PRELIMINARY FOUNDATION INVESTIGATION REPORT
for
CPR OVERHEAD REPLACEMENT CULVERT
HIGHWAY 11, STATION 22+290
SITE NO. 30-080
TOWNSHIP OF SEVERN
SIMCOE COUNTY, ONTARIO
CENTRAL REGION, G.W.P. 2177-10-00

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May 1, 2013

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Peto MacCallum Ltd.
CONSULTING ENGINEERS

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for
CPR Overhead Replacement Culvert
Highway 11, Station 22+290
Site No. 30-080
Township of Severn
Simcoe County, Ontario
Central Region, GWP 2177-10-00

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1. INTRODUCTION

This report summarizes the results of the foundation investigation carried out at the site of the existing CPR overhead on Highway 11 at approximate Station 22+290 in the Township of Severn. The investigation was carried out by Peto MacCallum Ltd. (PML) for AECOM Canada Ltd. (AECOM) on behalf of the Ministry of Transportation of Ontario (MTO).

The existing overhead will be removed and the opening partially filled by a pedestrian culvert, as shown in the General Arrangement Drawing 'HWY 11 CPR REPLACEMENT C. I. P. BOX CULVERT' prepared by AECOM dated January 13, 2013.

The purpose of this report was to summarize the subsurface stratigraphy and groundwater conditions encountered in the foundation investigation. The results of two boreholes that were drilled in 1977 based on Geocres Report No. 31D254 are included in this report.

2. SITE DESCRIPTION AND GEOLOGY

The contemplated culvert will be located at about 60 m south of the existing Highway 11 Southbound Lanes (SBL) / Hampshire Mills Line at-grade intersection. The site is about 1.0 km north of the City of Orillia in the Geographic Township of Severn, Simcoe County.

Land use in the vicinity of the site includes commercial activities to the west and isolated residential houses to the east. Locally, the existing Highway 11 is a four lane highway. The local topography of the site is generally flat. The existing Highway 11 embankment is about 9.0 m high at the overhead location. The abandoned CPR tracks pass through the existing overhead in an

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approximate southeast to northwest direction. The ground cover includes grasses, bushes and trees.

The soil cover at the project site is derived from glaciolacustrine plain deposits (clayey silts and sands) which overlie Paleozoic (Middle Ordovician) age Simcoe Group, Bobcaygeon Formation (limestone) bedrock. The bedrock is estimated at 20 to 30 m depth at the proposed culvert location based on Aggregate Resources Inventory Paper 80, Simcoe County from the Ontario Geological Survey, Ministry of Northern Development and Mines, 1994.

3. INVESTIGATION PROCEDURES

The subsurface investigation was carried out on January 9, 2013. A total of two boreholes (CPR-101 and CPR-102) were drilled to 10.8 and 6.4 m depths at the locations shown on Drawing CPR-1, appended. Although the results of the investigation are considered representative, allowances should be made for local variations in subsurface stratigraphy.

The locations of the boreholes were selected by PML allowing for drill rig accessibility and buried utilities. The ground surface elevations at the borehole locations were surveyed by exp Geomatics in March 2013. All elevations in this report are expressed in metres.

The boreholes were advanced using continuous flight solid stem augers through the soil cover with a track-mounted CME-55 drill rig, supplied and operated by a specialist drilling contractor, working under the full-time supervision of a PML field supervisor.

Soil samples were recovered from the boreholes at regular 0.75 and 1.5 m intervals of depth using the standard penetration test method. Standard penetration tests were conducted to assess the strength characteristics of the substrata. Soils were identified in accordance with the MTO soil classification manual procedures.

The groundwater conditions in the boreholes were assessed during drilling by visual examination of the soil, the sampler and drill rods as the samples were retrieved and, where encountered, by measuring the groundwater level in the open holes.

The boreholes were backfilled with a bentonite/cement mixture where required in accordance with the MTO guideline and MOE Reg. 903 for borehole abandonment.

The recovered soil samples were returned to the PML laboratory in Toronto for detailed visual examination, laboratory testing and classification. The laboratory testing program included the following tests:

- Natural moisture content determinations (19)
- Atterberg Limits (3)
- Grain size distribution analyses (7)

The laboratory grain size distribution charts are presented in Figures CPR-GS-1 and CPR-GS-2. The Atterberg Limits results are presented in Figures CPR-PC-1 and CPR-PC-2. All of the test results are summarized on the Record of Borehole sheets.

4. SUMMARIZED SUBSURFACE CONDITIONS

Reference is made to the appended Record of Borehole sheets for details of the subsurface conditions including soil classifications, inferred stratigraphy, standard penetration test results and groundwater observations. The results of laboratory grain size distributions, Atterberg Limits and moisture content determinations are also shown on the Record of Borehole sheets.

The borehole locations, stratigraphic profile and cross-sections prepared from the borehole data are shown on Drawing CPR-1. The boundaries between soil strata have been established at the borehole locations only. Between and beyond the boreholes, the soil boundaries are assumed and may vary.

Two previous boreholes were drilled in 1977 based on the Geocres Report No. 31D254 and the results of the two boreholes are included in Appendix A. The two boreholes were drilled from the top of the approach embankments through 6.8 and 7.8 m thick fills comprising clayey silt with sand and gravel. The fill is underlain by silt to clayey silt deposits. The deposit extended beyond 14.0 and 19.3 m, the termination depths of the boreholes.

The subsurface stratigraphy revealed in the current boreholes is variable although generally consistent with the Geocres Report No. 31D254 in Appendix A and generally included layers of fill and clayey silt till underlain by a silty sand to sand till deposit.

4.1 Fill

A 0.9 and 1.4 m thick layer of gravelly sand and sand fill was encountered surficially in both boreholes CPR-101 and CPR-102, respectively. The fill extended to 1.4 m (elevation 225.0) in borehole CPR-101 and to 0.9 m (elevation 226.4) in borehole CPR-102. N values varied from 9 to 10 indicating loose compactness. The moisture content determinations ranged from 6 to 30%.

4.2 Clayey Silt Till

A clayey silt till deposit was encountered below the fill at 1.4 m (elevation 225.0) in borehole CPR 101. The layer was 1.6 m thick extending to the silty sand to sand till at 3.0 m (elevation 223.4) in borehole CPR-101. N values ranged from 41 to 51 indicating a stratum with hard consistency.

The results of grain size distribution analysis for the clayey silt till sample are included in Figure CPR-GS-1. The Atterberg plasticity chart is presented in Figure CPR-PC-1. The liquid limit of the clayey silt till sample was 42, and the plastic limit was 22 with the corresponding plasticity index value of 20. The Atterberg limits of a sample of the same soil tested in the previous borehole 1 indicated a liquid limit of 35, plastic limit of 17 and a computed plasticity index of 18. The moisture content determinations were 6 and 8%.

4.3 Silty Sand to Sand Till

A silty sand to sand till deposit was encountered below the clayey silt till at 3.0 m (elevation 223.4) in borehole CPR-101 and below the fill at 0.9 m (elevation 226.4) in borehole CPR-102. The boreholes were terminated in the silty sand to sand till at 10.8 and 6.4 m (elevations 215.6 and 220.9). N values ranged from 16 to 100 for 18 cm indicating compact to very dense compactness.

The results of grain size distribution analyses for the silty sand to sand till samples are included in Figure CPR-GS-2. The Atterberg plasticity charts are presented in Figure CPR-PC-2. The liquid limits of the silty sand to sand till samples were 13 and 14, and the plastic limits were both 11, respectively with the corresponding plasticity index values of 2 and 3, essentially non-plastic material. The moisture content determinations ranged from 7 to 12%.

4.4 Groundwater

Groundwater was encountered in both boreholes. During drilling, groundwater was observed at 1.1 m and ground surface (elevations 225.3 and 227.3) in boreholes CPR-101 and CPR-102, respectively. Upon completion of drilling, groundwater was measured at 6.1 m and 0.6 m (elevations 220.3 and 226.7) in boreholes CPR-101 and CPR-102, respectively.

The groundwater level is subject to seasonal fluctuations and rainfall patterns. Perched groundwater may likely have accumulated within fill units. In the wet or spring thaw seasons, the perched groundwater level may be high and rise close to the ground surface.

5. CLOSURE

Mr. F. Portela carried out the field investigation for this study under the supervision of Mr. B. Rao, P. Eng., and Mr. C. M. P. Nascimento, P. Eng., Project Manager. Walker Drilling Ltd. supplied the drill rig for the subsurface exploration. The laboratory testing of the selected samples was carried out in the PML laboratory in Toronto.

This Foundation Investigation Report was prepared by Mr. B. Rao, P. Eng., and reviewed by Mr. B. R. Gray, MEng, P. Eng., MTO Designated Principal Contact. Mr. C. M. P. Nascimento, P. Eng., Project Manager conducted an independent review of the report.

Yours very truly

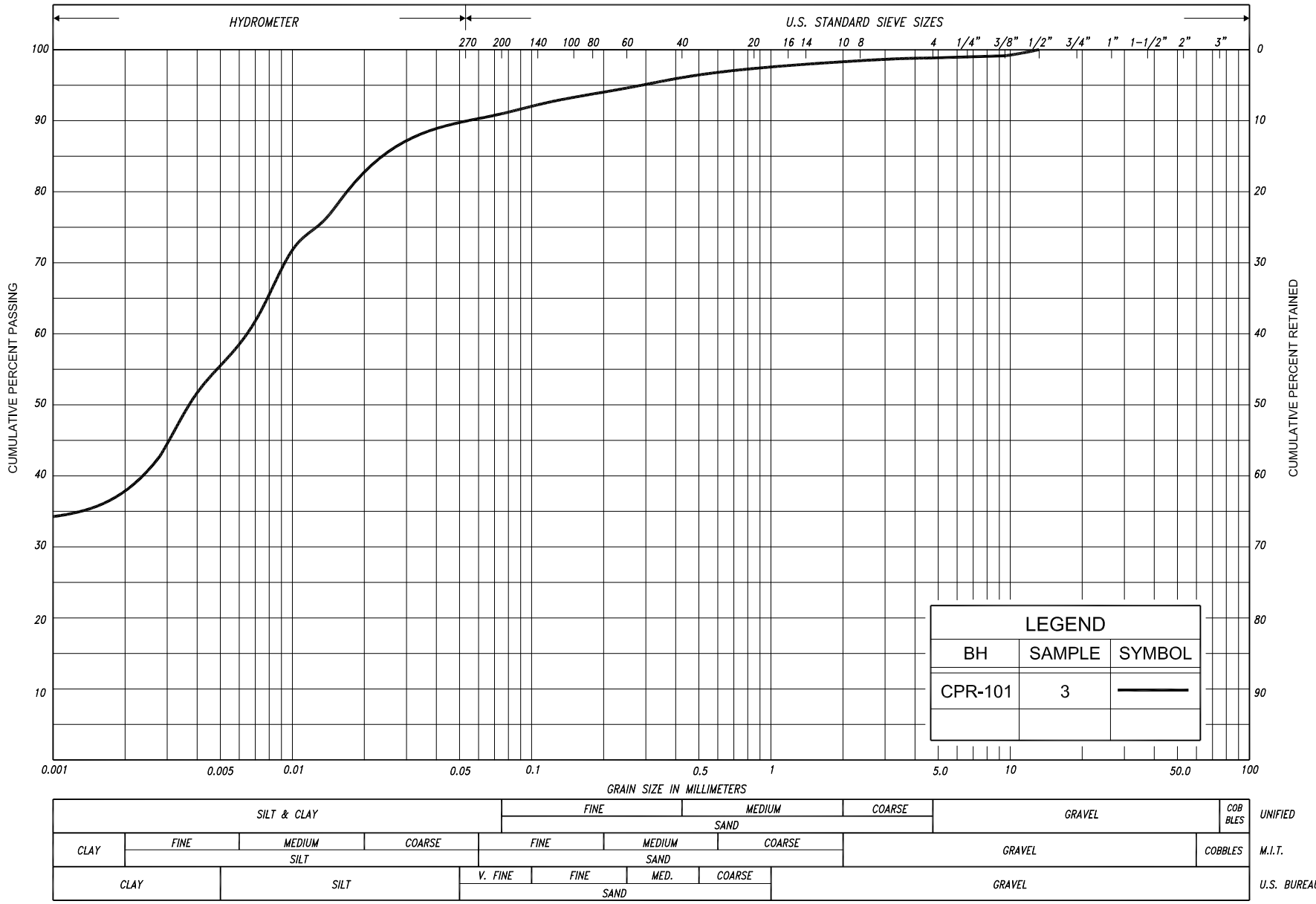
Peto MacCallum Ltd.

Bin Rao, P.Eng.
Project Engineer

Carlos M.P. Nascimento, P.Eng.
Project Manager

Brian R. Gray, MEng, P.Eng.
MTO Designated Principal Contact

BR/CN/BRG:br-mi-sq

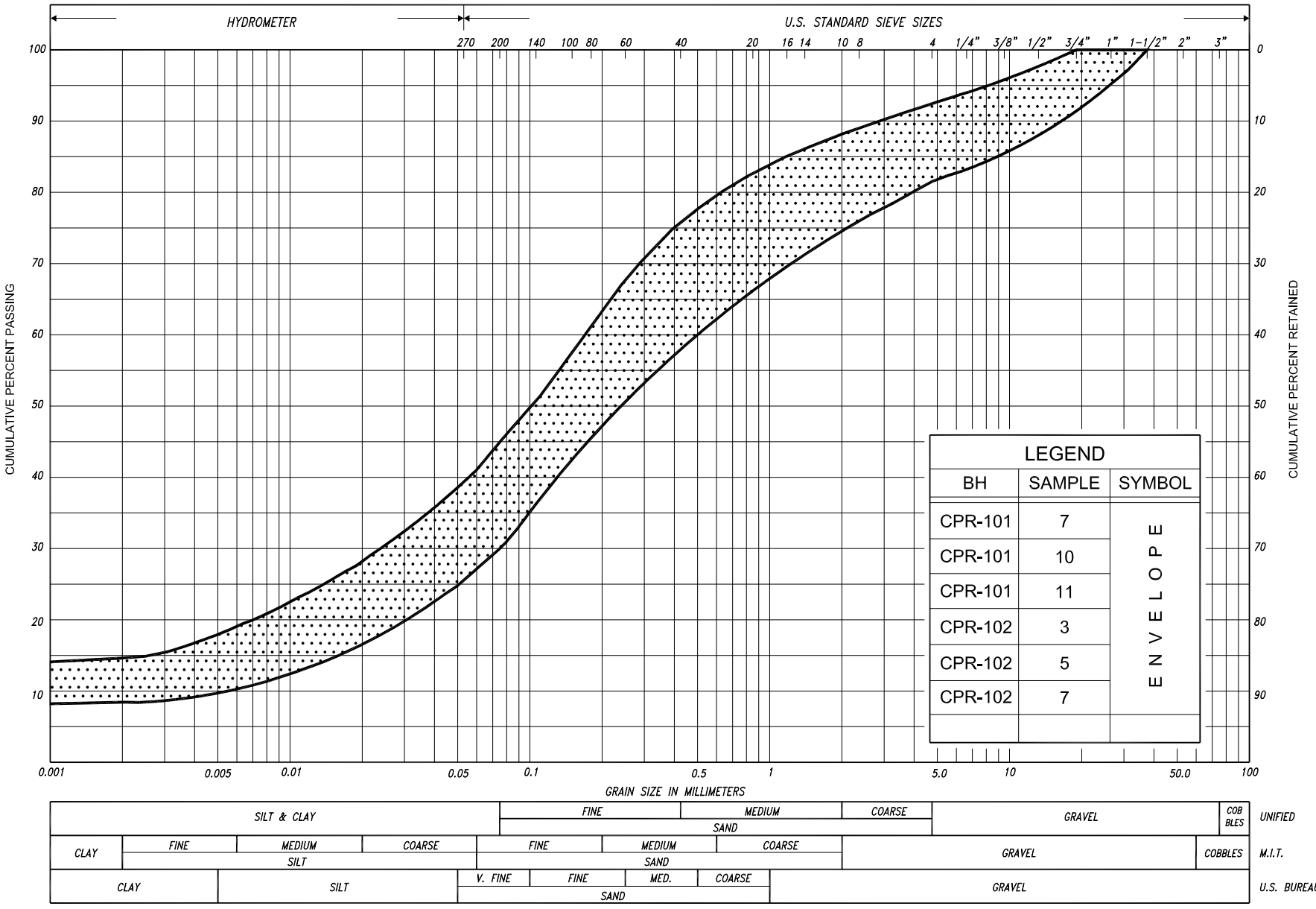


Ontario

GRAIN SIZE DISTRIBUTION

CLAYEY SILT, trace sand, trace gravel
(TILL)

FIG No.	CPR-GS-1
HWY:	11
W.P. No.	2177-10-00

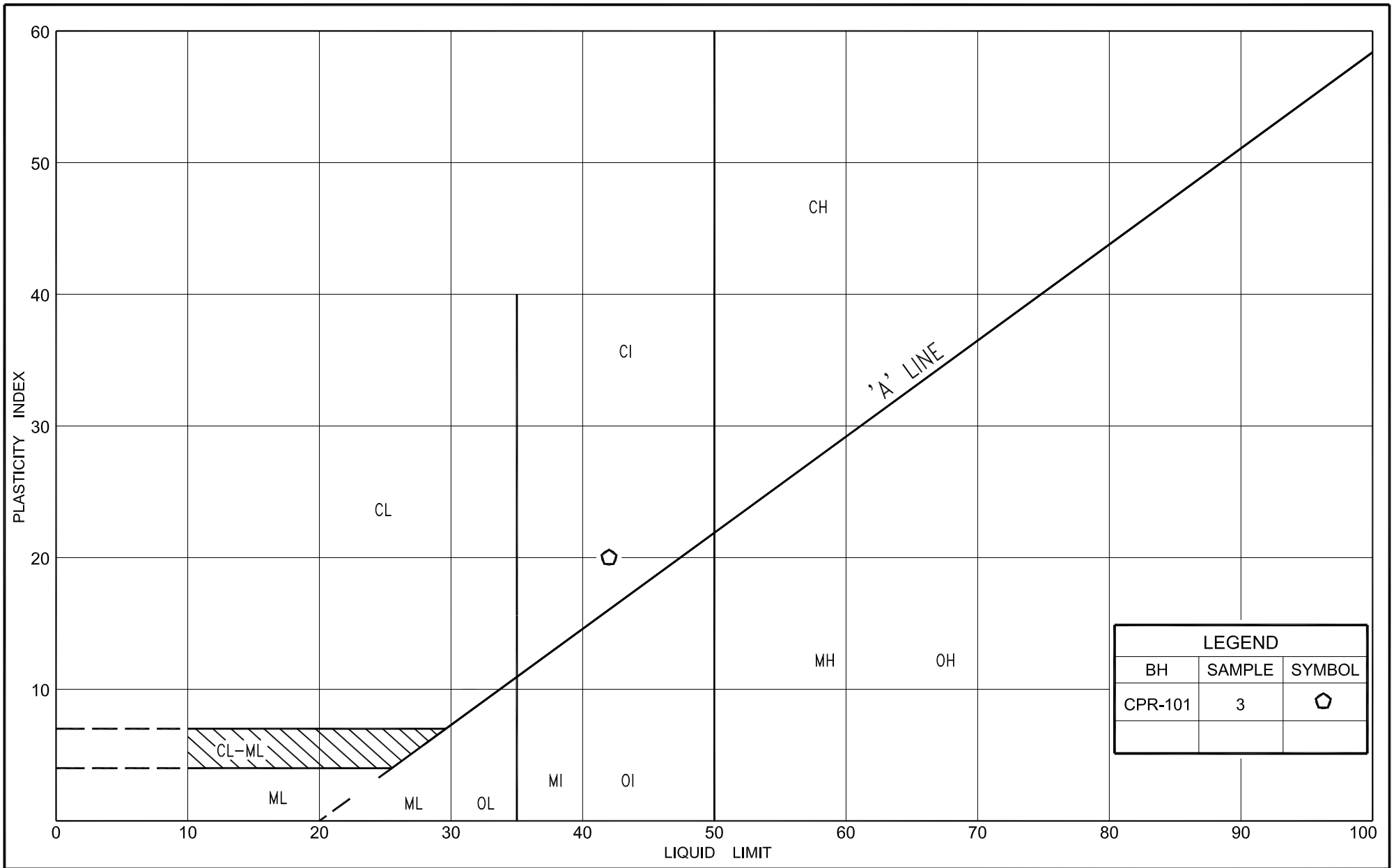


Ontario

GRAIN SIZE DISTRIBUTION

SILTY SAND to SAND with silt, trace to some gravel, trace to some clay (TILL)

FIG No.	CPR-GS-2
HWY:	11
W.P. No.	2177-10-00

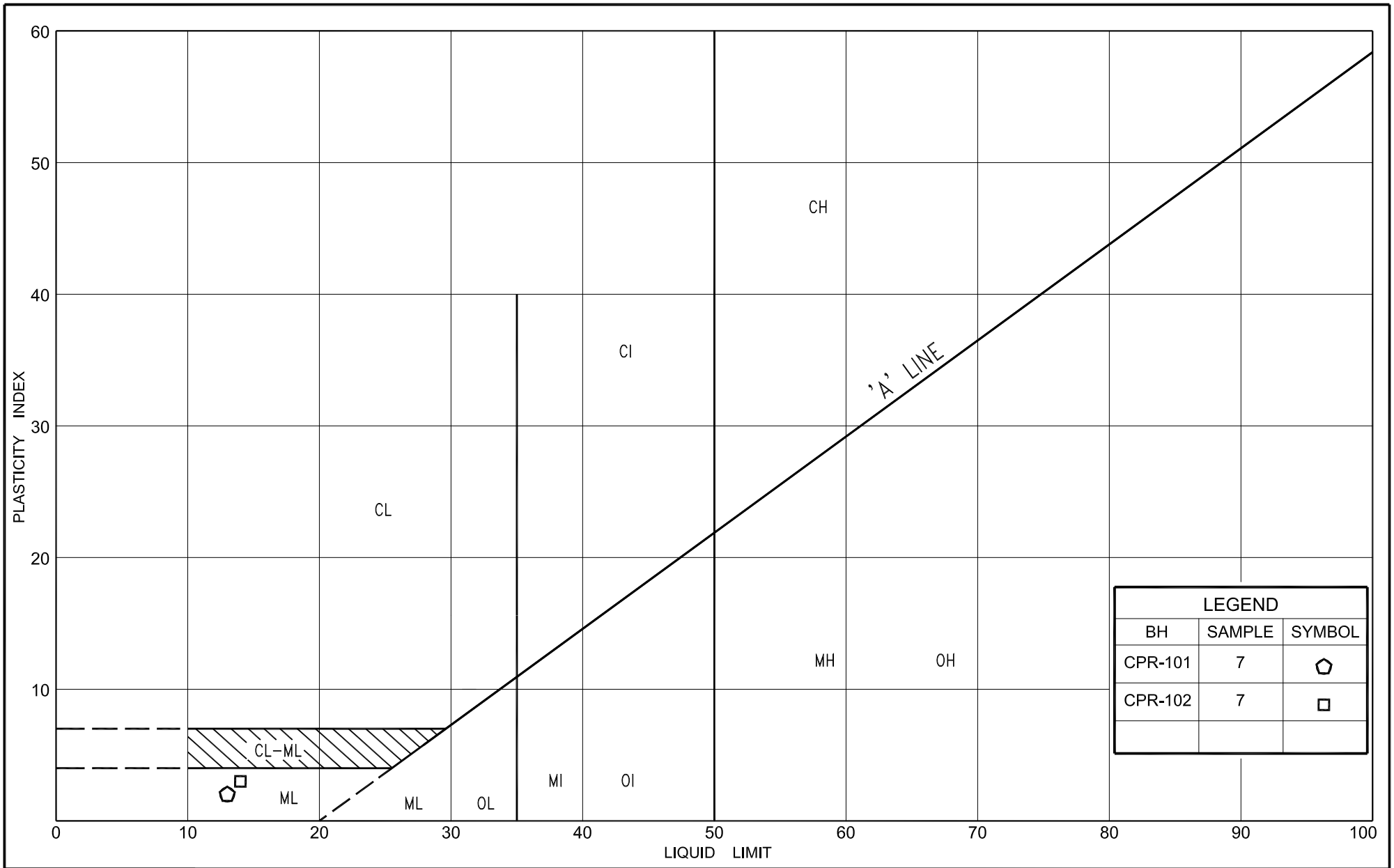


Ontario

PLASTICITY CHART

CLAYEY SILT, trace sand, trace gravel
(TILL)

FIG No.	CPR-PC-1
HWY:	11
W.P. No.	2177-10-00



Ontario

PLASTICITY CHART

SAND, with silt, some clay, trace to some gravel
(TILL)

FIG No.	CPR-PC-2
HWY:	11
W.P. No.	2177-10-00

EXPLANATION OF TERMS USED IN REPORT

N VALUE: THE STANDARD PENETRATION TEST (SPT) N VALUE IS THE NUMBER OF BLOWS REQUIRED TO CAUSE A STANDARD 51mm O.D. SPLIT BARREL SAMPLER TO PENETRATE 0.3m INTO UNDISTURBED GROUND IN A BOREHOLE WHEN DRIVEN BY A HAMMER WITH A MASS OF 63.5kg, FALLING FREELY A DISTANCE OF 0.76m. FOR PENETRATIONS OF LESS THAN 0.3m N VALUES ARE INDICATED AS THE NUMBER OF BLOWS FOR THE PENETRATION ACHIEVED. AVERAGE N VALUE IS DENOTED THUS $\bar{N}$.

DYNAMIC CONE PENETRATION TEST: CONTINUOUS PENETRATION OF A CONICAL STEEL POINT (51mm O.D. 60° CONE ANGLE) DRIVEN BY 475 J IMPACT ENERGY ON 'A' SIZE DRILL RODS. THE RESISTANCE TO CONE PENETRATION IS MEASURED AS THE NUMBER OF BLOWS FOR EACH 0.3m ADVANCE OF THE CONICAL POINT INTO THE UNDISTURBED GROUND.

SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR DENSENESS.

COMPOSITION: SECONDARY SOIL COMPONENTS ARE DESCRIBED ON THE BASIS OF PERCENTAGE BY MASS OF THE WHOLE SAMPLE AS FOLLOWS:

PERCENT BY MASS	0 – 10	10 – 20	20 – 30	30 – 40	> 40
	TRACE	*SOME*	*WITH*	*ADJECTIVE (SILTY)*	*AND (AND SILT)*

CONSISTENCY: COHESIVE SOILS ARE DESCRIBED ON THE BASIS OF THEIR UNDRAINED SHEAR STRENGTH (c_u) AS FOLLOWS:

c_u (kPa)	0 - 12	12 - 25	25 - 50	50 - 100	100 - 200	>200
	VERY SOFT	*SOFT*	*FIRM*	*STIFF*	*VERY STIFF*	*HARD*

DENSENESS: COHESIONLESS SOILS ARE DESCRIBED ON THE BASIS OF DENSENESS AS INDICATED BY SPT N VALUES AS FOLLOWS:

N (BLOWS/0.3m)	0 - 5	5 - 10	10 - 30	30 - 50	>50
	VERY LOOSE	*LOOSE*	*COMPACT*	*DENSE*	*VERY DENSE*

ROCKS ARE DESCRIBED BY THEIR COMPOSITION AND STRUCTURAL FEATURES AND / OR STRENGTH.

RECOVERY: SUM OF ALL RECOVERED ROCK CORE PIECES FROM A CORING RUN EXPRESSED AS A PERCENT OF THE TOTAL LENGTH OF THE CORING RUN.

MODIFIED RECOVERY: SUM OF THOSE INTACT CORE PIECES, 100mm+ IN LENGTH EXPRESSED AS A PERCENT OF THE LENGTH OF THE CORING RUN. THE ROCK QUALITY DESIGNATION (R Q D), FOR MODIFIED RECOVERY, IS:

RQD (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
	VERY POOR	*POOR*	*FAIR*	*GOOD*	*EXCELLENT*

JOINTING AND BEDDING:

SPACING	50mm	50 - 300mm	0.3m - 1m	1m - 3m	>3m
JOINTING	*VERY CLOSE*	*CLOSE*	*MOD. CLOSE*	*WIDE*	*VERY WIDE*
BEDDING	*VERY THIN*	*THIN*	*MEDIUM*	*THICK*	*VERY THICK*

ABBREVIATIONS AND SYMBOLS

FIELD SAMPLING

S S	SPLIT SPOON	T P	THINWALL PISTON
W S	WASH SAMPLE	O S	OSTERBERG SAMPLE
S T	SLOTTED TUBE SAMPLE	R C	ROCK CORE
B S	BLOCK SAMPLE	P H	T W ADVANCED HYDRAULICALLY
C S	CHUNK SAMPLE	P M	T W ADVANCED MANUALLY
T W	THINWALL OPEN	F S	FOIL SAMPLE
F V	FIELD VANE		

STRESS AND STRAIN

u_w	kPa	PORE WATER PRESSURE
r_u	1	PORE PRESSURE RATIO
σ	kPa	TOTAL NORMAL STRESS
σ'	kPa	EFFECTIVE NORMAL STRESS
τ	kPa	SHEAR STRESS
$\sigma_1, \sigma_2, \sigma_3$	kPa	PRINCIPAL STRESSES
ϵ	%	LINEAR STRAIN
$\epsilon_1, \epsilon_2, \epsilon_3$	%	PRINCIPAL STRAINS
E	kPa	MODULUS OF LINEAR DEFORMATION
G	kPa	MODULUS OF SHEAR DEFORMATION
μ	1	COEFFICIENT OF FRICTION

MECHANICAL PROPERTIES OF SOIL

m_v	kPa^{-1}	COEFFICIENT OF VOLUME CHANGE
C_c	1	COMPRESSION INDEX
C_s	1	SWELLING INDEX
C_α	1	RATE OF SECONDARY CONSOLIDATION
c_v	m^2/s	COEFFICIENT OF CONSOLIDATION
H	m	DRAINAGE PATH
T_v	1	TIME FACTOR
U	%	DEGREE OF CONSOLIDATION
σ'_{vo}	kPa	EFFECTIVE OVERBURDEN PRESSURE
σ'_p	kPa	PRECONSOLIDATION PRESSURE
τ_f	kPa	SHEAR STRENGTH
c'	kPa	EFFECTIVE COHESION INTERCEPT
ϕ'	-°	EFFECTIVE ANGLE OF INTERNAL FRICTION
c_u	kPa	APPARENT COHESION INTERCEPT
ϕ_u	-°	APPARENT ANGLE OF INTERNAL FRICTION
τ_R	kPa	RESIDUAL SHEAR STRENGTH
τ_r	kPa	REMOULDED SHEAR STRENGTH
S_t	1	SENSITIVITY = $\frac{c_u}{\tau_r}$

PHYSICAL PROPERTIES OF SOIL

ρ_s	kg/m^3	DENSITY OF SOLID PARTICLES
γ_s	kN/m^3	UNIT WEIGHT OF SOLID PARTICLES
ρ_w	kg/m^3	DENSITY OF WATER
γ_w	kN/m^3	UNIT WEIGHT OF WATER
ρ	kg/m^3	DENSITY OF SOIL
γ	kN/m^3	UNIT WEIGHT OF SOIL
ρ_d	kg/m^3	DENSITY OF DRY SOIL
γ_d	kN/m^3	UNIT WEIGHT OF DRY SOIL
ρ_{sat}	kg/m^3	DENSITY OF SATURATED SOIL
γ_{sat}	kN/m^3	UNIT WEIGHT OF SATURATED SOIL
ρ'	kg/m^3	DENSITY OF SUBMERGED SOIL
γ'	kN/m^3	UNIT WEIGHT OF SUBMERGED SOIL
e	1,%	VOID RATIO
n	1,%	POROSITY
w	1,%	WATER CONTENT
S_r	%	DEGREE OF SATURATION
w_L	%	LIQUID LIMIT
w_P	%	PLASTIC LIMIT
w_S	%	SHRINKAGE LIMIT
I_P	%	PLASTICITY INDEX = $w_L - w_P$
I_L	1	LIQUIDITY INDEX = $\frac{w - w_P}{I_P}$
I_C	1	CONSISTENCY INDEX = $\frac{w_L - w}{I_P}$
DTPL		DRIER THAN PLASTIC LIMIT
APL		ABOUT PLASTIC LIMIT
WTPL		WETTER THAN PLASTIC LIMIT
e_{max}	1,%	VOID RATIO IN LOOSEST STATE
e_{min}	1,%	VOID RATIO IN DENSEST STATE
I_D	1	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
D	mm	GRAIN DIAMETER
D_n	mm	n PERCENT - DIAMETER
C_U	1	UNIFORMITY COEFFICIENT
h	m	HYDRAULIC HEAD OR POTENTIAL
q	m^3/s	RATE OF DISCHARGE
v	m/s	DISCHARGE VELOCITY
i	1	HYDRAULIC GRADIENT
k	m/s	HYDRAULIC CONDUCTIVITY
j	kN/m^3	SEEPAGE FORCE

Ontario

Peto MacCallum Ltd. CONSULTING ENGINEERS

Foundation Design

RECORD OF BOREHOLE No CPR-101 1 of 1 METRIC

G.W.P. 2177-10-00 **LOCATION** Coords: 4 945 953.7 N; 311 401.1 E **ORIGINATED BY** F.P.

DIST Central **HWY** 11 **BOREHOLE TYPE** Continuous Flight Solid Stem Augers **COMPILED BY** B.R.

DATUM Geodetic **DATE** January 09, 2013 **CHECKED BY** B.R.G.

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/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
226.4	Ground Surface										
0.0	Gravelly sand, trace silt Compact Dark brown Moist		1	SS	10		226		○		
	Sand, trace silt Loose Brown Moist (FILL)		2	SS	9	▽*			○		
225.0							225				
1.4	Clayey silt trace sand, trace gravel Hard Grey Moist (TILL)		3	SS	41				○		2 7 53 38
223.4			4	SS	51		224		○		
3.0	Silty sand to Sand with silt trace to some clay trace to some gravel Dense to very dense Brown Moist to wet (TILL)		5	SS	34		223		○		
			6	SS	104/20cm				○		
			7	SS	52		222		○		15 49 24 12
	with gravel, trace clay		8	SS	81		221		○		
			9	SS	61	▼*	220		○		
			10	SS	101		219		○		18 52 22 8
			11	SS	123		218		○		8 47 33 12
215.6			12	SS	100/18cm		217		○		
10.8	End of borehole						216				

* 2013 01 09

▽ Water level observed during drilling

▼ Water level measured after drilling

Borehole open upon completion of drilling.

ON MTO_VER3 NEW LOGO 12KF069A.GPJ ON_MOT.GDT 5/1/2013 3:51:57 PM

Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

Ontario

Peto MacCallum Ltd. CONSULTING ENGINEERS

Foundation Design

RECORD OF BOREHOLE No CPR-102 1 of 1 METRIC

G.W.P. 2177-10-00 **LOCATION** Coords: 4 945 989.1 N; 311 360.6 E **ORIGINATED BY** F.P.

DIST Central **HWY** 11 **BOREHOLE TYPE** Continuous Flight Solid Stem Augers **COMPILED BY** B.R.

DATUM Geodetic **DATE** January 09, 2013 **CHECKED BY** B.R.G.

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: 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/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
227.3	Ground Surface										
0.0	Gravelly sand, trace silt Compact Dark brown Moist to wet		1	SS	10	▼*	227		○		
226.4	(FILL)										
0.9	Silty sand to Sand with silt some clay trace to some gravel Compact to Brown very dense Moist to wet (TILL)		2	SS	16		226		○		
			3	SS	74				○		13 41 33 13
			4	SS	117/23cm		225				
			5	SS	110/23cm		224		○		18 38 32 12
			6	SS	101				○		
			7	SS	122		223		○H		8 55 22 15
							222				
220.9			8	SS	119		221		○		
6.4	End of borehole										

* 2013 01 09

▽ Water level observed during drilling

▼ Water level measured after drilling

Borehole open upon completion of drilling.

7 , 5 × Numbers refer to Sensitivity

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

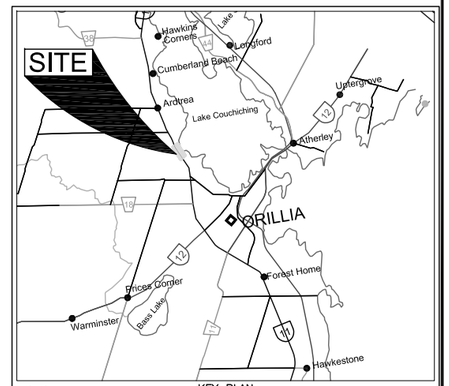
CONT No 2013-XXX

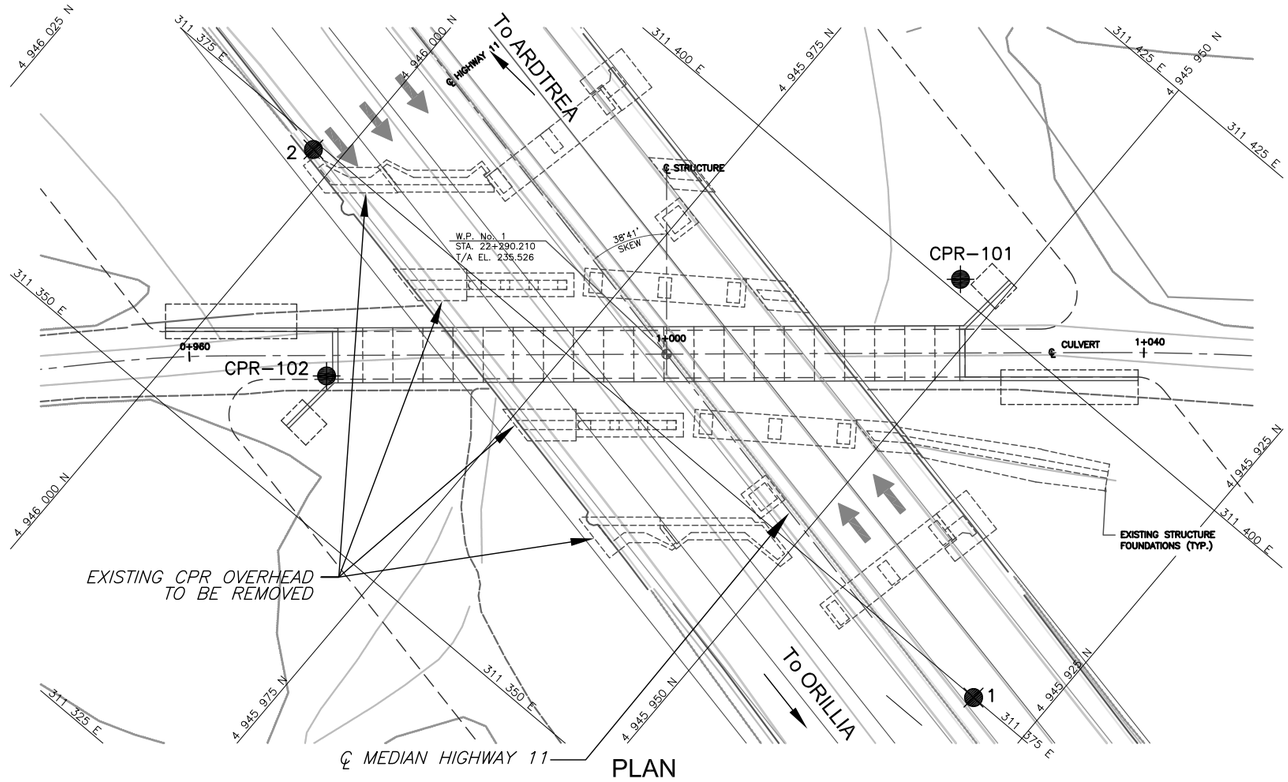
WP No 2177-10-00

CPR OVERHEAD REPLACEMENT CULVERT
HIGHWAY 11 STA 22+290.2
BOREHOLE LOCATIONS AND SOIL STRATA

SHEET

Peto MacCallum Ltd.
CONSULTING ENGINEERS

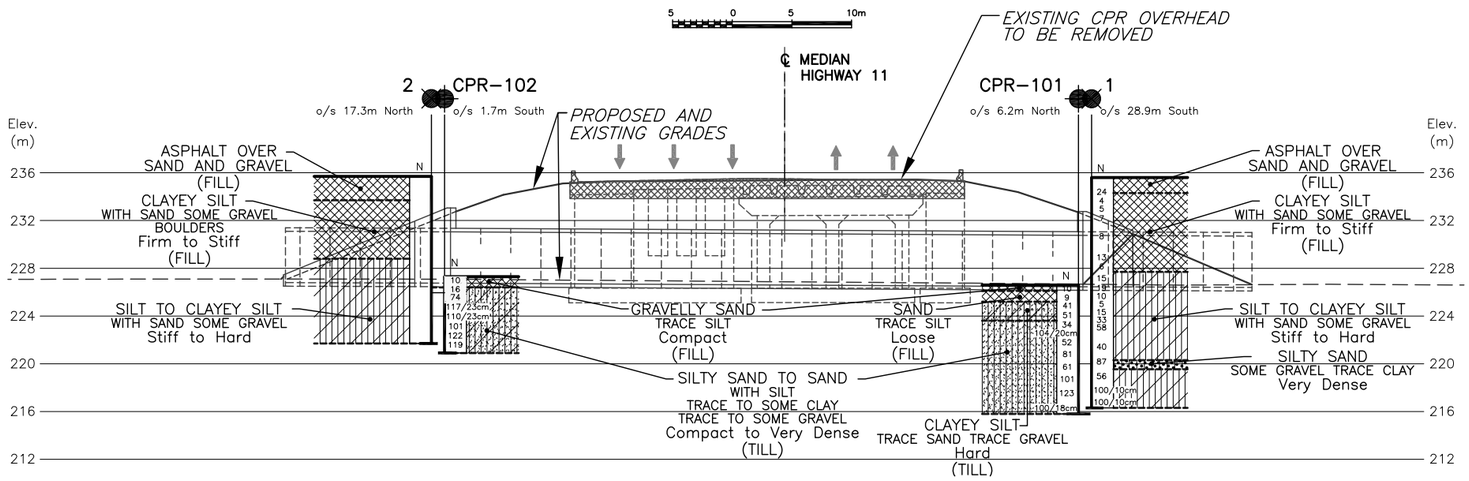




PLAN

SCALE

5 0 5 10m



PROFILE ALONG ℄ BOX CULVERT (PROPOSED)

SCALE

5 0 5 10m

NOTES:

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH THE TEXT OF REPORT AND RECORD OF BOREHOLE LOGS.
2. THIS DRAWING IS FOR SUBSURFACE INFORMATION ONLY. SURFACE DETAILS AND FEATURES ARE FOR CONCEPTUAL ILLUSTRATION.
3. DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN. STATIONS ARE IN KILOMETRES AND METRES.

LEGEND	
	Borehole
	Previous Borehole from Geocres Report
N	Blows/0.3m (Std. Pen Test, 475 J/blow)
CONE	Blows/0.3m (60 Cone, 475 J/blow)
	WL at time of investigation Jan. 2013
*	Water level not established
	Head ARTESIAN WATER Encountered
	PIEZOMETER

BH No	ELEVATION	NORTHINGS	EASTINGS
CPR-101	226.4	4 945 953.7	311 401.1
CPR-102	227.3	4 945 989.1	311 360.6
GEOCRES REPORT BOREHOLES			
1	235.6	4 945 930.3	311 375.0
2	235.7	4 946 002.2	311 374.4

REGISTERED PROFESSIONAL ENGINEER B. R. GRAY MAY 01, 2013 PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER C M P Nascimento May 1, 2013 PROVINCE OF ONTARIO

Reference AECOM Drawings:
60282808-ST-CULVERT_30-080_GA_Precast-Alt3&4.dwg dated Jan. 2013
and B-189-11-120933.dwg

– NOTE –
The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.

REVISIONS		
DATE	BY	DESCRIPTION

Geocres No. 31D-558

HWY No	11			DIST	North Bay
SUBM'D	NA	CHECKED	BR	DATE	MAY 01, 2013
DRAWN	NA	CHECKED	BRG	APPROVED	CN
				SITE	30-080/1/2
				DWG	CPR-1

APPENDIX A

GEOCRES REPORT

Foundation Investigation Report for CPR Overhead Widening,

Geocres No. 31D-254, January 1978

DOCUMENT MICROFILMING IDENTIFICATION

G.I.-30 SEPT. 1976

GEOCRES No. 31D-254

DIST. 5 REGION

W.P. No. 162-75-040

CONT. No. 79-92

W. O. No.

STR. SITE No. 30-80

HWY. No. 11

LOCATION C.P.R. Overhead Widening
0.8 mi N of N. Junction Hwy 11B &
No OF PAGES - Hwy 11

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

REMARKS:

ENGINEERING MATERIALS OFFICE
SOIL MECHANICS SECTION

WP 162-75-04 DIST 5

HWY 11 STR SITE 30-80

C.P.R. Overhead Widening
0.8 Miles North of
North Junction Hwy. 11B and Hwy. 11

DISTRIBUTION

A.P. Watt (2)
J.R. Roy
A. Wittenberg
J.H. Blevins (2)

A.E. McKim
G.A. Wrong
B.J. Giroux
R.S. Pillar

R. Hore

A. Crowley)
J. Anderson) cover only
G. Sloan)

Files ✓

SAMPLE DISPOSITION NOTICE

TYPE	DISCARD AFTER	RECOMM. BY
JARS	78-01-06	[illegible]
TUBES	—	—
ROCK CORES	—	—

GEOCRES 31 D - 254 DATE JAN 0 9 1978

FOUNDATION INVESTIGATION REPORT

For
C.P.R. Overhead Widening
.0.8 Miles North of
North Junction Hwy.11B and Hwy.11
Hwy.11, District 5, Owen Sound
W.P. 162-75-04, Site #30-80

INTRODUCTION

This report contains the results of a foundation investigation carried out at the above location. Fieldwork was completed on September 21 and 22, 1977. A muskeg vehicle mounted power auger equipped with 3¼ inch I.D. hollow stem augers was used to advance two boreholes. Additional shallow borings were put down by hand auger adjacent to the existing bridge footings.

SITE DESCRIPTION

The site is located 1.0 mile north of the north junction of Hwy. 11B and Hwy. 11 in the Township of Orillia. Hwy. 11 passes over the C.P.R. tracks on a multiple span structure with 22 to 25 feet of fill present behind the abutments.

Both deciduous and coniferous trees make up the vegetation of this gently rolling area, which lies in the physiographic region of the Sand Plains of the Simcoe Lowlands.

SUBSURFACE CONDITIONS

General

The subsoil within the investigated area was found to consist of fill material (asphalt, sand, gravel and clayey silt) followed by silt to clayey silt with sand and with gravel within the depth of borings.

The extent of the various deposits are shown on the Record of Borehole Sheets in the Appendix. An estimated stratigraphic profile has been prepared on Drawing No. 1627504-A.

Soil types encountered in the boreholes can be described as follows:

Fill Material

Two different types of material were observed within the existing approaches. The upper 4-7 feet consists of asphalt, sand and gravel, while the lower portion is cohesive in nature.

This cohesive zone, made up of clayey silt, with sand, some gravel, extends to the limits of the fill, approximately 22 to 25 feet below pavement. A bouldery zone is present from 7 to 18 feet in B.H. 2 and a layer of organic material around 15 feet in B.H. 1. Generally this layer is firm to stiff in consistency with moisture contents varying from 4% to 16%.

Silt to Clayey Silt, With Sand and Gravel

Silt to clayey silt, with sand and gravel extends from the fill material to the limits of the boreholes. Standard Penetration 'N' values range from 10 blows per foot to 100 blows for 2 inches of penetration giving this material a stiff to hard consistency. Virtual refusal to augering was reached at elevation 711 in B.H. 1 and elevation 727 in B.H. 2.

In B.H. 1, approximately the first 8 feet of the deposit is lacking in sand and gravel and a very dense layer of silty sand, some gravel, trace of clay, is present around elevation 723. The moisture content of this soil varies from 5% to 10%.

Groundwater

Observations showed groundwater at elevation 744 in B.H. 1. The source of this water is a silty sand seam around elevation 723. No groundwater was measured in the remaining borings.

APPENDIX

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 1

W P 162-75-04 LOCATION Co-ords N 16,226,079; E 1,021,542 ORIGINATED BY JM

DIST 5 HWY 11 BOREHOLE TYPE Continuous Flight Auger (MVM) COMPILED BY JM

DATUM Geodetic DATE September 21, 1977 CHECKED BY RS

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
773.0	Ground Level							
0.0	Asphalt, Sand, Gravel							
768.8	(Fill Material)		1	SS	24		770	58 38 (4)
4.2	Fill Material		2	SS	4			
	Clayey Silt with Sand,		3	SS	5			
	Some Gravel		4	SS	7			11 43 36 10
	Black Organic		5	SS	8		760	
	Firm to Stiff		6	SS	13			
			7	SS	6		750	14 38 33 15
747.0			8	SS	15			
26.0			9	SS	19	▽		
			10	SS	10			
	Silt to Clayey Silt with Sand, Gravel		11	SS	5		740	
			12	SS	15			27 38 26 9
			13	SS	33			
			14	SS	58			
			15	SS	40		730	
	Silty Sand							
	Some Gravel, Trace of Clay		16	SS	87			
							720	
	Stiff to Hard		17	SS	56			
			18	SS	100/ 4"			
709.7			19	SS	100/ 4"		710	8 45 32 15
63.3	End of Borehole							

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100

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

PLASTIC LIMIT W_P NATURAL MOISTURE CONTENT W LIQUID LIMIT W_L

WATER CONTENT (%) 10 20 30

UNIT WEIGHT γ

PML Note:
Fill symbol added from 4.2 to 26.0 ft. depth

$\bullet^3$, $\times^5$: Numbers refer to Sensitivity

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

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 2

W P 162-75-04 LOCATION Co-ords N 16,226,315; E 1,021,540 ORIGINATED BY JM

DIST 5 HWY 11 BOREHOLE TYPE Continuous Flight Auger (MVN) COMPILED BY JM

DATUM Geodetic DATE September 22, 1977 CHECKED BY [illegible]

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 (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	PLASTIC LIMIT Wp / NATURAL MOISTURE CONTENT W / LIQUID LIMIT Wl — WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
773.2	Ground Level										
0.0	Asphalt, Sand, Gravel (Fill Material)		1	SS	44		770		○		39 53 (8)
766.7			2	SS	13						
6.5	Fill Material		3	SS	19				○		2 93 (5)
	Clayey Silt With Sand, Boulders Some Gravel		4	SS	5						
			5	SS	102/ 11"		760				
			6	SS	7						
750.7	Firm to Stiff		7	SS	11						15 41 32 12
22.5			8	SS	13		750				
	Silt to Clayey Silt With Sand, Gravel		9	SS	18						
			10	SS	24				○		30 41 22 7
			11	SS	34						
	Stiff to Hard						740				
			12	SS	16				○		37 33 21 9
			13	SS	100/ 2"						
727.2			14	SS	100/ 3"		730		○		23 49 18 10
46.0	End of Borehole										

Note: Water Level Not Observed

+3, ×5 : Numbers refer to Sensitivity

15 20/10 5 (%) STRAIN AT FAILURE

EXPLANATION OF TERMS USED IN REPORT

'N' VALUE: AN INDICATOR OF SUBSOIL QUALITY. IT IS OBTAINED FROM THE STANDARD PENETRATION TEST (CSA STD. A119.1). SPT 'N' VALUE IS THE NUMBER OF BLOWS REQUIRED TO CAUSE A STANDARD 2 INCH O.D. SPLIT-BARREL SAMPLER TO PENETRATE 12 INCHES INTO UNDISTURBED GROUND IN A BOREHOLE WHEN DRIVEN BY A HAMMER WEIGHING 140 POUNDS, FALLING FREELY A DISTANCE OF 30 INCHES. FOR PENETRATIONS OF LESS THAN 12 INCHES 'N' VALUES ARE INDICATED AS THE NUMBER OF BLOWS FOR THE PENETRATION ACHIEVED. 'N' VALUES CORRECTED FOR OVERBURDEN PRESSURE ARE DENOTED THUS N.

DYNAMIC CONE PENETRATION TEST (CSA STD. A119.3): CONTINUOUS PENETRATION OF A CONICAL STEEL POINT (2" O.D. 60 CONE ANGLE) DRIVEN BY 350 FT-LB IMPACTS ON 'A' SIZE DRILL RODS. THE RESISTANCE TO CONE PENETRATION IS MEASURED AS THE NUMBER OF BLOWS FOR EACH 12 INCH ADVANCE OF THE CONICAL POINT INTO THE UNDISTURBED GROUND.

SOIL QUALITY: SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR DENSITY.

CONSISTENCY: COHESIVE SOILS ARE DESCRIBED ON THE BASIS OF THEIR UNDRAINED SHEAR STRENGTH AS FOLLOWS:

S_u (PSF)	0 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 4000	>4000
	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD

DENSENESS: COHESIONLESS SOILS ARE DESCRIBED ON THE BASIS OF SPT 'N' VALUES AS FOLLOWS:

'N' (BLOW/FT)	0 - 5	5 - 10	10 - 30	30 - 50	> 50
	VERY LOOSE	LOOSE	COMPACT	DENSE	VERY DENSE

ROCK QUALITY: ROCKS ARE DESCRIBED BY THEIR COMPOSITION AND STRUCTURAL FEATURES AND/OR STRENGTH.

RECOVERY: SUM OF ALL RECOVERED ROCK CORE PIECES FROM A CORING RUN EXPRESSED AS A PERCENT OF THE TOTAL LENGTH DRILLED IN THAT CORING RUN.

MODIFIED RECOVERY: SUM OF THOSE NATURALLY FRACTURED CORE PIECES, 4"+ IN LENGTH EXPRESSED AS A PERCENT OF THE LENGTH OF THE CORING RUN. THE ROCK QUALITY DESIGNATION (RQD), FOR MODIFIED RECOVERY, IS:

RQD (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
	VERY POOR	POOR	FAIR	GOOD	EXCELLENT

JOINTING AND BEDDING:

SPACING	2"	2" - 12"	1' - 3'	3' - 10'	> 10'
JOINTING	VERY CLOSE	CLOSE	MOD. CLOSE	WIDE	VERY WIDE
BEDDING	VERY THIN	THIN	MEDIUM	THICK	VERY THICK

ABBREVIATIONS & SYMBOLS

LABORATORY TESTING

TRIAXIAL TESTS ARE DESCRIBED IN TERMS OF WHETHER
THEY ARE CONSOLIDATED (C) OR NOT (U)
ISOTROPICALLY (I) OR NOT (A)
AND SHEARED DRAINED (D) OR UNDRAINED (U)
WITH PORE PRESSURE MEASUREMENTS (BAR OVER SYMBOLS)
EG. $\overline{CIU}$ = CONSOLIDATED ISOTROPIC UNDRAINED
TRIAXIAL WITH PORE PRESSURE MEASUREMENT
UNLESS OTHERWISE SPECIFIED IN REPORT ALL TESTS
ARE IN COMPRESSION

FIELD SAMPLING

S S	SPLIT SPOON
W S	WASH SAMPLE
S T	SLOTTED TUBE SAMPLE
B S	BLOCK SAMPLE
C S	CHUNK SAMPLE
T W	THINWALL OPEN
T P	THINWALL PISTON
O S	OSTERBERG SAMPLE
F S	FOIL SAMPLE
R C	ROCK CORE
P H	T.W. ADVANCED HYDRAULICALLY
P M	T.W. ADVANCED MANUALLY

EARTH PRESSURE TERMS

μ	COEFFICIENT OF FRICTION
δ	ANGLE OF WALL FRICTION
k_o	COEFFICIENT OF EARTH PRESSURE AT REST
k_A	COEFFICIENT OF ACTIVE EARTH PRESSURE
k_p	COEFFICIENT OF PASSIVE EARTH PRESSURE
i	ANGLE OF INCLINATION OF SURCHARGE
w	SLOPE ANGLE-BACKFACE OF WALL
β	ANGLE OF SLOPE
N_γ, N_q, N_c	BEARING CAPACITY FACTORS
D_f	DEPTH OF FOOTING
B, L	FOOTING DIMENSIONS

INDEX PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	UNIT WEIGHT OF SUBMERGED SOIL
G_s	SPECIFIC GRAVITY OF SOLIDS
e	VOIDS RATIO
e_o	INITIAL VOIDS RATIO
e_{max}	e IN LOOSEST STATE
e_{min}	e IN DENSEST STATE
D_r	RELATIVE DENSITY = $\frac{e_{max} - e}{e_{max} - e_{min}}$
n	POROSITY
w	WATER CONTENT
w_L	LIQUID LIMIT
w_p	PLASTIC LIMIT
w_s	SHRINKAGE LIMIT
I_p	PLASTICITY INDEX = $w_L - w_p$
I_L	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
I_c	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$
A_c	ACTIVITY = $\frac{I_p \text{ of soil}}{\%< 2\mu m \text{ Soil Fraction}}$
Om	ORGANIC MATTER CONTENT
S_r	DEGREE OF SATURATION
S	SENSITIVITY = $\frac{S_u \text{ (undisturbed)}}{S_u \text{ (remoulded)}}$

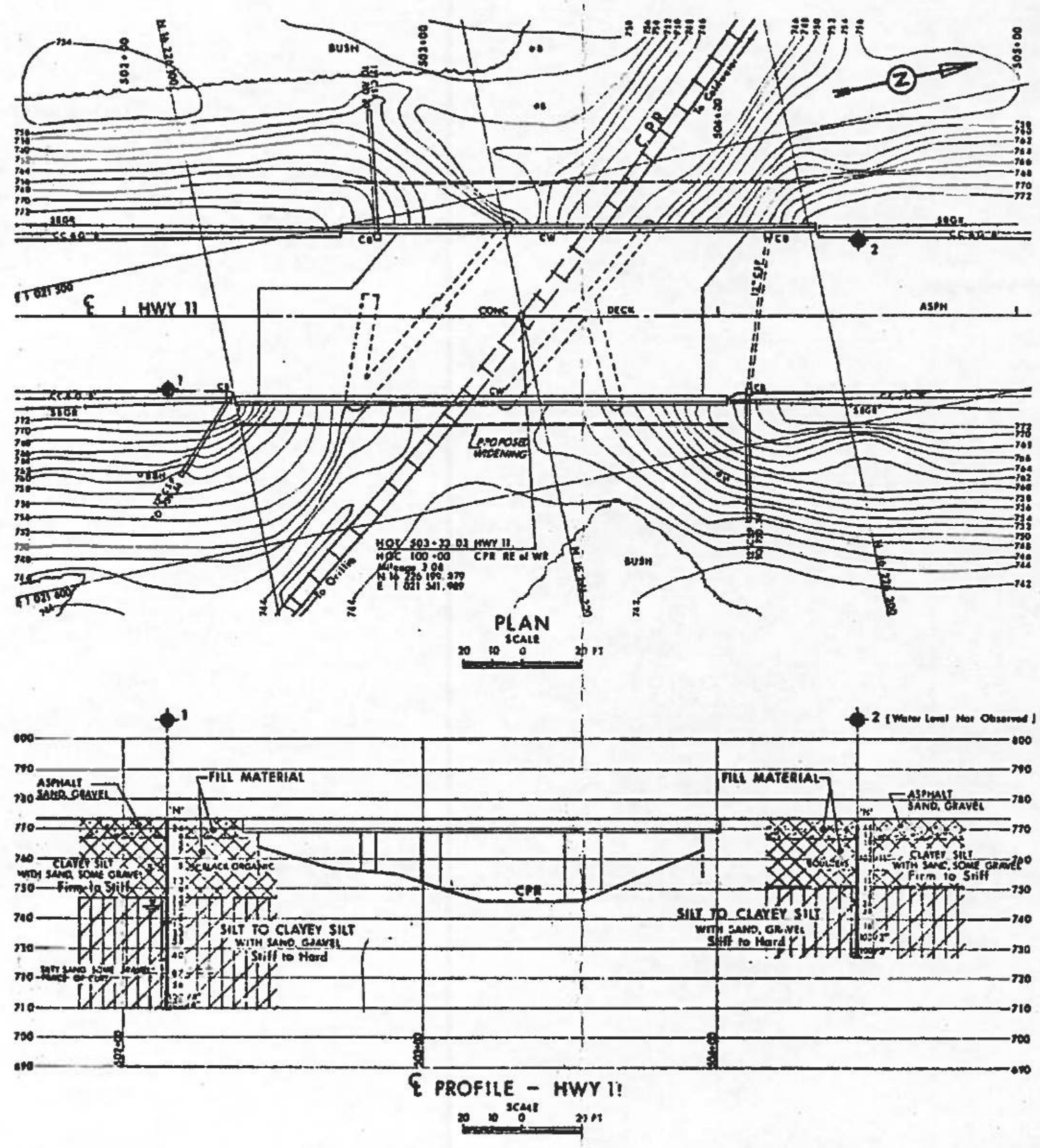
STRENGTH PARAMETERS

ϕ	ANGLE OF SHEARING RESISTANCE
τ_f	PEAK SHEAR STRENGTH
τ_R	RESIDUAL SHEAR STRENGTH
c	COHESION INTERCEPT
$\sigma_1, \sigma_2, \sigma_3$	NORMAL PRINCIPAL STRESSES
u	PORE WATER PRESSURE
u_e	EXCESS u
r_u	PORE PRESSURE RATIO
q_u	UNCONFINED COMPRESSIVE STRENGTH
s_u	UNDRAINED SHEAR STRENGTH
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO
E	MODULUS OF ELASTICITY
G	MODULUS OF SHEAR DEFORMATION
k_s	MODULUS OF SUBGRADE REACTION
m, n	STABILITY COEFFICIENTS
A, B	PORE PRESSURE COEFFICIENTS

NOTE: EFFECTIVE STRESS PARAMETERS ARE DENOTED BY USE OF APOSTROPHE ABOVE THE SYMBOL, THUS:
ϕ' = EFFECTIVE ANGLE OF SHEARING RESISTANCE;
σ' = EFFECTIVE NORMAL STRESS

HYDRAULIC TERMS

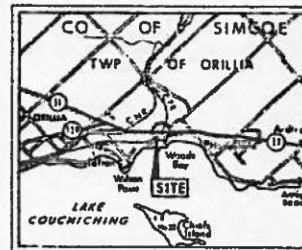
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
j	SEEPAGE FORCE PER UNIT VOLUME
η	COEFFICIENT OF VISCOSITY
k	COEFFICIENT OF HYDRAULIC CONDUCTIVITY
k_h	k IN HORIZONTAL DIRECTION
k_v	k IN VERTICAL DIRECTION
m_v	COEFFICIENT OF VOLUME CHANGE
c_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX
C_r	RECOMPRESSION INDEX
d	DRAINAGE PATH DISTANCE
T_v	TIME FACTOR
U	DEGREE OF CONSOLIDATION
OCR	OVERCONSOLIDATION RATIO



CONT No
WP No 162-75-04

C P R O'HEAD - STR WIDENING
BORE HOLE LOCATIONS & SOIL STRATA

SHEET



KEY PLAN

1 0.5 0 1 Mile

LEGEND

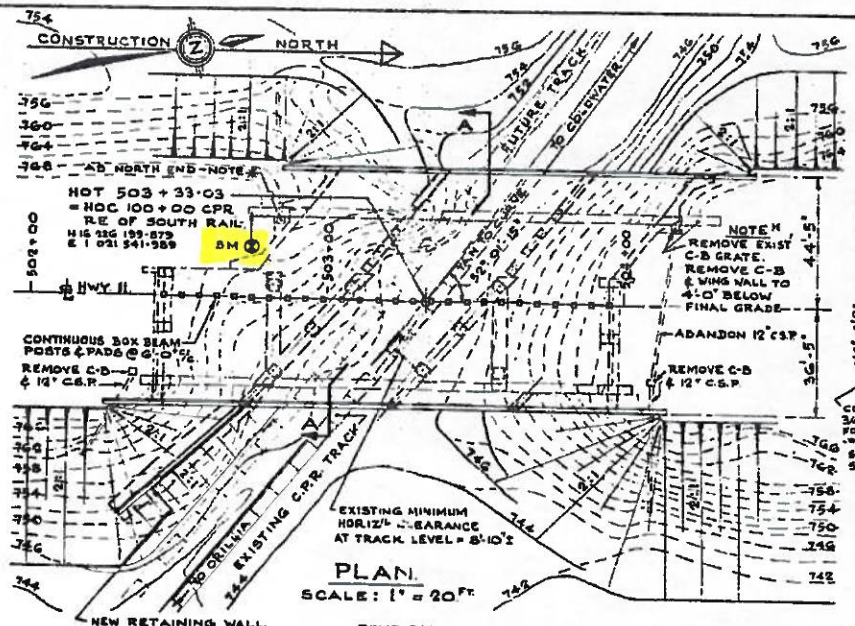
- Bore Hole
- Dynamic Cone Penetration Test (Cone)
- Bore Hole & Cone
- 'N' Blows/ft (Std Pen Test 350 ft lbs energy)
- CONE Blows/ft (60° Cone, 350 ft lbs energy)
- WL at time of investigation SEPT, 1977

No	ELEVATION	CO-ORDINATES NORTH	EAST
1	773.0	16 226 079	1 021 542
2	773.2	16 226 315	1 021 540

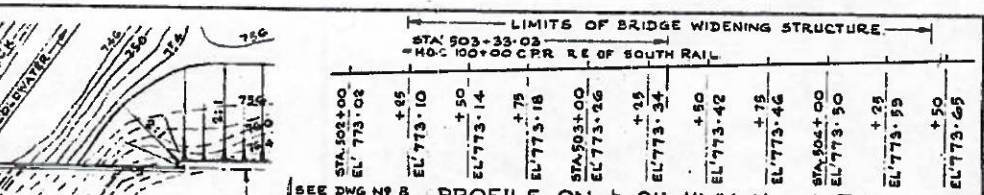
-NOTE-
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS	DATE	BY	DESCRIPTION

May 29, 1977 30-80 1627504-A

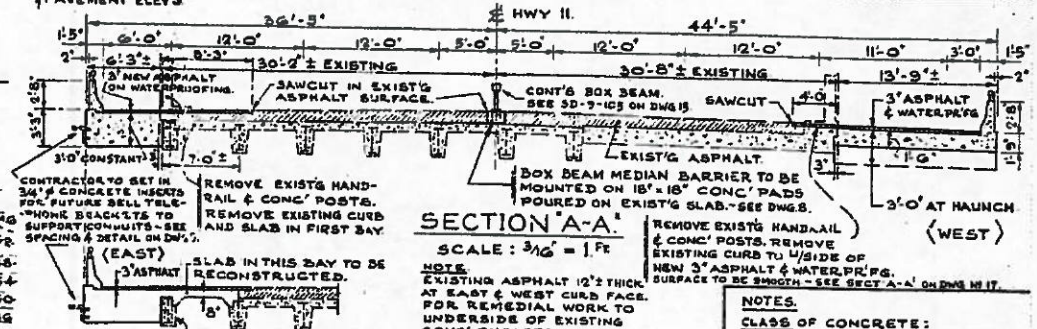


PLAN
SCALE: 1" = 20 FT.



SEE DWG Nº 8 FOR FINISHED PAVEMENT ELEV'S

PROFILE ON ℄ OF HWY. 11. - N.T.S.

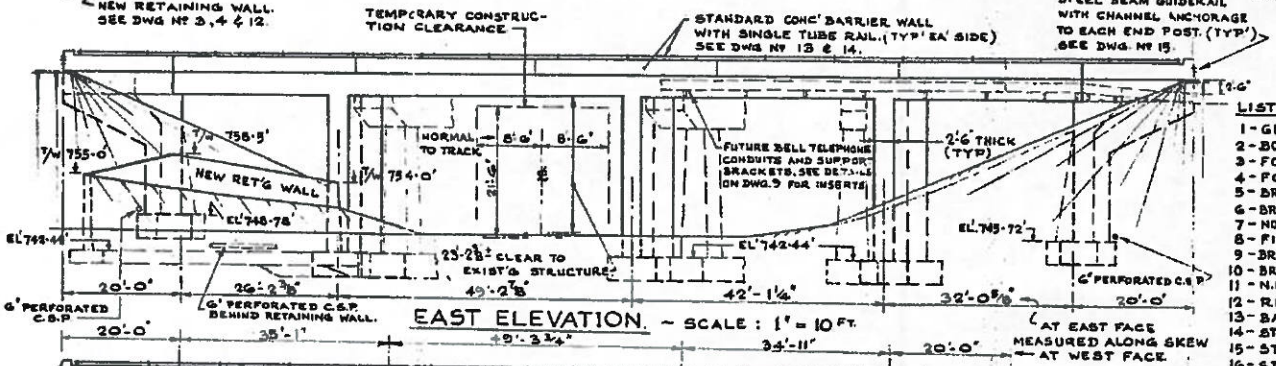


SEE DECK DWG FOR DETAILS. (DWG Nº 9.)

SECTION "A-A"
SCALE: 3/16" = 1 FT.

REMOVE EXIST'G HAND-RAIL & CONC' POSTS. REMOVE EXISTING CURB TO U/SIDE OF NEW 3" ASPHALT & WATERPR'FG. SURFACE TO BE SMOOTH - SEE SECT A-A' ON DWG Nº 17.

NOTE
EXISTING ASPHALT 12'± THICK AT EAST & WEST CURB FACE. FOR REMEDIAL WORK TO UNDERSIDE OF EXISTING CONC' ENCASED STEEL BEAMS SEE DRAWING Nº 19.
FOR TRAFFIC DIVERSION, ROADWAY PROTECTION AND TRACK PROTECTION DURING CONSTRUCTION - SEE DWG 17 & 18.



LIST OF DRAWINGS.

1 - GENERAL LAYOUT.
2 - BOREHOLE LOCATIONS & SOIL STRATA.
3 - FOOTINGS - LAYOUT
4 - FOOTINGS - REINF'
5 - BRIDGE FRAME (WEST WIDENING) - LAYOUT.
6 - BRIDGE FRAME (WEST WIDENING) - REINF'
7 - NORTHWEST & SOUTHWEST WINGWALLS
8 - FINISHED PAVEMENT ELEVATIONS.
9 - BRIDGE FRAME (EAST WIDENING) - LAYOUT
10 - BRIDGE FRAME (EAST WIDENING) - REINF'
11 - N.E. AND S.E. ABUTMENTS & WINGWALLS
12 - RETAINING WALL.
13 - BARRIER WALL.
14 - STEEL RAILING. (SINGLE TUBE)
15 - STANDARD DETAILS (I)
16 - STANDARD DETAILS (II)
17 - TRAFFIC DIVERSION DURING CONSTRUCTION.
18 - TEMPORARY SHORING DURING CONSTRUCTION
19 - REMEDIAL WORK TO EXISTING BEAMS.

NOTES.

CLASS OF CONCRETE:

BRIDGE FRAMES (INCLUDING DECK), ABUTMENTS AND WINGWALLS, I.E. CONC' IN BRIDGE.	~4000 PSI
BARRIER WALLS	~4000 PSI
RETAINING WALLS.	~4000 PSI
FOOTINGS	~3000 PSI
MEDIAN PADS FOR B/BEAM	~3000 PSI
MASS CONCRETE	~2000 PSI

CLEAR COVER TO REINF' STEEL:

TOP OF DECK SLAB.	— 2"
BOTTOM OF DECK SLAB.	— 1½"
RETAINING WALLS (BACK & FRONT)	— 3"
FOOTINGS AND ABUTMENTS	— 3"

(OR AS NOTED ON THE DRAWING)

REINFORCING STEEL:
REINF' BARS WITH THE DESIGNATION 'G' AT THE END OF BAR MARKS SHALL BE COATED BARS. GRADE 400 REINFORCING STEEL.

CONSTRUCTION NOTES:
BACKFILL TO ABUTMENTS TO BE GRANULAR 'B' PLACED AND COMPACTED SIMULTANEOUSLY FROM BOTH SIDES.
DIMENSIONS OF EXISTING STRUCTURE ARE TO BE CHECKED IN THE FIELD.

CONCRETE QUANTITIES.

CONCRETE QUANTITIES ARE LISTED BELOW FOR THE APPROPRIATE CONCRETE LUMP SUM TENDER ITEMS.

	CU. YD.
CONCRETE IN BRIDGE	593 (4000 PSI) 3 (3000 PSI) 5 (2000 PSI)
CONCRETE IN BARRIER WALLS	29
CONCRETE IN RETAINING WALL	46

RECEIVED
JAN 10 1979
SOIL MECHANICS
MINISTRY OF TRANSPORTATION & COMMUNICATIONS

BM ② - EL' 772·78'
CC ON S-W CORNER OF CW AT E-END OF EXIST'G BRIDGE 28' LEFT AT STA' 502 + 75

FOR REDUCED PLAN USE SCALE BELOW
0 6 12 18
3 INCHES ON ORIGINAL PLAN

DIST No 5
CONT No
WP No 162-75-04

HIGHWAY 11 WIDENING OVER C.P.R. 06 MILES NORTH OF NORTH JUNCTION OF HIGHWAY 118 AND HIGHWAY 11
GENERAL LAYOUT

SHEET

MAKSYMEC & ASSOCIATES LIMITED
TORONTO SUDBURY
CONSULTING PROFESSIONAL ENGINEERS CANADA

REVISIONS
DATE BY DESCRIPTION

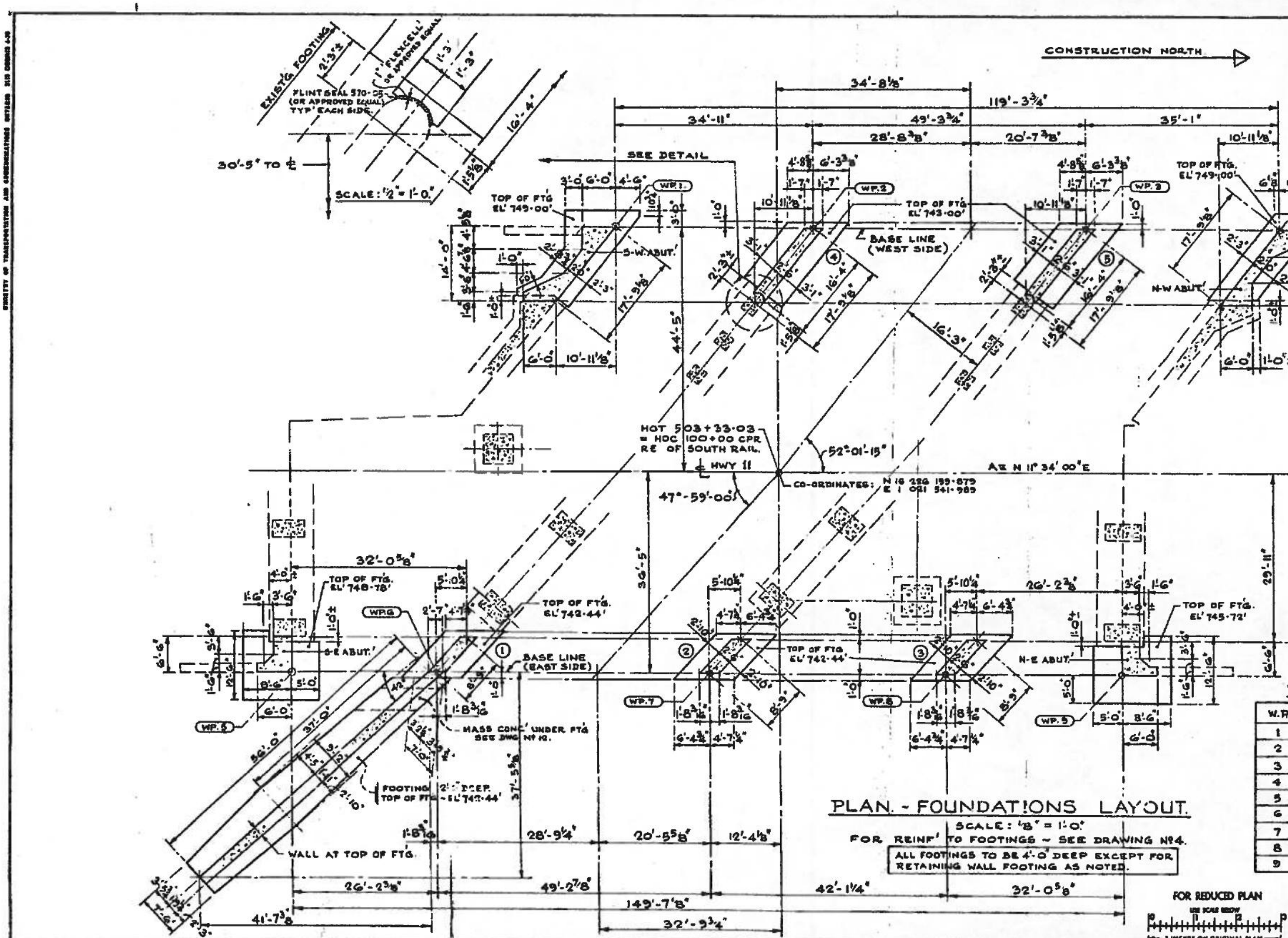
DESIGN JC CHECK L LEADING Nº 20-44 DATE Oct 78
DRAWING L CHECK SITE No 30-80 DWG

DIST No 5
CONT No
WP No 162-75-04

HIGHWAY 11 WIDENING OVER C.P.R.
0.6 MILES NORTH OF NORTH JUNCTION OF HIGHWAY 11B AND HIGHWAY 11
FOOTINGS - LAYOUT

SHEET

MAKSYMEC & ASSOCIATES LIMITED
TORONTO SUDBURY
CONSULTING PROFESSIONAL ENGINEERS CANADA



PLAN - FOUNDATIONS LAYOUT

SCALE: 1/8" = 1'-0"

FOR REINF' TO FOOTINGS ~ SEE DRAWING Nº4.

ALL FOOTINGS TO BE 4'-0" DEEP EXCEPT FOR RETAINING WALL FOOTING AS NOTED.

WORKING POINTS CO-ORDINATES.

W.P.	NORTH	EAST
1	N 16 226 180-435	E 1 021 492-672
2	N 16 226 214-643	E 1 021 499-673
3	N 16 226 262-954	E 1 021 509-561
4	N 16 226 297-325	E 1 021 516-595
5	N 16 226 106-579	E 1 021 560-065
6	N 16 226 132-245	E 1 021 565-318
7	N 16 226 180-484	E 1 021 575-191
8	N 16 226 221-733	E 1 021 583-633
9	N 16 226 253-134	E 1 021 590-060

FOR REDUCED PLAN
USE SCALE BELOW
3 INCHES ON ORIGINAL PLAN

REVISIONS	DATE	BY	DESCRIPTION

DESIGN | CHECK | LOADING HS20-44 | DATE
DRAWING | CHECK | SITE No 30-80 | DWG 3