



FOUNDATION INVESTIGATION REPORT
CULVERT REPLACEMENT
WASHBURN DRAIN
HIGHWAY 23

AGREEMENT # 3010-E-0033
MTO WEST REGION
SITE # 25-331-C

MTO GEOCRES No. xxxxxxxx

Submitted to:

Ministry of Transportation
West Region
Geotechnical Section
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Submitted by:

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1.0 INTRODUCTION

AMEC Earth & Environmental, a division of AMEC Americas Limited (AMEC), Consulting Geotechnical, Construction Quality Control and Environmental Engineers, was retained by the Ministry of Transportation (West Region) to conduct a foundation investigation for the replacement of a structural culvert. The existing culvert is located where Washburn Drain crosses Hwy 23 (Perth Road 164). The project site is located at the border of the Township of Blandshard, Perth County, Ontario and the Township of Usborne, Huron County, Ontario. The overall site location is shown on Drawing 1.

Available subsurface information from previous projects was reviewed prior to carrying out the fieldwork for this project. The following information was reviewed at the MTO Foundation Library (GEOCRES), in Downsview, and used in preparing this report, wherever applicable.

- ***"Foundation Investigation, Fish Creek (North) Bridge Replacement, Highway 23, Site 25-224, GWP 313-94-00, Agreement Number 3005-A-000078"***, Prepared by Golder Associates Ltd, Dated September 2001. (GEOCRES NO. 40P6-18).
- ***"Foundation Investigation, Fish Creek (Centre) Bridge Replacement, Highway 23, Site 25-225, GWP 313-94-00, Agreement Number 3005-A-000078"***, Prepared by Golder Associates Ltd, Dated September 2001. (GEOCRES NO. 40P6-19).
- ***"Foundation Investigation, Fish Creek (South) Bridge Replacement, Highway 23, Site 25-226, GWP 313-94-00, Agreement Number 3005-A-000078"***, Prepared by Golder Associates Ltd, Dated September 2001. (GEOCRES NO. 40P6-20).

Based on a review of these documents, the soils generally consist of variable thicknesses of topsoil and fill materials underlain by silt, silty clay and sand and gravel. These soils were underlain by sandy silt till and/or clayey silt till.

This investigation was carried out by means of a limited number of boreholes, in-situ tests and laboratory tests on selected samples. The results of the soil conditions encountered in the boreholes and laboratory tests are presented in this report.

2.0 SITE DESCRIPTION

Culvert 25-331-C is located on Hwy 23 (Perth Road 164) at Station $\pm 16+510$ between Line 6 Road and Kirkton Road. At the project site location, Hwy 23 marks the division between two townships. West of Hwy 23 is the Township of Usborne, Huron County and east of Hwy 23 is Township of Blandshard, Perth County.

Table 1 lists the designation, stationing, dimensions and the type of culvert.

Table 1 – Details of Culvert 25-331-C

NAME	SITE #	STATION	DIMENSIONS WxHxL (m)	TYPE
Washburn Drain	25-331-C	±16+510	3.65 x 1.83 x 21.0	Concrete Open

The road at this location is a two lane paved road and runs on top of an embankment built up above the surrounding grade with an approximate fill height above the culvert of 0.9 to 1.0 m. The top of the culvert lies at elevation 299.62 m and 299.59 m, at the inlet and outlet, respectively. Rebars were exposed due to the deterioration of the concrete at the inlet and outlet of the culvert.

The road embankment at the culvert location is approximately 1.6 to 1.7 m above the surrounding grades. The embankment slopes were covered with low vegetation and granular material at the time of the fieldwork. Based on field measurements, the embankment slopes adjacent to the culvert have a maximum slope of 2.5H:1V from the edge of the shoulder to the toe of the embankment.

At the time of the fieldwork, the water flow in the drain was low. The flow runs from west to east. Photographs taken at an earlier date (April 19, 2011) indicate significantly more water flowing through the culvert.

Typical site photographs of the culvert locations can be found in Appendix C.

3.0 GEOLOGY

Ontario Road Network, National Topographic Database (Canvec) basemap shapefiles, Tile 30M12, indicates that the native soils at the culvert locations consist of Silty Clay Rannoch Till. Map 2254, Paleozoic Geology of Southern Ontario, indicates the region is underlain by limestone of the Dundee formation. The rock surface is typically found at depths of about 12 to 27 m below the ground surface.

4.0 INVESTIGATION PROCEDURES

4.1 Field Investigation

In accordance with the Terms of Reference for this investigation, three (3) borehole locations were staked and cleared for presence of underground utility. Borehole 1 was drilled to a depth 10.8 m below ground surface at mid shoulder of Hwy 23, south of the culvert. Boreholes 2 and 3 were drilled close to the culvert inlet and outlet, respectively. Borehole 2 was drilled to a depth of 7.5 m and Borehole 3 was terminated at 5.0 m due to auger refusal on a possible boulder.

Borehole locations were adjusted based on the proximity of underground and overhead utilities, as well as limited drill rig access due to steep slopes. The borehole locations are presented in Drawing 2.

The fieldwork was performed on May 13th, 2011 under the full-time supervision of experienced geotechnical personnel from AMEC. Prior to drilling, utility locates were carried out. Drilling operations were performed using a track-mounted drilling rig, outfitted with hollow stem augers.

Ground surface elevations at the borehole locations were surveyed by AMEC personnel. The elevations at the project site were related to the geodetic benchmarks (BM) listed on Engineering Transportation References (ETR's) for Site # 25-331-C. The benchmark is located on top of the culvert outlet with geodetic elevation of 299.585 m.

Soil samples were taken at 0.75m intervals for the top 3 m and subsequently at 1.5 m intervals during the performance of Standard Penetration Test (SPT) in accordance with ASTM D1586. This consisted of freely dropping a 63.5 kg hammer for a vertical distance of 0.76 m to drive a 51 mm diameter O.D. split-barrel (split spoon) sampler into the ground. The number of blows of the hammer required to drive the sampler into the relatively undisturbed ground by a vertical distance of 300 mm was recorded as SPT 'N' value of the soil, which indicated the consistency of cohesive soils or the compactness of non-cohesive soils.

Combustible soil headspace vapour readings were measured for each soil sample recovered from the boreholes, using a portable vapour meter (GasTectorTM 1238ME).

The groundwater levels were monitored during, and upon completion of the drilling operations. Upon completion of drilling, Boreholes 1 and 2 were backfilled with bentonite in accordance with the general requirements of Ont. Regulation 903. In accordance with the Terms of Reference, a standpipe piezometer was installed in Borehole 3 to monitor the groundwater level. The standpipe was decommissioned at the end of the day.

The results of the in-situ and laboratory tests are presented in the corresponding Records of Boreholes (Appendix A) and Laboratory Test Results (Appendix B).

AMEC will retain the soil samples for a period of one year after completion of the Project, unless otherwise advised in writing by the Ministry.

4.2 Laboratory Tests

In accordance with the Terms of Reference for this investigation, the following tests were conducted:

- In-situ water content determination (24);
- Grain size distribution analysis (3);
- Atterberg Limits (2);
- Soil Corrosivity (1).

The results of the laboratory tests are included in the Record of Boreholes in Appendix A. The grain size distribution curves, Plasticity Chart and results of soil corrosivity testing are shown in Appendix B.

4.3 Miscellaneous

The boreholes were drilled by Determination Drilling and Soil Investigations, who are licensed well drillers. The drilling operations were supervised by Shailendrasinh Jadeja, P.Eng. of AMEC.

Upon completion of drilling, the soil samples were transported to AMEC's Laboratory in Hamilton for further examination and laboratory testing. Testing to determine the corrosivity of the soils was subcontracted to Maxxam Analytics, an accredited CAEL laboratory. The laboratory test results are included in Appendix B.

5.0 SUB-SURFACE CONDITIONS

The general soil profile through the road embankment consisted of gravelly sand fill over buried topsoil. Native soil below the fill was mainly silty clay to silty clay till/sandy silt till deposits.

The stratigraphic units and groundwater conditions at the borehole locations are discussed in the following sections. Detailed information is provided in the Record of Boreholes (Appendix A), and the interpolated stratigraphical sections are shown on Drawing 2. However, soil and groundwater conditions may vary between the borehole locations.

5.1 Stratigraphy

Topsoil

Topsoil was encountered at all three (3) borehole locations; at surface, in Boreholes 2 and 3 and buried at Boreholes 1 and 3. The thickness of the surface topsoil was approximately 200 mm. Buried topsoil was encountered in Borehole 1 at elevation 298.9 m and was approximately 1.2 m thick. Buried topsoil was encountered in Borehole 3 at elevation 298.2 m and was approximately 300 mm thick.

Fill

Through the shoulder embankment, brown gravelly sand fill of thickness 1.4 m was encountered in Borehole 1, overlying 1.2 m of buried topsoil. The fill also contained some clayey silt. The granular fill was compact to loose, with SPT 'N' value of 16 and 8 blows per 300 mm. Two moisture contents measured within the granular fill were 17 % and 7%.

At Borehole 3, silty clay fill was encountered between surface topsoil and buried topsoil. The silty clay fill was 400 mm thick. The topsoil and the fill extended to 0.9 m below ground surface (Elev. 297.9 m). The fill at Borehole 3 was firm with 'N' value of 6 blows per 300 mm.

The results of laboratory testing carried out on a sample are summarized in Table 2.

Table 2 – Summary of Index Testing - Site 25-331-C - Fill

	%			Atterberg Limits	Soil Classification	Moisture Content, % (Lab Sample)
	Gravel	Sand	Fines			
BH1-SS1	31.6	54.9	13.5		Gravelly sand, some silt	7

Silty Clay/Silt and Clay

Brown, mottled silty clay/silt and clay deposit was encountered below buried and/or surface topsoil at all three borehole locations. At Borehole 1 location, the deposit also contained traces of shells. The deposit was soft to stiff, with 'N' values varying from 3 to 13 blows per 300 mm.

The results of laboratory testing carried out on one selected sample are summarized in Table 3.

Table 3 – Summary of Index Testing - Site 25-331-C – Silt and Clay

	%				Atterberg Limits	Soil Classification	Moisture Content, % (Lab sample)
	Gravel	Sand	Silt	Clay			
BH3-SS3	0	11.0	58.0	41.0	LL=23, PL=17, PI=6	Silt and clay, trace sand	13.5

Silty Clay Till / Sandy Silt Till

Native silty clay till deposit was encountered at geodetic elevations 294.6 m, 297.6 m and 296.2 m in Boreholes 1, 2 and 3, respectively. The silty clay till deposit extended to at least the maximum depths investigated. The deposit also contained trace to some sand and gravel and trace cobbles. The color of deposit varied from brown to grey.

A discrete deposit of sandy silt till with some clay was encountered in Borehole 1 at a depth of 4.0 m to 5.6 m below grade.

SPT values indicated that the silty clay till was stiff to hard, with 'N' values ranging from 13 blows per 300 mm to 50 blows for 80 mm.

The results of laboratory testing carried out on one selected sample are summarized in Table 4.

Table 4 – Summary of Index Testing - Site 25-331-C – Sandy Silt Till

	%				Atterberg Limits	Soil Classification	Moisture Content, % (Lab sample)
	Gravel	Sand	Silt	Clay			
BH1-SS6	6.7	27.7	41.6	24.0	LL=18, PL=12, PI=6	Sandy silt, some clay, trace gravel	12.3

One sample was submitted for analytical testing to determine the soil aggressiveness towards corrosion. The laboratory test certificates can be found in Appendix B. The test results are summarized in Table 5.

Table 5 – Summary of Analytical Testing

Soil Characteristic	Units	BH2-SS6
Resistivity	ohm-cm	4700
Soluble (20:1) Chloride (Cl)	ug/g	<20
Conductivity	umho/cm	213
Available (CaCl2) pH	pH	7.84
Soluble (20:1) Sulphate (SO4)	ug/g	52

5.2 Groundwater

At completion of drilling, groundwater depths were recorded at 9.8 m and 4.6 m below ground surface in Boreholes 1 and 3, respectively. Borehole 2 dry was at completion of drilling.

A standpipe piezometer was installed in Borehole 3, and the water level was measured at the end of the day following the installation. The groundwater level was recorded at 0.95 m below ground surface. The piezometer was decommissioned at the end of the day as per Ministry of Environmental Regulation 903.

5.3 Organic Vapour Measurements

Combustible soil headspace vapour readings were measured using a portable vapour meter GasTechtor™ 1238E. Combustible soil vapour headspace measurements for all of the soil samples recovered from the Boreholes 1, 2 and 3 ranged from non-detectable to 30 parts per million (ppm).

6.0 CLOSURE

The Limitations of Report, as quoted on the following page, is an integral part of this report.

The sub-soil information contained in this report should be used solely for the purpose of foundation assessment of this site.

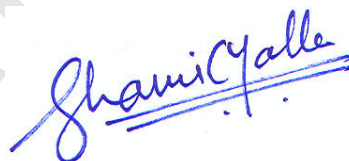
The information presented in this report is complete within AMEC's terms of reference. If there are any further questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,

AMEC Earth & Environmental,
A division of AMEC Americas Limited



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Consulting Engineer
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Prapote Boonsinsuk, Ph.D., P.Eng.
Designated Principal Contact

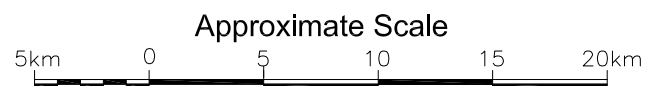
LIMITATIONS OF REPORT



The conclusions and recommendations given in this report are based on information determined at the testhole locations. The information contained herein in no way reflects on the environmental aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Geotechnical Engineer be retained during the construction to confirm that the subsurface conditions across the site do not deviate materially from those encountered in the testholes.

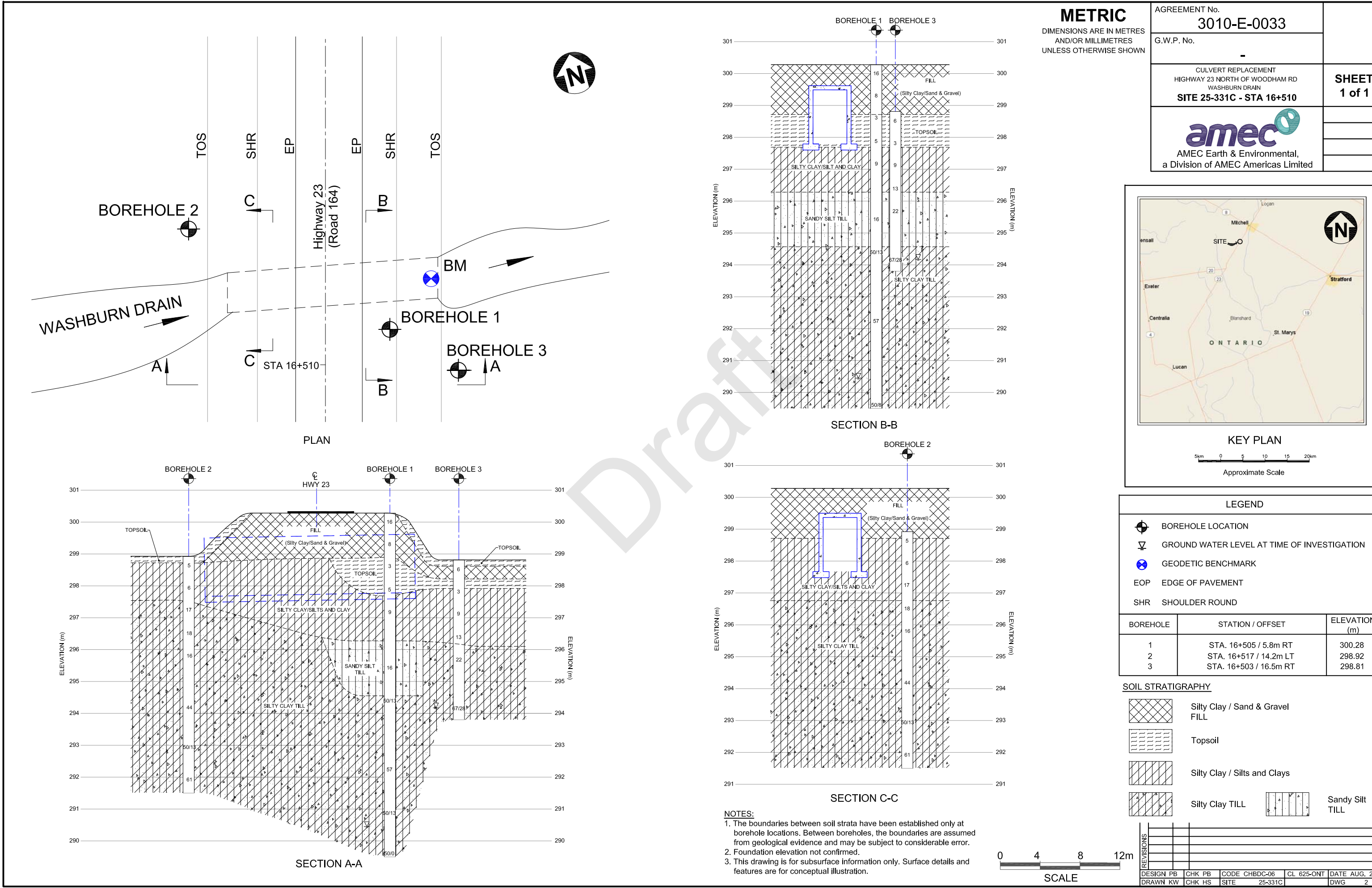
The design recommendations given in this report are applicable only to the project described in the text, and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

The comments made in this report relating to potential construction problems and possible methods of construction are intended only for the guidance of the designer. The number of testholes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

The benchmark and elevations mentioned in this report were obtained strictly for use by this office in the geotechnical design of the project. They should not be used by any other party for any other purpose.



AMEC Earth & Environmental, a Division of AMEC Americas Limited			CLIENT LOGO 	CLIENT MINISTRY OF TRANSPORTATION ONTARIO	
TITLE SITE MAP			DWN BY: KW	DATUM: -	DATE: AUGUST 2011
PROJECT CULVERT REPLACEMENT HIGHWAY 23 NORTH OF WOODHAM RD - WASHBURN DRAIN <small>AGREEMENT NUMBER 3010-E-0033, Site 25-331C - STATION 16+510</small>			CHK'D BY: PB	REV. NO.: A	PROJECT NO: TB112041
			PROJECTION: -	SCALE: AS SHOWN	DRAWING No. 1



METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

AGREEMENT No.
3010-E-0033

G.W.P. No.
-

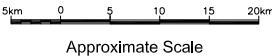
CULVERT REPLACEMENT
HIGHWAY 23 NORTH OF WOODHAM RD
WASHBURN DRAIN
SITE 25-331C - STA 16+510

AMEC Earth & Environmental,
a Division of AMEC Americas Limited

SHEET
1 of 1



KEY PLAN



LEGEND

- BOREHOLE LOCATION
- GROUND WATER LEVEL AT TIME OF INVESTIGATION
- GEODETIC BENCHMARK
- EOP EDGE OF PAVEMENT
- SHR SHOULDER ROUND

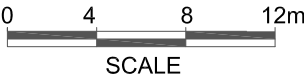
BOREHOLE	STATION / OFFSET	ELEVATION (m)
1	STA. 16+505 / 5.8m RT	300.28
2	STA. 16+517 / 14.2m LT	298.92
3	STA. 16+503 / 16.5m RT	298.81

SOIL STRATIGRAPHY

- Silty Clay / Sand & Gravel
- FILL
- Topsoil
- Silty Clay / Silts and Clays
- Silty Clay TILL
- Sandy Silt TILL

NOTES:

- The boundaries between soil strata have been established only at borehole locations. Between boreholes, the boundaries are assumed from geological evidence and may be subject to considerable error.
- Foundation elevation not confirmed.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.



REVISIONS	DESIGN	CHK	CODE	CL	DATE
1	PB	PB	CHBDC-06	625-ONT	AUG. 2011
2	KW	HS	SITE	25-331C	DWG

APPENDIX A
RECORD OF BOREHOLES

EXPLANATION OF BOREHOLE LOG

This form describes some of the information provided on the borehole logs, which is based primarily on examination of the recovered samples, and the results of the field and laboratory tests. Additional description of the soil/rock encountered is given in the accompanying geotechnical report.

GENERAL INFORMATION

Project details, borehole number, location coordinates and type of drilling equipment used are given at the top of the borehole log.

SOIL LITHOLOGY

Elevation and Depth

This column gives the elevation and depth of inferred geologic layers. The elevation is referred to the datum shown in the Description column.

Lithology Plot

This column presents a graphic depiction of the soil and rock stratigraphy encountered within the borehole.

Description

This column gives a description of the soil strata, based on visual and tactile examination of the samples augmented with field and laboratory test results. Each stratum is described according to the *MTC Soil Classification Manual*.

The compactness condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined as follows (*Ref. MTC Soil Classification Manual*):

Compactness of		Consistency of		Undrained Shear Strength	
<u>Cohesionless Soils</u>	<u>SPT N-Value*</u>	<u>Cohesive Soils</u>		<u>kPa</u>	
Very loose	0 to 5	Very soft		0 to 12	
Loose	5 to 10	Soft		12 to 25	
Compact	10 to 30	Firm		25 to 50	
Dense	30 to 50	Stiff		50 to 100	
Very Dense	> 50	Very stiff		100 to 200	
		Hard		Over 200	

* For penetration of less than 0.3 m, N-values are indicated as the number of blows for the penetration achieved (e.g. 50/25: 50 blows for 25 centimeter penetration).

Soil Sampling

Sample types are abbreviated as follows:

SS	Split Spoon	TW	Thin Wall Open (Pushed)	RC	Rock Core	GS	Grab Sample
AS	Auger Sample	TP	Thin Wall Piston (Pushed)	WS	Washed Sample	AR	Air Return Sample

Additional information provided in this section includes sample numbering, sample recovery and numerical testing results.

Field and Laboratory Testing

Results of field testing (e.g., SPT, pocket penetrometer, and vane testing) and laboratory testing (e.g., natural moisture content, and limits) executed on the recovered samples are plotted in this section.

Instrumentation Installation

Instrumentation installations (monitoring wells, piezometers, inclinometers, etc.) are plotted in this section. Water levels, if measured during fieldwork, are also plotted. These water levels may or may not be representative of the static groundwater level depending on the nature of soil stratum where the piezometer tips are located, the time elapsed from installation to reading and other applicable factors.

Comments

This column is used to describe non-standard situations or notes of interest.

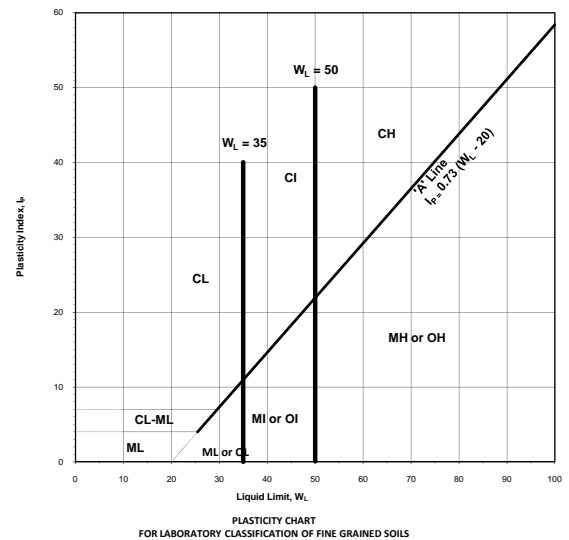
MTC SOIL CLASSIFICATION

Based on MTC Soil Classification Manual



MAJOR DIVISION					GROUP SYMBOL	TYPICAL DESCRIPTION	INFORMATION REQUIRED FOR DESCRIBING SOILS	LABORATORY CLASSIFICATION CRITERIA				
COARSE GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN 75µm)	GRAVELS MORE THAN HALF THE COARSE FRACTION LARGER THAN 4.75mm	CLEAN GRAVELS (LITTLE OR NO FINES)	WIDE RANGE IN GRAIN SIZE & SUBSTANTIAL AMOUNTS OF ALL INTERMEDIATE PARTICULAR SIZE		GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	GIVE TYPE, NAME, IF NECESSARY, INDICATE APPROX % OF SAND & GRAVEL ; MAX SIZE; ANGULARITY, SURFACE CONDITION, & HARDNESS OF THE COARSE GRAINS. LOCAL OR GEOLOGICAL NAME & OTHER PERTINENT DESCRIPTIVE INFORMATION, & SYMBOL IN PARENTHESIS. FOR UNDISTURBED SOILS ADD INFORMATION ON STRATIFICATION, DEGREE OF COMPACTNESS, CEMENTATION, MOISTURE CONDITION & DRAINAGE CHARACTERISTICS	$C_u = \frac{D_{60}}{D_{10}}$ GREATER THAN 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ BETWEEN 1 AND 3				
			PREDOMINANTLY ONE SIZE OF A RANGE OF SIZES WITH STONE INTERMEDIATE SIZES MISSING		GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES						
		GRAVEL WITH FINES (APPLICABLE AMOUNT OF FINES)	NON PLASTIC FINES (FOR IDENTIFICATION PROCEDURES SEE ML BELOW)		GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND- SILT MIXTURES		NOT MEETING ALL GRADATION REQUIREMENTS FOR GW				
			PLASTIC FINES (FOR IDENTIFICATION PROCEDURES SEE CL BELOW)		GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES						
	SANDS MORE THAN HALF THE COARSE FRACTION SMALLER THAN 4.75mm	CLEAN SANDS (LITTLE OR NO FINES)	WIDE RANGE IN GRAIN SIZE & SUBSTANTIAL AMOUNT OF ALL INTERMEDIATE PARTICLE SIZES		SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES		DETERMINE PERCENTAGE OF GRAVEL & SAND FROM GRAIN SIZE CURVE. DEPENDING ON PERCENTAGE OF FINES (FRACTION SMALLER THAN 75 µm) COARSE GRAINED SOILS ARE CLASSIFIED AS FOLLOWS: LESS THAN 5% GW, GP, SW, SP MORE THAN 12% GM, GC, SM, SC 5% TO 12% BORDER LINE CASES REQUIRE USE OF DUAL SYMBOL.	ATTTERBERG LIMITS BELOW A-LINE OR I_p LESS THAN 4	ABOVE A-LINE WITH I_p BETWEEN 4 AND 7 ARE BORDERLINE CASES REQUIRING USE OF DUAL SYMBOLS		
			PREDOMINANTLY ONE SIZE OR A RANGE OF SIZES WITH SOME INTERMEDIATE SIZE MISSING		SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES						
SANDS WITH FINES (APPLICABLE AMOUNT OF FINES)		NON PLASTIC FINES (FOR IDENTIFICATION PROCEDURES SEE ML BELOW)		SM	SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES	ATTTERBERG LIMITS ABOVE A- LINE WITH I_p GREATER THAN 7						
		PLASTIC FINES (FOR IDENTIFICATION PROCEDURES SEE CL BELOW)		SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES							
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT SMALLER THAN 75µm)	IDENTIFICATION PROCEDURE ON FRACTION SMALLER THAN 425µm						USE GRAIN SIZE CURVE IN IDENTIFYING THE FACTORS AS GIVEN UNDER FIELD IDENTIFICATION	FOR UNDISTURBED SOILS ADD INFORMATION ON STRUCTURE, STRATIFICATION, CONSISTANCY IN UNDISTURBED AND REMOLDED STATES, MOISTURE & DRAINAGE CONDITION.	ATTTERBERG LIMITS BELOW A- LINE OR I_p LESS THAN 4	ABOVE A-LINE WITH I_p BETWEEN 4 AND 7 ARE BORDERLINE CASES REQUIRING USE OF DUAL SYMBOLS		
	SILT AND CLAYS	LIQUID LIMIT LESS THAN 35 AND 50	DRY STRENGTH (CRUSHING CHARACTERISTICS)	DILATANCY (REACTION TO SHAKING)	TOUGHNESS (CONSISTENCY NEAR PLASTIC LIMIT)							
			NONE	QUICK	NONE	ML						
			MEDIUM TO HIGH	NONE TO VERY SLOW	MEDIUM	CL						
			SLIGHT TO MEDIUM	SLOW	SLIGHT	OL						
	LIQUID LIMIT BETWEEN 35 AND 50	NONE TO SLIGHT	SLOW TO QUICK	SLIGHT	MI							
		HIGH	NONE	MEDIUM TO HIGH	CI							
		SLIGHT TO MEDIUM	VERY SLOW	SLIGHT	OI							
		SLIGHT TO MEDIUM	SLOW TO NONE	MEDIUM	MH							
	LIQUID LIMIT GREATER THAN 50	HIGH TO VERY HIGH	NONE	HIGH	CH							
		MEDIUM TO HIGH	NONE TO VERY SLOW	SLIGHT TO MEDIUM	OH							
		HIGH ORGANIC SOILS									READILY IDENTIFIED BY COLOUR, ODOUR, SPONGY FEEL & FREQUENTLY BY FIBROUS TEXTURE	Pt

FRACTION	U.S STANDARD SIEVE SIZE		DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS		
GRAVEL	COARSE	PASSING	RETAINED	PERCENT	DESCRIPTOR
		75 mm	26.5 mm	40-50 30-40 20-30 10-20 1-10	AND Y/EY WITH SOME TRACE
SAND	FINE	26.5 mm	4.75 mm		
		4.75 mm	2.00 mm		
	MEDIUM	2.00 mm	425 µm		
	FINE	425 µm	75 µm		
FINES (SILT OR CLAY BASED ON PLASTICITY)		75 µm			
OVERSIZED MATERIAL					
ROUNDED OR SUBROUNDED: COBBLES 75 mm TO 200 mm BOULDERS > 200 mm				NOT ROUNDED: ROCK FRAGMENTS > 75 mm ROCKS > 0.76 CUBIC METRE IN VOLUME	



BOUNDARY CLASSIFICATION: BOUNDARY CLASSIFICATION: SOILS POSSESSING CHARACTERISTICS OF TWO GROUPS ARE DESIGNATED BY COMBINATIONS OF GROUP SYMBOLS FOR EXAMPLE GW-GC WELL GRADED GRAVEL-SAND MIXTURE WITH CLAY BINDER



AMEC Earth & Environmental,
a Division of AMEC American

www.amec.com

**MTC SOIL CLASSIFICATION MANUAL
ENGINEERING PROPERTIES OF SOIL**

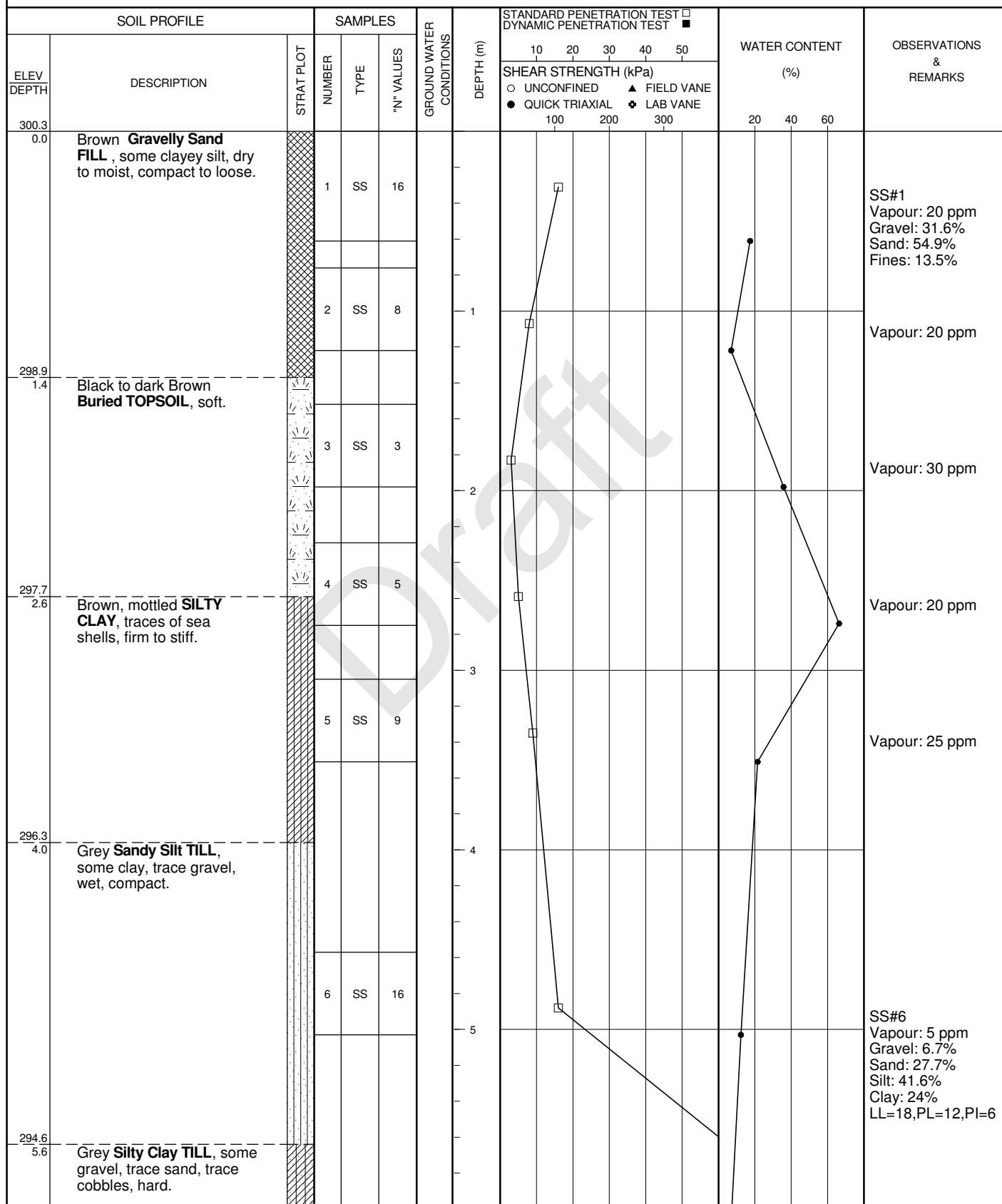


TYPICAL NAMES OF SOIL GROUPS	GROUP SYMBOLS	PERMEABILITY WHEN COMPACTED	STRENGTH WHEN COMPACTED	COMPRESSIBILITY WHEN COMPACTED	WORKABILITY AS A CONSTRUCTION MATERIAL	SCOUR RESISTANCE	SUSCEPTIBILITY TO SURFICIAL EROSION	SUSCEPTIBILITY TO FROST ACTION	DRAINAGE CHARACTERISTICS
WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	GW	PERVIOUS	EXCELLENT	NEGLECTIBLE	EXCELLENT	MEDIUM	NEGLECTIBLE	NEGLECTIBLE	EXCELLENT
POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	GP	VERY PERVIOUS	GOOD	NEGLECTIBLE	GOOD	MEDIUM	NEGLECTIBLE	NEGLECTIBLE	EXCELLENT
SILTY GRAVELS, POORLY GRADED GRAVEL- SAND-SILT MIXTURES	GM	SEMI-PERVIOUS TO IMPERVIOUS	GOOD	NEGLECTIBLE	GOOD	LOW TO MEDIUM	SLIGHT	SLIGHT	FAIR TO SEMI IMPERVIOUS
CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES	GC	IMPERVIOUS	GOOD TO FAIR	VERY LOW	GOOD	MEDIUM	SLIGHT	NEGLECTIBLE TO SLIGHT	PRACTICALLY IMPERVIOUS
WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	SW	PERVIOUS	EXCELLENT	NEGLECTIBLE	EXCELLENT	LOW TO MEDIUM	SLIGHT	NEGLECTIBLE	EXCELLENT
POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	SP	PERVIOUS	GOOD	VERY LOW	FAIR TO GOOD	LOW TO MEDIUM	MODERATE	NEGLECTIBLE TO SLIGHT	EXCELLENT
SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES	SM	SEMI-PERVIOUS TO IMPERVIOUS	GOOD	LOW	FAIR	LOW	MODERATE	SLIGHT TO MODERATE	FAIR TO SEMI IMPERVIOUS IMPERVIOUS
CLAYEY SANDS, POORLY GRADED SAND WITH SOME CLAY MIXTURES	SC	IMPERVIOUS	GOOD TO FAIR	LOW	GOOD	VERY LOW TO LOW	MODERATE TO SLIGHT	NEGLECTIBLE	PRACTICALLY IMPERVIOUS
INORGANIC SILTS AND SANDY SILTS OF SLIGHT PLASTICITY, ROCK FLOUR	ML	SEMI-PERVIOUS TO IMPERVIOUS	FAIR	MEDIUM	FAIR	VERY LOW	SEVERE	SEVERE	FAIR TO POOR
INORGANIC CLAYEY SILTS OF LOW PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, LEAN CLAYS	CL	IMPERVIOUS	FAIR	MEDIUM	GOOD TO FAIR	LOW TO MEDIUM	SLIGHT TO MODERATE	MODERATE TO SEVERE	PRACTICALLY IMPERVIOUS
ORGANIC SILTS OF LOW PLASTICITY	OL	SEMI-PERVIOUS TO IMPERVIOUS	POOR	MEDIUM	FAIR TO POOR	VERY LOW TO LOW	SEVERE	SEVERE	POOR
INORGANIC COMPRESSIBLE SILTS OF MEDIUM PLASTICITY	MI	SEMI-PERVIOUS TO IMPERVIOUS	FAIR	MEDIUM TO HIGH	FAIR TO POOR	LOW	MODERATE	MODERATE TO SEVERE	FAIR TO POOR
INORGANIC SILTY CLAYS OF MEDIUM PLASTICITY	CI	IMPERVIOUS	FAIR TO POOR	HIGH	FAIR	LOW TO MEDIUM	SLIGHT	MODERATE TO SEVERE	SEMI IMPERVIOUS TO PRACTICALLY
ORGANIC SILTY CLAY OF MEDIUM PLASTICITY	OI	SEMI-PERVIOUS TO IMPERVIOUS	POOR	HIGH	POOR	VERY LOW TO LOW	SEVERE	MODERATE TO SEVERE	POOR TO PRACTICALLY IMPERVIOUS
INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	MH	SEMI-PERVIOUS TO IMPERVIOUS	FAIR TO POOR	HIGH	POOR	VERY LOW	MEDIUM	SEVERE	POOR
INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	CH	IMPERVIOUS	POOR	HIGH	FAIR TO POOR	LOW TO MEDIUM	SLIGHT TO NEGLECTIBLE	NEGLECTIBLE	PRACTICALLY IMPERVIOUS
ORGANIC CLAYS OF HIGH PLASTICITY	OH	IMPERVIOUS	POOR	HIGH	POOR	LOW	MODERATE	NEGLECTIBLE TO SLIGHT	PRACTICALLY IMPERVIOUS
PEAT AND OTHER HIGHLY ORGANIC SOILS	Pt	-	-	-	-	LOW	SEVERE	-	FAIR TO GOOD

RECORD OF BOREHOLE No 1

1 OF 2

PROJECT Agreement # 3010-E-0033 Hwy 23 LOCATION Washburn Drain - Site # 25-331-C ORIGINATED BY SJ
 CLIENT MTO West Region Hwy 23, Sta(16+510) COMPILED BY SJ
 JOB NO. TB112041 DATE 13 May 2011 Mid Shoulder, NBL, 5.8 m Rt of CL. CHECKED BY WK



Continued Next Page

RECORD OF BOREHOLE No 1

2 OF 2

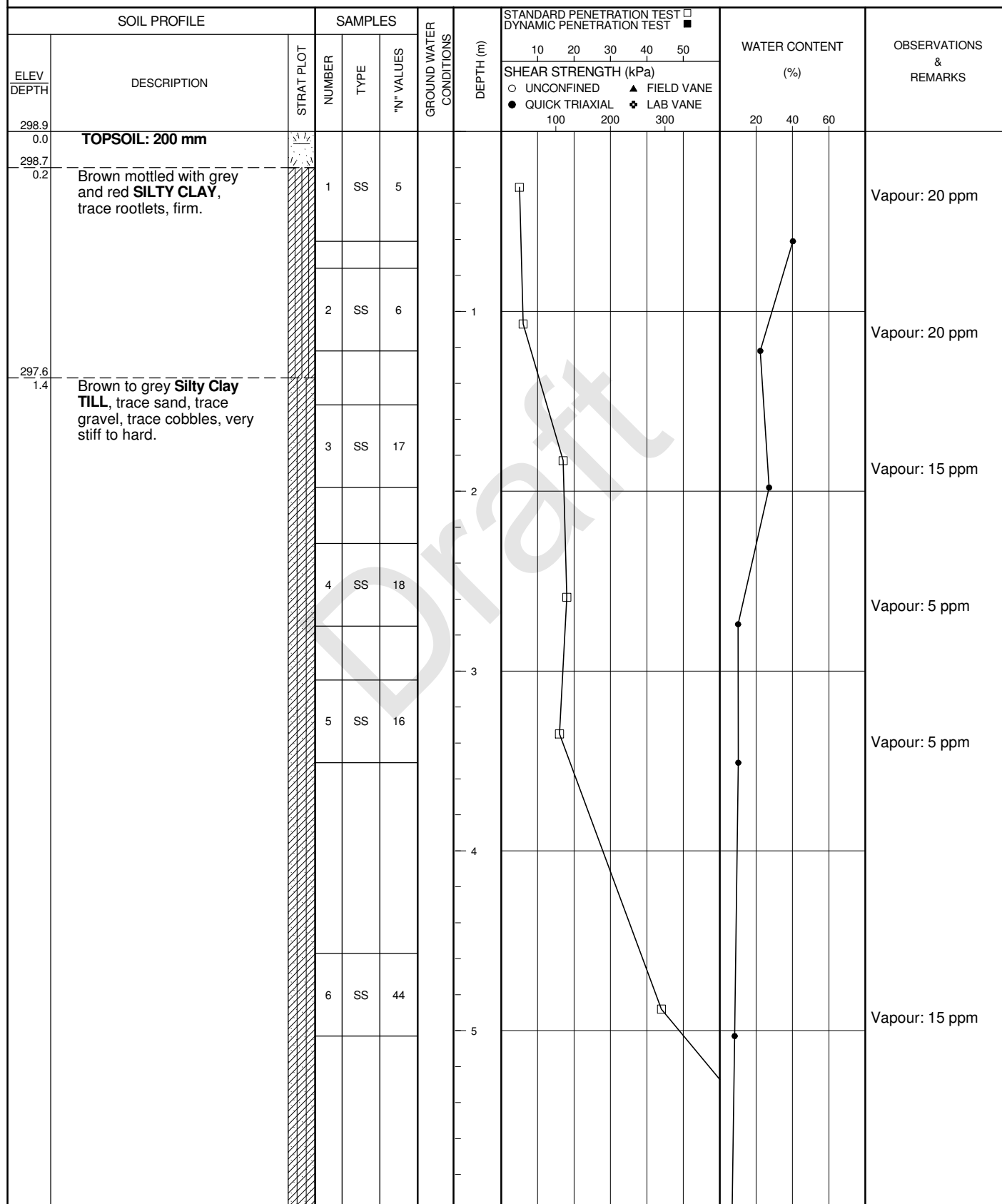
PROJECT Agreement # 3010-E-0033 Hwy 23 LOCATION Washburn Drain - Site # 25-331-C ORIGINATED BY SJ
 CLIENT MTO West Region Hwy 23, Sta(16+510) COMPILED BY SJ
 JOB NO. TB112041 DATE 13 May 2011 Mid Shoulder, NBL, 5.8 m Rt of CL. CHECKED BY WK

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH (m)	STANDARD PENETRATION TEST <input type="checkbox"/> DYNAMIC PENETRATION TEST <input checked="" type="checkbox"/>					WATER CONTENT (%)	OBSERVATIONS & REMARKS
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH (kPa)						
						○ UNCONFINED ▲ FIELD VANE ● QUICK TRIAXIAL ◆ LAB VANE 100 200 300					20 40 60			
			7	SS	50/13 cm									Vapour: 5 ppm
			8	SS	57									Vapour: 25 ppm
			9	SS	50/13 cm									Vapour: 15 ppm
			10	SS	50/8 cm									Vapour: 5 ppm
289.5 10.8	End of Borehole Due to split spoon refusal.													Upon Completion: Borehole open to 10.1 m & GWL at 9.8 m.

RECORD OF BOREHOLE No 2

1 OF 2

PROJECT Agreement # 3010-E-0033 Hwy 23 LOCATION Washburn Drain - Site # 25-331-C ORIGINATED BY SJ
 CLIENT MTO West Region Hwy 23, Sta(16+510) COMPILED BY SJ
 JOB NO. TB112041 DATE 13 May 2011 5.9 m N-W of Culvert Inlet, W of Hwy 23 CHECKED BY WK



Continued Next Page

RECORD OF BOREHOLE No 2

2 OF 2

PROJECT Agreement # 3010-E-0033 Hwy 23 LOCATION Washburn Drain - Site # 25-331-C ORIGINATED BY SJ
 CLIENT MTO West Region Hwy 23, Sta(16+510) COMPILED BY SJ
 JOB NO. TB112041 DATE 13 May 2011 5.9 m N-W of Culvert Inlet, W of Hwy 23 CHECKED BY WK

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH (m)	STANDARD PENETRATION TEST <input type="checkbox"/> DYNAMIC PENETRATION TEST <input checked="" type="checkbox"/>					WATER CONTENT (%)			OBSERVATIONS & REMARKS	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH (kPa)									
						○ UNCONFINED ▲ FIELD VANE ● QUICK TRIAXIAL ✱ LAB VANE											
						10	20	30	40	50	100	200	300	20	40	60	
			7	SS	50/13 cm												Vapour: 5 ppm
			8	SS	61												Vapour: 15 ppm
291.5 7.5	End of Borehole																Upon Completion: Borehole open to 6.4 m and dry.

RECORD OF BOREHOLE No 3

1 OF 1

PROJECT Agreement # 3010-E-0033 Hwy 23 LOCATION Washburn Drain - Site # 25-331-C ORIGINATED BY SJ
 CLIENT MTO West Region Hwy 23, Sta(16+510) COMPILED BY SJ
 JOB NO. TB112041 DATE 13 May 2011 6.44 m S-E of Culvert Outlet, E of Hwy 23 CHECKED BY WK

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH (m)	STANDARD PENETRATION TEST <input type="checkbox"/> DYNAMIC PENETRATION TEST <input type="checkbox"/>					WATER CONTENT (%)	OBSERVATIONS & REMARKS
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH (kPa)						
								10	20	30	40	50		
298.8 0.0	TOPSOIL: 200 mm													
298.6 0.2	Brown, mottled Silty Clay FILL , trace sand, trace rootlets, firm.		1	SS	6									Vapour: 20 ppm
298.2 0.6	Buried TOPSOIL													
297.9 0.9	Brown, mottled SILT and CLAY , trace sand, trace rootlets, soft to stiff.		2	SS	3		1							Vapour: 5 ppm
			3	SS	9		2							SS#3 Vapour: 5 ppm Gravel: 0% Sand: 1% Silt: 58% Clay: 41% LL=23, PL=17, PI=6
296.2 2.6	Brown to grey Silty Clay TILL , trace to some sand and gravel, trace cobbles, stiff to hard.		4	SS	13									Vapour: N/D
							3							
			5	SS	22									
							4							
293.8 5.0	Borehole Terminated Auger refusal due to boulders.		6	SS	67/28 cm		5							Vapour: 5 ppm
														Upon Completion: Borehole open and GWL at 4.57 m. Piezometer was installed. End of the day, GWL at 0.95 m.

APPENDIX B
LABORTORY TEST RESULTS

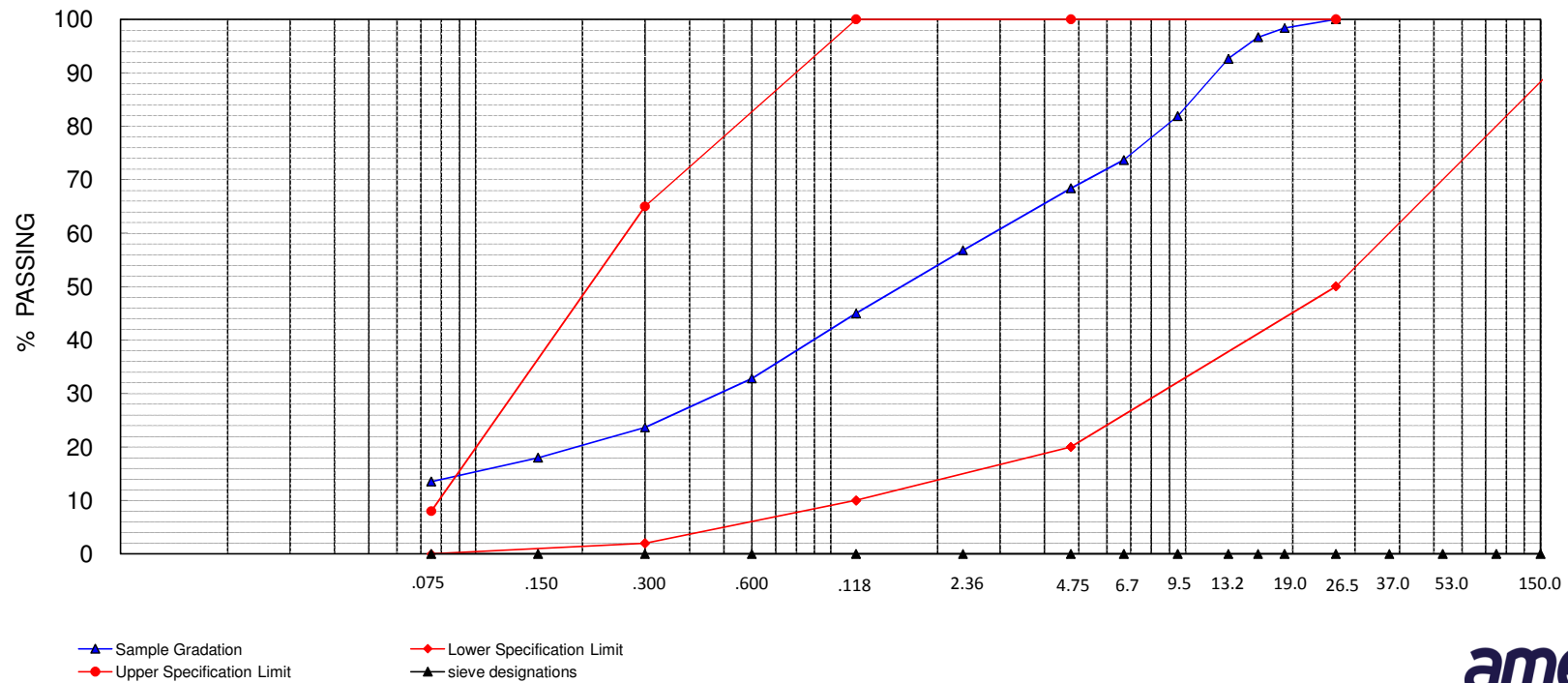
MATERIAL FINER THAN 75 μ m BY WASHING AND SIEVE ANALYSIS OF AGGREGATES MTO LS-601 & LS-602

Enclosure: 1
Date: 31 May 2011
Project: TB112041

Client: MTO West Region
MTO Assignment # 3010-E-0033
Sample Source: BH1 - SS1
Culvert Name: Washburn Drain (25-331-C)
Sample Type: Bore Hole
Specification: Granular B, Type I

Lab No: S315-11
Date Sampled: May 2011
Sampled by: AMEC
Date Received: 20 May 2011
Date Tested: 30 May 2011

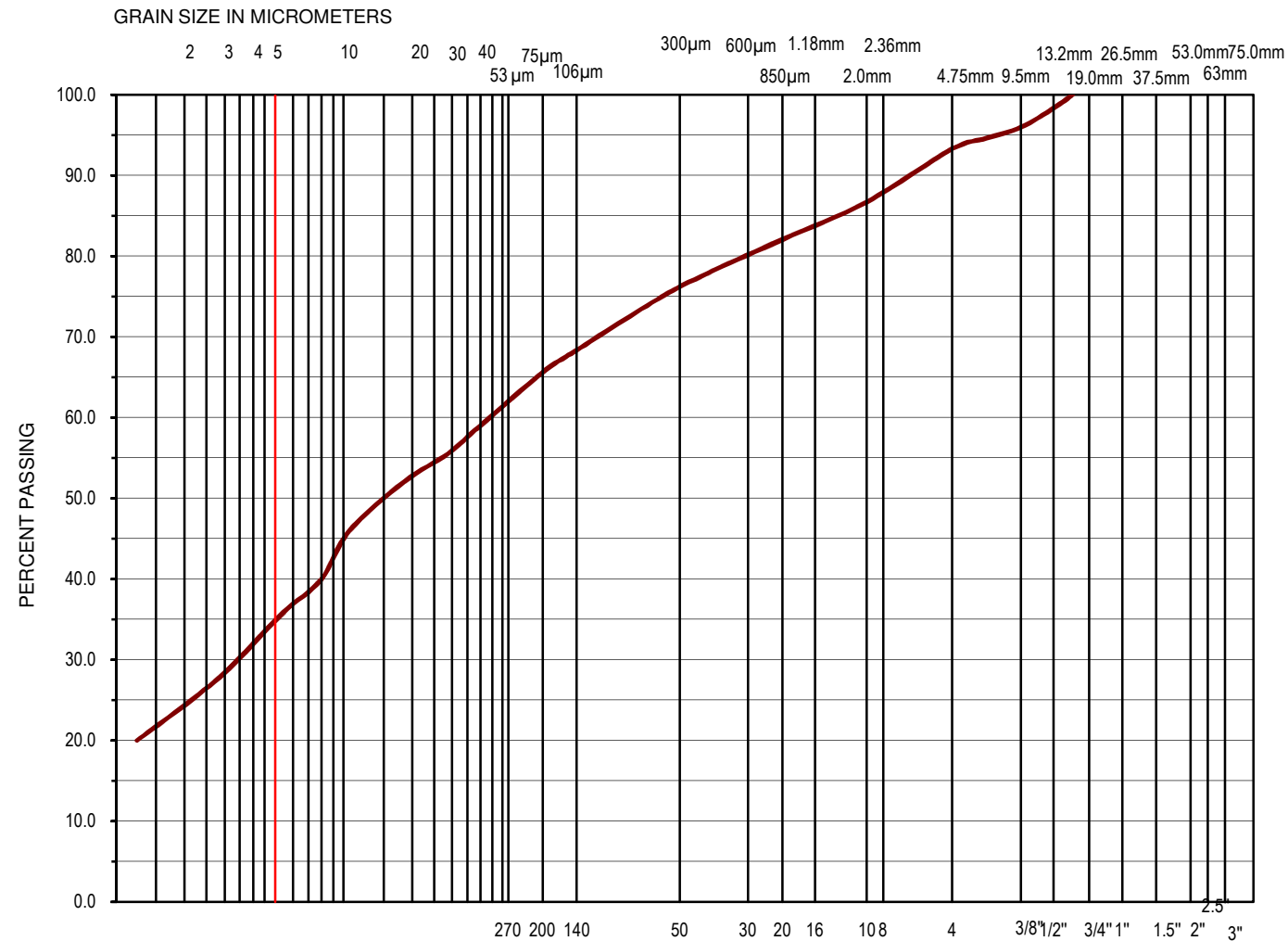
SIEVE SIZES (mm)	150	75.0	53.0	37.5	26.5	19.0	16.0	13.2	9.5	6.7	4.75	2.36	1.18	0.600	0.300	0.150	0.075
SPECIFICATIONS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
% PASSING	-	-	-	-	100.0	98.4	96.7	92.6	81.9	73.7	68.4	56.8	45.0	32.8	23.6	18.0	13.5



UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY	SILT	SAND			GRAVEL	
		Fine	Medium	Coarse	Fine	Coarse

MINISTRY SIEVE DESIGNATION (Metric)



Particle Size	Percent Passing
75	100.0
63	100.0
37.5	100.0
26.5	100.0
19	100.0
16	100.0
13.2	98.3
9.5	96.0
6.7	94.6
4.75	93.3
2	86.7
0.85	82.05
0.425	78.24
0.25	74.94
0.106	68.35
0.075	65.57
0.0400	58.98
0.0288	55.51
0.0185	52.04
0.0106	45.97
0.0080	39.90
0.0053	35.56
0.0028	27.75
0.0012	19.95



GRAIN SIZE DISTRIBUTION
Sandy Silt, Some Clay, Trace Gravel

BH1 - SS6

Lab No. S315-11

TB112041

Date Sampled: May 2011

Date Received: 20 May 2011

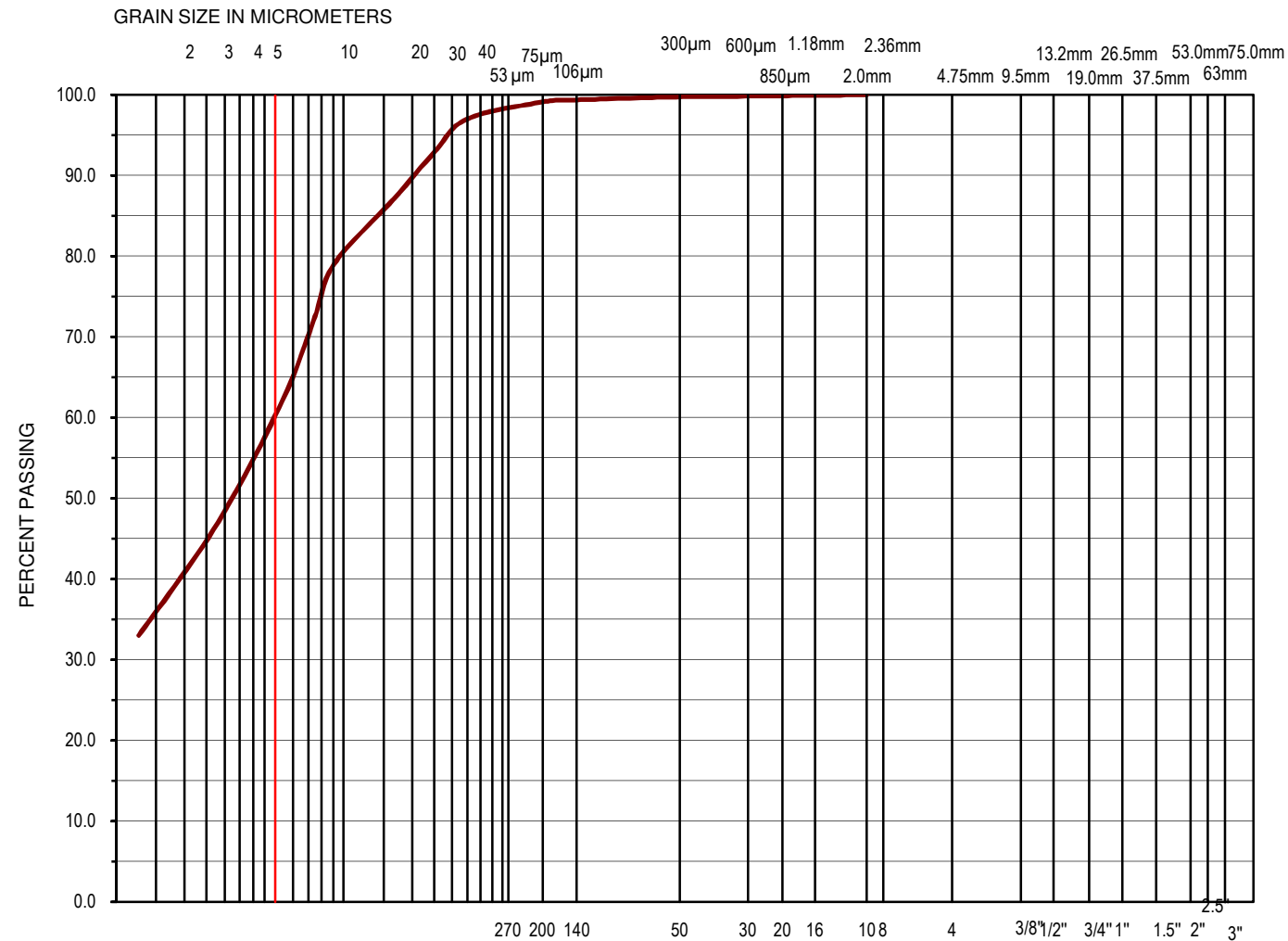
June 2, 2011

Enclosure: 1

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY	SILT	SAND			GRAVEL	
		Fine	Medium	Coarse	Fine	Coarse

MINISTRY SIEVE DESIGNATION (Metric)



Particle Size	Percent Passing
75	100.0
63	100.0
37.5	100.0
26.5	100.0
19	100.0
16	100.0
13.2	100.0
9.5	100.0
6.7	100.0
4.75	100.0
2	100.0
0.85	99.88
0.425	99.78
0.25	99.70
0.106	99.36
0.075	99.10
0.0349	96.99
0.0252	92.99
0.0165	86.99
0.0091	78.99
0.0074	72.00
0.0054	62.00
0.0028	47.00
0.0013	33.00



GRAIN SIZE DISTRIBUTION

Silt And Clay, Trace Sand

BH3 - SS3

Lab No. S315-11

TB112041

Date Sampled: May 2011

Date Received: 20 May 2011

May 31, 2011

Enclosure: 1

Your Project #: TB112041
 Site: HWY 23 AGREEMENT#3010-E-0033
 Your C.O.C. #: 19912

Attention: Shail Jadeja
 AMEC Earth & Environmental Ltd
 Hamilton - Standing Offer
 505 Woodward Ave
 Unit 1
 Hamilton, ON
 L8H 6N6

Report Date: 2011/05/27

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B172126
Received: 2011/05/20, 14:20

Sample Matrix: Soil
 # Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Chloride (20:1 extract)	2	N/A	2011/05/27	CAM SOP-00463	
Conductivity	2	N/A	2011/05/27	CAM SOP-00414	APHA 2510
pH CaCl2 EXTRACT	2	2011/05/26	2011/05/26	CAM SOP-00413	SM 4500 H
Resistivity of Soil	2	2011/05/21	2011/05/27	CAM SOP-00414	APHA 2510
Sulphate (20:1 Extract)	2	N/A	2011/05/27	CAM SOP-00464	EPA 375.4

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
 * Results relate only to the items tested.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

MARIJANE CRUZ, Project Manager
 Email: MCruz@maxxam.ca
 Phone# (905) 817-5756

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Total cover pages: 1

Maxxam Job #: B172126
Report Date: 2011/05/27

AMEC Earth & Environmental Ltd
Client Project #: TB112041
Project name: HWY 23 AGREEMENT#3010-E-0033

RESULTS OF ANALYSES OF SOIL

Maxxam ID		JO7086	JO7087		
Sampling Date		2011/05/12 13:00	2011/05/13 13:00		
	Units	BH2-SS6 WALLIS DRAIN	BH2-SS6 WASHBURN	RDL	QC Batch
Calculated Parameters					
Resistivity	ohm-cm	4100	4700		2495498
Inorganics					
Soluble (20:1) Chloride (Cl)	ug/g	<20	<20	20	2500532
Conductivity	umho/cm	244	213	2	2500541
Available (CaCl2) pH	pH	7.76	7.84		2499078
Soluble (20:1) Sulphate (SO4)	ug/g	70	52	20	2500535

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B172126
Report Date: 2011/05/27

AMEC Earth & Environmental Ltd
Client Project #: TB112041
Project name: HWY 23 AGREEMENT#3010-E-0033

Package 1	23.7°C
-----------	--------

Each temperature is the average of up to three cooler temperatures taken at receipt

GENERAL COMMENTS

Draft

Maxxam Job #: B172126
Report Date: 2011/05/27

AMEC Earth & Environmental Ltd
Client Project #: TB112041
Project name: HWY 23 AGREEMENT#3010-E-0033

QUALITY ASSURANCE REPORT

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD		QC Standard	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits	% Recovery	QC Limits
2500532	Soluble (20:1) Chloride (Cl)	2011/05/27	108	75 - 125	102	85 - 115	<20	ug/g	NC	35		
2500535	Soluble (20:1) Sulphate (SO4)	2011/05/27	101	75 - 125	103	85 - 115	<20	ug/g	NC	35		
2500541	Conductivity	2011/05/27					<2	umho/cm	1.9	35	103	75 - 125

N/A = Not Applicable

RPD = Relative Percent Difference

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Spiked Blank: A blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (RPD): The RPD was not calculated. The level of analyte detected in the parent sample and its duplicate was not sufficiently significant to permit a reliable calculation.

Validation Signature Page

Maxxam Job #: B172126

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

A handwritten signature in black ink, appearing to read "BRAD NEWMAN", is written over a horizontal line.

BRAD NEWMAN, Scientific Specialist

=====

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam

6740 Campobello Road, Mississauga, ON L5N 2L8
 Phone: 905-817-5700 Fax: 905-817-5778 Toll Free: (800) 561-1111

20-May-11 14:20

MARIJANE CRUZ



B172126

MHO

ENV-034

CHAIN OF CUSTODY RECORD

19912

Page 1 of 1

INVOICE INFORMATION Company Name: AMEC Earth & Environmental Contact Name: Shail Jadeja Address: 505 Woodward Avenue, Unit 1 Hamilton L8H 6N6 Phone: 905-312-0700 Fax: 905-312-0777 Email: Shail.jadeja@amec.com		REPORT INFORMATION Company Name: Contact Name: Address: Phone: Fax: Email:		OBJECT INFORMATION Project #: TB112041 Project Name: Agreement # 3010-E-0033 Location: Hwy 23 Sampled By: Shail Jadeja		MAXXAM JOB NUMBER CHAIN OF CUSTODY # 00	
---	--	---	--	---	--	---	--

REGULATORY CRITERIA				ANALYSIS REQUESTED (Please be specific)				TURNAROUND TIME (TAT) REQUIRED			
Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form. <input type="checkbox"/> MISA Reg. 153 <input type="checkbox"/> Sewer Use <input type="checkbox"/> PIWQO <input type="checkbox"/> Table 1 Residential / Parkland <input type="checkbox"/> Sanitary <input type="checkbox"/> Reg. 558 <input type="checkbox"/> Table 2 Industrial / Commercial <input type="checkbox"/> Storm <input type="checkbox"/> Table 3 Medium / Fine Municipality: <input type="checkbox"/> Table 6 Coarse Other (specify): Report Criteria on C of A? <input type="checkbox"/>				Regulated Drinking Water? (Y / N) Metals Field Filtered? (Y / N) Chloride Sulphate pH Resistivity				PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS. Regular (Standard) TAT: <input type="checkbox"/> 5 to 7 Working Days Rush TAT: Rush Confirmation #: (call Lab for #) <input type="checkbox"/> 1 day <input type="checkbox"/> 2 days <input type="checkbox"/> 3 days DATE Required: TIME Required:			
SAMPLES MUST BE KEPT COOL (<10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM.								Please note that TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.			
Sample Identification	Date Sampled	Time Sampled	Matrix (GW, SW, Soil, etc.)	Regulated Drinking Water? (Y / N)	Metals Field Filtered? (Y / N)	Chloride	Sulphate	pH	Resistivity	# of Cont.	COMMENTS / TAT COMMENTS
1 BH2 - SS6 Wallis Drain May 12 1:00pm	May 12	1:00pm	Soil	N	N	✓	✓	✓	✓		
2 BH2 - SS6 Washburn May 13 1:00pm	May 13	1:00pm	Soil	N	N	✓	✓	✓	✓		
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

RELINQUISHED BY (Signature/Print)		RECEIVED BY (Signature/Print)		Date	Time	# JARS USED AND NOT SUBMITTED	Laboratory Use Only
Shail Jadeja		[Signature]		May 20	11:00 AM		Temperature (°C) on Receipt
		[Signature]		20110520	14:20		24/24/23

*MANDATORY SECTIONS IN GREY MUST BE FILLED OUT. AN INCOMPLETE CHAIN OF CUSTODY WILL RESULT IN ANALYTICAL TAT DELAYS.

APPENDIX C
SITE PHOTOGRAPHS

APPENDIX C - PHOTOGRAPHIC RECORD

PROJECT NO. TB112041

PROJECT MTO West Region - Agreement # 3010-E-0033

LOCATION Washburn Drain, Highway 23

ENCLOSURE 1



PHOTOGRAPH

1

Description

[Culvert # 25-331-C](#)

Inlet



PHOTOGRAPH

2

Description

[Culvert # 25-331-C](#)

Upstream - Washburn
Drain

APPENDIX C - PHOTOGRAPHIC RECORD


PROJECT NO. TB112041

PROJECT MTO West Region - Agreement # 3010-E-0033

LOCATION Washburn Drain, Highway 23

ENCLOSURE 2

	PHOTOGRAPH	3
	Description	
<p>Culvert # 25-331-C</p> <p>Outlet</p>		

	PHOTOGRAPH	4
	Description	
<p>Culvert # 25-331-C</p> <p>Downstream - Washburn Drain</p>		