FOUNDATION INVESTIGATION REPORT
HIGHWAY 17
CPR OVERHEAD BRIDGE AT ROSSPORT
DISTRICT OF THUNDER BAY, ONTARIO

G.W.P. 6103-10-00, Site No. 48C-24

Geocres Number: 42D-28

Report to

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PART 1: FACTUAL INFORMATION

1 INTRODUCTION

This report presents the factual findings obtained from a foundation investigation conducted at the site of a proposed replacement of the existing bridge which carries Highway 17 over the CP tracks at Rossport. The bridge is located approximately 300 m west of Main Street in the Rossport Community, District of Thunder Bay, Ontario.

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

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

In the preparation of this report and in addition to the boreholes drilled under the current assignment, reference has been made to information on subsurface conditions contained in a previous foundation report. The title of this report is listed as follows:

- Foundation Investigation Report, C.P.R. Overpass, T.C.H. #17, Revised Location, Rossport, Geocres 58-F-277C, prepared by Trow, Soderman and Associates, dated May 26, 1958.

2 SITE DESCRIPTION

The site of this investigation is located at the crossing of Highway 17 over CP tracks, approximately 300 m west of Main Street in the Community of Rossport, Thurder Bay District, Ontario. At present, the highway crosses the railway tracks on a skewed three-span structure supported on two abutments and two piers. Each span is 19.8 m long. The total length of the bridge is 59.4 m and the width is 10.3 m. The existing embankment heights are approximately 5.0 m to 9.0 m for the west approach and 10.0 m to 15.0 m at the east approach.

The area surrounding the bridge site generally slopes gently towards the eastsouth. The immediate areas to north and east of the site are treed. Bedrock outcrops are present on the west side of the bridge. Cobbles, boulders and/or rockfill were observed on the embankment slope surface during the field investigation. Lake Superior is located approximately 200 south from the existing bridge.

Photographs in Appendix D show the general nature of the site.

The site lies within the physiographic region known as the Wabigoon Subprovince of the Superior Province of the Canadian Shield. The region is characterized by granite rocks. Locally, a sand layer was encountered above the bedrock.

3 SITE INVESTIGATION AND FIELD TESTING

The site investigation and field testing for this project were carried out from May 23 to 31, 2012 and consisted of drilling and sampling ten boreholes (numbered RPT-01 to RPT-10) through the existing highway embankment in the area of the existing and proposed west and east approaches and abutments. Four test pits (numbered TP-01 to TP-04) were conducted along the toe of the existing west embankment (at railway track level between the existing west abutment and the west pier), to establish the depth to bedrock.

Initially, both a three span and a single span bridge replacement were considered at this site. The field investigation was completed for a three span option.

Boreholes RPT-01 and RPT-10 were drilled near the west and east approaches and terminated at 9.1 m and 9.8 m depth (elevations 199.6 and 193.7), respectively. Boreholes RPT-02, RPT-03, RPT-08 and RPT-09 were drilled near the existing west and east abutments and extended to 7.9 m to 16.2 m depth (elevations 188.5 to 200.1). Boreholes RPT-04, RPT-05, PRT-06 and RPT-07 were drilled near the location of the proposed piers for the three span option and near the location of the new east and west abutments and terminated at depths ranging from 9.9 m to 17.5 m (elevations 188.4 to 197.6).

Bedrock was proved in Boreholes RPT-02 to RPT-05, RPT-07 and RPT-08 by NQ size diamond coring.

Test pits excavated along the toe of the existing west embankment were terminated on bedrock at 0.6 m and 0.8 m depth. Bedrock was exposed at one test pit location.

Records of boreholes drilled during the current investigation are included in Appendix A.

Records of Boreholes drilled during the previous investigation (Geocres 58-F-277C) and their respective laboratory test results are enclosed in Appendix C.

The approximate locations of the boreholes are shown on the attached Borehole Locations and Soil Strata Drawing in Appendix E. The coordinates and elevations of the boreholes are listed on the drawings and are presented on the individual Record of Borehole Sheets in Appendix A. MRC provided plan drawings to obtain the co-ordinates and the ground surface elevations for the boreholes.

The borehole locations were marked in the field and utility clearances were obtained prior to drilling.

The drilling was carried out from the highway grade using a CME 55 truck-mounted drill rig. NW casing was used to advance the boreholes through the soils and NQ coring methods were used to advance the boreholes through the cobbles and boulders encountered in the highway embankment fill and through the bedrock. 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 and rock samples for transport to Thurber's laboratory for further examination and testing.

All rock cores were logged, and the Total Core Recovery (TCR), Rock Quality Designation (RQD) and the Fracture Indices (FI) were determined.

Two standpipe piezometers consisting of 19 mm PVC pipe with slotted screen and enclosed in filter sand were installed at this site to permit longer term groundwater level monitoring. The boreholes were backfilled with bentonite holeplug in general accordance with O.Reg. 903 upon completion. The location and completion details of the piezometer and boreholes are presented in Table 3.2. The piezometers were decommissioned on July 24, 2012 in accordance with O.Reg. 903.

Table 3.2 – Borehole Abandonment Details

Location	Borehole/ Test pit	Piezometer Tip Depth/ Elevation (m)	Abandonment Details
West approach	RPT-01	None installed	Borehole backfilled with bentonite from 9.1 m to 0.1 m, then asphalt to surface.
Existing west abutment	RPT-02	7.9/200.1	Sand from 7.9 m to 5.9 m, bentonite holeplug from 5.9 m to 2.0 m, sand from 2.0 m to 0.4 m, then asphalt to surface.
	RPT-03	None installed	Borehole backfilled with holeplug from 8.1 m to 0.1 m, then asphalt to surface.
Proposed west abutment	RPT-04	None installed	Borehole backfilled with holeplug from 11.0 m to 7.0 m, concrete from 0.3 m to 0.1 m, then asphalt to surface.
	RPT-05	None installed	Borehole backfilled with holeplug from 9.9 m to 5.7 m. At bridge deck, borehole backfilled with concrete from 0.3 m to 0.06 m, then asphalt to surface.
Proposed east abutment	RPT-06	None installed	Borehole backfilled with holeplug from 11.8 m to 5.0 m. At bridge deck, borehole backfilled with concrete to 0.3 m to surface.
	RPT-07	None installed	Borehole backfilled with holeplug from 17.5 m to 4.8 m. At bridge deck, borehole backfilled with concrete from 0.3 m to 0.15m, then asphalt to surface.
Existing east abutment	RPT-08	None installed	Borehole backfilled with holeplug from 16.2 m to 0.9 m, concrete from 0.9 m to 0.1 m, then asphalt to surface.
	RPT-09	14.6/190.3	Sand from 14.6 m to 12.5 m, holeplug form 12.5 m to 0.3 m, sand from 0.3 m to 0.1 m, then asphalt to surface.
East approach	RPT-10	None installed	Borehole backfilled with holeplug from 9.8 m to 0.1 m, then asphalt to surface.

4 LABORATORY TESTING

The recovered soil samples were subjected to Visual Identification (VI) and to 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 in Appendix A and shown on the figures contained in Appendix B.

Point load tests were carried out on selected samples of intact bedrock upon arrival at the laboratory to assist in evaluation of the compressive strength of the bedrock. Results of point load tests on the rock core samples are included in Appendix B and on the Record of Borehole sheets in Appendix A.

5 DESCRIPTION OF SUBSURFACE CONDITIONS

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

In general terms, the stratigraphy encountered at this site consists of pavement structure overlying the embankment granular fill. Native sand and gravelly sand were encountered below the east approach embankment fill. A thin layer of clayey silt was encountered below the sand in one borehole drilled near the new east abutment. Grey, pink and white granite bedrock as well as auger refusal on probable bedrock were encountered below the approach fill on the west side of the CP overhead and below the native layers of sand, gravelly sand and clayey silt on the east side of the structure.

More detailed descriptions of the individual strata are presented below.

5.1 Pavement Structure

Pavement structure was encountered in all the boreholes at this site, which were drilled through the existing Highway 17 roadway. The thickness of the asphalt ranged from 50 mm to 88 mm. A layer of concrete ranging from 225 mm to 455 mm in thickness was encountered below the asphalt in Boreholes RPT-03 to PRT-07, which were drilled through the bridge deck and approach slabs. The concrete layer was 810 mm thick in Borehole RPT-08.

Granular fill was encountered below the asphalt and concrete.

5.2 Sand and Sand and Gravel Fill

Fill was encountered below the pavement structure in the boreholes drilled through Highway 17 embankment, except in Boreholes RPT-04 to RPT-07. These four boreholes encountered fill which forms the forward slope. Fill was also encountered surficially in Test pits TP-02 to TP-04, drilled near the toe of the west embankment slope, at the railway track level, between the existing west abutment and west pier.

The fill comprising the existing highway embankment, consisted of the following distinct soil layers:

- West approach and west abutment (Boreholes RPT-01 to RPT-05)

  Brown sand and gravel fill containing cobbles, boulders, possible rockfill and trace to some silt and clay. Coring through cobbles and boulders encountered in the fill was required to advance the boreholes. Boulders and cobbles (and

possible rockfill) are visible near the lower part of the forward and side embankment slopes, below the existing abutments and along the side embankment slopes, as shown in photographs in Appendix G. It is not confirmed whether some rockfill is present in the approach embankment. It must be recognized that embankment fills are heterogeneous in nature and may contain obstructions such as cobbles, boulders or rockfill.

Test pits drilled near the west abutment, revealed surficial sand and gravel fill.

- East approach and east abutment (Boreholes RPT-06 to RPT-10)

  An upper layer of brown sand and gravel fill was contacted surficially in Borehole RPT-06 and below the approach slab and asphalt in Boreholes RPT-08 to RPT-10. Below the sand and gravel fill, and surficially in Borehole RPT-07, sand fill was encountered.

The thickness of the granular fill ranged from 4.7 m to 10.7 m. In Boreholes RPT-04 to RPT-07, the thickness of the fill varied from 0.8 m to 7.2 m.

In Test pits TP-02 to TP-04, the thickness of the sand and gravel ranged from 0.6 m to 0.8 m.

In Boreholes RPT-02 to RPT-05, drilled near the west abutment, the depth to the base of the fill ranged from 5.2 m to 7.8 m (elevations 199.7 to 202.9). The depth to the base of the fill in Boreholes RPT-06 to RPT-09, drilled at the east abutment, varied from 10.7 m to 12.0 m (elevation 193.1 to 194.2). Boreholes RPT-01 and RPT-10 drilled at the west and east approaches, were terminated in the granular embankment fill at 9.1 m and 9.8 m depth (elevations 199.6 and 193.7), respectively.

SPT N-values recorded in the sand and gravel fill at the west abutment generally ranged from 15 blows per 0.3 m of penetration to 50 blows for not penetration, indicating a compact to very dense relative density. Only two samples revealed SPT N-values of 8 and 7 blows per 0.3 m of penetration, indicating a loose relative density.

At the east abutment, the SPT N-values are lower. The SPT N-values measured in the fill in Boreholes RPT-06 and RPT-07, drilled near the forward slope, typically ranged from 0 to 7 blows per 0.3 m of penetration, indicating a very loose to loose relative density. In Boreholes RPT-08 to RPT-10, the SPT N-values ranged from 8 to 61 blows per 0.3 m of penetration, indicating a loose to very dense relative density. In Borehole RPT-08, an SPT N-value of 153 blows per 0.225 m of penetration was recorded on a probable cobble near elevation 195.5.

The moisture content of samples of the sand/sand and gravel fill generally ranged from 1% to 29%.

Grain size distribution curves for sand fill and sand and gravel fill samples are presented on the Record of Borehole sheets and on Figures B1to B3 of Appendix B. The results of the laboratory tests are summarized as follows:

Soil Particles	Sand and Gravel Fill Percentage (%)	Sand Fill Percentage (%)
Gravel	30 to 54	0 to 14
Sand	43 to 66	83 to 98
Silt and Clay	1 to 11	2 to 9

5.3 Sand

Native brown sand containing trace to some gravel, trace silt and clay and occasional cobbles and boulders was contacted below the east granular approach fill at depths ranging from 10.7 m to 12.0 m (elevations 193.1 to 194.2) in Boreholes RPT-07 to RPT-09.

The depths to the base of the sand in Boreholes RPT-07 and RPT-08 were at 13.7 m and 13.2 m (elevations 192.2 and 191.5), respectively.

Borehole RPT-09 was terminated within the sand layer at 14.6 m depth (elevation 190.3) upon refusal on probable bedrock.

SPT N-values recorded in the sand layers ranged from 19 to 50 blows per 0.3 m of penetration indicating a compact to dense relative density.

The moisture contents of samples of sand ranged from 7% to 23%.

A grain size distribution curve for one sample of the sand is presented on the Record of Borehole sheets and on Figure B4 of Appendix B. The results of the laboratory test are summarized as follows:

Soil Particles	Sand Percentage (%)
Gravel	20
Sand	78
Silt and Clay	2

5.4 Clayey Silt

A layer of grey clayey silt was contacted below the sand at 13.7 m depth (elevation 192.2) in Borehole RPT-07. The thickness of the clayey silt was 800 mm.

The depth to the base of the clayey silt was at 14.5 m (elevation 191.4).

The moisture content in the clayey silt was 24%.

5.5 Bedrock and Refusal

The overburden soils described above are underlain by granite bedrock, locally quartz diorite in Borehole RPT-04. The bedrock varied in colour from pink and grey to pink and white. The bedrock cores revealed occasional vertical and sub-vertical breaks. The bedrock was described as slightly weathered to fresh with the exception of the initial run in Borehole RPT-03 which was described as moderately weathered.

Bedrock was proved by coring in Boreholes RPT-02 to RPT-05, RPT-07 and RPT-08. Boreholes RPT-06 and RPT-09 were terminated upon auger refusal on probable bedrock or boulders. The depths and elevations of the bedrock surface encountered in the boreholes are summarized in Table 5.1.

Table 5.1 – Depths and Elevations of Top of Bedrock and Auger Refusal on Probable Bedrock or Boulders

Location	Borehole/DCPT	Top of Bedrock or Auger Refusal on Probable Bedrock or Boulders	
		Depth (m)	Elevation (m)
Behind west abutment	RPT-02[1]	5.6	202.4
	RPT-03[1]	5.2	202.9
Between west abutment and west pier	RPT-04[1]	0.8	199.7
	RPT-05[1]	1.8	200.0
Between east pier and east abutment	RPT-06	6.8	194.0
	RPT-07[1]	9.7	191.4
Behind east abutment	RPT-08[1]	13.2	191.5
	RPT-09	14.6	190.3

[1]Bedrock proved by coring

Based on the borehole information, the bedrock surface generally slopes down approximately 10.9 to 12.6 m between the existing west abutment (Boreholes RPT-02 and RPT-03) and the existing east abutment (Boreholes RPT-08 and RPT-09), a distance of about 70 m. The bedrock is exposed adjacent to the west side of the west pier in an apparent rock cut (Photograph 9 in Appendix G). Four testpits excavated at the toe of the outcrop encountered bedrock at the ground surface (Testpit TP-01) and at depths ranging from 0.6 m to 0.8 m (Testpits TP-02 to TP-04).

Core recovery in the bedrock was 100%. The RQD values ranged from 81% to 100%, indicating a good to excellent rock quality. An RQD of 59%, indicating a fair rock quality, was observed in Borehole RPT-02 Run 1. An RQD of 0% was noted in Borehole RPT-04 Run 1.

The Fracture Index (FI) of the rock, expressed as fractures per 0.3 m of core, ranged from 0 to 5. A Fracture of Index greater than 15 was noted in Borehole RPT-02 Run 1. Highly

broken zones were noted in cores from Borehole RPT-03 near elevations 201.7 and 202.3, and in Borehole RPT-04 near elevation 198.3.

The estimated unconfined compressive strength of the rock cores (average per Run) generally ranged from 132 MPa to 316 MPa, indicating a very strong to extremely strong rock. Unconfined compressive strengths of 65 MPa and 99 MPa were estimated in Boreholes RPT-03 Run 1 and RPT-05 Run 1, indicating a strong rock. These estimated rock strength values are interpreted from point load tests that were conducted on rock cores recovered from the boreholes. A summary of the Point Load Test Results are presented in Appendix B.

5.6 Water Levels

Water levels were monitored in the open boreholes during and upon completion of drilling. Two standpipe piezometers were installed in Boreholes RPT-02 and RTP-09 to monitor water levels after completion of drilling. The water levels measured in the piezometer and open boreholes are summarized in Table 5.2

Table 5.2 – Water Level Measurements

Borehole	Date	Water Level (m)		Comments
		Depth	Elevation	
RPT-02	July 24, 2012	6.2	201.8	In piezometer
RPT-03	May 30, 2012	5.1	203.0	Open borehole
RPT-05	May 30, 2012	7.3	200.2	Open borehole
RPT-07	May 31, 2012	9.7	196.2	Open borehole, water observed in the fill layer
RPT-09	July 24, 2012	12.3	192.6	In piezometer

The water levels observed in Boreholes RPT-03, RPT-05 and RPT-07 are believed to represent water added into the borehole during wash-boring and rock coring operations. The piezometric reading in Borehole RPT-02, taken approximately two months after piezometer installation, likely represents water retained within the core hole from the rock coring operations or from seepage along the bedrock surface, and is not believed to represent a stabilized groundwater level.

The piezometric reading from Borehole RPT-09 indicates that the groundwater level is near elevation 192.6 at the east abutment. This level is consistent with the level of ponded water noted in the southeast quadrant of the site during the fieldwork.

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.

5.7 Data from Previous Foundation Report

Five boreholes and two DCPTs were advanced at the site during the 1958 investigation carried out for the existing overhead structure. The approximate locations of these boreholes and DCPTs are included on the Borehole Locations drawing in Appendix H, and the borehole logs are reproduced in Appendix C.

The subsurface conditions encountered in the previous boreholes were variable, generally consisting of topsoil, native sand and native clay overlying granite bedrock to the south of the east abutment, and railway embankment fill (sand, gravel and boulders) over bedrock to the north of the structure.

The depths and elevations of the bedrock surface encountered in the previous boreholes are summarized in Table 5.3. In general, the bedrock surface identified in these boreholes slopes down from northwest to southeast.

Table 5.3 – Depths and Elevations of Top of Bedrock/Probable Bedrock in Previous Boreholes

Location	Borehole/DCPT	Top of Bedrock or Probable Bedrock	
		Depth below original grade (m)	Elevation (m)
South of structure	1	0.2	194.5
East pier	2	2.3	191.1
South of structure	3	6.4	186.6
East of structure	4	6.5	185.5
	5	6.7	184.6
North of structure	6	2.4	195.0
	7	1.8	195.4

It is noted that the original grades at the borehole locations varied from elevation 197.4 on the railway embankment (Borehole 6), to elevation 193.0 to the south of the highway alignment (Borehole 3), and elevation 191.3 to the east (Borehole 5).

6 MISCELLANEOUS

Borehole locations were selected and established in the field by Thurber Engineering Ltd. MRC provided plan drawings to obtain the co-ordinates and the ground surface elevations for the boreholes.

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

Eastern Ontario Diamond Drilling Ltd. from Hawkesbury, Ontario supplied truck mounted CME 55 drill rig and conducted the drilling, sampling and in-situ testing operations.

The drilling and sampling operations in the field were supervised on a full time basis by Mr. George Azzopardi and Ms. Eckie Siu Mei of Thurber Engineering Ltd.

Routine laboratory testing was carried out by Thurber Engineering Ltd.

Overall planning and supervision of the field program was conducted by Mr. Mark Farrant, P. Eng.

Interpretation of the data and preparation of the report was carried out by Ms. R. Palomeque Reyna, P.Eng. and Mr. Murray Anderson, P.Eng. The report was reviewed by Dr. P.K. Chatterji, P.Eng., a Designated Principal Contact for MTO Foundations Projects.

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Appendix A
Record of Borehole Sheets
(Present investigation)

SYMBOLS AND TERMS USED ON TEST HOLE LOGS

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 naked eye

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

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

TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

DESCRIPTIVE TERM	UNDRAINED SHEAR STRENGTH (kPa)		APPROX. SPT[1] "N" VALUE
Very Soft	< 10		< 2
Soft	10 to 25	(POCKET PEN)	2 to 4
Firm	25 to 50	(0.5-1)	4 to 8
Stiff	50 to 100	(1-2)	8 to 15
Very Stiff	100 to 200	(2-4)	15 to 30
Hard	> 200	(>4)	> 30

(1) Standard Penetration Test – the number of blows from a 63.5kg hammer falling through 0.76m to advance a 60 degree truncated cone 0.3m

TERMS DESCRIBING DENSITY(COHESIONLESS SOILS)

DESCRIPTIVE TERM	SPT "N" VALUE
Very Loose	< 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	> 50

HIERARCHY OF SOUL STRENGTH PREDICTION

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

LEGEND FOR TEST HOLE LOGS

■ Shelby Tube A -- Casing ⊠ SPT ▥ Grab/Auger sample ▯ Core ⊠ No Recovery

- MC – Moisture Content (% by Weight) as determined by sample

▼	Water Level
C_{vane}	Shear Strength Determination by Field Insitu Vane
C_{pen}	Shear Strength Determination by Pocket Penetrometer
C_{lab}	Shear Strength Determination using a Laboratory Vane Apparatus
C_U	Undrained Shear Strength determined by Unconfined Compression Test
AS/GS/BS	Auger Sample/Grab Sample/ Block Sample
SS	Split-spoon
SC	Soil core
AED	Oedometer test
TXL	Triaxial test

UNIFIED SOILS CLASSIFICATION

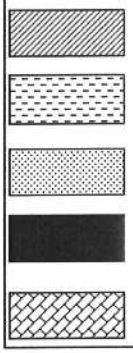
MAJOR DIVISIONS		GROUP SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines.
		GM	Silty gravels, gravel-sand-silt mixtures.
		GC	Clayey gravels, 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			

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



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

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

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-01 1 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 129.3 E 267 279.2 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY ES/GA

HWY 17 BOREHOLE TYPE Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.28 - 2012.05.29 CHECKED BY RPR

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
208.7											
0.0	**ASPHALT:** (88mm)										
0.1	**SAND** and **GRAVEL**, trace silt and clay Dense to Compact Brown Moist (FILL)		1	SS	44		208		○		36 56 7 (SI+CL)
			2	SS	15						
	Cored through cobbles and boulders Cobbles (75mm) at 1.6m		3	SS	36		207		○		
	Cobbles from 2.1m to 2.3m No recovery		4	SS	15		206				
	Cobbles from 2.8m to 3.0m No recovery		5	SS	58/ 0.275		205				
	Cobbles and boudlers from 3.4m to 4.6m										
	Cored through cobbles and boulders from 4.3m to 9.1m (FILL)		6	SS	100/ 0.050		204				
							203				
	No recovery		7	SS	50/ 0.100						
							202				
	No recovery		8	SS	50/ 0.150		201				
							200				
199.6											
9.1	END OF BOREHOLE AT 9.1m. BOREHOLE OPEN TO 9.1m AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE FROM 9.1m TO 0.1m.		9	SS	50/ 0.0						

Continued Next Page

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

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

ONTMT4S 1197.GPJ 7/20/12

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-01 2 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 129.3 E 267 279.2 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY ES/GA

HWY 17 BOREHOLE TYPE Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.28 - 2012.05.29 CHECKED BY RPR

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

ONTMT4S 1197.GPJ 7/20/12

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

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

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-02 1 OF 1 METRIC

W.P. 6103-10-00 LOCATION N 5 411 125.4 E 267 304.7 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY ES

HWY 17 BOREHOLE TYPE Hollow Stem Augers/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.25 - 2012.05.25 CHECKED BY RPR

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 (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
208.0											
0.0 / 0.1	**ASPHALT:** (63mm)						208				
	SAND and **GRAVEL**, , trace silt and clay, occasional cobbles and boulders Dense to Compact Brown Moist to Damp (FILL)		1	GS							41 54 6 (SI+CL)
			1	SS	43		207				
			2	SS	20		206				
			3	SS	30						
	Very Dense		4	SS	76		205				
	Cored through cobbles and boulders						204				
	Compact Start coring at 5.4m		5	SS	27		203			FI	
202.4										>15	RUN #1 TCR=100% SCR=69% RQD=59% UCS=191MPa (Average)
5.6	**BEDROCK**, granite, slightly weathered to fresh, pink and grey, occasional vertical and subvertical breaks Sub-vertical fracture (125mm) at 5.8m		1	RUN			202			>5	
	Sub-horizontal fracture (25mm) at 5.9m		2A	RUN						0	RUN #2A Core barrel jammed. No core recovery
			2B	RUN			201			0 1 1 2	RUN #2B TCR=100% SCR=100% RQD=100% UCS=165MPa (Average)
200.1			3	RUN						0	RUN #3 TCR=100% SCR=100% RQD=100%
7.9	END OF BOREHOLE AT 7.9m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Jul.24/12 6.2 201.8										

SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE

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

(%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 3/20/13

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-03 1 OF 1 METRIC

W.P. 6103-10-00 LOCATION N 5 411 120.8 E 267 297.3 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY GA

HWY 17 BOREHOLE TYPE Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.30 - 2012.05.30 CHECKED BY RPR

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
208.1											
0.0 / 0.1 / 207.6	**APPROACH SLAB** 75mm of asphalt over 455mm of concrete						208				
0.5	**SAND** and **GRAVEL** Compact to Loose Brown Damp (FILL)		1	SS	15				○		54 43 3 (SI+CL)
	Reddish Brown		2	SS	8		207		○		
	Very Dense No recovery, spoon bouncing		3	SS	50/ 0.0		206				
	Cored through cobbles and boulders from 3.0m to 4.5m No recovery		4	SS	50/ 0.150		205				
	No recovery, spoon bouncing		5	SS	50/ 0.0		204				
202.9	Start coring at 5.2m					▽	203			FI	
5.2	**BEDROCK**, granite, moderately weathered, grey, occasional vertical and subvertical breaks									1	RUN #1 TCR=100% SCR=59% RQD=81% UCS=146MPa (Average)
	Horizontal joint at 5.6m, 6.5m		1	RUN						1	
	Highly broken zones: 125mm at 5.8 100mm at 6.4m						202			5	
	Pink and Grey Fresh									0	
										>5	RUN #2 TCR=100% SCR=100% RQD=100% UCS=178MPa (Average)
			2	RUN			201			0	
200.0										0	
8.1	END OF BOREHOLE AT 8.1m. WATER LEVEL AT 5.1m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG FROM 8.1m TO 0.1m, THEN ASPHALT TO SURFACE.									0	
										0	
										0	

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

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

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THURBER

RECORD OF BOREHOLE No RPT-04 1 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 118.6 E 267 318.7 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY ES

HWY 17 BOREHOLE TYPE Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.25 - 2012.05.25 CHECKED BY RPR

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/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
207.5											
0.0 / 0.1 / 207.1 / 0.4	**BRIDGE DECK** 75mm of asphalt over 265mm of concrete Gap between underside of bridge deck and ground surface						207				
							206				
							205				
							204				
							203				
							202				
							201				
200.5 / 7.0	**SAND** and **GRAVEL**, occasional cobbles Compact Brown Moist (FILL)		1	SS	23		200		○	FI	RUN #1 TCR=100% SCR=0% RQD=0%
199.7 / 7.8	Layer of cobbles and boulders Start coring at 7.6m Cobbles from 7.5m to 7.8m		1	RUN						>5 3 3	
	BEDROCK, quartz diorite, slightly weathered to fresh, grey, occasional vertical and subvertical breaks Sub-vertical fracture (125mm) at 7.8m Sub-vertical fractures (25mm to 75mm) at 8.1m, 8.5m, 8.8m, 9.3m 100mm at 8.2m Broken zone: 75mm at 9.2m		2	RUN			199			3 1 >5	RUN #2 TCR=100% SCR=95% RQD=90% UCS=215MPa (Average)
							198			>5 3	RUN #3

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+ ³, × ³ : Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-04 2 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 118.6 E 267 318.7 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY ES

HWY 17 BOREHOLE TYPE Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.25 - 2012.05.25 CHECKED BY RPR

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued From Previous Page										
	BEDROCK, quartz diorite, fresh, vertical and subvertical breaks Sub-vertical fractures: 125mm at 9.7m 175mm at 10.0m Sub-vertical fractures at: 50mm at 10.3m 100mm at 10.5m		3	RUN			197			1 1 2 0	TCR=100% SCR=100% RQD=100% UCS=245MPa (Average)
196.4 11.0	END OF BOREHOLE AT 11.0m. BOREHOLE BACKFILLED WITH HOLEPLUG TO 0.3m, CONCRETE FROM 0.3m TO 0.1m, THEN ASPHALT TO SURFACE.										

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

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

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 3/20/13

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-05 1 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 113.2 E 267 313.2 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY GA

HWY 17 BOREHOLE TYPE Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.30 - 2012.05.30 CHECKED BY RPR

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
207.5							207				
0.0	**BRIDGE DECK**										
0.1 / 207.2	75mm of asphalt over 225mm of concrete										
0.3	Gap between underside of bridge deck and ground surface										
							206				
							205				
							204				
							203				
201.8							202				
5.7	**SAND** and **GRAVEL**, some silt and clay Loose to Compact Brown Damp (FILL)		1	SS	7				○		32 57 11 (SI+CL)
			2	SS	12		201		○		
	Black					▽					
200.0	Start coring at 7.5m		3	SS	50/ 0.150					FI	
7.5	**BEDROCK**, granite, slightly weathered to fresh, pink and white, occasional vertical and subvertical breaks		1	RUN			200		○	1 0 0 0	RUN #1 TCR=100% SCR=98% RQD=96% UCS=152MPa (Average)
							199			1	RUN #2
	Horizontal joints at 7.8m, 8.7m		2	RUN						0 0 0	TCR=100% SCR=100% RQD=100% UCS=216MPa (Average)
							198			0	
197.6										0	

Continued Next Page

+ ³ , × ³ : Numbers refer to Sensitivity

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

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 3/20/13

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-05 2 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 113.2 E 267 313.2 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY GA

HWY 17 BOREHOLE TYPE Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.30 - 2012.05.30 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
9.9	END OF THE BOREHOLE AT 9.9m. WATER LEVEL AT 7.3m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG FROM 9.9m TO 5.7m. AT BRIDGE DECK, BOREHOLE BACKFILLED WITH CONCRETE TO 0.06m, THEN ASPHALT TO SURFACE.										

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

20
15 ⊕ 5
10
(%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 3/20/13

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-06 1 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 102.6 E 267 352.4 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY ES

HWY 17 BOREHOLE TYPE Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.25 - 2012.05.25 CHECKED BY RPR

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
205.8											
0.0	**BRIDGE DECK**										
0.1	63mm of asphalt over 280mm of concrete										
205.5											
0.3	Gap between underside of bridge deck and ground surface										
							205				
							204				
							203				
							202				
							201				
200.8											
5.0	**SAND** and **GRAVEL**, trace silt and clay Very Loose Brown Damp (FILL)		1	SS	0				○		47 52 1 (SI+CL)
199.8							200				
6.0	**SAND**, trace to some gravel, trace silt Very Loose to Loose Brown Damp (FILL)		2	SS	2				○		
			3	SS	1		199		○		
			4	SS	3		198		○		
			5	SS	2		197		○		11 87 2 (SI+CL)
			6	SS	7		196		○		

Continued Next Page

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

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

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 3/20/13

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-06 2 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 102.6 E 267 352.4 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY ES

HWY 17 BOREHOLE TYPE Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.25 - 2012.05.25 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100; SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	Continued From Previous Page										
	SAND Compact Brown Moist (FILL)										
			7	SS	15		195		○		
194.0											
11.8	END OF BOREHOLE AT 11.8m UPON REFUSAL ON PROBABLE BEDROCK. BOREHOLE BACKFILLED WITH HOLEPLUG TO 5.0m. AT BRIDGE DECK, BOREHOLE BACKFILLED WITH CONCRETE TO SURFACE.										

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

20
15 ⊕ 5
10
(%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 3/20/13

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-07 1 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 097.4 E 267 346.7 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY GA

HWY 17 BOREHOLE TYPE NW Casing/NQ Coring COMPILED BY AN

DATUM Geodelic DATE 2012.05.31 - 2012.05.31 CHECKED BY LRB

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
205.9												
0.0 / 0.1 / 205.6 / 0.3	**BRIDGE DECK** 88mm of asphalt over 228mm of concrete											
	Gap between underside of bridge deck and ground surface						205					
							204					
							203					
							202					
201.1												
4.8	**SAND**, trace silt and clay Very Loose Brown Damp (FILL)		1	SS	2		201			○		
			2	SS	2		200			○		
			3	SS	2		199			○		0 98 2 (SI+CL)
			4	SS	2		198			○		
	Loose to Very Loose Wet		5	SS	4		197			○		
			6	SS	3	▽	196			○		0 98 2 (SI+CL)

Continued Next Page

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

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

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 3/20/13

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-07 2 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 097.4 E 267 346.7 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY GA

HWY 17 BOREHOLE TYPE NW Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.31 - 2012.05.31 CHECKED BY LRB

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 + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued From Previous Page										
	SAND, trace silt and clay Loose Brown Wet (FILL)						195		○		
			7	SS	6						
193.9							194				
12.0	**SAND**, trace silt and clay Compact Brown Wet										
			8	SS	19		193		○		
192.2											
13.7	Clayey **SILT** Soft Grey Start coring at 14.4m						192				
			9	SS	50/ 0.150				○		
191.4										FI	
14.5	**BEDROCK**, granite, slightly weathered to fresh, pink and white, occasional vertical breaks									0	RUN #1 TCR=100% SCR=100% RQD=100% UCS=188.9MPa (Average)
			1	RUN			191			1	
	Horizontal joints at 14.8m									0	
										0	
										0	
							190			0	RUN #2 TCR=100% SCR=100% RQD=100% UCS=185.7MPa (Average)
			2	RUN						0	
							189			0	
										0	
188.4										0	
17.5	END OF BOREHOLE AT 17.5m. WATER LEVEL AT 9.7m UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG FROM 17.5m TO 4.8m. AT BRIDGE DECK, BOREHOLE BACKFILLED WITH CONCRETE FROM 0.3m TO 0.15m, THEN ASPHALT TO SURFACE.										

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

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

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 3/20/13

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-08 1 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 094.8 E 267 369.0 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY ES

HWY 17 BOREHOLE TYPE Hollow Stem Augers/Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.23 - 2012.05.24 CHECKED BY RPR

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) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
204.7											
0.0	**APPROACH SLAB** 50mm of asphalt over 810mm of concrete										
203.8							204				
0.9	**SAND** and **GRAVEL**, occasional cobbles Very Dense to Dense Brown Wet (FILL)		1	SS	61						
			2	SS	36		203				
201.9			3	SS	18				○		
2.8	**SAND**, fine grained, trace to some gravel, trace silt and clay Loose to Compact Brown Wet (FILL)		4	SS	11		202		○		14 83 3 (SI+CL)
			5	SS	10		201		○		
			6	SS	9		200		○		0 98 2 (SI+CL)
	Occasional cobbles		7	SS	14		199		○		
			8	SS	153/ 0.225		198		○		
	Cobble						197				
							196				
							195				

Continued Next Page

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

(%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 3/20/13

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-08 2 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 094.8 E 267 369.0 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY ES

HWY 17 BOREHOLE TYPE Hollow Stem Augers/Casing/NQ Coring COMPILED BY AN

DATUM Geodetic DATE 2012.05.23 - 2012.05.24 CHECKED BY RPR

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued From Previous Page										
	SAND, trace gravel, trace silt and clay Compact Brown Wet (FILL)		9	SS	22		194		○		
193.1							193				
11.6	**SAND**, some gravel, occasional cobbles Dense Brown Wet		10	SS	35				○		
	Layer of cobbles and boulders						192				
191.5	Start coring at 13.1m									FI	
13.2	**BEDROCK**, granite, slightly weathered to fresh, pink and grey, occasional vertical and subvertical breaks		1	RUN			191			5 0 0	RUN #1 TCR=100% SCR=89% RQD=89% UCS=140MPa (Average)
			2	RUN			190			0 1 2 3 2	RUN #2 TCR=100% SCR=96% RQD=96% UCS=158MPa (Average)
188.5			3	RUN			189			2 3 0	RUN #3 TCR=100% SCR=100% RQD=100% UCS=170MPa (Average)
16.2	END OF BOREHOLE AT 16.2m. BOREHOLE BACKFILLED WITH HOLEPLUG TO 0.9m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

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

(%) STRAIN AT FAILURE

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 3/20/13

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-09 1 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 090.2 E 267 361.7 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY GA

HWY 17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2012.05.31 - 2012.05.31 CHECKED BY RPR

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
204.9											
0.0	**ASPHALT:** (75mm)										
0.1	**SAND** and **GRAVEL**, trace silt and clay Compact to Dense Brown (FILL)		1	SS	20				○		
			2	SS	24		204		○		30 66 4 (SI+CL)
203.4											
1.4	**SAND**, trace gravel, trace silt and clay Compact to Dense Brown Damp (FILL)		3	SS	15		203		○		
			4	SS	32				○		
			5	SS	16		202		○		
	Loose		6	SS	8		201		○		
			7	SS	9		200		○		
			8	SS	8		199		○		0 91 9 (SI+CL)
	Compact Damp		9	SS	13		198		○		
							197				
							196				
							195				

Continued Next Page

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

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

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-09 2 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 090.2 E 267 361.7 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY GA

HWY 17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2012.05.31 - 2012.05.31 CHECKED BY RPR

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	Continued From Previous Page										
194.2											
10.7	**SAND**, some gravel, trace silt Dense Brown		10	SS	50		194		○		
							193				
			11	SS	35				○		
							192				
			12	SS	44		191		○		20 78 2 (SI+CL)
190.3											
14.6	END OF BOREHOLE AT 14.6m UPON REFUSAL ON PROBABLE BEDROCK. BOREHOLE OPEN TO 14.6m AND WATER LEVEL AT 11.8m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Jul.24/12 12.3 192.6										

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

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

ONTMT4S 1197.GPJ 2012TEMPLATE(MTO).GDT 3/20/13

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-10 1 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 086.2 E 267 387.0 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY ES

HWY 17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2012.05.23 - 2012.05.23 CHECKED BY RPR

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
203.5											
0.0	**ASPHALT:** (88mm)										
0.1	**SAND** and **GRAVEL** Dense to Very Dense Brown Damp (FILL)		1	SS	44		203		○		
			2	SS	55		202		○		
201.6			3	SS	23				○		
1.9	**SAND**, fine grained, trace gravel, trace silt and clay Compact to Dense Brown Damp (FILL)		4	SS	29		201		○		1 95 4 (SI+CL)
			5	SS	33		200		○		
			6	SS	19		199		○		
			7	SS	47		198		○		
	Very Dense to Dense		8	SS	59		197		○		
			9	SS	47		196		○		
193.7							195				
9.8	END OF BOREHOLE AT 9.8m.						194				

Continued Next Page

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

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

ONTMT4S 1197.GPJ 7/20/12

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No RPT-10 2 OF 2 METRIC

W.P. 6103-10-00 LOCATION N 5 411 086.2 E 267 387.0 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY ES

HWY 17 BOREHOLE TYPE Hollow Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2012.05.23 - 2012.05.23 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	WATER CONTENT (%) 20 40 60	kN/m^3	GR SA SI CL
	Continued From Previous Page										
	BOREHOLE DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH HOLEPLUG TO 0.1m, THEN ASPHALT TO SURFACE.										

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

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

ONTMT4S 1197.GPJ 7/20/12

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No TP-01 1 OF 1 METRIC

W.P. 6103-10-00 LOCATION N 5 411 110.1 E 267 313.6 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY GA

HWY 17 BOREHOLE TYPE Hand Shovel COMPILED BY AN

DATUM Geodetic DATE 2012.05.29 - 2012.05.29 CHECKED BY LRB

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa O UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
198.0 / 0.0	BEDROCK AT SURFACE. BEDROCK EXPOSED ON SOUTH WEST SIDE OF BRIDGE.										

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

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

ONTMT4S 1197.GPJ 7/20/12

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No TP-02 1 OF 1 METRIC

W.P. 6103-10-00 LOCATION N 5 411 112.1 E 267 320.9 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY GA

HWY 17 BOREHOLE TYPE Hand Shovel COMPILED BY AN

DATUM Geodetic DATE 2012.05.29 - 2012.05.29 CHECKED BY RPR

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT w_P w w_L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE; 20 40 60 80 100	WATER CONTENT (%) 20 40 60	kN/m^3	GR SA SI CL
198.0											
0.0	**SAND** and **GRAVEL**, occasional rootlets Brown Damp (FILL)						198				
197.4											
0.6	END OF TEST PIT ON BEDROCK ENCOUNTERED AT 0.6m.										

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

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

ONTMT4S 1197.GPJ 7/20/12

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Ontario

THURBER

RECORD OF BOREHOLE No TP-03 1 OF 1 METRIC

W.P. 6103-10-00 LOCATION N 5 411 113.8 E 267 327.2 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY GA

HWY 17 BOREHOLE TYPE Hand Shovel COMPILED BY AN

DATUM Geodetic DATE 2012.05.29 - 2012.05.29 CHECKED BY LRB

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
198.0											
0.0	**SAND** and **GRAVEL** Brown Damp (FILL)						198				
197.2											
0.8	END OF TEST PIT ON BEDROCK ENCOUNTERED AT 0.8m.										

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

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

ONTMT4S 1197.GPJ 7/20/12

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No TP-04 1 OF 1 METRIC

W.P. 6103-10-00 LOCATION N 5 411 115.2 E 267 332.3 CP Overhead at Rossport, Mile 14.11 ORIGINATED BY GA

HWY 17 BOREHOLE TYPE Hand Shovel COMPILED BY AN

DATUM Geodetic DATE 2012.05.29 - 2012.05.29 CHECKED BY LRB

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L; WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
198.0											
0.0	**SAND** and **GRAVEL** Brown Damp (FILL)						198				
197.4											
0.6	END OF TEST PIT ON BEDROCK ENCOUNTERED AT 0.6m.										

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

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

ONTMT4S 1197.GPJ 7/20/12

Appendix B

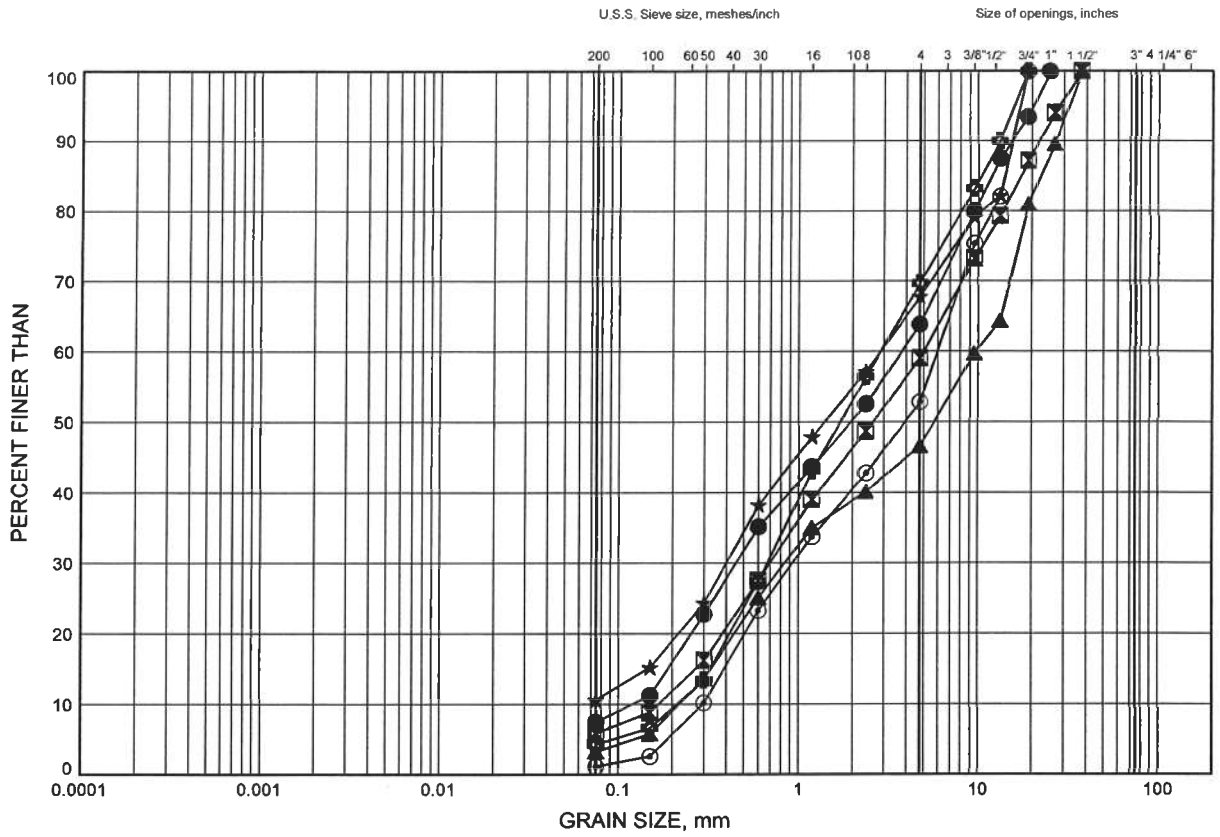
Laboratory Test Results
(Present investigation)

NWR 32 Rehabs

GRAIN SIZE DISTRIBUTION

FIGURE B1

SAND & GRAVEL FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	RPT-01	0.38	208.32
⊠	RPT-02	0.38	207.62
▲	RPT-03	1.07	207.03
★	RPT-05	6.10	201.40
⊙	RPT-06	5.33	200.46
✿	RPT-09	1.07	203.83

Date July 2012

W.P.# 6103-10-00

THURBER

Prep'd AN

Chkd. RPR

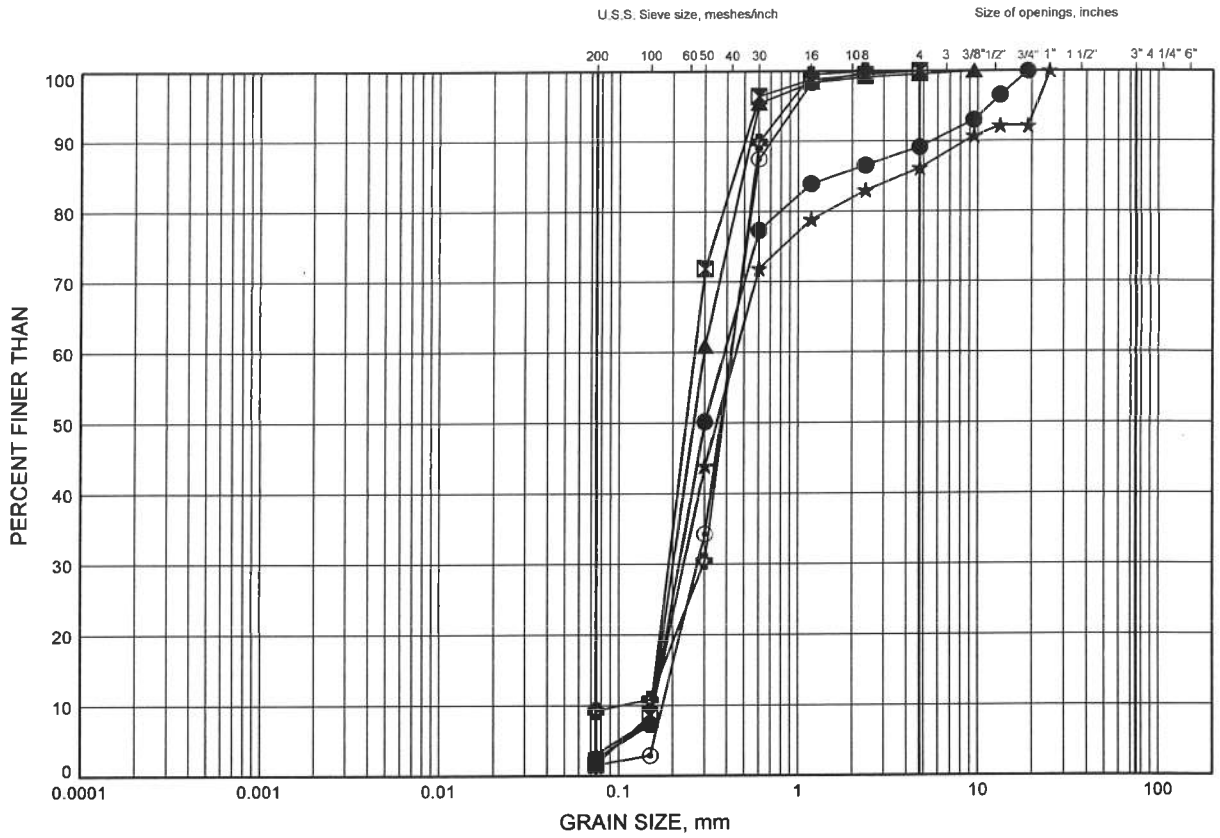
GRAIN SIZE DISTRIBUTION - THURBER 1197.GPJ 7/17/12

NWR 32 Rehabs

GRAIN SIZE DISTRIBUTION

FIGURE B2

SAND FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	RPT-06	8.69	197.11
⊠	RPT-07	6.71	199.19
▲	RPT-07	9.75	196.14
★	RPT-08	3.35	201.35
⊙	RPT-08	6.40	198.30
✿	RPT-09	7.92	196.97

Date August 2012

W.P.# 6103-10-00

THURBER

Prep'd AN

Chkd. RPR

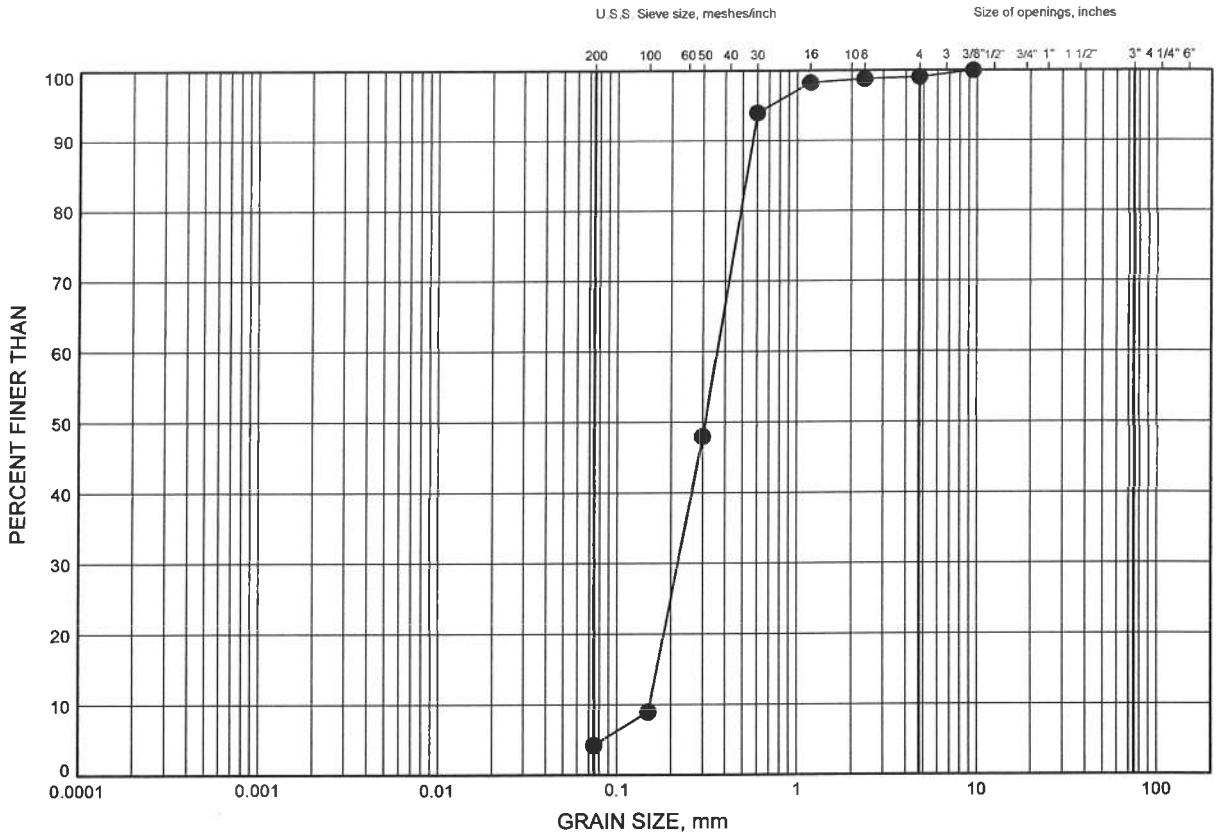
GRAIN SIZE DISTRIBUTION - THURBER 1197.GPJ 8/15/12

NWR 32 Rehabs

GRAIN SIZE DISTRIBUTION

FIGURE B3

SAND FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	RPT-10	2.59	200.91

Date August 2012

W.P.# 6103-10-00

THURBER

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Chkd. RPR

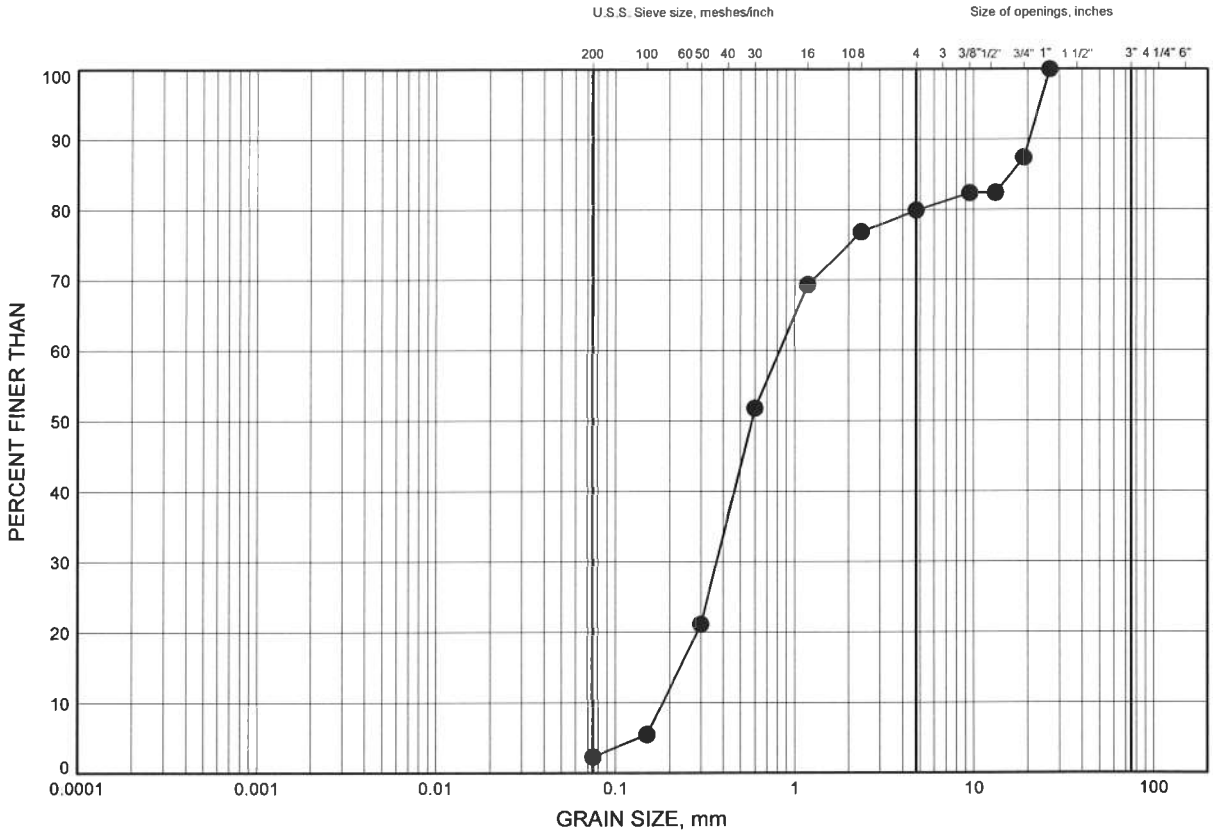
GRAIN SIZE DISTRIBUTION - THURBER 1197.GPJ 8/15/12

NWR 32 Rehabs

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)
●	RPT-09	14.02	190.88

Date March 2013

W.P. 6103-10-00

THURBER

Prep'd AN

Chkd. RPR

GRAIN SIZE DISTRIBUTION - THURBER 1197.GPJ 3/20/13

THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

POINT LOAD TEST SHEET

Job No : 19-1351-197 **Client :** MRC

Date Drilled : 5/24/2012

Project Name : CP Overhead at Rossport, Mileage 14.11 **Date Tested :** 6/1/2012

Core Size : NQ **BH No :** RPT-08 **Tester :** SLL

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	1	13.3	D	13.2	47.3	80.1	138.1	Granite	Very Strong
2	1	13.6	D	14.2	47.3	78.6	148.1	Granite	Very Strong
3	1	13.9	D	12.7	47.3	84.5	132.8	Granite	Very Strong
4	2	14.2	D	15.4	47.3	79.1	161.6	Granite	Very Strong
5	2	14.5	D	15.5	47.3	91.3	162.5	Granite	Very Strong
6	2	14.9	D	17.1	47.3	79.2	179.3	Granite	Very Strong
7	2	15.2	D	14.1	47.3	96.3	147.5	Granite	Very Strong
8	2	15.4	D	13.5	47.3	81.1	141.5	Granite	Very Strong
9	3	15.8	D	16.4	47.3	93.2	171.5	Granite	Very Strong
10	3	16.1	D	16.0	47.3	79.6	167.3	Granite	Very Strong
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

* It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1
Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.

THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

POINT LOAD TEST SHEET

Job No :	19-1351-197	**Client :**	MRC
		Date Drilled :	5/26/2012
Project Name :	CP Overhead at Rossport, Mileage 14.11	**Date Tested :**	6/12/2012
Core Size :	NQ **BH No :** RPT-02	**Tester :**	SLL

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	1	5.8	D	18.0	47.2	96.7	188.2	Granite	Very Strong
2	1	6.1	D	18.5	47.2	86.1	194.1	Granite	Very Strong
3	2	6.4	D	15.3	47.2	76.5	160.2	Granite	Very Strong
4	2	6.7	D	15.2	47.2	69.3	159.4	Granite	Very Strong
5	2	7.0	D	16.2	47.2	71.3	170.2	Granite	Very Strong
6	2	7.3	A	22.7	47.2	56.6	171.7	Granite	Very Strong
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

* It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1
Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.

THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

POINT LOAD TEST SHEET

Job No : 19-1351-197 **Client :** HMM

Date Drilled : 5/30/2012

Project Name : CP Overhead at Rossport, Mileage 14.11 **Date Tested :** 6/12/2012

Core Size : NQ **BH No :** RPT-03 **Tester :** SLL

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	1	5.5	D	9.4	47.2	77.7	98.9	Granite	Strong
2	1	6.1	D	18.4	47.2	79.1	193.2	Granite	Very Strong
3	2	6.7	D	16.0	47.2	86.4	167.4	Granite	Very Strong
4	2	7.1	D	11.4	47.2	90.3	119.5	Granite	Very Strong
5	2	7.4	D	15.1	47.2	86.9	157.9	Granite	Very Strong
6	2	7.7	D	18.4	47.2	87.3	192.8	Granite	Very Strong
7	2	8.1	D	24.1	47.2	78.1	253.3	Granite	Extremely Strong
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
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24									
25									
26									
27									
28									
29									
30									

* It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1
Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.

THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

POINT LOAD TEST SHEET

Job No : 19-1351-197 **Client :** MRC

Date Drilled : 5/25/2012

Project Name : CP Overhead at Rossport, Mileage 14.11 **Date Tested :** 6/1/2012

Core Size : NQ **BH No :** RPT-04 **Tester :** SLL

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	2	8.1	D	18.8	47.1	95.4	198.0	Granite	Very Strong
2	2	8.4	D	22.0	47.1	110.4	231.5	Granite	Very Strong
3	2	9.0	D	19.4	47.1	76.4	204.2	Granite	Very Strong
4	2	9.4	D	21.5	47.1	68.2	226.6	Granite	Very Strong
5	3	9.6	D	28.3	47.1	74.9	298.3	Granite	Extremely Strong
6	3	9.9	D	19.8	47.1	88.0	209.3	Granite	Very Strong
7	3	10.3	D	24.0	47.1	79.4	253.2	Granite	Extremely Strong
8	3	10.5	D	21.0	47.1	91.2	221.5	Granite	Very Strong
9	3	10.8	D	23.0	47.1	87.8	242.1	Granite	Very Strong
10									
11									
12									
13									
14									
15									
16									
17									
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24									
25									
26									
27									
28									
29									
30									

* It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1
Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.

THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

POINT LOAD TEST SHEET

Job No : 19-1351-197 **Client :** HMM

Date Drilled : 5/30/2012

Project Name : CP Overhead at Rossport, Mileage 14.11 **Date Tested :** 6/12/2012

Core Size : NQ **BH No :** RPT-05 **Tester :** SLL

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	1	7.7	D	15.2	47.1	86.3	160.0	Granite	Very Strong
2	1	8.0	D	19.0	47.1	79.4	200.5	Granite	Very Strong
3	1	8.3	D	17.1	47.1	81.8	180.4	Granite	Very Strong
4	1	8.6	D	6.2	47.1	93.4	65.2	Granite	Strong
5	2	8.9	D	17.4	47.1	79.1	183.4	Granite	Very Strong
6	2	9.2	D	17.2	47.1	86.9	181.5	Granite	Very Strong
7	2	9.6	D	30.0	47.1	80.8	316.5	Granite	Extremely Strong
8	2	9.9	D	17.5	47.1	93.4	184.3	Granite	Very Strong
9									
10									
11									
12									
13									
14									
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27									
28									
29									
30									

* It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1
Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.

THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

POINT LOAD TEST SHEET

Job No : 19-1351-197 **Client :** HMM

Date Drilled : 5/31/2012

Project Name : CP Overhead at Rossport, Mileage 14.11 **Date Tested :** 6/12/2012

Core Size : NQ **BH No :** RPT-07 **Tester :** SLL

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	1	14.8	D	17.5	47.1	83.9	184.4	Granite	Very Strong
2	1	15.1	D	16.5	47.1	84.8	173.5	Granite	Very Strong
3	1	15.5	D	19.3	47.1	98.1	203.7	Granite	Very Strong
4	1	15.7	D	18.4	47.1	75.6	194.0	Granite	Very Strong
5	2	16.1	D	15.8	47.1	88.0	166.4	Granite	Very Strong
6	2	16.4	D	19.8	47.1	76.2	208.6	Granite	Very Strong
7	2	16.7	D	18.9	47.1	80.0	199.5	Granite	Very Strong
8	2	17.0	D	13.5	47.1	81.1	142.1	Granite	Very Strong
9	2	17.3	D	20.1	47.1	94.6	212.0	Granite	Very Strong
10									
11									
12									
13									
14									
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27									
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29									
30									

* It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1
Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

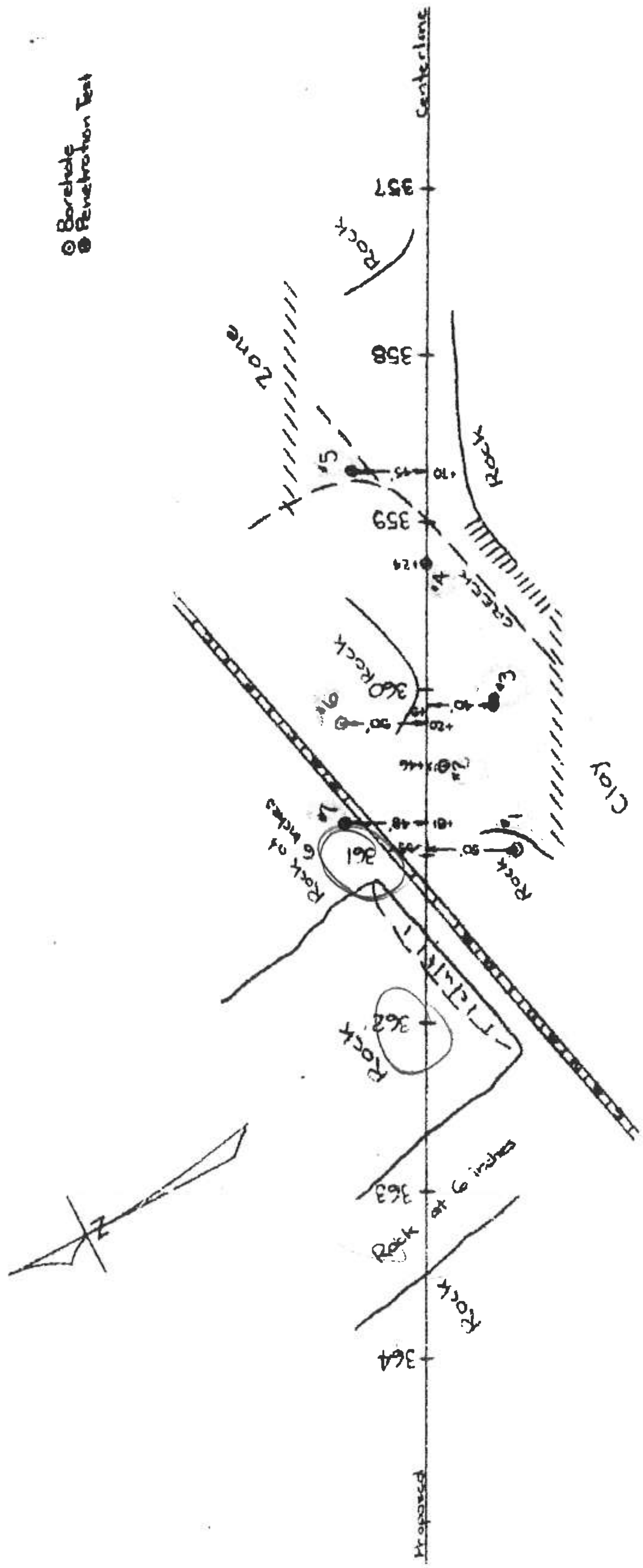
* Diametral Test should have 0.7 x D on either side of test point.

Appendix C

Record of Borehole Sheets and Laboratory Results (previous investigation)

PROJECT NO. 0129/J213

DRAWING NO. 1



Plan Showing Hole Locations & Rock Outcrops

SCALE 1" = 100'

TROW SODERMAN & ASSOCIATES

PROJECT NO. 6129 3213

DRAWING NO. 2

TROW SODERMAN AND ASSOCIATES

SITE INVESTIGATIONS AND SOIL MECHANICS CONSULTATION

PROJECT Rossport Overpass
LOCATION Rossport, Ont.
HOLE LOCATION See Dwg.#1
HOLE ELEVATION AND DATUM 638.7
B/R C.P.R. @ Sta. 36+18 = 648.9

BOREHOLE NO. 1
FIELD SUPERVISOR DS
DRILLER AA
PREP. DS

LEGEND
- 2" DIA. SPLIT TUBE
- 2" SHELBY TUBE
- 2" SPLIT TUBE
- 2" DIA. CONE
- CASING
- 2" SHELBY
- 1/2 UNCONFINED COMPRESSION (Qu)
- VANE TEST (Cu) AND SENSITIVITY (S)
- NATURAL MOISTURE AND LIQUIDITY INDEX
- LIQUID LIMIT
- PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE P.S.F. BLOWS/FT.	CONSISTENCY MOIST. CONTENT-% DRY WT.	SAMPLE	NATURAL UNIT WT. P.C.F.
	Topsoil	638.7	0				
	Bedrock - granite	638.2					
	End of hole	634.2	5				
			10				
			15				
			20				

PROJECT NO. C129/J213

DRAWING NO. 3

TROW SODERMAN AND ASSOCIATES

SITE INVESTIGATIONS AND SOIL MECHANICS CONSULTATION

PROJECT Rossport Overpass,
LOCATION Rossport, Ont.
HOLE LOCATION See Dwg. #1
HOLE ELEVATION AND DATUM 634.3
B/R C.P.R. @ Sta. 361 +18 = 648.9

BOREHOLE NO. 2
FIELD SUPERVISOR DS
DRILLER AA
PREP. DS

LEGEND
- 2" DIA. SPLIT TUBE
- 3" SHELEY TUBE
- 2" SPLIT TUBE
- 3" DIA. CONE
- CASING
- 3" SHELBY
- 1 2 UNCONFINED COMPRESSION (Qu)
- VANE TEST (C) AND SENSITIVITY (S)
- NATURAL MOISTURE AND LIQUIDITY INDEX
- LIQUID LIMIT
- PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV FEET	DEPTH FEET
	Topsoil	634.3	0
		633.6	
	SAND - clean brown medium		
		629.8	
	CLAY - grey, soft with sand sizes present.		5
		626.9	
	BEDROCK - granite		10
			15
	End of hole	618.1	20

STRENGTH AND PENETRATION RESISTANCE
Shear Strength 500 1000 P.S.F.
BLOWS FT.

CONSISTENCY
MOIST. CONTENT % DRY WT.

NATURAL UNIT WT. P.C.F.

SS1

C129/J213

DRAWING NO. 4

TROW SODERMAN AND ASSOCIATES

Rossport Overpass
Rossport, Ont.
See Dwg. #1
633.3
B/R CPR @ Sta. 361+18 = 648.9

BOREHOLE NO. 3
DRILLER DS
LOGGED AA
CHKD DS

Topsoil	633.3 / 632.8
SAND - brown, medium	630.3
CLAY - grey, stiff at first, then contains sand sizes	
Coarse sand and gravel present	
End of hole	614.3

STRENGTH AND PENETRATION RESISTANCE

Shear Str. 500 1000 BLOWS/FT

0 10 20

5

10

15

20

Refusal →

CONSISTENCY NATURAL MOISTURE CONTENT % W

20 30 40

TW1 No recovery
TW2 "
TW3 "
TW4 "
TW5 "
TW6 Damaged
TW7 No recovery

16' clay

PROJECT NO. 0129/3213

DRAWING NO. 5

TROW SODERMAN AND ASSOCIATES

SITE INVESTIGATIONS AND SOIL MECHANICS CONSULTATION

PROJECT Rossport Overpass

LOCATION Rossport, Ont.

RELOCATION See Dwg. #1

ELEVATION AND DATUM 630.0
B/R CPR @Sta. 361+18 = 648.9

BOREHOLE NO. 4

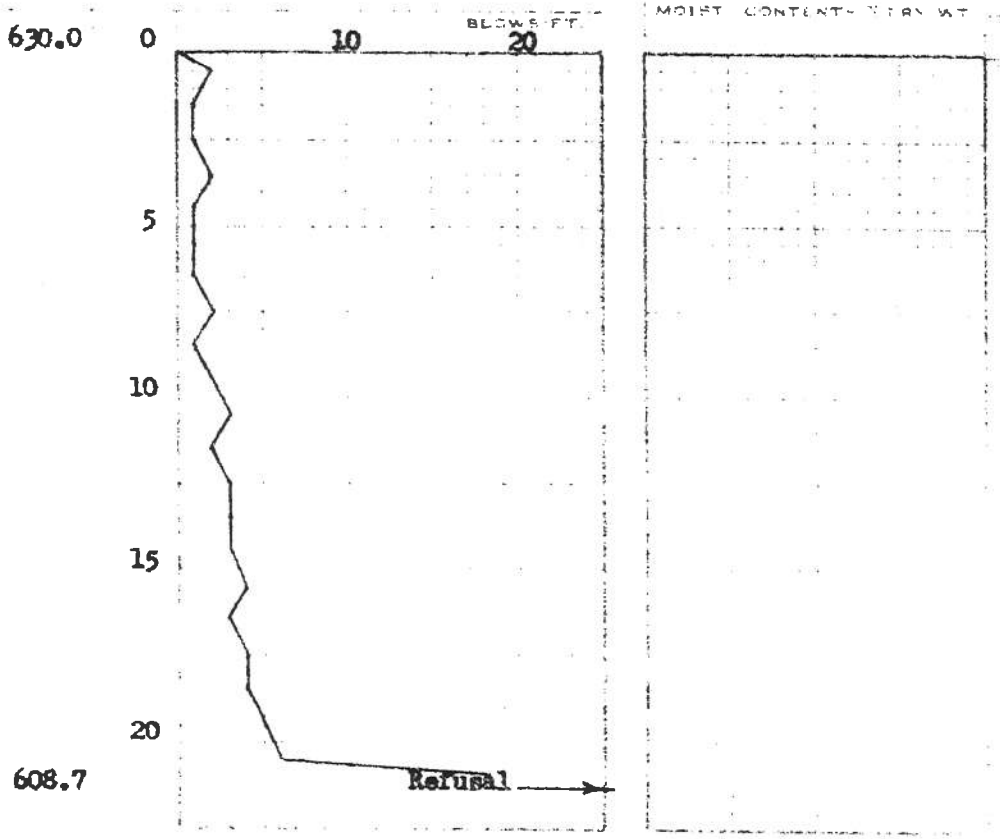
FIELD SUPERVISOR DS

DRILLER AA

PREP. DS

LEGEND
- 2" DIA. SPLIT TUBE
- 3" SHELBY TUBE
- 4" SPLIT TUBE
- 3¼" DIA. CONE
- CASING
- 2" SHELBY
- 1-2 UNCONFINED COMPRESSION (Qu)
- VANE TEST (C) AND SENSITIVITY (S)
- NATURAL MOISTURE AND LIQUIDITY INDEX (X)
- LIQUID LIMIT
- PLASTIC LIMIT

ELEVATION (FEET) | DEPTH (FEET) | STRENGTH AND PENETRATION RESISTANCE P.S.F. | CONSISTENCY | NATURAL SAMPLE UNIT WT P.C.F. | MOIST. CONTENT - % DRY WT.



Penetration test

21.3' clay

PROJECT NO. C129/J213

DRAWING NO. 6

TROW SODERMAN AND ASSOCIATES

SITE INVESTIGATIONS AND SOIL MECHANICS CONSULTATION

PROJECT Rossport Overpass
LOCATION Rossport, Ont.
HOLE LOCATION See Dwg.1
HOLE ELEVATION AND DATUM 627.6
B/H CPR @ Sta. 361+18 = 648.9

BOREHOLE NO. 5
FIELD SUPERVISOR DS
DRILLER AA
PREP. DS

LEGEND
- 1" DIA. SPLIT TUBE
- 2" SHELBY TUBE
- 2" SPLIT TUBE
- 2" DIA. CONE
- CASING
- 3" SHELBY
- UNCONFINED COMPRESSION (Qu)
- VANE TEST (C) AND SENSITIVITY (S)
- NATURAL MOISTURE AND LIQUIDITY INDEX
- LIQUID LIMIT
- PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
	Penetration test	627.6	0
			5
			10
			15
			20
		605.6	

STRENGTH AND PENETRATION RESISTANCE P.S.F.
BLOWS/FT. 10 20
Refusal

CONSISTENCY
MOIST. CONTENT - % DRY WT.

NATURAL SAMPLE UNIT WT. P.C.F.

22' clay

PROJECT NO. C129/J213

DRAWING NO. 7

TROW SODERMAN AND ASSOCIATES

SITE INVESTIGATIONS AND SOIL MECHANICS CONSULTATION

PROJECT Rossport Overpass
LOCATION Rossport, Ont.
HOLE LOCATION See Dwg.1
HOLE ELEVATION AND DATUM 647.8
B/R CPR @ Sta.361+18 = 648.9

BOREHOLE NO. 6
FIELD SUPERVISOR DS
DRILLER AA
PREP. DS

LEGEND
- 2" DIA. SPLIT TUBE
- 3" SHELBY TUBE
- 2" SPLIT TUBE
- 2" DIA. CONE
- CASING
- 3" SHELBY
- 1/2 UNCONFINED COMPRESSION [Qu]
- VANE TEST [C] AND SENSITIVITY [S]
- NATURAL MOISTURE AND LIQUIDITY INDEX
- LIQUID LIMIT
- PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
		647.8	0
	FILL: sand gravel boulders		5
		639.8	
	BEDROCK - granite		10
	End of hole	634.8	15
			20

STRENGTH AND PENETRATION RESISTANCE
P.S.F.
BLOWS/FT.

CONSISTENCY
MOIST. CONTENT - % DRY WT.

SAMPLE

NATURAL UNIT WT. P.C.F.

SS1 No recovery

PROJECT NO. C129/J213

DRAWING NO. 8

TROW SODERMAN AND ASSOCIATES

SITE INVESTIGATIONS AND SOIL MECHANICS CONSULTATION

PROJECT Rossport Overpass
LOCATION Rossport, Ont.
HOLE LOCATION See Dwg.1
HOLE ELEVATION AND DATUM 647.2
B/R CPR @Sta. 361+18 = 648.9

BOREHOLE NO. 7
FIELD SUPERVISOR DS
DRILLER AA
PREP. DS

LEGEND
- 2" DIA. SPLIT TUBE
- 2" SHELBY TUBE
- 2" SPLIT TUBE
- 2" DIA. CONE
- CASING
- 2" SHELBY
- 1/2 UNCONFINED COMPRESSION (Qu)
- VANE TEST (C) AND SENSITIVITY (S)
- NATURAL MOISTURE AND LIQUIDITY INDEX
- LIQUID LIMIT
- PLASTIC LIMIT

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET
		647.2	0
	FILL: Boulders, gravel & sand		
		641.2	5
	BEDROCK - granite		
	End of hole	637.2	10
			15
			20

STRENGTH AND PENETRATION RESISTANCE
P.S.F.
BLOWS/FT.

CONSISTENCY
MOIST. CONTENT % DRY WT.

SAMPLE

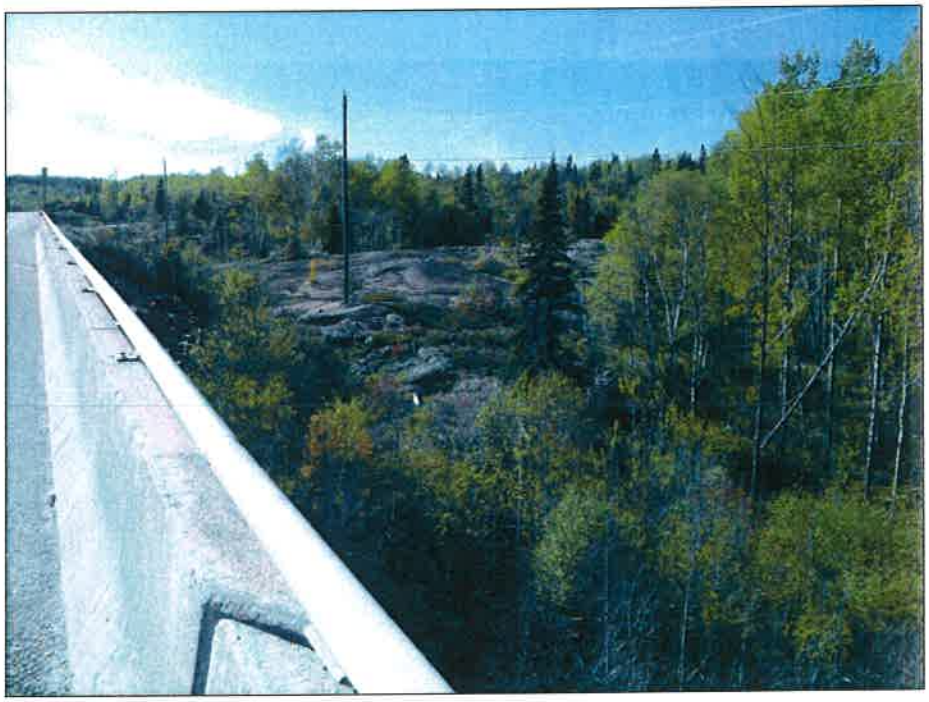
NATURAL UNIT WT. P.C.F.

Appendix D

Site Photographs

Photograph 1– Highway 17 and CP Overhead at Rossport crossing, south side

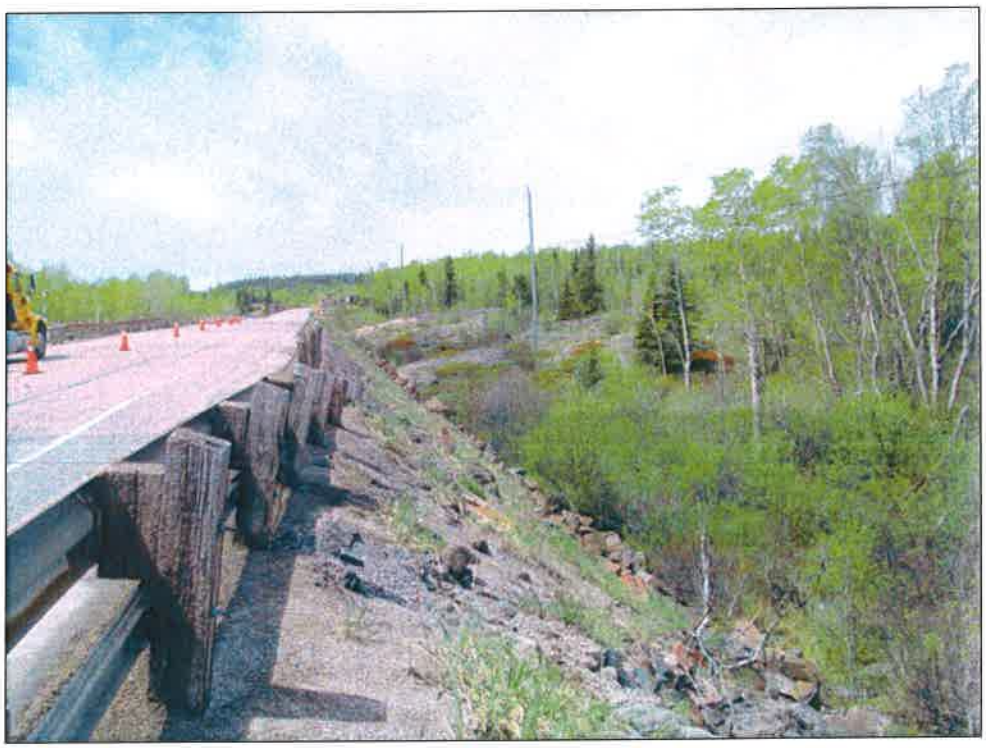
Photograph 2– Highway 17 and CP Overhead at Rossport crossing, north side



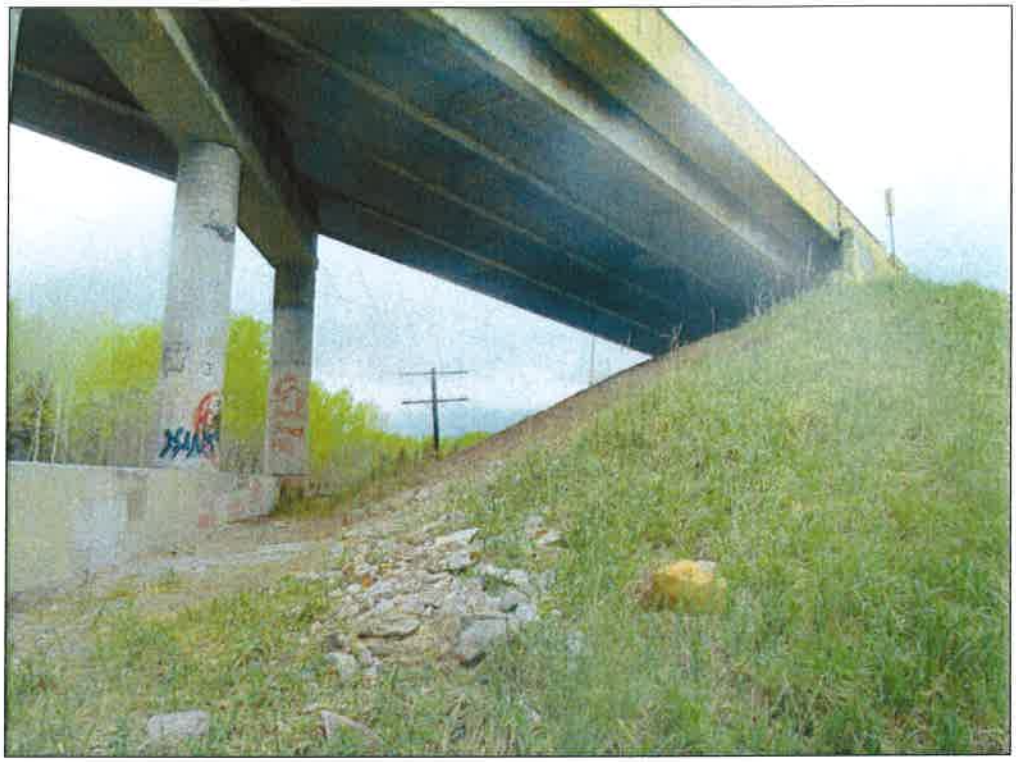
Photograph 3 Highway 17 and CP Overhead at Rossport crossing, northwest side

Photograph 4– Highway 17 and CP Overhead at Rossport crossing, north side

Photograph 5– Highway 17 and CP Overhead at Rossport crossing, southeast side



Photographs 6 and 7–CP Overhead at Rossport existing embankments



Photographs 8 and 9–CP Overhead at Rossport existing embankments

Appendix E

Drawing titled "Borehole Locations and Soil Strata"

MINISTRY OF TRANSPORTATION, ONTARIO

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

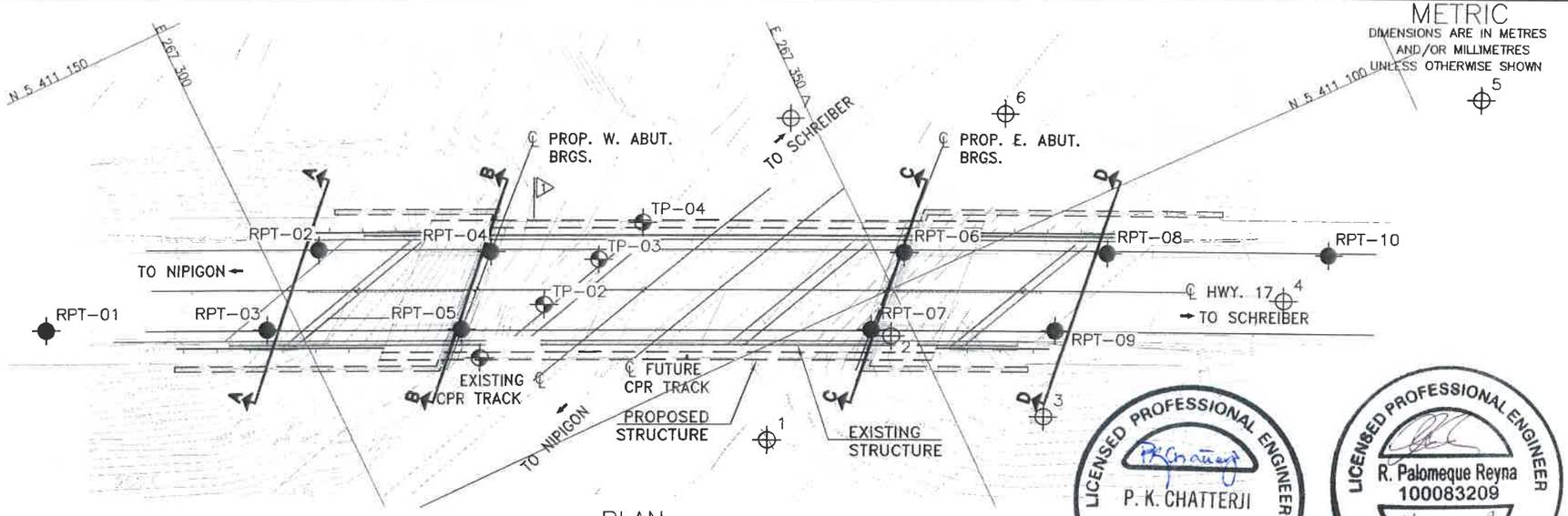
CONT No
WP No 6103-10-00

HIGHWAY 17
CPR OVERHEAD ROSSPORT
MILE 14.11
BOREHOLE LOCATIONS AND SOIL STRATA

SHEET

McCORMICK RANKIN
A member of MMM GROUP

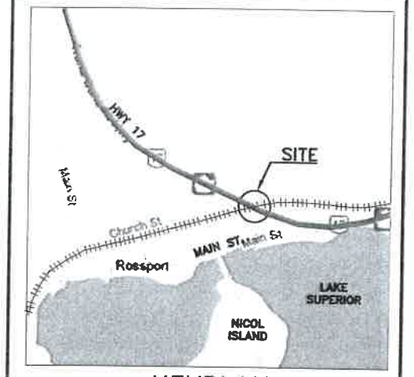
THURBER ENGINEERING LTD.



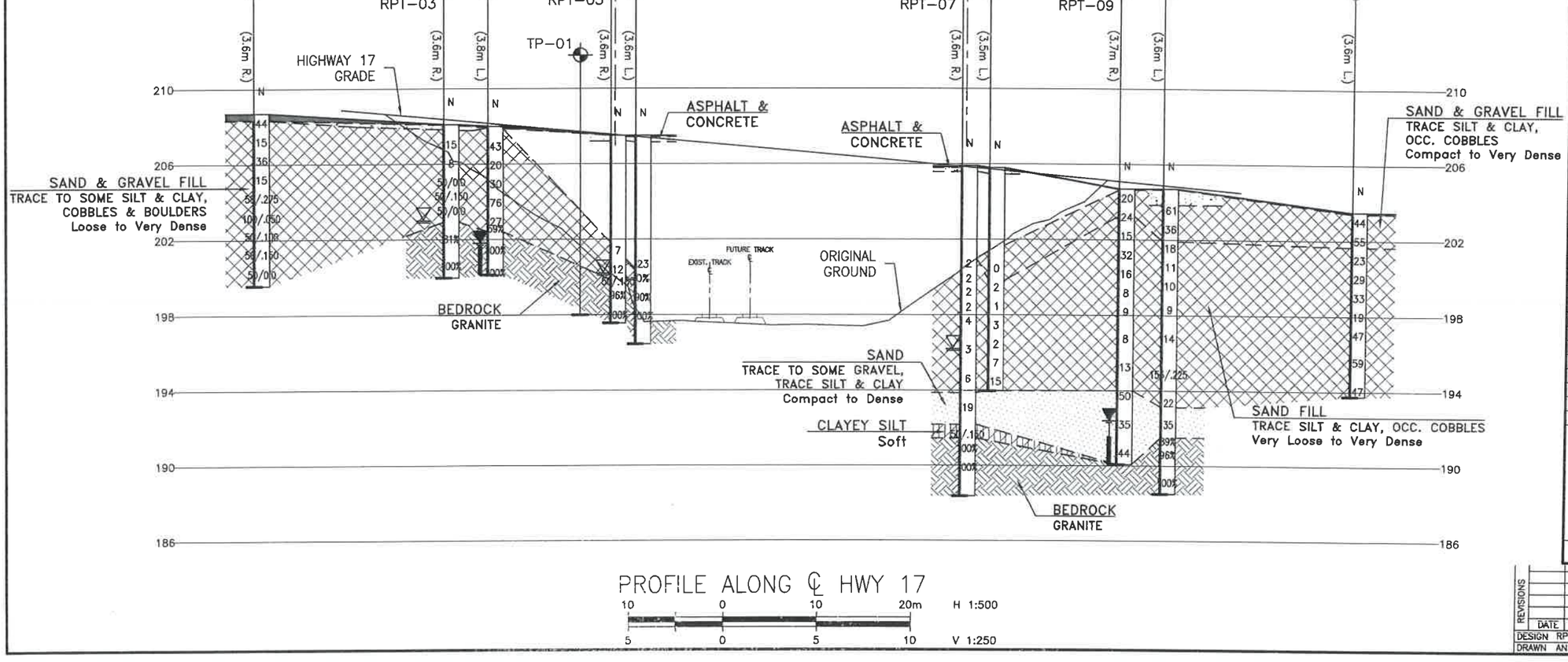
PLAN
SCALE 1:500

LICENSED PROFESSIONAL ENGINEER
P. K. CHATTERJI
Mar 21/13
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
R. Palomeque Reyna
100083209
Mar 21, 2013
PROVINCE OF ONTARIO



KEYPLAN



PROFILE ALONG ℄ HWY 17
H 1:500
V 1:250

LEGEND

●	Borehole (Current Investigation)
⊕	Test Pit (Current Investigation)
⊕	Borehole (Previous Investigation)
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
▽	Water Level During Drilling
▼	Water Level In Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
RPT-01	208.7	5 411 129.3	267 279.2
RPT-02	208.0	5 411 125.4	267 304.7
RPT-03	208.1	5 411 120.8	267 297.3
RPT-04	207.5	5 411 118.6	267 318.7
RPT-05	207.5	5 411 113.2	267 313.2
RPT-06	205.8	5 411 102.6	267 352.4
RPT-07	205.9	5 411 097.4	267 346.7
RPT-08	204.7	5 411 094.8	267 369.0
RPT-09	204.9	5 411 090.2	267 361.7
RPT-10	203.5	5 411 086.2	267 387.0
TP-01	198.0	5 411 110.1	267 313.6
TP-02	198.0	5 411 112.1	267 320.9
TP-03	198.0	5 411 113.8	267 327.2
TP-04	198.0	5 411 115.2	267 332.3

-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. 42D-28

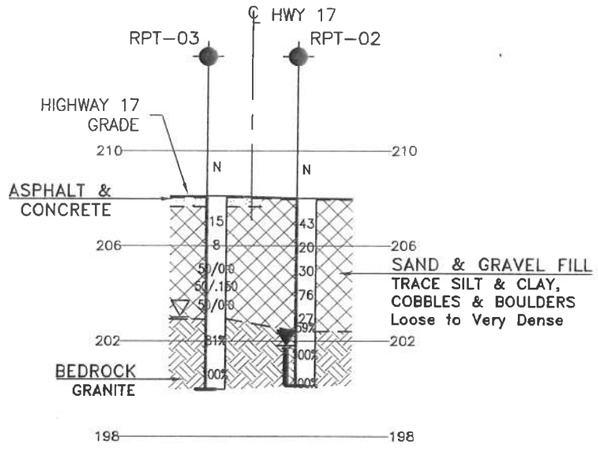
REVISIONS		
DATE	BY	DESCRIPTION

DESIGN	RPR	CHK RPR	CODE	LOAD	DATE MAR. 2013
DRAWN	AN	CHK	SITE	STRUCT	DWG 1

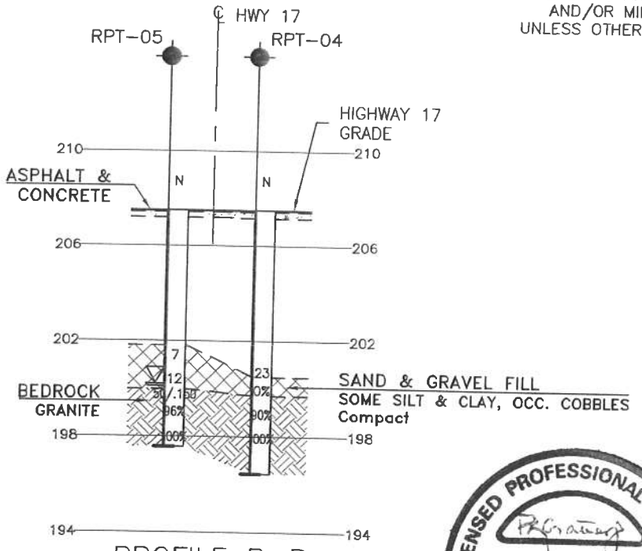
FILENAME: H:\Drafting\19\1351\197\ted197-CPR-Overhead-Rossport(Plan&Profile).dwg
PLOTDATE: 3/21/2013 11:38 AM

METRIC

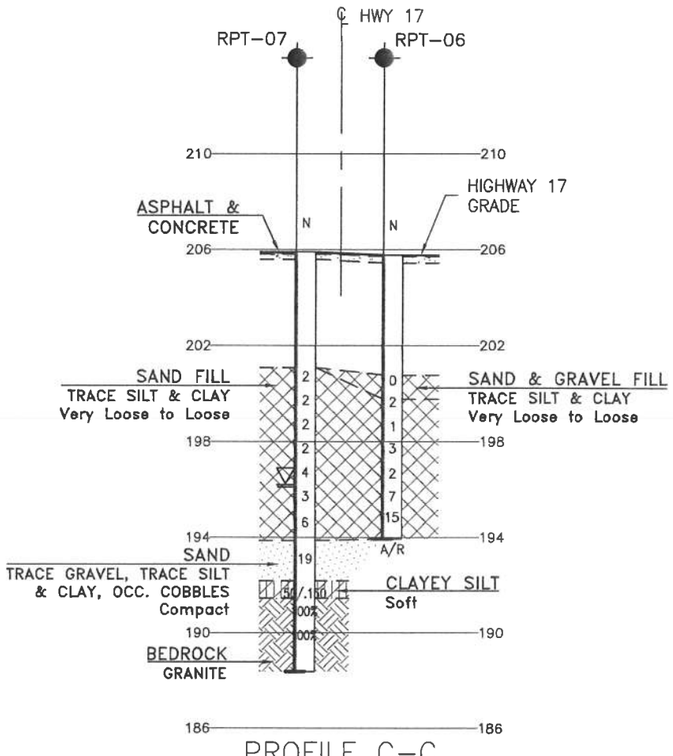
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN



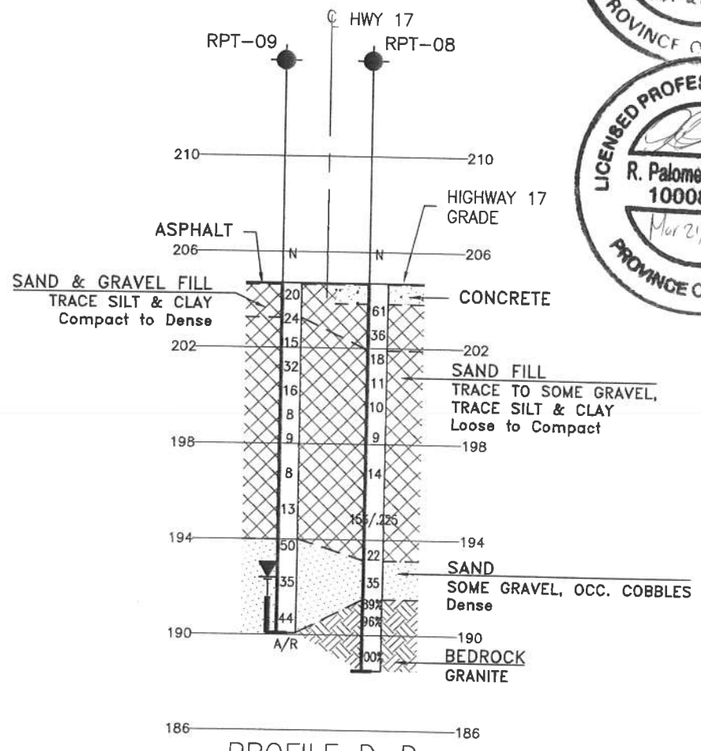
PROFILE A–A



PROFILE B–B



PROFILE C–C



PROFILE D–D

PROFILE ALONG ℄ HWY 17

10 0 10 20m H 1:500

5 0 5 10 V 1:250

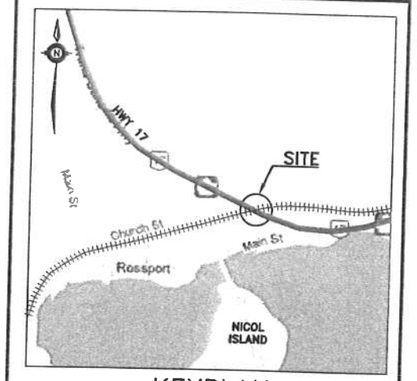
CONT No
WP No 6103-10-00

HIGHWAY 17
CPR OVERHEAD ROSSPORT
MILE 14.11
BOREHOLE LOCATIONS AND SOIL STRATA

SHEET

MRC McCORMICK RANKIN A member of MMM GROUP

THURBER ENGINEERING LTD.



KEYPLAN

LEGEND

⊕	Borehole (Current Investigation)
⊕	Test Pit (Current Investigation)
⊕	Borehole (Previous Investigation)
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
▽	Water Level During Drilling
	Water Level In Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
RPT–01	208.7	5 411 129.3	267 279.2
RPT–02	208.0	5 411 125.4	267 304.7
RPT–03	208.1	5 411 120.8	267 297.3
RPT–04	207.5	5 411 118.6	267 318.7
RPT–05	207.5	5 411 113.2	267 313.2
RPT–06	205.8	5 411 102.6	267 352.4
RPT–07	205.9	5 411 097.4	267 346.7
RPT–08	204.7	5 411 094.8	267 369.0
RPT–09	204.9	5 411 090.2	267 361.7
RPT–10	203.5	5 411 086.2	267 387.0
TP–01	198.0	5 411 110.1	267 313.6
TP–02	198.0	5 411 112.1	267 320.9
TP–03	198.0	5 411 113.8	267 327.2
TP–04	198.0	5 411 115.2	267 332.3

-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. 42D-28

REVISIONS		
DATE	BY	DESCRIPTION

DESIGN RPR	CHK RPR	CODE	LOAD	DATE MAR. 2013
DRAWN AN	CHK	SITE	STRUCT	DWG 2

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