



THURBER ENGINEERING LTD.



**FOUNDATION INVESTIGATION REPORT
LOW BAY INSPECTION BAY
CASSELMAN COMMERCIAL VEHICLE INSPECTION FACILITY
UNITED COUNTIES OF PRESCOTT AND RUSSELL
G.W.P. 4017-16-00
ASSIGNMENT NUMBER: 4015-E-0015**

GEOCRES NUMBER: 31D-257

**SUBMITTED TO
MCINTOSH PERRY CONSULTING ENGINEERS LTD. / LEA CONSULTING LTD.
JOINT VENTURE**

**JUNE 2017
15193**

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PART 1: FACTUAL INFORMATION

1 INTRODUCTION

This report presents the factual data obtained from a foundation investigation conducted by Thurber Engineering Ltd. (Thurber) for the design and construction of a low bay inspection bay at the existing Casselman Commercial Vehicle Inspection Facility (CVIF). Thurber carried out the investigation as a subconsultant to McIntosh Perry Consulting Engineers Ltd. – Lea Consulting Ltd. Joint Venture (MPCE-LEA) under Assignment 9 of Agreement No. 4015-E-0015.

General Arrangement (GA) drawings and base plan mapping were provided by MPCE-LEA for the preparation of this report.

The purpose of this investigation was to explore the subsurface conditions at the site and, based on this data, provide a borehole location plan, record of boreholes, a stratigraphic profile, laboratory test results and a written description of the subsurface conditions.

2 SITE DESCRIPTION

The CVIF is located on Highway 417 westbound, approximately 1.8 km west of the Highway 417 / County Road 138 interchange, in the United Counties of Prescott and Russell, Ontario. The location of the facility is shown on the inset Key Plan on Drawing No. 1 in Appendix A.

At present, the facility includes three at-grade inspection bays separated by concrete barriers. Each bay is approximately 31 m long and 6.0 wide with an asphalt surface. The inspection bays are located in the middle of the facility to the northeast of the buildings and scales. The lands surrounding the site are flat, poorly drained and consist of agriculture fields to the north and south of Highway 417. Site photographs showing the general conditions at the site, are presented in Appendix D.

The site is located within a physiographic region known as the Winchester Clay Plain. This is an area of low relief, lying almost entirely within the drainage basin of the South Nation River. Although the sensitive marine clay plains are dominant, the Leda clay in the area is underlain by a thin layer of glacial till and bedrock (Chapman and Putnam, 1984).

3 SITE INVESTIGATION

3.1 Previous Investigations

GEOCRES Report 31G-177 presents the results of the investigation carried out for the existing CVIF. The investigation was completed in 1976 and included three sampled boreholes, one

dynamic cone test, and laboratory testing. The boreholes were advanced to refusal but bedrock was not proven as part of the investigation.

The stratigraphy in the area of the CVIF is generally described as very soft to firm sensitive clay overlying compact to very dense glacial till, underlain by limestone bedrock.

It should be noted that settlement issues were noted in the original Foundation Investigation Report and surcharge loading was recommended in the area of the buildings and scales.

3.2 Field Investigation

The field investigation was carried out on November 24, 2016, and included advancing two boreholes. The approximate locations and elevations of the boreholes are shown on Drawing No. 1 provided in Appendix A and are summarized in Table 3-1.

Table 3-1: Borehole Summary

Borehole	Northing (m)	Easting (m)	Ground Surface Elevation (m)	Depth (m)
101	5021390.5	186617.4	65.7	14.3
102	5021400.2	186649.8	65.8	11.4

As a component of our standard procedures and due diligence, Thurber contacted Ontario One Call and MTO Electrical to provide utility locates/clearances for the intended borehole locations. The proposed locations were also reviewed with the operation staff from the CVIF.

The boreholes were advanced with a CME, truck mounted drill rig equipped with hollow stem augers. The subsurface stratigraphy encountered in the boreholes was recorded in the field by Thurber personnel. Split spoon samples were collected at regular depth intervals in the boreholes via the completion of Standard Penetration Tests (SPT), following the methods described in ASTM Standard D1586-11. In-situ shear vane testing was carried out within the cohesive strata. All soil samples recovered from the boreholes were placed in moisture-proof containers and the samples were transported to Thurber's Ottawa geotechnical laboratory for further examination and testing.

Groundwater was measured in the open boreholes prior to backfilling. The boreholes were backfilled with a low-permeability combination of auger cuttings and bentonite pellets in general accordance with the intent of Ontario MOE Regulation 903. All boreholes were capped with 150 mm of cold patch asphalt.

The as-drilled locations of the boreholes and ground surface elevations at the borehole locations were surveyed by Thurber on November 25, 2016. The temporary benchmark (TBM) used was the top of the manhole cover located approximately 3.5 m west of the existing inspection building. The location of the TBM is indicated on Drawing No. 1 in Appendix A. The geodetic elevation of the TBM was indicated on the drawings provided by MPCE-LEA as 65.914 m.

3.3 Laboratory Testing

Geotechnical laboratory testing consisted of natural moisture content determination and visual identification of all soil samples in accordance with the current MTO standards. Grain size distribution analyses and Atterberg Limits testing were also carried out on selected samples to MTO and ASTM standards.

The laboratory test results are presented on the Record of Borehole sheets in Appendix B and are illustrated on the figures in Appendix C.

4 DESCRIPTION OF SUBSURFACE CONDITIONS

4.1 Overview / General

Reference is made to the Record of Borehole sheets in Appendix B for details of the soil stratigraphy encountered in the boreholes. A stratigraphic profile for the site is presented on the Drawing No. 1 in Appendix A for illustrative purposes. An overall description of the stratigraphy is given in the following paragraphs; however, the factual data presented in the Record of Boreholes governs any interpretation of the site conditions.

In general, the stratigraphy in the boreholes is characterized by an asphalt pavement, overlying gravel and sand fill, overlying native clay, overlying glacial till, and underlain by inferred bedrock. This stratigraphy is generally consistent with the stratigraphy encountered in the previous MTO investigation.

More detailed descriptions of the individual strata are presented below.

4.2 Asphalt

The thickness of the asphalt measured at the borehole locations was 250 mm and 350 mm.

4.3 Fill – Silty Gravel with Sand

A fill layer consisting predominantly of gravel and sand with varying amounts of silt was encountered below the asphalt surface in both boreholes. The top of this layer has an elevation of 65.4 m. The thickness of this layer is 1.8 m. The SPT 'N' values ranged from 10 to 30 indicating a compact condition.

The moisture content of the samples tested ranged from 8% to 12%. The results of a grain size analysis completed on a sample of this material indicated a gravel content of 40%, sand content of 31%, and fines content (combined silt and clay size particles) of 29%. The results indicate the this material is low to moderately susceptible to frost heave. The results of the grain size analysis are illustrated on Figure 1 in Appendix C.

4.4 Clay

Clay Crust

A mottled grey and brown clay crust deposit was encountered below the granular fill layer in both boreholes. The top of this layer was identified at elevation 63.6 m. The thickness of this layer ranged from 0.5 m to 0.7 m. The SPT 'N' values were 5 and 6.

The moisture content of the samples tested were 30% and 31%. The results of grain size analysis testing completed on samples of this material indicated a gravel content of 0%, sand content of 1% and 3%, silt content of 34% and 35%, and clay content of 62% and 65%. The results of the grain size analysis are illustrated on Figure 2 in Appendix C.

The results of Atterberg Limits testing completed on samples of this material indicated a liquid limit of 58 and 62, a plastic limit of 22 and 23, and plasticity index of 36 and 39, indicating a clay of high plasticity (CH). Atterberg Limits analysis results are illustrated on Figure 3 in Appendix C.

Clay

A grey clay deposit was encountered below the clay crust stratum in both boreholes. The top of this layer ranged from elevation 63.1 m to 62.9 m. The thickness of this layer ranged from 8.5 m to 9.7 m. In-situ shear vane test results indicated an undrained shear strength ranging from 17 kPa to 60 kPa; indicating a soft to stiff consistency, but typically firm.

The moisture content of the samples tested ranged from 48% to 83%. The results of grain size analysis completed on samples of this material indicated a gravel content of 0%, sand content ranging from 0% to 3%, silt content ranging from 26% to 47%, and clay content ranging from 51% to 74%. The results of the grain size analysis testing are illustrated on Figure 2 in Appendix C.

The results of Atterberg Limits testing completed on samples of this material indicated a liquid limit ranging from 45 to 68, a plastic limit ranging from 20 to 24, and plasticity index ranging from 23 to 44, indicating a clay of intermediate to high plasticity (CI to CH). Atterberg Limits analysis results are illustrated on Figure 3 in Appendix C.

4.5 Glacial Till

A stratum of glacial till consisting predominantly of gravel and sand with varying amounts of fines was encountered beneath the clay stratum in Borehole 101. The top of this layer was identified at elevation 53.3 m. The SPT 'N' values were greater than 100 indicating a very dense condition.

The moisture content of a sample tested was 11%. The results of grain size analysis completed on a sample of this material indicated a gravel content of 48%, sand content of 23%, silt content of 24%, and clay content of 5%. The results of the grain size analysis testing are illustrated on Figure 4 in Appendix C.

Based on the results of Atterberg Limits testing the fines content is classified as non-plastic.

4.6 Refusal and Inferred Bedrock

Auger refusal was encountered beneath the glacial till in Borehole 101 and beneath the clay stratum in Borehole 102. The auger refusal has been inferred to be probable bedrock. The inferred bedrock surface ranges from elevation 51.4 m to 54.4 m in Boreholes 101 and 102 respectively.

4.7 Groundwater

The groundwater level was measured in the open boreholes at the time of drilling at depths of 7.0 m and 5.2 m; corresponding to elevations 58.7 m and 60.6 m in Boreholes 101 and 102 respectively. These observations are considered short-term readings. It is noted that free water was observed within the granular base and subbase material during a pavement investigation at this site. As such, it should be noted that perched groundwater could be encountered during excavation activities at a higher elevation than noted above.

Seasonal fluctuations of the groundwater level are to be expected. In particular, the groundwater level may be at a higher elevation after the spring snowmelt or after periods of heavy rainfall.

5 MISCELLANEOUS

Thurber staked and/or marked the borehole locations in the field and obtained utility clearances prior to drilling. Thurber surveyed the borehole locations, and provided the ground surface elevations based on contract drawings provided by MPCE-LEA. George Downing Estate Drilling Ltd. of Hawkesbury, Ontario, supplied and operated the drill rig to carry out the drilling, sampling, and in-situ testing. The drilling, and sampling operations in the field were supervised on a full-time basis by Mr. Jeff Morrison of Thurber. Laboratory testing was carried out by Thurber in its MTO-approved laboratory in Ottawa.

Overall project management and direction of the field program was provided by Paul Carnaffan, P.Eng. Interpretation of the field data and preparation of this report was completed by Kenton Power, P.Eng. The report was reviewed by Paul Carnaffan, P.Eng. and Dr. P.K. Chatterji, P.Eng., the Designated Principal Contact for MTO Foundations Projects.



Kenton C. Power, P.Eng.
Geotechnical Engineer

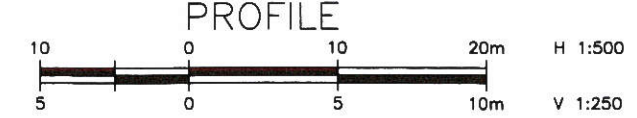
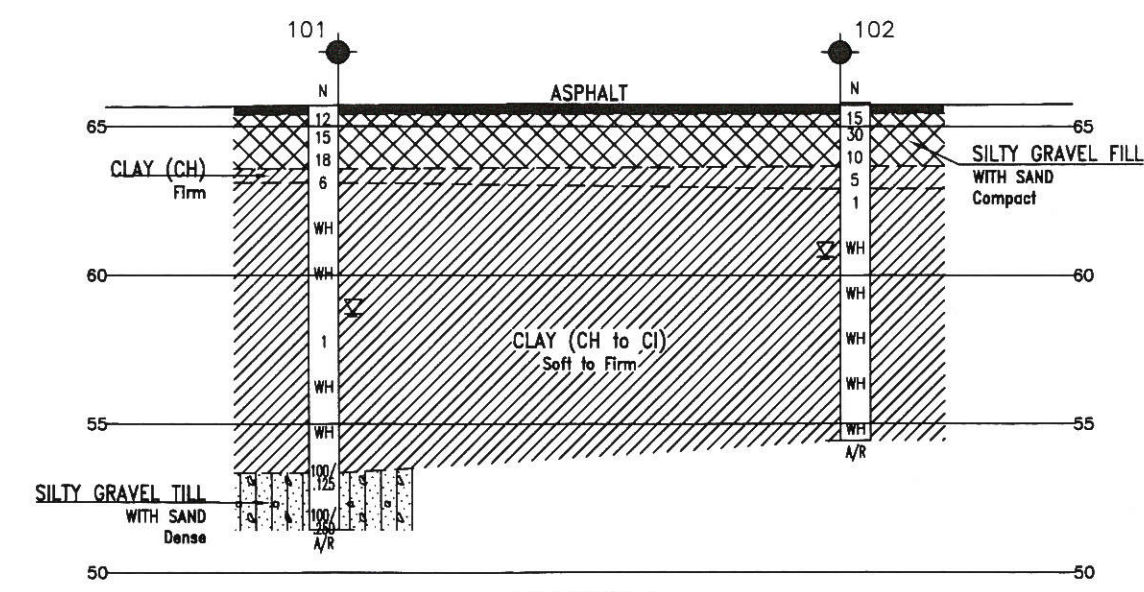
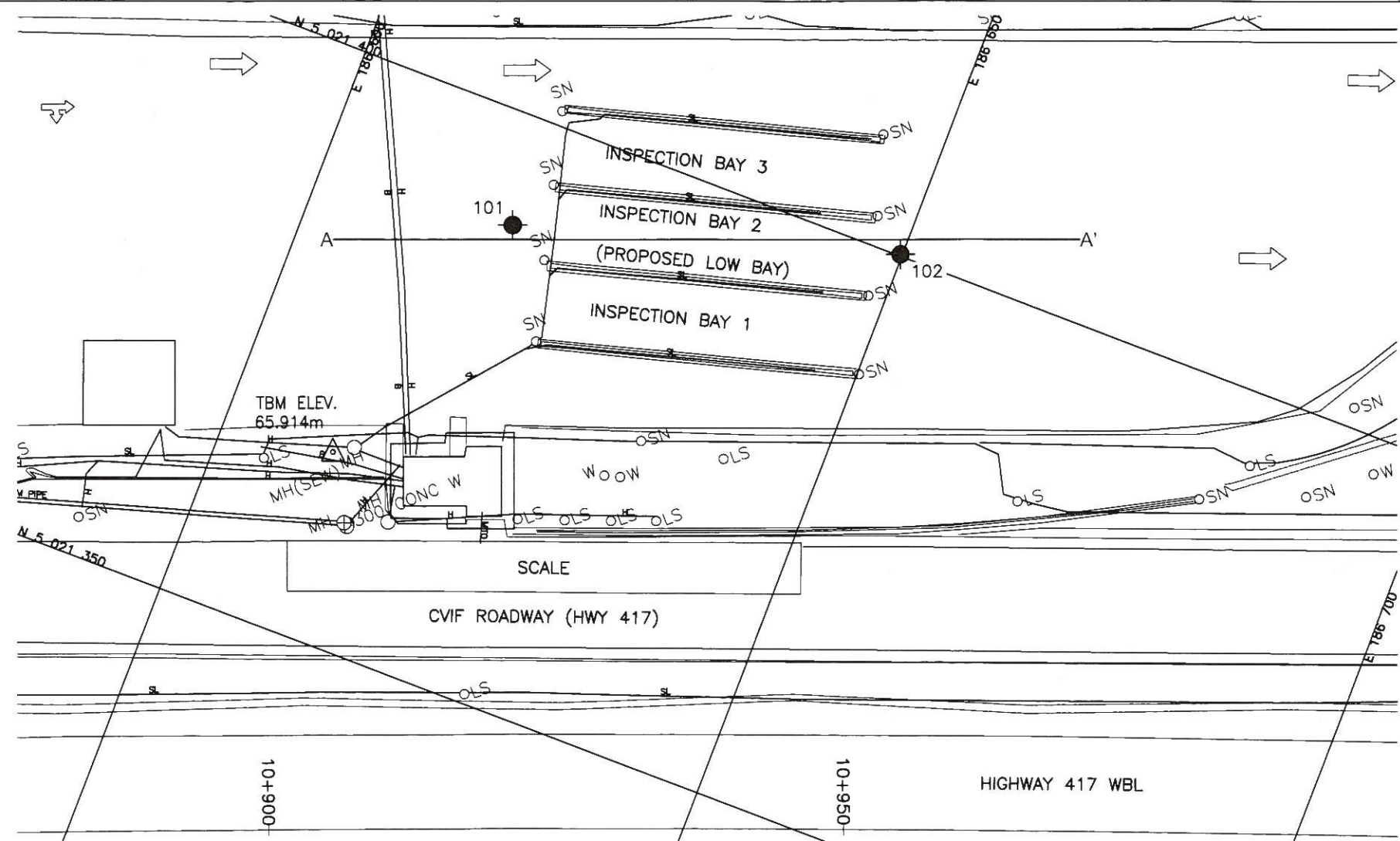


Paul Carnaffan, P.Eng.
Principal, Senior Geotechnical Engineer



P.K. Chatterji, P.Eng.
Review Principal, Designated MTO Contact

APPENDIX A
BOREHOLE LOCATIONS AND SOIL STRATA DRAWINGS



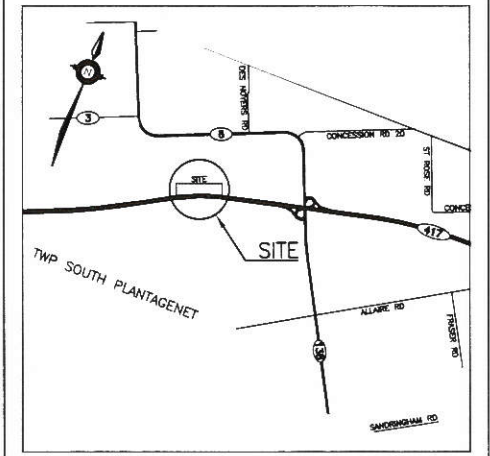
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AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

CONT No
CWP No 4017-16-00

HIGHWAY 417
CASSELMAN VEHICLE
INSPECTION FACILITY
BOREHOLE LOCATIONS AND SOIL STRATA

LEA MINTOSH PERRY Mp
Joint Venture

THURBER ENGINEERING LTD.



KEYPLAN LEGEND

- Borehole by Thurber
- Borehole by Others
- N Blows /0.3m (Std Pen Test, 475J/blow)
- CONE Blows /0.3m (60' Cone, 475J/blow)
- PH Pressure, Hydraulic
- W Water Level
- HA Head Artesian Water
- P Piezometer
- 90% Rock Quality Designation (RQD)
- A/R Auger Refusal

NO	ELEVATION	NORTHING	EASTING
101	65.7	5 021 390.5	186 617.4
102	65.8	5 021 400.2	186 649.8

-NOTES-

- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.
- Borehole locations are shown in MTM Zone 8 coordinates.

GEOCREs No. 31D-257



REVISIONS	DATE	BY	DESCRIPTION
DESIGN	10/1/17	CHK	10/1/17
DRAWN	10/1/17	CHK	10/1/17

APPENDIX B
RECORD OF BOREHOLE SHEETS

SYMBOLS, ABBREVIATIONS AND TERMS USED ON TEST HOLE RECORDS

TERMINOLOGY DESCRIBING COMMON SOIL GENESIS

Topsoil	mixture of soil and humus capable of supporting vegetative growth
Peat	mixture of fragments of decayed organic matter
Till	unstratified glacial deposit which may include particles ranging in sizes from clay to boulder
Fill	material below the surface identified as placed by humans (excluding buried services)

TERMINOLOGY DESCRIBING SOIL STRUCTURE:

Desiccated	having visible signs of weathering by oxidization of clay materials, shrinkage cracks, etc.
Fissured	having cracks, and hence a blocky structure
Varved	composed of alternating layers of silt and clay
Stratified	composed of alternating successions of different soil types, e.g. silt and sand
Layer	> 75 mm in thickness
Seam	2 mm to 75 mm in thickness
Parting	< 2 mm in thickness

RECOVERY:

For soil samples, the recovery is recorded as the length of the soil sample recovered.

N-VALUE:

Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 63.5 kg hammer falling 0.76 m, required to drive a 50 mm O.D. split spoon sampler 0.3 m into undisturbed soil. For samples where insufficient penetration was achieved and N-value cannot be presented, the number of blows are reported over the sampler penetration in millimetres (e.g. 50/75).

DYNAMIC CONE PENETRATION TEST (DCPT):

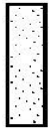
Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to an "A" size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone 0.3 m into the soil. The DCPT is used as a probe to assess soil variability.

STRATA PLOT:

Strata plots symbolize the soil and bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.



Boulders
Cobbles
Gravel



Sand



Silt



Clay



Organics



Asphalt



Concrete



Fill



Bedrock

TEXTURING CLASSIFICATION OF SOILS

Classification	Particle Size
Boulders	Greater than 200 mm
Cobbles	75 – 200 mm
Gravel	4.75 – 75 mm
Sand	0.075 – 4.75 mm
Silt	0.002 – 0.075 mm
Clay	Less than 0.002 mm

SAMPLE TYPES

SS	Split spoon samples
ST	Shelby tube or thin wall tube
DP	Direct push sample
PS	Piston sample
BS	Bulk sample
WS	Wash sample
HQ, NQ, BQ etc.	Rock core sample obtained with the use of standard size diamond coring equipment

TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

Descriptive Term	Undrained Shear Strength (kPa)
Very Soft	12 or less
Soft	12 – 25
Firm	25 – 50
Stiff	50 – 100
Very Stiff	100 – 200
Hard	Greater than 200

NOTE: Clay sensitivity is defined as the ratio of the undisturbed strength over the remolded strength.

TERMS DESCRIBING CONSISTENCY (COHESIONLESS SOILS ONLY)

Descriptive Term	SPT "N" Value
Very Loose	Less than 4
Loose	4 – 10
Compact	10 – 30
Dense	30 – 50
Very Dense	Greater than 50

MODIFIED UNIFIED SOIL CLASSIFICATION

Major Divisions		Group Symbol	Typical Description
COARSE GRAINED SOIL	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines.
		GM	Silty gravels, gravel-sand-silt mixtures.
		GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS	SW	Well-graded sands or gravelly sands, little or no fines.
		SP	Poorly-graded sands or gravelly sands, little or no fines.
		SM	Silty sands, sand-silt mixtures.
		SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS	SILT AND CLAY SOILS $W_L < 35\%$	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		OL	Organic silts and organic silty-clays of low plasticity.
	SILT AND CLAY SOILS $35\% < W_L < 50\%$	MI	Inorganic compressible fine sandy silt with clay of medium plasticity, clayey silts.
		CI	Inorganic clays of medium plasticity, silty clays.
		OI	Organic silty clays of medium plasticity.
	SILT AND CLAY SOILS $W_L > 50\%$	MH	Inorganic silts, micaceous or diatomaceous fine sandy of silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of high plasticity, organic silts.
HIGHLY ORGANIC SOILS		Pt	Peat and other organic soils.

Note - W_L = Liquid Limit

EXPLANATION OF ROCK LOGGING TERMS

ROCK WEATHERING CLASSIFICATION

Fresh (FR)	No visible signs of weathering.
Fresh Jointed (FJ)	Weathering limited to surface of major discontinuities.
Slightly Weathered (SW)	Penetrative weathering developed on open discontinuity surfaces, but only slight weathering of rock materials.
Moderately Weathered (MW)	Weathering extends throughout the rock mass, but the rock material is not friable.
Highly Weathered (HW)	Weathering extends throughout the rock mass and the rock is partly friable.
Completely Weathered (CW)	Rock is wholly decomposed and in a friable condition, but the rock texture and structures are preserved.

TERMS

Total Core Recovery: (TCR)	Core recovered as a percentage of total core run length.
Solid Core Recovery: (SCR)	Percent ratio of solid core of full cylindrical shape recovered. Expressed with respect to the total length of core run.
Rock Quality Designation: (RQD)	Total length of sound core recovered in pieces 0.1 m in length or larger, as a percentage of total core length
Unconfined Compressive Strength: (UCS)	Axial stress required to break the specimen.
Fracture Index: (FI)	Frequency of natural fractures per 0.3 m of core run.

DISCONTINUITY SPACING

Bedding	Bedding Plane Spacing
Very thickly bedded	Greater than 2 m
Thickly bedded	0.6 to 2 m
Medium bedded	0.2 to 0.6 m
Thinly bedded	60 mm to 0.2 m
Very thinly bedded	20 to 60 mm
Laminated	6 to 20 mm
Thinly laminated	Less than 6 mm

STRENGTH CLASSIFICATION

Rock Strength	Approximate Uniaxial Compressive Strength (MPa)
Extremely Strong	Greater than 250
Very Strong	100 – 250
Strong	50 – 100
Medium Strong	25 – 50
Weak	5 – 25
Very Weak	1 – 5
Extremely Weak	0.25 – 1

RECORD OF BOREHOLE No 101

1 OF 2

METRIC

GWP# 4017-16-00 LOCATION Casselman CVIF N 5 021 390.5 E 186 617.4 ORIGINATED BY JM
HWY 417 BOREHOLE TYPE HSA COMPILED BY JM
DATUM Geodetic DATE 2016.11.24 - 2016.11.24 CHECKED BY KP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	20 40 60 80 100		
65.7												
0.0	250 mm ASPHALT											
65.4												
0.3	Silty gravel with sand Compact Brown FILL		1	SS	12		65					40 31 29 (SI+CL)
			2	SS	15		64					
			3	SS	18		63					
63.6												
2.1	CLAY (CH) Firm											
63.1	Mottled grey and brown		4	SS	6		62					0 1 34 65
2.6	CLAY (CH to CI) Soft to firm Grey						61					
							60					0 0 26 74
			5	SS	WH		59					
							58					
			6	SS	WH		57					
							56					
			7	SS	1							
			8	SS	WH							

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
20
15
10
(%) STRAIN AT FAILURE

METRIC

SOIL PROFILE						
ELEV DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES			GROUND WATER CONDITIONS
			NUMBER	TYPE	"N" VALUES	
	Continued From Previous Page					
	CLAY (CH to CI) Soft to firm Grey					
			9	SS	WH	
	- base of the borehole rose 0.6 m inside the augers when the till layer was penetrated		10	SS	100 / 125mm	
53.3 12.3	Silty GRAVEL (GM) with sand TILL Dense Grey					
			11	SS	100/ 250mm	
51.4 14.3	End of Borehole Auger refusal on probable bedrock Groundwater level was measured in open borehole at 7 m BGS (elev. 58.7 m) on 2016/11/24					
<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT<div>20406080100</div><div>○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE</div><div>WATER CONTENT (%)<div>P W L</div></div></div>						
<div>UNIT WEIGHT γ kN/m³</div> <div>REMARKS & GRAIN SIZE DISTRIBUTION (%)<div>GR SA SI CL</div></div>						

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 102

1 OF 2

METRIC

GWP# 4017-16-00 LOCATION Casselman CVIF N 5 021 400.2 E 186 649.8 ORIGINATED BY JM
HWY 417 BOREHOLE TYPE HSA COMPILED BY JM
DATUM Geodetic DATE 2016.11.24 - 2016.11.24 CHECKED BY KP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)							
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								WATER CONTENT (%)				GR	SA	SI	CL
								○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE × LAB VANE														
65.8								20	40	60	80	100											
0.0	350 mm ASPHALT																						
65.4																							
0.4	Silty gravel with sand Compact Brown FILL		1	SS	15		65						○										
			2	SS	30								○										
			3	SS	10		64						○										
63.6																							
2.1	CLAY (CH) Firm Mottled grey and brown		4	SS	5		63						┌──○──┐				0	3	35	62			
62.9																							
2.9	CLAY (CH to CI) Soft to firm Grey		5	SS	1		62	1.7 +															
								1.5 +															
			6	SS	WH		61						┌──┐	○			0	0	47	53			
								3.7 +															
							60	3.0 +															
			7	SS	WH		59																
								2.4 +															
							58	3.3 +															
			8	SS	WH				5.3 +														
							57	3.2 +															
			9	SS	WH								┌──┐	○			0	3	46	51			
							56	2.2 +															

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 102

2 OF 2

METRIC

GWP# 4017-16-00 LOCATION Casselman CVIF N 5 021 400.2 E 186 649.8 ORIGINATED BY JM
 HWY 417 BOREHOLE TYPE HSA COMPILED BY JM
 DATUM Geodetic DATE 2016.11.24 - 2016.11.24 CHECKED BY KP

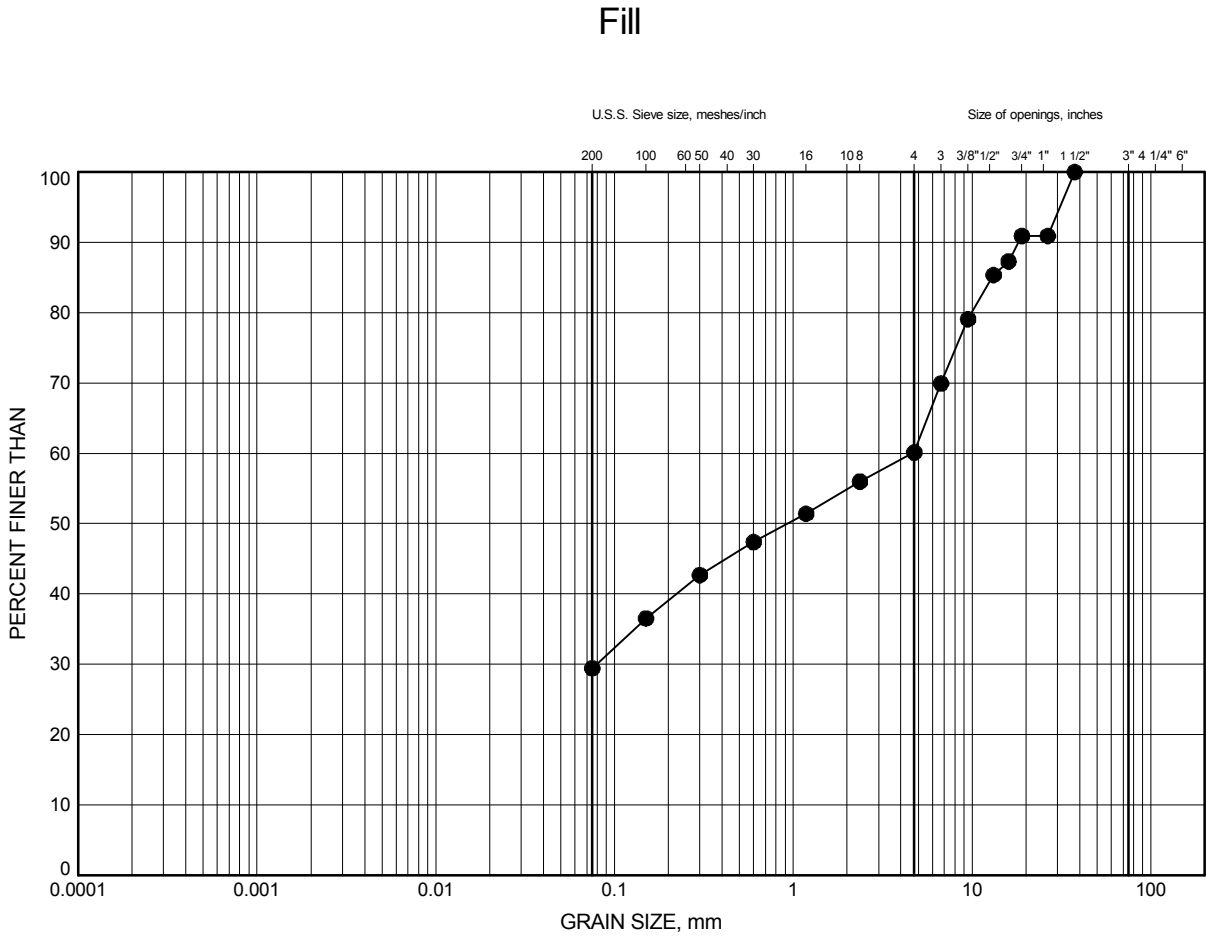
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
	Continued From Previous Page													
54.4	CLAY (CH to CI) Soft to firm Grey		10	SS	WH		55							
11.4	End of Borehole Auger refusal on inferred till Groundwater level was measured in open borehole at 5.2 m BGS (elev. 60.6 m) on 2016/11/24													

ONTMT4S 15193 - CASSELMAN CVIF - FOUNDATION.GPJ 2012TEMPLATE(MTO).GDT 1/2/17

APPENDIX C LABORATORY TEST RESULTS

Casselman Commercial Vehicle Inspection Facility
GRAIN SIZE DISTRIBUTION

FIGURE 1



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	101	1.07	64.63

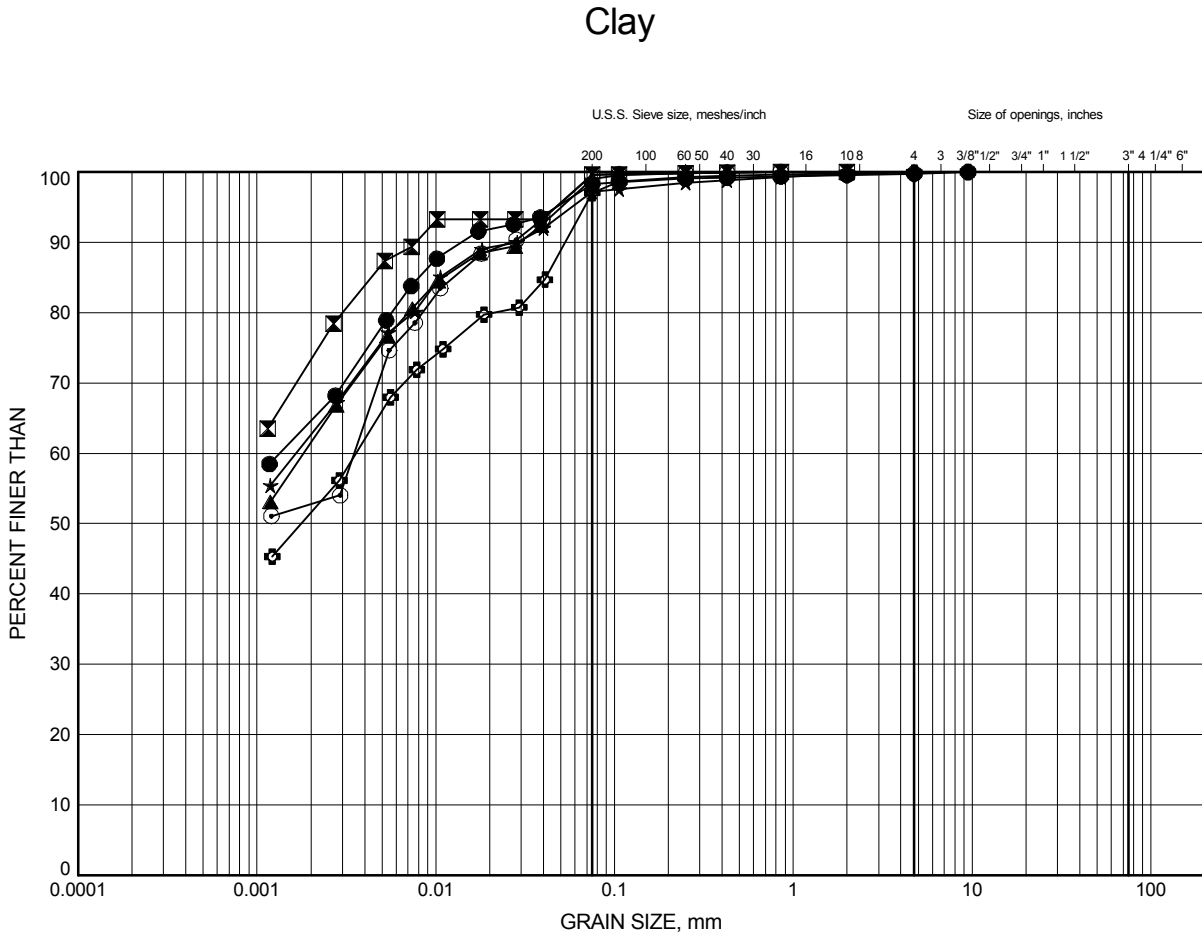
Date January 2017
 GWP# 4017-16-00



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GRAIN SIZE DISTRIBUTION

FIGURE 2



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	101	2.44	63.26
⊠	101	5.64	60.06
▲	101	10.97	54.72
★	102	2.59	63.17
⊙	102	4.88	60.88
⊕	102	9.45	56.31

Date January 2017

GWP# 4017-16-00

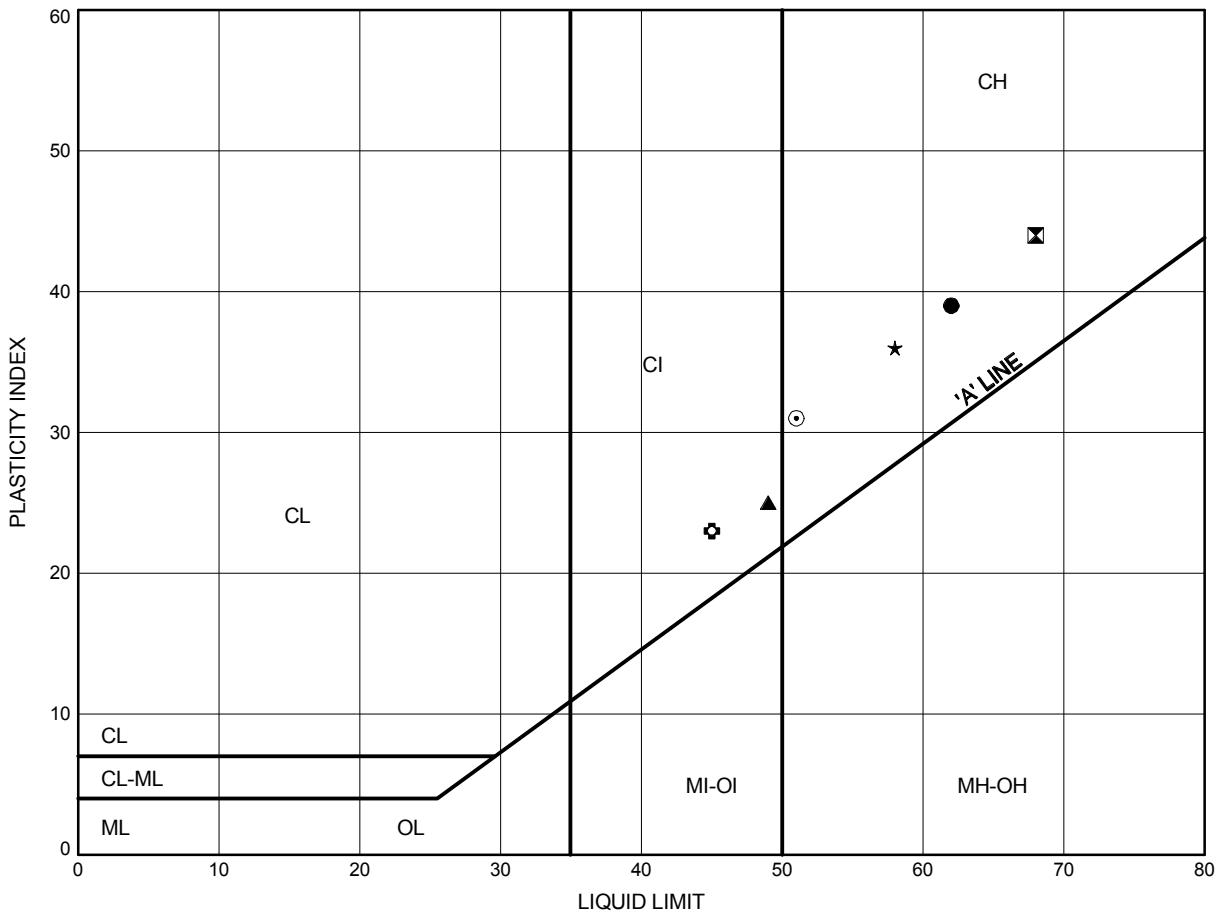


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ATTERBERG LIMITS TEST RESULTS

FIGURE 3



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	101	2.44	63.26
⊠	101	5.64	60.06
▲	101	10.97	54.72
★	102	2.59	63.17
⊙	102	4.88	60.88
⊕	102	9.45	56.31

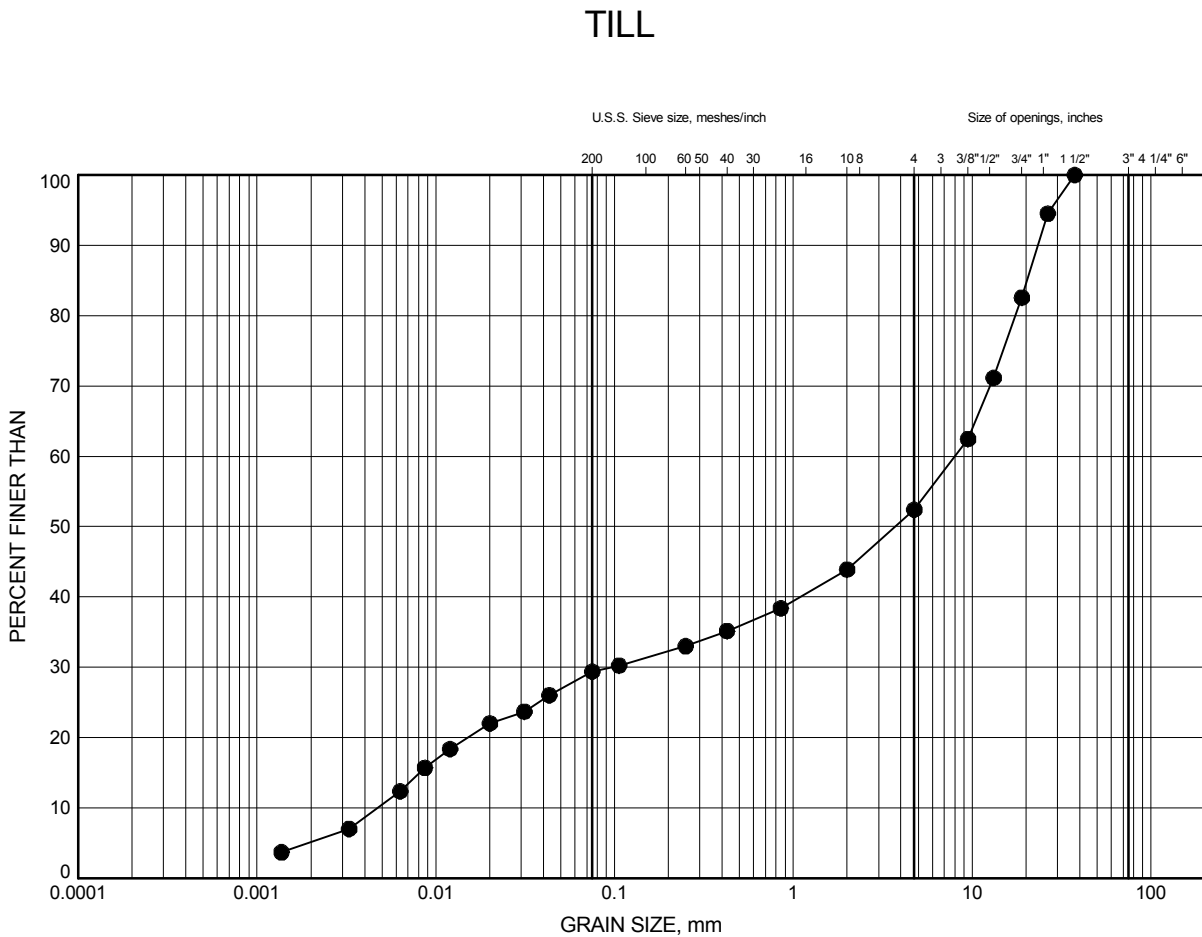
Date January 2017
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GRAIN SIZE DISTRIBUTION

FIGURE 4



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	101	14.02	51.67

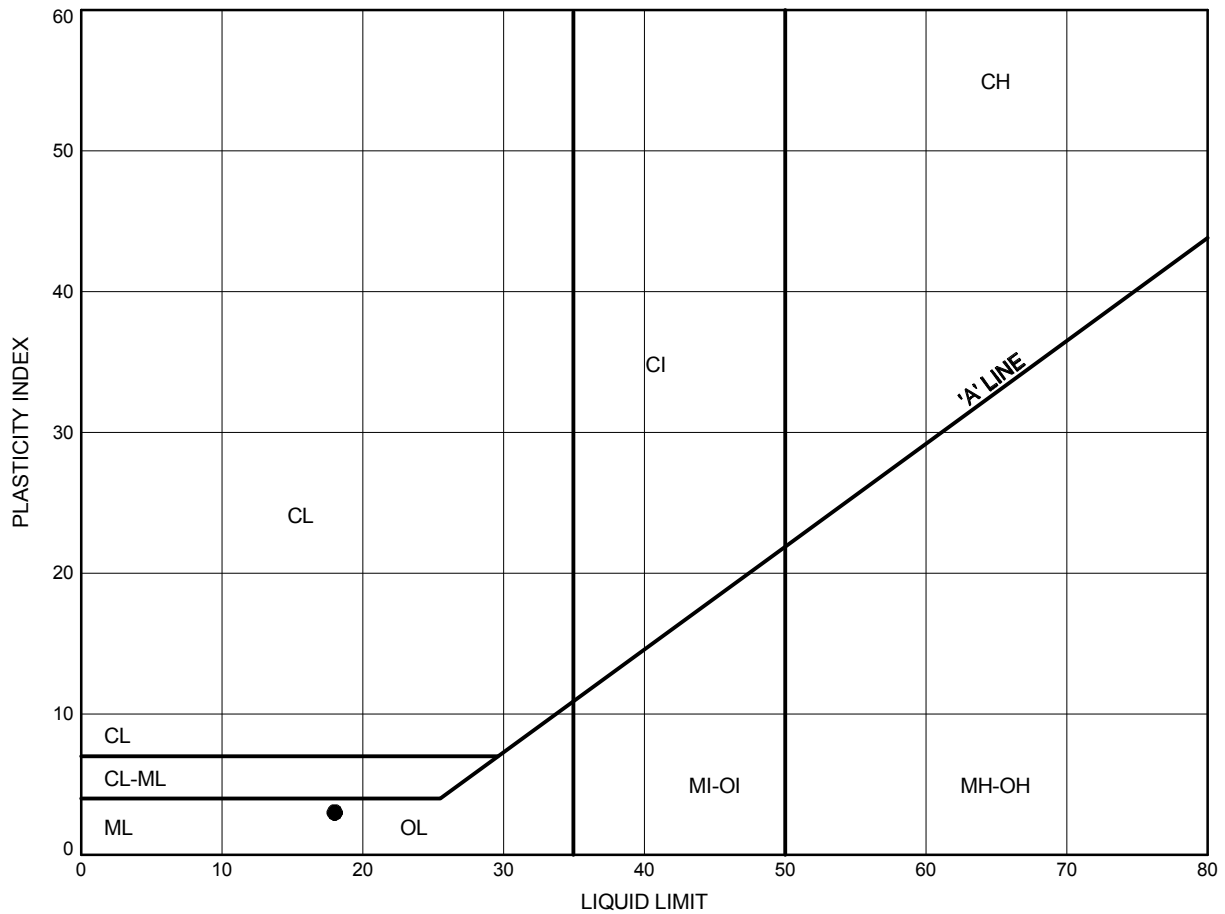
Date January 2017
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ATTERBERG LIMITS TEST RESULTS

FIGURE 5



LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	101	14.02	51.67

Date January 2017
 GWP# 4017-16-00



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**APPENDIX D
SELECTED PHOTOGRAPHS**



Figure 1: Casselman CVIF inspection bays looking southeast



Figure 2: Bay 2, the location of the new low bay inspection bay looking east