

G.I-30 SEPT. 1976

GEOCRES No. 31E-144

DIST. 52 REGION _____

G W.P. No. 217-89-00

CONT. No. _____

W. O. No. _____

STR. SITE No. _____

HWY. No. 69

LOCATION Cranberry Marsh Rd. W., Sta.

11+470 to 11+650, Embankments + Culverts.

No of PAGES - _____

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OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. _____

REMARKS: _____



**GEOTECHNICAL FOUNDATION REPORT
EMBANKMENT SECTION OVER SWAMP AREA
SNOWMOBILE CULVERT & CREEK CULVERT
CRANBERRY MARSH ROAD WEST
STATIONS 11+470 TO 11+650
W.P. 217-89-00
DISTRICT 52, HUNTSVILLE, ONTARIO**

PREPARED FOR:

R.V. ANDERSON ASSOCIATES LIMITED

TROW CONSULTING ENGINEERS LTD.

**Brampton, Calgary, Cambridge, Hamilton, Iqaluit, Kingston, London,
Markham, Montreal, North Bay, Orillia, Ottawa, Sudbury, Thunder Bay, Winnipeg**

**Project: SO7404G/C
Date: October 27, 1996**

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Sudbury Branch

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MEMORANDUM #2

SO7404G/C

TO: T.H. McColm, P.Eng.
Project Manager
R.V. Anderson

DATE: October 27, 1998

FROM: I.W. Gore, P.Eng.
Principal Geotechnical Engineer
Trow Consulting Engineers Ltd.

SUBJECT: Geotechnical Foundation Report
Embankment Section over Swamp Area
Snowmobile Culvert & Creek Culvert
Cranberry Marsh Road West
Stations 11+470 to 11+650
W.P. 217-89-00
District 52, Huntsville, Ontario

This memorandum addresses the geotechnical foundation investigation and report for

- the design and construction of an 11 m high embankment section (approximate Stations 11+470 to 11+650) along the Cranberry Marsh Road West;
- a proposed 2.5 m wide, 3 m high concrete box culvert (for snowmobile access) within the embankment section at approximately Station 11+560;
- a proposed 1.83 m by 1.83 m, non rigid frame box culvert within the embankment section for the creek at approximately Station 11+480 m.

1.0 INTRODUCTION

Along the proposed Cranberry Marsh Road West, an 11 m high, rock fill embankment section is required to cross a "swampy" section between approximate Stations 11+470 and 11+650. Shallow bedrock exists south of Station 11+470 and to the north of

Station 11+650, rising fairly steeply to a height of about 20 m (~elevations 220 to 224 m) above the swamp grade (~elevation 202 m). Bedrock is also intermittently exposed in the existing creek bed, which runs along the south end of the swamp at approximate Station 11+475.

The existing grade in the swamp section is at approximate elevation 202 m with the proposed road grade, at approximate elevations 212.5 m, requiring a rock embankment height of some 10.5 m. The existing creek bed level, running along the south end of the swamp (~ Station 11+475) is at an approximate elevation of 198.0 m.

The invert level of the proposed snowmobile culvert (centre line at approximate Station 11+560) is at elevation 200.8 m (west side) and 202.9 m (east side), i.e. elevation 201.8 m along the centre. The culvert for the creek is intended to be a 1.83 m by 1.83 m box culvert at Station 11+480, with an invert level at approximate elevation 198.0 m.

2.0 FIELD WORK

The field work for this project comprised four sampled boreholes extended to bedrock. The drilling was completed using a track mounted soils drill, equipped with hollow and solid stem flight augers on July 7, 1998.

The locations and details of the boreholes are noted on the enclosed logs and the attached site plan and profile, Dwg. 1. Details of the soil strata encountered in the boreholes are also included on the logs. Further information on soil descriptions are included on Dwgs. 2A and 2B.

3.0 SUBSURFACE CONDITIONS

The subsurface conditions consist of shallow bedrock at the north and south ends of the swamp. Bedrock is also evident in the bottom of the existing creek running along the south side of the swamp.

In the swamp section between the above noted rock shallow rock outcroppings, the subsoil, beneath a thin veneer of topsoil, consists of dense sand and gravel at the south end, over

shallow bedrock. North of approximate Station 11+500, the overburden thickness increases to a maximum of about 6.4 m, around Station 11+575, and consists of an upper 1.5 m to 2 m thick zone of very loose sandy silt overlying a 1 m to 3 m thick zone of soft silty clay which overlies compact to dense till. A brief description of each soil type is included below.

- Organic Soils

These surficial deposits are thin, less than 300 mm thick, and consist for the most part of topsoil.

- Sandy Silt

A relatively thin (~ 1.5 m to 2 m thick) deposit of very loose, sandy silt with organic inclusions, was encountered beneath the topsoil, north of approximately Station 11+540, as far as, approximately Station 11+615. This stratum extends down to approximate elevation 200 m.

- Silty Clay

As the overburden thickness increases, a deposit of soft silty clay exists beneath the very loose silt. This clay deposit is in the order of 2 m to 3 m thick, extending to a maximum depth of almost 5 m, at Station 11+575, i.e. down to approximate elevation 197.3 m.

The clay has an undrained shear strength of approximately 20 kPa with an insitu moisture content of 66%. The plastic limit was established at 20% to 22.5% with a liquid limit of 53% to 65%.

- Silty Sand & Gravel Till

Beneath the clay and immediately below the topsoil at the south end, a deposit of compact to dense silty sand and gravel was encountered.

- Bedrock

Bedrock is either exposed or exists at very shallow depths at each end of the swamp sections, as well as in the creek bed at the south end. The probable bedrock surface then lowers to a maximum depth of 6.5 m (~ El. 195.6 m) below the swamp area.

4.0 GROUNDWATER

Groundwater was encountered within 1 m of existing grade within the poorly drained section of the swamp. Near the creek, the groundwater table was lower since the creek was almost "dry" after a prolonged dry summer. The groundwater level is expected to fluctuate with precipitation levels, and may be at or above the existing grade level during wet periods.

5.0 RECOMMENDATIONS

5.1 Stability and Settlement

Because of the proposed high embankment fills (~ 10.5 m), it is recommended that the weak clay deposit be subexcavated down to the underlying competent, compact to dense till. This will require subexcavation to a maximum of about 5 m (~ elevation 197 m) around Station 11+560 to 11+600, approximately to 2.5 m depth (~ elevation 199.5 m) at Station 11+550, with no subexcavation necessary at the south end (south of approximately Station 11+540), since clay is absent and the conditions consist of till and/or shallow rock. North of Station 11+600, the clay is also likely to "thin-out", hence the extent of subexcavation will correspondingly decrease.

The rock fill embankment may be placed directly over the till, once the clay has been removed, without the risk of instability. Settlements of the underlying, heavily overconsolidated till will be minimal and should occur during construction.

5.2 Embankment Design

Since the proposed rock fill embankment (which will be constructed with 'bulk' blast rock) is over 10 m high, it is recommended that it be constructed with a side slope of 1.25H:1V with a 2 m wide "bench" incorporated at mid height.

Settlement of the 10.5 m high bulk rock fill embankment should be expected over the first 2 to 3 years after construction. It is likely that this settlement could be in the order of 1% to 2% of the height, i.e. a maximum of 150 mm to 300 mm (total rock fill height of 15 m, after subexcavation of the clay. This settlement could however be reduced substantially if smaller sized, well graded rock fill can be used. For example, if the rock fill can be limited to a maximum of 450 mm and compacted during placement, to 100 percent standard Proctor density these settlements will be much less and less than 50 mm. However, any settlement should occur within 12 months of placement. However, the additional cost implications of using smaller rock sizes in this embankment has not been evaluated and is left to the prime consultant to determine.

As per MTO Northern Region Guidelines, to accommodate future grade raises, to compensate for the anticipated settlement from bulk rock fill and for pavement overlays, the rock fill embankment should be constructed 1 m wider than the design cross section, on each side to the bottom of the subgrade level.

5.3 Construction Considerations

It is expected that temporary excavations for the upper silt and clay will be temporarily stable at angles of 2H:1V (upper 1.5 m to 2 m of sandy silt) and 1.5H:1V in the underlying clay. Subexcavation and backfilling with rock fill should be carried out concurrently and under water, if necessary.

5.4 Raising the Grade

Rock fill placed below the groundwater within the embankment excavation may be end dumped. However, once the rock fill is 0.3 m above any standing water in the excavation, placement and compaction of the fill should be completed according to OPSS standards and MTO practices.

5.5 Snowmobile Culvert

A concrete box snowmobile culvert (2.5 m wide by 3 m high) will be incorporated in the embankment at Station 11+560 for access beneath the highway. The invert level of this culvert is at 200.8 m (west side) and 202.9 m (east side) and 201.8 m on centre line.

Based on the foregoing comments, it is expected that subexcavation of the upper weak silts and clays will be required in the area, i.e. down to a depth of some 3.5 m below grade (~elevation 198.5 m).

Rather than backfill the subexcavated clay and silt beneath the culvert, over the exposed dense till and up to the underside of the box culvert with "bulk" rock fill, a pad of better quality rock fill (to form a satisfactory base to support the culvert and prevent settlement) is recommended. It is suggested that the rock fill satisfy the following gradation requirement.

100% < 450 mm size

15% < 150 mm size

The rock fill should be compacted to 100 percent standard Proctor maximum dry density in lifts not exceeding 600 mm with heavy vibratory equipment. The engineered rock fill pad should extend a minimum of 1 m beyond the perimeter base edge of the culvert and should be sloped downwards from the base of the culvert, at an angle of 1.5H:1V, to sand bottom (dense till). The recommended placement and bedding requirements are included on the attached Dwg. 3.

Provided the above recommendations are followed, the proposed culvert should be properly supported and no settlement problems are envisaged.

5.6 Creek Culvert

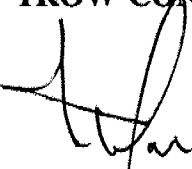
With a proposed invert elevation at 198.0 m the base of the culvert is expected to be in bedrock or dense silty sand and gravel till. As such no foundation nor settlement problems are expected, provided the culvert is designed and constructed in accordance with all appropriate OPSS standards and MTO procedures.

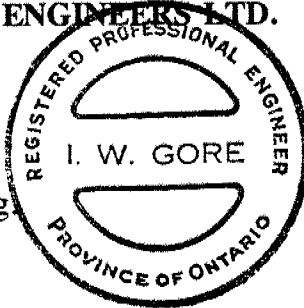
The recommended placement and bedding requirements are included on the attached Dwg. 4.


5.7 Miscellaneous

The field investigation was supervised by Mr. E.A. Gonneau, P.Eng., Project Engineer. The memorandum report was written by Mr. I.W. Gore, P.Eng., Principal Geotechnical Engineer, and reviewed by Mr. E.A. Gonneau and S.E. Gonsalves, P.Eng.

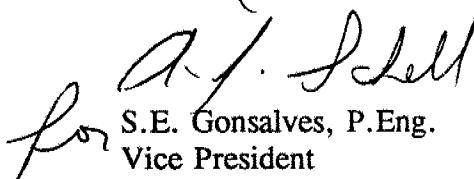
Yours truly,
TROW CONSULTING ENGINEERS LTD.


I.W. Gore, M.Sc., P.Eng.
Principal Engineer




Eric A. Gonneau, P.Eng.
Project Engineer




S.E. Gonsalves, P.Eng.
Vice President

IWG:lstp.43

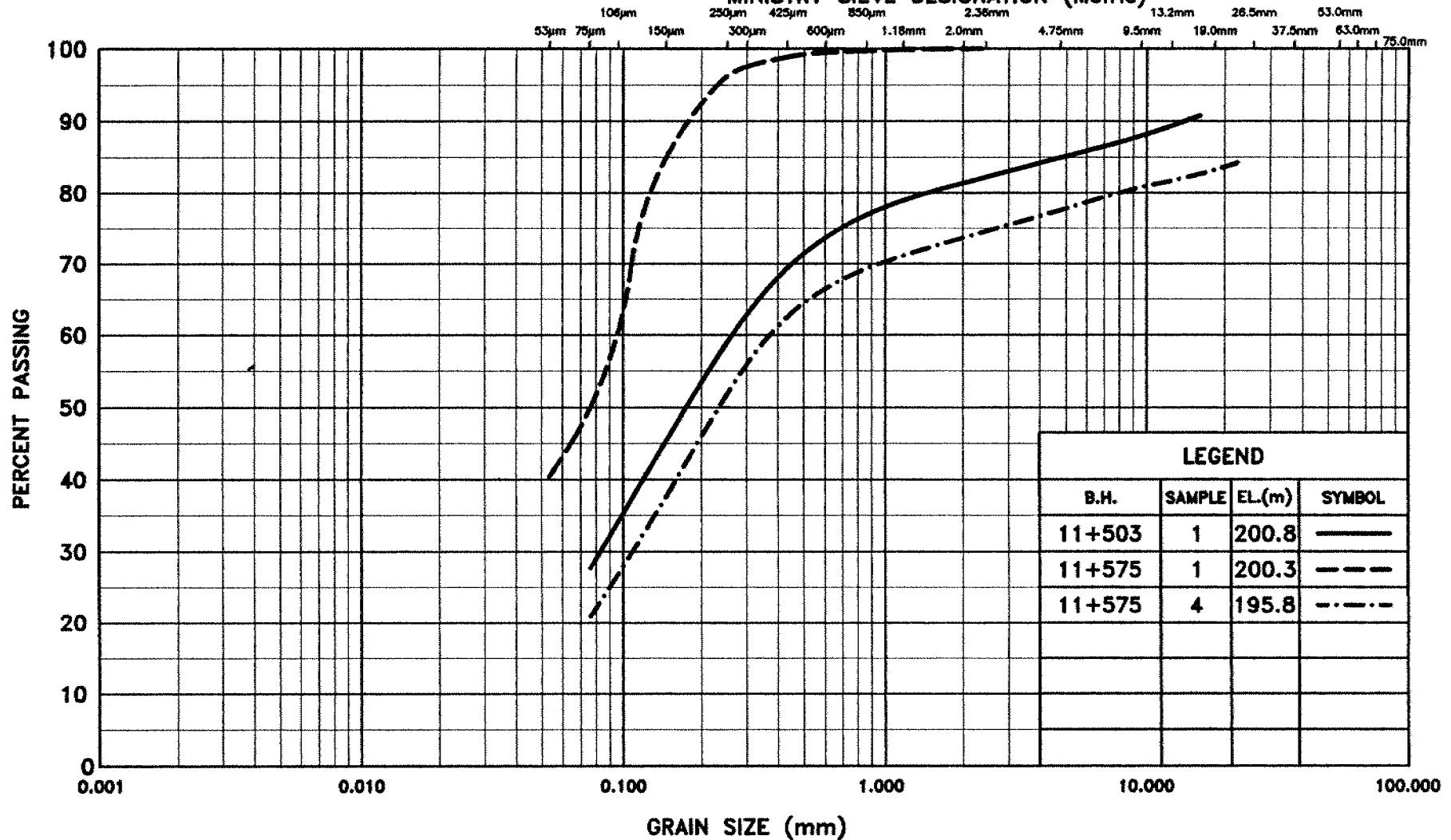
Encls.

Dist.: MTO (6 copies)
R.V. Anderson (2 copies)
Trow Brampton (1 copy)

UNIFIED SOIL CLASSIFICATION

CLAY AND SILT	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE

MINISTRY SIEVE DESIGNATION (Metric)



Ministry of
Transportation

METRIC

GRAIN SIZE DISTRIBUTION

11+503, SS-1 SILTY SAND with GRAVEL
 11+575, SS-1 SANDY SILT
 11+575, SS-4 SILTY SAND & GRAVEL TILL

FIGURE 1

W.P 217-89-00



PROJ. No. S07404G/C

NOTES ON SAMPLE DESCRIPTIONS

1. All descriptions included in this report follow the I.S.S.M.F.E. as suggested in the Canadian Foundation Manual. The laboratory grain-size analysis also follows this classification system. Others may designate the unified classification system as their source; a comparison of the two is shown for your information. Please note that, with the exception of those samples where the grain-size analysis has been carried out, all samples are classified visually and the accuracy of visual examination is not sufficient to differentiate between the classification systems or exact grain sizing.

UNIFIED SOIL CLASSIFICATION	Fines (silt or clay)			Sand			Gravel		Cobbles																					
				Fine	Medium	Coarse	Fine	Coarse																						
	I.S.S.H.F.E. SOIL CLASSIFICATION	Clay	Silt			Sand			Gravel			Cobbles																		
			Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse																			
			Sieve Sizes																											
Particle Size (mm)																														
	0.001	0.002	0.003	0.004	0.006	0.008	0.01	0.02	0.03	0.04	0.06	0.08	0.1	0.2	0.3	0.4	0.6	0.8	1.0	2.0	3.0	4.0	6.0	8.0	10	20	30	40	60	80

2. **FILL:** Where fill is designated on the borehole log, it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of the site fill material. All fills should be expected to contain obstructions such as large concrete pieces of subsurface basements, floors, tanks, etc.; none of these may have been encountered in the borehole. Since boreholes cannot accurately define the contents of fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact and correct composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant on-going and future settlements. Some fill material may be contaminated by toxic waste that renders it unacceptable for deposition in any but designated land fill sites. Unless specifically stated, the fill on this site has not been tested for contaminants that may be considered hazardous. This testing and a potential hazard study can be carried out if you so request. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common but are not detectable using conventional geotechnical procedures.
3. **TILL:** The term till on the borehole logs indicate that the material originates from a geological process associated with glaciation. As a result of this geological process, the till must be considered heterogeneous in composition and, as such, may contain pockets and/or seams of material such as sand, gravel silt or clay. As till often contains cobbles (60 to 200 mm) or boulders (over 200 mm), contractors may encounter them during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size, or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited areas; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till material.

NOTES ON SAMPLE DESCRIPTIONS (Cont'd)

Project No: S07404G/C

Drawing No: 2B

4. The following table gives a description of the soil based on particle sizes. With the exception of those samples where grain-size analyses have been performed, all samples are classified visually. The accuracy of visual examination is not sufficient to differentiate between this classification system or exact grain size.

Soil Classification		Terminology	Proportion
Clay	< 0.002 mm	"trace" (eg. trace sand)	1% - 10%
Silt	0.002 to 0.06 mm	"some" (eg. some sand)	10% - 20%
Sand	0.06 to 2 mm	adjective (eg. sandy)	20% - 35%
Gravel	2 to 60 mm	and (eg. and sand)	> 35%
Cobbles	60 to 200 mm	noun (eg. boulders)	> 35% and
Boulders	> 200 mm		main fraction

Classification system as suggested in the Canadian Foundation Engineering Manual, 3rd Edition, unless otherwise noted.

The compactness of cohesionless soils and the consistency of cohesive soils are defined by the following:

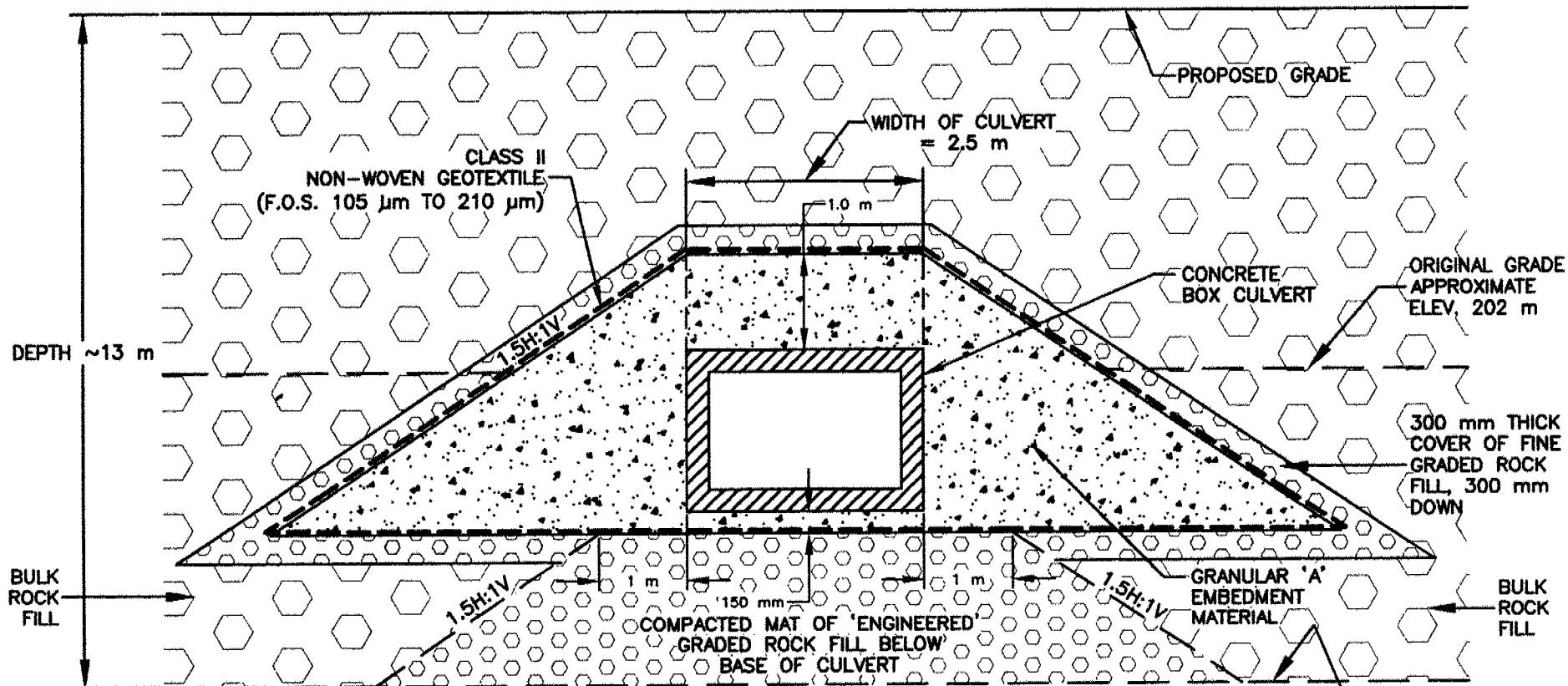
Cohesionless Soil		Cohesive Soil	
Compactness	Standard Penetration Resistance "N" Blows/0.3 m	Consistency	Undrained Shear Strength (kPa)
Very Loose	0 to 4	Very Soft	< 12
Loose	4 to 10	Soft	12 - 25
Compact	10 to 30	Firm	25 - 50
Dense	30 to 50	Stiff	50 - 100
Very Dense	Over 50	Very Stiff	100 - 200
		Hard	> 200

5. Rock Coring

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of core recovered, counting only those pieces of sound core that are 100 mm or more in length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD
Very poor quality	< 25
Poor quality	25 - 50
Fair quality	50 - 75
Good quality	75 - 90
Excellent quality	90 - 100

$$\text{Recovery Designation \% Recovery} = \frac{\text{Length of Core Per Run} \times 100}{\text{Total Length of Run}}$$



SNOWMOBILE CULVERT PLACEMENT IN ROCK FILLS

NOT TO SCALE

REFER ALSO TO O.P.S.D. 800 SERIES
FOR GUIDANCE

NOTE

Frost tapers to be applied
as per O.P.S.D. 803.01

SUBEXCAVATE LOOSE SILT & SOFT CLAY
DOWN TO SOUND BASE (DENSE TILL)
APPROXIMATE ELEVATION 199 m



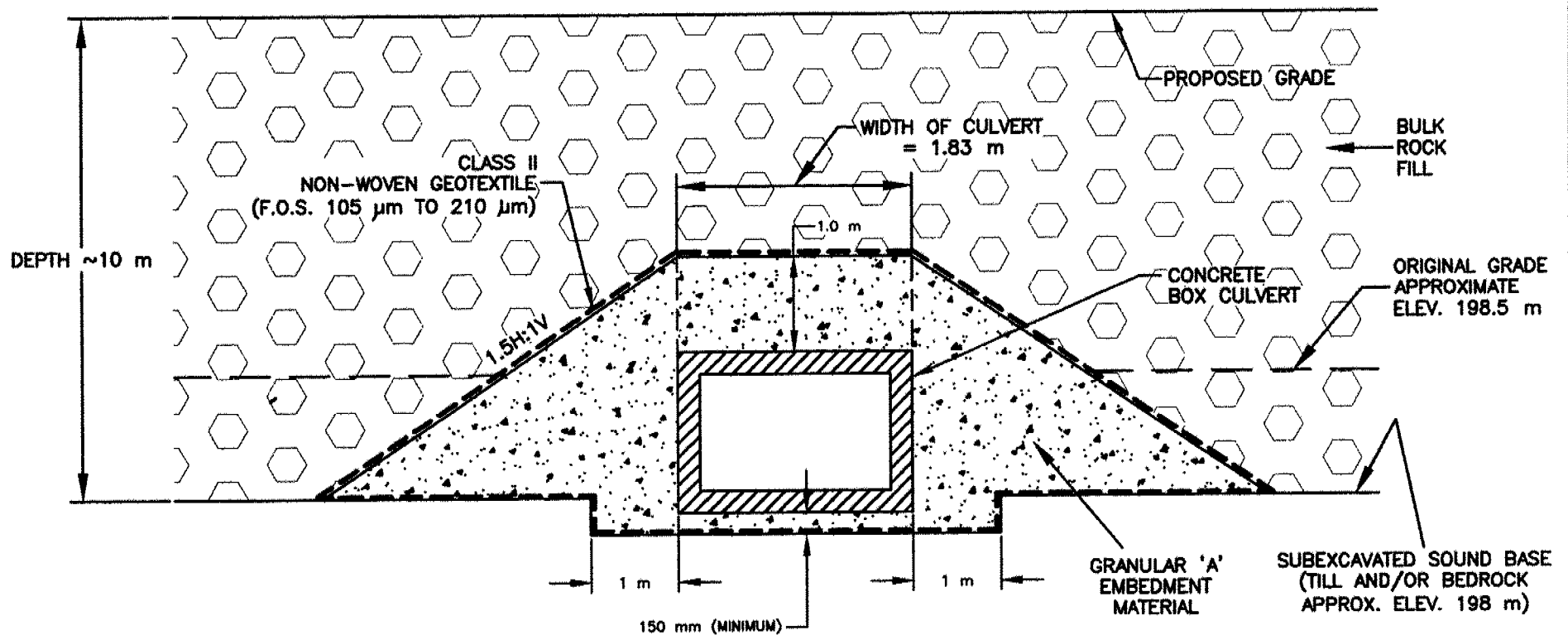
GEOTECHNICAL EVALUATION

CRANBERRY MARSH ROAD WEST
SNOWMOBILE CULVERT
W.P. 217-89-00

PROJ. No. S07404G/C

DATE: SEPTEMBER 1998

DWG. No. 3



CULVERT PLACEMENT IN ROCK FILLS

NOT TO SCALE

REFER ALSO TO O.P.S.D. 800 SERIES
FOR GUIDANCE

NOTE

Frost tapers to be applied
as per O.P.S.D. 803.01

Trow

GEOTECHNICAL EVALUATION

**CRANBERRY MARSH ROAD WEST
CREEK CULVERT
W.P. 217-89-00**

PROJ. No. S07404G/C

DATE: SEPTEMBER 1998

DWG. No. 4

RECORD OF BOREHOLE 11 + 503 1 OF 1

METRIC

W.P. 217-89-00 LOCATION Station 11 + 503, offset ~2 m right of centreline ORIGINATED BY I.D.
 DIST 52 HWY 69 BOREHOLE TYPE Standard auger / CME-55 COMPILED BY M.D.
 DATUM Geodetic DATE July 7, 1998 CHECKED BY I.G.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE (metres)	SPT TEST (N-Value) CONE PENETRATION TEST				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT				UNIT WEIGHT kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION GR SA (SI & CL)
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS/0.3m			20 40 60 80				wp — w — wl					
								SHEAR STRENGTH: Cu, KPa ● UNCONFINED QUICK TRIAXIAL × FIELD VANE LAB SHEAR				WATER CONTENT (%) 10 20 30 40					
202.50	GROUND SURFACE																
0.00	TOPSOIL, ~300 mm over SILTY SAND, with GRAVEL inclusions, grey/brown, some cobbles & possible boulders. (dense)						202										
			1	SS	48		201		⊗		C				15% 57% 28%		
							200										
199.60	END OF BOREHOLE DUE TO REFUSAL TO AUGER ON BEDROCK OR BOULDER																
2.90	Notes: 1) This borehole forms part of the Cranberry Marsh Road Foundation Investigation. 2) Borehole drilled at U.T.M. coordinates 4 988 990.3 N, 282 962.7 E. 3) Borehole was dry & open to full depth on completion. 4) Drill moved ~1.5 m east of borehole & met auger refusal at ~3.0 m. Drill then moved ~2.5 m north of borehole & met auger refusal at ~2.0 m depth.																



RECORD OF BOREHOLE 11 + 550 1 OF 1

METRIC

W.P. 217-89-00 LOCATION Station 11+550, on centreline ORIGINATED BY I.D.
 DIST 52 HWY 69 BOREHOLE TYPE Standard auger / CME-55 COMPILED BY M.D.
 DATUM Geodetic DATE July 7, 1998 CHECKED BY I.G.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE (metres)	SPT TEST (N-Value) CONE PENETRATION TEST				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION GR SA (SI & CL)
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS/0.3m			20 40 60 80	20 40 60 80	wp	w	wl				
202.31	GROUND SURFACE															
0.00	TOPSOIL, ~200 mm over SANDY SILT, grey/brown, wet, some organic content. (very loose)															
200.81	SILTY CLAY, seams of SILT, brown. (firm)		1	SS	2											
199.81	SILTY SAND & GRAVEL TILL, some cobbles, grey. (compact to dense)		2	SS	28											
2.50																
198.04	END OF BOREHOLE DUE TO REFUSAL TO AUGER ON BEDROCK OR BOULDER															
4.27	Notes: 1) This borehole forms part of the Cranberry Marsh Road Foundation Investigation. 2) Borehole drilled at U.T.M. coordinates 4 989 022.8 N, 282 928.6 E. 3) Water level was at ~3.8 m & hole was open to ~4.1 m depth on completion. 4) Water level was at ~0.9 m depth at end of day.															



RECORD OF BOREHOLE 11 + 575 1 OF 1

METRIC

W.P. 217-89-00 LOCATION Station 11+575, on centreline ORIGINATED BY I.D.
 DIST 52 HWY 69 BOREHOLE TYPE Standard auger / CME-55 COMPILED BY M.D.
 DATUM Geodetic DATE July 7, 1998 CHECKED BY I.G.

SOIL PROFILE			SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE (metres)	SPT TEST (N-Value) CONE PENETRATION TEST		PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE			20 40 60 80	20 40 60 80					
202.09	GROUND SURFACE					202							
0.00	TOPSOIL, ~200 mm over SANDY SILT, grey brown, wet, some organic staining. (loose)												
200.09	SILTY CLAY, some wet SILT seams, brown. (soft)		1	SS	6	201							0% 51% 49%
2.00			2	SS	0	200							
197.29	SILTY SAND & GRAVEL TILL, some cobbles, grey. (compact to dense)		3	SS	15	199							
4.80			4	SS	60	198							
195.69	END OF BOREHOLE DUE TO REFUSAL TO AUGER ON BEDROCK OR BOULDER					197							
6.40						196							
Notes: 1) This borehole forms part of the Cranberry Marsh Road Foundation Investigation. 2) Borehole drilled at U.T.M. coordinates 4 989 040.7 N, 282 911.2 E. 3) Water level was at ~2.7 m & hole was open to ~4.1 m depth on completion. 4) Water level was at ~0.8 m depth at end of day.													



RECORD OF BOREHOLE 11 + 600 1 OF 1

METRIC

W.P. 217-89-00 LOCATION Station 11+600, on centreline ORIGINATED BY I.D.
 DIST 52 HWY 69 BOREHOLE TYPE Standard auger / CME-55 COMPILED BY M.D.
 DATUM Geodetic DATE July 7, 1998 CHECKED BY I.G.

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE (metres)	SPT TEST (N-Value) CONE PENETRATION TEST		PLASTIC LIMIT		NATURAL MOISTURE CONTENT		LIQUID LIMIT		UNIT WEIGHT kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION
ELEV. DEPTH	DESCRIPTION	STRATA PLOT	NUMBER	TYPE	BLOWS/0.3m			20 40 60 80		wp — w — wl		WATER CONTENT (%)		10 20 30 40			
								SHEAR STRENGTH: Cu, KPa UNCONFINED QUICK TRIAXIAL X FIELD VANE LAB SHEAR									
202.89	GROUND SURFACE																
0.00	TOPSOIL, ~180 mm over SANDY SILT, occasional CLAY layers, grey, wet, with trace of organics. (very loose)						202										
200.89			1	SS	0		201										
2.00	SILTY CLAY, some wet SILT seams, grey. (soft)						200										
			2	SS	2		199										
198.59							198										
4.30	SILTY SAND & GRAVEL TILL (compact)		3	SS	7		197										
196.95																	
5.94	END OF BOREHOLE DUE TO REFUSAL TO AUGER ON BEDROCK OR BOULDER																
<p>Notes:</p> <p>1) This borehole forms part of the Cranberry Marsh Road Foundation Investigation.</p> <p>2) Borehole drilled at U.T.M. coordinates 4 989 058.7 N, 282 893.8 E.</p> <p>3) Water level was at ~4.1 m & hole was open to ~4.7 m depth on completion.</p> <p>4) Water level was at ~0.9 m depth at end of day.</p>																	



OVERSIZE DRAWING(S)

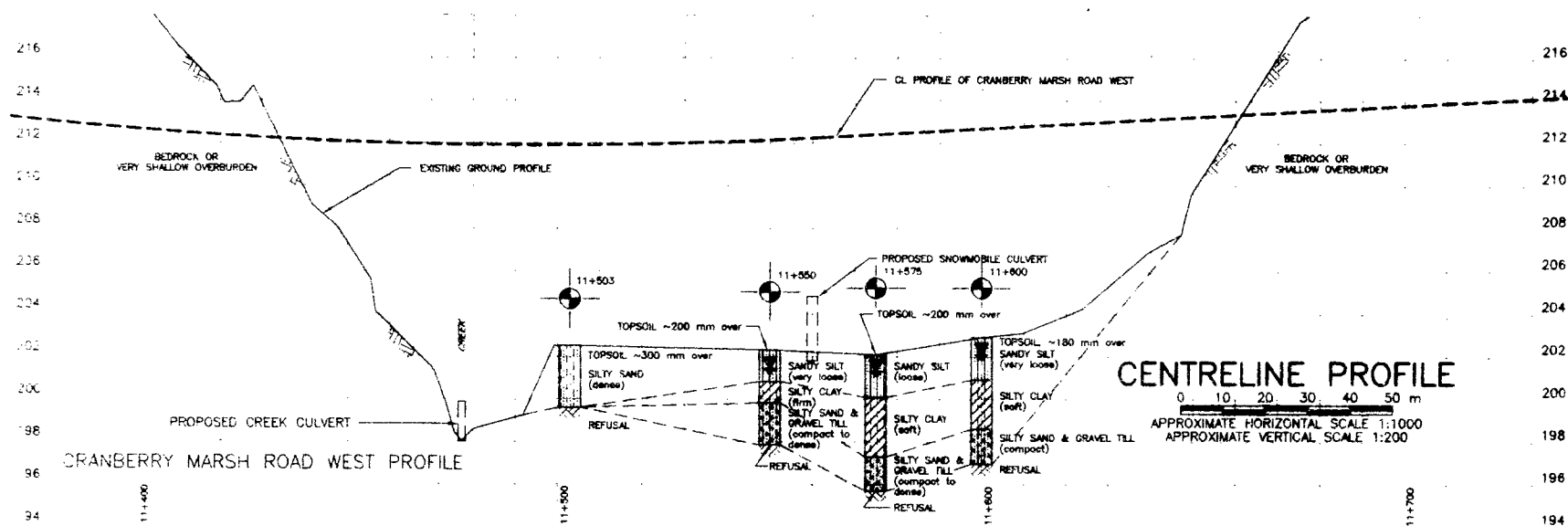
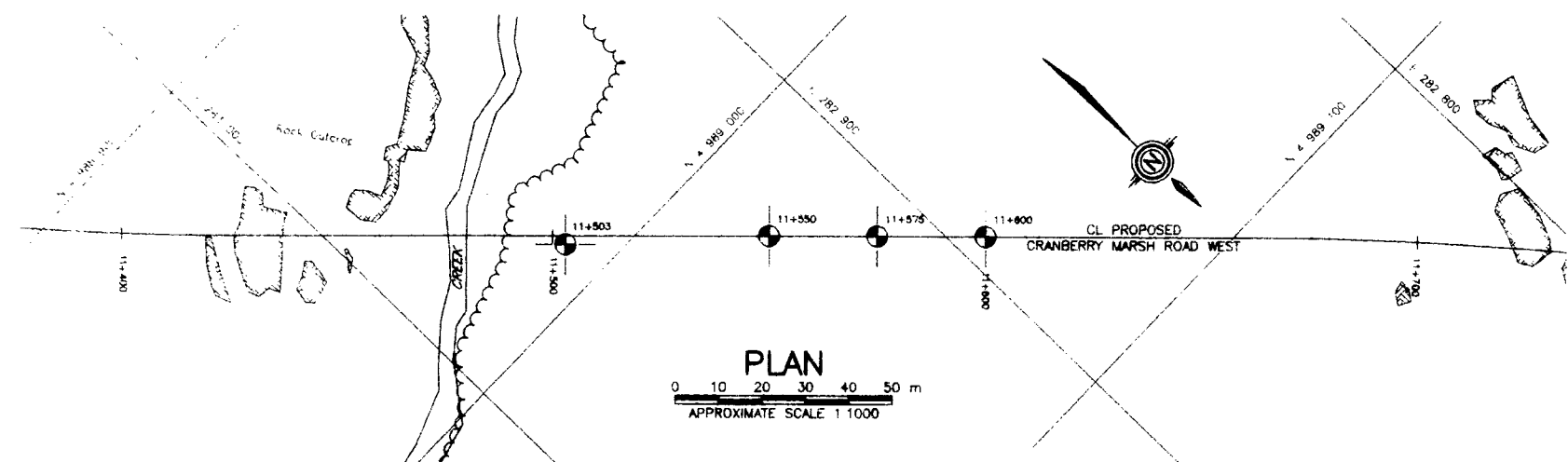



PLATE No
DRAWING No
CONT No
WP No 217-89-00

SHEET

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

 TROW CONSULTING ENGINEERS LTD.
SUDBURY, ONTARIO
Trow PROJ No. S074046/C DWG No. 1

MINISTRY OF TRANSPORTATION
ENGINEERING OFFICE
SURVEYS AND PLANS SECTION

SITE PLAN & SOIL PROFILE

PROPOSED
CRANBERRY MARSH ROAD WEST
SWAMP CROSSING AND
CULVERT INSTALLATIONS

GEOG TWY GIBSON DIST OF MUSKOGEE
LOT 13 CON 12

SCALE AS SHOWN	DISTRICT HUNTSVILLE	REGION NORTHERN
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SURVEY DATE	PLAN DATE: SEPT. 1986
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SITE	PLAN
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