

**FOUNDATION INVESTIGATION REPORT
PICKEREL RIVER BRIDGE REPLACEMENT
HIGHWAY 11
DISTRICT OF RAINY RIVER, ONTARIO**

G.W.P. 6042-08-00, SITE No. 45-96

Geocres Number: 52B-16

Report to

Hatch Mott MacDonald

Thurber Engineering Ltd.
2010 Winston Park Drive, Suite 103
Oakville, Ontario
L6H 5R7
Phone: (905) 829 8666
Fax: (905) 829 1166

March 27, 2013
File: 19-1605-121

H:\19\1605\121 Bridge & Culvert Rehabs NWR\Reports &
Memos\Pickerel River\PICKERAL RIVER BRIDGE - FINAL
FIR.doc

TABLE OF CONTENTS

PART 1 FACTUAL INFORMATION

1	INTRODUCTION.....	1
2	SITE DESCRIPTION.....	1
3	SITE INVESTIGATION AND FIELD TESTING	2
4	LABORATORY TESTING	3
5	DESCRIPTION OF SUBSURFACE CONDITIONS.....	3
5.1	Asphalt.....	4
5.2	Fill.....	4
5.3	Sand to Sandy Gravel	4
5.4	Clayey Silt	5
5.5	Silt to Sand and Silt	5
5.6	Sand	6
5.7	Water Levels.....	6
6	MISCELLANEOUS.....	8

Appendices

Appendix A	Record of Borehole Sheets
Appendix B	Laboratory Test Results
Appendix C	Site Photographs
Appendix D	Borehole Locations and Soil Strata Drawings

**FOUNDATION INVESTIGATION REPORT
PICKEREL RIVER BRIDGE REPLACEMENT
HIGHWAY 11
DISTRICT OF RAINY RIVER, ONTARIO**

G.W.P. 6042-08-00, SITE No. 45-96

Geocres Number: 52B-16

PART 1: FACTUAL INFORMATION

1 INTRODUCTION

This report presents the factual findings obtained from a foundation investigation conducted at the existing Pickerel River Bridge along Highway 11, in the District of Rainy River, 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, a stratigraphic profile, laboratory test results and written descriptions 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 Hatch Mott MacDonald, under the Ministry of Transportation Ontario (MTO) Agreement Number 6010-E-0010.

2 SITE DESCRIPTION

The existing Pickerel River Bridge is located on Highway 11, approximately 43 km east of Atikokan. The Pickerel River flows from north to south, connecting Mink Lake at the north-east to French Lake at the south-west. The surrounding lands are undeveloped and heavily wooded. Quetico Provincial Park Entrance to Dawson Trail is located approximately 200m east from the bridge.

The existing bridge is a nine-span structure supported on eight timber bent piers and two abutments. The bridge is approximately 42.6 m long and 10.2 m wide. The approach embankments are approximately 5.0 m high. The river channel is approximately 10 m wide at the location of the bridge.

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

The site lies within the physiographic region known as the Quetico Subprovince of the Superior Province of the Canadian Shield. The site is underlain by Neo to Mesozoic foliated tonalite to

granodiorite and massive granodiorite to granite igneous intrusive rocks. Diabase dikes of the Pigeon River and Pukaskwa swarms intrude at the east of the site. The bedrock is overlain by end moraine containing sand, gravel and boulders. Glaciolacustrine silt and clay deposits are present within deep depressions in the bedrock surface.

3 SITE INVESTIGATION AND FIELD TESTING

The site investigation and field testing for this project were carried out between August 29 and September 11, 2012. Due to limited site access under the bridge, several of the programmed boreholes were to be drilled from the bridge deck. It was observed that the existing timber deck suffered adverse impact during drilling of the first borehole through the deck and the investigation was adjusted thereafter following discussion with MTO. The borehole locations had to be shifted to avoid drilling through the bridge deck.

The investigation therefore comprised drilling and sampling five boreholes, identified as Boreholes PR-01, PR-02, PR-06, PR-09 and PR-10, and completing Borehole PR-06 with dynamic cone penetration testing (DCPT) below 15.8 m depth. The boreholes were advanced to depths of 9.8 m to 47.8 m below highway level.

Boreholes PR-01 and PR-10 were drilled on the west and east approaches respectively. Boreholes PR-02 and PR-09 were drilled at the existing west and east abutments respectively. Borehole PR-06 was drilled on the east bank of the Pickerel River from the bridge deck. The approximate borehole locations 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 estimated from topographic plans provided by HMM.

A truck-mounted drill rig was used to advance the boreholes using a combination of hollow-stem augers, NW casing and NQ coring techniques. Soil samples were obtained at selected intervals using a split spoon sampler in conjunction with Standard Penetration Testing (SPT).

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 transport 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 wash boring methods were used to drill the boreholes. Two standpipe piezometers were installed to monitor the groundwater level at the site. Completion details of the piezometers and boreholes were summarized in Table 3.1. The piezometers were decommissioned in general accordance with MOE Regulation 903 at the end of October 2012. Boreholes without piezometers were backfilled in general accordance with Regulation 903.

Table 3.1 – Borehole Abandonment Details

Foundation Unit	Borehole	Piezometer Tip Depth/ Elevation (m)	Abandonment Details
West Approach	PR-01	None installed	Borehole backfilled with sand and bentonite holeplug to 3.3 m, concrete from 3.3 m to 0.1 m, then asphalt cold patch to surface.
West Abutment	PR -02	43.8/ 369.7	Borehole backfilled with sand to 40.8 m, bentonite holeplug from 40.8 m to 37.3 m, bentonite holeplug and sand from 37.3 m to 0.3 m, sand from 0.3 m to 0.08 m, then asphalt cold patch to surface.
East Bank	PR -06	None installed	Borehole backfilled with bentonite holeplug and sand to ground surface, bridge deck backfilled with asphalt cold patch to bridge surface.
East Abutment	PR -09	43.2/ 370.9	Borehole backfilled with sand to 41.4 m, bentonite holeplug from 41.4 m to 39.9 m, bentonite holeplug and sand from 39.9 m to 0.5 m, then asphalt cold patch to surface.
East Approach	PR -10	None Installed	Borehole backfilled with bentonite holeplug and cuttings to 0.3 m, concrete from 0.3 m to 0.1 m, then asphalt cold patch to surface.

4 LABORATORY TESTING

All recovered soil samples were subjected to Visual Identification (VI) 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.

The site stratigraphy typically comprises cohesionless fill overlying a layer of native sand and gravel, underlain by a deep deposit of silt to sandy silt. Bedrock or refusal was not encountered in any of the boreholes within the depth of exploration of up to 47.8 m. More detailed descriptions of the individual strata are presented below.

5.1 Asphalt

Asphalt was encountered on the roadway surface in all boreholes drilled. The asphalt was between 65mm and 100mm thick. The asphalt overlies 160 mm of concrete at the bridge deck and 175mm to 250mm of concrete at the abutments.

5.2 Fill

Brown granular fill comprising sand, gravelly sand, sandy gravel, sand and gravel was encountered below the bridge in Borehole PR-06 and beneath the asphalt in all other boreholes. The thickness of fill encountered was 1.7 m to 5.8 m. The lower boundary of the fill layer was at depths of 2.9 m to 6.1 m (Elev. 407.8 to 411.2).

A thin layer of peat 50mm thick was encountered locally beneath the fill in Borehole PR-02. The peat is brown to black and fibrous.

SPT N-values recorded in the granular fill ranged from 8 to 42 blows for 0.3 m penetration, indicating a loose to dense condition, typically compact. Localized SPT N-values of 60 to 67 blows for less than 0.3 m penetration were recorded in Borehole PR-01 due to the presence of cobbles and boulders within the fill. Coring was required locally to advance the borehole through these cobbles and boulders. The moisture content ranged from 1% to 20%.

Four samples of the fill 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 B1 and B2 of Appendix B.

Soil Particles	Sand Fill (%)	Sand & Gravel Fill (%)
Gravel	9 to 19	44
Sand	70 to 88	48
Silt & Clay	2 to 11	8

5.3 Sand to Sandy Gravel

A brown to grey granular deposit was encountered beneath the fill in all boreholes. The deposit contained a mixture of sand, sand and gravel, sandy gravel and gravelly sand with trace silt and clay. Borehole PR-10 was terminated within this deposit at 9.8 m depth (Elev. 404.3). The thickness of the deposit in the remaining boreholes was between 1.6 m and 6.1 m, with its lower boundary at depths of 6.1 m to 12.2 m (Elev. 401.9 to 407.4).

SPT N-values measured ranged from 1 blow per 0.3 m penetration to 50 blows per 0.025 m penetration. The N-values in the sand were typically 5 to 12 blows per 0.3 m penetration, indicating loose to compact relative density, and greater than 26 blows per 0.3 m

penetration in the sand and gravel, indicating a compact to very dense relative density. Moisture contents in the deposit measured between 2% and 22%.

Grain size analysis testing was carried out on four samples of the granular deposit and the results 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 B3 and B4 of Appendix B.

Soil Particles	Sand (%)	Sand and Gravel (%)
Gravel	17	36 to 49
Sand	81	48 to 61
Silt & Clay	2	3 to 7

5.4 Clayey Silt

Clayey silt with trace sand was encountered locally in Borehole PR-01 beneath the sand. The layer is 2.6 m in thickness with its lower boundary at a depth of 8.7 m (Elev. 404.8).

SPT N-values of 6 to 8 blows per 0.3 m penetration were recorded, indicating a firm consistency. The moisture content of the layer ranged from 24% to 27%.

Results of grain size analysis testing carried out on a clayey silt sample are summarized below. These results are also presented on the Record of Borehole sheets included in Appendix A. The grain size distribution curve for this sample is shown on Figure B5 of Appendix B.

Soil Particles	Clayey Silt (%)
Gravel	0
Sand	9
Silt	70
Clay	21

5.5 Silt to Sand and Silt

A deep deposit of native grey silt to sandy silt was encountered beneath the sand and gravel deposits in all boreholes except Borehole PR-10. The silt deposit graded locally to sand and silt or silt and sand. The sampled portions of Boreholes PR-01, PR-06 and PR-09 were terminated in this deposit at depths of 11.3 to 44.8 m (Elev. 402.2 to 369.3), indicating a thickness of at least 2.6 to 32.6 m. Boreholes PR-06 and PR-09 were advanced a further 18.0 and 3.0 m by DCPT below the sampled portion, to total depths of 33.8 and 47.8 m (Elev. 380.1 and 366.3). In Borehole PR-02, the silt deposit was 26.1 m thick, with a lower boundary at 36.3 m depth (Elev. 377.2).

SPT N-values recorded typically ranged from 4 to 26 blows per 0.3 m penetration, indicating a loose to compact relative density. Moisture content of the silt and sand deposit measured between 15% and 35%.

Twelve samples of the 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 Figures B6, B7 and B8 of Appendix B.

Soil Particles	Silt (%)	Sandy Silt (%)	Silt and Sand (%)
Gravel	0	0	0 to 4
Sand	4 to 18	21 to 29	40 to 51
Silt & Clay	-	-	-
Silt	75 to 85	68 to 73	45 to 57
Clay	4 to 11	3 to 6	3 to 4

5.6 Sand

Sand with trace gravel and some silt and clay was encountered below the silt deposit at 36.3 m depth (Elev. 377.2) in Borehole PR-02. Cobbles and boulders were encountered below 42.5 m depth (Elev. 371.0) in this material, requiring coring methods to penetrate. Borehole PR-02 was terminated in the sand at 45.3 m depth (Elev. 368.2).

SPT N-values obtained in the sand ranged from 27 to 56 blows per 0.3 m penetration, indicating a compact to very dense condition. Moisture contents ranged from 15% to 19%.

The results of a grain size distribution analysis conducted on a sample of the sand are shown on the Record Borehole sheets in Appendix A and in Figure B3 of Appendix B. The results are as summarised below.

Soil Particles	Sand (%)
Gravel	4
Sand	80
Silt & Clay	16

5.7 Water Levels

Wash boring methods were used to advance the boreholes and therefore water levels were not measured in the open boreholes during and upon completion of drilling operations. Two standpipe piezometers were installed to monitor the groundwater level and the water levels observed are summarized in Table 5.2.

Table 5.2 – Water Level Measurements

Borehole	Date	Water Level		Comment
		Depth (m)	Elev. (m)	
PR-02	September 12, 2012	3.9	409.6	Piezometer
	October 27, 2012	2.4	411.1	
PR-09	September 12, 2012	1.1	413.0	Piezometer
	October 27, 2012	2.1	412.0	

The water level in the Pickerel River was measured at Elevation 409.0 on June 2, 2011. This information was provided by HMM.

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

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 HMM.

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. The drilling operations were supervised by Mr. Ryan Kromer and Ms. Eckie Siu, of Thurber.

Overall supervision of the field program was conducted by Mr. Mark Farrant, P.Eng. Interpretation of the data and preparation of the report were carried out by Ms. Rocio Palomeque Reyna, P.Eng. and Ms. Mei Cheong, M.Phil.

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

Mei Cheong, M.Phil.
Geotechnical Specialist



MAR 27, 2013

Murray R. Anderson, P.Eng., M.Eng
Senior Foundation Engineer



P. K. Chatterji, P.Eng.
Review Principal



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
 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.

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			

RECORD OF BOREHOLE No PR-01

2 OF 2

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 639.5 E 221 881.2 ORIGINATED BY ES
 HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Coring COMPILED BY AN
 DATUM Geodetic DATE 2012.09.09 - 2012.09.09 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
	Continued From Previous Page													
402.2	Some sand		9	SS	4									
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE BACKFILLED WITH SAND AND BENTONITE HOLEPLUG TO 3.3m, CONCRETE TO 0.1m, THEN ASPHALT COLD PATCH TO SURFACE.													

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

RECORD OF BOREHOLE No PR-02

1 OF 5

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 641.4 E 221 890.7 ORIGINATED BY RK
 HWY 11 BOREHOLE TYPE NW Casing COMPILED BY AN
 DATUM Geodetic DATE 2012.08.29 - 2012.09.09 CHECKED BY RPR

ELEV DEPTH	SOIL PROFILE DESCRIPTION	STRAT PLOT	SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
			NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)			
413.5							20 40 60 80 100	PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT			
0.0	ASPHALT: (100mm)							W _p	W	W _L			
0.1													
413.1	CONCRETE: (250mm)												
0.4	Gravelly SAND to Sandy GRAVEL Compact to Loose Brown Moist (FILL)		1	SS	19								
	Poor recovery		2	SS	20								
	Coring from 2.1m to 2.7m Cobbles and boulders, granitic White/grey		3	SS	8							19 70 11 (SI+CL)	
408.9													
408.9	PEAT, coarse, fibrous Dark Brown/Black Moist		4	SS	5								
4.6	SAND, some gravel, trace silt and clay Loose Grey Wet		5	SS	10								
	No recovery												
	Compact		6	SS	12							17 81 2 (SI+CL)	
			7	SS	1								
	Very Loose												

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

Continued Next Page

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

RECORD OF BOREHOLE No PR-02

2 OF 5

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 641.4 E 221 890.7 ORIGINATED BY RK
 HWY 11 BOREHOLE TYPE NW Casing COMPILED BY AN
 DATUM Geodetic DATE 2012.08.29 - 2012.09.09 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
	Continued From Previous Page						20 40 60 80 100							
403.3														
10.2	SILT, some sand, trace clay Loose Grey Wet		8	SS	8									
			9	SS	8									
			10	SS	7								0 18 75 7	
			11	SS	5									
396.7														
16.8	SILT and SAND, trace clay Loose Grey Wet		12	SS	4								0 40 57 3	
			13	SS	9									
394.1														
19.4	SILT, trace to some sand, trace to some clay Loose to Compact Grey													

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

Continued Next Page

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

RECORD OF BOREHOLE No PR-02

4 OF 5

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 641.4 E 221 890.7 ORIGINATED BY RK
 HWY 11 BOREHOLE TYPE NW Casing COMPILED BY AN
 DATUM Geodetic DATE 2012.08.29 - 2012.09.09 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							
	Continued From Previous Page														
	SILT, trace to some sand, trace to some clay Compact Grey Wet		18	SS	18		383							0 17 79 4	
			19	SS	10		378								
377.2							377								
36.3	SAND, trace gravel, some silt and clay Compact to Very Dense Grey Moist		20	SS	29		375								
			21	SS	27		374								

Continued Next Page

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

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

RECORD OF BOREHOLE No PR-02

5 OF 5

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 641.4 E 221 890.7 ORIGINATED BY RK
 HWY 11 BOREHOLE TYPE NW Casing COMPILED BY AN
 DATUM Geodetic DATE 2012.08.29 - 2012.09.09 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
	Continued From Previous Page						20	40	60	80	100	W _p	W	W _L			
	Occasional cobbles and boulders (330mm)		22	SS	56												4 80 16 (SI+CL)
	Coring from 43.3m to 43.8m																
	Coring from 43.8m to 45.3m																
368.2																	
45.3	END OF BOREHOLE AT 45.3m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Sep. 12/12 3.9 409.6 Oct. 27/12 2.4 411.1																

ONTMT4S_5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

RECORD OF BOREHOLE No PR-06

1 OF 4

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 625.6 E 221 918.5 ORIGINATED BY ES
 HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Coring COMPILED BY AN
 DATUM Geodetic DATE 2012.09.06 - 2012.09.06 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60					
413.9															
0.0	ASPHALT: (65mm)														
0.1	CONCRETE: (160mm)														
0.2	WOOD DECK														
413.4															
0.5	Air gap between underside of bridge deck and ground surface														
409.5															
4.4	SAND, coarse grained, some gravel, occasional cobbles Compact Brown Wet (FILL) Poor recovery Cobbles, granitic White/grey/pink		1	SS	10										
			2	SS	31										
407.8															
6.1	SAND and GRAVEL, occasional cobble Dense Brown/Orange Wet Poor recovery at 6.1m		3	SS	32										
			4	SS	33										
			5	SS	31										
405.2															
8.7	SILT, some sand, trace gravel Loose Grey Moist		6	SS	8										

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

Continued Next Page

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

RECORD OF BOREHOLE No PR-06

2 OF 4

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 625.6 E 221 918.5 ORIGINATED BY ES
 HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Coring COMPILED BY AN
 DATUM Geodetic DATE 2012.09.06 - 2012.09.06 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W		
403.7	Continued From Previous Page											
10.2	Sandy SILT, trace clay Compact Grey Moist		7	SS	12							
	Loose		8	SS	8							0 24 70 6
	Silty		9	SS	9							
	Compact		10	SS	15							0 16 79 5
398.1	End of sampling at 15.8m and start of DCPT											
15.8												

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

Continued Next Page

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

RECORD OF BOREHOLE No PR-06

3 OF 4

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 625.6 E 221 918.5 ORIGINATED BY ES
 HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Coring COMPILED BY AN
 DATUM Geodetic DATE 2012.09.06 - 2012.09.06 CHECKED BY RPR

SOIL PROFILE			SAMPLES				GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	20 40 60 80 100			20 40 60	W _p W W _L						
	Continued From Previous Page						394									
							393									
							392									
							391									
							390									
							389									
							388									
							387									
							386									
							385									
							384									

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

Continued Next Page

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

RECORD OF BOREHOLE No PR-06

4 OF 4

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 625.6 E 221 918.5 ORIGINATED BY ES
 HWY 11 BOREHOLE TYPE Hollow Stem Augers/NW Casing/NQ Coring COMPILED BY AN
 DATUM Geodetic DATE 2012.09.06 - 2012.09.06 CHECKED BY RPR

SOIL PROFILE			SAMPLES				GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	20			40	60	80					
	Continued From Previous Page															
380.1																
33.8	END OF BOREHOLE AT 33.8m UPON DCPT REFUSAL. BOREHOLE BACKFILLED WITH SAND AND BENTONITE HOLEPLUG TO GROUND SURFACE AND BRIDGE DECK BACKFILLED WITH ASPHALT COLD PATCH TO BRIDGE SURFACE.															

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

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

RECORD OF BOREHOLE No PR-09

1 OF 5

METRIC

W.P. 6042-08-00 LOCATION Pickerel River Bridge N 5 393 610.7 E 221 931.9 ORIGINATED BY ES
 HWY 11 BOREHOLE TYPE Casing COMPILED BY AN
 DATUM Geodetic DATE 2012.09.10 - 2012.09.11 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
						20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE				WATER CONTENT (%)			
						20 40 60 W P W W L							
414.1													
0.0	ASPHALT: (75mm)												
419.8	CONCRETE: (175mm)												
0.3	SAND, coarse grained, trace to some gravel, trace silt and clay Compact Brown Moist (FILL)		1	SS	12								
			2	SS	12								
			3	SS	12								
	Occasional cobbles and boulders		4	SS	26								10 88 2 (SI+CL)
	Cobbles		5	SS	31								
408.0													
6.1	SAND and GRAVEL, trace silt and clay Compact Brown/Grey Wet		6	SS	14								49 48 3 (SI+CL)
406.5													
7.6	Sandy GRAVEL, occasional cobbles Compact Brown/Orange Wet Poor recovery		7	SS	29								
			8	SS	26								

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

Continued Next Page

+³, ×³: Numbers refer to Sensitivity 20 15 10 5 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No PR-09

2 OF 5

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 610.7 E 221 931.9 ORIGINATED BY ES
 HWY 11 BOREHOLE TYPE Casing COMPILED BY AN
 DATUM Geodetic DATE 2012.09.10 - 2012.09.11 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							
Continued From Previous Page															
401.9	No recovery		9	SS	50/ 0.025		404								
12.2	SILT, some sand, trace clay Loose to Compact Grey Wet		10	SS	7		402					○		0 17 76 7	
			11	SS	14		401					○			
			12	SS	8		400					○			
			13	SS	10		399					○			
395.8	Sandy SILT, trace clay Compact Grey Moist		14	SS	20		398					○		0 21 73 6	
18.3							397								
							396								
							395								

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

Continued Next Page

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

RECORD OF BOREHOLE No PR-09

3 OF 5

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 610.7 E 221 931.9 ORIGINATED BY ES
 HWY 11 BOREHOLE TYPE Casing COMPILED BY AN
 DATUM Geodetic DATE 2012.09.10 - 2012.09.11 CHECKED BY RPR

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa				
	Continued From Previous Page											
	Sandy SILT, trace clay Compact Grey Moist		15	SS	13							
			16	SS	10							
			17	SS	11							0 29 68 3
			18	SS	14							

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

Continued Next Page

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

RECORD OF BOREHOLE No PR-09

4 OF 5

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 610.7 E 221 931.9 ORIGINATED BY ES
 HWY 11 BOREHOLE TYPE Casing COMPILED BY AN
 DATUM Geodetic DATE 2012.09.10 - 2012.09.11 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE								WATER CONTENT (%) 20 40 60	
Continued From Previous Page																	
383.6	SILT, some sand, trace clay Compact Grey Moist	[Strat Plot]	19	SS	18	[Ground Water]	384										
30.5							383										
							382										
							381										
							380										
			20	SS	16		379										
							378										
377.5	SAND and SILT, trace clay Compact Grey Moist	[Strat Plot]	21	SS	21	[Ground Water]	377										
36.6							376										
							375										

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

Continued Next Page

+³, ×³: Numbers refer to Sensitivity
 20
 15 10 5 0
 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No PR-09

5 OF 5

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 610.7 E 221 931.9 ORIGINATED BY ES
 HWY 11 BOREHOLE TYPE Casing COMPILED BY AN
 DATUM Geodetic DATE 2012.09.10 - 2012.09.11 CHECKED BY RPR

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV. DEPTH	DESCRIPTION	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60					
Continued From Previous Page													
		22	SS	25								0 51 45 4	
		23	SS	26									
366.3													
47.8	END OF BOREHOLE AT 47.8m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Sep. 12/12 1.1 413.0 Oct. 27/12 2.1 412.0												

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

+³, ×³: Numbers refer to Sensitivity
 20
 15 10 5
 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No PR-10

1 OF 2

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 613.7 E 221 939.4 ORIGINATED BY RK
 HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2012.08.29 - 2012.08.29 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
						20 40 60 80 100	20 40 60	20 40 60							
414.1															
0.0	ASPHALT: (100mm)														
0.1															
413.6	SAND and GRAVEL Brown Moist (FILL)		1	AS											
0.5															
	SAND, coarse, trace clay and gravel Compact Brown Moist (FILL)		1	SS	20										
			2	SS	11										
			3	SS	11										
411.2	Difficulty in advancing auger at 2.9m														
2.9	Gravelly SAND to SAND and GRAVEL Dense to Very Dense Brown Moist		4	SS	45									9 88 3 (SI+CL)	
	Difficulty in advancing auger at 4.0m														
			5	SS	73										
			6	SS	29									36 61 3 (SI+CL)	
			7	SS	42										
	Some silt														
404.3			8	SS	102									40 53 7 (SI+CL)	
9.8	END OF BOREHOLE AT 9.8m.														

ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

Continued Next Page

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

RECORD OF BOREHOLE No PR-10

2 OF 2

METRIC

W.P. 6042-08-00 LOCATION Pickering River Bridge N 5 393 613.7 E 221 939.4 ORIGINATED BY RK
 HWY 11 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN
 DATUM Geodetic DATE 2012.08.29 - 2012.08.29 CHECKED BY RPR

SOIL PROFILE			SAMPLES				GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)							
	Continued From Previous Page							20	40	60	80	100	W _p	W	W _L			
	BOREHOLE CAVED TO 2.7m. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG AND CUTTINGS TO 0.3m, CONCRETE TO 0.1m, THEN ASPHALT COLD PATCH TO SURFACE.																	

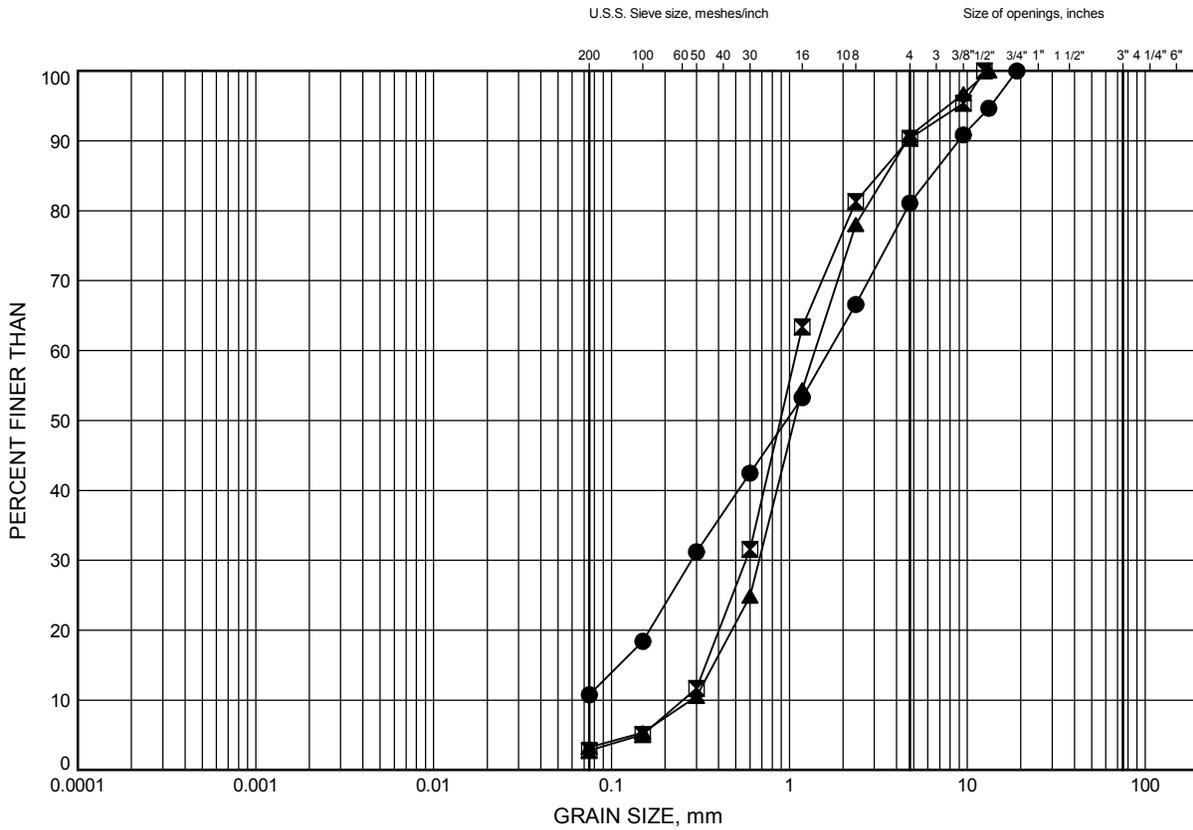
ONTMT4S 5121.GPJ 2012TEMPLATE(MTO).GDT 2/14/13

Appendix B
Laboratory Test Results

Pickerel River Bridge
GRAIN SIZE DISTRIBUTION

FIGURE B1

SAND FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	PR-02	3.05	410.45
⊠	PR-09	2.59	411.51
▲	PR-10	2.59	411.51

GRAIN SIZE DISTRIBUTION - THURBER 5121.GPJ 1/31/13

Date January 2013
W.P. 6042-08-00

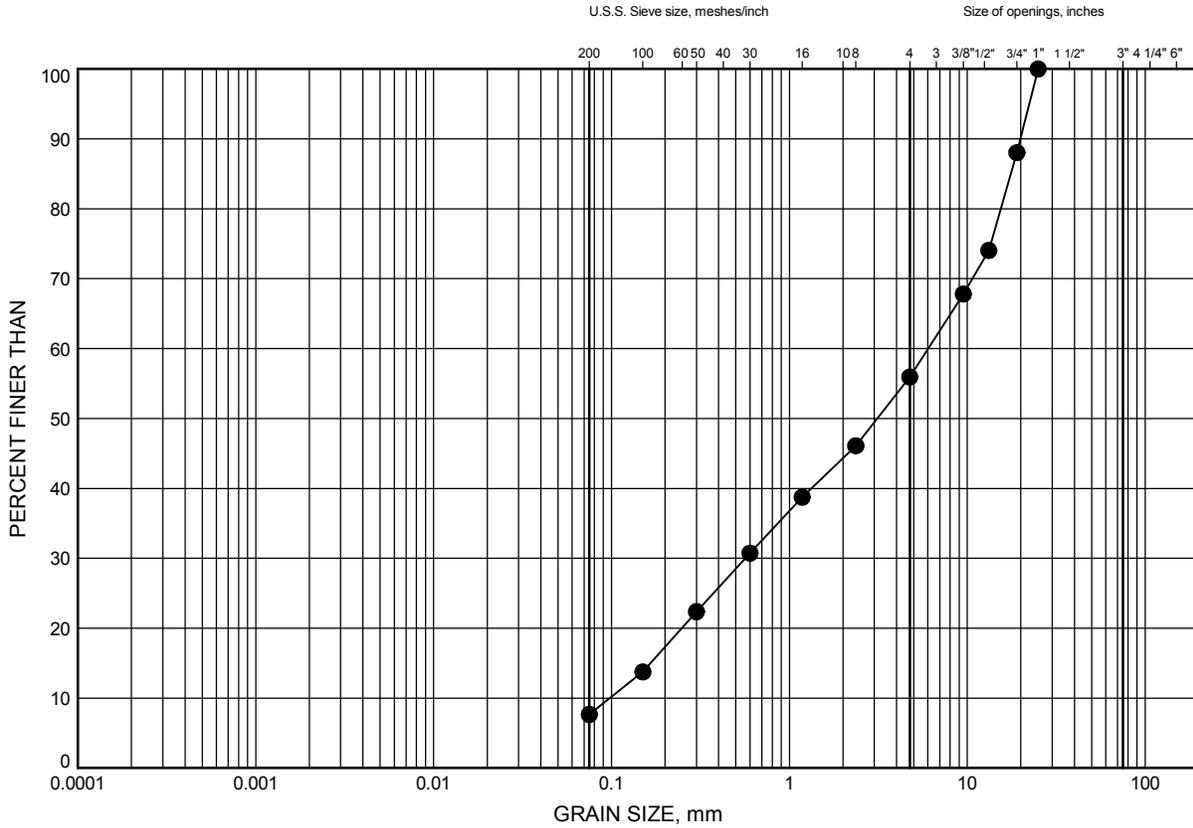


Prep'd AN
Chkd. MC

Pickrel River Bridge
GRAIN SIZE DISTRIBUTION

FIGURE B2

SAND AND GRAVEL FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	PR-01	1.83	411.67

GRAIN SIZE DISTRIBUTION - THURBER 5121.GPJ 1/31/13

Date .. January 2013 ..
 W.P. .. 6042-08-00 ..

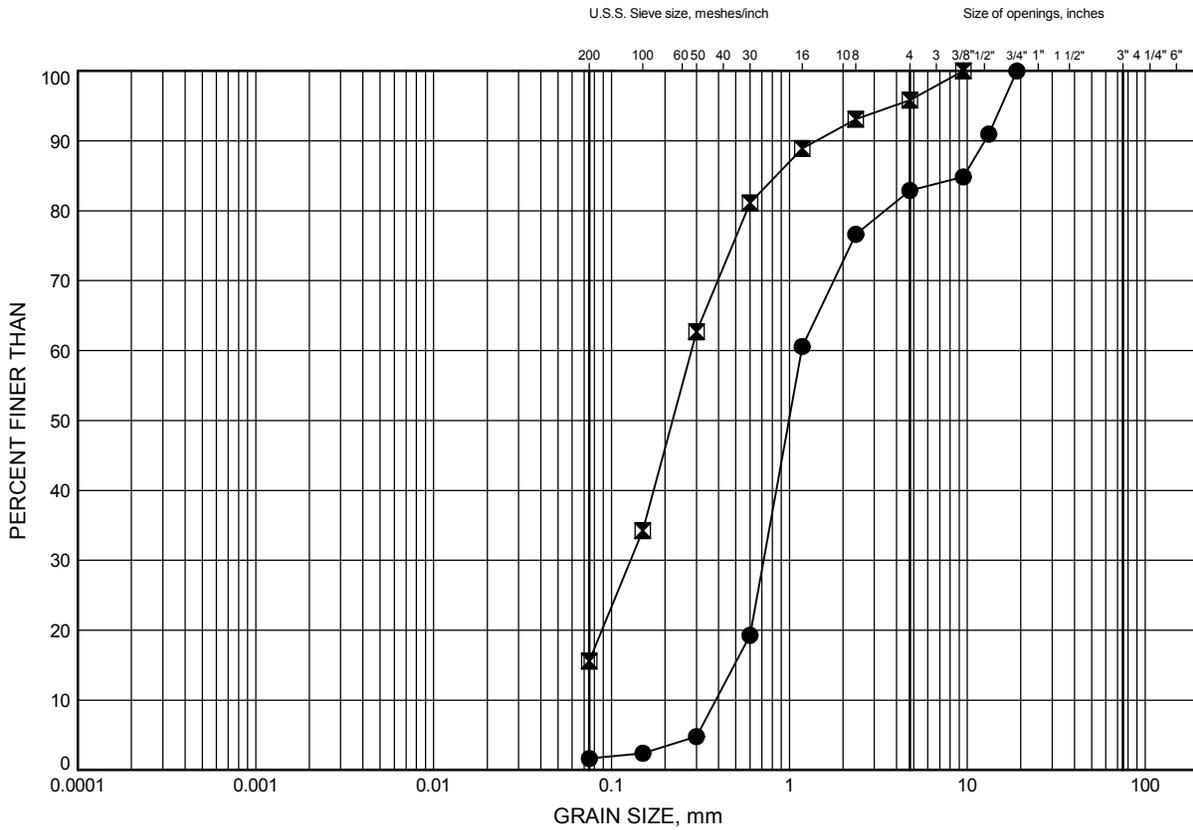


Prep'd .. AN ..
 Chkd. .. MC ..

Pickerel River Bridge
GRAIN SIZE DISTRIBUTION

FIGURE B3

SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	PR-02	7.92	405.58
⊠	PR-02	42.96	370.54

GRAIN SIZE DISTRIBUTION - THURBER 5121.GPJ 2/14/13

Date February 2013
 W.P. 6042-08-00

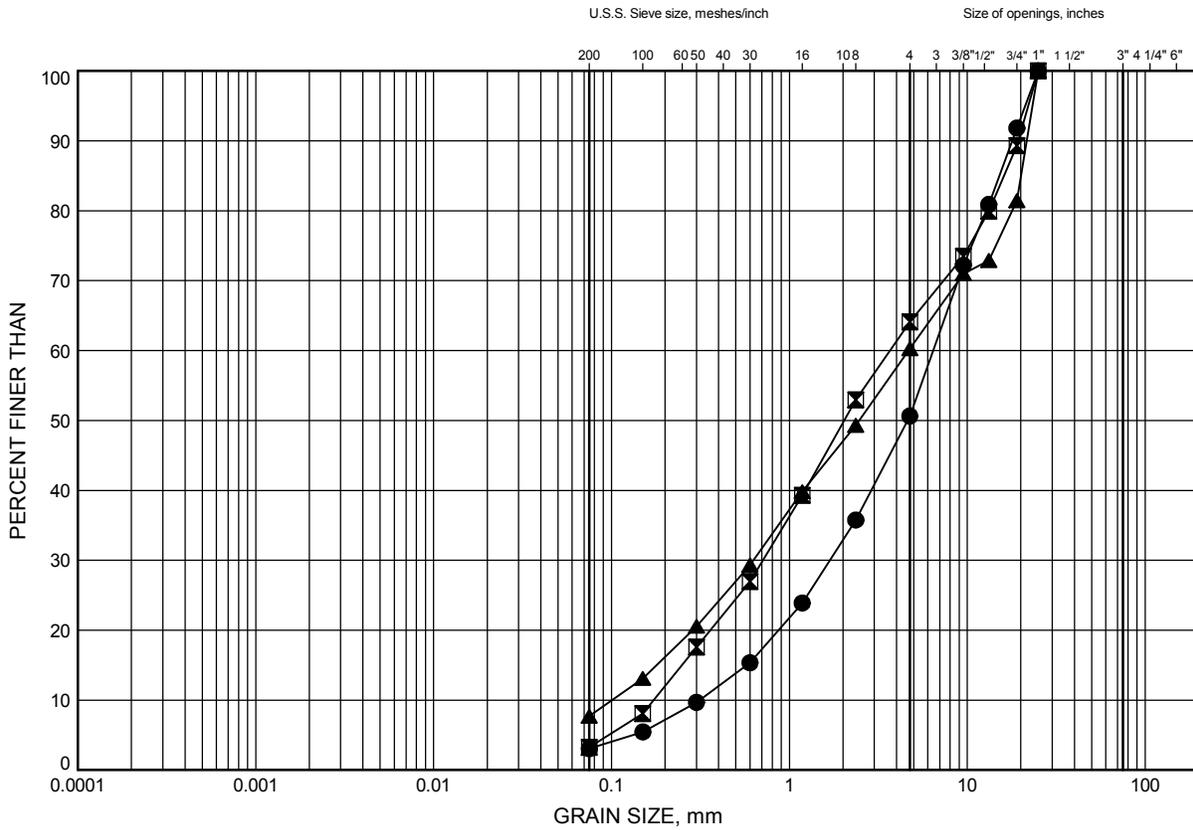


Prep'd AN
 Chkd. MC

Pickrel River Bridge
GRAIN SIZE DISTRIBUTION

FIGURE B4

SAND AND GRAVEL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	PR-09	6.40	407.70
⊠	PR-10	6.40	407.70
▲	PR-10	9.45	404.65

GRAIN SIZE DISTRIBUTION - THURBER 5121.GPJ 1/31/13

Date January 2013
W.P. 6042-08-00

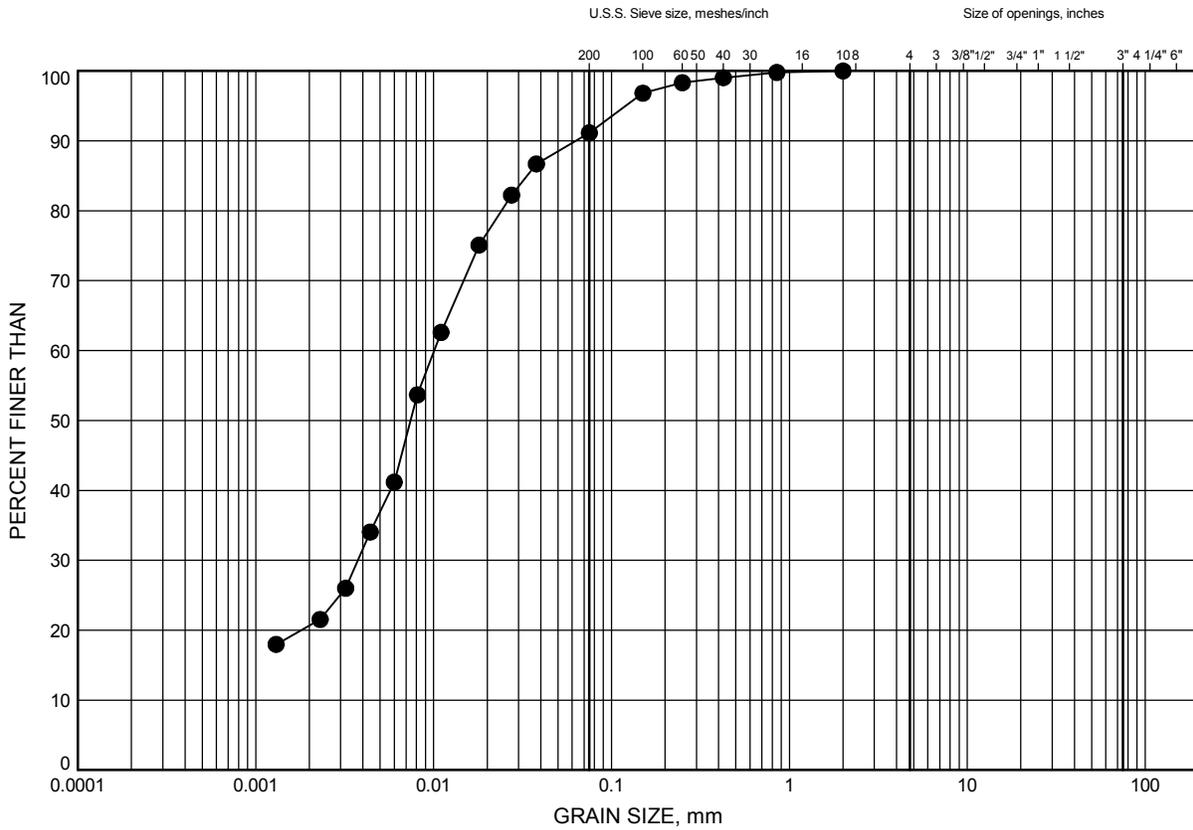


Prep'd AN
Chkd. MC

Pickrel River Bridge
GRAIN SIZE DISTRIBUTION

FIGURE B5

CLAYEY SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	PR-01	6.40	407.10

GRAIN SIZE DISTRIBUTION - THURBER 5121.GPJ 1/31/13

Date .. January 2013 ..
 W.P. .. 6042-08-00 ..

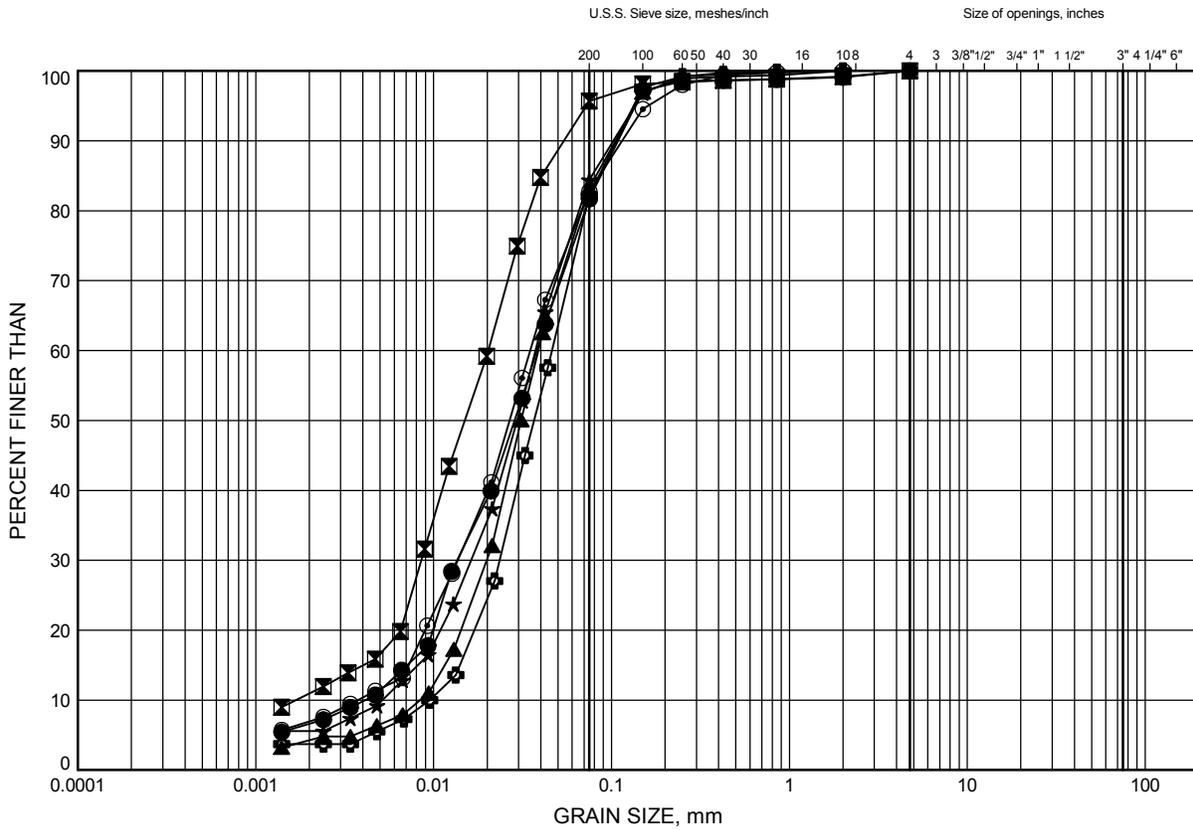


Prep'd .. AN ..
 Chkd. .. MC ..

Pickerel River Bridge
GRAIN SIZE DISTRIBUTION

FIGURE B6

SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	PR-02	14.02	399.48
⊠	PR-02	20.12	393.38
▲	PR-02	32.31	381.19
★	PR-06	15.54	398.36
⊙	PR-09	12.50	401.60
⊕	PR-09	32.31	381.79

Date February 2013
W.P. 6042-08-00

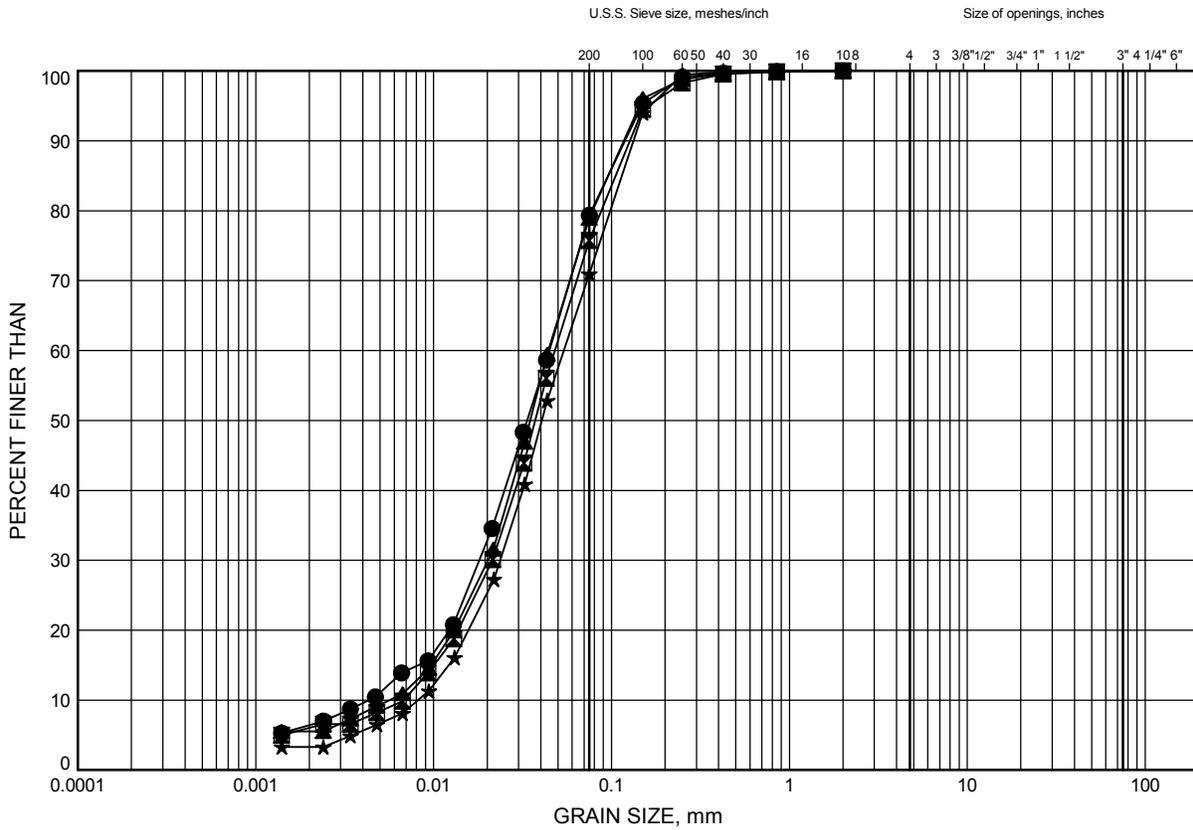


Prep'd AN
Chkd. MC

Pickerel River Bridge
GRAIN SIZE DISTRIBUTION

FIGURE B7

SANDY SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	PR-01	9.45	404.05
⊠	PR-06	12.50	401.40
▲	PR-09	18.59	395.51
★	PR-09	26.21	387.89

GRAIN SIZE DISTRIBUTION - THURBER 5121.GPJ 2/14/13

Date February 2013
 W.P. 6042-08-00

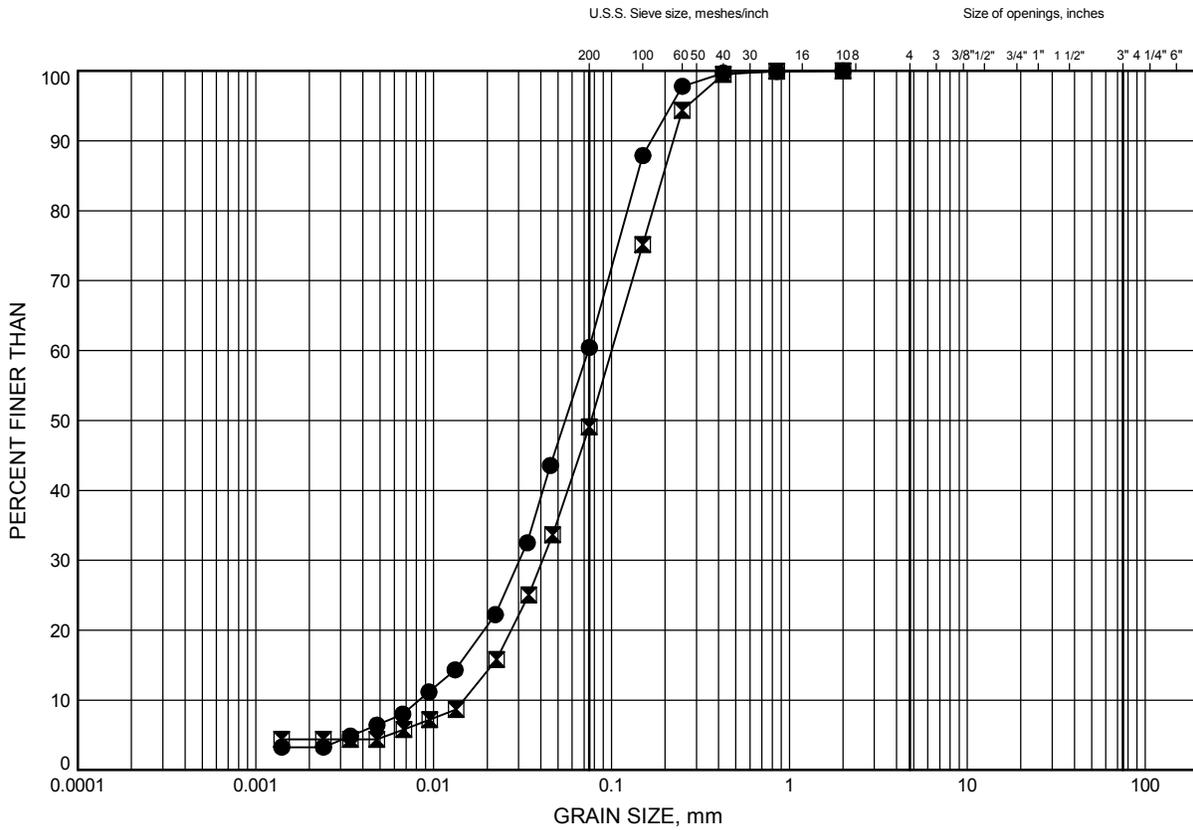


Prep'd AN
 Chkd. MC

Pickrel River Bridge
GRAIN SIZE DISTRIBUTION

FIGURE B8

SILT AND SAND



Appendix C
Site Photographs

Pickerel River Bridge Replacement
Highway 11, Site 45-96



Photograph 1 – North elevation of the bridge, looking west



Photograph 2 – South elevation of the bridge, looking west



Photograph 3 – East abutment and bents, looking east

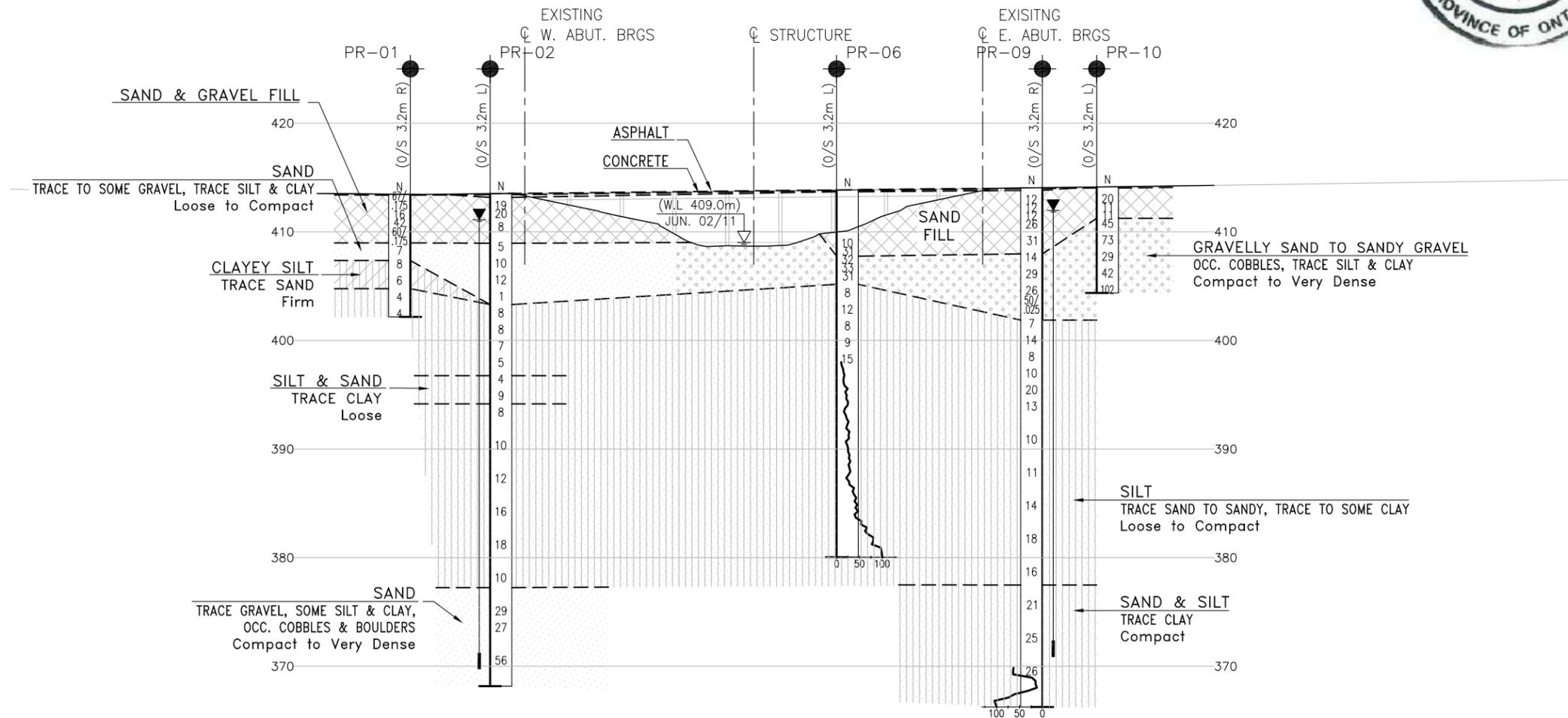
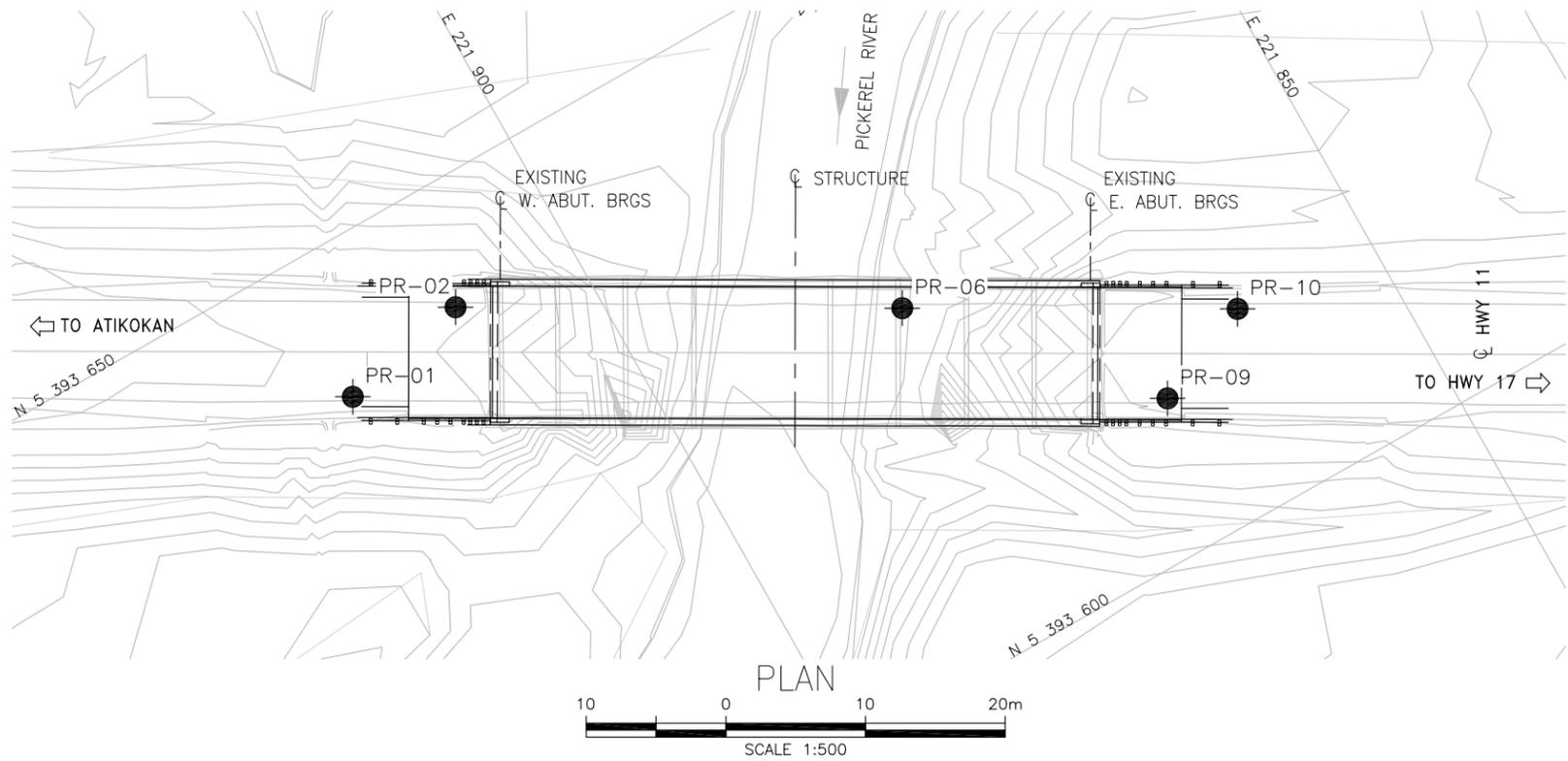


Photograph 4 – East abutment, looking north

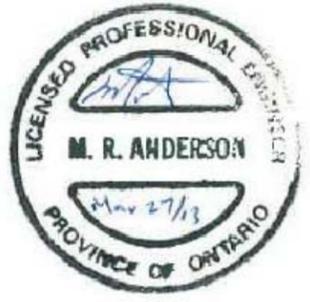
Appendix D

Drawing

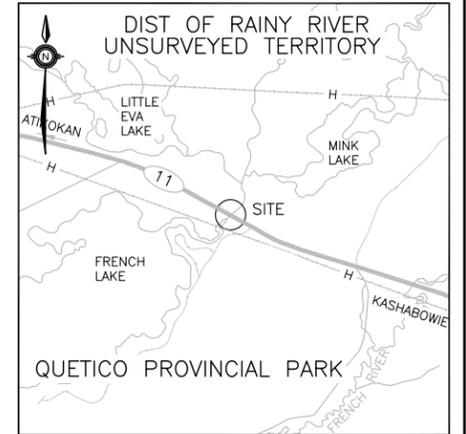
Borehole Locations and Soil Strata



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



CONT No GWP No 6042-08-00	
PICKEREL RIVER BRIDGE STRUCTURAL REPLACEMENT BOREHOLE LOCATIONS AND SOIL STRATA	SHEET



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 During Drilling
	Water Level In Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
PR-01	413.5	5 393 639.5	221 881.2
PR-02	413.5	5 393 641.4	221 890.7
PR-06	413.9	5 393 625.6	221 918.5
PR-09	414.1	5 393 610.7	221 931.9
PR-10	414.1	5 393 613.7	221 939.4

-NOTES-

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

GEOCREs No. 52B-16

REVISIONS	DATE	BY	DESCRIPTION

DESIGN	MC	CHK	PKC	CODE	LOAD	DATE	MAR. 2013
DRAWN	MFA	CHK	MC	SITE	45-96	STRUCT	DWG 1