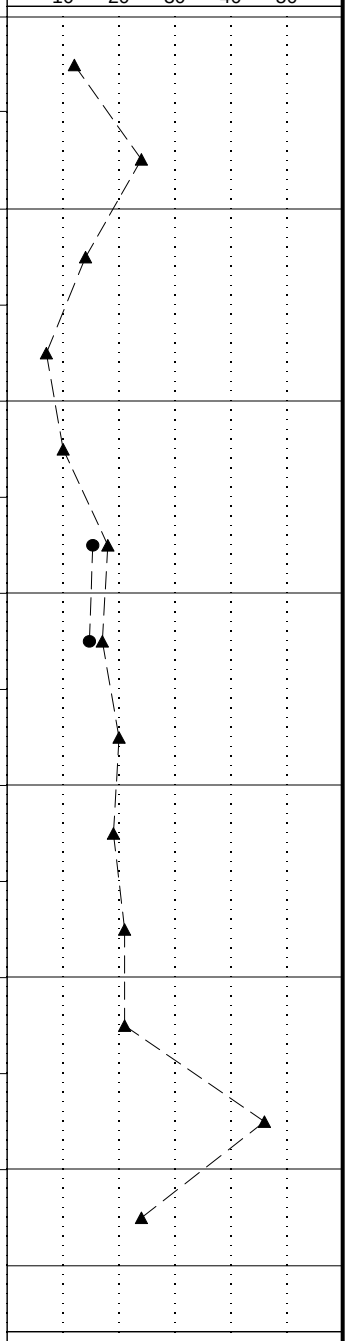
BOREHOLE LOG No. BH05

PROJECT: Geotechnical Investigation
CLIENT: PWGSC **DATUM:** Geodetic
PROJECT LOCATION: Nova Institute, Truro, NS **ELEVATION (m):** 37.75
DRILLING CONTRACTOR: Logan Drilling **PROJECT #** 9175
LOGGED BY: C.Ough **CHECKED BY:** A.Mouland
DRILLING METHOD: Skid Mount Drill **DATE:** April 17, 2012
DEPTH TO WATER (m): INITIAL: 1.83 **24 hrs.**

Depth (meters)	Depth (feet)	Description	Elevation (m)	Groundwater	Graphic	Sample Type	Sample No.	Lab Tests	Sample Rec (cm)	Blow Counts (N Value)	% < #200
0	0	Compact Sand and Gravel Fill	37.75				47		25	2-5-7-7 (12)	
0.8	2.67	Firm to Very Stiff Reddish Brown Sandy Clay with Some Gravel					48		50	11-13-11-9 (24)	
1.6	5.33						49		37	10-10-4-4 (14)	
							50		52	3-3-4-5 (7)	
2.4	8						51		37	2-4-6-11 (10)	
3.2	10.67						52		48	10-8-10-9 (18)	73
4	13.33						53		45	4-7-10-14 (17)	65
							54		48	7-9-11-12 (20)	
4.8	16						55		25	4-10-9-10 (19)	
5.6	18.67						56		22	5-9-12-10 (21)	
6.4	21.33						57		50	4-10-11-16 (21)	
							58		30	10-23-23-34 (46)	
7.2	24						59		30	9-11-13-13 (24)	
		Borehole Terminated at 7.93 m (Elevation = 29.82m)									

TEST RESULTS

Plastic Limit ⊢⊣ Liquid Limit
Water Content - ●
SPT N-Value - ▲



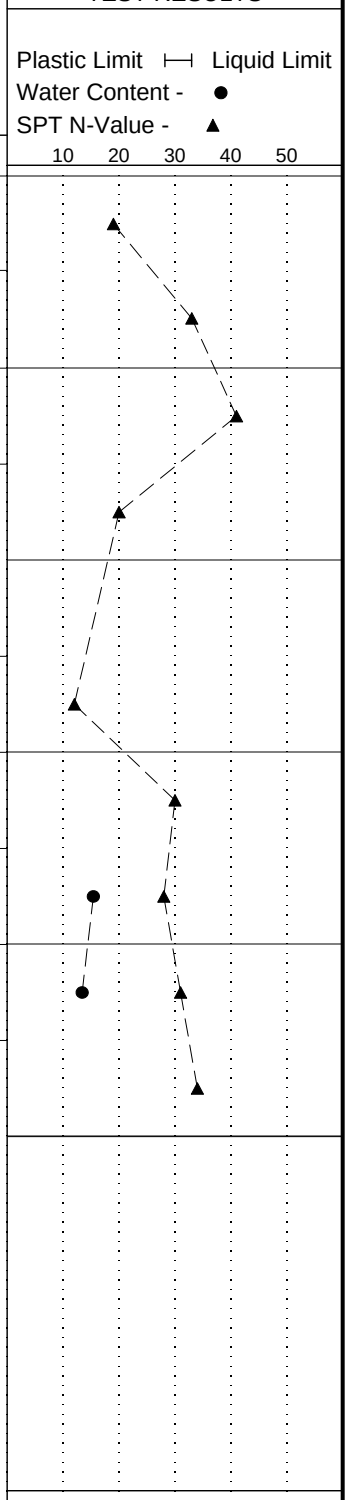
FUNDY Engineering

BOREHOLE LOG No. BH06

PROJECT: Geotechnical Investigation
CLIENT: PWGSC **DATUM:** Geodetic
PROJECT LOCATION: Nova Institute, Truro, NS **ELEVATION (m):** 38.07
DRILLING CONTRACTOR: Logan Drilling **PROJECT #** 9175
LOGGED BY: C.Ough **CHECKED BY:** A.Mouland
DRILLING METHOD: Skid Mount Drill **DATE:** April 19, 2012
DEPTH TO WATER (m): INITIAL: 0.61 **24 hrs.**

Depth (meters)	Depth (feet)	Description	Elevation (m)	Groundwater	Graphic	Sample Type	Sample No.	Lab Tests	Sample Rec (cm)	Blow Counts (N Value)	% < #200
0	0	Compact Sand and Gravel Fill	38.07				60		45	4-10-9-9 (19)	
0.8	2.67	Very Stiff to Hard Reddish Brown Sandy Clay with Some Gravel	37.47				61		39	5-15-18-18 (33)	
1.6	5.33						62		45	19-20-21-24 (41)	
							63		32	11-10-10-7 (20)	
2.4	8	Auger through Cobbles									
3.2	10.67	Stiff to Hard Reddish Brown Sandy Clay with Some Gravel and Cobbles	35.02				64		30	2-4-8-11 (12)	
4	13.33						65		60	12-15-15-14 (30)	
							66		18	12-13-15-14 (28)	54
4.8	16						67		45	13-14-17-22 (31)	62
5.6	18.67						68		25	18-17-17-20 (34)	
		Borehole Terminated at 6.10 m (Elevation = 31.97m)									

TEST RESULTS



FUNDY Engineering

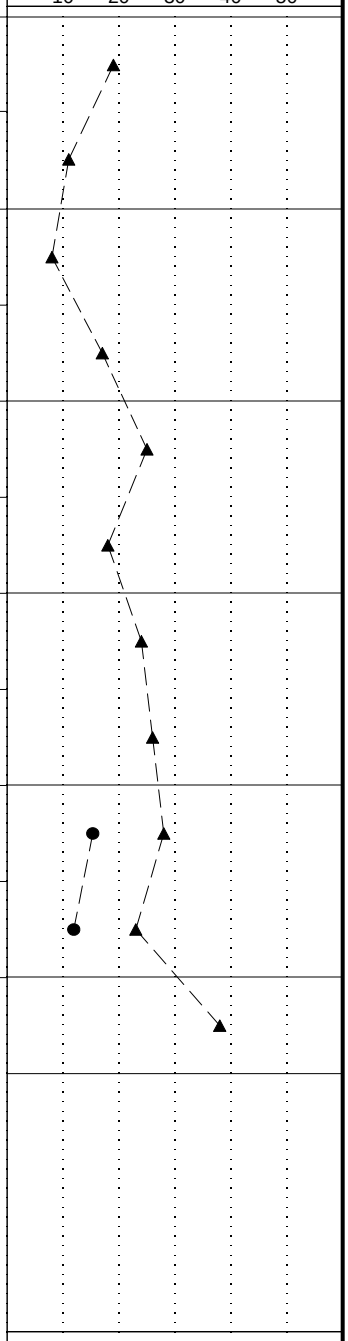
BOREHOLE LOG No. BH07

PROJECT: Geotechnical Investigation
CLIENT: PWGSC **DATUM:** Geodetic
PROJECT LOCATION: Nova Institute, Truro, NS **ELEVATION (m):** 37.94
DRILLING CONTRACTOR: Logan Drilling **PROJECT #** 9175
LOGGED BY: C.Ough **CHECKED BY:** A.Mouland
DRILLING METHOD: Skid Mount Drill **DATE:** April 17, 2012
DEPTH TO WATER (m): INITIAL: 1.22 **24 hrs.**

Depth (meters)	Depth (feet)	Description	Elevation (m)	Groundwater	Graphic	Sample Type	Sample No.	Lab Tests	Sample Rec (cm)	Blow Counts (N Value)	% < #200
0	0	Compact Grey Sand and Gravel Fill	37.94				69		25	6-7-12-12 (19)	
0.8	2.67	Firm to Very Stiff Reddish Brown Sandy Clay with Some Gravel					70		21	10-4-7-5 (11)	
1.6	5.33						71		36	6-4-4-7 (8)	
2.4	8						72		60	8-7-10-10 (17)	
3.2	10.67						73		60	11-13-12-14 (25)	
4	13.33						74		33	9-8-10-10 (18)	
4.8	16						75		47	6-11-13-14 (24)	
5.6	18.67						76		60	9-14-12-11 (26)	
6.4	21.33						77		50	9-12-16-13 (28)	61
							78		60	11-10-13-14 (23)	59
		Hard Reddish Brown Clay with Some Gravel and Cobbles	31.84				79		40	14-18-20-16 (38)	
		Borehole Terminated at 6.71 m (Elevation = 31.23m)									

TEST RESULTS

Plastic Limit ⊢⊣ Liquid Limit
Water Content - ●
SPT N-Value - ▲



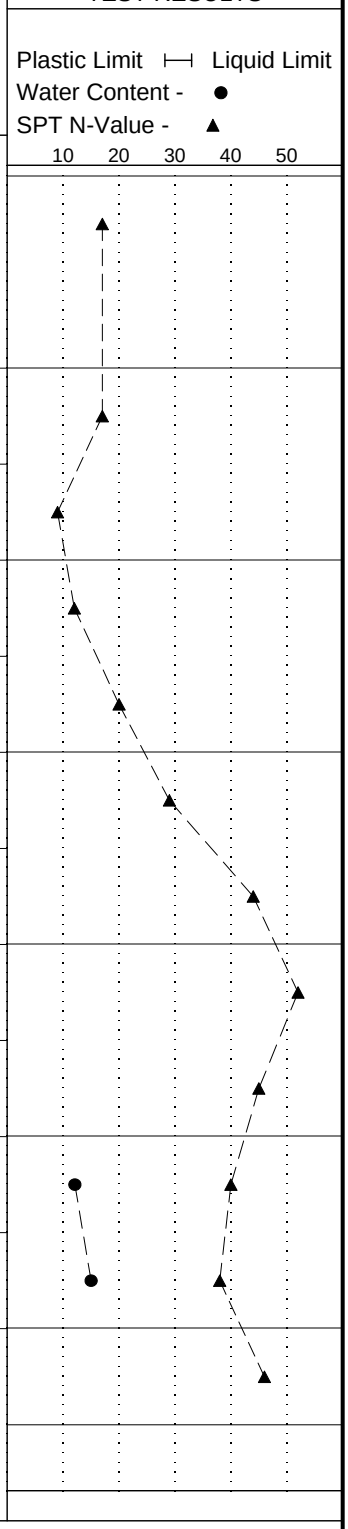
FUNDY Engineering

BOREHOLE LOG
No. BH08

PROJECT: Geotechnical Investigation
CLIENT: PWGSC **DATUM:** Geodetic
PROJECT LOCATION: Nova Institute, Truro, NS **ELEVATION (m):** 37.73
DRILLING CONTRACTOR: Logan Drilling **PROJECT #** 9175
LOGGED BY: C.Ough **CHECKED BY:** A.Mouland
DRILLING METHOD: Skid Mount Drill **DATE:** April 17, 2012
DEPTH TO WATER (m): INITIAL: 1.22 **24 hrs.**

Depth (meters)	Depth (feet)	Description	Elevation (m)	Groundwater	Graphic	Sample Type	Sample No.	Lab Tests	Sample Rec (cm)	Blow Counts (N Value)	% < #200
0	0	Gravel and Sand Fill with Cobbles	37.73						29	4-6-11-25 (17)	
0.8	2.67	Auger through Cobbles to 1.2m									
1.6	5.33	Firm to Very Stiff Reddish Brown Sandy Clay with Some Gravel	36.51	▽			80		24	9-10-7-4 (17)	
							81		30	3-4-5-4 (9)	
2.4	8						82		10	9-6-6-7 (12)	
3.2	10.67						83		35	3-10-10-12 (20)	
4	13.33						84		12	13-15-14-15 (29)	
		Very Stiff to Hard Reddish Brown Sandy Clay with Some Gravel and Cobbles	33.46				85		60	23-22-22-24 (44)	
4.8	16						86		45	6-7-45-24 (52)	
5.6	18.67						87		25	18-22-23-24 (45)	
6.4	21.33						88		30	20-20-20-18 (40)	51
7.2	24						89		35	16-14-24-22 (38)	34
							90		40	21-23-23-20 (46)	
		Borehole Terminated at 7.93 m (Elevation = 29.8m)									

TEST RESULTS



FUNDY Engineering

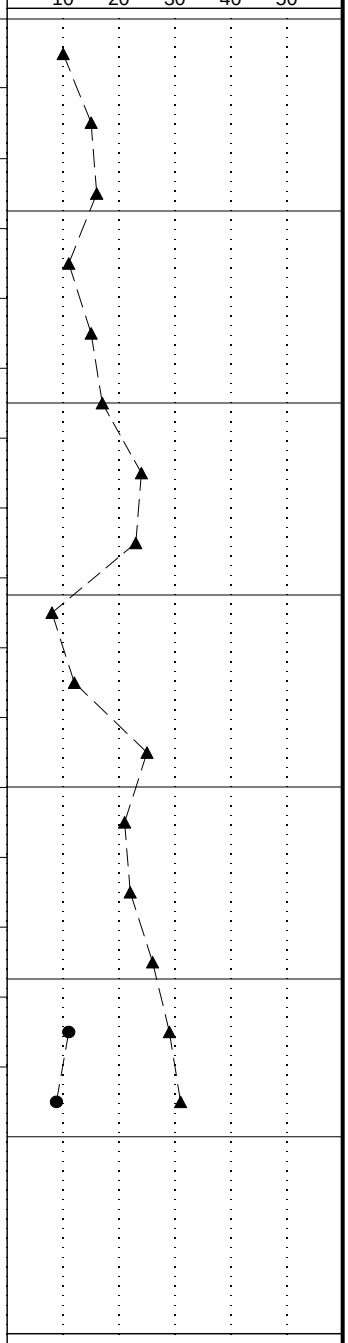
BOREHOLE LOG No. BH09

PROJECT: Geotechnical Investigation
CLIENT: PWGSC **DATUM:** Geodetic
PROJECT LOCATION: Nova Institute, Truro, NS **ELEVATION (m):** 39.78
DRILLING CONTRACTOR: Logan Drilling **PROJECT #** 9175
LOGGED BY: C.Ough **CHECKED BY:** A.Mouland
DRILLING METHOD: Skid Mount Drill **DATE:** April 18, 2012
DEPTH TO WATER (m): INITIAL: 2.44 **24 hrs.**

Depth (meters)	Depth (feet)	Description	Elevation (m)	Groundwater	Graphic	Sample Type	Sample No.	Lab Tests	Sample Rec (cm)	Blow Counts (N Value)	% < #200
0	0	Firm to Stiff Reddish Brown Sandy Clay with Some Gravel	39.78				91		50	1-2-8-10 (10)	
							92		45	8-7-8-6 (15)	
1.1	3.67						93		47	8-9-7-5 (16)	
							94		20	4-5-6-8 (11)	
2.2	7.33						95		30	6-7-8-9 (15)	
							96		55	4-7-10-10 (17)	
3.3	11	Very Stiff Reddish Brown Sandy Clay with Some Gravel and Sand Seams	36.12				97		37	9-12-12-13 (24)	
							98		38	7-11-12-12 (23)	
4.4	14.67	Firm to Hard Reddish Brown Sandy Clay with Some Gravel and Cobbles	34.9				99		25	3-2-6-7 (8)	
							100		26	4-5-7-8 (12)	
5.5	18.33						101		43	9-12-13-10 (25)	
							102		35	6-9-12-11 (21)	
6.6	22						103		38	7-10-12-12 (22)	
							104		27	7-12-14-14 (26)	
7.7	25.67						105		22	8-13-16-20 (29)	41
							106		50	8-13-18-24 (31)	28
8.8	29.33	Borehole Terminated at 9.76 m (Elevation = 30.02m)									

TEST RESULTS

Plastic Limit ⊢⊣ Liquid Limit
Water Content - ●
SPT N-Value - ▲



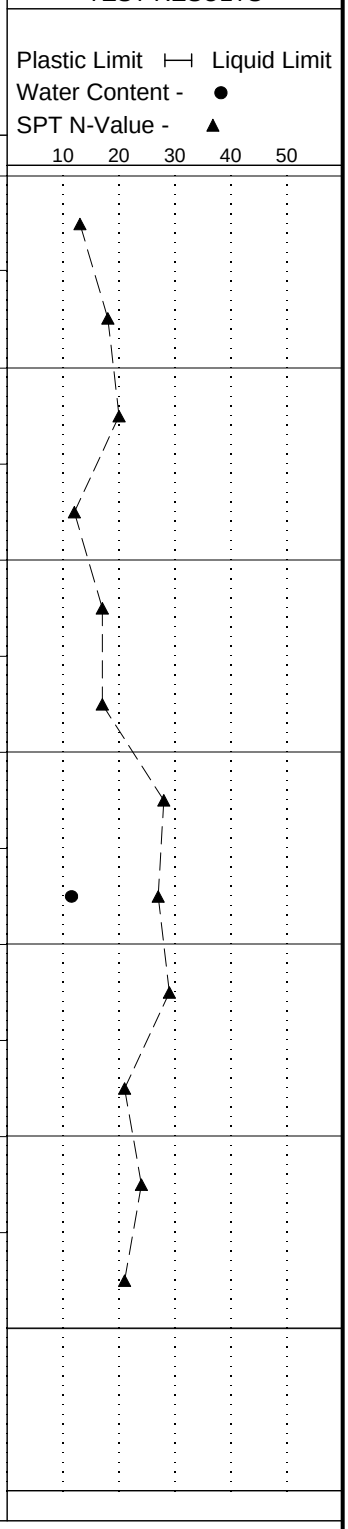
FUNDY Engineering

BOREHOLE LOG No. BH10

PROJECT: Geotechnical Investigation
CLIENT: PWGSC **DATUM:** Geodetic
PROJECT LOCATION: Nova Institute, Truro, NS **ELEVATION (m):** 40.22
DRILLING CONTRACTOR: Logan Drilling **PROJECT #** 9175
LOGGED BY: C.Ough **CHECKED BY:** A.Mouland
DRILLING METHOD: Skid Mount Drill **DATE:** April 19, 2012
DEPTH TO WATER (m): INITIAL: 2.44 **24 hrs.**

Depth (meters)	Depth (feet)	Description	Elevation (m)	Groundwater	Graphic	Sample Type	Sample No.	Lab Tests	Sample Rec (cm)	Blow Counts (N Value)	% < #200
0	0	Firm to Stiff Reddish Brown Sandy Clay with Some Gravel	40.22				107		20	2-4-9-13 (13)	
0.8	2.67						108		8	10-10-8-7 (18)	
1.6	5.33						109		40	11-11-9-8 (20)	
							110		9	6-6-6-7 (12)	
2.4	8			▽			111		11	8-9-8-13 (17)	
3.2	10.67						112		42	4-7-10-10 (17)	
4	13.33	Reddish Brown Sandy Clay with Some Gravel and Cobbles	36.56				113		38	7-15-13-12 (28)	
							114		45	10-13-14-13 (27)	68
4.8	16						115		40	12-15-14-15 (29)	
5.6	18.67						116		32	10-11-10-13 (21)	
6.4	21.33						117		41	8-15-9-12 (24)	
7.2	24	Borehole Terminated at 7.32 m (Elevation = 32.9m)					118		60	9-10-11-11 (21)	

TEST RESULTS



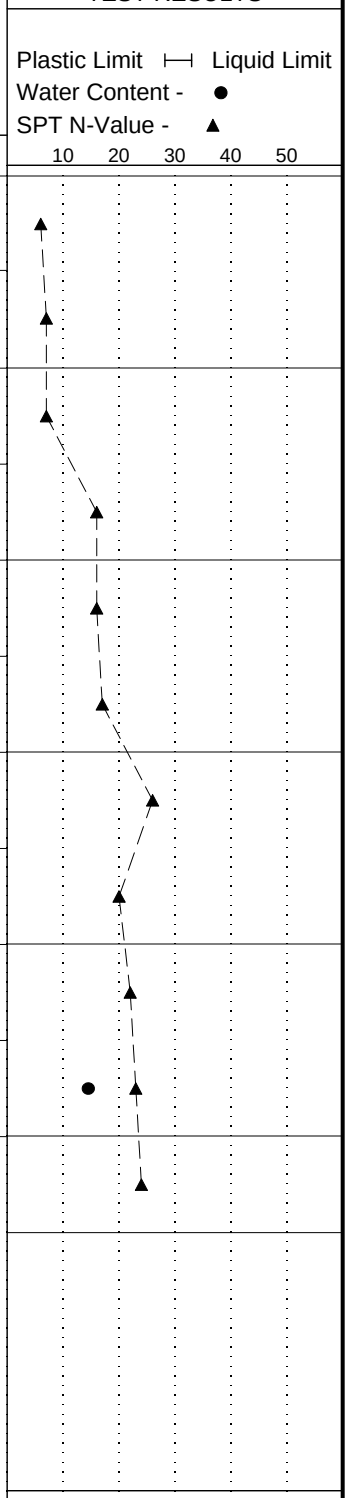
FUNDY Engineering

BOREHOLE LOG No. BH11

PROJECT: Geotechnical Investigation
CLIENT: PWGSC **DATUM:** Geodetic
PROJECT LOCATION: Nova Institute, Truro, NS **ELEVATION (m):** 39.59
DRILLING CONTRACTOR: Logan Drilling **PROJECT #** 9175
LOGGED BY: C.Ough **CHECKED BY:** A.Mouland
DRILLING METHOD: Skid Mount Drill **DATE:** April 19, 2012
DEPTH TO WATER (m): INITIAL: 2.44 **24 hrs.**

Depth (meters)	Depth (feet)	Description	Elevation (m)	Groundwater	Graphic	Sample Type	Sample No.	Lab Tests	Sample Rec (cm)	Blow Counts (N Value)	% < #200
0	0	Firm to Very Stiff Reddish Brown Sandy Clay with Some Gravel	39.59				119		35	3-2-4-3 (6)	
0.8	2.67						120		20	3-4-3-5 (7)	
1.6	5.33						121		43	3-3-4-9 (7)	
2.4	8			▽			122		29	6-6-10-10 (16)	
3.2	10.67						123		18	4-7-9-13 (16)	
4	13.33						124		45	6-7-10-11 (17)	
4.8	16						125		60	11-13-13-14 (26)	
5.6	18.67						126		55	8-10-10-11 (20)	
6.4	21.33	Very Stiff Reddish Brown Sandy Clay with Some Gravel and Cobbles	34.71				127		43	12-12-10-13 (22)	
							128		60	9-10-13-12 (23)	58
							129		51	11-10-14-12 (24)	
		Borehole Terminated at 6.71 m (Elevation = 32.88m)									

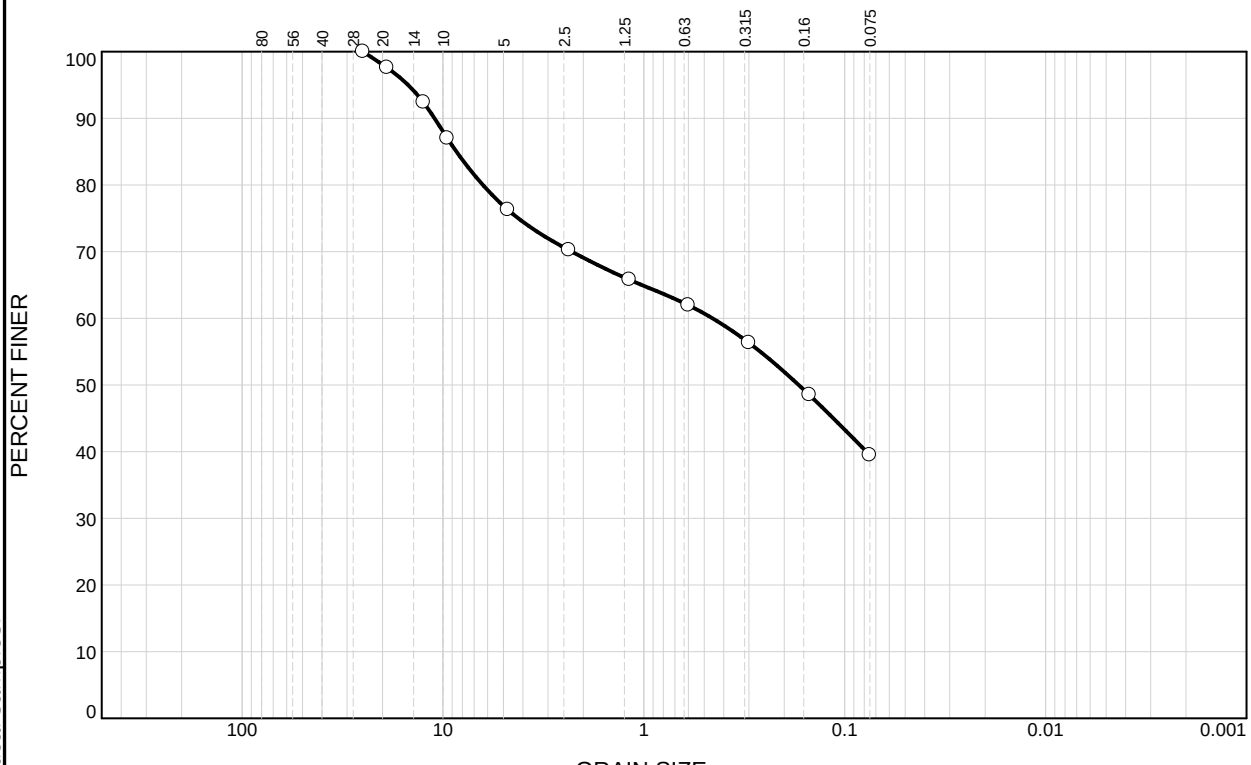
TEST RESULTS



APPENDIX IV

LABORATORY TESTING RESULTS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	2	22	7	10	20	39	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
25 mm	100		
19 mm	98		
12.5 mm	92		
9.5 mm	87		
4.75 mm	76		
2.36 mm	70		
1.18 mm	66		
0.6 mm	62		
0.3 mm	56		
0.15 mm	49		
0.075 mm	39		

* (no specification provided)

Material Description

Reddish Brown Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 11.0143 D_{85}= 8.5641 D_{60}= 0.4551
D_{50}= 0.1693 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH01 **Depth:** .06

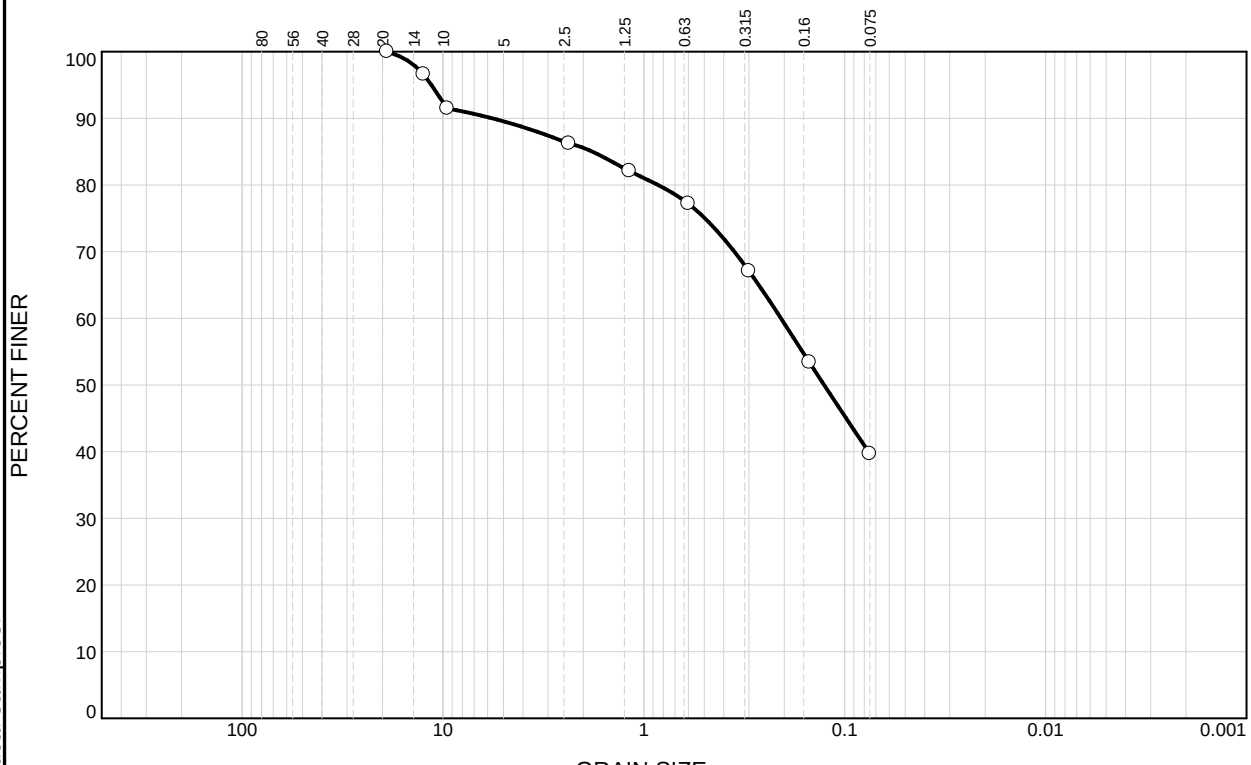
Date: 04/23/2012

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrikson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	11	3	13	33	40	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100		
12.5 mm	97		
9.5 mm	91		
2.36 mm	86		
1.18 mm	82		
0.6 mm	77		
0.3 mm	67		
0.15 mm	53		
0.075 mm	40		

* (no specification provided)

Material Description

Reddish Brown Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 5.6810 D_{85}= 1.8044 D_{60}= 0.2076
D_{50}= 0.1266 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH01 **Depth:** 1.22

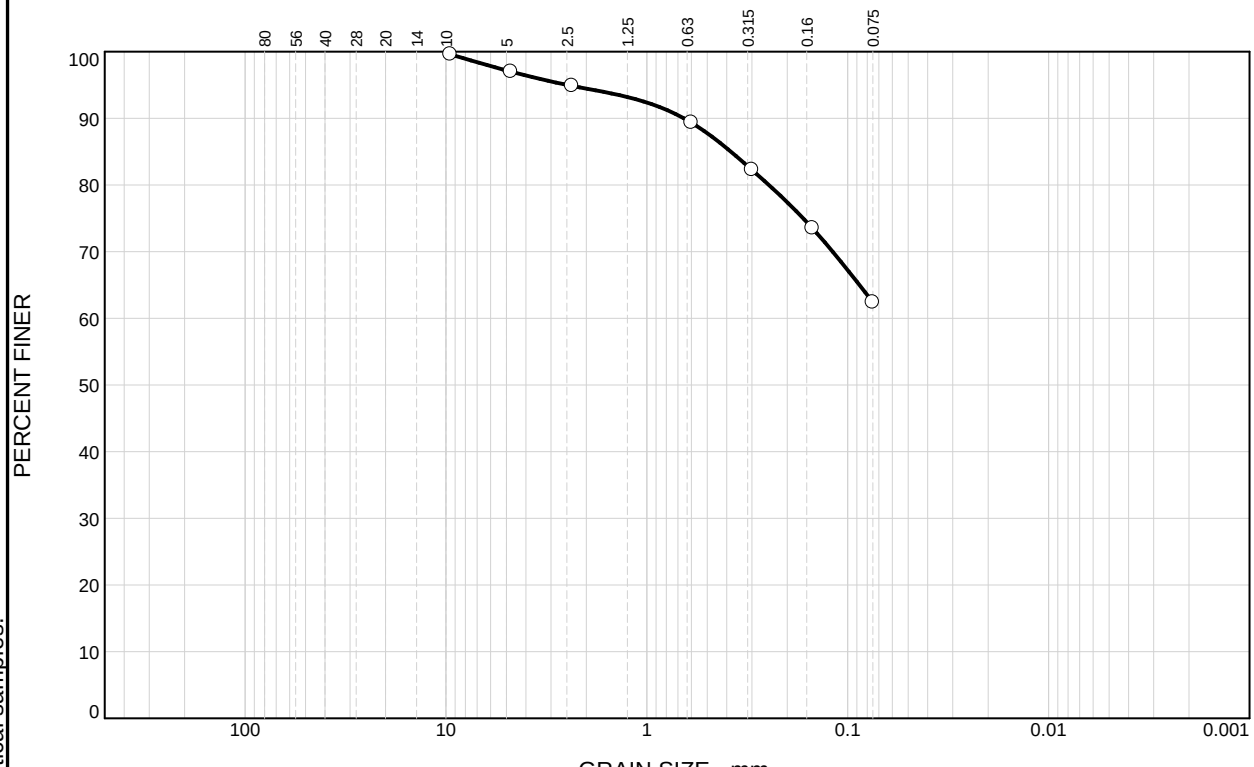
Date: 04/23/2012

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrikson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			3	8	24	62	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5mm	100		
4.75mm	97		
2.36mm	95		
.6mm	89		
.3mm	82		
.15mm	74		
.075mm	62		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6536 D_{85}= 0.3819 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH02 **Depth:** 1.83

Date:

FUNDY Engineering

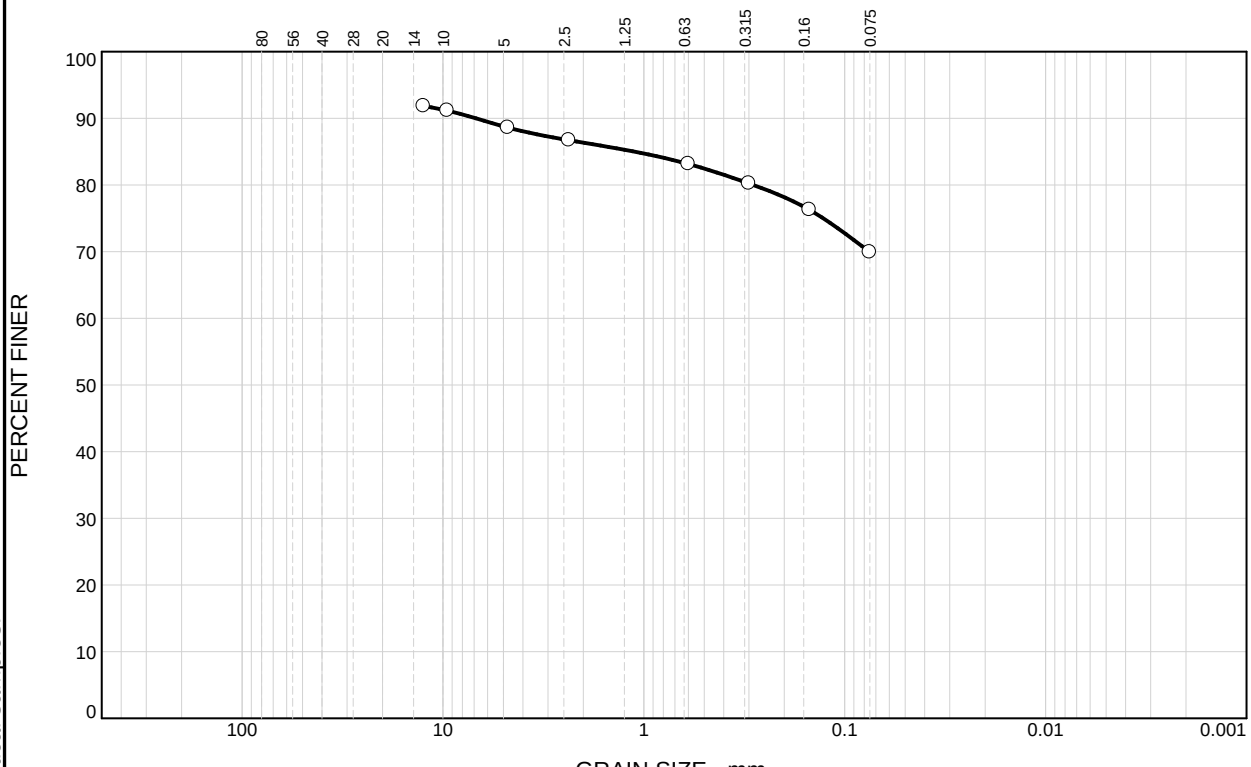
Client: PWGSC
Project: Geotechnical Investigation

Project No: 9175 **Figure**

Tested By: Rob Haineault

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			3	4	12	70	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
12.5mm	92		
9.5mm	91		
4.75mm	89		
2.36mm	87		
.6mm	83		
.3mm	80		
.15mm	76		
.075mm	70		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 6.8594 D_{85}= 1.1145 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH02 **Depth:** 2.44

Date:

FUNDY Engineering

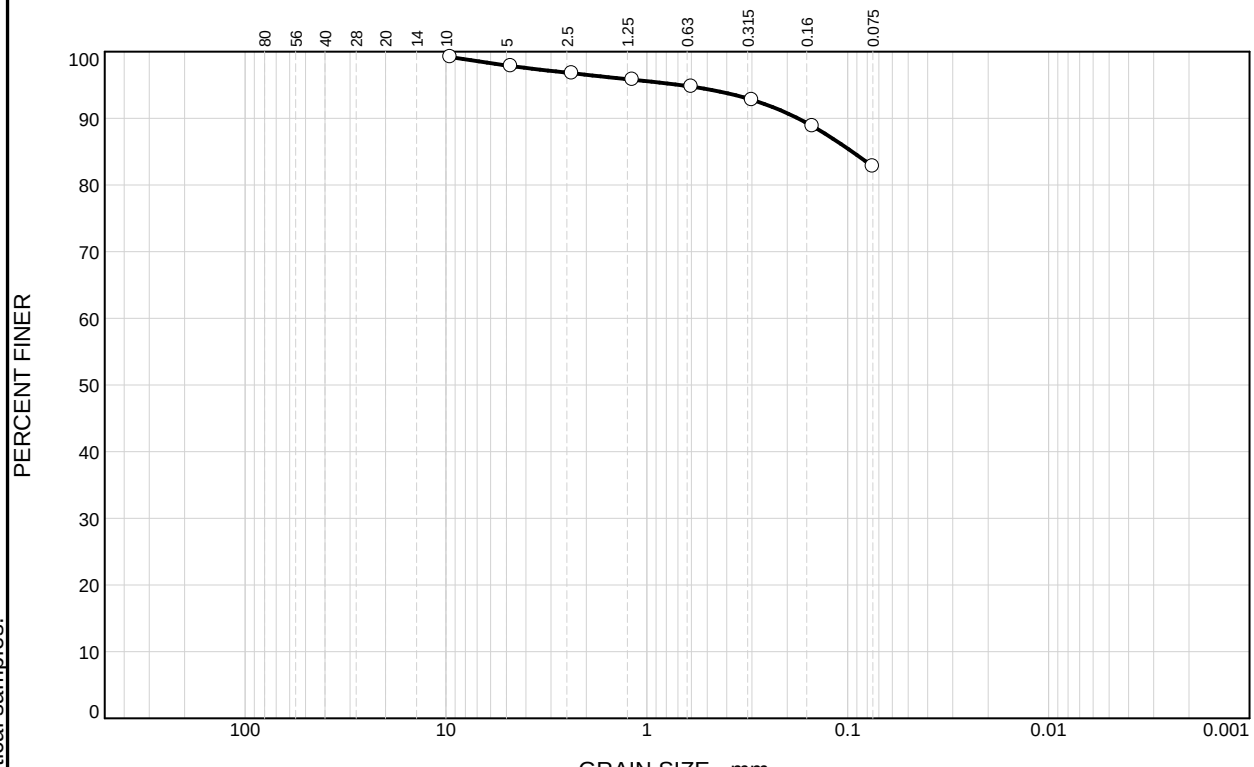
Client: PWGSC
Project: Geotechnical Investigation

Project No: 9175 **Figure**

Tested By: Rob Haineault

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			1	3	11	83	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5mm	99		
4.75mm	98		
2.36mm	97		
1.18mm	96		
.6mm	95		
.3mm	93		
.15mm	89		
.075mm	83		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1771 D_{85}= 0.0951 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH03 **Depth:** 3.05

Date:

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

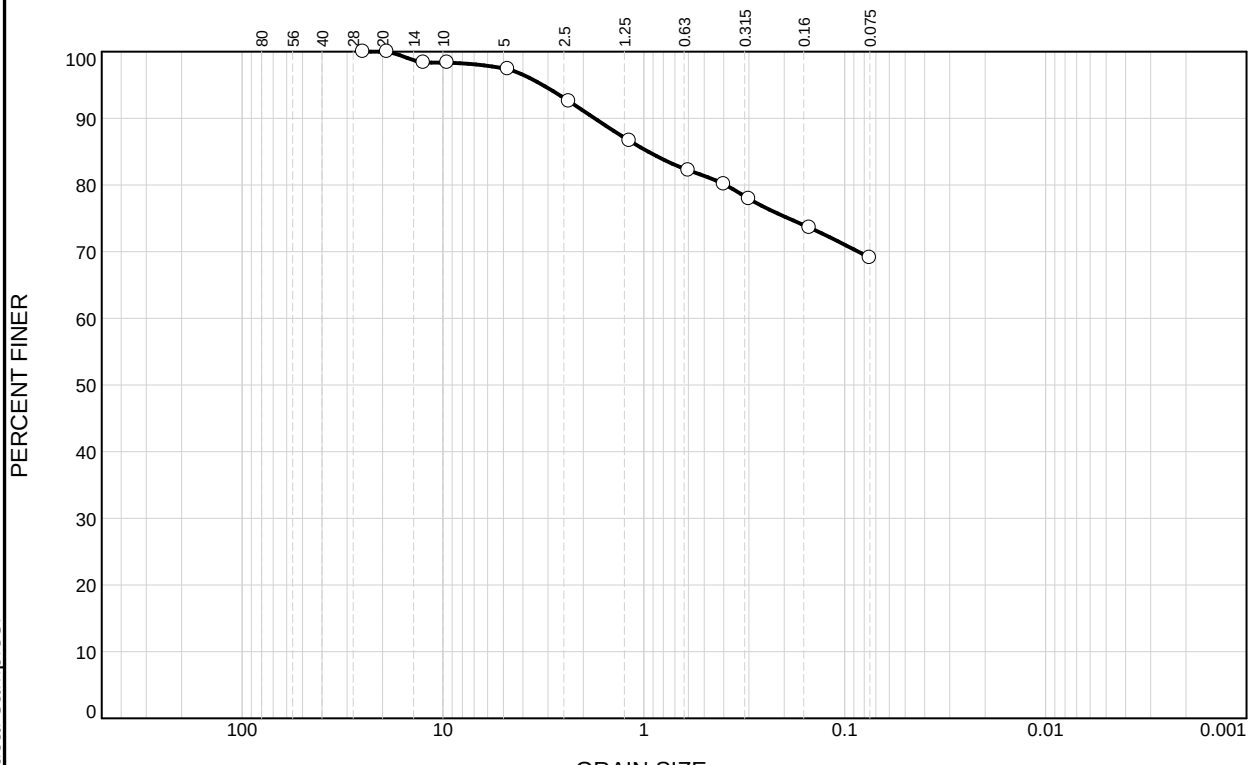
FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation

Project No: 9175 **Figure**

Tested By: Rob Haineault

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	3	6	10	12	69	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
25 mm	100		
19 mm	100		
12.5 mm	98		
9.5 mm	98		
4.75 mm	97		
2.36 mm	93		
1.18 mm	87		
0.6 mm	82		
.4 mm	80		
0.3 mm	78		
0.15 mm	74		
.075 mm	69		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.7562 D_{85}= 0.9512 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH03 **Depth:** 3.66

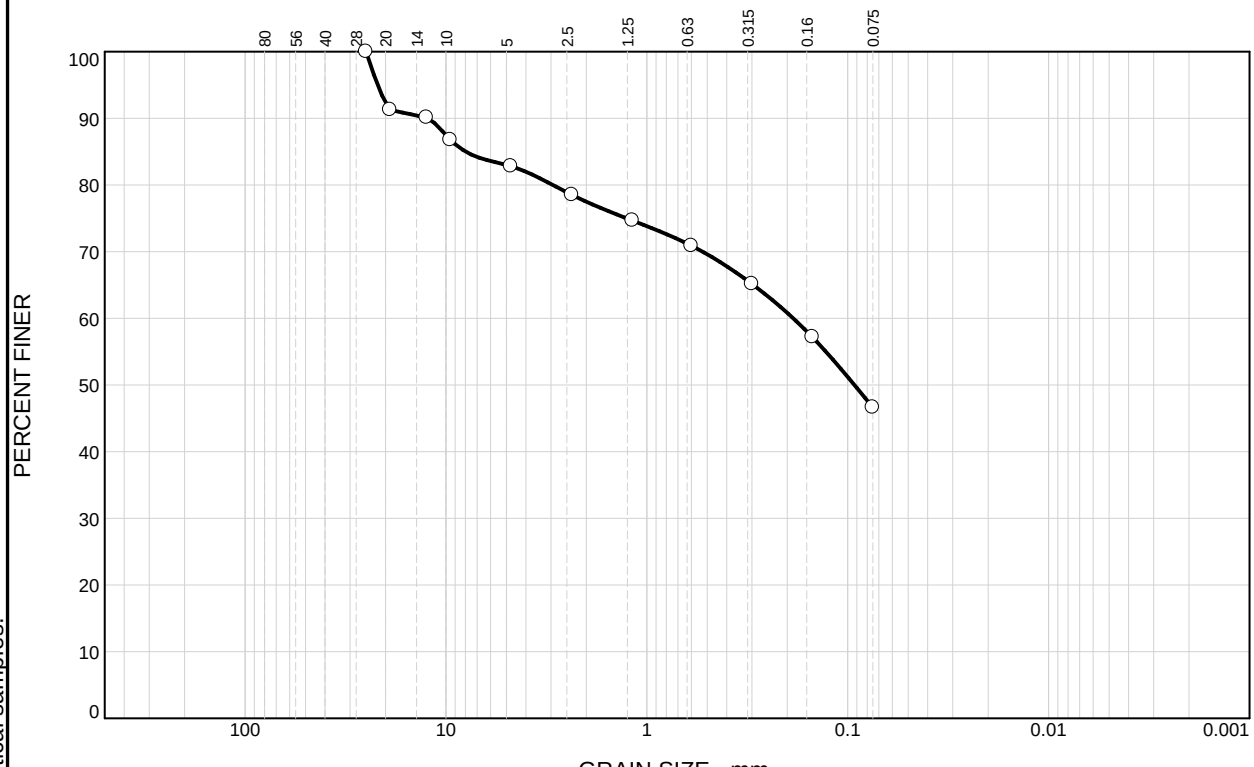
Date: 4/23/12

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrikson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	9	8	6	9	21	47	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
25 mm	100		
19 mm	91		
12.5 mm	90		
9.5 mm	87		
4.75 mm	83		
2.36 mm	79		
1.18 mm	75		
0.6 mm	71		
0.3 mm	65		
0.15 mm	57		
0.075 mm	47		

* (no specification provided)

Material Description

Reddish Brown Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 12.2809 D_{85}= 7.9717 D_{60}= 0.1867
D_{50}= 0.0926 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH04 **Depth:** 1.22

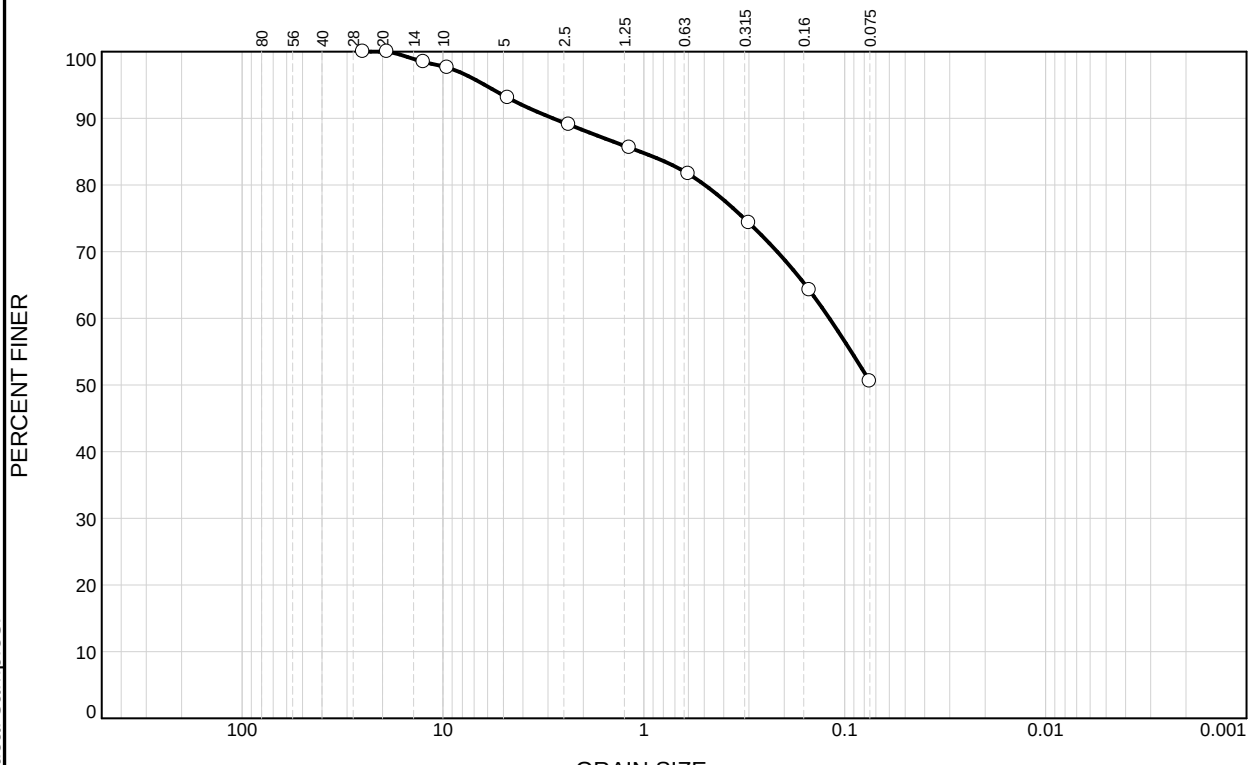
Date: 04/23/2012

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrikson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	7	5	10	27	51	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
25 mm	100		
19 mm	100		
12.5 mm	98		
9.5 mm	98		
4.75 mm	93		
2.36 mm	89		
1.18 mm	86		
0.6 mm	82		
0.3 mm	74		
0.15 mm	64		
.075 mm	51		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.8320 D_{85}= 1.0430 D_{60}= 0.1192
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH04 **Depth:** 1.83

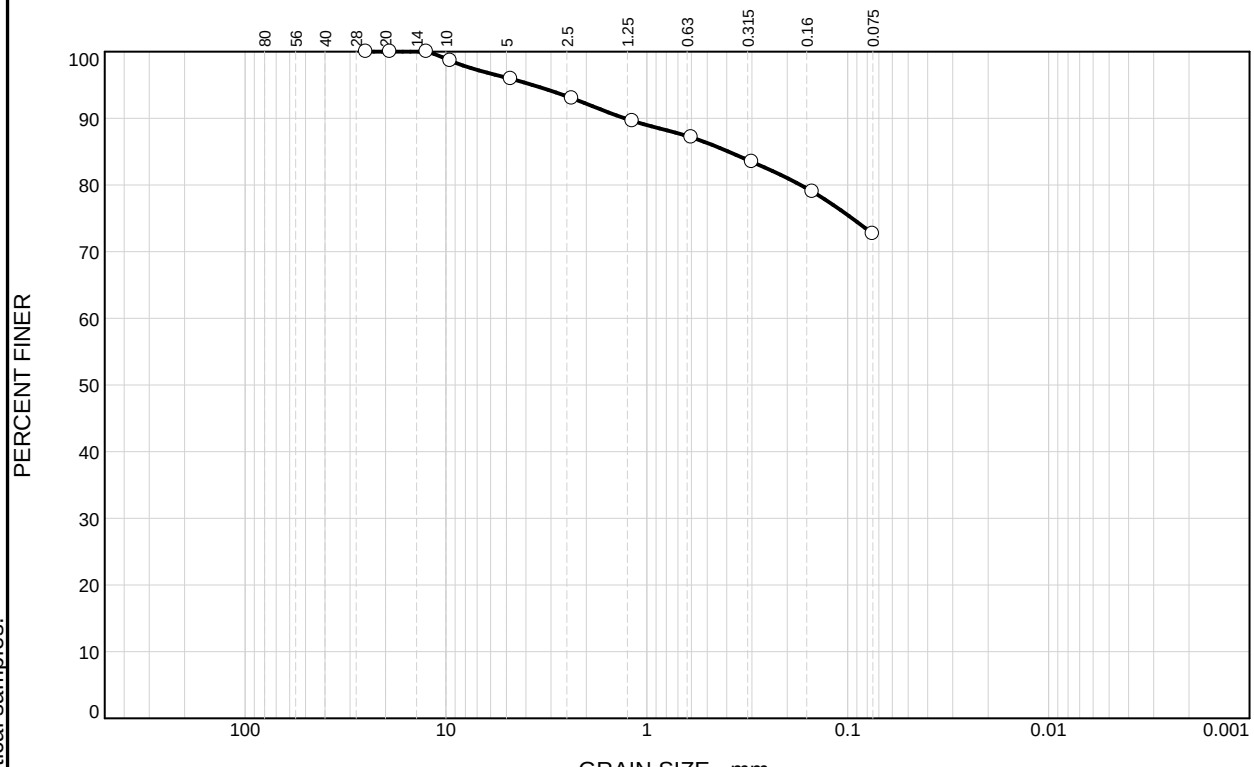
Date: 23/04/2012

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrikson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	4	4	7	12	73	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
25 mm	100		
19 mm	100		
12.5 mm	100		
9.5 mm	99		
4.75 mm	96		
2.36 mm	93		
1.18 mm	90		
0.6 mm	87		
0.3 mm	83		
0.15 mm	79		
.075 mm	73		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.2895 D_{85}= 0.3917 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH05 **Depth:** 3.05

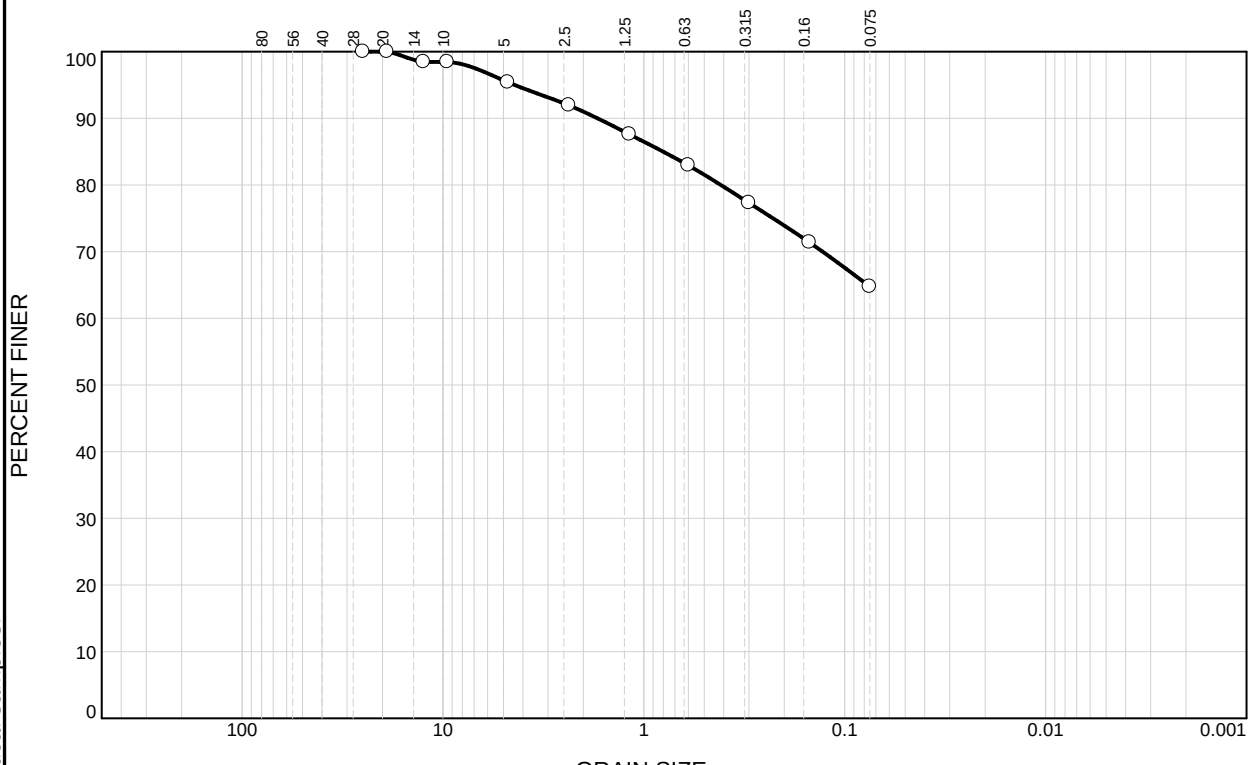
Date: 23/04/2012

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrikson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	5	4	11	15	65	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
25 mm	100		
19 mm	100		
12.5 mm	98		
9.5 mm	98		
4.75 mm	95		
2.36 mm	92		
1.18 mm	88		
0.6 mm	83		
0.3 mm	77		
0.15 mm	71		
0.075 mm	65		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.7007 D_{85}= 0.8006 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH05 **Depth:** 3.66

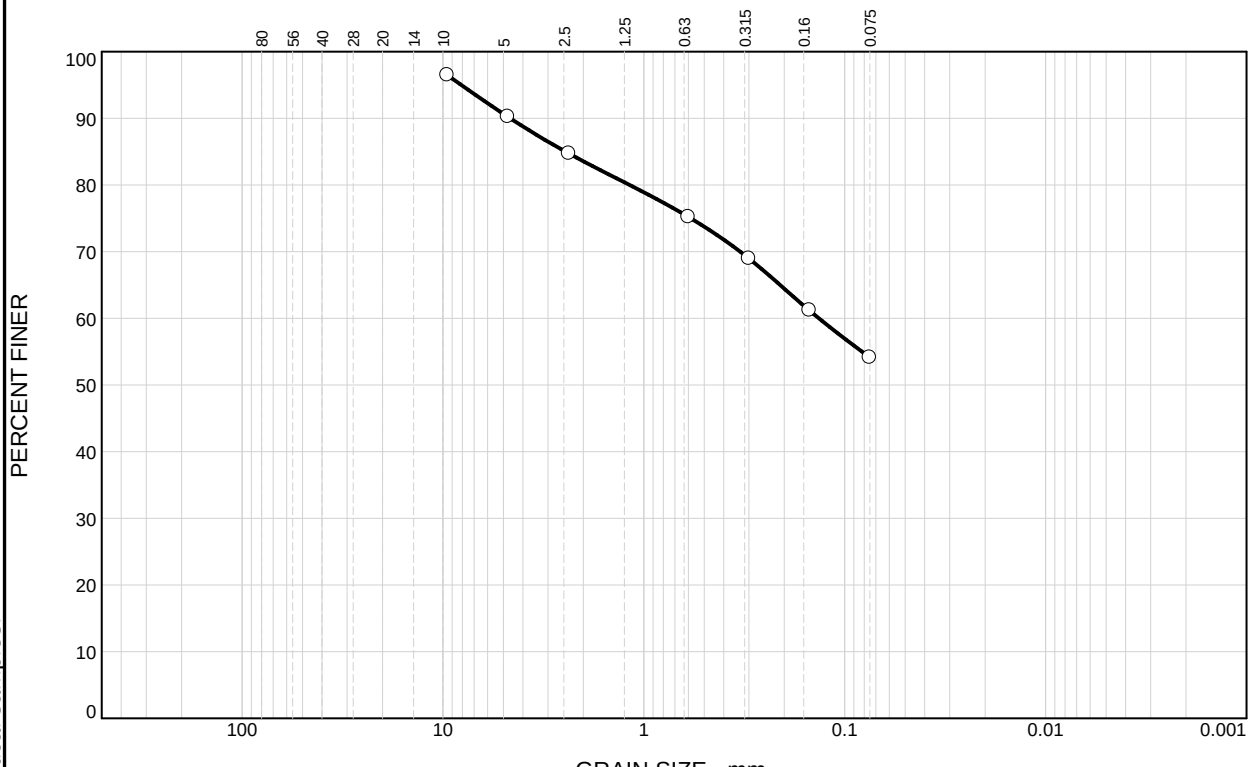
Date: 23/04/2012

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrikson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
			6	12	18	54	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5mm	96		
4.75mm	90		
2.36mm	85		
.6mm	75		
.3mm	69		
.15mm	61		
.075mm	54		

* (no specification provided)

Material Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 4.6273 D_{85}= 2.4516 D_{60}= 0.1344
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH06 **Depth:** 4.27

Date:

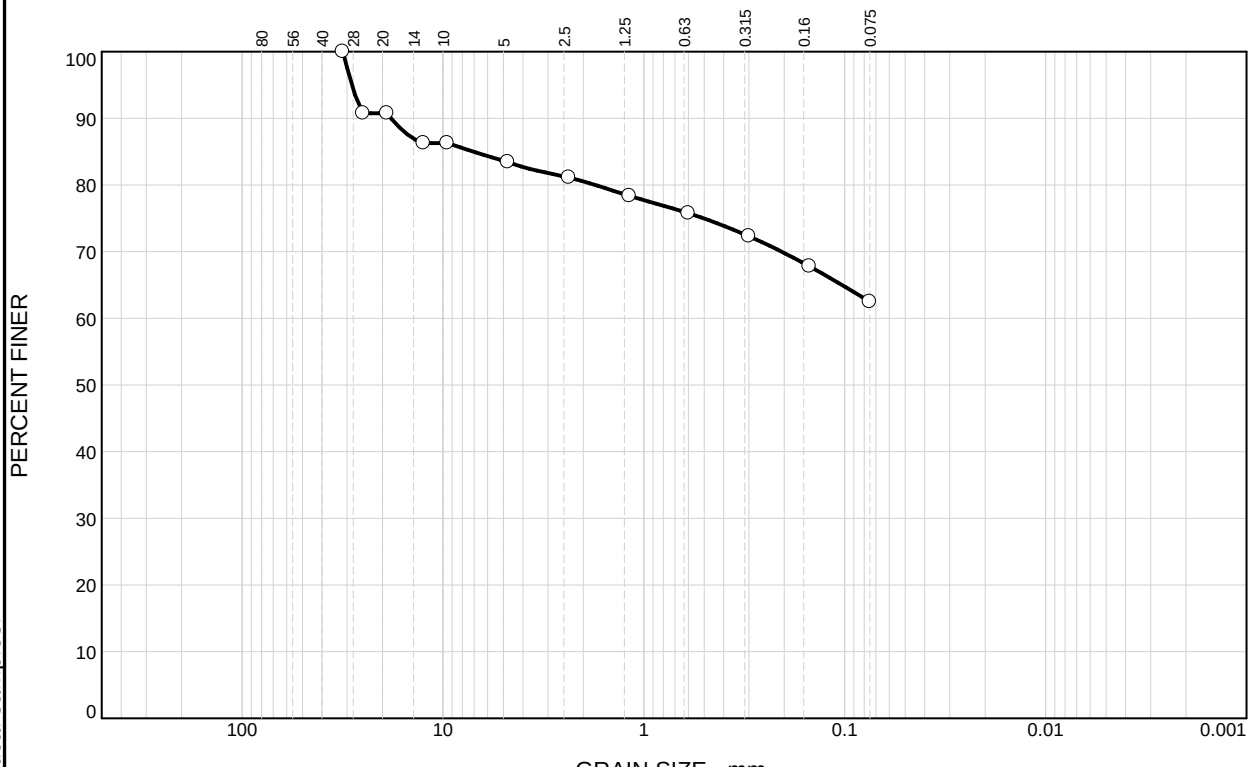
FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation

Project No: 9175 **Figure**

Tested By: Rob Haineault

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	9	8	2	7	12	62	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
31.5 mm	100		
25 mm	91		
19 mm	91		
12.5 mm	86		
9.5 mm	86		
4.75 mm	83		
2.36 mm	81		
1.18 mm	78		
0.6 mm	76		
0.3 mm	72		
0.15 mm	68		
0.075 mm	62		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 18.1419 D_{85}= 7.0472 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH06 **Depth:** 4.88

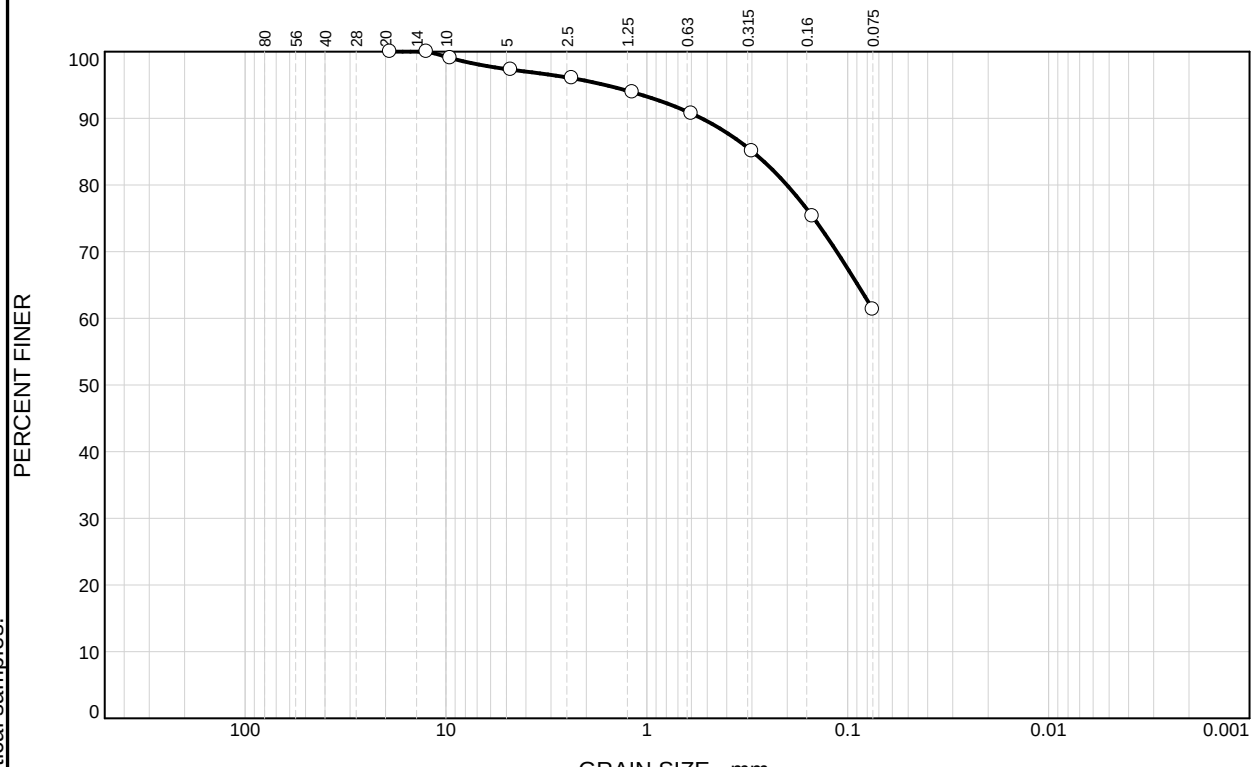
Date: 23/04/2012

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrickson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	3	1	8	27	61	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100		
12.5 mm	100		
9.5 mm	99		
4.75 mm	97		
2.36 mm	96		
1.18 mm	94		
0.6 mm	91		
0.3 mm	85		
0.15 mm	75		
0.075 mm	61		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.5338 D_{85}= 0.2976 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH07 **Depth:** 4.88

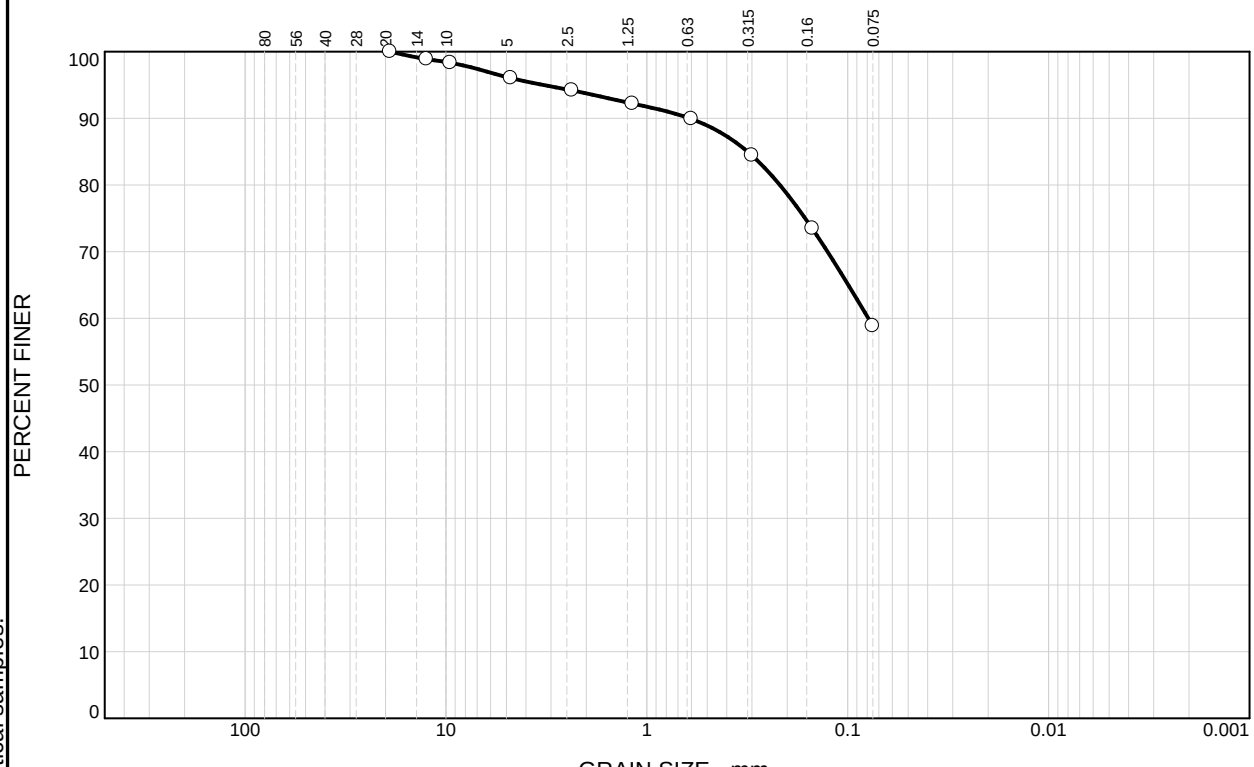
Date: 23/04/2012

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrickson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	4	2	6	29	59	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100		
12.5 mm	99		
9.5 mm	98		
4.75 mm	96		
2.36 mm	94		
1.18 mm	92		
0.6 mm	90		
0.3 mm	84		
0.15 mm	73		
0.075 mm	59		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6117 D_{85}= 0.3150 D_{60}= 0.0790
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH07 **Depth:** 5.49

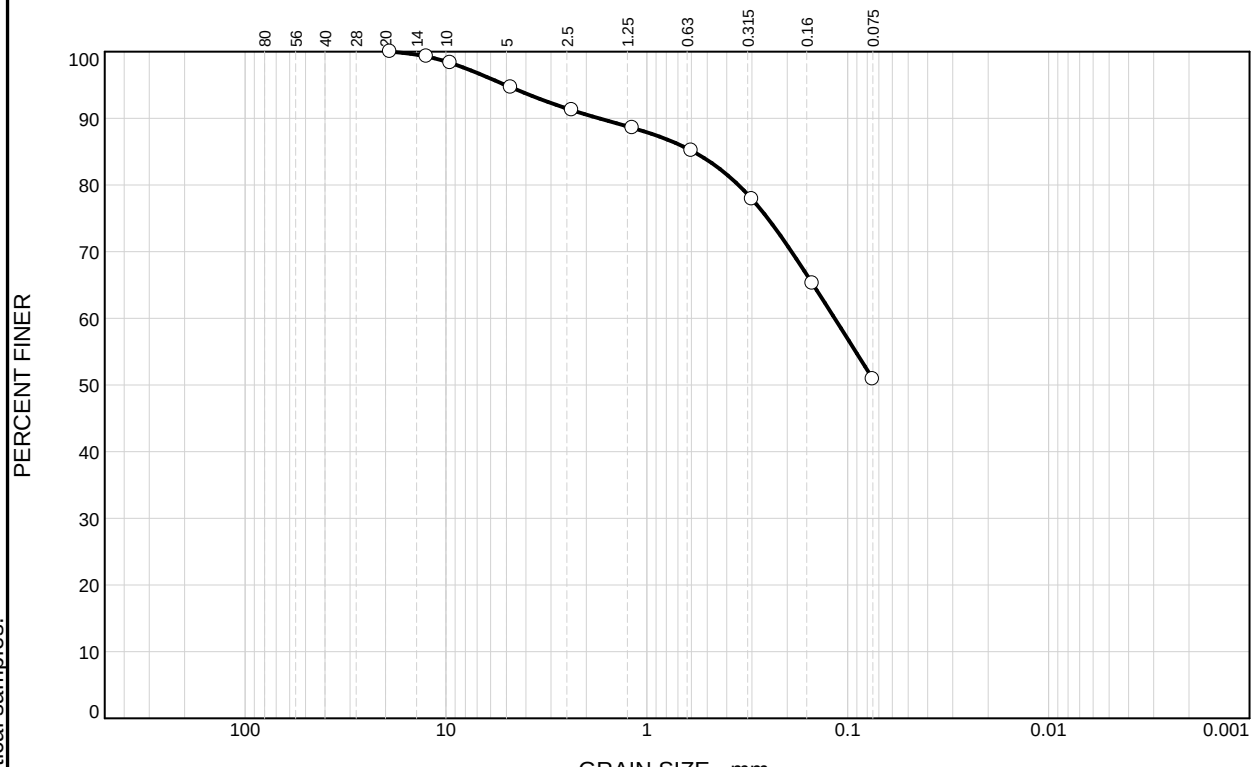
Date: 04/23/2012

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrikson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	5	4	9	31	51	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100		
12.5 mm	99		
9.5 mm	98		
4.75 mm	95		
2.36 mm	91		
1.18 mm	89		
0.6 mm	85		
0.3 mm	78		
0.15 mm	65		
0.075 mm	51		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.7314 D_{85}= 0.5867 D_{60}= 0.1161
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH08 **Depth:** 6.10

Date: 23/04/2012

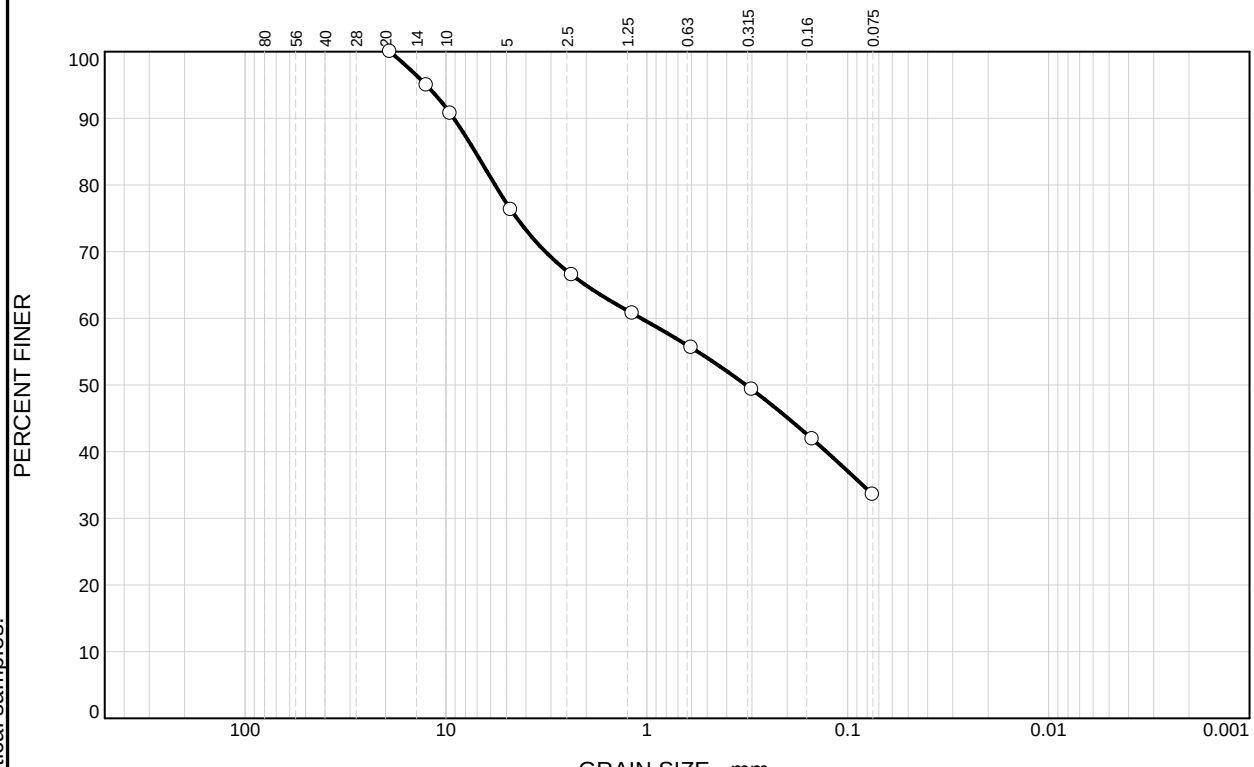
These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrickson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	24	11	12	19	34	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100		
12.5 mm	95		
9.5 mm	91		
4.75 mm	76		
2.36 mm	66		
1.18 mm	61		
0.6 mm	56		
0.3 mm	49		
0.15 mm	42		
0.075 mm	34		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 9.1365 D_{85}= 7.1610 D_{60}= 1.0675
D_{50}= 0.3212 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH08 **Depth:** 6.71

Date: 23/04/2012

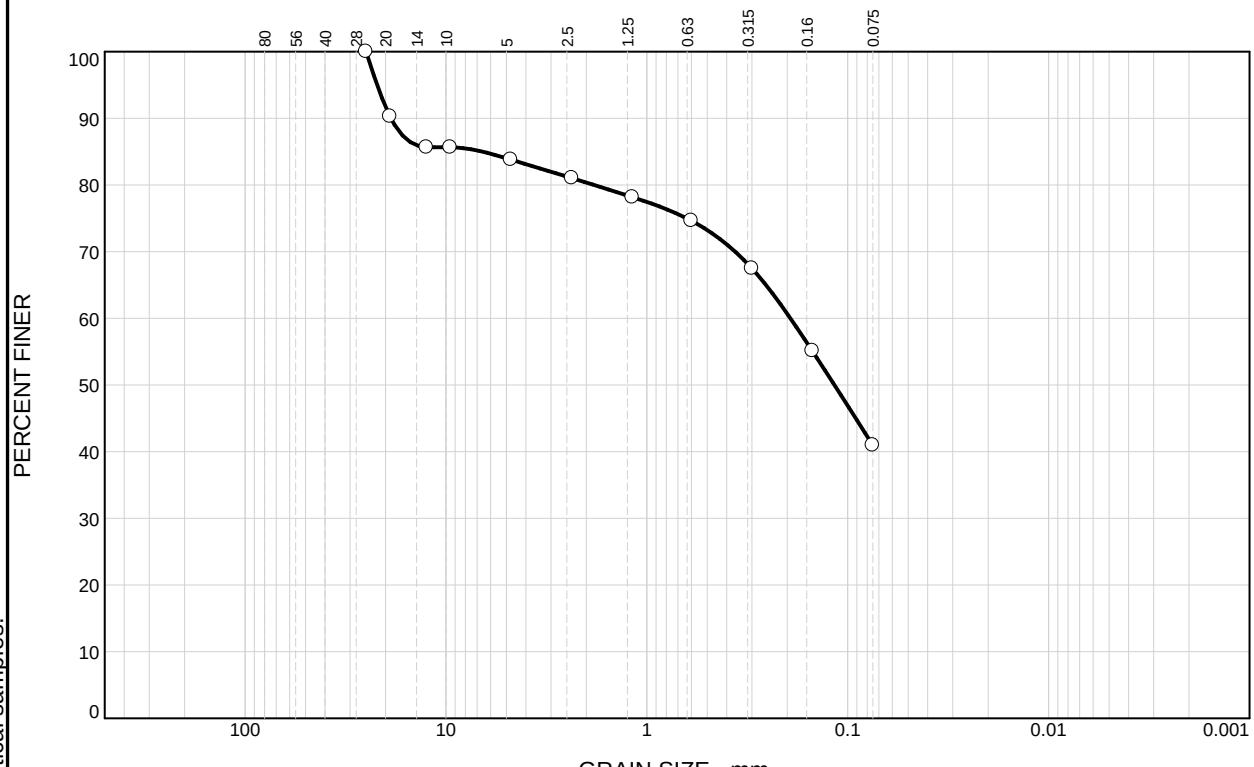
These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrickson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	10	6	4	8	31	41	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
25 mm	100		
19 mm	90		
12.5 mm	86		
9.5 mm	86		
4.75 mm	84		
2.36 mm	81		
1.18 mm	78		
0.6 mm	75		
0.3 mm	67		
0.15 mm	55		
0.075 mm	41		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 18.7998 D_{85}= 6.5876 D_{60}= 0.1928
D_{50}= 0.1165 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH09 **Depth:** 8.54

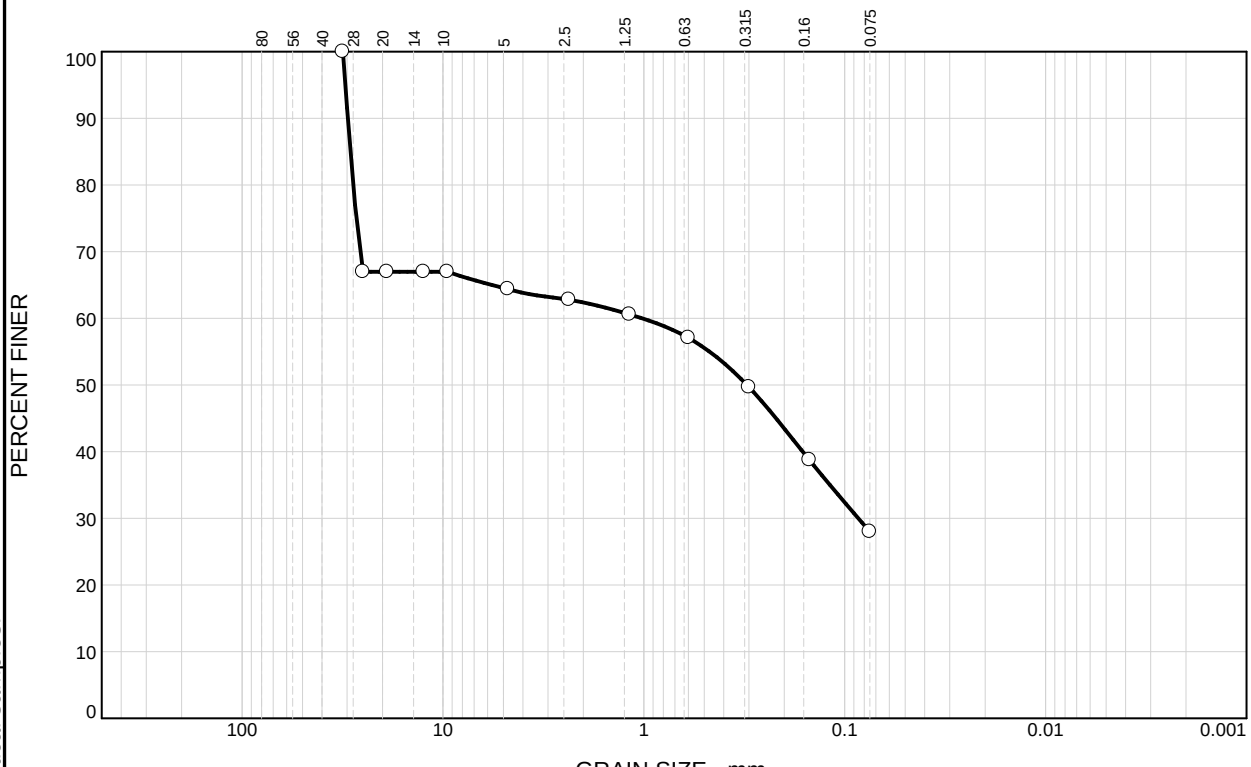
Date: 23/04/2012

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrickson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	33	3	2	8	26	28	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
31.5 mm	100		
25 mm	67		
19 mm	67		
12.5 mm	67		
9.5 mm	67		
4.75 mm	64		
2.36 mm	63		
1.18 mm	61		
0.6 mm	57		
0.3 mm	50		
0.15 mm	39		
0.075 mm	28		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 29.7552 D_{85}= 28.8794 D_{60}= 1.0217
D_{50}= 0.3068 D_{30}= 0.0856 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH09 **Depth:** 9.15

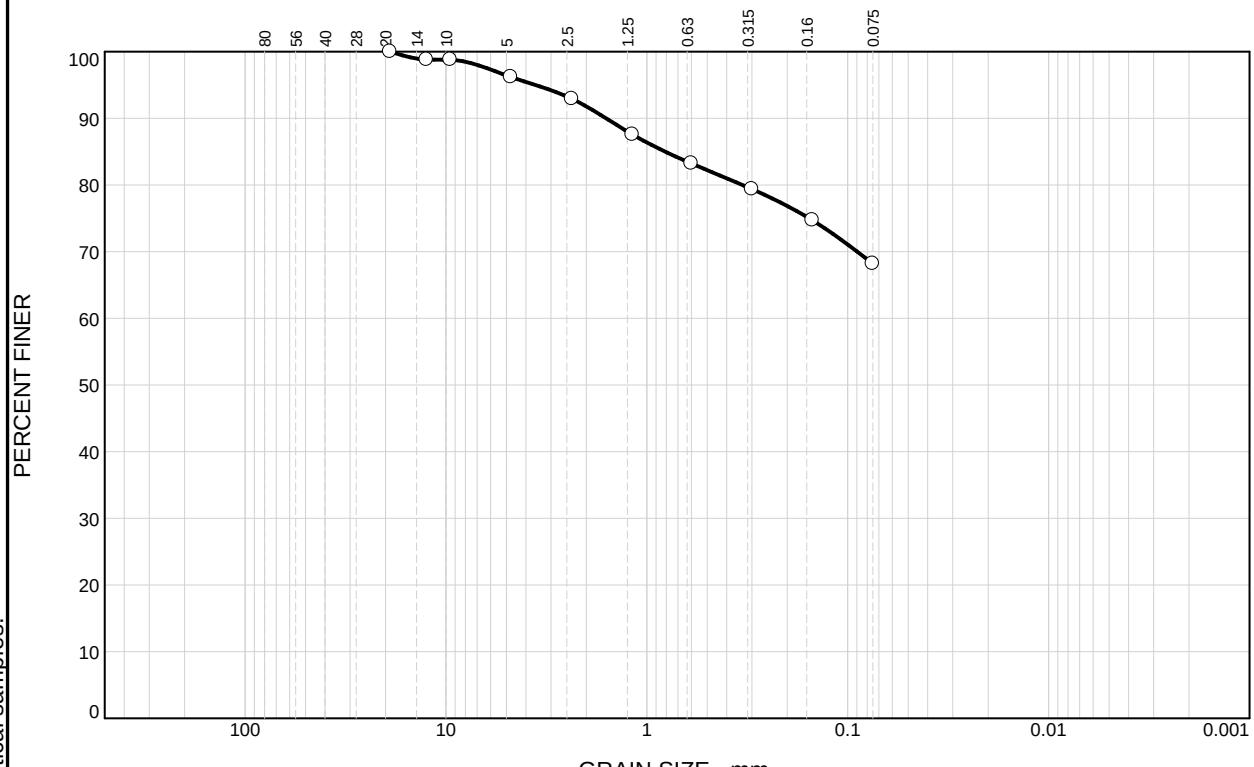
Date: 23/04/2012

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrickson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	4	4	11	13	68	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19 mm	100		
12.5 mm	99		
9.5 mm	99		
4.75 mm	96		
2.36 mm	93		
1.18 mm	88		
0.6 mm	83		
0.3 mm	79		
0.15 mm	75		
0.075 mm	68		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.5947 D_{85}= 0.8102 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH10 **Depth:** 4.27

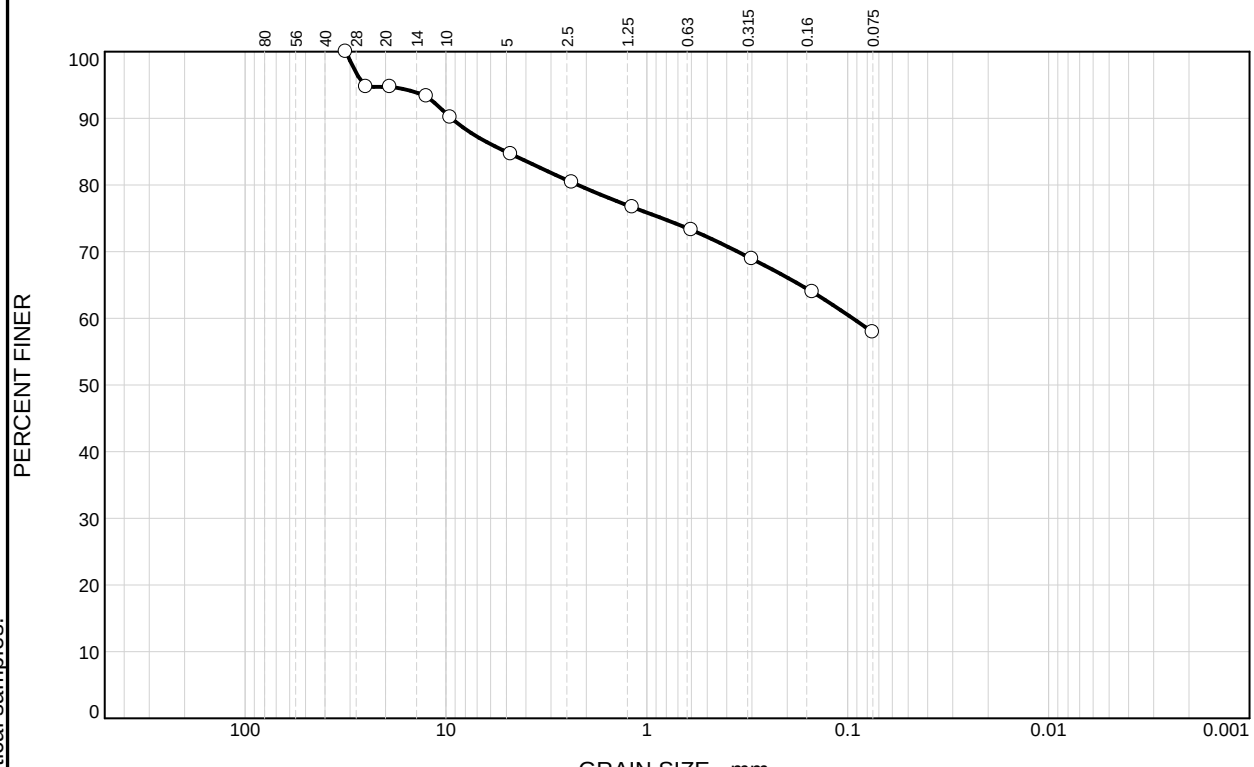
Date:

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrikson **Checked By:** C.Ough

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	5	10	6	8	13	58	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
31.5 mm	100		
25 mm	95		
19 mm	95		
12.5 mm	93		
9.5 mm	90		
4.75 mm	85		
2.36 mm	80		
1.18 mm	77		
0.6 mm	73		
0.3 mm	69		
0.15 mm	64		
0.075 mm	58		

* (no specification provided)

Material Description

Sandy Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 9.3823 D_{85}= 5.0245 D_{60}= 0.0945
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: BH11 **Depth:** 5.49

Date: 23/04/2012

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

FUNDY Engineering

Client: PWGSC
Project: Geotechnical Investigation
Project No: 9175 **Figure**

Tested By: T.Henrickson **Checked By:** C.Ough

Reference Number: 135134-AQS

Date: April 23, 2012

Client: Cameron Ough
Fundy Engineering & Consulting
27 Wellington Row
Saint John, NB
E2L 4S1

RADON ANALYSIS

(Project No 9175)

An E-PERM Electret Ion Chamber was used for a short-term radon screening measurement conducted at the Nova Institution in Truro, Nova Scotia. The sample was collected over a 48-hour time period. The results can be found in Table 1.

Table 1: Radon Results

Sample Identification	Radon (Bq/m^3)
BH-7 @ 2' depth	**5934**

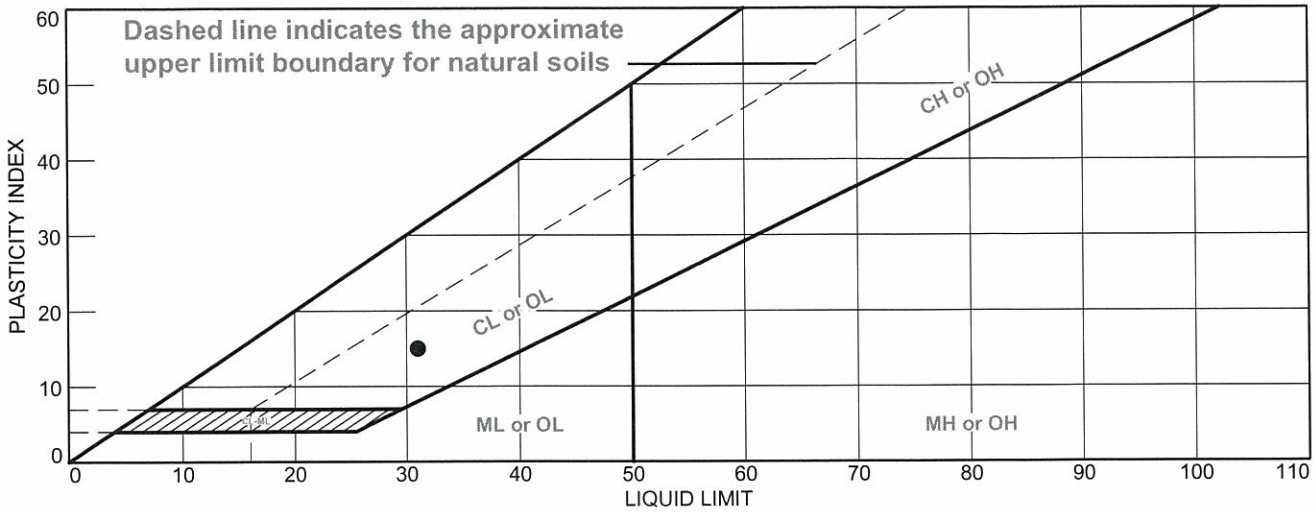
This report relates only to the sample and information provided to the laboratory

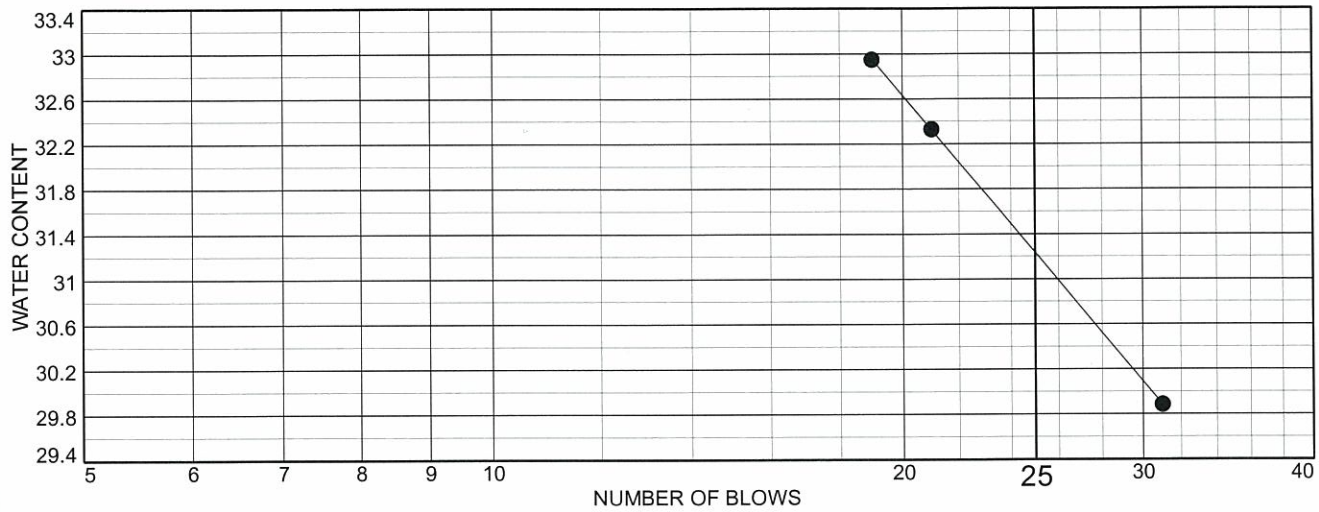
I trust that this information is useful to you and encourage you to call if you have any questions regarding this report.

Karla McLellan
Air Quality Technician

Diane Botelho
Air Quality Scientist

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●		31	16	15			

Project No. 9175 **Client:** PWGSC

Project: Geotechnical Investigation

● **Source of Sample:** BH02 **Depth:** 3.05 **Sample Number:** 17

Remarks:

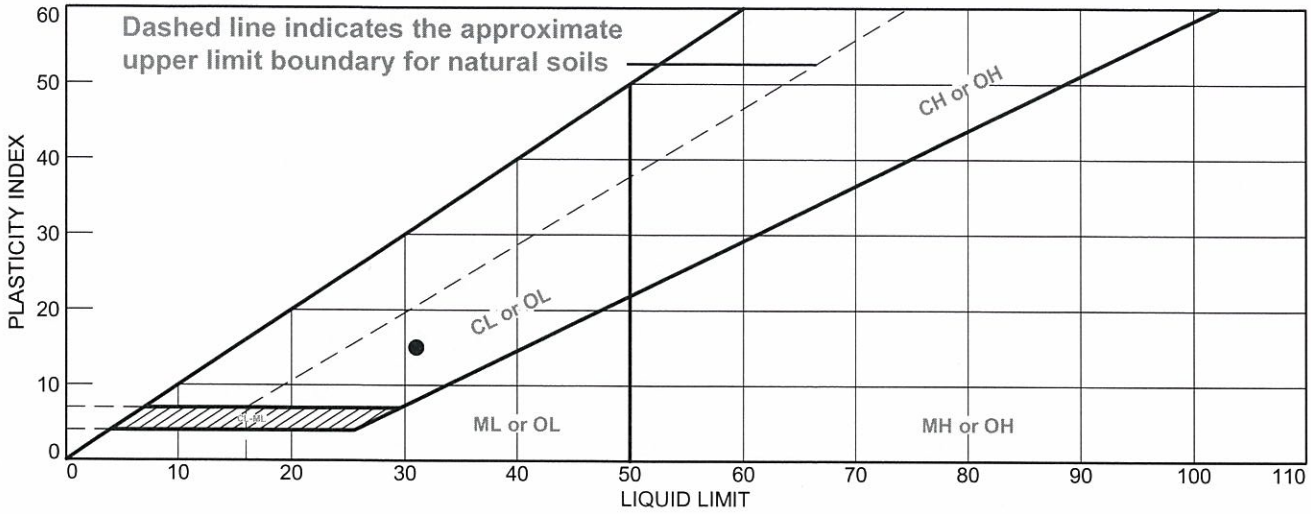
FUNDY Engineering

Figure

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Tested By: T.Henrikson **Checked By:** A.Mouland

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●		31	16	15			

Project No. 9175 **Client:** PWGSC

Project: Geotechnical Investigation

● **Source of Sample:** BH05 **Depth:** 2.44 **Sample Number:** 51

Remarks:

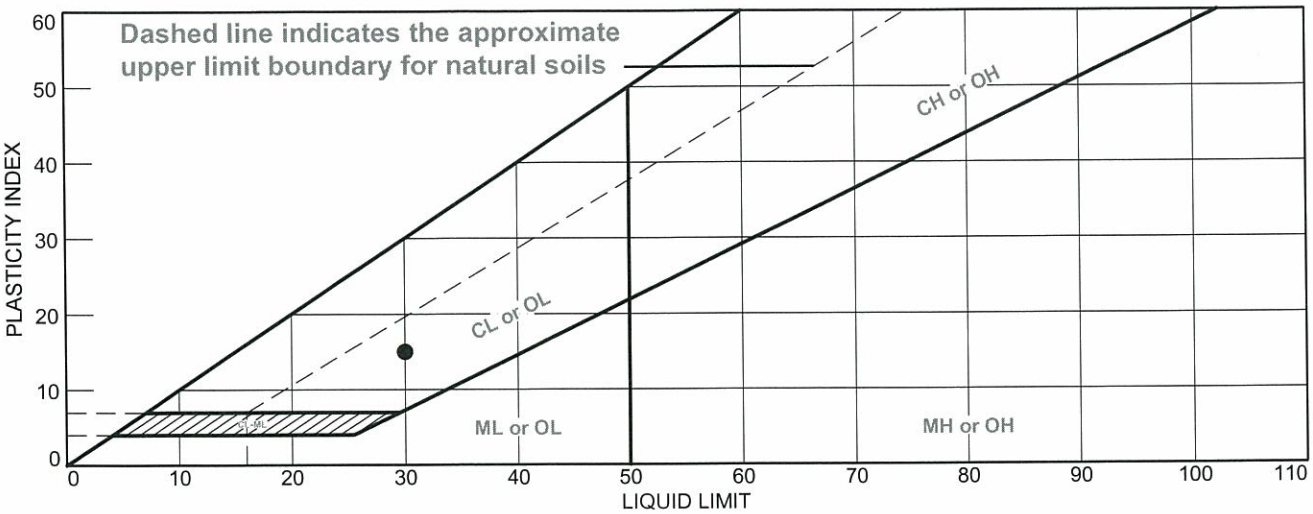
FUNDY Engineering

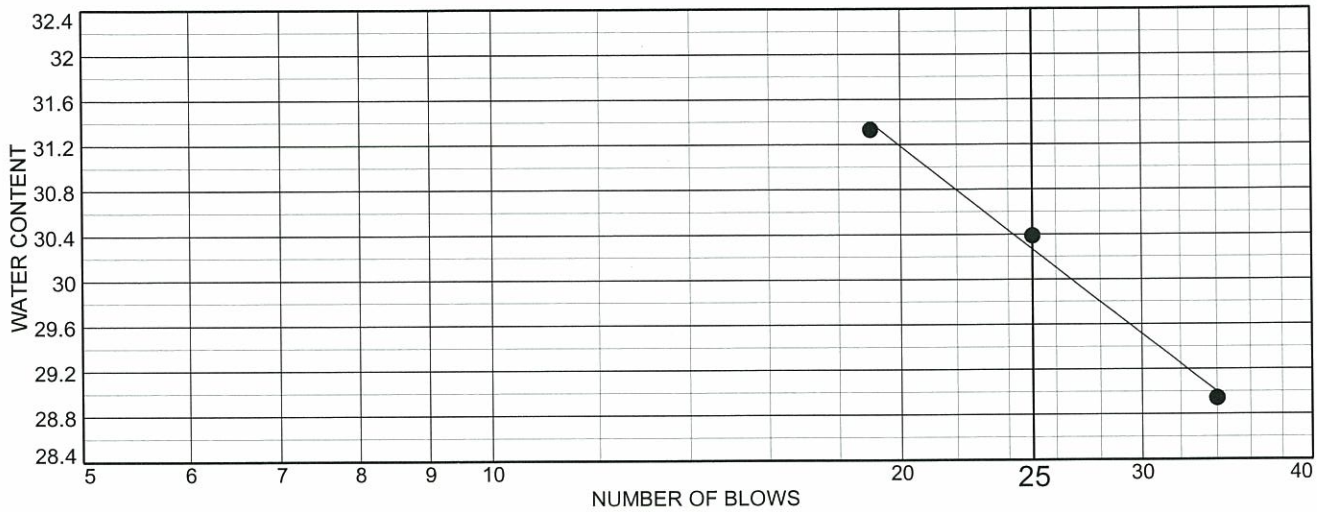
Figure

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Tested By: T.Henrikson **Checked By:** A.Mouland

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Stiff to Hard Reddish Brown Sandy Clay with Some Gravel and Cobbles	30	15	15			

Project No. 9175 **Client:** PWGSC

Project: Geotechnical Investigation

● **Source of Sample:** BH06 **Depth:** 3.05 **Sample Number:** 64

Remarks:

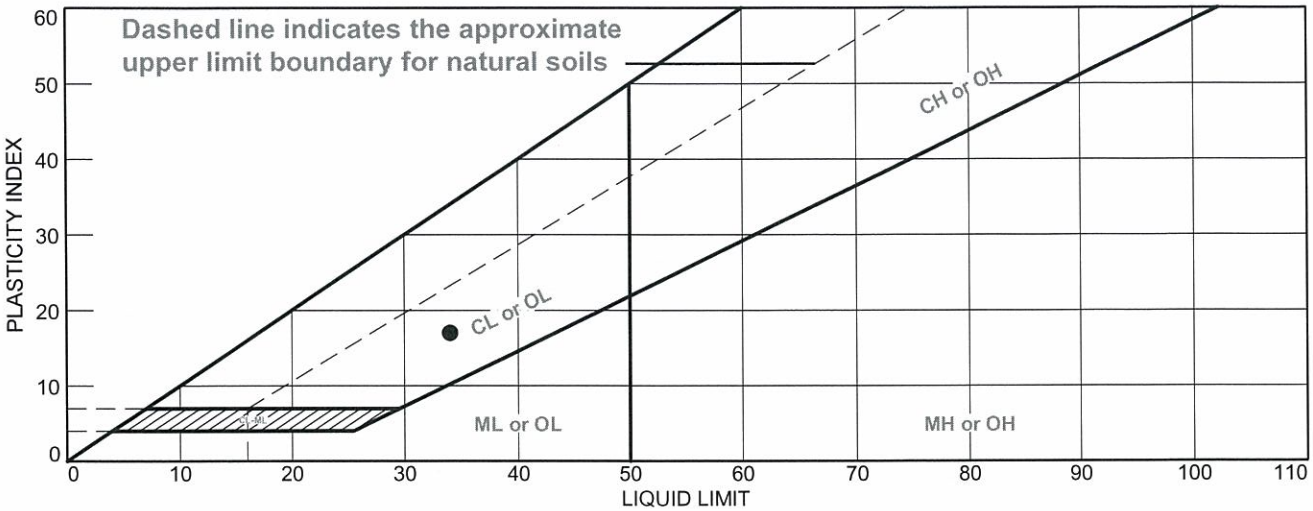
FUNDY Engineering

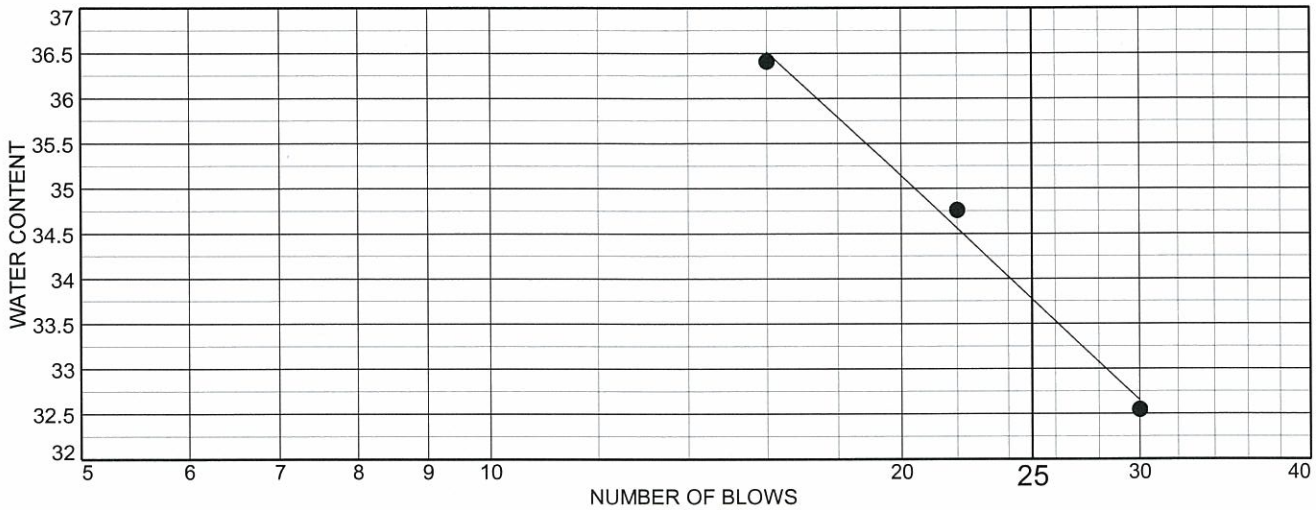
Figure

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Tested By: T.Henrikson **Checked By:** A.Mouland

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●		34	17	17			

Project No. 9175 **Client:** PWGSC

Project: Geotechnical Investigation

● **Source of Sample:** BH09 **Depth:** 4.27 **Sample Number:** 98

Remarks:

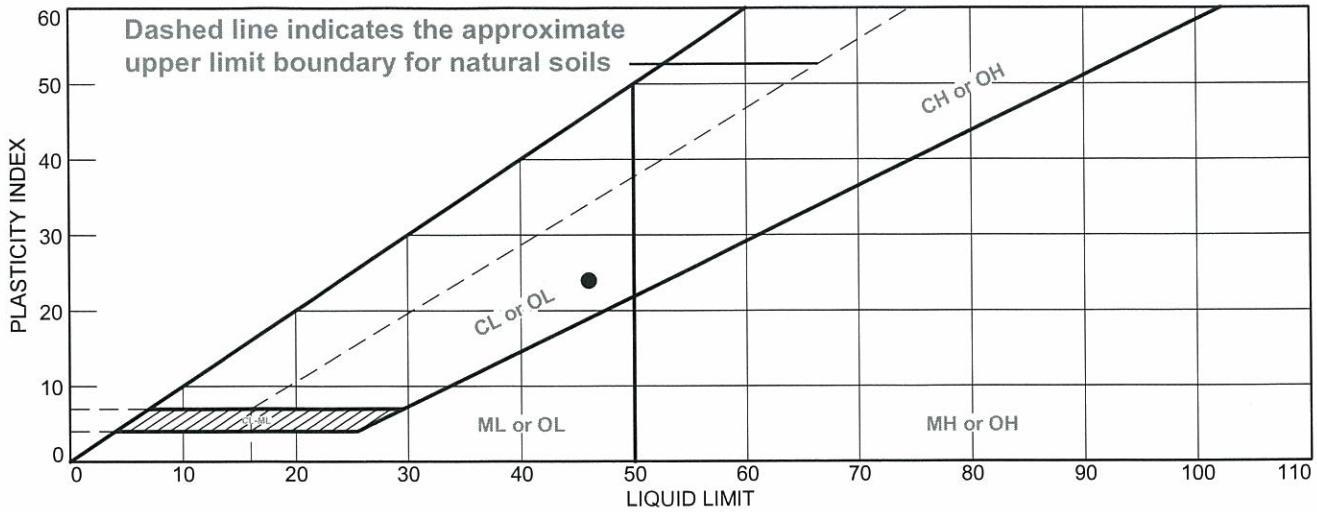
FUNDY Engineering

Figure

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Tested By: T.Henrikson **Checked By:** A.Mouland

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●		46	22	24			

Project No. 9175 **Client:** PWGSC

Project: Geotechnical Investigation

● **Source of Sample:** BH11 **Depth:** 1.83 **Sample Number:** 122

Remarks:

FUNDY Engineering

Figure

These results are for the exclusive use of the client for whom they were obtained. They apply only to the samples tested and are not indicative of apparently identical samples.

Tested By: T.Henrikson **Checked By:** A.Mouland