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This report was commissioned and obtained by AECOM, an engineer retained by the Township for the completion of the Culvert replacement project ("Project").

We note that other reports in relation to the Project were also completed by the author, V.A. Woods Associates Limited ("VA Woods").

Various legal proceedings have been commenced against VA Woods in relation to its work on the Project. In such circumstances, the reader should be aware that certain persons take issue with VA Woods work on the Project. The readers should not conclude or believe that AECOM or the Township are in agreement that the facts, analysis, or conclusions in this report are correct (or incorrect) and the Township makes no representations regarding the accuracy of the facts, analysis, or conclusions of the report.

During the course of the Project other data was obtained and other reports completed by other engineers and contracting firms.

Further, it is alleged in various legal proceedings that, subsequent to this report, the Project resulted in settlement of the subject building and other nearby buildings and it is alleged that the events at the site and in the area may affect the conclusions in this report.

The Township strongly advises against reliance on this report. The Township makes absolutely no representations or warranties of the accuracy or suitability of this report. Any interested person should complete their own investigations of the subject property.

The Township has no liability for the use of this report by any person.



# V. A. WOOD ASSOCIATES LIMITED

CONSULTING GEOTECHNICAL ENGINEERS

1080 TAPSCOTT ROAD, UNIT 24, SCARBOROUGH, ONTARIO M1X 1E7

TELEPHONE: (416) 292-2868 • FAX No: (416) 292-5375

***GEOTECHNICAL INVESTIGATION  
CULVERT RECONSTRUCTION  
BROCK STREET/CENTENNIAL DRIVE  
UXBRIDGE, ONTARIO***

*Ref. No. 7171-17-6*

*Revised February 2018*

*Prepared for:*

*AECOM  
300 Water Street  
Whitby, Ontario  
L1N 9J2*

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1.0 **INTRODUCTION**

*V.A. Wood Associates Limited was retained by AECOM to carry out a geotechnical investigation for the proposed reconstruction of the existing culvert at Brock Street and Centennial Drive in Uxbridge, Ontario.*

*The replacement culvert will be a twin concrete structure and will be built by cut and fill. There are existing buildings along and adjacent the culvert alignment and shoring works to protect these buildings are required.*

*The culverts are located at the base of a wide valley which has been filled over the years and subsequently developed.*

*The purpose of the investigation was to reveal the subsurface conditions and to determine the relevant soil properties for the design and construction of the foundation of the replacement culvert and reinstatement of the road pavement, restoration of parking lot, and provide recommendations for shoring and dewatering works.*

2.0 **FIELD WORK**

*The field work was carried out between August 26 and August 30, 2017 and consisted of eleven boreholes at the locations shown on Enclosure 1. The boreholes were advanced to the sampling depths by means of a power-auger machine, equipped for soil sampling. Standard Penetration tests were carried out at frequent intervals of depth and the results are shown on the Borehole Logs as N-values.*

*Monitoring wells, consisting of 50 mm diameter PVC pipes with 1.5 to 3 m screens at the bottom were installed in ten of the boreholes.*

*The field work was supervised by a soils technician and the soil samples were transported to our soils laboratory for further examination, classification and testing. The ground elevation at each borehole location was provided by I. B. W. Surveyors.*

3.0 SUBSURFACE CONDITIONS

*Full details of the soils encountered in each borehole are given on the Borehole Logs, Enclosures 2 to 12 inclusive, and the following notes are intended to summarize this data.*

*All of the boreholes were augered to a depth of 0.75 m. No sampling or testing was carried out over this section.*

*From a depth of 0.75 m, all of the boreholes encountered a layer of fill, which extended to a depth of between 2.9 and 4.4 m below grade. The fill varies in composition from gravelly sand to sandy silt, with seams of silty clay in places. Standard Penetration tests in the fill gave N-values between 1 and 34 blows/300mm, and generally less than 10 blows/300 mm.*

*Based on the test results, the fill is considered to be in a generally loose to very loose condition.*

*Except in Boreholes 2, 3 and 10, the fill was underlain by a deposit of silt sand, which extended to a depth of between 3.6 and 7 m below grade. This deposit generally contained peat, wood fragments and/or topsoil, and is likely to be alluvial in origin. Standard Penetration tests in this deposit gave N-values between 4 and 12 blows/300mm (24 blows/300mm in Borehole 9). The grain size distribution of the silty sand sections of this deposit are shown in Enclosures 13 and 14.*

*Based on the test results, the silty sand with peat/wood/ topsoil is considered to have a generally loose relative density. It is noted that the alluvial deposit in most of the boreholes contained tree trunks and/or stumps.*

*The fill in Boreholes 2, 3 and 10, and the silty sand in Boreholes 4, 7 and 9 were underlain by a deposit of gravelly sand, which extended to a depth of between 5.5 and 6.6 m below grade. This deposit is comprised generally of well graded sand and fine to medium sub-rounded gravel and is likely alluvial in origin. Standard Penetration tests in this deposit gave N-values between 4 and 15 blows/300mm. The grain size distribution of representative samples of the gravelly sand are shown in Enclosures 15 to 18.*

*Based on the test results, the gravelly sand is considered to have a generally loose to medium compact relative density.*

*The silty sand in Boreholes 1, 5, 6, 8 and 9, and the gravelly sand in Boreholes 2, 3, 4, 9 and 10 were underlain by a deposit of sandy silt, which extended to a depth of between 17 and more than 9.6 m below grade (maximum depth investigated). This deposit is comprised of bedded silt and very fine sand. Standard Penetration tests in this deposit gave N-values between 3 and 40 blows/300mm. The grain size distribution of representative samples of the sandy silt are shown in Enclosures 19 to 24.*

*Based on the test results, the sandy silt is considered to have a generally compact relative density (loose or dense in places).*

*The sandy silt in Borehole 11 was underlain by a deposit of sandy silt till, which extended to a depth of more than 9.6 m below grade (maximum depth investigated). This glacial deposit is comprised of a sandy silt matrix which contained traces of fine gravel. Standard Penetration tests in this deposit gave N-values between 6 and 23 blows/300mm. The grain size distribution of a representative sample of the sandy silt till is shown in Enclosure 25.*

*Based on the test results, the sand and gravel is considered to have a dense relative density*

*Based on the test results, the sandy silt till is considered to have loose to dense relative density.*

*The sandy silt in Boreholes 2 and 3 was underlain by a deposit of sand and gravel, which extended to a depth of more than 9.6 m below grade (maximum depth investigated). Standard Penetration tests in this deposit gave N-values between 31 and 44 blows/300mm.*

*Based on the test results, the sand and gravel is considered to have a dense relative density.*

*A longitudinal profile showing the summarized soil conditions is shown in Enclosure 1a.*



#### 4.0 GROUNDWATER CONDITIONS

A monitoring well was installed in all of the boreholes, except in Borehole 6 which was located in the middle of the road (Brock Street). The construction of the monitoring wells are shown on the Monitoring Well Logs in Enclosures 2A to 12A. Monitoring of the ground water was carried out and the findings are as follows:

Date	Well No.	Location of Ground Water	
		Depth	Elevation
September 15, 2017	MW1	1.4 m	261.61
	MW2	0.15 m	262.66
	MW3	Ground Surface (262.7)	
	MW4	1.68 m	261.36
	MW5	2.74 m	262.96
	MW7	3.29 m	262.39
	MW8	1.22 m	264.59
	MW9	1.68 m	263.55
	MW10	2.32 m	262.45
	MW11	3.11 m	261.64
	September 26, 2017	MW1	no change
MW2		0.18	262.63
MW3		1.5	261.2
MW4		2.3	260.74
MW5		no change	
MW7		no change	
MW8		no change	
MW9		no change	
MW10		no change	
MW11		no change	

## 5.0 DISCUSSION AND RECOMMENDATIONS

### 5.1 General

*The boreholes encountered 2.9 to 4.3 m of generally loose fill, followed by 0 to 3 m of silty sand with peat/wood, then 0 to 3.5 m of gravelly sand, then native bedded silt and fine sand, underlain by sand and gravel or sandy silt till in places. The ground water table is located a depth of between zero (artesian condition) and 3.29 m (Elev. 261.2 to Elev. 264.6).*

*The 190± m replacement culvert will be a twin closed concrete structure. It is noted that the subsurface conditions are not considered to be suitable for an open bottom culvert.*

*It is understood that construction will be carried out in stages using open cuts, and that the creek will be effectively diverted at each stage. Full details of the proposed structure were not available at the time of this report and, therefore, the following recommendations should be reviewed when these details are available.*

### 5.2 Foundations

*It is understood that the invert of the culverts will be at Elev. 260.5± at the inlet and Elev. 259.81± at the outlet. Based on the Borehole Logs, the foundation subgrade will likely be comprised mainly of gravelly sand between Sta. 0+150± and Sta. 0+180±, and bedded silt and sand between Sta. 0+215± and the outlet. These strata are considered capable of supporting an allowable bearing pressure (SLS bearing pressure) of at least 75 kPa.*

From the inlet to Sta. 0+150±, and between Sta. 0+180± and Sta. 0+215±, the Borehole Logs indicate that sand and peat exist below the invert. The peat should be removed and replaced with approved compacted fill. In this case, the footings on the compacted fill may be designed to the allowable bearing pressure of 75 kPa. Additional boreholes (using hollow stem augers) should be put down when the building at No. 30 and 32 is removed.

It is understood that driven piles may be used south of Brock Street. In this case, they can be designed using an allowable steel stress of 6.5 N/mm<sup>2</sup> (10,000 psi) and the coefficient of horizontal reaction can be based on  $n_h$  of 2200 kN/m<sup>3</sup> above the water table and 1300 kN/m<sup>3</sup> below the water table.

For the design of members resisting lateral loads, the recommended soil parameters are:

Soil Parameter	Existing Fill	Sand, Peat and Wood	Gravelly Sand	Sandy Silt	Compacted Fill (Granular)
Unit Weight	20 kN/m <sup>3</sup>	15 kN/m <sup>3</sup>	22 kN/m <sup>3</sup>	20 kN/m <sup>3</sup>	21 kN/m <sup>3</sup>
Friction Angle	28°	20°	30°	30°	32°
Cohesion	0	0	0	0	0
Coeff. of Earth Pressure At Rest	0.53	0.66	0.5	0.5	0.47
Coeff. of Active Earth Pressure	0.36	0.49	0.33	0.33	0.31
Coeff. of Passive Earth Pressure	2.8	2.0	3.0	3.0	3.2
Coefficient of Friction	--	--	0.45	0.4	0.4

*All foundation excavations should be inspected by geotechnical personnel from V.A. Wood Associates Limited to ensure the founding soils are similar to those identified in the Borehole Logs and that they are capable of supporting the design loads.*

5.3 *Excavation Shoring and Groundwater Control*

*A brief review of the site history indicates that the culvert accommodates the flow from two creeks which have been dammed south of Highway 8. The floodplain from the two creeks extended from Toronto St. in the west to Bascom St. and Main St. in the east. The land from Centennial Dr. in the south and for a distance of  $100 \pm m$  to the north of Brock St. has been backfilled to accommodate Brock St. W and the development to the north and south.*

*To minimize the volume of excavation and the extent of the disturbed area, we recommend that sheet piles be used for shoring. The sheet pile design should be carried out by a specialist designer/contractor and should protect the adjacent structures. The soil parameters given on the table in the preceding page may be used for the preliminary design. We anticipate that the installation of the sheet piles by vibration will be less disruptive than driven sheet piles.*

*A review of the water levels in the monitoring wells indicates that they are  $0.6$  to  $4.5 \pm m$  above the invert of the culvert. The dewatering method will depend on the water level at the time of construction. The possibility of basal heave will depend on the extent of*

*dewatering. If the water pressure under the base of the excavation is more than about 600 mm then basal heave will be a concern.*

*The dewatering works will cause a significant lowering of the ground water outside of the construction area. This will increase the effective pressures on the subsoils and could cause the settlement of the surrounding buildings and paved areas/ground surface. To prevent/minimize ground settlement and damage to the buildings and the lowering of the ground water outside of the construction area, a sheeted excavation is recommended below the water table. The sheeting should extend to a depth below the excavation grade at least equal to the water level above the excavation grade.*

*The main dewatering wells should be located within the excavation and the groundwater should not be lowered beyond what is required to build the culvert. Any well required outside of the excavation/sheet pile wall should be located as far as possible from the buildings and the ground water should not be lowered more than necessary. The ground water levels should be monitored through a system of monitoring well. A specialist dewatering consultant/contractor should be consulted for the design and construction and operation of the dewatering system.*

*A pre-construction survey and settlement monitoring of buildings, structures, paved areas, etc. within at least 100 m of the construction area is recommended.*

*It is anticipated that selected excavated sand and gravelly sand may be re-used as backfill. Backfill should be placed in horizontal loose layers 150 to 200mm thick and compacted to at least 98% SPMDD.*

*To minimize potential problems, backfilling operations should follow closely after excavation so that only a minimal length of trench slope is exposed.*

*Should construction be carried out in the winter season, particular attention should be given to make sure frozen material is not used as backfill.*

5.4 Pavements

*The pavement for the roadways and the parking lots will be reinstated. It is anticipated that a heavy duty asphalt will be required for the roadway and light duty asphalt will be required for the parking lots. Considering the traffic requirements and subsoil conditions, the following pavement designs are recommended:*

	<i>Car Parking Areas (Light Duty Asphalt)</i>	<i>Roadways/Fire Route (Heavy Duty Asphalt)</i>
<i>HL-3 Asphaltic Concrete</i>	<i>50 mm</i>	<i>40 mm</i>
<i>HL-8 Asphaltic Concrete</i>	<i>--</i>	<i>75 mm</i>
<i>Granular 'A' or 20 mm crusher run limestone</i>	<i>150 mm</i>	<i>150 mm</i>
<i>Granular 'B' or 50 mm crusher run limestone</i>	<i>200 mm</i>	<i>300 mm</i>

*The base and sub-base granular materials should be compacted to at least 98% SPMDD and the asphaltic concrete to 96% Marshall density. The thicknesses shown above are compacted thicknesses of the layers. We recommend that the top course asphalt not be placed until the base course asphalt has been in place for one winter season.*

*Frequent inspection by geotechnical personnel from V.A. Wood Associates Limited should be carried out during construction to verify the compaction of the subgrade, base courses and asphaltic concrete by in-situ density testing using nuclear gauges.*

5.8 Soil Chemical Analysis

*A sample of the existing fill from each the eleven boreholes were submitted for chemical analysis for metals and inorganic parameters for disposal purposes. The analysis was carried out by ALS Canada.*

*The test results are given in Appendix 'B' and reference to this shows that, except for SAR (sodium adsorption ratio) and EC (electrical conductivity) in all of the samples, and mercury in Sample BH6/5 and cadmium in Sample BH11/4, all of the parameters tested meet Table 1 standards of the current O/Reg 153/04 guidelines.*

*The cadmium and mercury values meet Table 2 standards for commercial/industrial property use. The high SAR and EC value were likely due to road salt.*

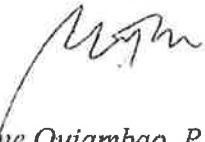


6.0 STATEMENT OF LIMITATIONS

*The Statement of Limitations presented on Appendix 'A' is an integral part of this report.*

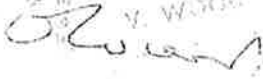
**V.A. WOOD ASSOCIATES LIMITED**

Prepared by:



Rene Quiambao, P. Eng.

Reviewed by:



V. Wood, M.Eng., P.Eng.

RQ/VW

*APPENDICES*

STATEMENT OF LIMITATIONS

*The conclusions and recommendations in this report are based on information determined at the borehole locations and on geological data of a general nature which may be available for the area investigated. Soil and groundwater conditions between and beyond the boreholes may differ from those encountered at the borehole locations and conditions may become apparent during construction which would not be detected or anticipated at the time of the soil investigation.*

*We recommend that we be retained to ensure that all necessary stripping, subgrade preparation and compaction requirements are met, and to confirm that the soil conditions do not deviate materially from those encountered in the boreholes. In cases where this recommendation is not followed, the company's responsibility is limited to interpreting accurately the information encountered at the borehole locations.*

*This report is applicable only to the project described in the introduction, constructed substantially in accordance with details of alignment and elevations quoted in the text.*

*APPENDIX 'B'*

*Soil Chemical Analysis*



V.A. WOOD ASSOCIATES LIMITED  
ATTN: Vic Wood  
1080 Tapscott Rd  
Unit 24  
Scarborough ON M1X 1E7

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Client Phone: 416-292-2868

## Certificate of Analysis

Lab Work Order #: L1989352  
Project P.O. #: NOT SUBMITTED  
Job Reference: 7171  
C of C Numbers: 15-557089  
Legal Site Desc:

Mathy Mahadeva  
Account Manager

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ADDRESS: 95 West Beaver Creek Road, Unit 1, Richmond Hill, ON L4B 1H2 Canada | Phone: +1 905 881 9887 | Fax: +1 905 881 8062  
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# ANALYTICAL REPORT

## Summary of Guideline Exceedances

Guideline	ALS ID	Client ID	Grouping	Analyte	Result	Guideline Limit	Unit
<b>Ontario Regulation 153/04 - April 15, 2011 Standards - T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use</b>							
L1989352-1	7171-BH1/2		Saturated Paste Extractables	SAR	6.09	2.4	SAR
L1989352-2	7171-BH2/3		Physical Tests	Conductivity	1.36	0.57	mS/cm
L1989352-3	7171-BH3/3		Saturated Paste Extractables	SAR	43.3	2.4	SAR
L1989352-4	7171-BH4/4		Physical Tests	Conductivity	1.22	0.57	mS/cm
L1989352-5	7171-BH5/5		Saturated Paste Extractables	SAR	55.3	2.4	SAR
L1989352-6	7171-BH6/5		Physical Tests	Conductivity	1.26	0.57	mS/cm
L1989352-7	7171-BH7/4		Saturated Paste Extractables	SAR	3.49	2.4	SAR
L1989352-8	7171-BH8/5		Physical Tests	Conductivity	0.693	0.57	mS/cm
L1989352-9	7171-BH9/3		Saturated Paste Extractables	SAR	18.9	2.4	SAR
L1989352-10	7171-BH10/5		Physical Tests	Conductivity	2.15	0.57	mS/cm
L1989352-11	7171-BH11/4		Saturated Paste Extractables	SAR	42.2	2.4	SAR
			Metals	Mercury (Hg)	0.361	0.27	ug/g
			Physical Tests	Conductivity	1.14	0.57	mS/cm
			Saturated Paste Extractables	SAR	9.10	2.4	SAR
			Physical Tests	Conductivity	0.576	0.57	mS/cm
			Saturated Paste Extractables	SAR	10.6	2.4	SAR
			Physical Tests	Conductivity	0.665	0.57	mS/cm
			Saturated Paste Extractables	SAR	8.04	2.4	SAR
			Physical Tests	Conductivity	0.681	0.57	mS/cm
			Saturated Paste Extractables	SAR	3.38	2.4	SAR
			Physical Tests	Conductivity	0.711	0.57	mS/cm
			Saturated Paste Extractables	SAR	16.8	2.4	SAR
			Metals	Cadmium (Cd)	1.81	1.2	ug/g

\* Please refer to the Reference Information section for an explanation of any qualifiers noted.

# ANALYTICAL REPORT

## Physical Tests - SOIL

Analyte	Unit	Guide Limits		Lab ID	Sample Date	Sample ID	L1989352-1	L1989352-2	L1989352-3	L1989352-4	L1989352-5	L1989352-6	L1989352-7	L1989352-8	L1989352-9
		#1	#2												
Conductivity	mS/cm	0.57	-	0.239	1.36	1.22	1.26	0.693	2.15	1.14	0.576	0.665			
% Moisture	%	-	-	2.84	13.9	13.3	51.6	14.2	21.5	3.95	19.8	17.7			
pH	pH units	-	-	8.04	8.75	7.76	7.16	7.68	7.44	7.94	7.42	7.58			

### Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Commu Property Use

- Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
- Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

\* Please refer to the Reference Information section for an explanation of any qualifiers noted.



# ANALYTICAL REPORT

## Physical Tests - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2
Conductivity	mS/cm	0.57	-
% Moisture	%	-	-
pH	pH units	-	-

### Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.  
 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

\* Please refer to the Reference Information section for an explanation of any qualifiers noted.







# ANALYTICAL REPORT

## Cyanides - SOIL

Analyte	Unit	Guide #1	Guide #2
Cyanide, Weak Acid Diss	ug/g	0.051	<0.050

Lab ID L1989352-10 L1989352-11  
 Sample Date 26-AUG-17 26-AUG-17  
 Sample ID 7171-BH10/5 7171-BH11/4

### Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.  
 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

\* Please refer to the Reference Information section for an explanation of any qualifiers noted.





# ANALYTICAL REPORT

## Saturated Paste Extractables - SOIL

Analyte	Unit	Guide Limits	
		#1	#2
SAR	SAR	2.4	16.8
Calcium (Ca)	mg/L	43.3	5.3
Magnesium (Mg)	mg/L	<1.0	<1.0
Sodium (Na)	mg/L	80.8	140

### Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.  
 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

\* Please refer to the Reference Information section for an explanation of any qualifiers noted.



# ANALYTICAL REPORT

## Metals - SOIL

Analyte	Unit	Guide Limits		Sample Data																						
		#1	#2	Sample ID	Lab ID	Sample Date	Sample ID	Lab ID	Sample Date	Sample ID	Lab ID	Sample Date	Sample ID	Lab ID	Sample Date	Sample ID	Lab ID	Sample Date								
Antimony (Sb)	ug/g	1.3	<1.0	7171-BH1/2	L1989352-1	29-AUG-17	7171-BH3/3	L1989352-3	30-AUG-17	7171-BH4/4	L1989352-4	29-AUG-17	7171-BH5/5	L1989352-5	29-AUG-17	7171-BH6/6	28-AUG-17	7171-BH7/4	L1989352-7	26-AUG-17	7171-BH8/5	L1989352-8	26-AUG-17	7171-BH9/3	L1989352-9	26-AUG-17
Arsenic (As)	ug/g	18	1.7	<1.0	1.6	<1.0	1.8	2.1	1.6	1.8	1.6	1.8	1.6	1.8	1.6	1.8	1.6	1.8	1.6	1.8	1.6	1.8	1.6	1.8	1.6	1.8
Barium (Ba)	ug/g	220	28.8	27.4	30.7	98.3	27.4	98.3	38.6	46.8	38.6	46.8	38.6	46.8	38.6	46.8	38.6	46.8	38.6	46.8	38.6	46.8	38.6	46.8	38.6	46.8
Beryllium (Be)	ug/g	2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Boron (B)	ug/g	36	5.5	<5.0	<5.0	7.2	<5.0	7.2	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Boron (B), Hot Water Ext.	ug/g	36	<0.10	0.19	0.19	0.85	0.17	0.85	0.10	0.56	0.10	0.56	0.10	0.56	0.10	0.56	0.10	0.56	0.10	0.56	0.10	0.56	0.10	0.56	0.10	0.56
Cadmium (Cd)	ug/g	1.2	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Chromium (Cr)	ug/g	70	14.3	9.0	9.0	12.7	9.3	12.7	10.2	10.4	10.2	10.4	10.2	10.4	10.2	10.4	10.2	10.4	10.2	10.4	10.2	10.4	10.2	10.4	10.2	10.4
Cobalt (Co)	ug/g	21	3.3	2.6	2.6	2.5	2.8	2.5	3.1	3.3	3.1	3.3	3.1	3.3	3.1	3.3	3.1	3.3	3.1	3.3	3.1	3.3	3.1	3.3	3.1	3.3
Copper (Cu)	ug/g	92	8.1	7.7	7.7	6.0	7.8	6.0	5.8	6.9	5.8	6.9	5.8	6.9	5.8	6.9	5.8	6.9	5.8	6.9	5.8	6.9	5.8	6.9	5.8	6.9
Lead (Pb)	ug/g	120	6.3	21.7	21.7	3.2	21.3	3.2	6.0	83.3	6.0	83.3	6.0	83.3	6.0	83.3	6.0	83.3	6.0	83.3	6.0	83.3	6.0	83.3	6.0	83.3
Mercury (Hg)	ug/g	0.27	0.0095	0.0462	0.0462	0.0300	0.0939	0.0300	0.0202	0.361	0.0202	0.361	0.0202	0.361	0.0202	0.361	0.0202	0.361	0.0202	0.361	0.0202	0.361	0.0202	0.361	0.0202	0.361
Molybdenum (Mo)	ug/g	2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel (Ni)	ug/g	82	7.0	6.1	6.1	5.2	6.4	5.2	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Selenium (Se)	ug/g	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Silver (Ag)	ug/g	0.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium (Tl)	ug/g	1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium (U)	ug/g	2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vanadium (V)	ug/g	86	16.6	18.1	18.1	16.0	18.0	16.0	20.7	20.8	20.7	20.8	20.7	20.8	20.7	20.8	20.7	20.8	20.7	20.8	20.7	20.8	20.7	20.8	20.7	20.8
Zinc (Zn)	ug/g	290	26.5	42.4	42.4	24.1	64.4	24.1	20.0	31.2	20.0	31.2	20.0	31.2	20.0	31.2	20.0	31.2	20.0	31.2	20.0	31.2	20.0	31.2	20.0	31.2

### Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

  Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.  
  Analytical result for this parameter exceeds Guideline Limit listed. See Summary of Guideline Exceedances.

\* Please refer to the Reference Information section for an explanation of any qualifiers noted.

# ANALYTICAL REPORT

## Metals - SOIL

Analyte	Unit	Guide Limits	
		#1	#2
Arsenic (As)	ug/g	1.3	<1.0
Barium (Ba)	ug/g	18	1.3
Beryllium (Be)	ug/g	220	22.9
Boron (B)	ug/g	2.5	<0.50
Boron (B), Hot Water Ext.	ug/g	36	<5.0
Cadmium (Cd)	ug/g	36	0.26
Chromium (Cr)	ug/g	1.2	<0.50
Cobalt (Co)	ug/g	70	7.9
Copper (Cu)	ug/g	21	2.2
Lead (Pb)	ug/g	92	3.7
Mercury (Hg)	ug/g	120	9.9
Molybdenum (Mo)	ug/g	0.27	0.0263
Nickel (Ni)	ug/g	2	<1.0
Selenium (Se)	ug/g	82	4.0
Silver (Ag)	ug/g	1.5	<1.0
Thallium (Tl)	ug/g	0.5	<0.20
Uranium (U)	ug/g	1	<0.50
Vanadium (V)	ug/g	2.5	<1.0
Zinc (Zn)	ug/g	86	21.7
	ug/g	290	30.3
			40.0

### Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Comm Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.  
 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

\* Please refer to the Reference Information section for an explanation of any qualifiers noted.





# ANALYTICAL REPORT

## Speciated Metals - SOIL

Analyte	Unit	Guide Limits #1	Guide Limits #2
Chromium, Hexavalent	ug/g	0.66	<0.20

### Guide Limit #1: T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use

Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.  
 Analytical result for this parameter exceeds Guide Limits listed. See Summary of Guideline Exceedances.

\* Please refer to the Reference Information section for an explanation of any qualifiers noted.



## Reference Information

**Qualifiers for Individual Parameters Listed:**

Qualifier	Description
SAR:M	Reported SAR represents a maximum value. Actual SAR may be lower if both Ca and Mg were detectable.

**Methods Listed (if applicable):**

ALS Test Code	Matrix	Test Description	Method Reference**
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**B-HWS-R511-WT** Soil Boron-HWE-O.Reg 153/04 (July 2011) HW EXTR, EPA 6010B

A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

**CN-WAD-R511-WT** Soil Cyanide (WAD)-O.Reg 153/04 (July 2011) MOE 3015/APHA 4500CN I-WAD

The sample is extracted with a strong base for 16 hours, and then filtered. The filtrate is then distilled where the cyanide is converted to cyanogen chloride by reacting with chloramine-T, the cyanogen chloride then reacts with a combination of barbituric acid and isonicotinic acid to form a highly colored complex.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

**CR-CR6-IC-WT** Soil Hexavalent Chromium in Soil SW846 3060A/7199

This analysis is carried out using procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846, Method 7199, published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

**EC-WT** Soil Conductivity (EC) MOEE E3138

A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

**HG-200.2-CVAA-WT** Soil Mercury in Soil by CVAAS EPA 200.2/1631E (mod)

Soil samples are digested with nitric and hydrochloric acids, followed by analysis by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

**MET-200.2-CCMS-WT** Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A (mod)

This method uses a heated strong acid digestion with HNO<sub>3</sub> and HCl and is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

**MOISTURE-WT** Soil % Moisture Gravimetric: Oven Dried

**PH-WT** Soil pH MOEE E3137A

## Reference Information

### Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
SAR-R511-WT	Soil	SAR-O.Reg 153/04 (July 2011)	SW846 6010C

A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

\*\*ALS test methods may incorporate modifications from specified reference methods to improve performance.

### Chain of Custody Numbers:

15-557089

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

### GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information.



# Quality Control Report

Workorder: L1989352

Report Date: 18-SEP-17

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Client: V.A. WOOD ASSOCIATES LIMITED  
1080 Tapscott Rd Unit 24  
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
B-HWS-R511-WT Soil								
Batch R3828286								
WG2615585-4	DUP	L1988852-3						
Boron (B), Hot Water Ext.		0.14	0.14		ug/g	2.1	30	14-SEP-17
WG2615585-2	IRM	HOTB-SAL_SOIL5						
Boron (B), Hot Water Ext.			128.3		%		70-130	14-SEP-17
WG2615585-3	LCS							
Boron (B), Hot Water Ext.			97.8		%		70-130	14-SEP-17
WG2615585-1	MB							
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	14-SEP-17
Batch R3829177								
WG2616578-4	DUP	L1989352-11						
Boron (B), Hot Water Ext.		0.33	0.33		ug/g	1.2	30	15-SEP-17
WG2616578-2	IRM	HOTB-SAL_SOIL5						
Boron (B), Hot Water Ext.			125.0		%		70-130	15-SEP-17
WG2616578-3	LCS							
Boron (B), Hot Water Ext.			110.6		%		70-130	15-SEP-17
WG2616578-1	MB							
Boron (B), Hot Water Ext.			<0.10		ug/g		0.1	15-SEP-17
CN-WAD-R511-WT Soil								
Batch R3830913								
WG2613570-3	DUP	L1989325-1						
Cyanide, Weak Acid Diss		<0.050	<0.050	RPD-NA	ug/g	N/A	35	15-SEP-17
WG2613570-2	LCS							
Cyanide, Weak Acid Diss			95.0		%		80-120	15-SEP-17
WG2613570-1	MB							
Cyanide, Weak Acid Diss			<0.050		ug/g		0.05	15-SEP-17
WG2613570-4	MS	L1989325-1						
Cyanide, Weak Acid Diss			99.6		%		70-130	15-SEP-17
CR-CR6-IC-WT Soil								
Batch R3826444								
WG2613572-4	CRM	WT-SQC012						
Chromium, Hexavalent			94.9		%		70-130	13-SEP-17
WG2613572-3	DUP	L1989232-1						
Chromium, Hexavalent		<0.20	<0.20	RPD-NA	ug/g	N/A	35	13-SEP-17
WG2613572-2	LCS							
Chromium, Hexavalent			96.5		%		80-120	13-SEP-17
WG2613572-1	MB							
Chromium, Hexavalent			<0.20		ug/g		0.2	13-SEP-17



# Quality Control Report

Workorder: L1989352

Report Date: 18-SEP-17

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Client: V.A. WOOD ASSOCIATES LIMITED  
1080 Tapscott Rd Unit 24  
Scarborough ON M1X 1E7

Contact: Vlc Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CR-CR6-IC-WT	Soil							
<b>Batch</b> R3830869								
<b>WG2617273-3 CRM</b> Chromium, Hexavalent		<b>WT-SQC012</b>	85.7		%		70-130	18-SEP-17
<b>WG2617273-4 DUP</b> Chromium, Hexavalent		<b>L1992202-1</b> <0.20	<0.20	RPD-NA	ug/g	N/A	35	18-SEP-17
<b>WG2617273-2 LCS</b> Chromium, Hexavalent			96.5		%		80-120	18-SEP-17
<b>WG2617273-1 MB</b> Chromium, Hexavalent			<0.20		ug/g		0.2	18-SEP-17
EC-WT	Soil							
<b>Batch</b> R3828610								
<b>WG2615587-4 DUP</b> Conductivity		<b>WG2615587-3</b> 0.189	0.190		mS/cm	0.6	20	14-SEP-17
<b>WG26155863-1 LCS</b> Conductivity			99.6		%		90-110	14-SEP-17
<b>WG2615587-1 MB</b> Conductivity			<0.0040		mS/cm		0.004	14-SEP-17
<b>Batch</b> R3828774								
<b>WG2615589-4 DUP</b> Conductivity		<b>WG2615589-3</b> 1.60	1.62		mS/cm	1.1	20	14-SEP-17
<b>WG2615865-1 LCS</b> Conductivity			99.1		%		90-110	14-SEP-17
<b>WG2615589-1 MB</b> Conductivity			<0.0040		mS/cm		0.004	14-SEP-17
1G-200.2-CVAA-WT	Soil							
<b>Batch</b> R3828494								
<b>WG2615554-2 CRM</b> Mercury (Hg)		<b>WT-CANMET-TILL1</b>	96.6		%		70-130	14-SEP-17
<b>WG2615554-6 DUP</b> Mercury (Hg)		<b>WG2615554-5</b> 0.0939	0.0839		ug/g	11	40	14-SEP-17
<b>WG2615554-3 LCS</b> Mercury (Hg)			103.5		%		80-120	14-SEP-17
<b>WG2615554-1 MB</b> Mercury (Hg)			<0.0050		mg/kg		0.005	14-SEP-17
1ET-200.2-CCMS-WT	Soil							



ALS Environmental

# Quality Control Report

Workorder: L1989352

Report Date: 18-SEP-17

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Client: V.A. WOOD ASSOCIATES LIMITED  
 1080 Tapscott Rd Unit 24  
 Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT		Soil						
<b>Batch</b>	<b>R3829247</b>							
<b>WG2615554-2</b>	<b>CRM</b>	<b>WT-CANMET-TILL1</b>						
Antimony (Sb)			99.5		%		70-130	14-SEP-17
Arsenic (As)			101.7		%		70-130	14-SEP-17
Barium (Ba)			103.1		%		70-130	14-SEP-17
Beryllium (Be)			98.5		%		70-130	14-SEP-17
Boron (B)			3.3		mg/kg		0-8.2	14-SEP-17
Cadmium (Cd)			108.8		%		70-130	14-SEP-17
Chromium (Cr)			104.3		%		70-130	14-SEP-17
Cobalt (Co)			103.0		%		70-130	14-SEP-17
Copper (Cu)			103.1		%		70-130	14-SEP-17
Lead (Pb)			102.6		%		70-130	14-SEP-17
Molybdenum (Mo)			109.9		%		70-130	14-SEP-17
Nickel (Ni)			102.1		%		70-130	14-SEP-17
Selenium (Se)			0.32		mg/kg		0.11-0.51	14-SEP-17
Silver (Ag)			0.23		mg/kg		0.13-0.33	14-SEP-17
Thallium (Tl)			0.137		mg/kg		0.077-0.18	14-SEP-17
Uranium (U)			105.6		%		70-130	14-SEP-17
Vanadium (V)			102.3		%		70-130	14-SEP-17
Zinc (Zn)			103.8		%		70-130	14-SEP-17
<b>WG2615554-6</b>	<b>DUP</b>	<b>WG2615554-5</b>						
Antimony (Sb)		0.15	0.18		ug/g	16	30	14-SEP-17
Arsenic (As)		1.78	1.81		ug/g	2.0	30	14-SEP-17
Barium (Ba)		27.4	27.5		ug/g	0.7	40	14-SEP-17
Beryllium (Be)		0.20	0.18		ug/g	8.3	30	14-SEP-17
Boron (B)		<5.0	<5.0	RPD-NA	ug/g	N/A	30	14-SEP-17
Cadmium (Cd)		0.173	0.157		ug/g	9.6	30	14-SEP-17
Chromium (Cr)		9.32	9.21		ug/g	1.2	30	14-SEP-17
Cobalt (Co)		2.82	2.84		ug/g	0.7	30	14-SEP-17
Copper (Cu)		7.75	7.94		ug/g	2.4	30	14-SEP-17
Lead (Pb)		21.3	24.8		ug/g	15	40	14-SEP-17
Molybdenum (Mo)		0.28	0.27		ug/g	2.9	40	14-SEP-17
Nickel (Ni)		6.38	6.47		ug/g	1.4	30	14-SEP-17
Selenium (Se)		<0.20	<0.20	RPD-NA	ug/g	N/A	30	14-SEP-17
Silver (Ag)		<0.10	<0.10	RPD-NA	ug/g	N/A	40	14-SEP-17



South America

# Quality Control Report

Workorder: L1989352

Report Date: 18-SEP-17

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Client: V.A. WOOD ASSOCIATES LIMITED  
1080 Tapscott Rd Unit 24  
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	Soil							
<b>Batch</b>	<b>R3829247</b>							
<b>WG2615554-6</b>	<b>DUP</b>	<b>WG2615554-5</b>						
Thallium (Tl)		0.060	0.064		ug/g	6.7	30	14-SEP-17
Uranium (U)		0.401	0.394		ug/g	1.6	30	14-SEP-17
Vanadium (V)		18.0	17.6		ug/g	1.8	30	14-SEP-17
Zinc (Zn)		64.4	66.7		ug/g	3.4	30	14-SEP-17
<b>WG2615554-4</b>	<b>LCS</b>							
Antimony (Sb)			99.2		%		80-120	14-SEP-17
Arsenic (As)			97.4		%		80-120	14-SEP-17
Barium (Ba)			102.5		%		80-120	14-SEP-17
Beryllium (Be)			90.6		%		80-120	14-SEP-17
Boron (B)			85.8		%		80-120	14-SEP-17
Cadmium (Cd)			99.2		%		80-120	14-SEP-17
Chromium (Cr)			98.4		%		80-120	14-SEP-17
Cobalt (Co)			100.2		%		80-120	14-SEP-17
Copper (Cu)			97.0		%		80-120	14-SEP-17
Lead (Pb)			98.3		%		80-120	14-SEP-17
Molybdenum (Mo)			100.8		%		80-120	14-SEP-17
Nickel (Ni)			98.0		%		80-120	14-SEP-17
Selenium (Se)			98.0		%		80-120	14-SEP-17
Silver (Ag)			99.5		%		80-120	14-SEP-17
Thallium (Tl)			99.9		%		80-120	14-SEP-17
Uranium (U)			100.8		%		80-120	14-SEP-17
Vanadium (V)			100.9		%		80-120	14-SEP-17
Zinc (Zn)			93.5		%		80-120	14-SEP-17
<b>WG2615554-1</b>	<b>MB</b>							
Antimony (Sb)			<0.10		mg/kg		0.1	14-SEP-17
Arsenic (As)			<0.10		mg/kg		0.1	14-SEP-17
Barium (Ba)			<0.50		mg/kg		0.5	14-SEP-17
Beryllium (Be)			<0.10		mg/kg		0.1	14-SEP-17
Boron (B)			<5.0		mg/kg		5	14-SEP-17
Cadmium (Cd)			<0.020		mg/kg		0.02	14-SEP-17
Chromium (Cr)			<0.50		mg/kg		0.5	14-SEP-17
Cobalt (Co)			<0.10		mg/kg		0.1	14-SEP-17
Copper (Cu)			<0.50		mg/kg		0.5	14-SEP-17
Lead (Pb)			<0.50		mg/kg		0.5	14-SEP-17



# Quality Control Report

Workorder: L1989352

Report Date: 18-SEP-17

Page 5 of 8

Client: V.A. WOOD ASSOCIATES LIMITED  
1080 Tapscott Rd Unit 24  
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-CCMS-WT	Soil							
<b>Batch</b>	<b>R3829247</b>							
<b>WG2615554-1 MB</b>								
Molybdenum (Mo)			<0.10		mg/kg		0.1	14-SEP-17
Nickel (Ni)			<0.50		mg/kg		0.5	14-SEP-17
Selenium (Se)			<0.20		mg/kg		0.2	14-SEP-17
Silver (Ag)			<0.10		mg/kg		0.1	14-SEP-17
Thallium (Tl)			<0.050		mg/kg		0.05	14-SEP-17
Uranium (U)			<0.050		mg/kg		0.05	14-SEP-17
Vanadium (V)			<0.20		mg/kg		0.2	14-SEP-17
Zinc (Zn)			<2.0		mg/kg		2	14-SEP-17
MOISTURE-WT	Soil							
<b>Batch</b>	<b>R3825968</b>							
<b>WG2613568-3 DUP</b>		<b>L1988852-2</b>						
% Moisture		6.25	5.89		%	6.1	20	12-SEP-17
<b>WG2613568-2 LCS</b>								
% Moisture			99.3		%		90-110	12-SEP-17
<b>WG2613568-1 MB</b>								
% Moisture			<0.10		%		0.1	12-SEP-17
PH-WT	Soil							
<b>Batch</b>	<b>R3827676</b>							
<b>WG2613554-1 DUP</b>		<b>L1988849-1</b>						
pH		7.88	7.88	J	pH units	0.00	0.3	13-SEP-17
<b>WG2614791-1 LCS</b>								
pH			6.97		pH units		6.9-7.1	13-SEP-17
SAR-R511-WT	Soil							
<b>Batch</b>	<b>R3828534</b>							
<b>WG2615589-4 DUP</b>		<b>WG2615589-3</b>						
Calcium (Ca)		8.9	9.0		mg/L	1.3	30	14-SEP-17
Sodium (Na)		336	339		mg/L	0.7	30	14-SEP-17
Magnesium (Mg)		2.8	2.4		mg/L	15	30	14-SEP-17
<b>WG2615589-2 IRM</b>		<b>WT SAR1</b>						
Calcium (Ca)			96.0		%		70-130	14-SEP-17
Sodium (Na)			101.2		%		70-130	14-SEP-17
Magnesium (Mg)			95.7		%		70-130	14-SEP-17
<b>WG2615589-1 MB</b>								
Calcium (Ca)			<1.0		mg/L		1	14-SEP-17
Sodium (Na)			<1.0		mg/L		1	14-SEP-17



environmental

# Quality Control Report

Workorder: L1989352

Report Date: 18-SEP-17

Page 6 of 8

Client: V.A. WOOD ASSOCIATES LIMITED  
1080 Tapscott Rd Unit 24  
Scarborough ON M1X 1E7

Contact: Vic Wood

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SAR-R511-WT	Soil							
<b>Batch R3828534</b>								
<b>WG2615589-1 MB</b>								
Magnesium (Mg)			<1.0		mg/L		1	14-SEP-17
<b>Batch R3828541</b>								
<b>WG2615587-4 DUP</b>		<b>WG2615587-3</b>						
Calcium (Ca)		7.0	6.6		mg/L	6.9	30	14-SEP-17
Sodium (Na)		4.4	4.1		mg/L	7.2	30	14-SEP-17
Magnesium (Mg)		1.9	1.7		mg/L	9.4	30	14-SEP-17
<b>WG2615587-2 IRM</b>		<b>WT SAR1</b>						
Calcium (Ca)			97.4		%		70-130	14-SEP-17
Sodium (Na)			100.8		%		70-130	14-SEP-17
Magnesium (Mg)			98.4		%		70-130	14-SEP-17
<b>W 15587-1 MB</b>								
C (Ca)			<1.0		mg/L		1	14-SEP-17
Sodium (Na)			<1.0		mg/L		1	14-SEP-17
Magnesium (Mg)			<1.0		mg/L		1	14-SEP-17



# Quality Control Report

Workorder: L1989352

Report Date: 18-SEP-17

Client: V.A. WOOD ASSOCIATES LIMITED  
1080 Tapscott Rd Unit 24  
Scarborough ON M1X 1E7  
Co. Act: Vic Wood

Page 7 of 8

## Legend:

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Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

## Sample Parameter Qualifier Definitions:

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Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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# Quality Control Report

Workorder: L1989352

Report Date: 18-SEP-17

Client: V.A. WOOD ASSOCIATES LIMITED  
 1080 Tapscott Rd Unit 24  
 Scarborough ON M1X 1E7  
 Co. Name: Vic Wood

**Hold Time Exceedances:**

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
<b>Physical Tests</b>							
% Moisture							
	7	28-AUG-17 08:00	12-SEP-17 09:00	14	15	days	EHTR
	8	26-AUG-17 12:00	12-SEP-17 09:01	14	17	days	EHTR
	9	26-AUG-17 12:00	12-SEP-17 09:02	14	17	days	EHTR
	10	26-AUG-17 08:00	12-SEP-17 09:03	14	17	days	EHTR
	11	26-AUG-17 08:00	12-SEP-17 09:04	14	17	days	EHTR
<b>Cyanides</b>							
Cyanide (WAD)-O.Reg 153/04 (July 2011)							
	7	28-AUG-17 08:00	12-SEP-17 08:00	14	15	days	EHTR
	8	26-AUG-17 12:00	12-SEP-17 08:00	14	17	days	EHTR
	9	26-AUG-17 12:00	12-SEP-17 08:00	14	17	days	EHTR
	10	26-AUG-17 08:00	12-SEP-17 08:00	14	17	days	EHTR
	11	26-AUG-17 08:00	12-SEP-17 08:00	14	17	days	EHTR

**Legend & Qualifier Definitions:**

- EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
- EHTR: Exceeded ALS recommended hold time prior to sample receipt.
- EHTL: Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
- EHT: Exceeded ALS recommended hold time prior to analysis.
- Rec. HT: ALS recommended hold time (see units).

**Notes:**  
 Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.  
 Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1989352 were received on 11-SEP-17 17:30.

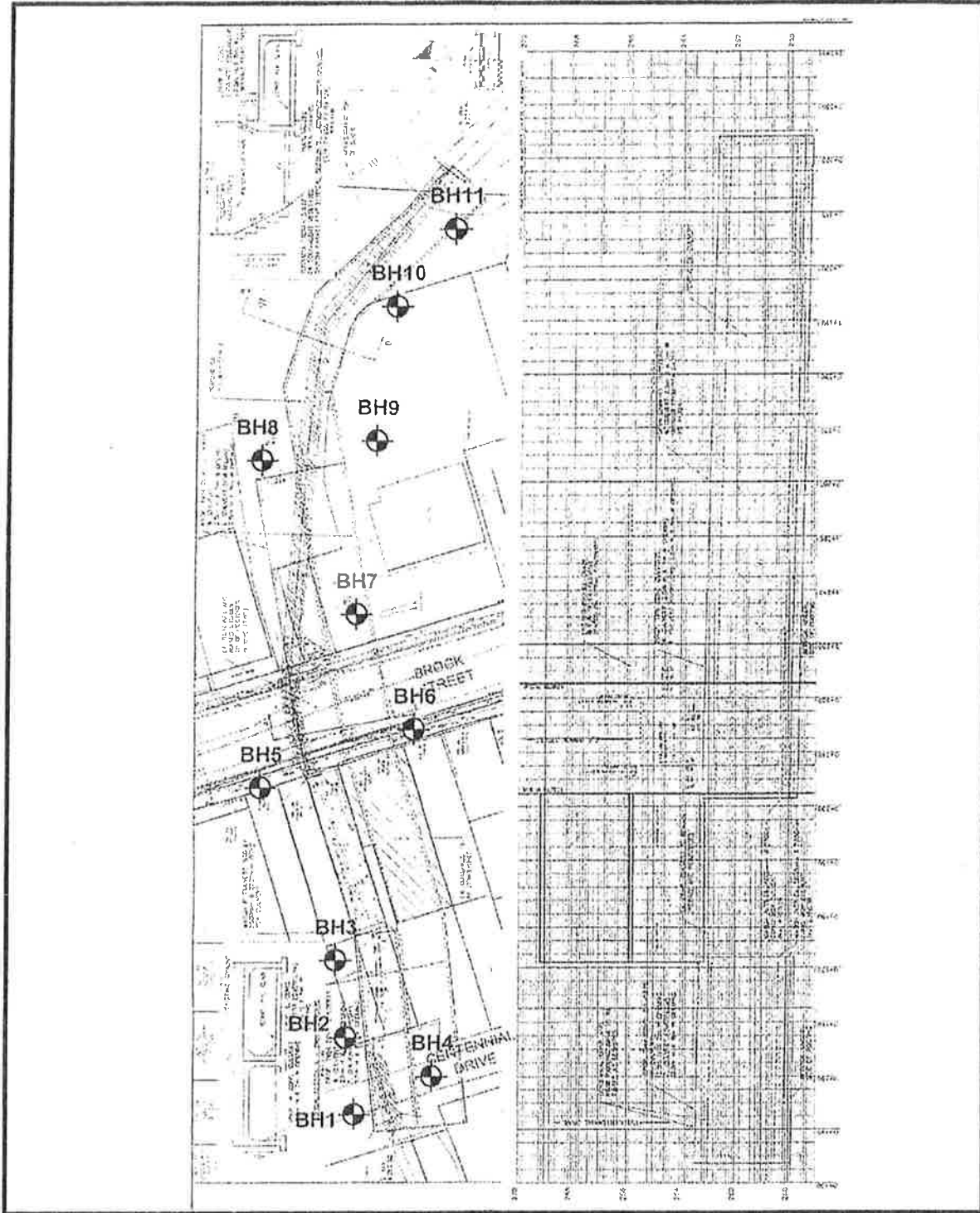
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

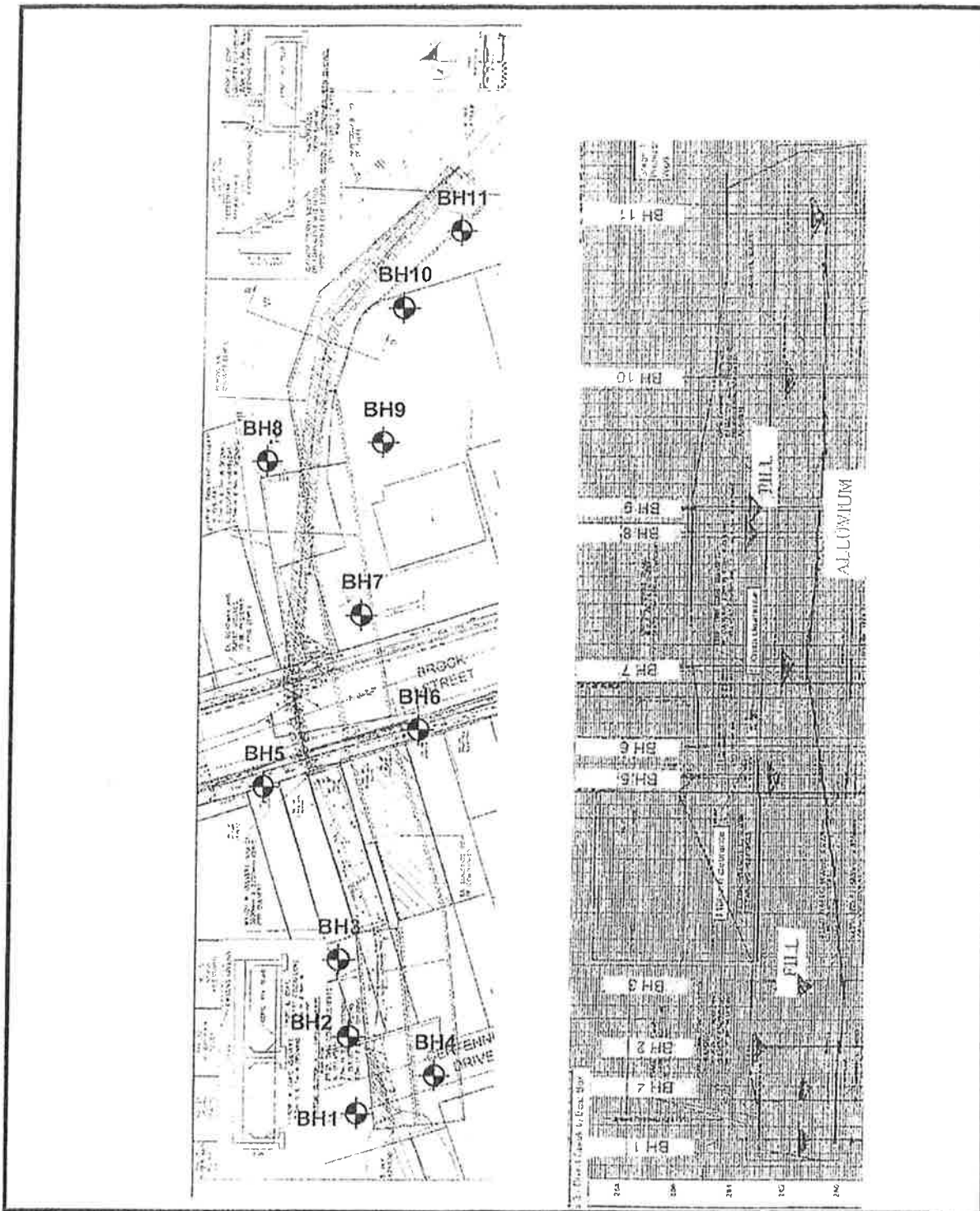
Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



*ENCLOSURES*



BOREHOLE LOCATION PLAN



SUMMARIZED LONGITUDINAL SECTION

Reference No : 7171-17-6

**Borehole No : 1**

Enclosure No : 2

Client : AECOM

Project : Culvert Reconstruction

Method : Auger

Location : Brock St./Centennial Dr., Uxbridge, ON

Diameter : 110 mm

Datum Elevation : Gendetic

Date : August 29, 2017

SUBSURFACE PROFILE				SAMPLE			Standard Penetration Test blows/300mm 20 40 60 80	Moisture Content, % 10 30 50	Remarks	
Elevation m	Depth m	Description	Symbol	Water	Number	Type				N-value
263.01	0	Ground Surface								
		Augered to 0.75 m								
262.26	1	<b>FILL</b> Silty sand, some gravel, brown, moist, compact to dense then very loose	[Cross-hatched symbol]		1	SS	34	○		
	2				2	SS	13	○		
	3				3	SS	2	○		
260.11	4	<b>SILTY SAND</b> Loose, some wood fragments and peat, grey, wet	[Cross-hatched symbol]		4	SS	8	○		
	5									
259.01	6	<b>SANDY SILT</b> Compact, silt and very fine sand, light grey, wet	[Dotted symbol]		5	SS	19	○		
	7									
256.46	8	End of Borehole			6	SS	20	○		

50 mm diameter monitoring well to depth of 6.1 m

Reference No : 7171-17-6

## Borehole No : 2

Enclosure No : 3

Client : AECOM

Project : Culvert Reconstruction

Method : Auger

Location : Brock St./Centennial Dr., Uxbridge, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : August 29, 2017

SUBSURFACE PROFILE					SAMPLE			Standard Penetration Test				Moisture Content, %			Remarks
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value	blows/300mm				Moisture Content, %			
								20	40	60	80	10	30	50	
262.81	0	Ground Surface													50 mm diameter monitoring well to depth of 9.1 m
		Augered to 0.75 m													
262.02	1	<i>FILL</i> Organic stained sand, some gravel, brown, moist, loose	[Cross-hatch pattern]		1	SS	5								
	2				2	SS	3								
	3				3	SS	6								
259.91	4	<i>GRAVELLY SAND</i> Loose, grey, wet to saturated	[Cross-hatch pattern]		4	SS	7								
	5				5	SS	8								
	6				6	SS	5								
256.41	7				7	SS	23								
	8	<i>SANDY SILT</i> loose then compact, silt and very fine sand, light grey, wet	[Dotted pattern]		8	SS	31								
	9														
253.21	10	End of Borehole													

**V.A. WOOD ASSOCIATES LIMITED**

Disk :

Sheet : 1 of 1



Reference No : 7171-17-6

# Borehole No : 3

Enclosure No : 4

Client : AECOM

Project : Culvert Reconstruction





Method : Auger

Location : Brock St./Centennial Dr., Uxbridge, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : August 30, 2017

SUBSURFACE PROFILE				SAMPLE			Standard Penetration Test				Moisture Content, %			Remarks	
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value	blows/300mm							
								20	40	60	80	10	30		50
262.72	0	Ground Surface													
	0.75	Augered to 0.75 m													
261.97	1	<i>FILL</i> Well graded sand, some gravel, brown, moist, wet at the bottom, very loose then loose			1	SS	3								50 mm diameter monitoring well to depth of 9.1 m
	2				2	SS	6								
	3				3	SS	6								
259.82	4	<i>GRAVELLY SAND</i> Loose to compact, grey, wet to saturated			4	SS	5								
	5				5	SS	15								
257.22	6				6	SS	3								
	7	<i>SANDY SILT</i> Loose then compact, silt and very fine sand, light grey, wet to saturated			7	SS	18								
254.22	8				8	SS	44								
253.12	9	<i>SAND AND GRAVEL</i> Dense, grey, saturated			8	SS	44								
	10	End of Borehole													

V.A. WOOD ASSOCIATES LIMITED

Disk :

Sheet : 1 of 1

Reference No : 7171-17-6

# Borehole No : 4

Enclosure No : 5

Client : AECOM

Project : Culvert Reconstruction






Method : Auger

Location : Brock St./Centennial Dr., Uxbridge, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : August 30, 2017

SUBSURFACE PROFILE				SAMPLE			Standard Penetration Test				Moisture Content, %			Remarks	
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value	blows/300mm							
								20	40	60	80	10	30		50
263.04	0	Ground Surface													
		Augered to 0.75 m													
262.29	0.75														50 mm diameter monitoring well to depth of 6.1 m
	1	<b>FILL</b>			1	SS	5								
	2	Gravelly sand, clear stone at 1.5 m, moist then wet to saturated, loose to very loose			2	SS	1								
	3				3	SS	1								
260.14	3	<b>PEAT</b> Very loose, wet			4	SS	4								
259.44	4														
	5	<b>GRAVELLY SAND</b> Loose, some topsoil and organics, grey, saturated			5	SS	8								
258.24	5														
	6	<b>SANDY SILT</b> Compact, silt and very fine sand, light grey, wet			6	SS	10								
256.49	6														
	7	End of Borehole													
	8														

**V.A. WOOD ASSOCIATES LIMITED**

Disk :

Sheet : 1 of 1

Reference No : 7171-17-6

# Borehole No : 5

Enclosure No : 6

Client : AECOM

Project : Culvert Reconstruction




Method : Auger

Location : Brock St./Centennial Dr., Uxbridge, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : August 29, 2017

SUBSURFACE PROFILE				SAMPLE			Standard Penetration Test blows/300mm 20 40 60 80	Moisture Content, % 10 30 50	Remarks	
Elevation m	Depth m	Description	Symbol	Water	Number	Type				N-value
265.74	0	Ground Surface								
		Augered to 0.75 m								
264.99	1	FILL  Silty sand, some gravel, occasional seams of silty clay, brown, moist, compact then loose to very loose			1	SS	16			
	2				2	SS	8			
	3				3	SS	3			
	4				4	SS	3			
261.74	5	SILTY SAND Very loose, grey, saturated			5	SS	1			
260.24	6	SILTY SAND AND PEAT Loose, seams of silty sand and peat, wet			6	SS	5			
258.74	7	SANDY SILT  Compact, silt and very fine sand, light grey, wet  some seams of clay			7	SS	12			
	8				8	SS	20			
256.14	10	End of Borehole								

50 mm diameter monitoring well to depth of 9.1 m

**V.A. WOOD ASSOCIATES LIMITED**

Disk :

Sheet : 1 of 1

Reference No : 7171-17-6

**Borehole No : 6**

Enclosure No : 7

Client : AECOM

Project : Culvert Reconstruction






Method : Auger

Location : Brock St/Centennial Dr., Uxbridge, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : August 29, 2017

SUBSURFACE PROFILE				SAMPLE			Standard Penetration Test				Moisture Content, %			Remarks	
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value	blows/300mm							
								20	40	60	80	10	30		50
265.41	0	Ground Surface													
		Augered to 0.75 m												50 mm diameter monitoring well to depth of 9.1 m	
264.66	1	FILL Gravelly sand, loose, moist			1	SS	5								
264.01	2	FILL Seams of sand and silty clay, some wood fragments, dense then very loose, moist			2	SS	37								
	3				3	SS	2								
	4				4	SS	1								
261.41	5	SANDY SILT Loose, some wood fragments, wet			5	SS	8								
259.91	6	SAND AND PEAT Compact, well graded sand and peat, wet			6	SS	12								
258.41	7	SANDY SILT Compact, silt and very fine sand, light grey, wet			7	SS	7								
255.81	8				8	SS	34								
	10	End of Borehole													

**V.A. WOOD ASSOCIATES LIMITED**

Disk :

Sheet : 1 of 1

Reference No : 7171-17-6

**Borehole No : 7**

Enclosure No : 8

Client : AECOM

Project : Culvert Reconstruction


Method : Auger

Location : Brock St./Centennial Dr., Uxbridge, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : August 28, 2017

SUBSURFACE PROFILE				SAMPLE			Standard Penetration Test blows/300mm 20 40 60 80	Moisture Content, %			Remarks	
Elevation m	Depth m	Description	Symbol	Water	Number	Type		N-value	10	30		50
265.68	0	Ground Surface										
		Augered to 0.75 m									50 mm diameter monitoring well to depth of 6.1 m	
264.93	1	FILL Sand, some gravel, damp to moist. brown, loose  gravelly			1	SS	4					
	2				2	SS	4					
	3				3	SS	4					
	4				4	SS	24					
261.68	5	SILTY SAND Loose, some wood fragments, grey, wet			5	SS	5					
260.18	6	GRAVELLY SAND Compact, some silt, organic stained, grey, saturated			6	SS	13					
259.13	7	End of Borehole										
	8											

**V.A. WOOD ASSOCIATES LIMITED**

Disk :

Sheet : 1 of 1

Reference No : 7171-17-6

**Borehole No : 8**

Enclosure No : 9

Client : AECOM

Project : Culvert Reconstruction

Method : Auger

Location : Brock St./Centennial Dr., Uxbridge, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : August 26, 2017

SUBSURFACE PROFILE				SAMPLE			Standard Penetration Test blows/300mm 20 40 60 80	Moisture Content, % 10 30 50	Remarks	
Elevation m	Depth m	Description	Symbol	Water	Number	Type				N-value
265.81	0	Ground Surface								
	0.75	Augered to 0.75 m								
265.06	1	<b>FILL</b> Fine to medium to well graded sand, some gravel, brown, moist, loose to very loose			1	SS	9	50 mm diameter monitoring well to depth of 9.1 m		
	2				2	SS	5			
	3				3	SS	4			
	4				4	SS	1			
261.81	4	<b>SILTY SAND</b> Loose, organic stained silty sand, some gravel and pent, grey, wet			5	SS	4			
260.31	5									
	6	<b>SANDY SILT</b> Loose then compact to dense, silt and very fine sand, light grey, wet to saturated			6	SS	7			
	7									
	8				7	SS	19			
256.21	9				8	SS	40			
	10	End of Borehole								

**V.A. WOOD ASSOCIATES LIMITED**

Disk :

Sheet : 1 of 1

Reference No : 7171-17-6

# Borehole No : 9

Enclosure No : 10

Client : AECOM

Project : Culvert Reconstruction

Method : Auger

Location : Brock St./Centennial Dr., Uxbridge, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : August 25, 2017

SUBSURFACE PROFILE					SAMPLE							Remarks			
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value	Standard Penetration Test blows/300mm					Moisture Content, %		
								20	40	60	80		10	30	50
265.23	0	Ground Surface													
		Augered to 0.75 m													
264.48	1	<i>FILL</i> Seams of gravelly sand, occasional seams of clayey silt, some topsoil and organic stained at the lower section, moist then wet to saturated, loose to very loose			1	SS	5							50 mm diameter monitoring well to depth of 9.1 m	
	2				2	SS	10								
	3				3	SS	4								
	4	saturated			4	SS	2								
260.83	5	Wood fragments			5	SS	24								
260.03	6	<i>GRAVELLY SAND</i> Compact, saturated			6	SS	8								
258.93	7														
	8	<i>SANDY SILT</i> Loose to compact, silt and very fine sand, rootlets observed, light grey, wet to saturated			7	SS	8								
255.63	9				8	SS	10								
	10	End of Borehole													

**V.A. WOOD ASSOCIATES LIMITED**

Disk :

Sheet : 1 of 1

Reference No : 7171-17-6

# Borehole No : 10

Enclosure No : 11

Client : AECOM

Project : Culvert Reconstruction

Method : Auger

Location : Brock St./Centennial Dr., Uxbridge, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : August 26, 2017

SUBSURFACE PROFILE				SAMPLE							Remarks			
Elevation in Depth m	Description	Symbol	Water	Number	Type	N-value	Standard Penetration Test blows/300mm					Moisture Content, %		
							20	40	60	80		10	30	50
264.77	0	Ground Surface												
		Augered to 0.75 m												50 mm diameter monitoring well to depth of 9.1 m
264.02	1	<b>FILL</b> Organic stained silty sand, some gravel, seams of topsoil and some organics in places, brown then grey, moist, compact at the top, then loose to very loose		1	SS	18								
	2	some topsoil		2	SS	4								
	3			3	SS	1								
	4			4	SS	2								
260.47	5	<b>GRAVELLY SAND</b> Loose, some silt and seams of clay at the bottom, grey, saturated		5	SS	7								
	6	lt grey silt at the bottom												
258.22	7	End of Borehole		6	SS	4								
	8													
	9													
	10													

V.A. WOOD ASSOCIATES LIMITED

Disk :

Sheet : 1 of 1



Reference No : 7171-17-6

# Borehole No : 11

Enclosure No : 12

Client : AECOM

Project : Culvert Reconstruction

Method : Auger

Location : Brock St./Centennial Dr., Uxbridge, ON

Diameter : 110 mm

Datum Elevation : Geodetic

Date : August 25, 2017

SUBSURFACE PROFILE				SAMPLE			Standard Penetration Test blows/300mm				Moisture Content, %			Remarks		
Elevation m	Depth m	Description	Symbol	Water	Number	Type	N-value	20	40	60	80	10	30		50	
264.75	0	Ground Surface														
	0.75	Augered to 0.75 m														
264	1	<b>FILL</b> Organic stained silty sand, some gravel, some topsoil and organics in places, brown to grey, moist, loose to very loose	[Cross-hatched symbol]		1	SS	9								50 mm diameter monitoring well to depth of 9.1 m	
	2				2	SS	4									
	3				3	SS	3									
	4				4	SS	4									
260.75	4	<b>SILTY SAND</b> Loose, organic stained, some gravel and topsoil, grey, wet	[Cross-hatched symbol]		5	SS	7									
	5															
259.35	6	<b>SANDY SILT</b> Compact, silt and very fine sand, light grey, wet	[Dotted symbol]		6	SS	10									
	7															
257.75	8	<b>SANDY SILT TILL</b> Loose to compact, trace fine gravel, light grey, wet to saturated	[Dotted with gravel symbol]		7	SS	6									
	9															
255.15	9				8	SS	23									
	10	End of Borehole														

**V.A. WOOD ASSOCIATES LIMITED**

Disk :

Sheet : 1 of 1

Project No: 7171-17-6

**Monitoring Well No.: 1**

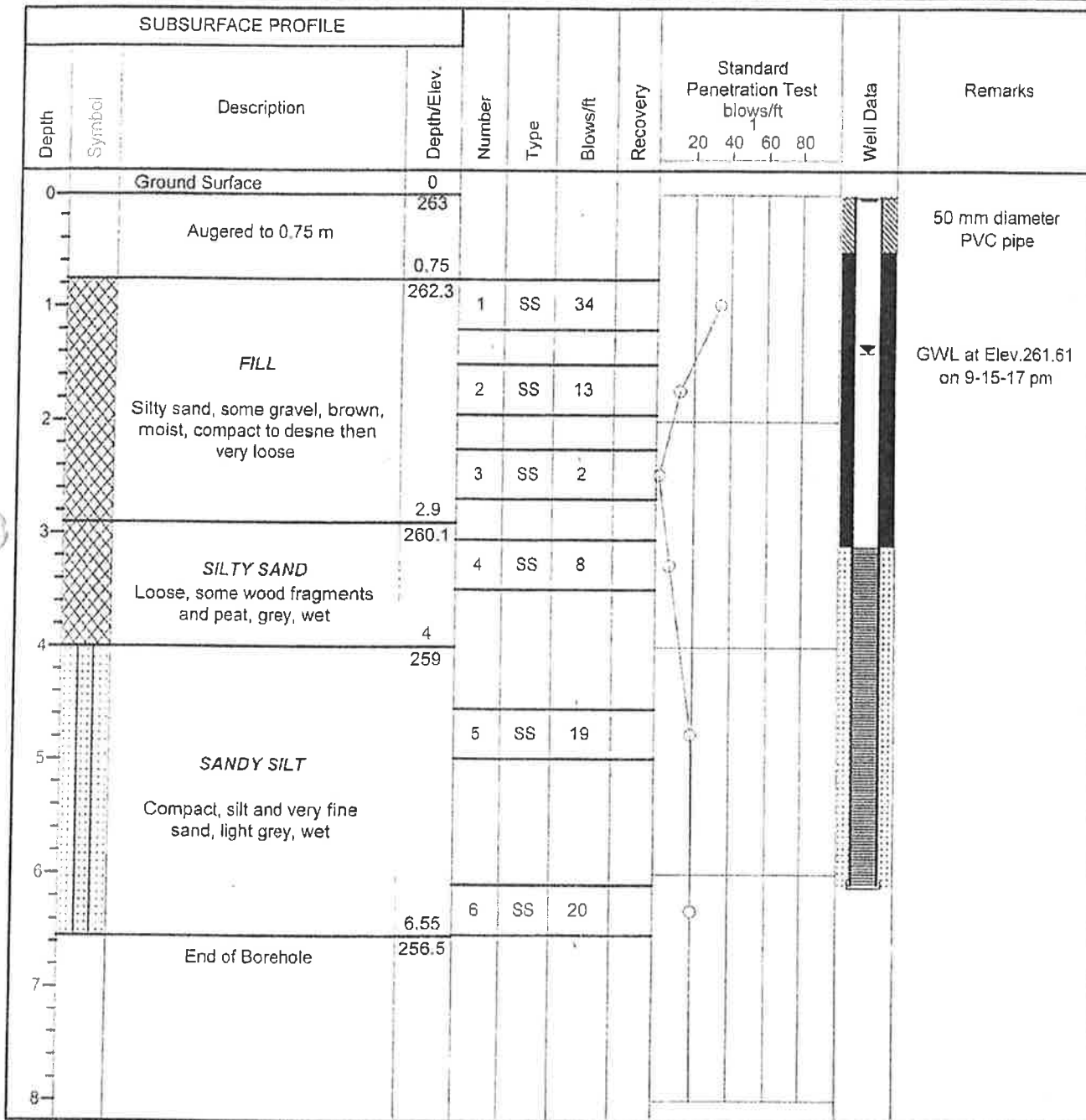
Project: Culvert Reconstruction

Client: AECOM

Enclosure: 2A

Location: Brock Rd./Centennial Dr., Uxbridge, ON

Datum Elev.: 263.01 m



Drilled By: Geotech Support Services Inc.

V A Wood Associates Ltd  
1080 Tapscott Rd, Unit 24  
Scarborough, ON  
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: August 29, 2017

Sheet: 1 of 1

Project No: 7171-17-6

**Monitoring Well No.: 2**

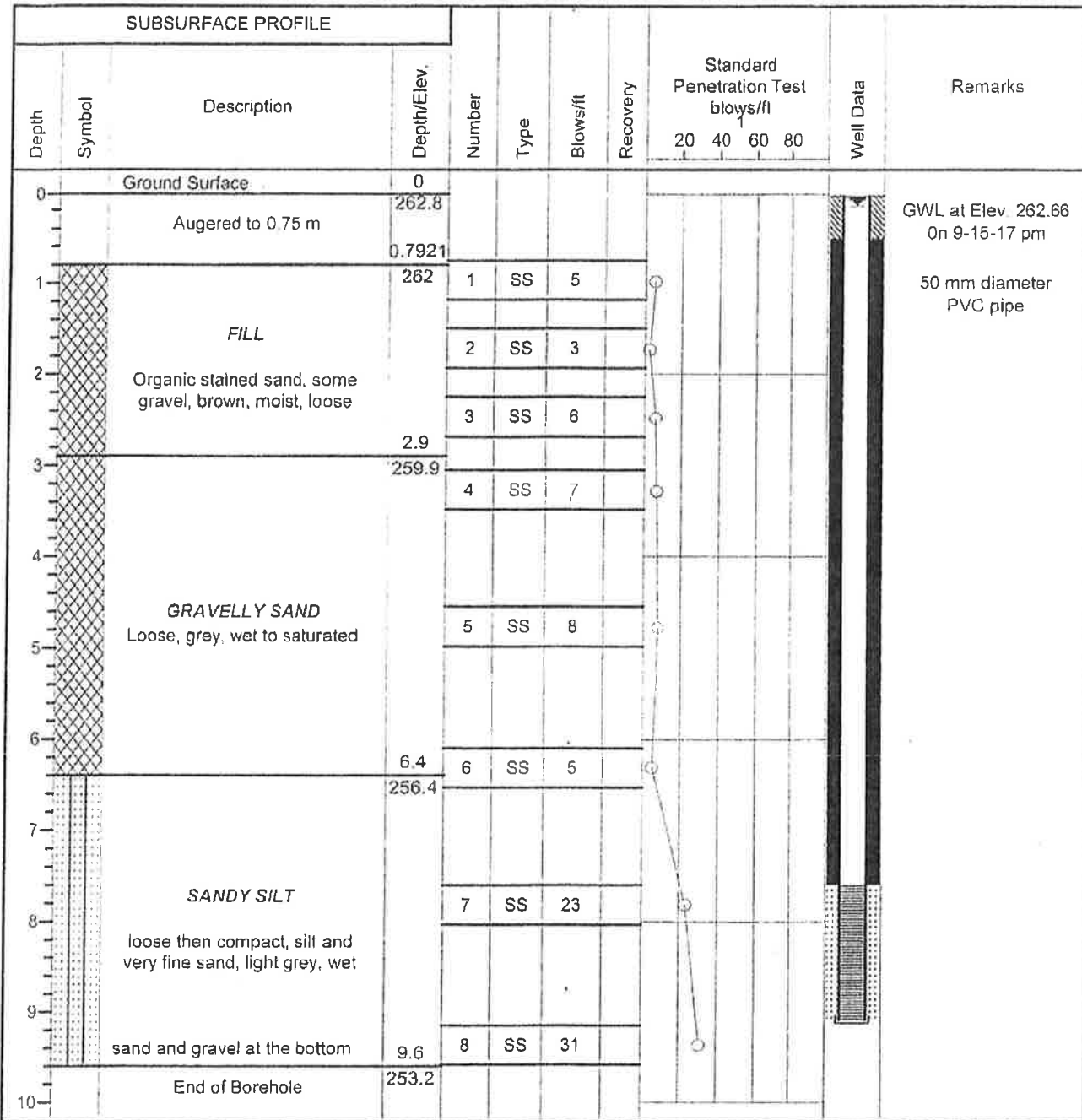
Project: Culvert Reconstruction

Client: AECOM

Enclosure: 3A

Location: Brock St./Centennial Dr., Uxbridge, ON

Datum Elev.: 262.81 m



Drilled By: Geotech Support Services Inc.	V A Wood Associates Ltd	Hole Size: 110 mm
Drill Method: Auger	1080 Tapscott Rd, Unit 24	Datum: Geodetic
Drill Date: August 29, 2017	Scarborough, ON	Sheet: 1 of 1
	M1X 1E7	

Project No: 7171-17-6

**Monitoring Well No.: 3**





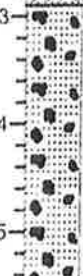


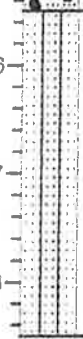


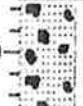

Project: Culvert Reconstruction

Client: AECOM

Enclosure: 4A

Location: Brock St./Centennial Dr., Uxbridge, ON

Datum Elev.: 262.72 m

SUBSURFACE PROFILE			Number	Type	Blows/ft	Recovery	Standard Penetration Test blows/ft 1 20 40 60 80	Well Data	Remarks
Depth	Symbol	Description							
0		Ground Surface							
		Augered to 0.75 m							GWL at ground surface on 9-15-17
0.75									
1		<b>FILL</b> Well graded sand, some gravel, brown, moist, wet at the bottom, very loose then loose	1	SS	3				50 mm diameter PVC pipe
2			2	SS	6				
3			3	SS	6				
2.9									
3		<b>GRAVELLY SAND</b> Loose to compact, grey, wet to saturated	4	SS	5				
4									
5			5	SS	15				
5.5									
6		<b>SANDY SILT</b> Loose then compact, silt and very fine sand, light grey, wet to saturated	6	SS	3				
7									
8			7	SS	18				
8.5									
9		<b>SAND AND GRAVEL</b> Dense, grey, saturated	8	SS	44				
9.6									
10		End of Borehole							

Drilled By: Geotech Support Services Inc.

V A Wood Associates Ltd  
1080 Tapscott Rd, Unit 24  
Scarborough, ON  
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: August 30, 2017

Sheet: 1 of 1

Project No: 7171-17-6

**Monitoring Well No.: 4**

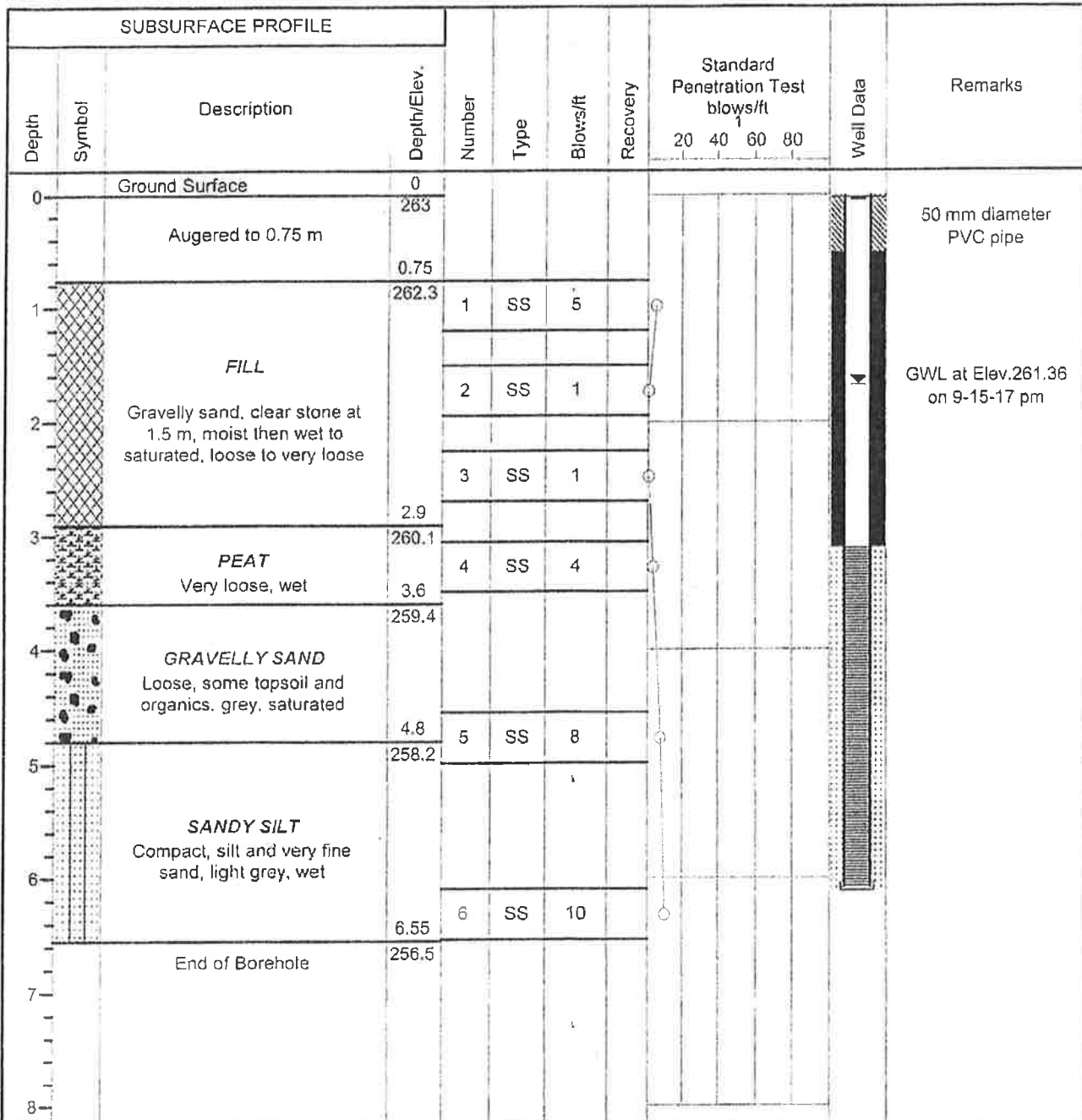
Project: Culvert Reconstruction

Client: AECOM

Enclosure: 5A

Location: Brock St./Centennial Dr., Uxbridge, ON

Datum Elev.: 263.04 m



Drilled By: Geotech Support Services Inc.

V A Wood Associates Ltd  
1080 Tapscott Rd, Unit 24  
Scarborough, ON  
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: August 30, 2017

Sheet: 1 of 1

Project No: 7171-17-6

**Monitoring Well No.: 5**

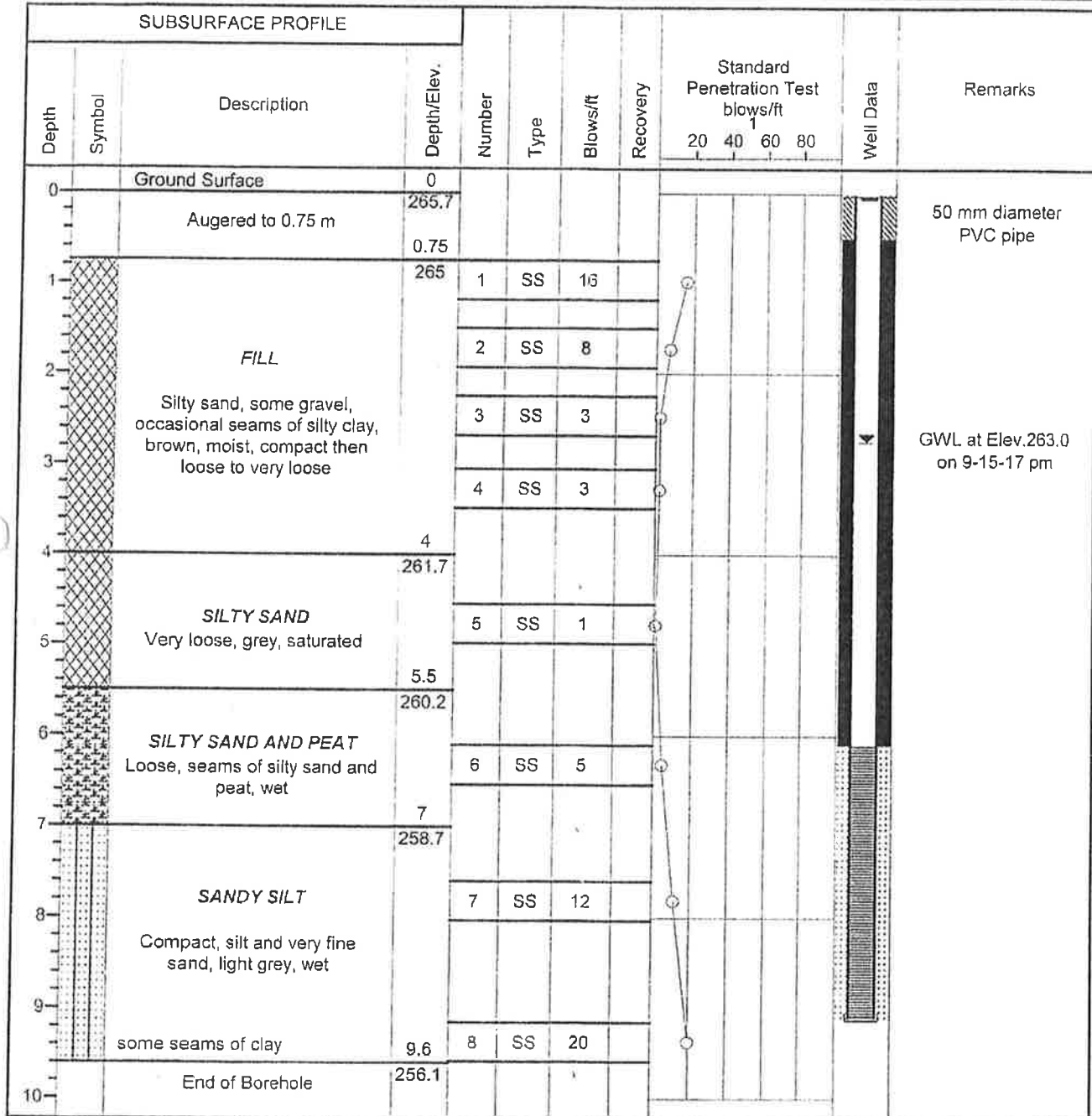
Project: Culvert Reconstruction

Client: AECOM

Enclosure: 6A

Location: Brock St./Centennial Dr., Uxbridge, ON

Datum Elev.: 265.74 m



GWL at Elev. 263.0 on 9-15-17 pm

Drilled By: Geotech Support Services Inc.

V A Wood Associates Ltd  
1080 Tapscott Rd, Unit 24  
Scarborough, ON  
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: August 29, 2017

Sheet: 1 of 1

Project No: 7171-17-6

**Monitoring Well No.: 7**

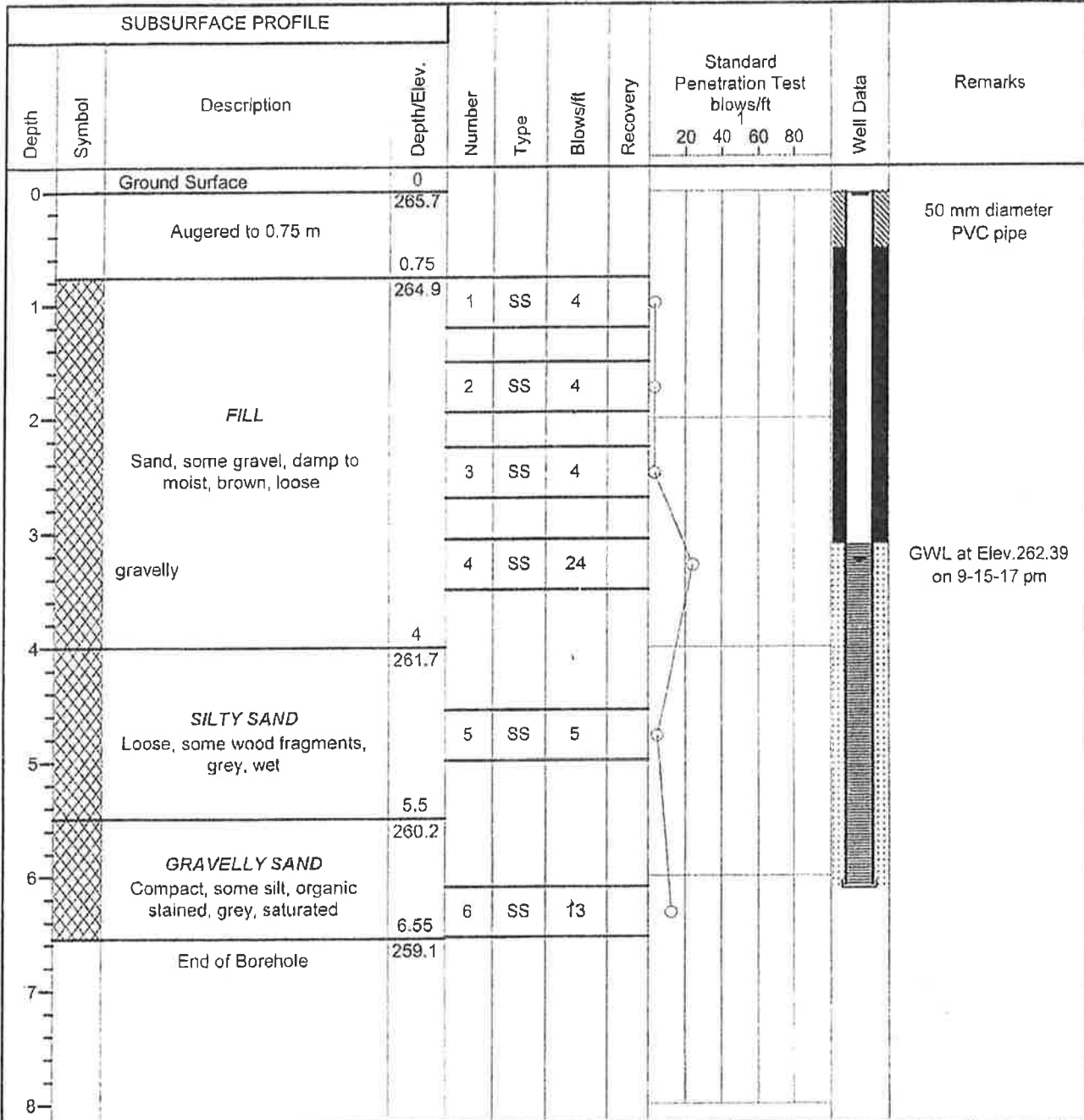
Project: Culvert Reconstruction

Client: AECOM

Enclosure: 8A

Location: Brock St./Centennial Dr., Uxbridge, ON

Datum Elev.: 265.68 m



Drilled By: Geotech Support Services Inc.

V A Wood Associates Ltd  
1080 Tapscott Rd, Unit 24  
Scarborough, ON  
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: August 28, 2017

Sheet: 1 of 1

Project No: 7171-17-6

**Monitoring Well No.: 8**

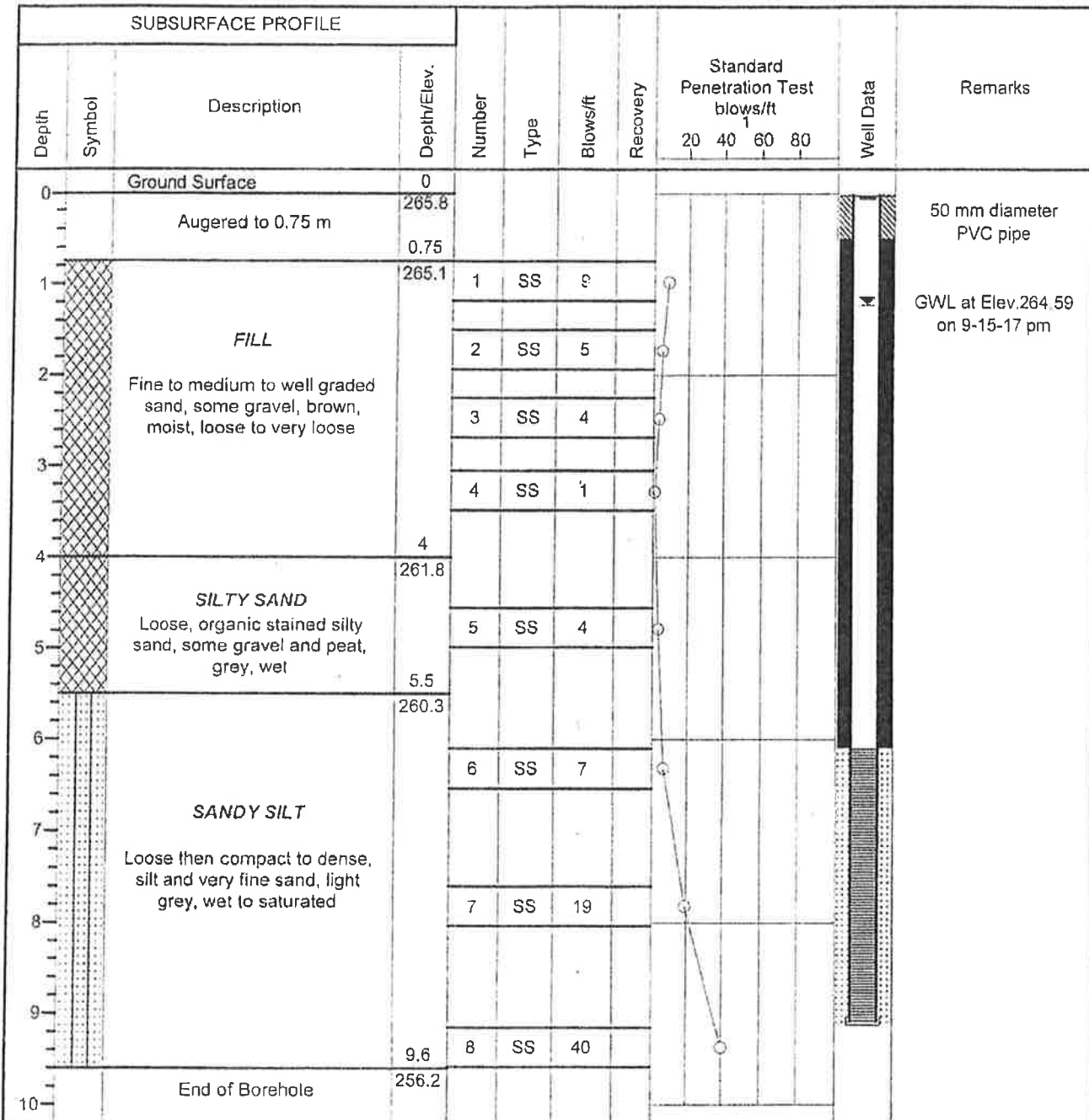
Project: Culvert Reconstruction

Client: AECOM

Enclosure: 9A

Location: Brock St./Centennial Dr., Uxbridge, ON

Datum Elev.: 265.81 m



Drilled By: Geotech Support Services Inc.

V A Wood Associates Ltd  
1080 Tapscott Rd, Unit 24  
Scarborough, ON  
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: August 26, 2017

Sheet: 1 of 1



Project No: 7171-17-6

**Monitoring Well No.: 9**

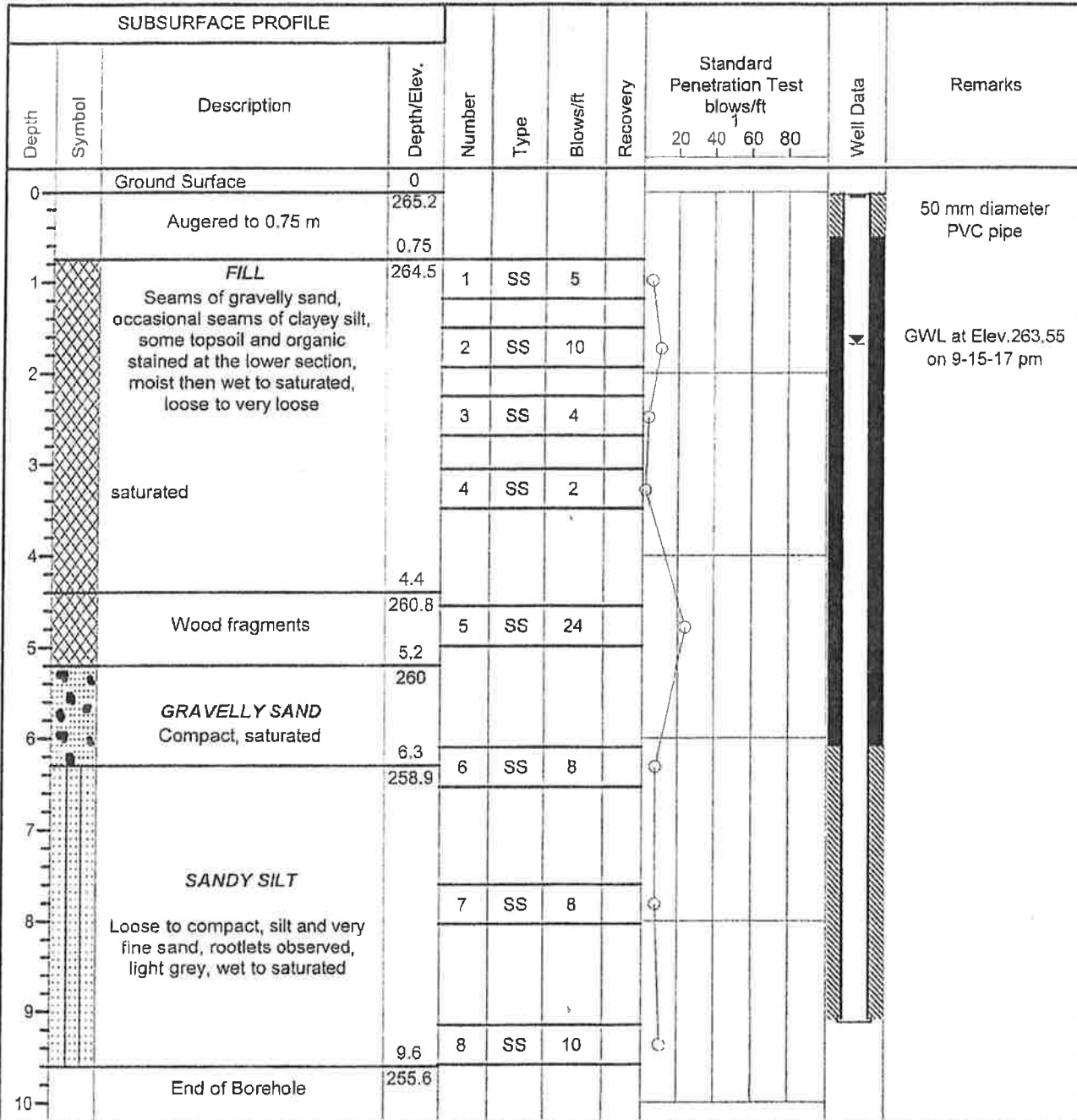
Project: Culvert Reconstruction

Client: AECOM

Enclosure: 10A

Location: Brock St./Centennial Dr., Uxbridge, ON

Datum Elev.: 265.23 m



Drilled By: Geotech Support Services Inc.

V A Wood Associates Ltd  
1080 Tapscott Rd, Unit 24  
Scarborough, ON  
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: August 25, 2017

Sheet: 1 of 1

Project No: 7171-17-6

**Monitoring Well No.: 10**

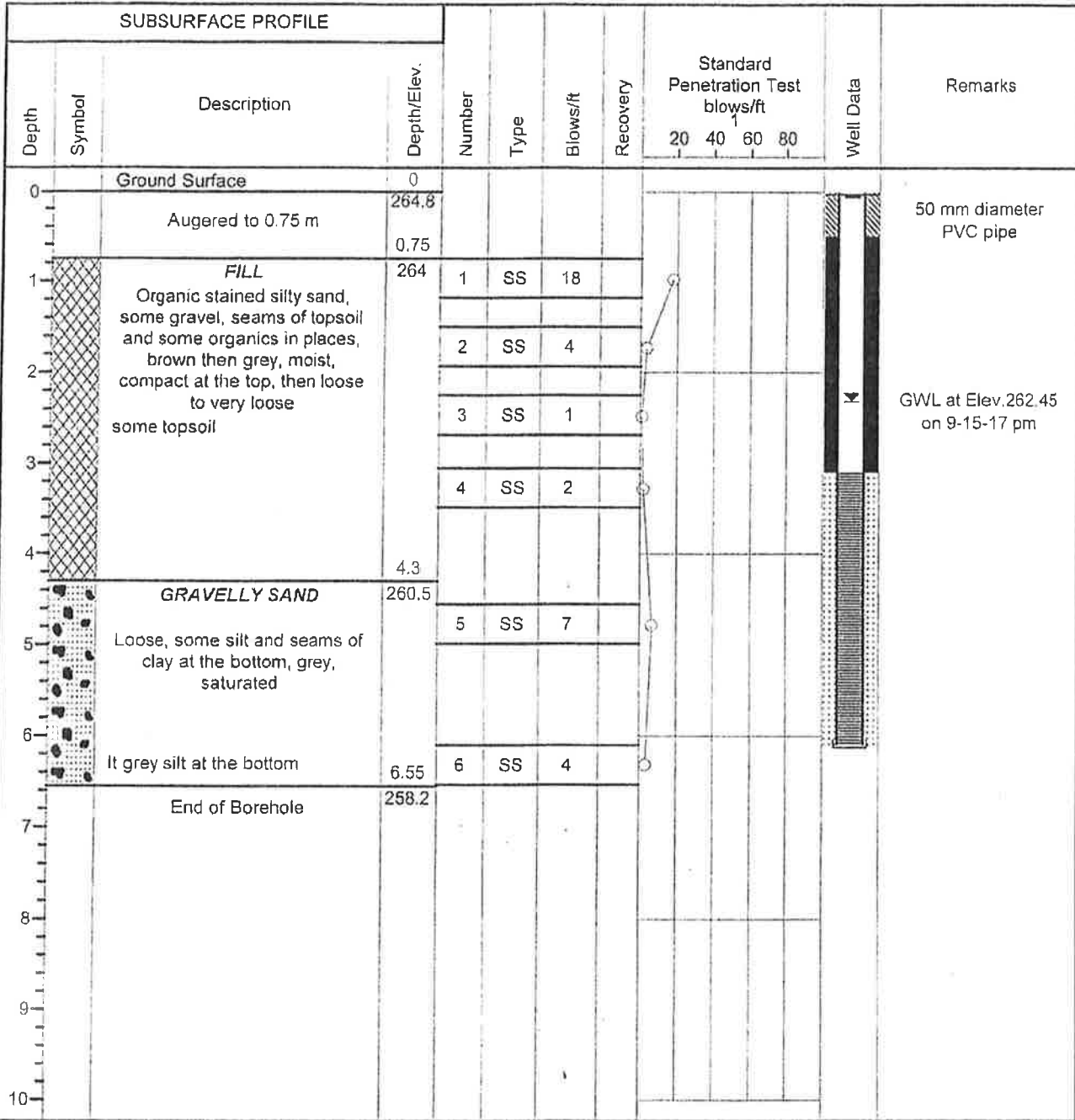
Project: Culvert Reconstruction

Client: AECOM

Enclosure: 11A

Location: Brock St./Centennial Dr., Uxbridge, ON

Datum Elev.: 264.77 m



GWL at Elev. 262.45 on 9-15-17 pm

Drilled By: Geotech Support Services Inc.

V A Wood Associates Ltd  
1080 Tapscott Rd, Unit 24  
Scarborough, ON  
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

Datum: Geodetic

Drill Date: August 26, 2017

Sheet: 1 of 1

Project No: 7171-17-6

**Monitoring Well No.: 11**

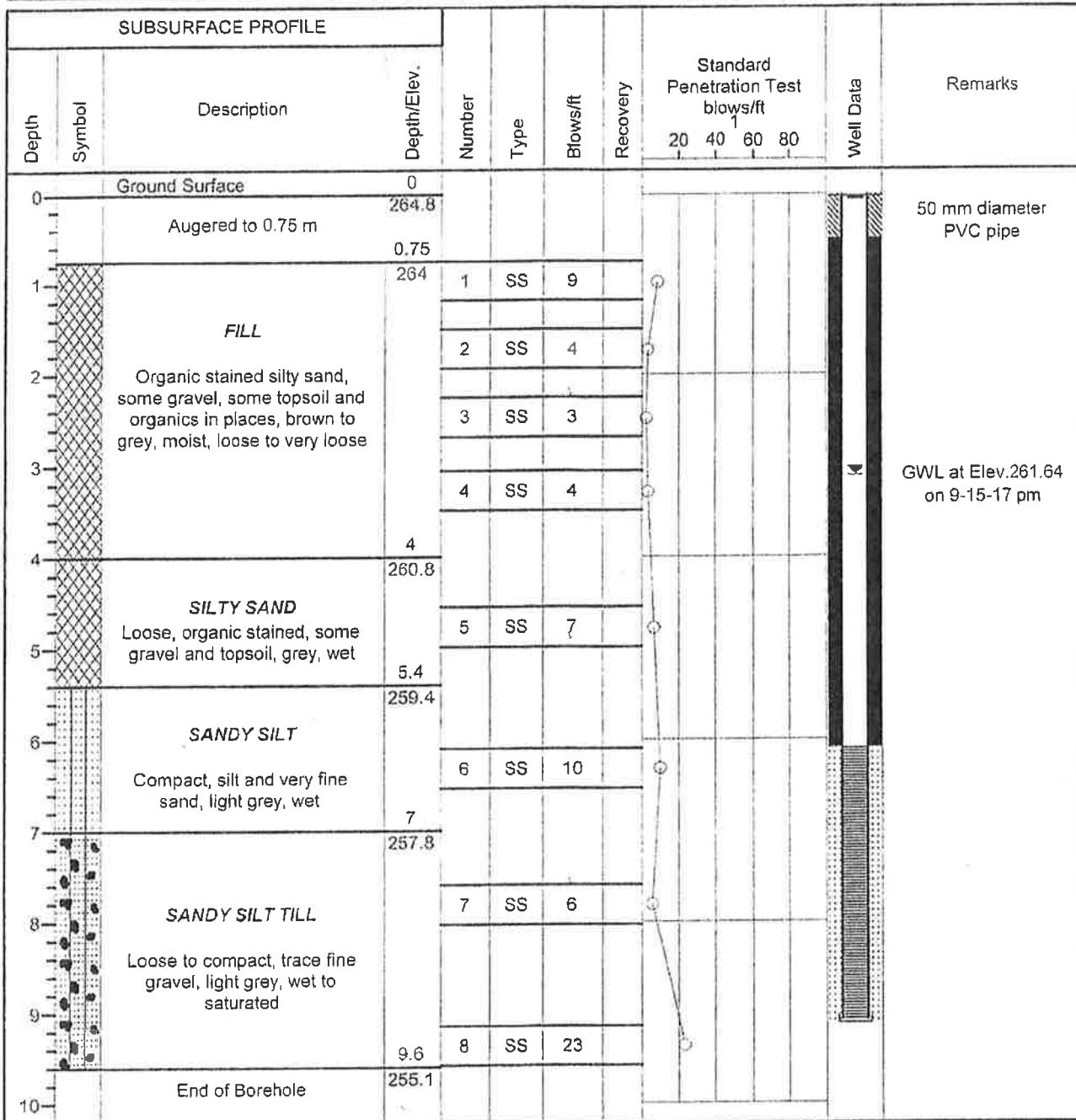
Project: Culvert Reconstruction

Client: AECOM

Enclosure: 12A

Location: Brock St./Centennial Dr., Uxbridge, ON

Datum Elev.: 264.75 m



Drilled By: Geotech Support Services Inc.

V A Wood Associates Ltd  
1080 Tapscott Rd, Unit 24  
Scarborough, ON  
M1X 1E7

Hole Size: 110 mm

Drill Method: Auger

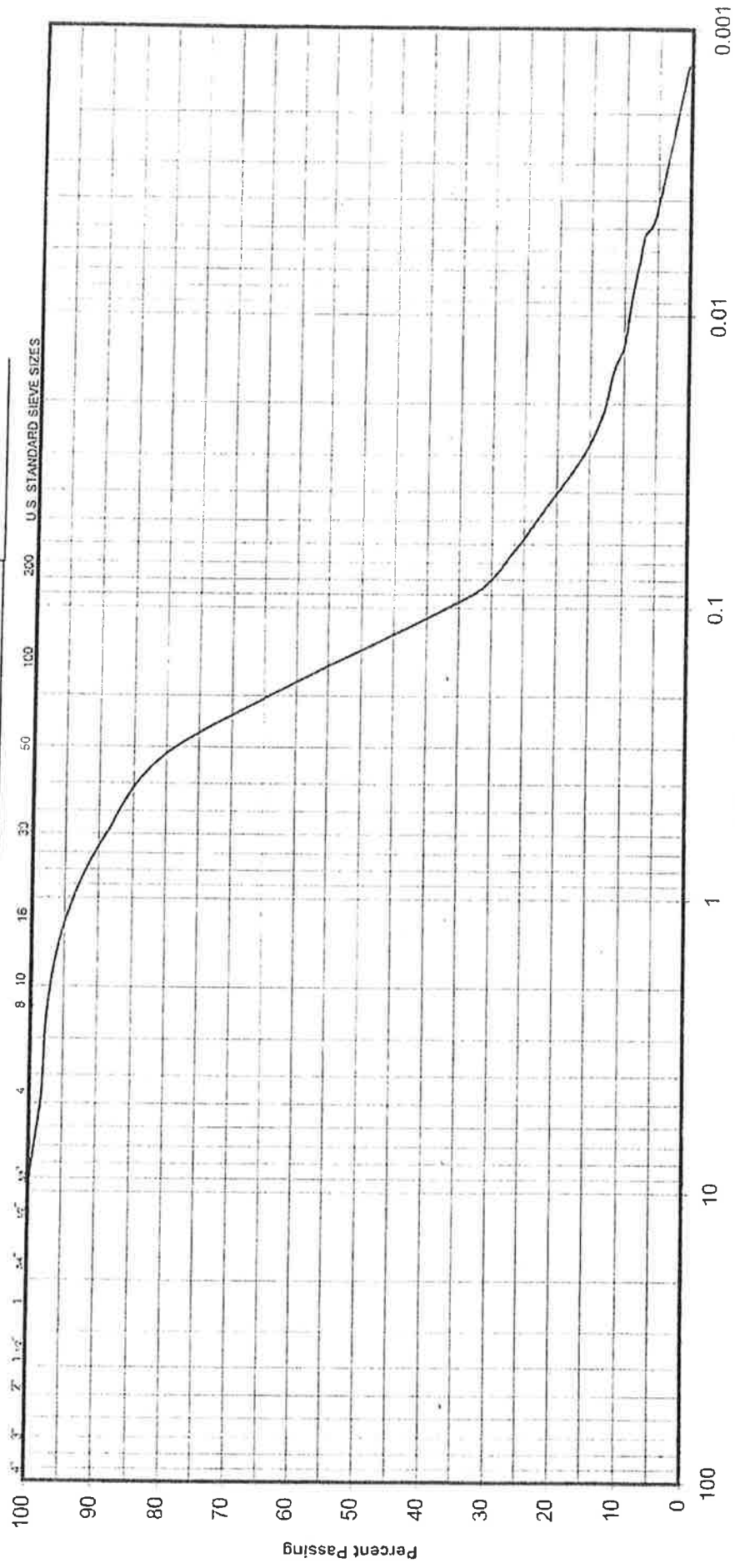
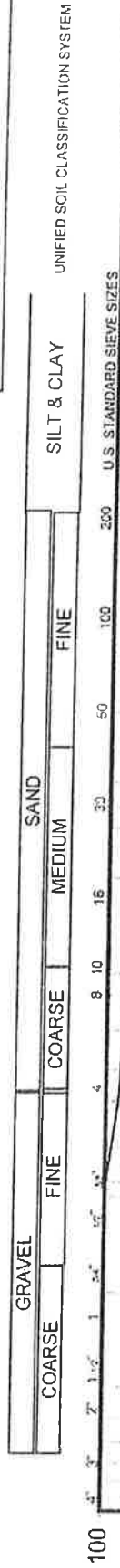
Datum: Geodetic

Drill Date: August 25, 2017

Sheet: 1 of 1

# GRAIN SIZE DISTRIBUTION

OUR REFERENCE No.: 7171-17-6



PROJECT: Culvert Reconstruction  
 LOCATION: Brock St./Centennial Dr., Uxbridge, ON  
 BOREHOLE NO.: 5  
 SAMPLE NO.: 5  
 DEPTH: 4.8 m  
 DATE: September 2017

ENCLOSURE No.: 13

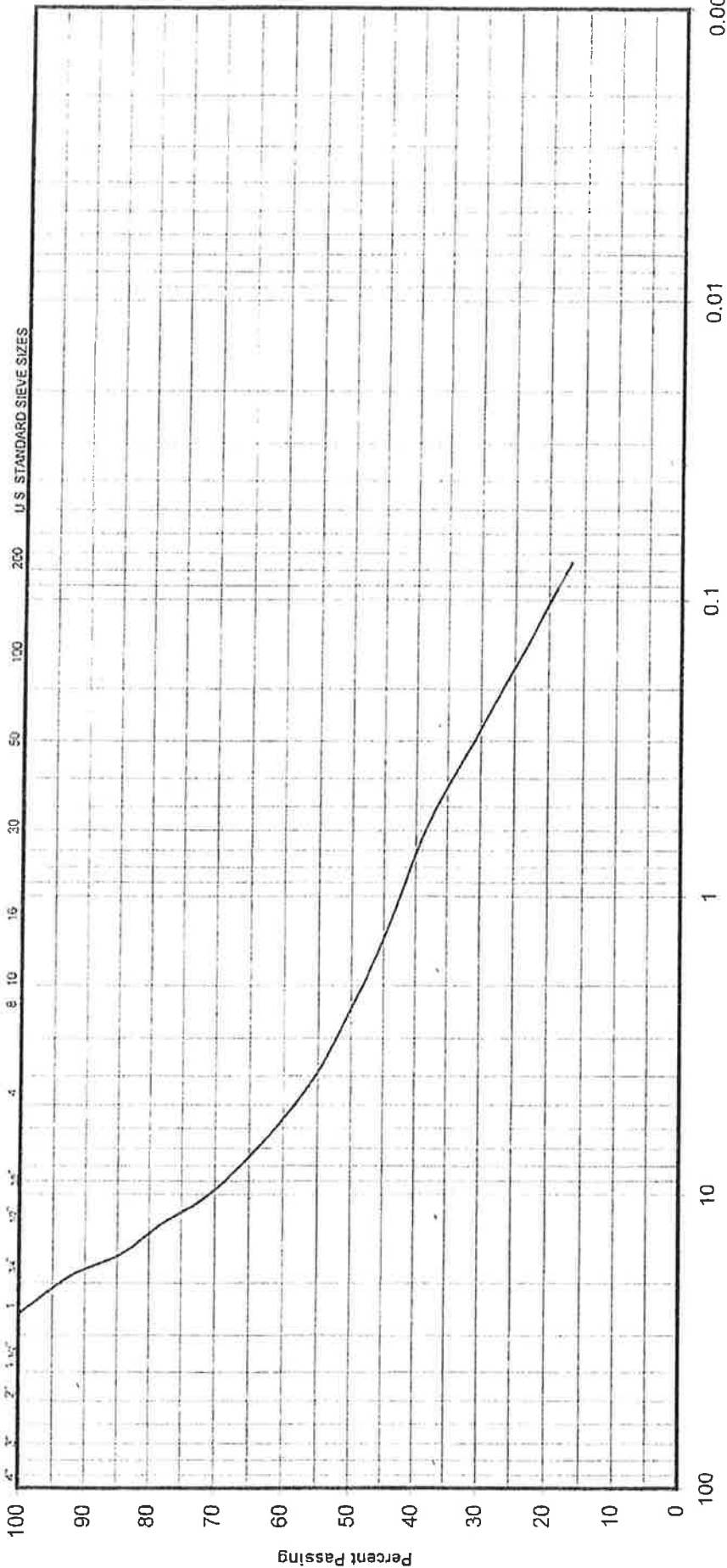
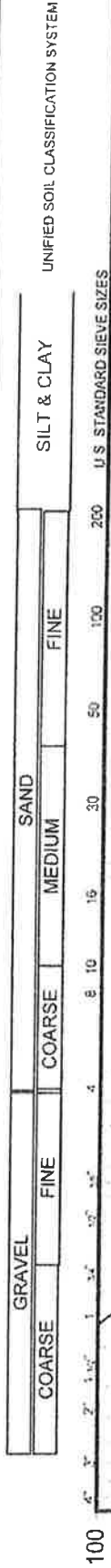
Silty SAND, trace clay





GRAIN SIZE DISTRIBUTION

OUR REFERENCE No.: 7171-17-6



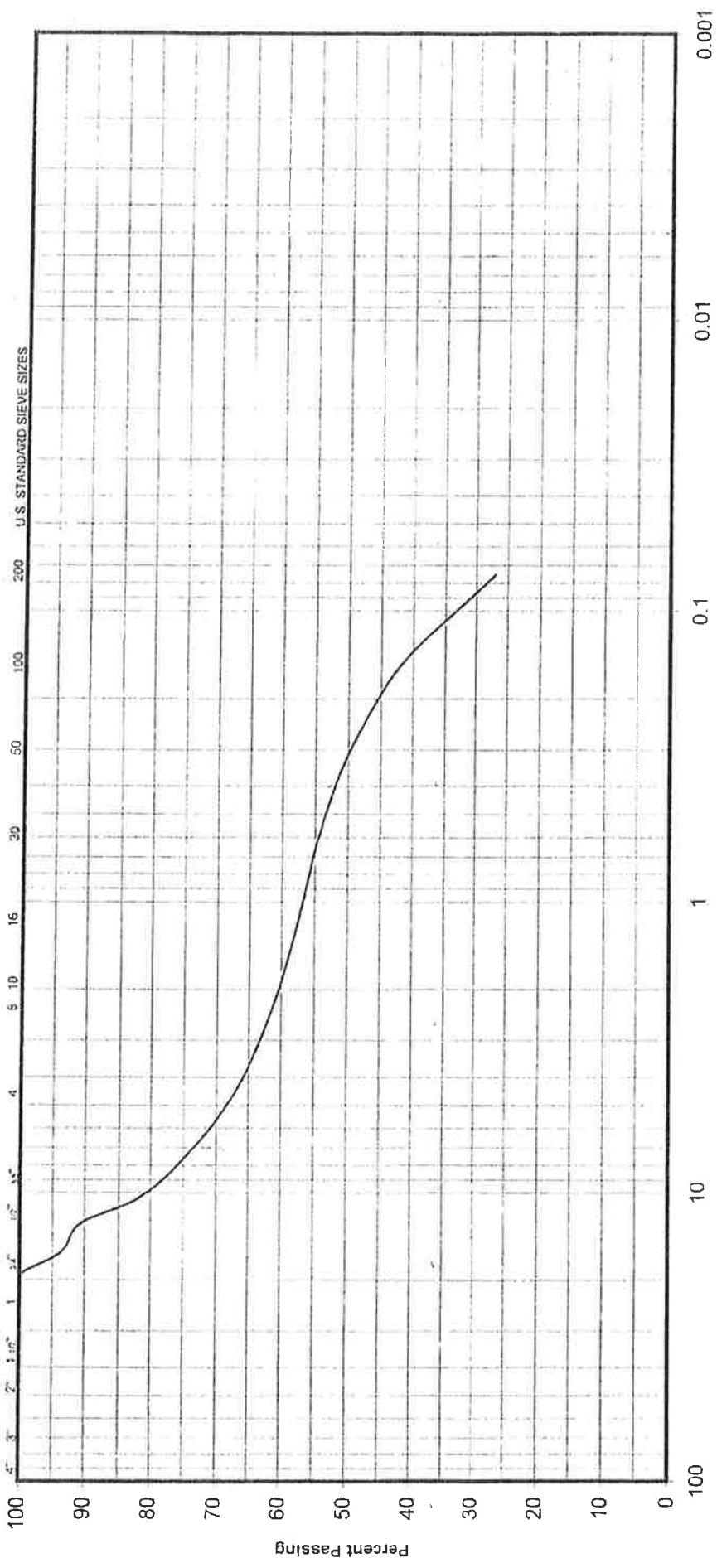
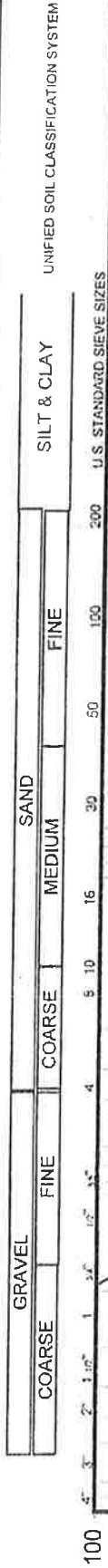
PROJECT: Culvert Reconstruction  
 LOCATION: Brock St./Centennial Dr., Uxbridge, ON  
 BOREHOLE NO.: 3  
 SAMPLE NO.: 5  
 DEPTH: 4.8 m  
 DATE: September 2017

ENCLOSURE No.: 16

Well graded SAND and GRAVEL

# GRAIN SIZE DISTRIBUTION

OUR REFERENCE No.: 7171-17-6



ENCLOSURE No.: 17

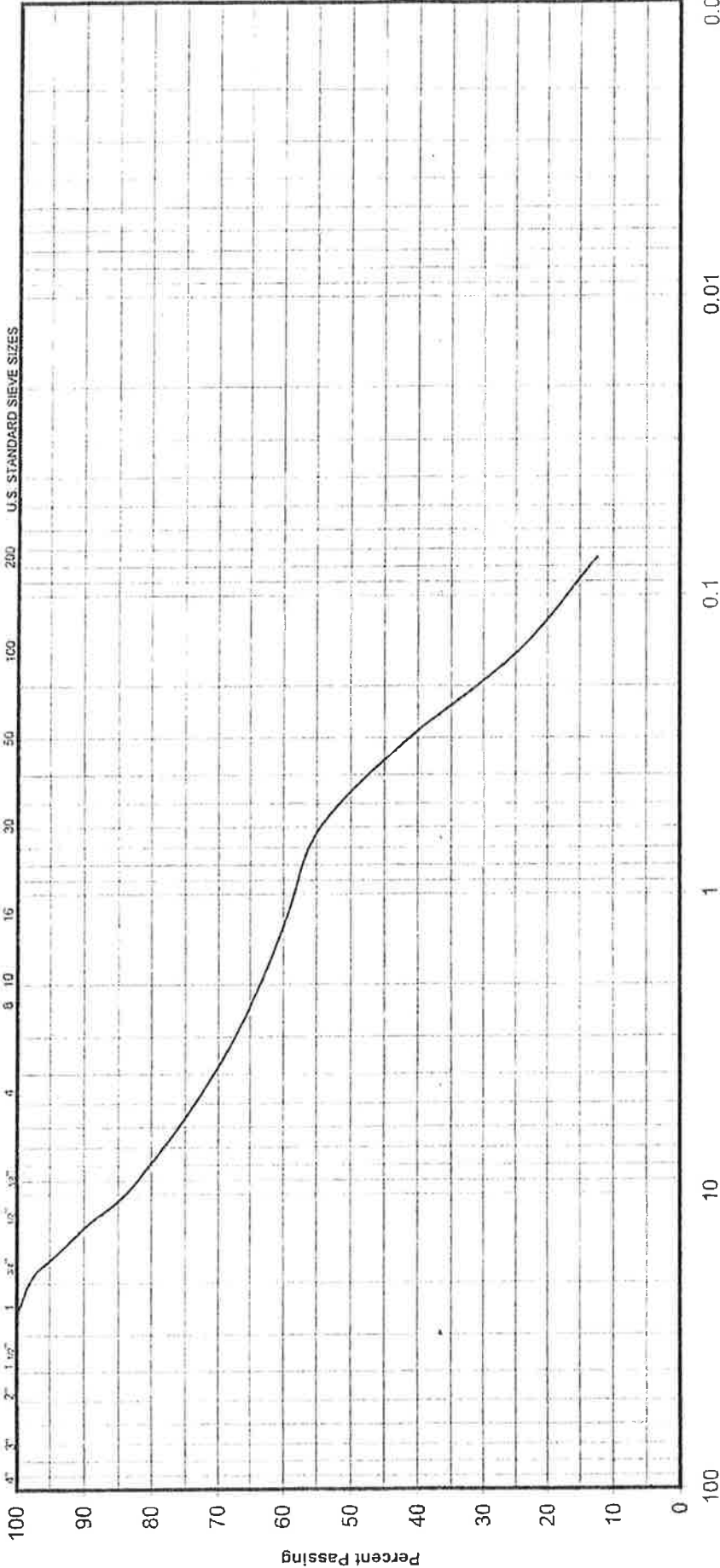
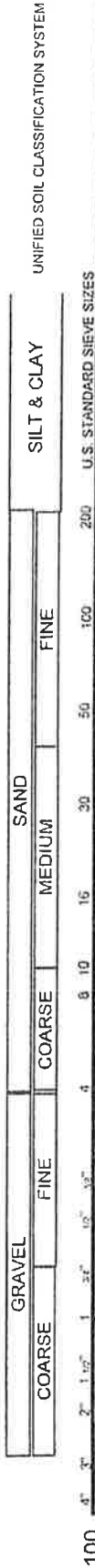
PROJECT: Culvert Reconstruction  
 LOCATION: Brock St./Centennial Dr., Uxbridge, ON  
 BOREHOLE NO.: 4  
 SAMPLE NO.: 5  
 DEPTH: 4.8 m  
 DATE: September 2017

Gravelly SAND, some silt



GRAIN SIZE DISTRIBUTION

OUR REFERENCE No.: 7171-17-6



Grain Size in Millimeters

PROJECT: Culvert Reconstruction
LOCATION: Brock St./Centennial Dr., Uxbridge, ON
BOREHOLE NO.: 7
SAMPLE NO.: 6
DEPTH: 6.3 m
DATE: September 2017

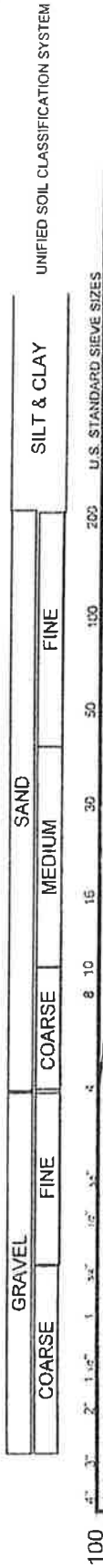
ENCLOSURE No.: 18

Gravelly SAND, trace silt



**GRAIN SIZE DISTRIBUTION**

OUR REFERENCE No.: 7171-17-6



ENCLOSURE No.: 20

Grain Size in Millimeters

SILT and Fine SAND

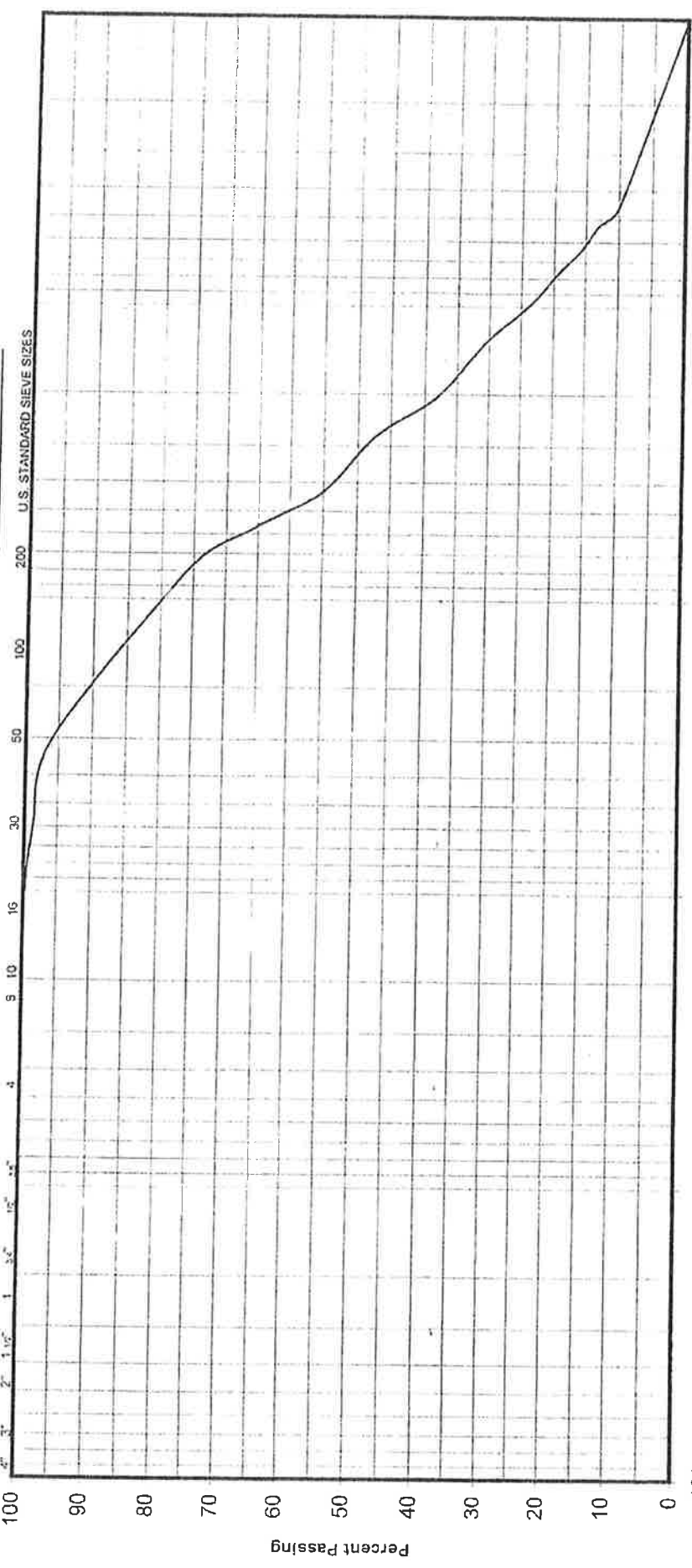
PROJECT: Culvert Reconstruction
LOCATION: Brock St./Centennial Dr., Uxbridge, ON
BOREHOLE NO.: 1
SAMPLE NO.: 6
DEPTH: 6.3 m
DATE: September 2017

# GRAIN SIZE DISTRIBUTION

OUR REFERENCE No.: 7171-17-6

UNIFIED SOIL CLASSIFICATION SYSTEM  
SILT & CLAY

GRAVEL	SAND		SILT & CLAY	
COARSE	FINE	COARSE	MEDIUM	FINE



Grain Size in Millimeters

ENCLOSURE No.: 21

PROJECT: Culvert Reconstruction  
 LOCATION: Brock St./Centennial Dr., Uxbridge, ON  
 BOREHOLE NO.: 3  
 SAMPLE NO.: 6  
 DEPTH: 6.3 m  
 DATE: September 2017

Sandy SILT, trace clay

GRAIN SIZE DISTRIBUTION

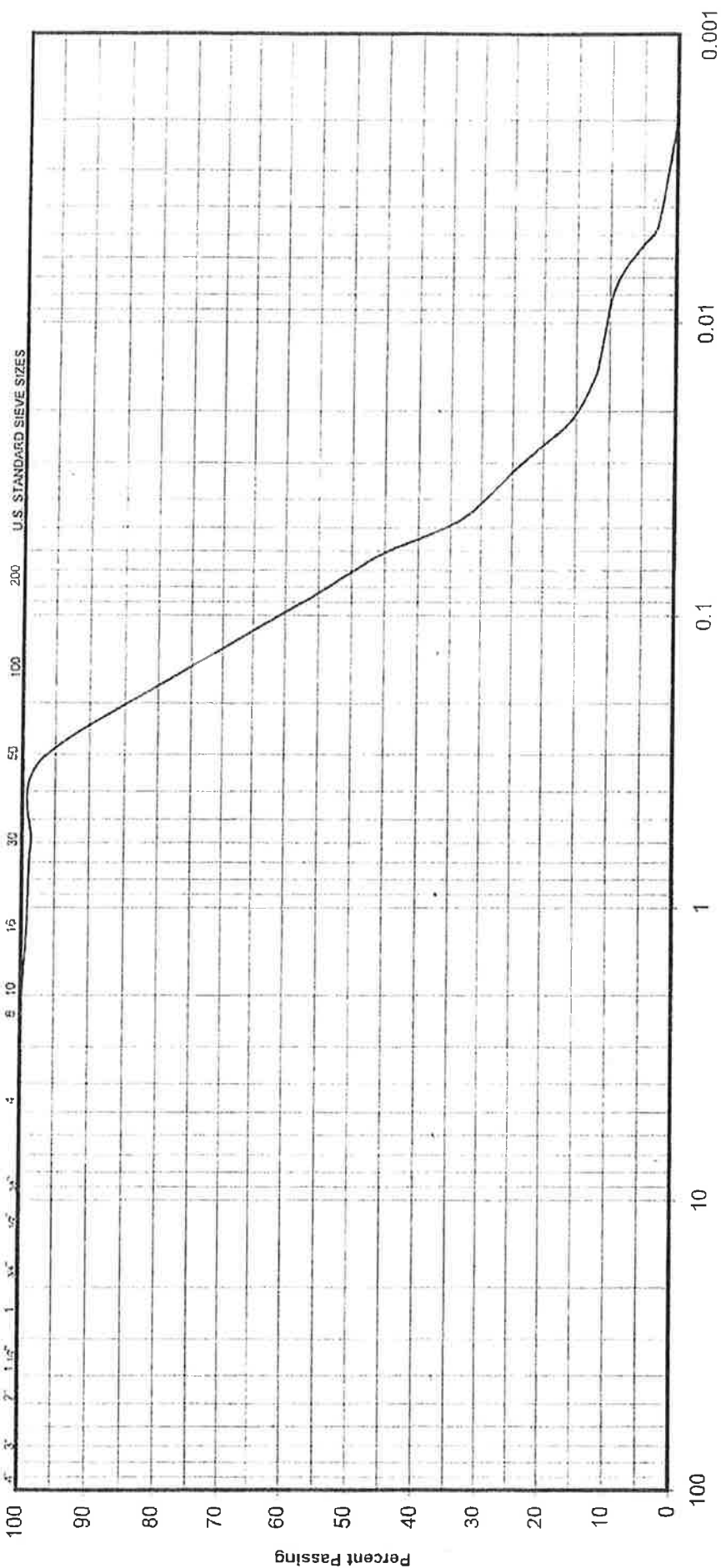
OUR REFERENCE No.: 7171-17-6

UNIFIED SOIL CLASSIFICATION SYSTEM  
SILT & CLAY

SAND

COARSE FINE

GRAVEL  
COARSE FINE



ENCLOSURE No.: 22

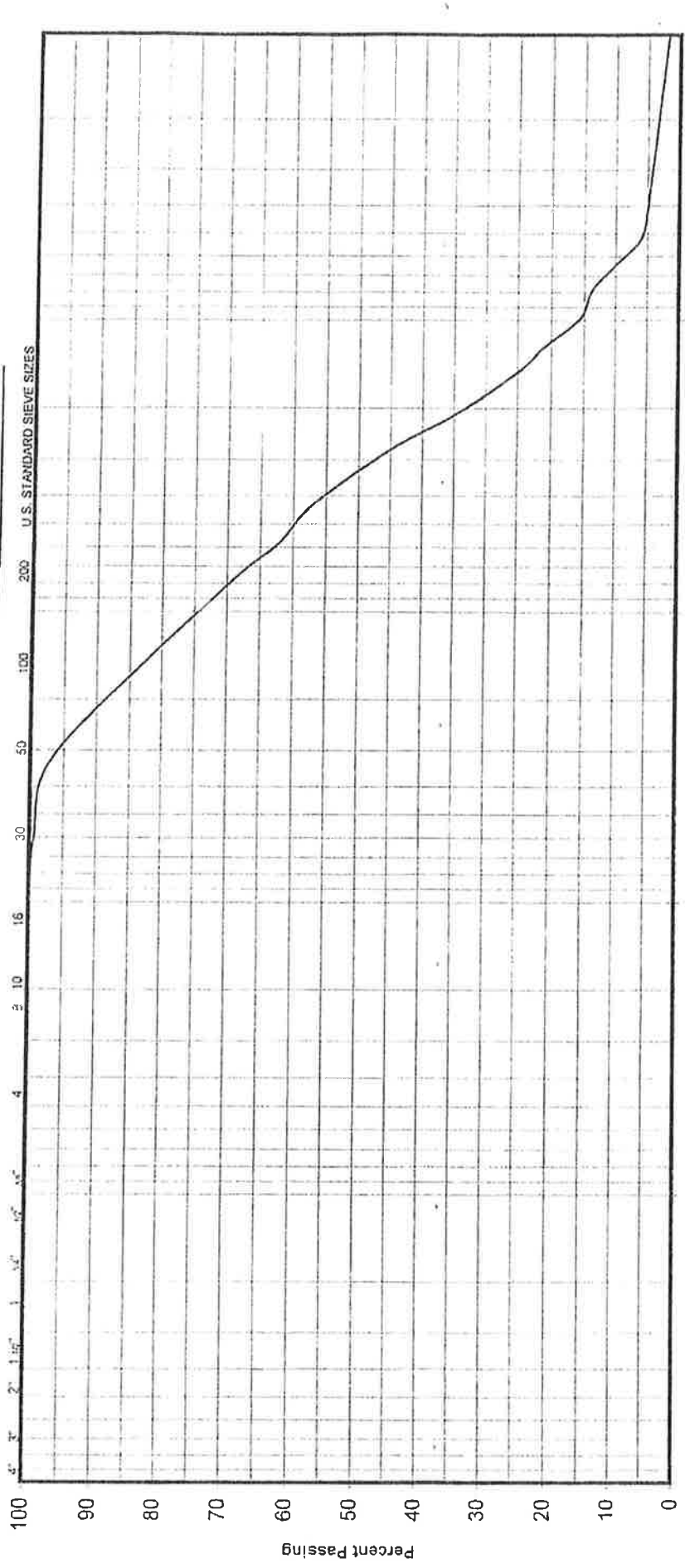
PROJECT: Culvert Reconstruction
LOCATION: Brock St./Centennial Dr., Uxbridge, ON
BOREHOLE NO.: 5
SAMPLE NO.: 7
DEPTH: 7.8 m
DATE: September 2017

Fine SAND and SILT

OUR REFERENCE No.: 7171-17-6

### GRAIN SIZE DISTRIBUTION

UNIFIED SOIL CLASSIFICATION SYSTEM  
SILT & CLAY

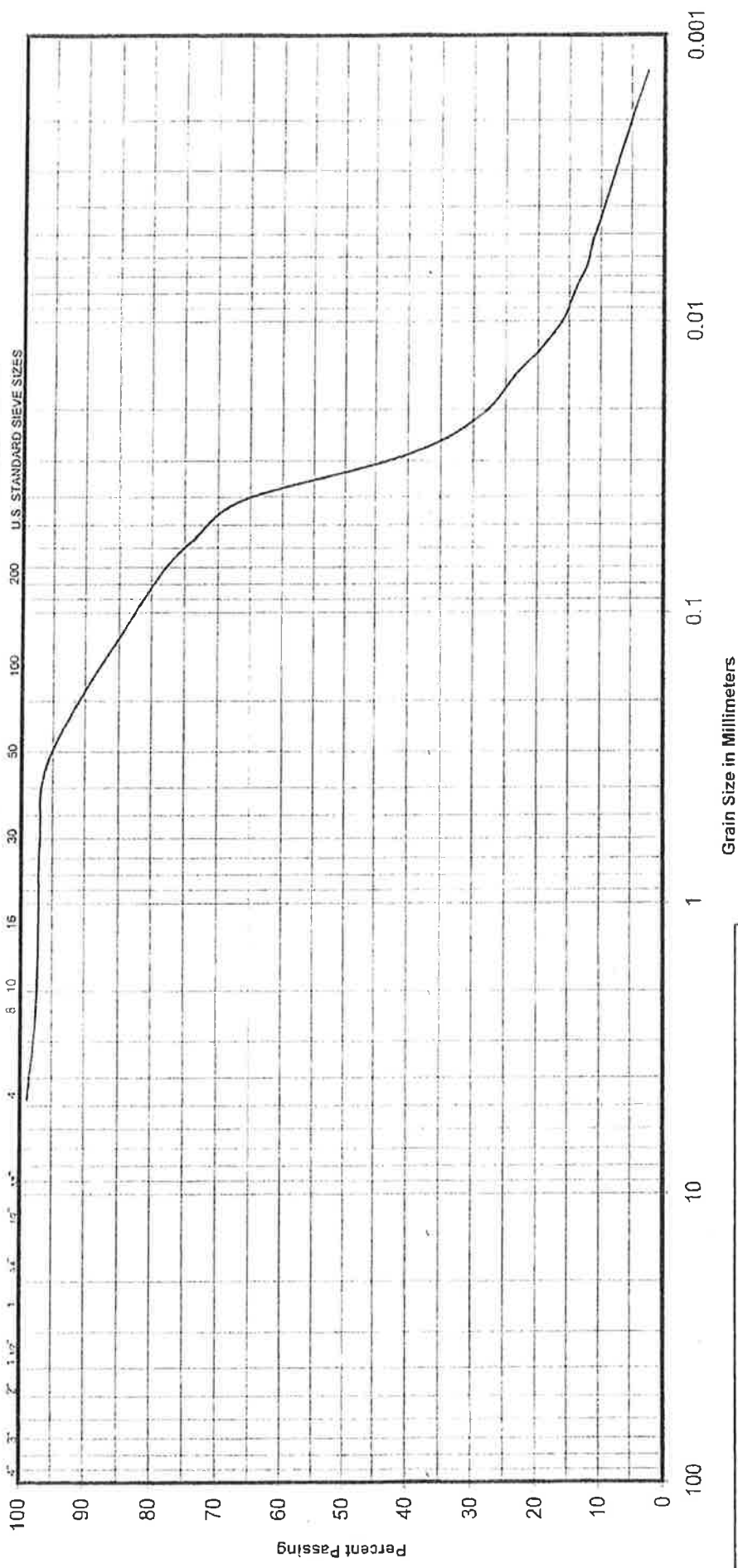


GRAIN SIZE DISTRIBUTION

OUR REFERENCE No.: 7171-17-6

UNIFIED SOIL CLASSIFICATION SYSTEM  
SILT & CLAY

GRAVEL		SAND			SILT & CLAY	
COARSE	FINE	COARSE	MEDIUM	FINE		



ENCLOSURE No.: 24

PROJECT: Culvert Reconstruction
LOCATION: Brock St./Centennial Dr., Uxbridge, ON
BOREHOLE NO.: 9
SAMPLE NO.: 7
DEPTH: 7.8 m
DATE: September 2017

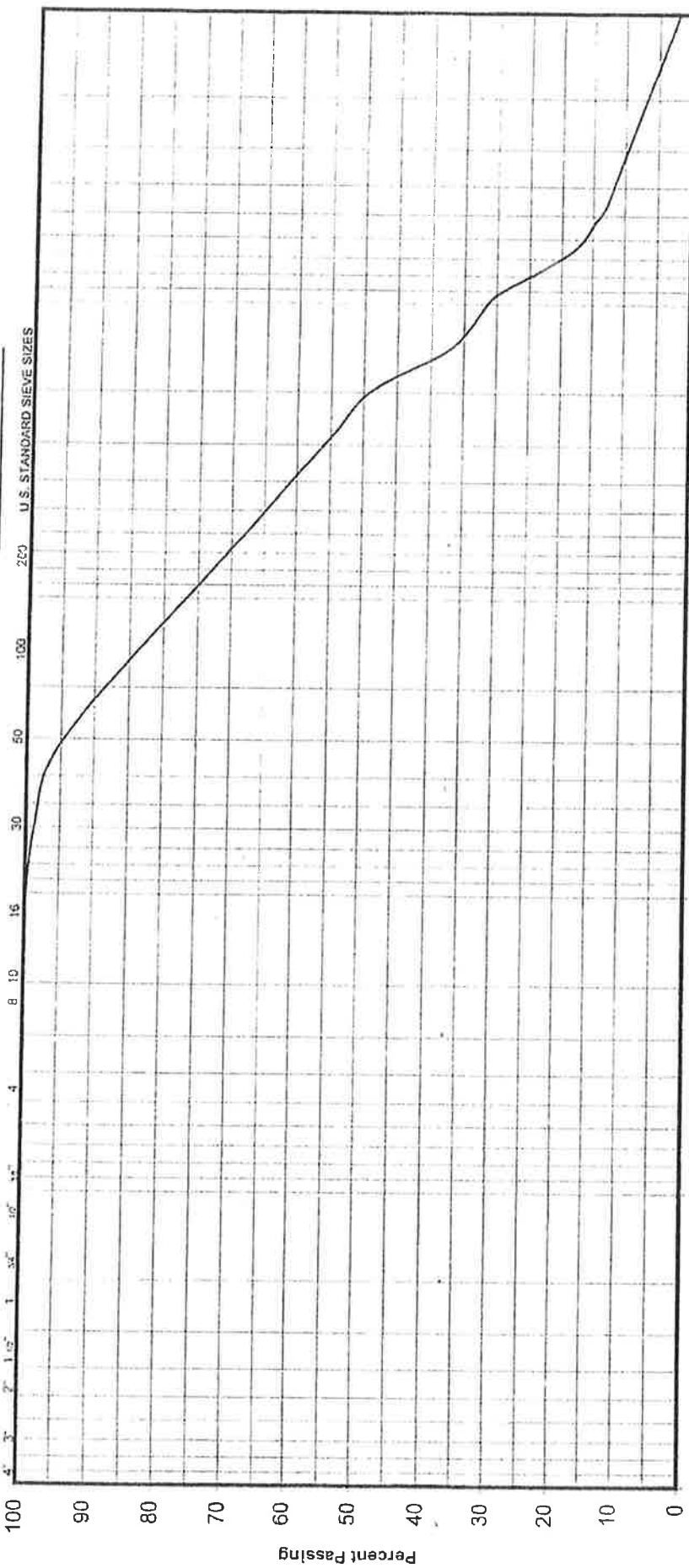
Sandy SILT, trace clay

OUR REFERENCE No.: 7171-17-6

### GRAIN SIZE DISTRIBUTION

SILT & CLAY  
UNIFIED SOIL CLASSIFICATION SYSTEM

SAND  
FINE  
MEDIUM  
COARSE



Grain Size in Millimeters

ENCLOSURE No.: 25

PROJECT: Culvert Reconstruction
LOCATION: Brock St./Centennial Dr., Uxbridge, ON
BOREHOLE NO.: 11
SAMPLE NO.: 7
DEPTH: 7.8 m
DATE: September 2017

Sandy SILT, trace clay



