THURBER ENGINEERING LTD.

FOUNDATION INVESTIGATION REPORT
COUNTY ROAD 30 - GABION WALL ON EAST CUT SLOPE
BETWEEN STATIONS 11+580 AND 11+640
BRIGHTON, ON
G.W.P. 4016-13-01

GEOCRES NO. 31C-266

Report

to

AECOM

Date: February 08, 2018
File: 19-4406-20

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FOUNDATION INVESTIGATION AND DESIGN REPORT
COUNTY ROAD 30 - GABION WALL ON EAST CUT SLOPE
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1 INTRODUCTION

This report presents the factual findings obtained from a foundation investigation carried out by Thurber Engineering Ltd. (Thurber) for the design and construction of the proposed gabion wall in County Road 30, Brighton, Ontario on the east side slope located approximately 230 m north of Newton Lane. Thurber was retained by AECOM to carry out the foundation investigation at this site on behalf of the Ministry of Transportation Ontario (MTO).

The purpose of the investigation was to explore the subsurface conditions at the site and, based on the data obtained, provide a borehole location plan and soil strata drawing with stratigraphic profile and cross-section(s), records of boreholes, laboratory test results and a written description of the subsurface conditions. A model of the subsurface conditions was developed from the data obtained during the course of the present investigation.

2 SITE AND PROJECT DESCRIPTION

The site is located on County Road 30, approximately 300 m south of Highway 401 in Brighton, Ontario. Based on the preliminary road grading drawings and cross section drawings provided by AECOM, the road grade between approximately Sta.11+460 and 11+760 on County Road 30 will be lowered; resulting in widening the cut slope adjacent to the Road. The east slope of the widened cut will encroach into private property beyond MTO's right-of-way between approximately Sta.11+580 and 11+640. Therefore, construction of a mid-slope gabion wall has been proposed so that the east slope of the final cut could remain within MTO's right-of-way. To

provide foundation and construction recommendations for the gabion wall, a geotechnical investigation is required.

The existing east slope between Stations 11+580 and 11+640 has an inclination of 2H:1V with a height of approximately 5 to 6.5 m. The vegetation on the slope is limited to local grass with some trees and shrubs.

From published geological information in *The Physiography of Southern Ontario* by Chapman and Putnam (1984), the site lies within the physiographic region known as Iroquois Plain. The Iroquois Plain generally consists of glacio-lacustrine sand and silty sand. The overburden soils are underlain by limestone bedrock.

3 INVESTIGATION PROCEDURES

The site investigation for this project was carried out between October 3 and October 5, 2016 during which time a total of two (2) boreholes denoted as Boreholes GW 16-01 and GW 16-02 were advanced to a depth of 9.3 m (see Table 3.1).

Borehole GW 16-01 was advanced approximately 10 m south of the north edge of the proposed gabion wall; whereas, borehole GW 16-02 was drilled approximately 20 m north of the south edge of the gabion wall. The locations of the two boreholes are shown on the Borehole Locations and Soil Strata Drawing provided in Appendix C.

Table 3.1 – Borehole Details

Borehole Number	Approximate Station	Approximate Ground Elevation (m)	Borehole Termination Depth (m)	Borehole Termination Elevation (m)
GW 16-01	11+630	204.5	9.3	195.2
GW 16-02	11+605	203.5	9.3	194.2

Drilling was carried out using portable tri-pod equipment with wash boring technique. All drilling equipment was supplied and operated by OGS Inc. Soil samples were obtained at selected

intervals using a 50 mm diameter split spoon sampler in conjunction with Standard Penetration Testing (SPT).

Groundwater conditions were observed in the open boreholes throughout the drilling operations. Upon completion of drilling, the two boreholes were backfilled in general accordance with Ontario Regulation 903.

Table 3-2. Borehole Backfilling Details

Borehole	Borehole Termination Depth/ Elevation (m)	Borehole Backfilling Details
GW16-01	9.3 / 195.2	Borehole backfilled with bentonite holeplug to surface.
GW16-02	9.3 / 194.2	Borehole backfilled with bentonite holeplug to surface.

The field work was supervised on a full-time basis by a member of Thurber's technical staff who marked/staked the boreholes in the field, arranged for the clearance of buried utilities, directed the drilling, sampling and in-situ testing operations, logged the boreholes and processed the recovered soil samples for transport to Thurber's laboratory for further examination and testing.

4 LABORATORY TESTING

Geotechnical laboratory testing was carried out at Thurber's laboratory. All recovered soil samples were subjected to visual identification and to natural moisture content determination. Selected samples were also subjected to grain size distribution analysis (hydrometer and/or sieve analysis). Laboratory testing results are summarized on the Record of Borehole sheets included in Appendix A and are presented on the figures included in Appendix B.

5 DESCRIPTION OF SUBSURFACE CONDITIONS

Details of the encountered soil stratigraphy are presented on the Record of Borehole sheets included in Appendix A and on the Borehole Location and Soil Strata drawing in Appendix C. A general description of the stratigraphy, based on the conditions encountered in the boreholes, is

given in the following paragraphs. However, the factual data presented on the Record of Borehole sheets takes precedence over this general description and must be used for interpretation of the site conditions. It should be recognized and expected that soil conditions may vary between and beyond borehole locations.

In general, the subsurface stratigraphy encountered in boreholes GW 16-01 and GW 16-02 consists of surficial topsoil overlying sandy silt fill, underlain by glacial till ranging from sand, silty sand, sandy silt to silt to a termination depth of 9.3 m. The groundwater levels are in the order of 4 to 5 m below ground surface at the borehole locations.

5.1 Topsoil

A 75 mm thick topsoil layer was encountered at ground surface in both Boreholes GW 16-01 and GW 16-02.

5.2 Sandy Silt Fill

A fill layer consisting of brown sandy silt with some clay and trace roots and organics was encountered immediately beneath the topsoil in both boreholes. The thickness of the sandy silt fill layer was 0.7 m.

SPT 'N' values recorded in the sandy silt fill ranged between 7 and 11 blows per 0.3 m of penetration, indicating a loose to compact condition. Measured moisture contents within the fill were 12% to 13%.

The result of grain size distribution analysis carried out on one sample of the sandy silt fill is presented on the Record of Borehole Sheets included in Appendix A and on Figure B1 of Appendix B. The results of the grain size distribution analyses are summarized below:

Soil Particle	Percentage (%)
Gravel	0
Sand	21
Silt	64
Clay	15

5.3 Silt Till

A layer of silt till with trace to some clay, trace sand, and trace gravel was encountered below the fill in Boreholes GW 16-01 and GW 16-02. The thickness of this till layer varied from 5.0 m to 7.7 m (Base Elevation ranged from 196.0 m to 197.7 m).

SPT 'N' values recorded in this layer ranged from 79 blows per 0.3 m penetration to greater than 50 blows for less than 0.3 m of penetration, indicating a very dense condition. Measured moisture contents within this layer varied between 11% and 24%.

The results of grain size distribution analyses carried out on selected samples of this layer are presented on the Record of Borehole Sheets included in Appendix A and on Figure B2 of Appendix B. The results of the grain size distribution analyses are summarized below:

Soil Particle	Percentage (%)
Gravel	0 to 10
Sand	0 to 12
Silt	68 to 91
Clay	9 to 11

Glacial tills inherently contain cobbles and boulders. The high blow counts may represent the presence of cobbles and boulders.

5.4 Silty Sand to Sandy Silt Till

A deposit of silty sand to sandy silt till with trace to some gravel and trace clay was encountered below the silt till in Boreholes GW16-01 and GW16-02. The two boreholes were terminated within this till layer at a depth of 9.3 m below the ground surface.

SPT ‘N’ values recorded in this layer were greater than 50 blows for less than 0.3 m of penetration, indicating a very dense condition. Measured moisture contents within this layer varied between 18% and 22%.

The results of grain size distribution analyses carried out on one sample of the silty sand to sandy silt till layer is presented on the Record of Borehole Sheets included in Appendix A and on Figures B3 of Appendix B. The results of the grain size distribution analyses are summarized below:

Soil Particle	Percentage (%)
Gravel	0
Sand	58
Silt and Clay	42

Glacial tills inherently contain cobbles and boulders. The high blow counts may represent the presence of cobbles and boulders.

5.5 Sand

An interlayer of native sand with some silt and trace clay and gravel was encountered within the silt till layer in Borehole GW 16-01. The thickness of this sand layer was 1.8 m (Top and Base Elevations were 202.2 m and 200.4 m, respectively).

SPT ‘N’ values recorded in the sand layer were typically greater than 50 blows for less than 0.3 m of penetration, indicating a very dense condition. Measured moisture contents within the sand were 8% to 15%.

The result of grain size distribution analysis carried out on one sample of the sand layer is presented on the Record of Borehole Sheets included in Appendix A and on Figure B4 of Appendix B. The results of the grain size distribution analyses are summarized below:

Soil Particle	Percentage (%)
Gravel	6
Sand	79
Silt and Clay	15

5.6 Groundwater Conditions

Groundwater conditions were observed during drilling operations and groundwater levels were measured in the open boreholes upon completion of drilling. The groundwater levels measured in the boreholes GW 16-01 and GW 16-02 were 4.6 and 4.3 m below ground surface, respectively.

These levels 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 periods of significant or prolonged precipitation events.

6 MISCELLANEOUS

Thurber marked and/or staked the borehole locations in the field and obtained buried utility clearances prior to drilling.

Geotechnical laboratory testing was carried out at Thurber's MTO approved high complexity Toronto area laboratory.

OGS Inc. supplied and operated the drilling, sampling and in-situ testing equipment for the field investigation.

The field investigation was supervised on a full-time basis by a member of Thurber's technical staff. Overall supervision of the investigation program was conducted by Dr. Mohamad Hosney, P.Eng. Compilation of data and preparation of the report was carried out by Dr. Mohamad Hosney, P.Eng. and Mr. Jason Lee, P.Eng. The report was reviewed by Dr. P.K. Chatterji, P.Eng., who is a Designated Principal Contact for MTO Foundations Projects.

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Thurber Engineering Ltd.

Mohamad Hosney, P.Eng.
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Review Principal, Designated MTO Contact

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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

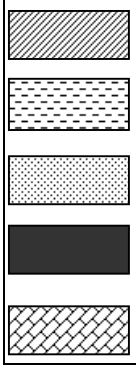
ROCK WEATHERING CLASSIFICATION

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 (MPa)**	**(psi)**	**Field Estimation of Hardness***
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			

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No GW16-01 1 OF 1 METRIC

W.P. 4016-13-01 LOCATION Gabion Retaining Wall N 4 882 115.2 E 203 317.1 ORIGINATED BY OA

HWY County Rd. 30 BOREHOLE TYPE Tripod COMPILED BY AN

DATUM Geodetic DATE 2016.10.03 - 2016.10.04 CHECKED BY MH

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"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)	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
204.5	GROUND SURFACE										
0.0 / 0.1	**TOPSOIL:** (75mm)										
	Sandy **SILT**, some clay, some organics, trace roots Compact Brown		1	SS	11		204		○		0 21 64 15
203.7 / 0.8	Damp (FILL)		2	SS	50/ 0.100				○		
	SILT, some sand, trace gravel Very Dense Grey Moist (TILL)		3	SS	50/ 0.125		203		○		
202.2 / 2.3	**SAND**, some silt, trace clay, trace gravel Very Dense Grey Moist		4	SS	50/ 0.100		202		○		6 79 15 (SI+CL)
			5	SS	50/ 0.075				○		
200.4 / 4.1	**SILT**, some sand, some gravel, some clay Very Dense Grey Wet (TILL)		6	SS	50/ 0.125	▽	201		○		
			7	SS	50/ 0.075		200		○		10 12 68 10
			8	SS	50/ 0.125		199		○		
			9	SS	50/ 0.075		198		○		
196.0 / 8.5	Sandy **SILT**, some gravel, trace clay Very Dense Grey Moist (TILL)		10	SS	50/		197		○		
195.2 / 9.3	END OF BOREHOLE AT 9.3m. BOREHOLE OPEN AND WATER LEVEL AT 4.6m. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO SURFACE.				0.125		196		○		

Continued Next Page

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

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

Ministry of Transportation
Ontario

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RECORD OF BOREHOLE No GW16-02 1 OF 1 METRIC

W.P. 4016-13-01 LOCATION Gabion Retaining Wall N 4 882 091.1 E 203 327.5 ORIGINATED BY OA

HWY County Rd. 30 BOREHOLE TYPE Tripod COMPILED BY AN

DATUM Geodetic DATE 2016.10.05 - 2016.10.05 CHECKED BY MH

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 (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	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
203.5	GROUND SURFACE										
0.0 / 0.1	**TOPSOIL:** (75mm)										
	Sandy **SILT**, some clay, trace organics, trace roots Loose Brown		1	SS	7		203	○ 20 40 60 80 100	○ 20 40 60		
202.7 / 0.8	Moist (FILL)		2	SS	79			○ 20 40 60 80 100	○ 20 40 60		0 4 87 9
	SILT, trace to some clay, trace sand, trace gravel Very Dense Grey Moist (TILL)		3	SS	50/ 0.150		202	○ 20 40 60 80 100	○ 20 40 60		
			4	SS	50/ 0.075		201	○ 20 40 60 80 100	○ 20 40 60		0 0 89 11
			5	SS	50/ 0.125	▽	200	○ 20 40 60 80 100	○ 20 40 60		
			6	SS	50/ 0.075		199	○ 20 40 60 80 100	○ 20 40 60		0 0 91 9
197.7	125mm boulders and cobbles at 5.8m		7	SS	50/ 0.150		198	○ 20 40 60 80 100	○ 20 40 60		
5.8	Silty **SAND**, trace clay, trace gravel Very Dense Grey Moist (TILL)		8	SS	50/ 0.150		197	○ 20 40 60 80 100	○ 20 40 60		
			9	SS	50/ 0.150		196	○ 20 40 60 80 100	○ 20 40 60		
194.2			10	SS	50/		195	○ 20 40 60 80 100	○ 20 40 60		0 58 42 (SI+CL)
9.3	END OF BOREHOLE AT 9.3m. BOREHOLE OPEN AND WATER LEVEL AT 4.3m. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO SURFACE.				0.150						

Continued Next Page

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

15 20 10 5 (%) STRAIN AT FAILURE

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Appendix B

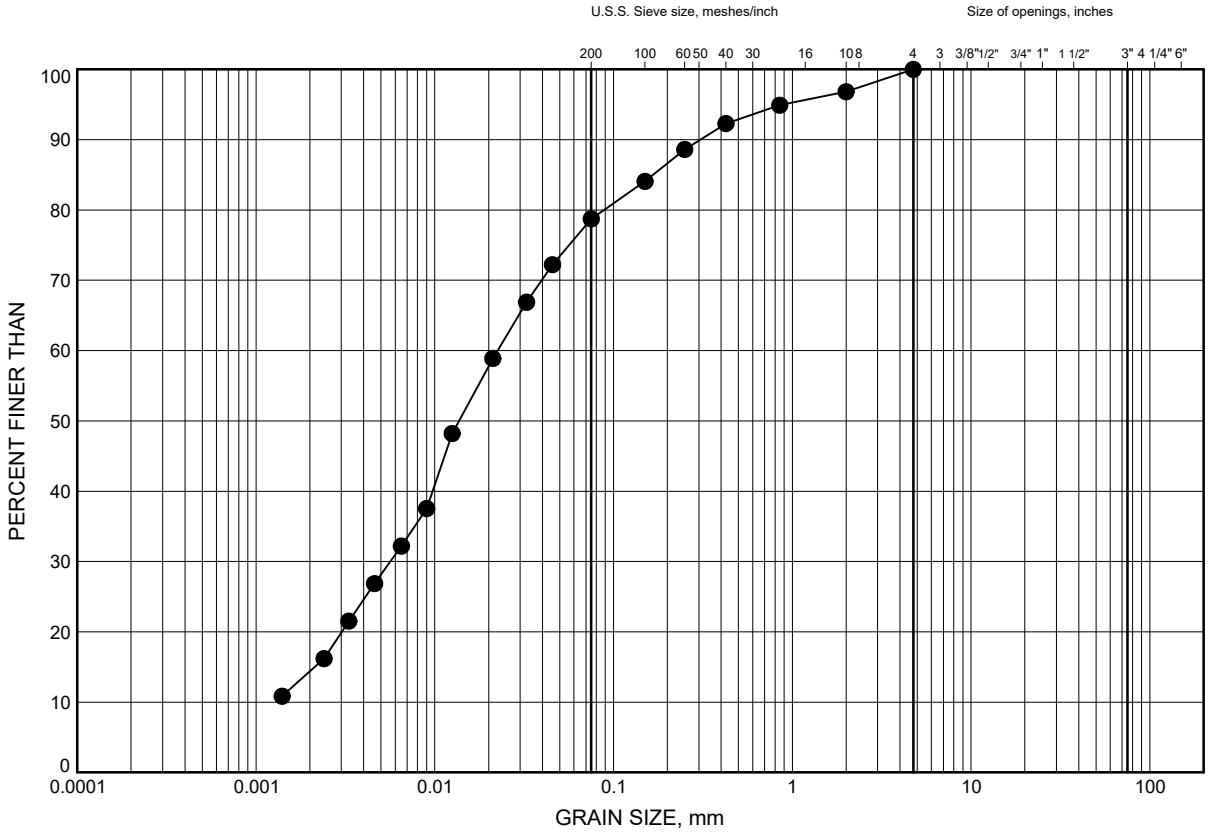
Laboratory Test Results

Gabion Retaining Wall

GRAIN SIZE DISTRIBUTION

FIGURE B1

Sandy SILT FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	GW16-01	0.30	204.20

GRAIN SIZE DISTRIBUTION - THURBER 0620.GPJ 12/16/16

Date December 2016

W.P. 4016-13-01

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Prep'd AN

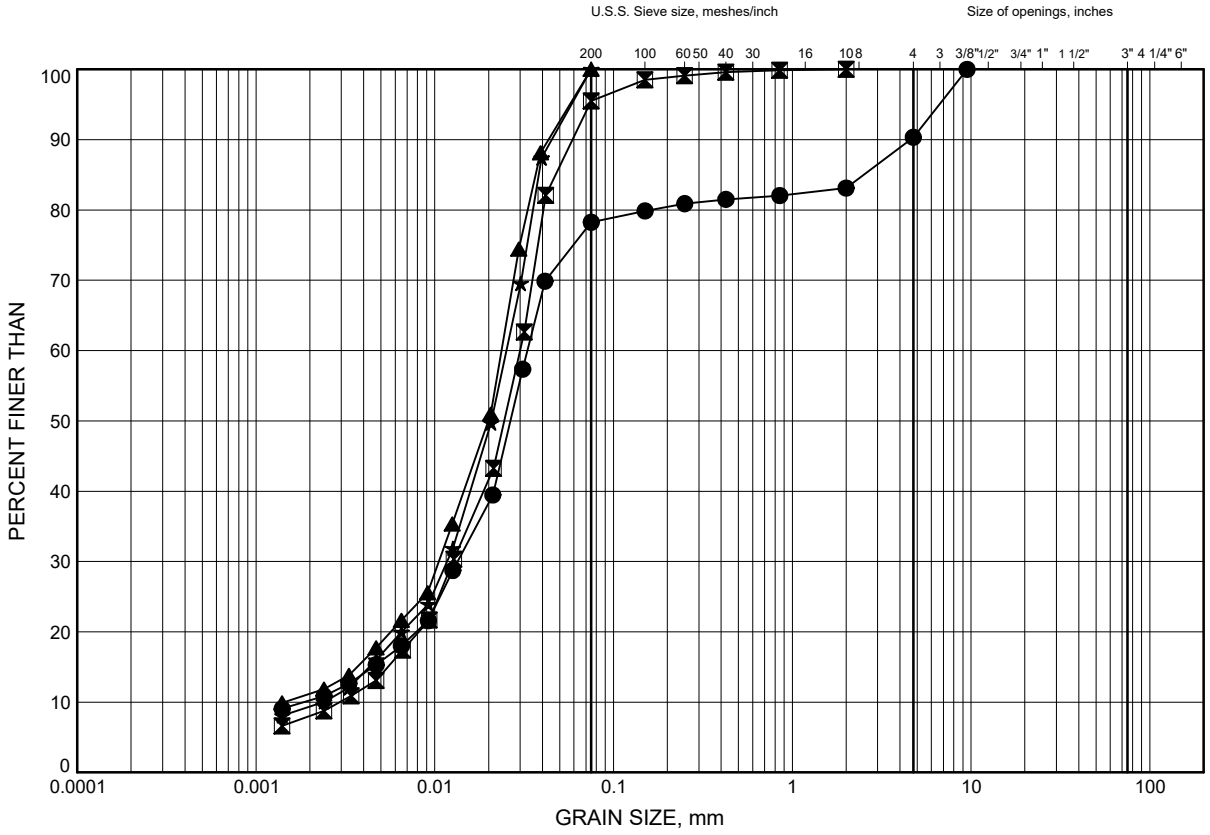
Chkd. MH

Gabion Retaining Wall

GRAIN SIZE DISTRIBUTION

FIGURE B2

Sandy SILT to SILT TILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	GW16-01	5.41	199.09
⊠	GW16-02	1.07	202.43
▲	GW16-02	2.40	201.10
★	GW16-02	4.76	198.74

Date December 2016

W.P. 4016-13-01

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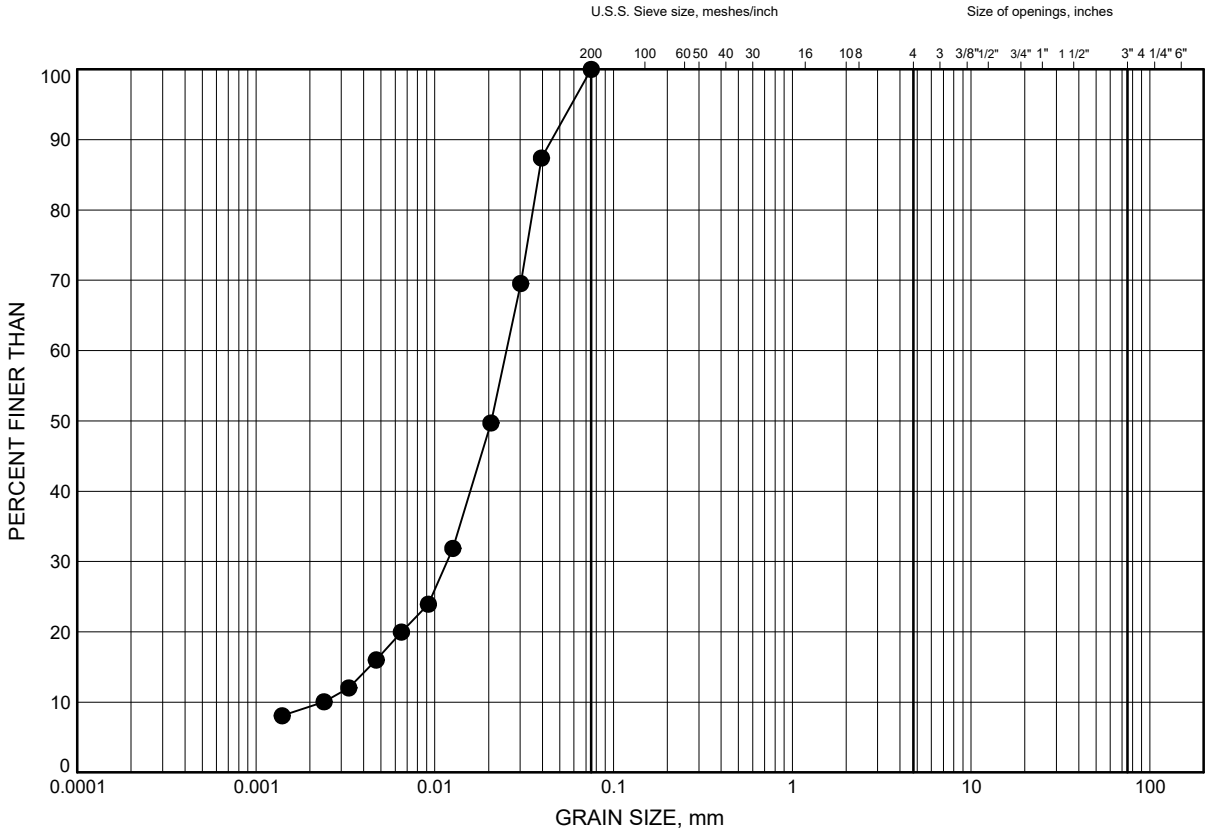
GRAIN SIZE DISTRIBUTION - THURBER 0620.GPJ 12/16/16

Gabion Retaining Wall

GRAIN SIZE DISTRIBUTION

FIGURE B3

Silty SAND TILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	GW16-02	4.76	198.74

GRAIN SIZE DISTRIBUTION - THURBER 0620.GPJ 12/16/16

Date December 2016

W.P. 4016-13-01

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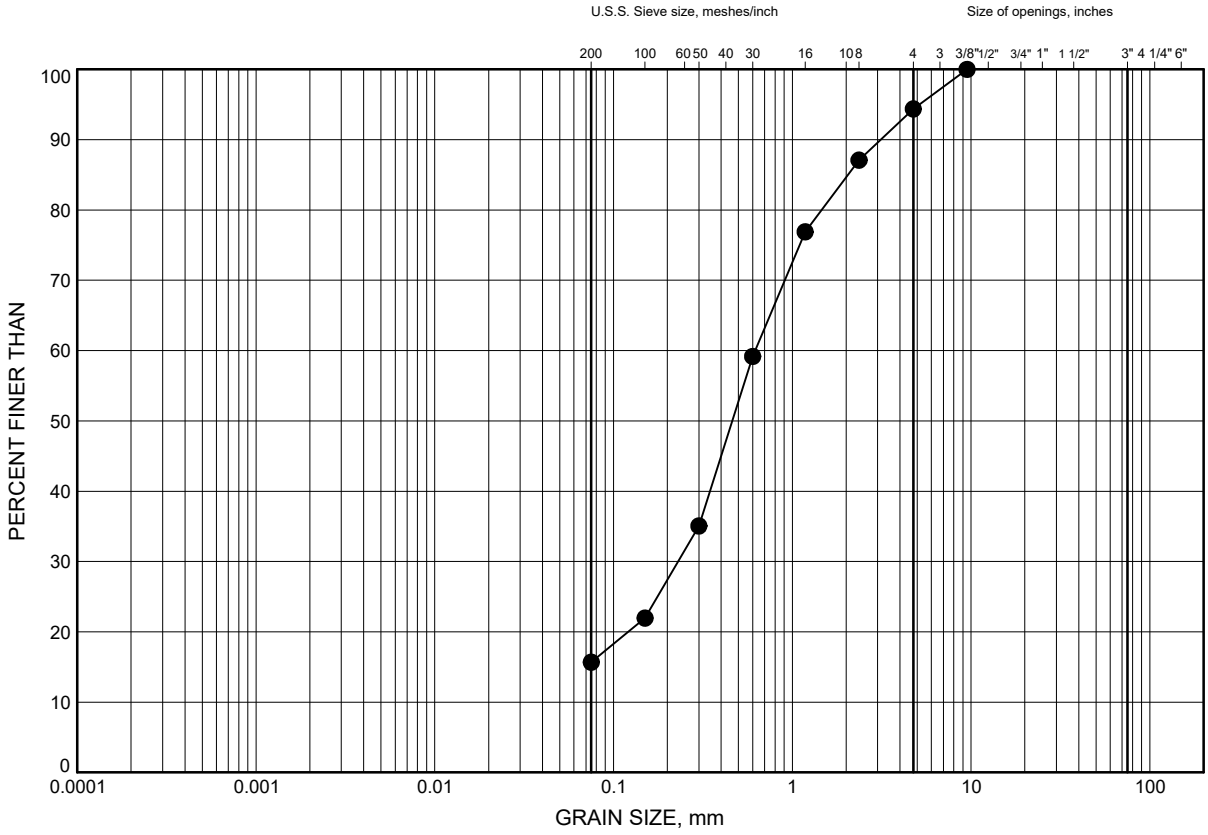
Gabion Retaining Wall

GRAIN SIZE DISTRIBUTION

FIGURE B4

SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	GW16-01	2.41	202.09

GRAIN SIZE DISTRIBUTION - THURBER 0620.GPJ 12/16/16

Date December 2016

W.P. 4016-13-01

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Appendix C

Drawing titled “Borehole Locations and Soil Strata”

MINISTRY OF TRANSPORTATION, ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. K. CHATTERJI
Feb 8/16
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
J. P. K. LEE
100086735
Feb 8/18
PROVINCE OF ONTARIO

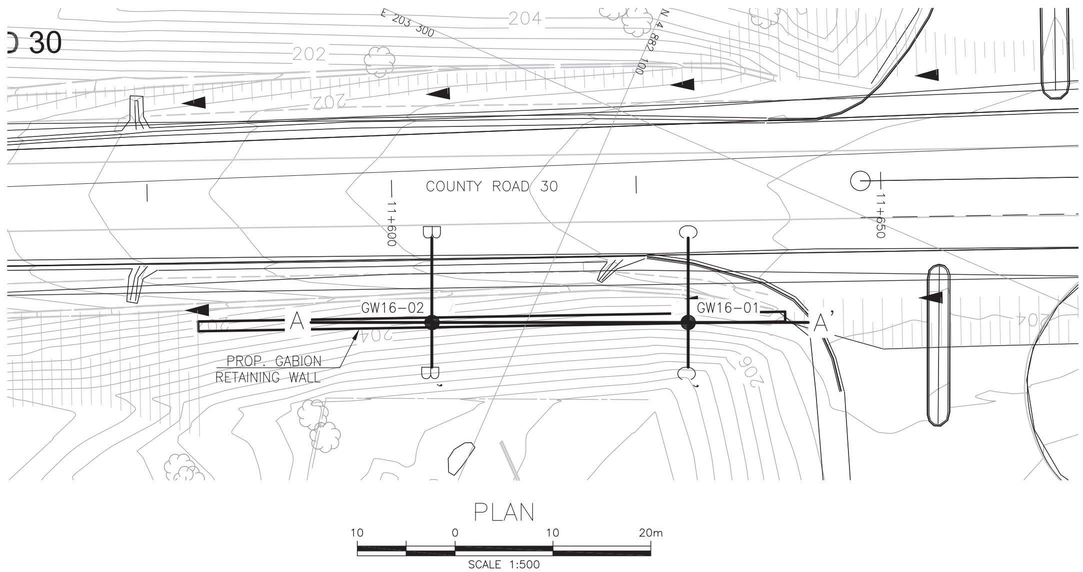
METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

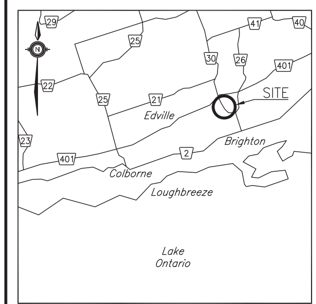
CONT No
WP No 4016-13-01

HIGHWAY 401
COUNTY ROAD 30
GABOIN RETAINING WALL
BOREHOLE LOCATIONS AND SOIL STRATA

SHEET

THURBER ENGINEERING LTD.



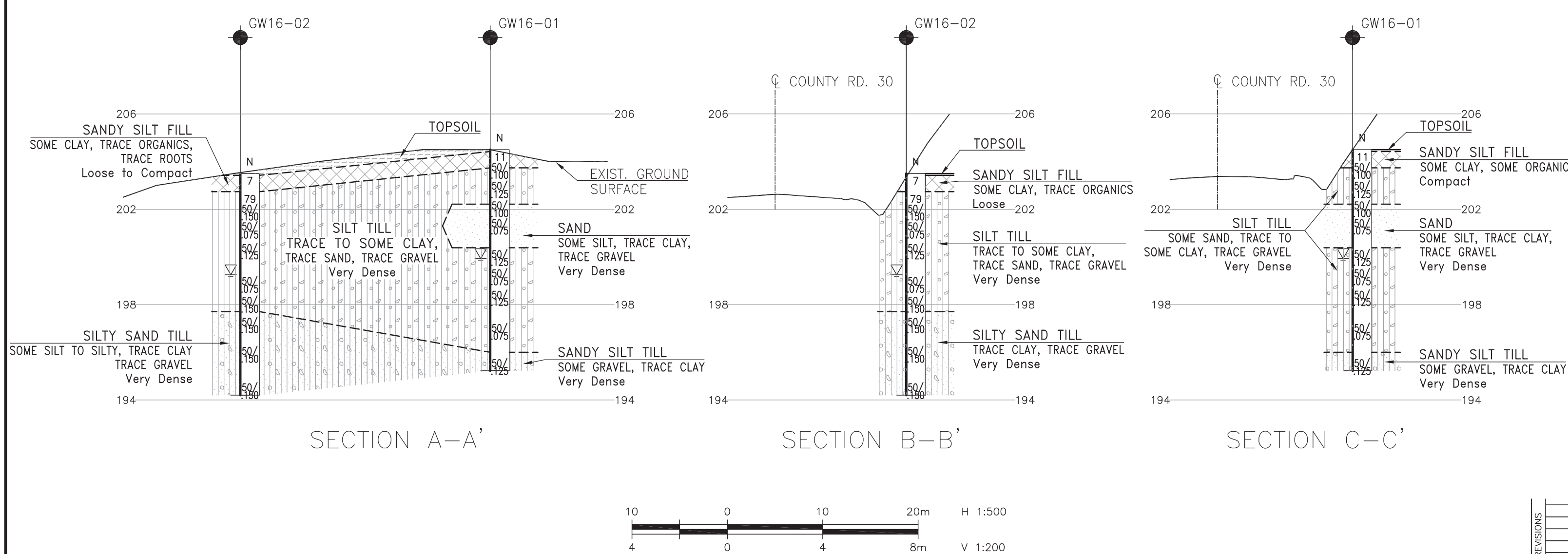


KEYPLAN

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
	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
GW16-01	204.5	4 882 115.2	203 317.1
GW16-02	203.5	4 882 091.1	203 327.5



-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. 31C-266

REVISIONS	DATE	BY	DESCRIPTION

DESIGN PP	CHK SKP	CODE	LOAD	DATE DEC 2016
DRAWN AN	CHK PP	SITE	STRUCT	DWG 1

FILENAME: H:\Drafting\19\4406\20\ted0620-Plan&Profile(GabionWall).dwg
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