



**THURBER** ENGINEERING LTD.

**FINAL  
FOUNDATION INVESTIGATION REPORT  
TEMPORARY DETOUR BRIDGE  
NEMEGOSENDA RIVER BRIDGE HIGHWAY 101  
AGREEMENT NO.: 5015-E-0027**

**G.W.P. 5144-10-00**

**Geocres No.: 41O-30**

Report to:

**McIntosh Perry Consulting Engineers Limited**

Latitude: 47.93808°  
Longitude: -83.06024°

October 2018  
Thurber File No.: 13624

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**G.W.P. 5144-10-00  
Geocres No.: 41O-30**

**PART 1. FACTUAL INFORMATION**

**1 INTRODUCTION**

This section of the report presents the factual findings obtained from a foundation investigation completed for the proposed temporary detour bridge proposed for use during the replacement of the Nemegosenda River Bridge (Structure No. 46-215). The existing structure is located on Highway 101 approximately 32 km east of Highway 129. Thurber Engineering Ltd. (Thurber) carried out the investigation as a subconsultant to McIntosh Perry Consulting Engineers (MPCE) as part of Change Proposal 1 for Agreement No. 5015-E-0027.

The purpose of this investigation was to explore the subsurface conditions at the site and, based on this data, provide a borehole location plan, record of boreholes, a stratigraphic profile, laboratory test results and a written description of the subsurface conditions. A base plan survey drawing was provided by MPCE for the preparation of this report.

This report is provided to supplement the Foundation Investigation and Design Report completed for the replacement of the mainline Nemegosenda River Bridge (Geocres No. 41O-29) and should be read in conjunction with that report. Please also refer to the Pavement Design Report for the embankment widening prepared by others.

**2 SITE DESCRIPTION**

The existing Nemegosenda River structure is located on Highway 101 within the township of Chewett (Linear Highway Referencing System Base Points: 40420, Offset: 0.0). The location of the bridge is shown on the inset Key Plan on Drawing No. 1 in Appendix A. At the bridge site, Highway 101 is a two-lane, undivided highway with a rural cross-section. Steel guide rails are present on both sides of the highway for a short distance from the bridge.

To the southwest of the bridge is a gravel access road leading to a water monitoring shed located at the river's west bank. The topography adjacent to the bridge site is rolling forested lands with frequent bedrock outcrops. The land in the vicinity of the bridge is uninhabited and undeveloped. Traffic volumes are understood to be less than 1000 AADT (2012).

Site photographs showing the general conditions in the area of the temporary detour bridge during the time of the field investigation are presented in Appendix D.

**FINAL**

### 3 SITE INVESTIGATION AND FIELD TESTING

Thurber contacted Ontario One Call in advance of the field investigation to provide utility locate clearances in the vicinity of the intended borehole locations.

The current field investigation for the detour bridge included advancing two foundation boreholes drilled on May 11, 2017 and May 24, 2017. The northing, easting and elevation of the boreholes are shown on the Borehole Location and Soil Strata Drawing No. 1 in Appendix A and are summarized in Table 3-1.

**Table 3-1: Borehole Summary**

Borehole No.	Drilled Location	Northing (m)	Easting (m)	Ground Surface Elevation (m)	Termination Depth below Existing Ground Surface (m)
17-01	West Temporary Abutment	5 311 467.8	374 980.8	403.2	5.9
17-04	East Temporary Abutment	5 311 450.7	375 024.2	402.4	7.1

Borehole 17-01 was advanced with a track mounted CME 550 drill rig equipped with hollow stem augers and HW/NW casing. Borehole 17-04 was not accessible by a track drill rig and was advanced using a portable tripod and electric casing/coring drill and a full-weight hammer. Two Dynamic Cone Penetration Tests (DCPTs), identified as 17-04A and 17-04B, were advanced to refusal at approximately 1 m offsets from Borehole 17-04. The drilling and sampling operations were supervised on a full-time basis by a member of Thurber's technical staff. Soil samples were collected at regular depth intervals in the boreholes using a split spoon sampler in conjunction with Standard Penetration Tests (SPT). All soil samples recovered from the boreholes were transported to Thurber's Ottawa geotechnical laboratory for further examination and testing.

The boreholes were backfilled with a low-permeability mixture of bentonite pellets and auger cuttings in accordance with Ontario MOE Regulation 903. The coordinates and elevations were surveyed by Thurber following completion of drilling relative to site features and elevation benchmarks provided by MPCE. The coordinates are provided on the Borehole Locations and Stratigraphy Drawing included in Appendix A and on the individual Record of Borehole sheets.

### 4 LABORATORY TESTING

Geotechnical laboratory testing consisted of natural moisture content determination and visual identification on all retained soil samples in accordance with the current MTO standards. Grain size distribution analyses testing were carried out on selected samples to MTO and ASTM standards.

The results of the geotechnical tests are summarized on the Record of Borehole sheets included in Appendix B and all laboratory results are presented on the figures included in Appendix C.

## **5 DESCRIPTION OF SUBSURFACE CONDITIONS**

Reference is made to the Record of Borehole sheets in Appendix B for details of the soil stratigraphy encountered in the boreholes. A stratigraphic profile and cross section for the bridge area are presented on Drawing No. 1 in Appendix A for illustrative purposes. An overall description of the stratigraphy is given in the following paragraphs; however, the factual data presented in the Record of Boreholes governs any interpretation of the site conditions. It must be recognized that the soil and groundwater conditions may vary between and beyond borehole locations.

The stratigraphy in the boreholes along the alignment of the proposed temporary bridge structure is generally characterized by a sand fill overlying native organic silt, underlain by silty sand with gravel overlying bedrock.

### **5.1 Topsoil**

A thin veneer of topsoil was noted in Borehole 17-04 and was found to be 100 mm thick.

### **5.2 Fill**

Granular fill varying in composition from silty sand, some gravel to sand with gravel was encountered from surface in Borehole 17-01 and below the topsoil in Borehole 17-04. Trace organics were noted in the upper portion of the fill and occasional cobbles were noted in the lower portion of the fill. This fill had a thickness ranging from 1.1 m to 2.6 m (base elevation of 400.6 m to 401.2 m). The SPT 'N' values ranged from 2 to 8 blows indicating a very loose to loose condition.

The moisture content of the samples tested ranged from 7% to 20%. The results of grain size analyses conducted on three samples of this material are summarized in Table 5-1 and are illustrated on Figure C1 in Appendix C.

**Table 5-1: Gradation Results for Fill**

Soil Particle	%
Gravel	5 to 22
Sand	69 to 91
Silt and Clay	4 to 17

### **5.3 Organic Silt**

A layer of organic silt with occasional wood fragments was encountered below the fill in Borehole 17-04. This layer has a thickness of 2.0 m and an underside elevation of 399.2 m. The SPT 'N' values ranged from 7 to 10 blows indicating a loose condition.

The moisture content for the samples tested ranged from 32% to 96%. The results of an organic content analysis conducted on one sample of this material indicated an organic content of 19.8%.

#### 5.4 Silty Sand with Gravel

Silty sand with gravel was encountered below the fill in Borehole 17-01 and below the organic silt in Borehole 17-04. Occasional cobbles and boulders were noted in this layer in Borehole 17-01 and frequent cobbles and boulders were noted in Borehole 17-04. This layer had a thickness ranging from 0.3 m to 2.2 m (underside elevation of 397.0 m to 400.3 m). An SPT 'N' value of 22 blows was recorded, indicating a compact condition. Refusal blow counts were obtained where cobbles/boulders were encountered.

The moisture content of the samples tested ranged from 9% to 15%. No grain size analyses were conducted on this material due to very poor split spoon sample recovery.

#### 5.5 Bedrock

The overburden materials were underlain by granite bedrock. Both Boreholes 17-01 and 17-04 were advanced into the bedrock by coring. The inferred and cored bedrock surface ranges from elevation 396.7 to 400.3 m and is summarized in the table below:

**Table 5-2 Summary of Bedrock Elevation**

Location	Borehole No.	Depth Below Existing Ground Surface (m)	Top of Bedrock or Inferred Bedrock Elevation (m)
West Abutment	17-01	2.9	400.3
East Abutment	17-04	5.4	397.0
	17-04A	5.6	396.9(*)
	17-04B	5.6	396.7(*)

Note: (\*) inferred by DCPT refusal completed at approximately 1 m off-sets from Borehole 17-04

The Total Core Recovery (TCR) was 100% within the granite bedrock, the Solid Core Recovery (SCR) ranged from 64 to 100% and the Rock Quality Designation (RQD) ranged from 38 to 100%. Based on the RQD value the bedrock is classified to be of poor to excellent quality. Photographs of the recovered core are provided in Appendix C.

#### 5.6 Groundwater

Groundwater was observed in Borehole 17-04 after completion of coring and was noted to be at elevation 401.2 m. It is noted that water was introduced into the drill stem during coring, thus the measured water level may be not be representative of the stabilized water level. The water level in Nemegosenda River was measured in October 2016 by Thurber at an elevation of 400.3 m.

These observations are considered 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 and/or prolonged precipitation. It is expected that the groundwater level will largely be controlled by the water level in Nemegosenda River.

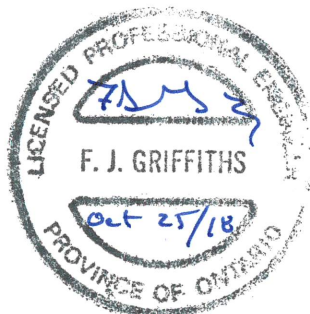
## 6 MISCELLANEOUS

Borehole locations were selected and positioned relative to existing site features and the proposed foundation locations and the as-drilled locations and elevations were surveyed by Thurber after completion of drilling. Elevation benchmarks were provided MPCE.

George Downing Estate Drilling Ltd. of Hawkesbury, Ontario supplied and operated the track mounted CME 550 drill and equipment to carry out the drilling, sampling, in-situ testing, and borehole decommissioning at the west abutment. OGS Drilling of Almonte, Ontario supplied and operated the portable drilling equipment to carry out the drilling, sampling, in-situ testing, and borehole at the east abutment. The field investigation was supervised on a full-time basis by Ms. Katya Edney, P.Eng. of Thurber. Overall project management and direction of the field program was provided by Mr. Stephen Peters, P.Eng.

Routine laboratory testing was carried out in Thurber's MTO-approved laboratory in Ottawa. Organic content testing was completed by Stantec's MTO-approved laboratory in Ottawa. Interpretation of the field data and preparation of this report was completed by Mr. Christopher Murray P.Eng. The report was reviewed by Dr. Fred Griffiths, P.Eng. and Dr. P.K. Chatterji, P.Eng., the Designated Principal Contact for MTO Foundations Projects.

*F. J. Griffiths*  
*for*  
Christopher Murray, M.A.Sc., P.Eng.  
Geotechnical Engineer



Fred Griffiths, P.Eng., Ph.D.  
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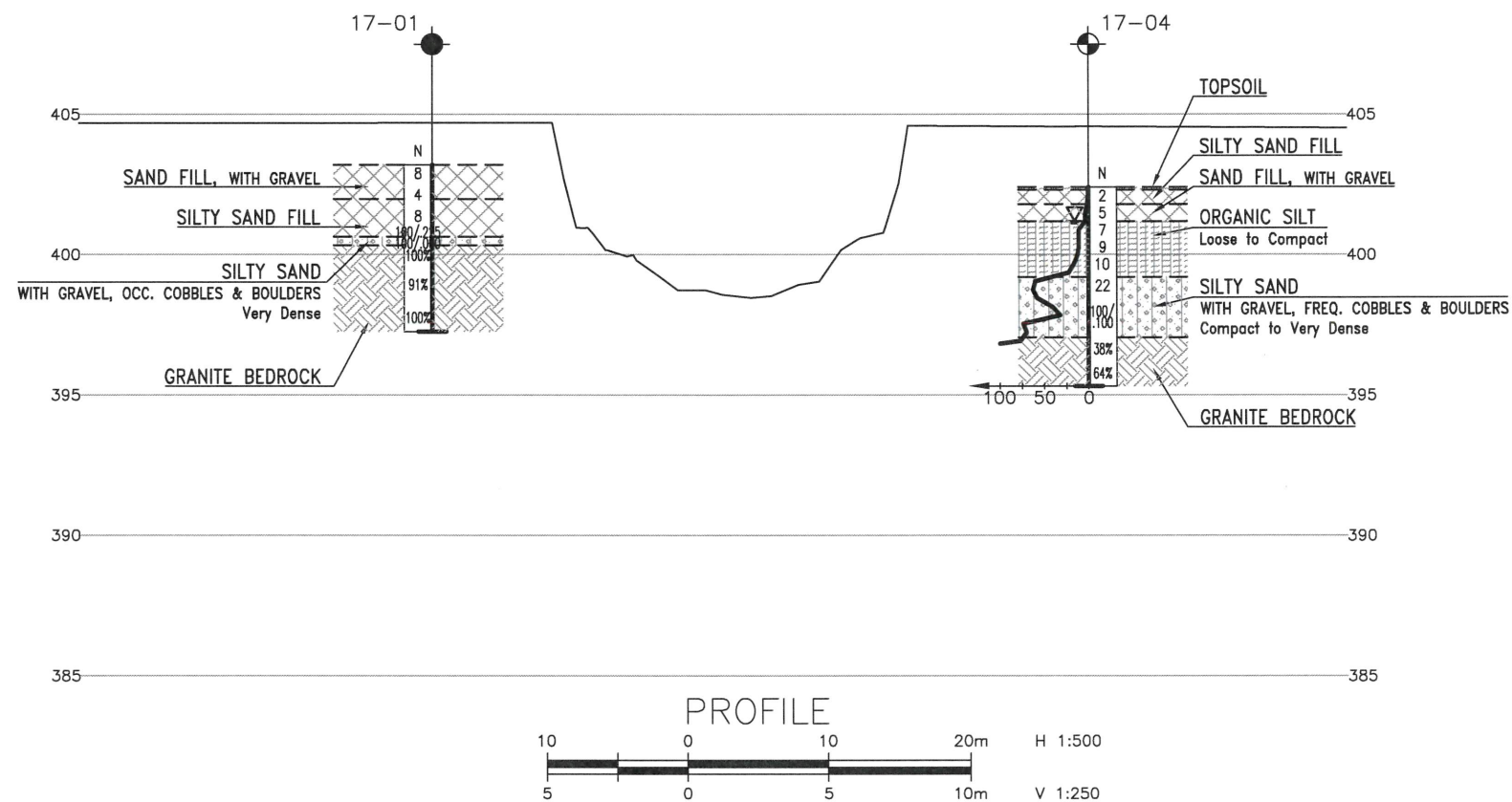
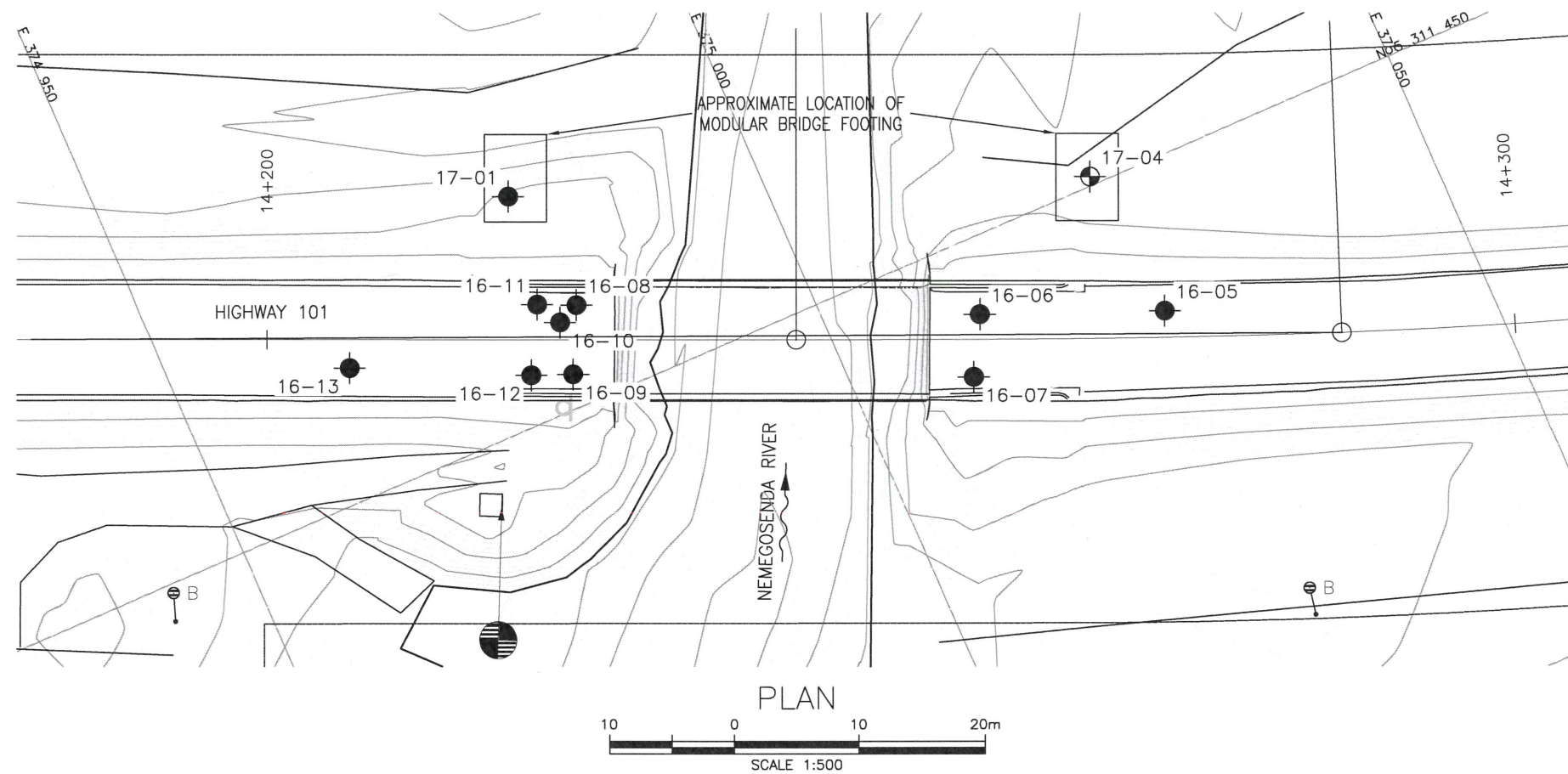
P.K. Chatterji, P.Eng., Ph.D.  
MTO Review Principal  
Senior Geotechnical Engineer

FINAL

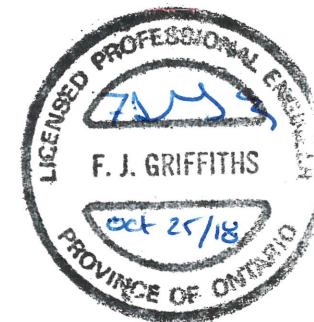
**Appendix A.**

**Borehole Location Plan and Stratigraphic Drawings**





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



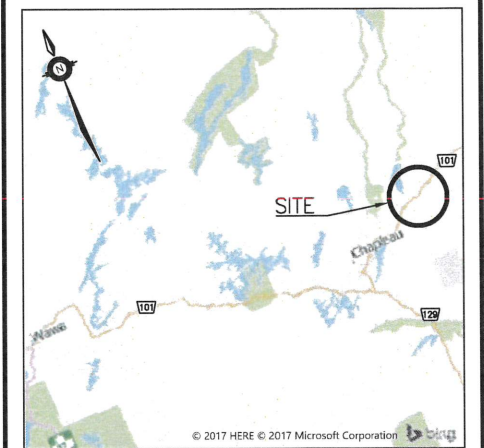
CONT No  
GWP No 5144-10-00

HIGHWAY 101  
NEMEGOSENDA RIVER  
TEMPORARY BRIDGE  
BOREHOLE LOCATIONS AND SOIL STRATA

McINTOSH PERRY



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
16-05	404.5	5 311 438.4	375 025.3
16-06	404.6	5 311 444.1	375 011.6
16-07	404.6	5 311 439.7	375 009.2
16-08	404.7	5 311 457.6	374 982.4
16-09	404.7	5 311 452.6	374 979.9
16-10	404.7	5 311 456.9	374 980.6
16-11	404.7	5 311 458.9	374 979.5
16-12	404.7	5 311 453.9	374 976.8
16-13	404.6	5 311 460.2	374 963.7
17-01	403.2	5 311 467.8	374 980.8
17-04	402.4	5 311 450.7	375 024.2

-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.
- Borehole locations are shown in MTM Zone 13 coordinates.

GEOCRES No. 410-30

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	JG	CHK -	CODE
DRAWN	MFA	CHK JG	SITE 46-215
LOAD			DATE OCT 2018
STRUCT			DWG 1

TEMPORARY DETOUR BRIDGE  
NEMEGOSENDA RIVER BRIDGE HIGHWAY 101

**Appendix B.**

**Record of Borehole Sheets**



## SYMBOLS, ABBREVIATIONS AND TERMS USED ON TEST HOLE RECORDS

### TERMINOLOGY DESCRIBING COMMON SOIL GENESIS

Topsoil	mixture of soil and humus capable of supporting vegetative growth
Peat	mixture of fragments of decayed organic matter
Till	unstratified glacial deposit which may include particles ranging in sizes from clay to boulder
Fill	material below the surface identified as placed by humans (excluding buried services)

### TERMINOLOGY DESCRIBING SOIL STRUCTURE:

Desiccated	having visible signs of weathering by oxidization of clay materials, shrinkage cracks, etc.
Fissured	having cracks, and hence a blocky structure
Varved	composed of alternating layers of silt and clay
Stratified	composed of alternating successions of different soil types, e.g. silt and sand
Layer	> 75 mm in thickness
Seam	2 mm to 75 mm in thickness
Parting	< 2 mm in thickness

### RECOVERY:

For soil samples, the recovery is recorded as the length of the soil sample recovered.

### N-VALUE:

Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 63.5 kg hammer falling 0.76 m, required to drive a 50 mm O.D. split spoon sampler 0.3 m into undisturbed soil. For samples where insufficient penetration was achieved and N-value cannot be presented, the number of blows are reported over the sampler penetration in millimetres (e.g. 50/75).

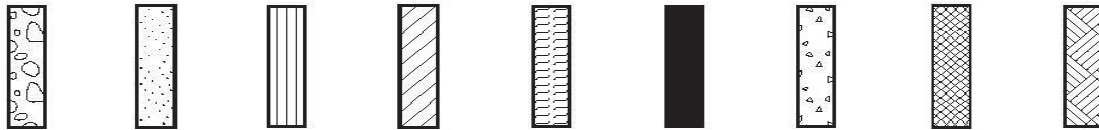
### DYNAMIC CONE PENETRATION TEST (DCPT):

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to an "A" size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone 0.3 m into the soil. The DCPT is used as a probe to assess soil variability.



### STRATA PLOT:

Strata plots symbolize the soil and bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.



Boulders  
Cobbles  
Gravel      Sand      Silt      Clay      Organics      Asphalt      Concrete      Fill      Bedrock

### TEXTURING CLASSIFICATION OF SOILS

Classification	Particle Size
Boulders	Greater than 200 mm
Cobbles	75 – 200 mm
Gravel	4.75 – 75 mm
Sand	0.075 – 4.75 mm
Silt	0.002 – 0.075 mm
Clay	Less than 0.002 mm

### TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

Descriptive Term	Undrained Shear Strength (kPa)
Very Soft	12 or less
Soft	12 – 25
Firm	25 – 50
Stiff	50 – 100
Very Stiff	100 – 200
Hard	Greater than 200

NOTE: Clay sensitivity is defined as the ratio of the undisturbed strength over the remolded strength.

### SAMPLE TYPES

SS	Split spoon samples
ST	Shelby tube or thin wall tube
DP	Direct push sample
PS	Piston sample
BS	Bulk sample
WS	Wash sample
HQ, NQ, BQ etc.	Rock core sample obtained with the use of standard size diamond coring equipment

### TERMS DESCRIBING CONSISTENCY (COHESIONLESS SOILS ONLY)

Descriptive Term	SPT “N” Value
Very Loose	Less than 4
Loose	4 – 10
Compact	10 – 30
Dense	30 – 50
Very Dense	Greater than 50

### MODIFIED UNIFIED SOIL CLASSIFICATION

Major Divisions		Group Symbol	Typical Description
COARSE GRAINED SOIL	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	SILT AND CLAY SOILS $W_L < 35\%$	ML	Inorganic silts, 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.
		OL	Organic silts and organic silty-clays of low plasticity.
	SILT AND CLAY SOILS $35\% < W_L < 50\%$	MI	Inorganic compressible fine sandy silt with clay of medium plasticity, clayey silts.
		CI	Inorganic clays of medium plasticity, silty clays.
		OI	Organic silty clays of medium plasticity.
	SILT AND CLAY SOILS $W_L > 50\%$	MH	Inorganic silts, micaceous or diatomaceous fine sandy of silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of high plasticity, organic silts.
HIGHLY ORGANIC SOILS		Pt	Peat and other organic soils.

Note -  $W_L$  = Liquid Limit



## EXPLANATION OF ROCK LOGGING TERMS

### ROCK WEATHERING CLASSIFICATION

Fresh (FR)	No visible signs of weathering.
Fresh Jointed (FJ)	Weathering limited to surface of major discontinuities.
Slightly Weathered (SW)	Penetrative weathering developed on open discontinuity surfaces, but only slight weathering of rock materials.
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 structures are preserved.

### 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 0.1 m in length or larger, as a percentage of total core length
Unconfined Compressive Strength: (UCS)	Axial stress required to break the specimen.
Fracture Index: (FI)	Frequency of natural fractures per 0.3 m of core run.

### DISCONTINUITY SPACING

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

### STRENGTH CLASSIFICATION

Rock Strength	Approximate Uniaxial Compressive Strength (MPa)
Extremely Strong	Greater than 250
Very Strong	100 – 250
Strong	50 – 100
Medium Strong	25 – 50
Weak	5 – 25
Very Weak	1 – 5
Extremely Weak	0.25 – 1



# RECORD OF BOREHOLE No 17-01

1 OF 1

METRIC

GWP# 5144-10-00 LOCATION Hwy 101 - Negemosa River Temporary Bridge N 5 311 467.8 E 374 980.8 ORIGINATED BY KE  
 HWY 101 BOREHOLE TYPE HSA / HW Casing / HQ Coring COMPILED BY CM  
 DATUM Geodetic DATE 2017.05.11 - 2017.05.11 CHECKED BY SP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT  $\gamma$ kN/m <sup>3</sup>	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 (%)							
							PLASTIC      NATURAL      LIQUID LIMIT      MOISTURE      LIMIT 							

ONTMT4S 13624 - 101 AND 129 - NEMEGOSEDA.GPJ 2012TEMPLATE(MTO).GDT 23/10/18

# RECORD OF BOREHOLE No 17-04

1 OF 1

METRIC

GWP# 5144-10-00 LOCATION Hwy 101 - Negemosenda River Temporary Bridge N 5 311 450.7 E 375 024.2 ORIGINATED BY KE  
HWY 101 BOREHOLE TYPE Portable / BW Casing / BQ Coring COMPILED BY CM  
DATUM Geodetic DATE 2017.05.24 - 2017.05.24 CHECKED BY SP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT  $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
402.4								20 40 60 80 100		PLASTIC LIMIT W P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W L	
0.0	100mm Topsoil							20 40 60 80 100		WATER CONTENT (%)			
0.1	Silty SAND, trace Gravel and Organics FILL		1	SS	2								5 91 4 (SI+CL)
401.8	Very Loose Brown												
0.6	SAND with Gravel FILL		2	SS	5								
401.2	Loose Brown												
1.2	Organic SILT, occasional Wood fragments		3	SS	7								
	Loose to Compact Dark Brown		4	SS	9								
			5	SS	10								
399.2													
3.2	Silty SAND with Gravel, trace wood, frequent Cobbles and Boulders		6	SS	22								
	Compact to Very Dense Grey												
	-150 mm Boulder at 3.8 m												
			7	SS	100/								
	-Used core barrel below 4.7 m due to casing refusal												
	-250 mm Boulder at 4.7 m		1	RUN									
397.0													
5.4	GRANITE BEDROCK		2	RUN									RUN #2 TCR=100% SCR=66% RQD=38%
	Grey Medium Grained Fresh												
			3	RUN									RUN #3 TCR=100% SCR=64% RQD=64%
	-Core barrel jammed at 7.1 m, no core recovery in Run 3 below 6.5 m												
395.3													
7.1	End of Borehole												
	Ground Water at 1.2 m BGS (Elev. 401.2 m) on completion of drilling												
	Two DCPTs were performed in the area to confirm bedrock elevation:												
	DCPT INFERRED BR ELEV.												
	17-4A 396.9 m												
	17-4B 396.7 m (shown)												

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

ONTMT4S 13624 - 101 AND 129 - NEMEGOSENDA.GPJ 2012TEMPLATE(MTO).GDT 23/10/18



## **Appendix C.**

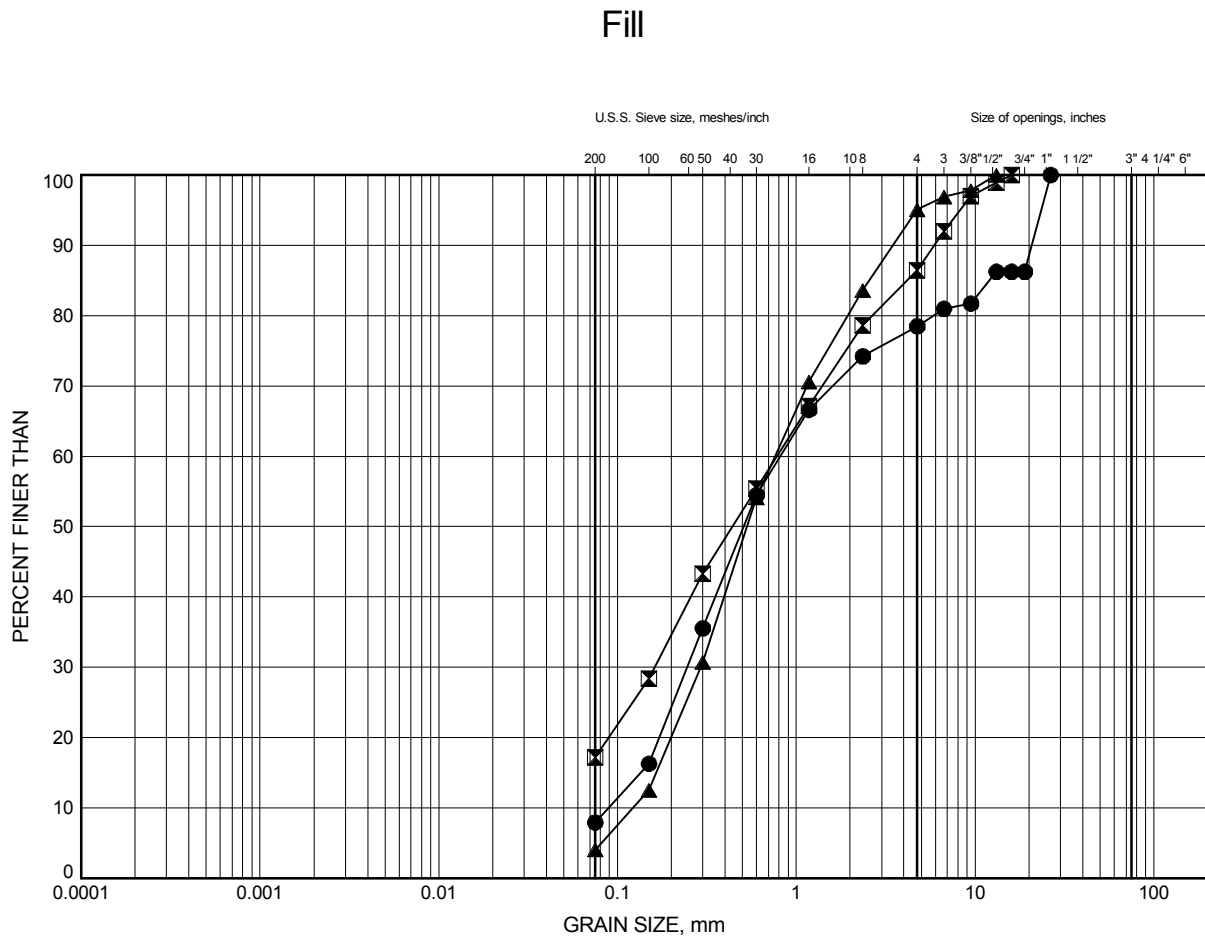
### **Laboratory Testing**

**Appendix C.1**  
**Particle Size Analysis Figures**

# Nemegosenda River Bridge

## GRAIN SIZE DISTRIBUTION

FIGURE C1



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

### LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	17-01	1.07	402.13
⊠	17-01	2.44	400.76
▲	17-04	0.30	402.07

Date July 2017  
GWP# 5144-10-00



Prep'd CM  
Chkd. SP

**Appendix C.2**  
**Analytical Testing Results**



**Stantec**

**Stantec Consulting Ltd**  
100 A&B-2781 Lancaster Rd  
Ottawa, ON K1B 1A7  
Tel: (613) 738-6075  
Fax: (613) 738-6067

July 4, 2017  
File: 122410864

**Attention: Thurber Engineering Ltd., File #13624**

**Reference: ASTM D2974 Organic Matter of Peat & Other Soils**

The table below summarizes one test result for Organic Matter of Peat and Other Soils.

Source	Depth	Location	Organic Content
BH17-4 SS4	6'-8'	Highway 101 & 129	19.8%

Sincerely,

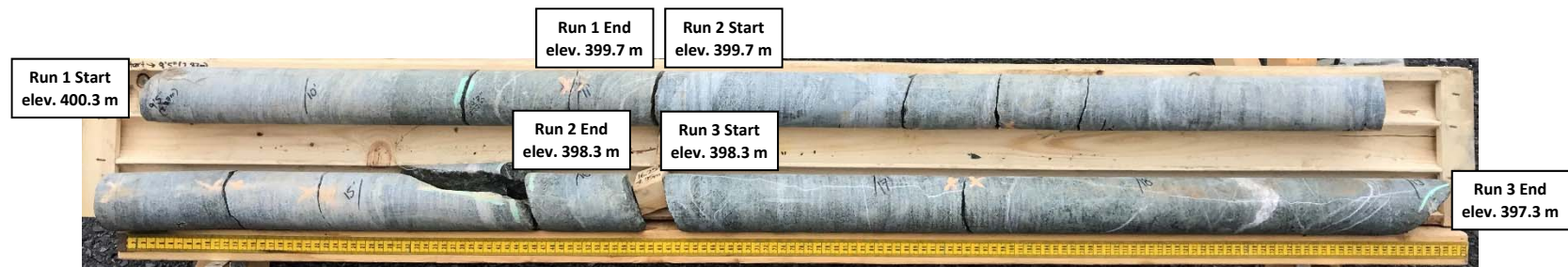
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TEMPORARY DETOUR BRIDGE  
NEMEGOSENDA RIVER BRIDGE HIGHWAY 101

**Appendix C.3**  
**Rock Core Photographs**

**Borehole 17-1**  
**Run 1 to 3 (of 3)**  
**Elevation 400.3 m to 397.3 m**



**Borehole 17-4**  
**Run 1 to 3 (of 3)**  
**Elevation 397.7 m to 395.3 m**





**Appendix D.**

**Selected Site Photographs**

TEMPORARY DETOUR BRIDGE  
NEMEGOSENDA RIVER BRIDGE HIGHWAY 101



**Photo 1. Looking northeast at north side of the east abutment [taken May 2017].**



**Photo 2. Looking northwest at north side of the west abutment [taken  
\_May 2017].**