

DOCUMENT MICROFILMING IDENTIFICATION

G.I.-30 SEPT. 1976

GEOCRES No. 31E-112

DIST. 11 REGION

W.P. No. 65-79-01

CONT. No.

W. O. No.

STR. SITE No. N/A

HWY. No. 632

LOCATION SWAMP CROSSING HWY 632

(10.9 KM SOUTH OF ROSSEAU)

=====

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.

REMARKS:



RECORD OF BOREHOLE No 1 SITE: A METRIC

W P 65-79-01

LOCATION 11 + 391 10.5 m OS RT

ORIGINATED BY D.C.

DIST 11 HWY 632

BOREHOLE TYPE CONT' FLIGHT AUGER H.S.

COMPILED BY D.C.

DATUM GEODETIC

DATE 86 02 12

CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	20 40 60 80 100					
22.74 0.0	ROAD SHOULDER SAND & GRAVEL		1	AS	—	*	227							
5	OLD COBBLES AND BOULDERS		2	SS	0		226							
	Loose to V. Loose		3	SS	2									
10	FILL MATERIAL		4	SS	1		225							
3.4	CLAY						224							
	TRACE OF SAND													
22.9	V. SOFT		5	SS	0		223							
5.5	SILTY SAND						222							0.2 (98)
22.7	SOME CLAY		6	SS	0		221							0.50 39 11
6.7	V. Loose						220							
	SILTY CLAY		7	SS	0		219							
	(Low & Medium Plasticity)		8	SS	0		218							
	TRACE OF SAND						217							
	V. SOFT						215							
	TO		9	SS	0		214							
	SOFT						213							
			10	SS	0		212							0.2 (98)
21.5							211							
16.9	SILTY SAND		11	SS	2		210							0.75 24 1
	TO						209							
	SAND		12	SS	3		208							
	TRADES OF CLAY						207							
	V. Loose						206							
	TRADES OF GRAVEL		13	SS	33		205							
	DENSE		14	SS	36		204							3.82 13 2
20.7			15	SS	10/15cm/REPS		203							
20.7	END OF BOREHOLE						202							
	* WATER LEVEL NOT OBSERVED						201							
							200							
							199							
							198							

RECORD OF BOREHOLE No 2 SITE : A METRIC

WP 65-79-01

LOCATION 11 + 39.1 10.5m OS RT

ORIGINATED BY D.C.

DIST 11 HWY 632

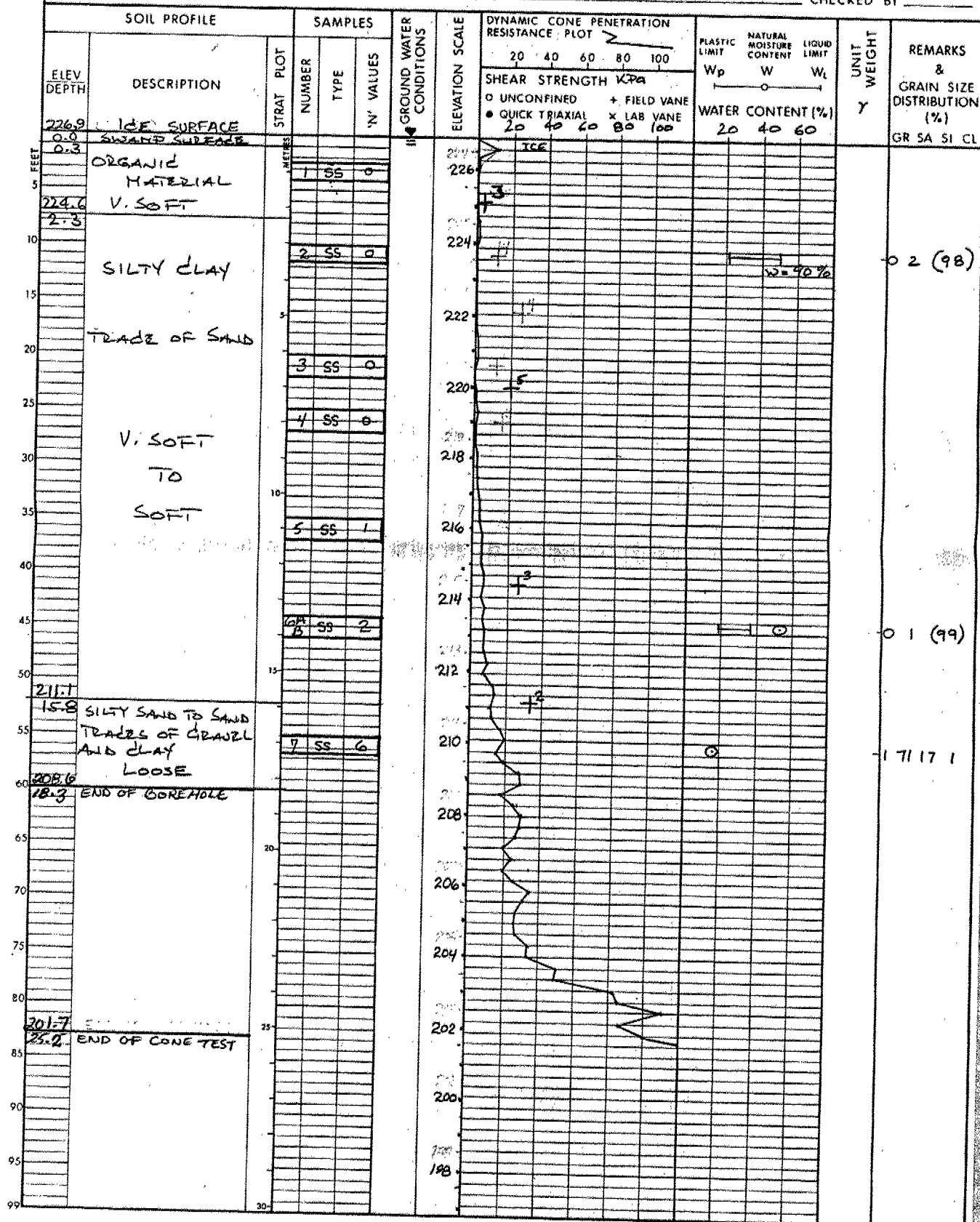
BOREHOLE TYPE 'CONT' FLIGHT AUGER HS

COMPILED BY D. C.

DATUM GEODETIC

DATE 86 02 12 614

CHECKED BY _____



+3, x5: Numbers refer to Sensitivity.



RECORD OF BOREHOLE No 3 SITE: A METRIC

W P 65-79-01 LOCATION 11 + 391 3m OS RT ORIGINATED BY D.C.
DIST 11 HWY 632 BOREHOLE TYPE DYNAMIC CONE PENETRATION TEST ONLY COMPILED BY D.C.
DATUM GEODETIC DATE 86 02 17 CHECKED BY _____

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	PLASTIC LIMIT W _p NATURAL MOISTURE CONTENT W LIQUID LIMIT W _L WATER CONTENT (%)	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE						
227.4 0.0	ROAD SHOULDER									
5										
10										
15										
20										
25										
30										
35										
40										
45										
50										
55										
60										
65										
70										
75										
80										
82.5										
84.9	END OF CONE TEST									
85										
90										
95										
99										

+3, x5: Numbers refer to Sensitivity
20
15 5 (%) STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION



Ministry of
Transportation and
Communications
Ontario

RECORD OF BOREHOLE No 5 SITE: B METRIC

W.P. 65-79-01 LOCATION 11+020 12.5 m OS LT ORIGINATED BY D.C.
DIST 11 HWY 632 BOREHOLE TYPE 'CONT' FLIGHT AUGER H.S. COMPILED BY D.C.
DATUM GEODETIC DATE BG 02 20 CHECKED BY _____

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT Σ 20 40 60 80 100 SHEAR STRENGTH KPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE 20 40 60 80 100	PLASTIC LIMIT W_p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W_L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES									
225.3	SWAMP SURFACE		1	SS	1		225							
223.6	ORGANIC MATERIAL		2	SS	0		223							
223.6	V. SOFT		3	SS	0		221							
1.7			4	SS	0		219							
	SILTY CLAY		5	SS	0		217							
	SOME SAND		6	SS	0		215							
	V. SOFT TO SOFT		7	SS	0		213							
			8	SS	35		211							
212.0	SILTY SAND		9	SS	41		209							
13.3	TRACE OF CLAY		10	SS	120	20 cm	207							
207.7	DENSE						205							
15.6	SAND & GRAVEL						203							
	SOME SILT						201							
	TRACE OF CLAY						199							
207.3	DENSE TO V. DENSE						197							
18.2	END OF BOREHOLE													

3, x 5: Numbers refer to
Sensitivity

20
15 ϕ 5 (%) STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION



RECORD OF BOREHOLE No 6 SITE: B METRIC

W P 65-79-01 LOCATION 11+020 19 m OS LT ORIGINATED BY D.C.
DIST 11 HWY 632 BOREHOLE TYPE DYNAMIC CONE PENETRATION TEST ONLY COMPILED BY D.C.
DATUM GEODETIC DATE 86 02 20 CHECKED BY _____

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE								
225.3	SWAMP SURFACE											
225												
223												
221												
219												
217												
215												
213												
211												
209												
207												
205												
203												
201												
199												
197												
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193												
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125												
123												
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107												
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103												
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31												
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23												
21												
19												
17												
15												
13												
11												
9												
7												
5												
3												
1												
0												

METRIC

W P 65-79-01 LOCATION 11 T020 25.5 m OS LT ORIGINATED BY D.C.
DIST 11 HWY 632 BOREHOLE TYPE 'CONT' FLIGHT AUGER H.S. COMPILED BY D.C.
DATUM GEODETC DATE 86 02 19 CHECKED BY _____

[illegible]

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to Sensitivity

15 \pm 5 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 8 SITE B METRIC

W P 65-79-01

LOCATION 11+020 3m OS LT

ORIGINATED BY D.C.

DIST 11 HWY 632

BOREHOLE TYPE DYNAMIC PENETRATION CONE TEST ONLY

COMPILED BY D.C.

DATUM GEODETIC

DATE 86 02 18

CHECKED BY _____

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 Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES								
226.0	ROAD SHOULDER												
225.0													
224.0													
223.0													
222.0													
221.0													
220.0													
219.0													
218.0													
217.0													
216.0													
215.0													
214.0													
213.0													
212.0													
211.0													
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112.0													
111.0													
110.0													
109.0													
108.0													
107.0													
106.0													
105.0													
104.0													
103.0													
102.0													
101.0													
100.0													
99.0													

*3, x5: Numbers refer to
Sensitivity

20
15
10
5 (%) STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION



RECORD OF BOREHOLE No 9 SITE: B METRIC

W P 65-79-01 LOCATION 11 +020 9m OS RT ORIGINATED BY D.C.
DIST 11 HWY 632 BOREHOLE TYPE 'CONT' FLIGHT AUGER H.S. COMPILED BY D.C.
DATUM GEODETIC DATE 86 02 18 CHECKED BY _____

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 x LAB VANE 20 40 60 80 100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES									
225.3 0.0	SWAMP SURFACE						225							
223.2 2.1	ORGANIC MATERIAL V. SOFT		1	AS			223							
			2	SS	0									
	SILTY CLAY TO CLAY		3	SS	0		221							0 2 (98)
	TRACE OF SAND		4	SS	0		219							
	V. SOFT TO SOFT		5	SS	0		217							
			6	SS	0		215							0 1 (99)
			7	SS	2		213							0 60 39 1
212.1 13.2	SILTY SAND TRACE OF CLAY COMPACT TO V. DENSE		8	SS	25 / 23 cm		211							
209.8 15.5	SAND & GRAVEL SOME SILT TRACE OF CLAY		9	SS	27		209							21.62.16 1
207.2 18.1	V. DENSE		10	SS	87									
	END OF BOREHOLE REFUSAL PROBABLE BEDROCK		11	SS	120 / 18 cm									

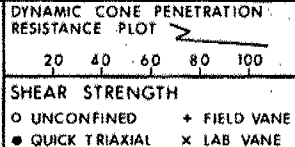
+3, x5: Numbers refer to
Sensitivity

20
15
10
5 (%) STRAIN AT FAILURE



RECORD OF BOREHOLE No 10 SITE: B METRIC

W P 65-79-01 LOCATION 11 +020 18 m OS RT ORIGINATED BY D.C.
DIST 11 HWY 632 BOREHOLE TYPE DYNAMIC PENETRATION CONE TEST ONLY COMPILED BY D.C.
DATUM GEODETIC DATE 86 02 21 CHECKED BY _____

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES									
225.3 0.0	SWAMP SURFACE						225							
5							223							
10							221							
15							219							
20							217							
25							215							
30							213							
35							211							
40							209							
45														
50	209.8 15.5	END OF CONE TEST												
55														
60														
65														
70														
75														
80														
85														
90														
95														
99														



RECORD OF BOREHOLE No 11 SITE: A METRIC

W P 65-79-01 LOCATION 11+423 9.5 m OS RT ORIGINATED BY D.C.
DIST 11 HWY 632 BOREHOLE TYPE DYNAMIC CONE PENETRATION TEST ONLY COMPILED BY D.C.
DATUM GEODETIC DATE 86 02 24 CHECKED BY _____

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE			VALUES	20 40 60 80 100					
227.1	GROUND SURFACE												
227.0													
225													
223													
221													
219													
217													
215													
213													
211													
209													
207													
205													
203													
201													
199													
197													
195													
193													
191													
189													
187													
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123													
121													
119													
117													
115													
113													
111													
109													
107													
105													
103													
101													
99													

+3, x5: Numbers refer to
Sensitivity

20
15 - 5 (%) STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION



RECORD OF BOREHOLE No 12 SITE: A METRIC

W P 65-79-01 LOCATION 11 + 467 9.5m OS RT ORIGINATED BY D.C.
DIST 11 HWY 632 BOREHOLE TYPE CONT' FLIGHT AUGER H.S. COMPILED BY D.C.
DATUM GEODETIC DATE 86 02 24 CHECKED BY _____

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 x LAB VANE 20 40 60 80 100	PLASTIC LIMIT Wp	NATURAL MOISTURE CONTENT W	LIQUID LIMIT Wl	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES								
226.9	SWAMP SURFACE												
226.0	ORGANIC MATERIAL												
226.0	V. SOFT												
225.9	SILTY CLAY		1	SS	3		226						
	TRACE OF SAND		2	SS	—		224						
	V. SOFT		3	SS	0								
223.7	SILTY SAND		4	SS	14								
3.2	SOME GRAVEL		5	SS	42								
221.4	TRACE OF CLAY												
221.4	COMPACT TO DENSE												
5.5	END OF BOREHOLE												
	REFUSAL												
	PROBABLE BEDROCK												

WATER CONTENT (%) 20 40 60
Wp W Wl
Wl = 93%

01 (99)
11 60 28 1

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to
Sensitivity

20
15 ϕ 5 (%) STRAIN AT FAILURE
10

RECORD OF BOREHOLE No 13 SITE: A METRIC

W.P. 65-79-01 LOCATION 11 + 344 2m OS LT ORIGINATED BY D.C.
 DIST 11 HWY 632 BOREHOLE TYPE 10M' FLIGHT AUGER H.S. COMPILED BY D.C.
 DATUM GEODETIC DATE 86 02 24 CHECKED BY _____

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 x LAB VANE 20 40 60 80 100	PLASTIC LIMIT W_p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W_L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES								
226.0	SWAMP SURFACE												
0.0	ORGANIC												
	MATERIAL												
	TRACE OF SAND		1	SS	0								
224.3	V. SOFT												
2.6	SILTY CLAY		2	SS	0								
	TO												
	CLAY		3	SS	0								
	TRACE OF SAND												
	V. SOFT		4	SS	0								
	TO												
	SOFT												
228.4	SILTY SAND		5	SS	0	20 cm							
228.1	END OF BOREHOLE												
228.0	REFUSAL												
	PROBABLE REDROCK												

OFFICE REPORT ON SOIL EXPLORATION

RECORD OF BOREHOLE No 14 SITE: A METRIC

W P 65-79-01 LOCATION 11 + 344 9m OS RT ORIGINATED BY D.C.
 DIST 11 HWY 632 BOREHOLE TYPE DYNAMIC PENETRATION CONE TEST ONLY COMPILED BY D.C.
 DATUM GEODETIC DATE 86 02 21 CHECKED BY _____

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT <u>2</u>		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	SHEAR STRENGTH					
226.0 0.0	SWAMP SURFACE							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE						
226														
224														
222														
220														
218														
216														
214														
212														
210														
208														
206														
204														
202														
200														
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194														
192														
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38														
36														
34														
32														
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28														
26														
24														
22														
20														
18														
16														
14														
12														
10														
8														
6														
4														
2														
0														

+3, x5: Numbers refer to Sensitivity 20
 15 5 (%) STRAIN AT FAILURE
 10

OFFICE REPORT ON SOIL EXPLORATION

RECORD OF BOREHOLE No 15 SITE: A METRIC

W P 65-79-01 LOCATION 11 1334 8.0 m OS LT ORIGINATED BY DC
 DIST 11 HWY 632 BOREHOLE TYPE DYNAMIC CONE PENETRATION TEST ONLY COMPILED BY DC
 DATUM GEODETIC DATE 86 02 21 CHECKED BY _____

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES								
227.1 0.0	GROUND SURFACE												
225.1 2.0	END OF CONE TEST REFUSAL PROBABLE BEDROCK												
5													
10													
15													
20													
25													
30													
35													
40													
45													
50													
55													
60													
65													
70													
75													
80													
85													
90													
95													
99													

OFFICE REPORT ON SOIL EXPLORATION

RECORD OF BOREHOLE No 16 SITE: A METRIC

W P 65-79-01 LOCATION 11 + 334 2.5m OS RT ORIGINATED BY D.C.
 DIST 11 HWY 632 BOREHOLE TYPE CONT' FLIGHT AUGER H.S. COMPILED BY D.C.
 DATUM GEODETIC DATE 86 02 24 CHECKED BY _____

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT Wp	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES								
226.9	SWAMP SURFACE												
224.8	ORGANIC MATERIAL		1	AS									
221.1	V. SOFT		2	SS	0								
223.1	SILTY CLAY		3	AS									
218.8	V. SOFT												
218.8	END OF BOREHOLE REFUSAL (BEDROCK)												

OFFICE REPORT ON SOIL EXPLORATION

ROSSEAU

N

11+470 —



10 m 10 m

11+450 —

BENCH MARK



11+443 m

11+430 —



11+410 —



11+390 —

EXISTING ROADWAY

11+370 —



11+350 —



11+330 —

65-79-01
ROSSEAU
SITE # A

DC

ROSSEAU



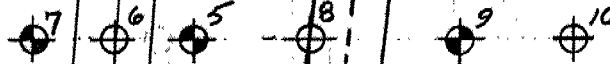
10m 10m

11+040 -

PROPOSED

EXISTING

APPROX 11+020



11+000 -

65-79-01
ROSSEAU
SITE B

J.I. McDougall
Head, Geotechnical Section
Northern Region
North Bay

1986 07 10

Att'n: E.W. Veritsky

From: Foundation Design Section
Room 315, Central Building
Downsview

Re: Swamp Crossing
Hwy. #632
10.9 km S of Rosseau
WP 65-79-01
District #11 (Huntsville)

General

As per your request, field investigations were carried out near the south end of Hwy. #632 at the following locations:

Site 'A': Sta. 11+250 - Sta. 11+500

Site 'B': Sta. 10+880 - Sta. 11+080

At both sites the subsoil was found to consist of organic material, followed by a very soft to soft cohesive deposit (silty clay to clay), followed by silty sand and/or sand and gravel. References should be made to the attached record of borehole sheets for the vertical extent of the individual deposits at a particular location. These sheets also contain the location and elevation of the borings, description of the encountered strata together with the obtained field and laboratory test results.

Discussion and Recommendations

It is proposed to improve the geometry (vertical and horizontal) of the existing Hwy. #632. This will require adjusting the profile grade and realigning the existing roadway at certain locations. At site 'A' the roadway will remain on the same alignment but the level of the grade line will be increased by about 1.5 m. Site 'B' is situated on "virgin" ground with a proposed profile grade level at 3 m above the swamp level.

Due to the encountered poor subsoil conditions, it is recommended that these proposed crossings should be avoided, since problems of stability, settlements and high construction costs are inevitable. If, however, no reasonable alternative exists, the following treatments are suggested.

Site 'A'

The thickness of the existing roadway material was found to be about 3.4 m (BH. #1), followed by a thin layer of muck and a deep deposit of very soft to soft cohesive material. It is noted that the

surface of the adjacent swamp is only 0.5 m lower than the grade of the highway. It is therefore concluded that about 2.9 m of settlement occurred since the original construction.

In view of the above facts, the following alternatives are offered:

- 1) Improve the existing drainage system by installing new and/or larger pipes (culverts). Increase the proposed grade line by not more than 0.3 m (1 ft.) above the existing road surface.
- 2) Reconstruct the existing roadway embankment as outlined below.
 - a) Excavate the fill material to 0.6 m (2 ft.) below the swamp level.
 - b) Place sawdust into the excavation (0.6 m thick) plus 0.6 m (2 ft.) additional sawdust over the swamp level.
 - c) Place 0.9 m (3 ft.) granular fill over sawdust.

In this alternative, the following densities were assumed:

Granular fill:	$\gamma = 2082 \text{ kg/m}^3$ (130 pcf)
Sawdust:	$\gamma = 561 \text{ kg/m}^3$ (35 pcf)

It is pointed out that these density values should not be exceeded.

There are some concerns using wood-waste products such as sawdust. These products, in general, are subjected to decay if not placed below water level. In addition, there are other risks involved using these materials above water level: heating and spontaneous ignition, potential water quality problem, foul odor, etc. Some of these problems may be overcome by wrapping the sawdust into suitable plastic sheets.

Another concern is the thickness (0.9 m) of the recommended granular fill material from the pavement structure point of view. This aspect should be investigated by your office.

Site 'B'

As mentioned above, the realigned highway will be situated on "virgin" ground. The thickness of the swamp is about 2 m and followed by a deep deposit of very soft to soft silty clay to clay.

The following treatment is offered:

Partial Removal of Soft Material By Displacement

This method requires that suitable fill material (non-cohesive) be

placed directly on the surface of the swamp which will begin to settle and displace due to the weight of the fill material. Mud waves will begin to form in front of and at the sides of the fill. Settlement and displacement will occur until a stable situation is reached. The process can be accelerated somewhat by surcharging the loaded area and by excavating the mud wave in front of the fill. This method has the disadvantage that the total amount of fill required cannot be estimated accurately and also, that some soft material may become trapped under the fill and continue to settle for a long period after construction is completed.

We are recommending that this new road be built in sections about 15 m long, and surcharged by about a 2 m thick fill material. When the displacement is stopped, the surcharge can be pushed forward to the next section.

Should further information be required, please contact our office.



P. Payer, P. Eng.
Senior Foundations Engineer

PP/cb