FOUNDATION INVESTIGATION REPORT
STRAWBERRY CREEK BRIDGE 3 REHABILITATION
HIGHWAY 102
THUNDER BAY DISTRICT, ONTARIO

G.W.P. 6073-09-00, SITE NO. 48W-3

Geocres Number: 52A-187

Report to:

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PART 1: FACTUAL INFORMATION

1 INTRODUCTION

This report presents the factual findings obtained from a foundation investigation conducted at the existing Strawberry Creek Bridge 3 along Highway 102, in the District of Thunder Bay, Ontario.

The purpose of this investigation was to explore the subsurface conditions at the site and, based on the data obtained, to provide a borehole location plan, records of boreholes, stratigraphic profile and cross-sections, laboratory test results and a written description of the subsurface conditions. A model of the subsurface conditions was developed from the data obtained in the course of the investigation.

Thurber carried out the investigation as a sub-consultant to MMM Group Limited, under the Ministry of Transportation Ontario (MTO) Agreement Number 6010-E-0011.

2 SITE DESCRIPTION

The existing Strawberry Creek Bridge 3 is located on Highway 102 in the community of Kaministiquia, approximately 5.5 km east of the intersection of Highways 102 and 11/17, and 25 km northwest of Thunder Bay. The existing bridge is a single-span structure with a concrete deck and steel girders, and the abutments are supported on steel H-piles. The bridge spans a length of approximately 18.3 m and is 11 m wide.

Strawberry Creek flows from north to south at this bridge site, and flows in an overall northeast to southwest direction in the area, crossing Highway 102 at three locations before draining into the Kaministiquia River. The creek channel is approximately 12 m wide and 1.5 m deep at the site. The

surrounding lands are heavily wooded with occasional clearings for residential and commercial land usage along the highway.

Photographs in Appendix C show the general nature of the site and the existing bridge.

The site lies within the physiographic region known as the Wawa Subprovince of the Superior Province of the Canadian Shield. The soil deposits in the area comprise glaciofluvial outwash sands and gravels. Bedrock at depth is formed of mafic to felsic metavolcanic rocks.

3 SITE INVESTIGATION AND FIELD TESTING

The site investigation and field testing for this project were carried out between July 23 and 26, 2013 and consisted of drilling and sampling four boreholes, identified as Boreholes SBC3-01 to SBC3-04, through the highway embankment in the area of the existing west and east abutments and approaches. Boreholes SBC3-02 and SBC3-03 were drilled near the abutments to depths of 34.1 to 33.1 m, and Boreholes SCB3-01 and SBC3-04 were drilled through the approach embankments to depths of 9.8 m.

The approximate locations of the boreholes are shown on the attached Borehole Locations and Soil Strata Drawing in Appendix D.

The borehole locations were marked in the field and utility clearances were obtained prior to drilling. The coordinates and ground surface elevations for the boreholes were derived from topographic plans provided to Thurber by MMM Group Limited.

A truck-mounted CME 75 drill rig was used to advance the boreholes using NW casing/wash boring techniques. Soil samples were obtained at selected intervals using a split spoon sampler in conjunction with Standard Penetration Testing (SPT). Dynamic Cone Penetration Tests (DCPTs) were conducted below the sampled portion of Boreholes SBC3-02 and SBC3-03 and adjacent to these boreholes on completion of drilling.

The drilling and sampling operations were supervised on a full time basis by a member of Thurber's technical staff. The supervisor logged the boreholes and processed the recovered soil samples for transporting to Thurber's laboratory for further examination and testing.

Groundwater conditions in the open boreholes were observed throughout the drilling operations. Groundwater conditions observed after completion of drilling were not representative of site conditions as water was used during wash boring operations. Standpipe piezometers were installed in two boreholes to monitor the groundwater level after drilling. The piezometers were subsequently decommissioned and the boreholes without piezometers were backfilled in general accordance with MOE Regulation 903. Completion details of the piezometers and boreholes are summarized in Table 3.1.

Table 3.1 – Borehole Completion Details

Foundation Unit	Boreholes	Piezometer Tip Depth/ Elevation (m)	Completion Details
West Approach	SBC3-01	None installed	Borehole backfilled with bentonite holeplug from 9.8 m to 0.15 m, then asphalt to surface.
West Abutment	SBC3-02	30.5/ 284.0	Sand from 34.1 m to 26.8 m, bentonite holeplug from 26.8 m to 0.5 m, sand from 0.5 m to 0.15 m, then asphalt to surface.
East Abutment	SBC3-03	30.5/ 284.0	Sand from 33.1 m to 26.5 m, bentonite holeplug from 26.5 m to 0.15 m, then asphalt to surface.
East Approach	SBC3-04	None installed	Borehole backfilled with bentonite holeplug from 9.8 m to 0.15 m, then asphalt to surface.

4 LABORATORY TESTING

All recovered soil samples were subjected to visual identification and natural moisture content determination. Selected samples were also subjected to grain size distribution analyses (sieve and hydrometer). The results of this testing program are summarized on the Record of Borehole sheets included in Appendix A and on the figures presented in Appendix B.

5 DESCRIPTION OF SUBSURFACE CONDITIONS

Reference is made to the Record of Borehole sheets included in Appendix A. Details of the encountered soil stratigraphy are presented in these sheets and on the "Borehole Locations and Soil Strata" drawing included in Appendix D. An overall description of the stratigraphy is given in the following paragraphs. However, the factual data presented in the Record of Borehole sheets governs any interpretation of the site conditions. It must be recognized that soil conditions may vary between and beyond the borehole locations.

The soil stratigraphy typically comprises a sand and gravel embankment fill, underlain by a layer of native sandy gravel, over a deep deposit of sands and silts. More detailed description of the individual strata are presented below.

5.1 Asphalt and Concrete

Asphalt was encountered in all the boreholes, which were drilled from the existing Highway 102 roadway. The asphalt layer ranged from 90 to 125 mm in thickness at the borehole locations. A concrete slab (125 to 150 mm thick) was encountered below the asphalt in Boreholes SBC3-02 and SBC3-03 near the bridge abutments.

5.2 Embankment Fill

The existing highway embankment fill beneath the asphalt typically comprised brown sand and gravel containing trace silt and occasional cobbles. The lower portion of the embankment fill

(below 3.2 m depth) transitioned to sandy, silty clay in Borehole SBC3-02. The embankment fill has a total thickness of 4.3 to 4.5 m with a lower boundary at a depth of 4.6 m (Elev. 310.0 to 309.9).

SPT 'N' values recorded in the sand and gravel fill typically ranged from 10 to 58 blows per 0.3 m penetration, indicating a compact to very dense relative density. The lower silty clay fill was firm, based on an SPT 'N' value of 5 blows per 0.3 m penetration. High 'N' values of 98 blows per 0.225 m penetration and 50 blows per 0.125 m penetration were obtained upon encountering probable cobbles. An 'N' value of 5 (loose) was recorded at 3.0 m depth in Borehole SBC3-03.

Measured moisture contents ranged from 4% to 16% in the sand and gravel fill, and was 30% in the sandy silty clay fill.

The results of grain size analyses conducted on the embankment fill are summarized below. These results are also presented on the Record of Borehole sheets included in Appendix A and on Figures B1 and B2 of Appendix B.

Sand and Gravel Fill:

Gravel %	35 to 61
Sand %	35 to 58
Silt & Clay %	4 to 15

Sandy Silty Clay Fill:

Gravel %	7
Sand %	29
Silt %	29
Clay %	35

5.3 Sandy Gravel to Sand and Gravel

A native deposit of brown sandy gravel ranging in composition to sand and gravel was encountered below the embankment fill in Boreholes SBC3-02 to SBC3-04. This layer contained trace silt and occasional cobbles and boulders. Where fully penetrated, the cohesionless deposit had a thickness of 1.5 and 3.2 m, with a lower boundary at depths of 6.1 and 7.8 m (Elev. 308.4 and 306.7). Borehole SBC3-04 was terminated within sand and gravel at a depth of 9.8 m (Elev. 304.8).

SPT 'N' values obtained in the deposit ranged from 17 to 55 blows for 0.3 m penetration, indicating a compact to very dense relative density. Measured moisture contents ranged from 11% to 25%.

Two samples of the sandy gravel to sand and gravel deposit underwent laboratory grain size analysis testing, the results of which are summarized below. These results are also presented on the Record of Borehole sheets included in Appendix A. The grain size distribution curves for these samples are shown on Figure B3 of Appendix B.

Gravel %	39 to 72
Sand %	27 to 53
Silt & Clay %	1 to 8

5.4 Sands and Silts

A deep native deposit of sands and silts was encountered below the fill or native sand and gravel layers in Boreholes SBC3-01 to SBC3-03. The deposit mainly consisted of sandy silt or sand and silt with trace gravel and trace clay, however zones of silt with some sand and trace clay, and sand with trace silt and trace gravel were also encountered within the deposit. The boreholes were terminated within the sands and silts at depths of 9.8 to 34.1 m (Elev. 304.7 to 280.4).

SPT 'N' values obtained in the sands and silts typically ranged from 4 to 26 blows for 0.3 m penetration, indicating a loose to compact relative density. Below depths of 27.4 and 24.4 m in Boreholes SBC3-02 and SBC3-03, the sands and silts become dense to very dense with 'N' values of 33 to 64 blows for 0.3 m penetration. Measured moisture contents ranged from 18% to 31%.

Selected samples of the sands and silts underwent laboratory grain size analysis testing, the results of which are summarized below. These results are also presented on the Record of Borehole sheets included in Appendix A. The grain size distribution curves for these samples are shown on Figures B4 to B7 of Appendix B.

Sandy Silt to Silt:

Gravel %	0 to 4
Sand %	12 to 37
Silt %	60 to 84
Clay %	2 to 4

Sand and Silt to Silty Sand:

Gravel %	0 to 3
Sand %	54 to 65
Silt %	27 to 43
Clay %	2 to 5

5.5 Water Levels

Where possible, water levels were monitored in the open boreholes during drilling operations. Wash boring methods were used to advance the boreholes and therefore water levels recorded during or upon completion of drilling may not reflect natural groundwater levels. Standpipe piezometers were installed in two boreholes to monitor the groundwater level after completion. The water levels measured in the piezometers are summarized in Table 5.1.

Table 5.1 – Water Level Measurements

Borehole	Date	Water Level		Comment
		Depth (m)	Elev. (m)	
SBC3-02	August 1, 2013	3.8	310.7	In piezometer
	May 2, 2014	3.4	311.1	In piezometer
SBC3-03	August 1, 2013	3.9	310.6	In piezometer
	May 2, 2014	3.1	311.4	In piezometer

The preliminary GA drawing provided by MMM Group Limited indicates a water level at Elev. 310.7 in Strawberry Creek in March 1972. In general, the groundwater level is expected to be at or slightly above the water level in the creek.

The above values are short-term readings and seasonal fluctuations of the groundwater and creek level are to be expected. In particular, the water levels may be at a higher elevation after the spring snowmelt or after periods of heavy rainfall.

6 MISCELLANEOUS

Borehole locations were selected and established in the field by Thurber Engineering Ltd. The coordinates and the ground surface elevations for the boreholes were established based on topographic survey information provided by MMM Group Limited.

Thurber obtained utility clearances for the borehole locations prior to drilling.

Eastern Ontario Diamond Drilling of Hawkesbury, Ontario supplied a truck-mounted CME-75 drill rig and conducted the drilling, sampling and in-situ testing operations for the boreholes. The drilling operations were supervised by Ms. Eckie Siu of Thurber.

Overall supervision of the field program, interpretation of the data, and preparation of the report were carried out by Mr. Mark Farrant P.Eng.

The report was reviewed by Mr. Murray Anderson, P.Eng. and Dr. P.K. Chatterji, P.Eng., a Designated Principal Contact for MTO Foundations Projects.

Thurber Engineering Ltd.

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Appendix A

Record of Borehole Sheets

SYMBOLS, ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES

1. TEXTURAL CLASSIFICATION OF SOILS

CLASSIFICATION	PARTICLE SIZE	VISUAL IDENTIFICATION
Boulders	Greater than 200mm	same
Cobbles	75 to 200mm	same
Gravel	4.75 to 75mm	5 to 75mm
Sand	0.075 to 4.75mm	Not visible particles to 5mm
Silt	0.002 to 0.075mm	Non-plastic particles, not visible to the naked eye
Clay	Less than 0.002mm	Plastic particles, not visible to the naked eye

2. COARSE GRAIN SOIL DESCRIPTION (50% greater than 0.075mm)

TERMINOLOGY	PROPORTION
Trace or Occasional	Less than 10%
Some	10 to 20%
Adjective (e.g. silty or sandy)	20 to 35%
And (e.g. sand and gravel)	35 to 50%

3. TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

DESCRIPTIVE TERM	UNDRAINED SHEAR STRENGTH (kPa)	APPROXIMATE SPT[(1)] 'N' VALUE
Very Soft	12 or less	Less than 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	Greater than 200	Greater than 30

NOTE: Hierarchy of Soil Strength Prediction

1) Laboratory Triaxial Testing
2) Field Insitu Vane Testing
3) Laboratory Vane Testing
4) SPT value
5) Pocket Penetrometer

4. TERMS DESCRIBING DENSITY (COHESIONLESS SOILS ONLY)

DESCRIPTIVE TERM	SPT "N" VALUE
Very Loose	Less than 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Greater than 50

5. LEGEND FOR RECORDS OF BOREHOLES

SYMBOLS AND ABBREVIATIONS FOR SAMPLE TYPE

SS Split Spoon Sample WS Wash Sample AS Auger (Grab) Sample
TW Thin Wall Shelby Tube Sample TP Thin Wall Piston Sample
PH Sampler Advanced by Hydraulic Pressure PM Sampler Advanced by Manual Pressure
WH Sampler Advanced by Self Static Weight RC Rock Core SC Soil Core

$$\text{Sensitivity} = \frac{\text{Undisturbed Shear Strength}}{\text{Remoulded Shear Strength}}$$

∇ Water Level

C_{pen} Shear Strength Determination by Pocket Penetrometer

(1) SPT 'N' Value Standard Penetration Test 'N' Value – refers to the number of blows from a 63.5kg hammer free falling a height of 0.76m to advance a standard 50 mm outside diameter split spoon sampler for 0.3 m depth into undisturbed ground.

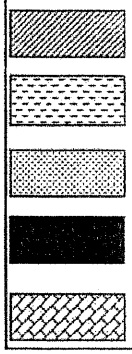
(2) DCPT Dynamic Cone Penetration Test – Continuous penetration of a 50 mm outside diameter, 60° conical steel point attached to "A" size rods driven by a 63.5 kg hammer free falling a height of 0.76 m. The resistance to cone penetration is the number of hammer blows required for each 0.3 m advance of the conical point into undisturbed ground.

EXPLANATION OF ROCK LOGGING TERMS

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

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

SYMBOLS



CLAYSTONE

SILTSTONE

SANDSTONE

COAL

BEDROCK

STRENGTH CLASSIFICATION			
Rock Strength	**Approximate Uniaxial Compressive Strength**		**Field Estimation of Hardness***
	(MPa)	**(psi)**	
Extremely Strong	Greater than 250	Greater than 36,000	Specimen can only be chipped with a geological hammer
Very Strong	100-250	15,000 to 36,000	Requires many blows of geological hammer to break
Strong	50-100	7,500 to 15,000	Requires more than one blow of geological hammer to break
Medium Strong	25.0 to 50.0	3,500 to 7,500	Breaks under single blow of geological hammer.
Weak	5.0 to 25.0	750 to 3,500	Can be peeled by a pocket knife with difficulty
Very Weak	1.0 to 5.0	150 to 750	Can be peeled by a pocket knife, crumbles under firm blows of geological pick.
Extremely Weak (Rock)	0.25 to 1.0	35 to 150	Indented by thumbnail

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

UNIFIED SOILS CLASSIFICATION

MAJOR DIVISIONS		GROUP SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines.
		GM	Silty gravels, gravel-sand-silt mixtures.
		GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS	SW	Well-graded sands or gravelly sands, little or no fines.
		SP	Poorly-graded sands or gravelly sands, little or no fines.
		SM	Silty sands, sand-silt mixtures.
		SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS	SILTS AND CLAYS $W_L < 50\%$	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. ($W_L < 30\%$).
		CI	Inorganic clays of medium plasticity, silty clays. ($30\% < W_L < 50\%$).
		OL	Organic silts and organic silty-clays of low plasticity.
	SILTS AND CLAYS $W_L > 50\%$	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.
CLAY SHALE			
SANDSTONE			
SILTSTONE			
CLAYSTONE			
COAL			

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RECORD OF BOREHOLE No SBC3-01 1 OF 2 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 229.1 E 335 773.3 ORIGINATED BY ES
HWY 102 BOREHOLE TYPE NW Casing COMPILED BY AN
DATUM Geodetic DATE 2013.07.24 - 2013.07.24 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
314.5	GROUND SURFACE										
0.0	**ASPHALT:** (90mm)										
0.1	**SAND** and **GRAVEL**, trace silt, occasional cobbles Very Dense to Compact Brown Moist (FILL)		1	SS	98/ 0.225		314		○		
	Cobbles (150mm)		2	SS	26		313		○		56 37 7 (SI+CL)
			3	SS	13		312		○		
			4	SS	10		311		○		
309.9							310				
4.6	Sandy **SILT**, trace clay Loose to Compact Grey Wet		5	SS	4				○		0 22 74 4
			6	SS	6		309		○		
			7	SS	16		308		○		0 23 73 4
			8	SS	16		307		○		
304.7							306				
9.8	END OF BOREHOLE AT 9.8m.						305				

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+ ^{3}, × ^{3}: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 10/10/14

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THURBER

RECORD OF BOREHOLE No SBC3-01 2 OF 2 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 229.1 E 335 773.3 ORIGINATED BY ES

HWY 102 BOREHOLE TYPE NW Casing COMPILED BY AN

DATUM Geodetic DATE 2013.07.24 - 2013.07.24 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	Continued From Previous Page										
	BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 0.15m, THEN ASPHALT TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 10/10/14

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THURBER

RECORD OF BOREHOLE No SBC3-02 1 OF 4 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 239.0 E 335 782.8 ORIGINATED BY ES

HWY 102 BOREHOLE TYPE NW Casing/Dynamic Cone Penetration Test COMPILED BY AN

DATUM Geodetic DATE 2013.07.24 - 2013.07.25 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
314.5	GROUND SURFACE										
0.0	**ASPHALT:** (125mm)										
314.2 0.4	**CONCRETE:** (125mm)										
0.3	**SAND** and **GRAVEL**, trace silt, occasional cobbles Very Dense to Compact Brown (FILL)		1	SS	56		314		○		35 58 7 (SI+CL)
			2	SS	21		313		○		61 35 4 (SI+CL)
			3	SS	21		312		○		
311.3											
3.2	Silty **CLAY**, sandy, trace gravel Firm Brown (FILL)		4	SS	5	▼	311		○		7 29 29 35
309.9											
4.6	Sandy **GRAVEL**, trace silt Compact Brown		5	SS	17		309				
308.4											
6.1	Sandy **SILT**, trace gravel and clay Loose to Compact Grey Moist		6	SS	4		308		○		4 29 63 4
			7	SS	4		307		○		
			8	SS	6		306				
							305		○		

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No SBC3-02 2 OF 4 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 239.0 E 335 782.8 ORIGINATED BY ES

HWY 102 BOREHOLE TYPE NW Casing/Dynamic Cone Penetration Test COMPILED BY AN

DATUM Geodetic DATE 2013.07.24 - 2013.07.25 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued From Previous Page										
	Sandy **SILT**, trace gravel and clay Loose to Compact Grey Moist						304				
			9	SS	4						1 37 60 2
							303				
			10	SS	9		302				0 29 69 2
							301				
	Silt layer		11	SS	11						
							300				
			12	SS	4		299				
							298				
			13	SS	5						
							297				
			14	SS	6		296				
295.6											
18.9	**SAND** and **SILT**, trace gravel and clay Compact Grey Moist						295				

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

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THURBER

RECORD OF BOREHOLE No SBC3-02 3 OF 4 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 239.0 E 335 782.8 ORIGINATED BY ES
HWY 102 BOREHOLE TYPE NW Casing/Dynamic Cone Penetration Test COMPILED BY AN
DATUM Geodetic DATE 2013.07.24 - 2013.07.25 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued From Previous Page										
	SAND and **SILT**, trace gravel and clay Compact Grey Moist						294				
			15	SS	14		293		○		3 54 41 2
							292				
							291				
290.1											
24.4	**SAND**, fine to medium grained, trace gravel Compact Grey Moist		16	SS	18		290		○		
							289				
							288				
287.1											
27.4	**SAND** and **SILT**, trace clay Dense to Very Dense Grey Moist		17	SS	33		287		○		0 58 40 2
							286				
							285				

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 10/10/14

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No SBC3-02 4 OF 4 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 239.0 E 335 782.8 ORIGINATED BY ES

HWY 102 BOREHOLE TYPE NW Casing/Dynamic Cone Penetration Test COMPILED BY AN

DATUM Geodetic DATE 2013.07.24 - 2013.07.25 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued From Previous Page										
	SAND and **SILT**, trace clay Dense to Very Dense Grey Moist Occasional cobbles						284				
			18	SS	59		283				
							282				
280.4							281				
34.1	END OF BOREHOLE AT 34.1m UPON DCPT REFUSAL. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Aug. 01/13 3.8 310.7 May 02/14 3.4 311.1										

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L

WATER CONTENT (%): 20 40 60

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 / 10 / 5 (%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 10/10/14

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No SBC3-03 1 OF 4 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 239.6 E 335 808.1 ORIGINATED BY ES

HWY 102 BOREHOLE TYPE NW Casing/Dynamic Cone Penetration Test COMPILED BY AN

DATUM Geodetic DATE 2013.07.23 - 2013.07.26 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
314.5	GROUND SURFACE										
0.0	**ASPHALT:** (125mm)										
310.2											
0.3	**CONCRETE:** (150mm)										
	SAND and **GRAVEL**, trace silt Very Dense Brown Moist (FILL)		1	SS	58						
	Occasional cobbles		2	SS	52						
			3	SS	50/0.125						
	Loose		4	SS	5						
309.9											
4.6	Sandy **GRAVEL**, trace silt, occasional cobbles Compact Brown Wet		5	SS	25						
			6	SS	26						72 27 1 (SI+CL)
306.7											
7.8	**SILT**, some sand, trace clay Loose Grey Wet		7	SS	4						0 12 84 4
			8	SS	5						
304.7											
9.8	Sandy **SILT**										

Continued Next Page

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

$\frac{20}{15 \cdot 10 \cdot 5}$ (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No SBC3-03 2 OF 4 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 239.6 E 335 808.1 ORIGINATED BY ES
HWY 102 BOREHOLE TYPE NW Casing/Dynamic Cone Penetration Test COMPILED BY AN
DATUM Geodetic DATE 2013.07.23 - 2013.07.26 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued From Previous Page										
	Sandy **SILT** Loose to Compact Grey Moist						304				
			9	SS	8						
							303				
	Sand layer		10	SS	13		302				
							301				
	Silt layer Wet		11	SS	9						
299.3							300				
15.2	**SAND**, trace silt Compact Grey moist		12	SS	26		299				
							298				
			13	SS	25						
296.2							297				
18.3	**SAND** and **SILT**, trace clay Compact Grey Moist		14	SS	20		296				0 55 43 2
							295				

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15}\oplus\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 10/10/14

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No SBC3-03 3 OF 4 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 239.6 E 335 808.1 ORIGINATED BY ES
HWY 102 BOREHOLE TYPE NW Casing/Dynamic Cone Penetration Test COMPILED BY AN
DATUM Geodetic DATE 2013.07.23 - 2013.07.26 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued From Previous Page										
	SAND and **SILT**, trace clay Compact Grey Moist						294				
							293				
	Silt layer		15	SS	16						
							292				
							291				
290.1											
24.4	**SAND**, trace gravel, trace silt Dense Grey Moist		16	SS	41		290				
							289				
							288				
287.1											
27.4	Silty **SAND**, trace clay, trace gravel Dense to Very Dense Brown Moist		17	SS	39		287				
							286				
							285				

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \cdot 10 \cdot 5}$ (%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 10/10/14

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No SBC3-03 4 OF 4 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 239.6 E 335 808.1 ORIGINATED BY ES

HWY 102 BOREHOLE TYPE NW Casing/Dynamic Cone Penetration Test COMPILED BY AN

DATUM Geodetic DATE 2013.07.23 - 2013.07.26 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued From Previous Page										
	Silty **SAND**, trace clay, trace gravel Dense to Very Dense Brown Moist						284				
			18	SS	64						3 65 27 5
							283				
281.4							282				
33.1	END OF BOREHOLE AT 33.1m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 3.0m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Aug. 01/13 3.9 310.6 May 02/14 3.1 311.4										

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100

WATER CONTENT (%): 20 40 60

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 / 10 / 5 (%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 10/10/14

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No SBC3-04 1 OF 2 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 249.5 E 335 817.6 ORIGINATED BY ES

HWY 102 BOREHOLE TYPE NW Casing COMPILED BY AN

DATUM Geodetic DATE 2013.07.25 - 2013.07.25 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
314.6	GROUND SURFACE										
0.0	**ASPHALT:** (100mm)										
0.1	**SAND** and **GRAVEL**, trace to some silt, occasional cobbles Dense to Compact Brown (FILL)		1	SS	42		314		○		
			2	SS	35		313		○		35 50 15 (SI+CL)
			3	SS	13		312				
			4	SS	11		311				
310.0											
4.6	**SAND** and **GRAVEL**, trace silt, occasional cobbles Compact to Very Dense Brown Wet		5	SS	27		310		○		
	Boulder (200mm) from 5.6m to 5.9m		6	SS	55		309		○		
	Cobbles and boulders						308				
	becoming Grey		7	SS	47		307		○		39 53 8 (SI+CL)
			8	SS	53		306		○		
304.8							305				
9.8	END OF BOREHOLE AT 9.8m.										

Continued Next Page

$+^3$, $\times^3$: Numbers refer to Sensitivity

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No SBC3-04 2 OF 2 METRIC

WP# 6073-09-00 LOCATION Strawberry Creek Bridge 3 N 5 377 249.5 E 335 817.6 ORIGINATED BY ES

HWY 102 BOREHOLE TYPE NW Casing COMPILED BY AN

DATUM Geodetic DATE 2013.07.25 - 2013.07.25 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	Continued From Previous Page										
	BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 0.15m, THEN ASPHALT TO SURFACE.										

$+^3$, $\times^3$: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 10/10/14

Appendix B

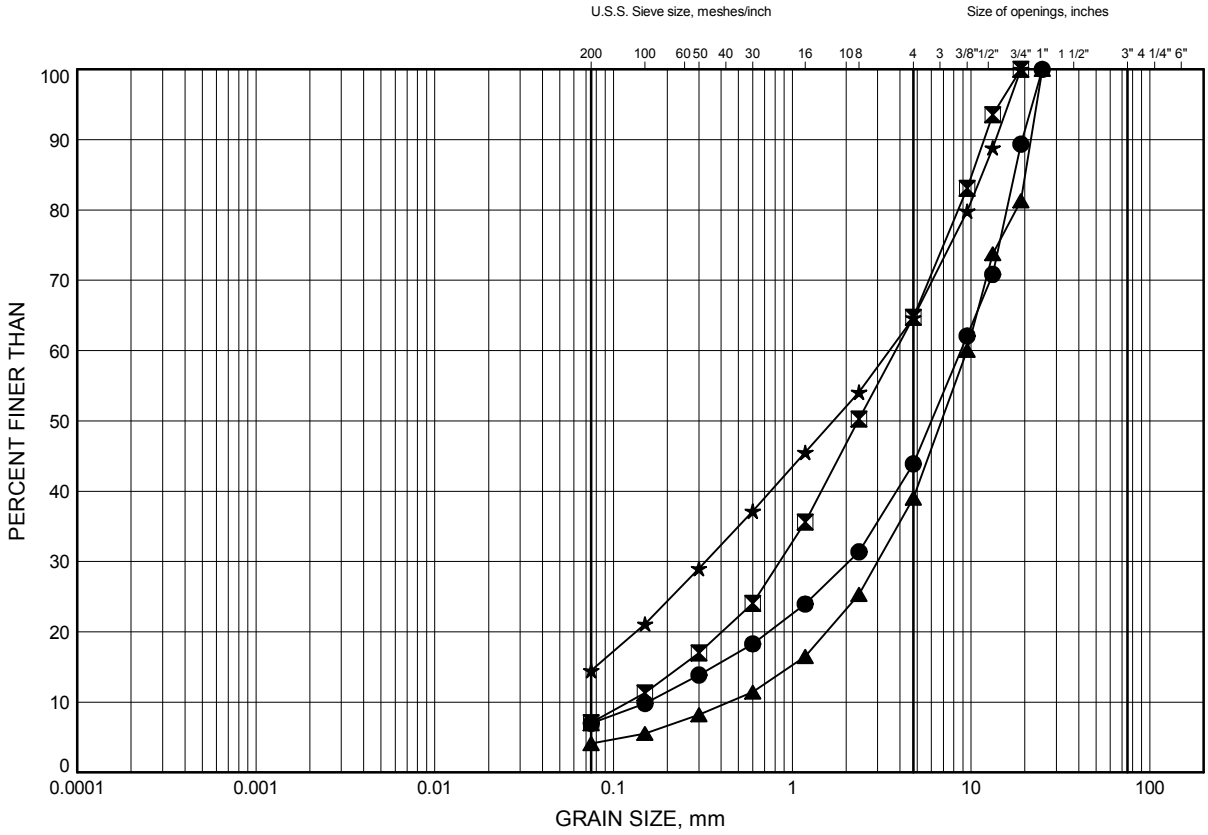
Laboratory Test Results

Strawberry Creek Bridge 3

GRAIN SIZE DISTRIBUTION

FIGURE B1

SAND & GRAVEL FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	SBC3-01	1.83	312.67
⊠	SBC3-02	1.07	313.43
▲	SBC3-02	1.83	312.67
★	SBC3-04	1.83	312.77

Date October 2014

WP# 6073-09-00

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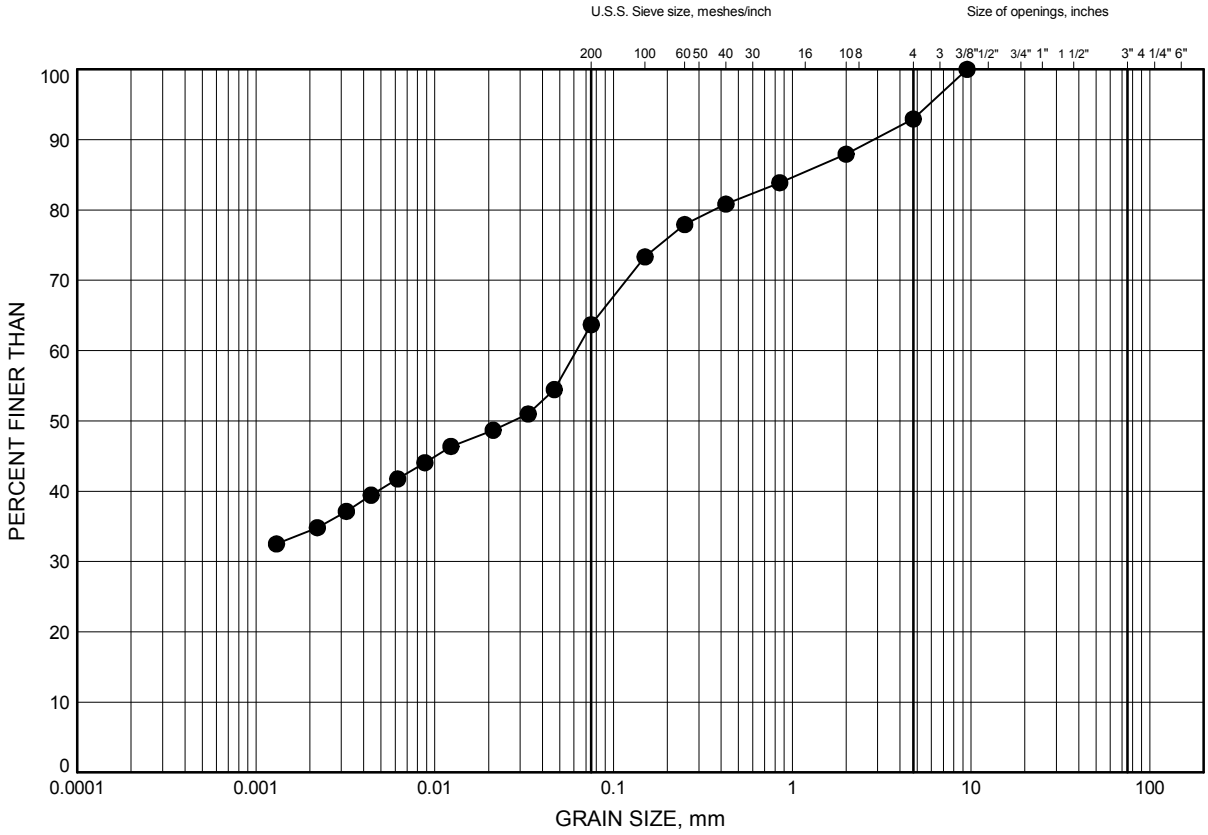
GRAIN SIZE DISTRIBUTION - THURBER 1197.GPJ 10/10/14

Strawberry Creek Bridge 3

GRAIN SIZE DISTRIBUTION

FIGURE B2

SILTY, SANDY CLAY FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	SBC3-02	3.35	311.15

Date October 2014

WP# 6073-09-00

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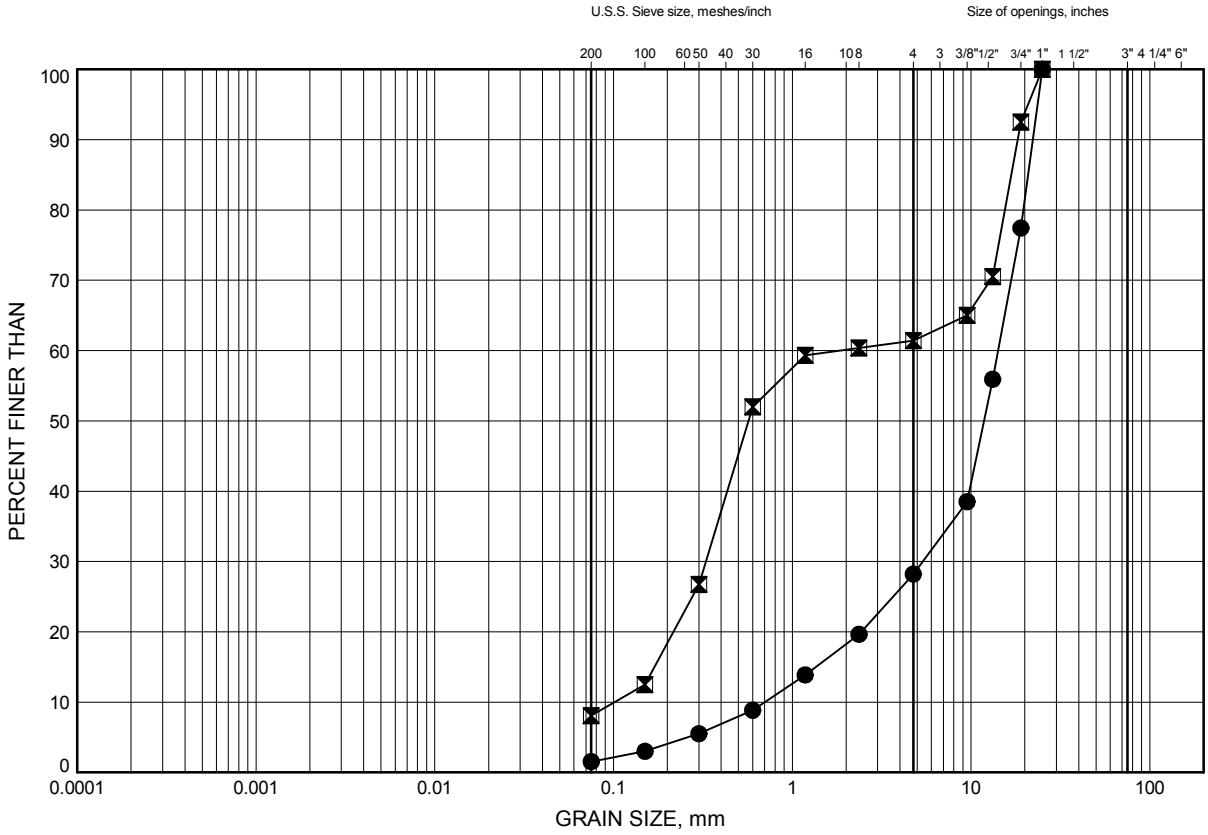
GRAIN SIZE DISTRIBUTION - THURBER 1197.GPJ 10/10/14

Strawberry Creek Bridge 3

GRAIN SIZE DISTRIBUTION

FIGURE B3

SANDY GRAVEL to SAND & GRAVEL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	SBC3-03	6.40	308.10
⧓	SBC3-04	7.92	306.68

Date October 2014

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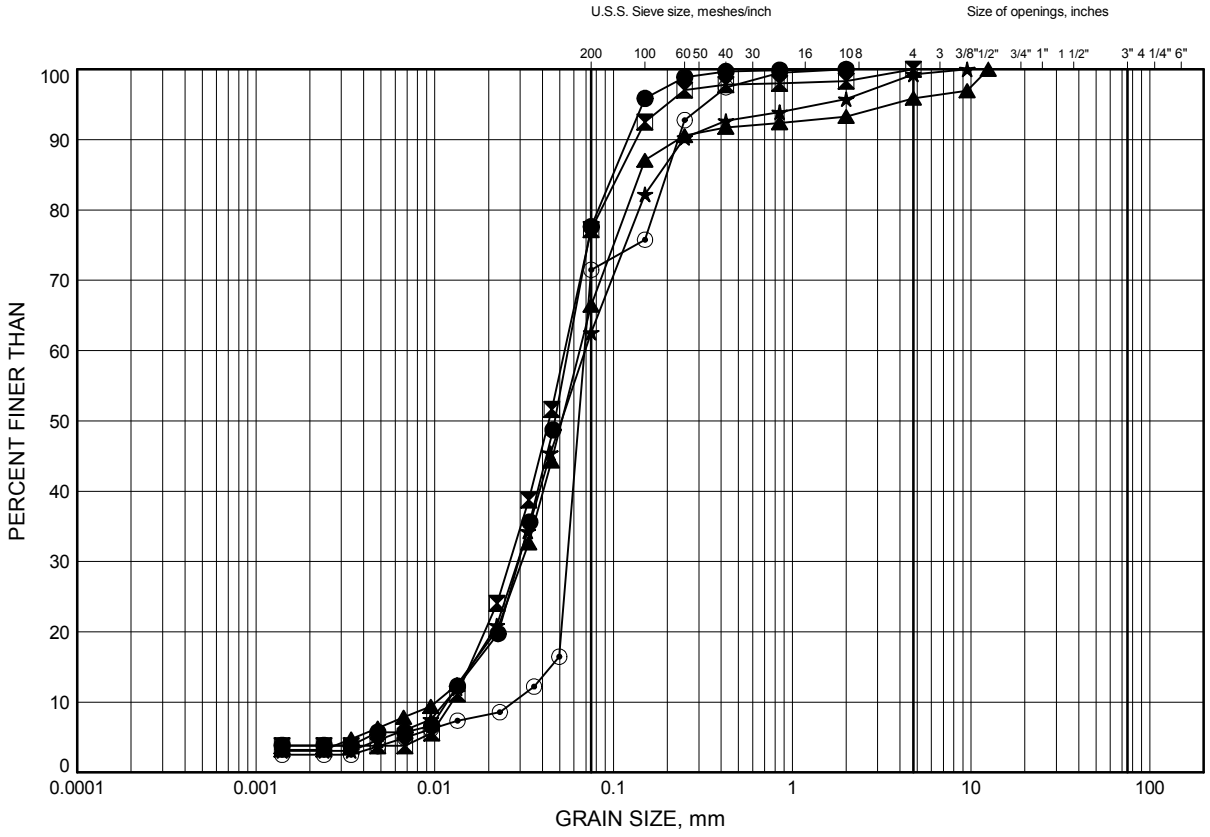
GRAIN SIZE DISTRIBUTION - THURBER 1197.GPJ 10/10/14

Strawberry Creek Bridge 3

GRAIN SIZE DISTRIBUTION

FIGURE B4

SANDY SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	SBC3-01	4.88	309.62
⊠	SBC3-01	7.92	306.58
▲	SBC3-02	6.40	308.10
★	SBC3-02	10.97	303.53
⊙	SBC3-02	12.50	302.00

Date October 2014

WP# 6073-09-00

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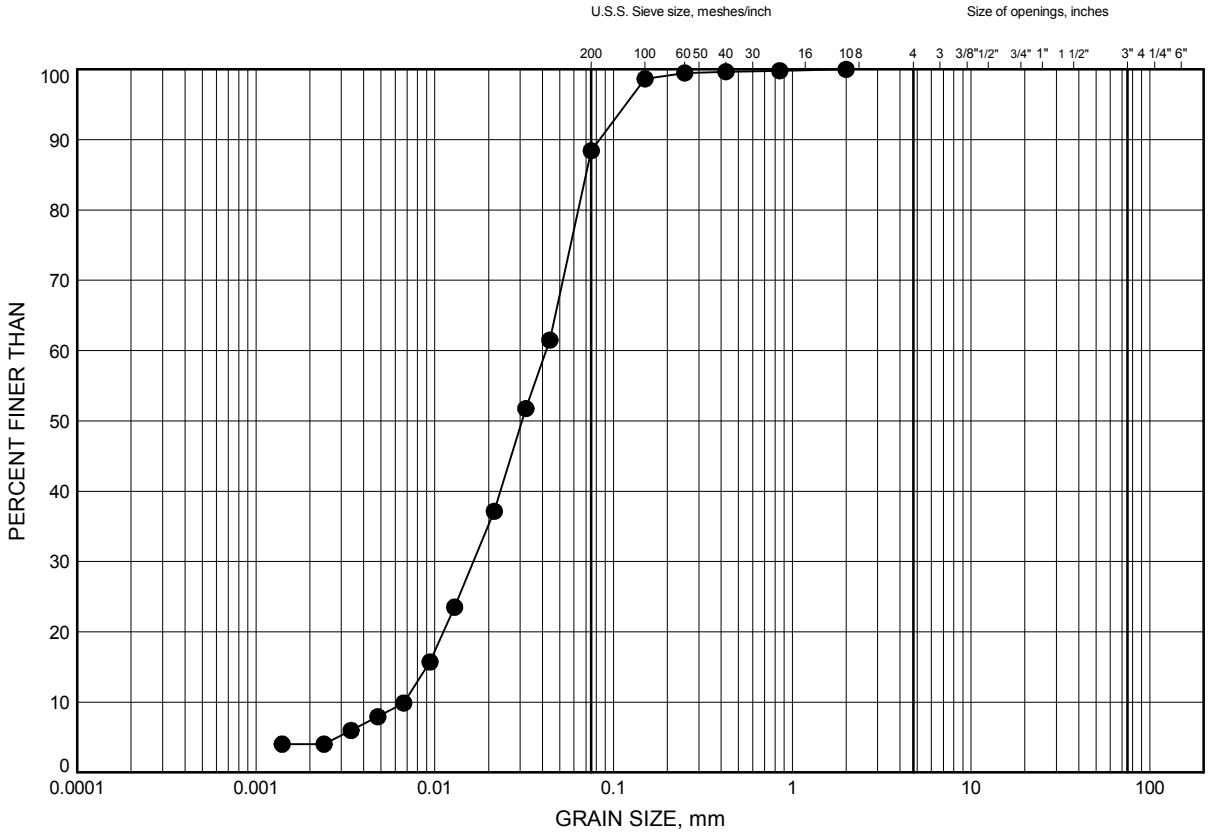
GRAIN SIZE DISTRIBUTION - THURBER 1197.GPJ 10/10/14

Strawberry Creek Bridge 3

GRAIN SIZE DISTRIBUTION

FIGURE B5

SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	SBC3-03	7.92	306.58

Date October 2014

WP# 6073-09-00

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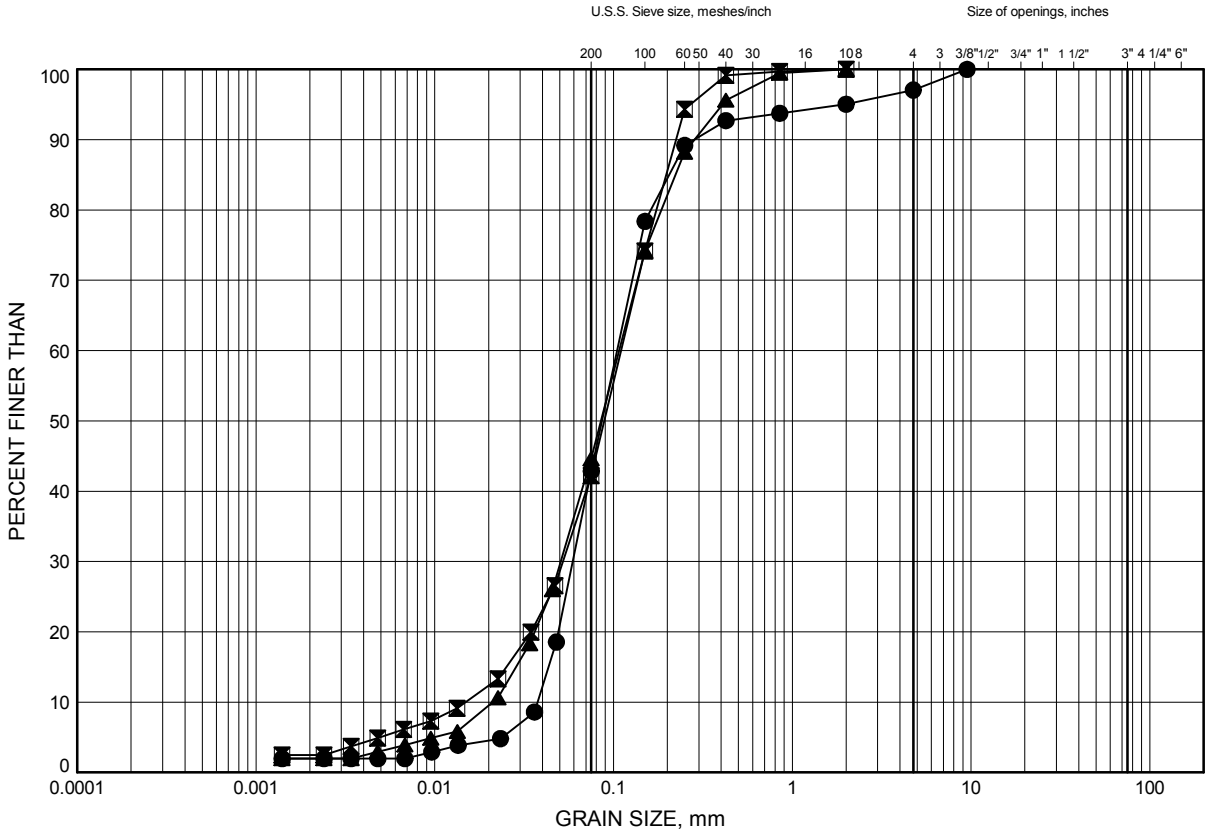
Strawberry Creek Bridge 3

GRAIN SIZE DISTRIBUTION

FIGURE B6

SAND & SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	SBC3-02	21.64	292.86
⊠	SBC3-02	27.74	286.76
▲	SBC3-03	18.59	295.91

Date October 2014

WP# 6073-09-00

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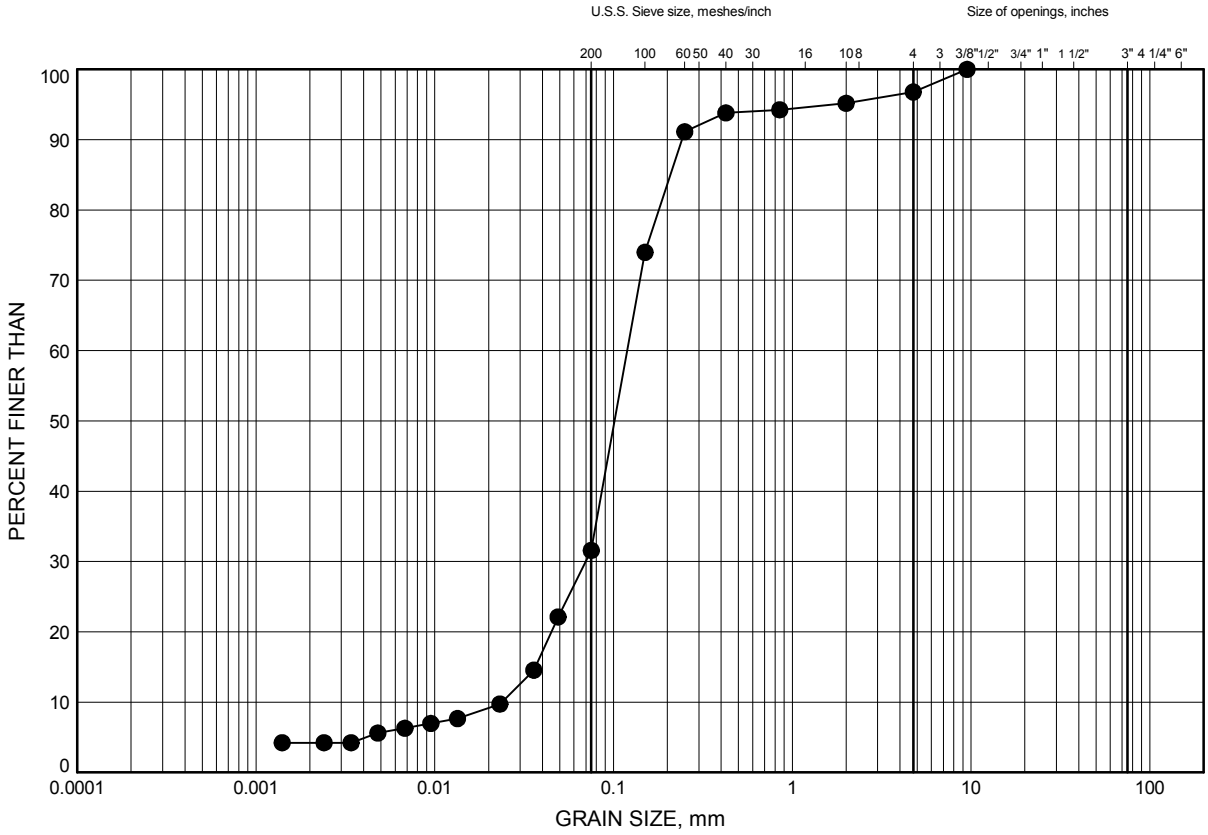
GRAIN SIZE DISTRIBUTION - THURBER 1197.GPJ 10/10/14

Strawberry Creek Bridge 3

GRAIN SIZE DISTRIBUTION

FIGURE B7

SILTY SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	SBC3-03	30.78	283.72

Date October 2014

WP# 6073-09-00

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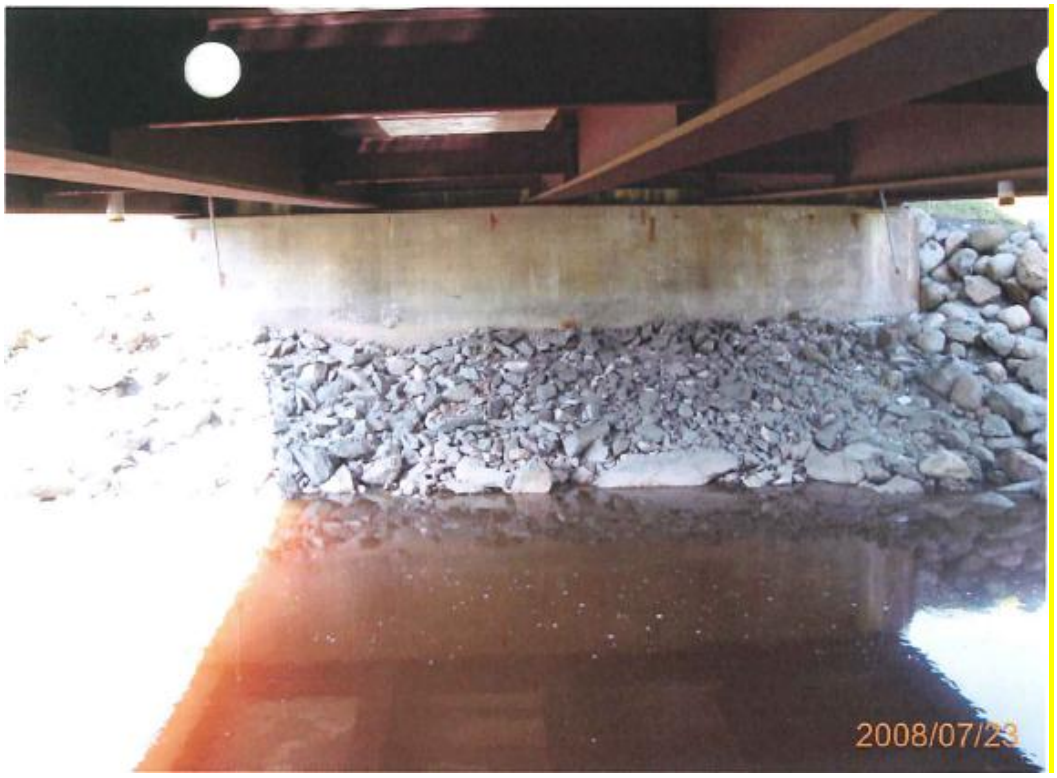
GRAIN SIZE DISTRIBUTION - THURBER 1197.GPJ 10/10/14

Appendix C

Site Photographs

Photograph 1 – East approach, looking west

Photograph 2 – West approach, looking east



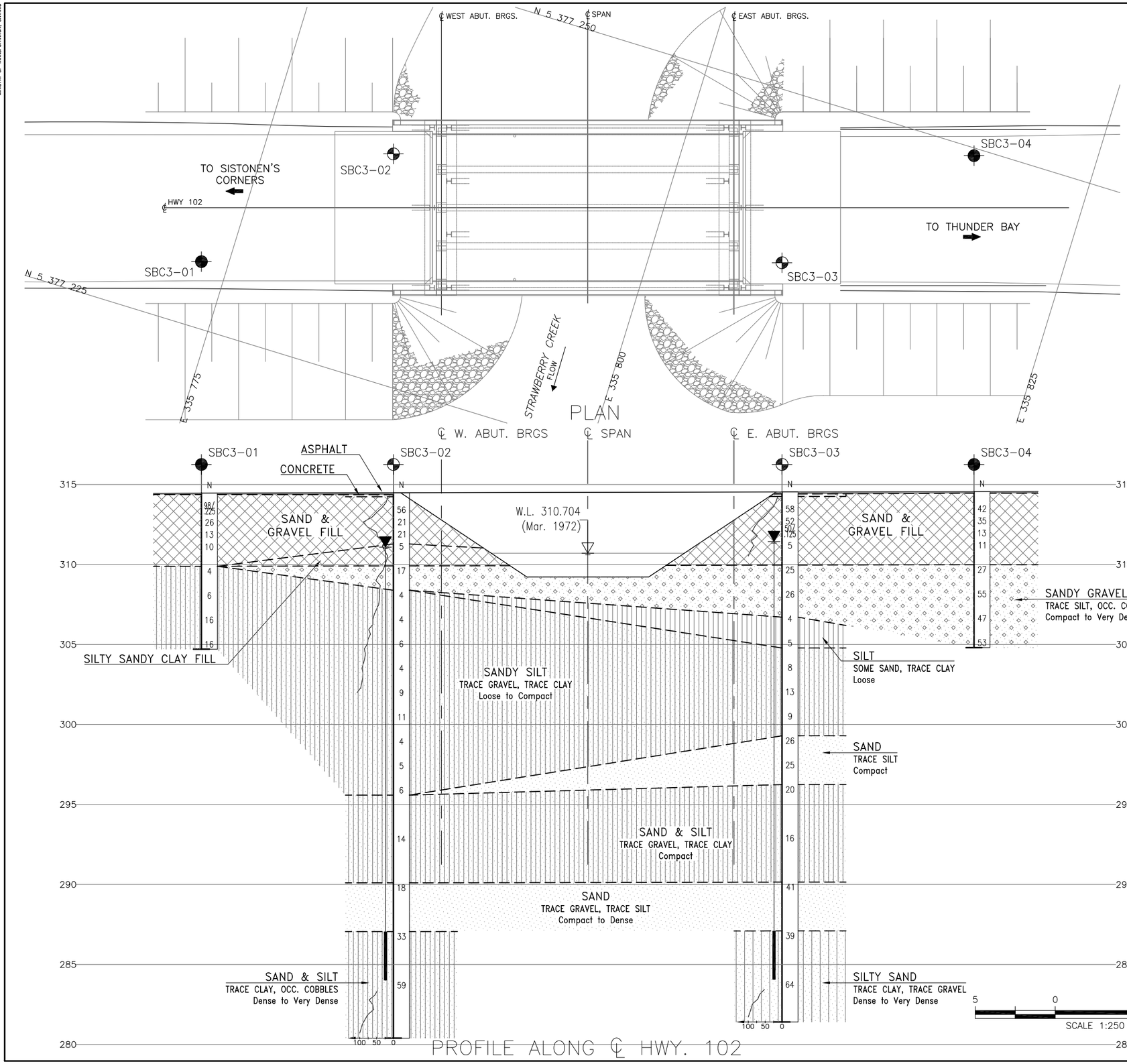
Photograph 3 – West Abutment

Photograph 4 – North Elevation, looking east

Appendix D

Borehole Locations and Soil Strata Drawing

MINISTRY OF TRANSPORTATION, ONTARIO



PROFILE ALONG ℄ HWY. 102

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

LICENSED PROFESSIONAL ENGINEER
M. R. ANDERSON
Oct 22/14
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. K. CHATTERJI
Oct 22/14
PROVINCE OF ONTARIO

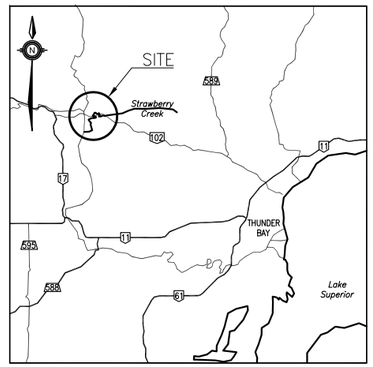
CONT No
WP No 6073-09-00

HIGHWAY 102
STRAWBERRY CREEK BRIDGE 3 REHABILITATION
BOREHOLE LOCATIONS AND SOIL STRATA

SHEET 30

MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

✱	Borehole
✱	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▽	Water Level In Open Borehole
▼	Water Level In Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
SBC3-01	314.5	5 377 229.1	335 773.3
SBC3-02	314.5	5 377 239.0	335 782.8
SBC3-03	314.5	5 377 239.6	335 808.1
SBC3-04	314.6	5 377 249.5	335 817.6

-NOTES-

1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 52A-187

REVISIONS			
DATE	BY	DESCRIPTION	
DESIGN MEF	CHK PKC	CODE	LOAD — DATE OCT 2014
DRAWN MFA	CHK MEF	SITE 48W-3	STRUCT — DWG 1

FILENAME: H:\Drafting\19\135\197\Strawberry Creek\ed1197-StrawberryCreek3.dwg
PLOTDATE: 10/22/2014 1:16 PM