

March 19, 2015

DST Reference No.: GS-TB-020477

J.P Perron, P. Eng.
Ministry of Transportation NER
447 McKeown Avenue, Suite 301
North Bay, Ontario
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Re: Agreement # 5013-E-0033, Assignment # 6, G.W.P. 5124-14-00, Geocres #41I-330
Highway 69, French River Bridge, Mowat Township, Station 22+613

DST Consulting Engineers Inc. (DST) has been retained by the Ministry of Transportation (MTO), Geotechnical Section, Northeastern Region to conduct a geotechnical investigation for the French River Bridge on Highway 69 approximately 11.7 km south of the Highway 64 junction. This work was carried out under Agreement No.: 5013-E-0033, Assignment # 6.

Site work was carried out during the week of February 16th, 2015 and included the advancement of two geotechnical boreholes at the bridge approaches. To advance the boreholes a CME 750 truck-mounted drill rig was utilized. Borehole 1 was advanced at Station 22+561 (3.1 m South of the South expansion joint), 1.7 m right of centreline in the Northbound lane East of the centreline. Borehole 2 was advanced at Station 22+688 (3.4 m North of the North expansion joint), 1.7 m left of centreline in the Southbound lane West of the centreline. The boreholes were advanced through fill materials and coring of bedrock was required. Borehole 1 was terminated in bedrock at a depth of 7.5 m below surface and Borehole 2 was terminated in bedrock at a depth of 4.37 m below surface.

The generalized stratigraphy for this site based on the Boreholes 1 and 2 consists of surface layer of asphalt (100 mm) and concrete (300 mm) overlaying a granular sand fill layer underlain by a bedrock. The following table summarizes the soils properties encountered in two boreholes. Elevation of 100.0 m has been assumed at the top of the Boreholes.

Table 1: French River Bridge BH 1 Summary

Soil Type	Depth (BH Location)	Elevation (m)	Soil Properties
Asphalt	0 to 0.07 m	100 to 99.9 m	
Concrete	0.07 to 0.3 m	99.9 to 99.7 m	
Fill-Sand-some to with gravel, trace silt, BROWN	0.07 to 5.5 m	99.7 to 94.5 m	Unit Weight ($\gamma = 21 \text{ kN/m}^3$) Internal Friction Angle ($\phi = 32 \text{ Degrees}$) Moisture Content between 8% to 20%
Bedrock-Migmatite	5.5 to 7.5 m	94.5 to 92.5 m	RQD* = 98% UCS# = 149 to 150 Mpa (correlated from point load test)

Table 2: French River Bridge BH 2 Summary

Soil Type	Depth (BH Location)	Elevation (m)	Soil Properties
Asphalt	0 to 0.07 m	100 to 99.9 m	
Concrete	0.07 to 0.3 m	99.9 to 99.7 m	
Fill-Sand-some to with gravel, trace silt, BROWN	0.3 to 3.3 m	99.7 to 96.7 m	Unit Weight ($\gamma = 21 \text{ kN/m}^3$) Internal Friction Angle ($\phi = 32 \text{ Degrees}$)
Bedrock- Migmatite	3.3 to 4.4 m	96.7 to 95.6 m	RQD* = 56% UCS# = 144 to 147 Mpa (correlated from point load test)

#UCS= Unconfined Compressive Strength

*RQD=Rock Quality Designation

The records of boreholes and lab results are enclosed with this letter.

We trust this satisfies your present needs. If you have any questions or comments, please contact the undersigned at your convenience.

Yours Truly,

For DST Consulting Engineers Inc.



Dr. M W Bo, PhD., P. Eng, P.Geo, Int PE,
 C.Geol, C. Eng, Eur Geol, Eur Eng
 Senior Vice President / Senior Principal

RECORD OF BOREHOLE No BH1

1 OF 1

METRIC

W.P. 5124-14-00 LOCATION French River Bridge: STA 22+561, 1.7 m Rt (17T 0532300 E, 5096130 N) ORIGINATED BY SH
DIST HWY 69 BOREHOLE TYPE Hollow Stem Auger - 80 mm ID COMPILED BY DB
DATUM LOCAL DATE 2015 02 23 CHECKED BY BV

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							
100.0	GROUND SURFACE							20	40	60	80	100			
99.9	Asphalt														
0.1	Concrete														
99.7															
0.4	FILL - SAND - some to with gravel, trace silt, BROWN, Loose to Dense		AS1	AS											
			SS2	SS	34		99								
			SS3	SS	27		98								
			SS4	SS	7										
							97								
			SS5	SS	8										
			SS6	SS	6		96								
			SS7	SS	9										
							95								
94.5															
5.5	Bedrock-Migmatite, Grey/Black, Slightly weathered														
	RQD=98% TCR = 100%						94								
			RC1	RC											
							93								
92.5															
7.5	End of Borehole at 7.5 m														Dry Upon Completion

NR = NO RECOVERY

+³, X³: Numbers refer to
Sensitivity

○ 3% STRAIN AT FAILURE

ENCLOSURE 1

ONL_MOT GS-TB-020477 FRENCH RIVER BRIDGE GPJ_DST_MIN.GDT 3/18/15

RECORD OF BOREHOLE No BH2

1 OF 1

METRIC

W.P. 5124-14-00 LOCATION French River Bridge: STA 22+688, 1.7 m Lt (17T 0532234 E, 5096231 N) ORIGINATED BY SH
DIST HWY 69 BOREHOLE TYPE Hollow Stem Auger - 80 mm ID COMPILED BY DB
DATUM LOCAL DATE 2015 02 24 CHECKED BY BV

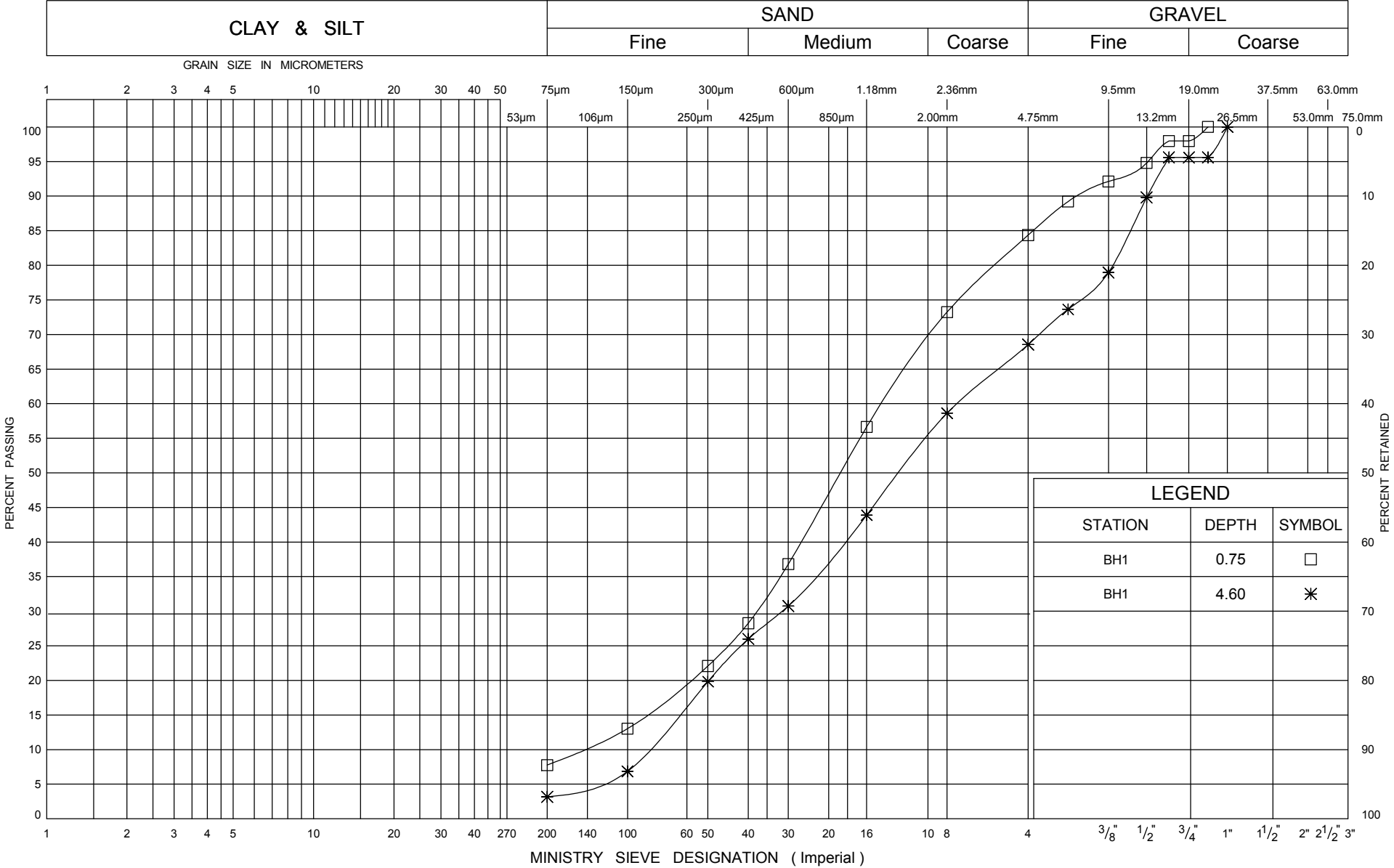
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								WATER CONTENT (%)		
								20	40	60						80	100	20
100.0	GROUND SURFACE																	
99.9	Asphalt		AS1	RC														
0.1	Concrete																	
99.7																		
0.4	FILL-SAND-some to with gravel, trace silt, BROWN, Loose to Compact																	
			SS2	SS	18													
			SS2	SS	12													
			SS3	SS	6													
			SS4	SS	35													
96.7																		
3.3	Bedrock-Migmatite, Grey/black, Moderately weathered TCR = 70% RQD = 56%		RC1	RC														
95.6																		
4.4	End of Borehole at 4.37 m														Dry Upon Completion			

ONL MOT GS-TB-020477 FRENCH RIVER BRIDGE.GPJ DST_MIN.GDT 3/18/15

NR = NO RECOVERY +³, X³: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

ENCLOSURE 2

UNIFIED SOIL CLASSIFICATION SYSTEM



GRAIN SIZE DISTRIBUTION
FILL-SAND

ENCLOSURE 1

W P 5013-E-0033

HWY 69



Ministry of
Transportation
Ontario