

GEOCRES No. 31E-73DIST. 13 REGION W.P. No. CONT. No. MUNICIPALW. O. No. 73-11117(R)STR. SITE No. SS-119HWY. No. DR 1184LOCATION STR. REPLACEMENT-SOUTHRIVER TRIBUTARY TWP. OF JOLYNo of PAGES - —

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OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. REMARKS:

## MEMORANDUM

TO: Mr. J. McAllister, (2) FROM: Soil Mechanics Section,  
Reg. Structural Planning Eng., Geotechnical Office,  
Northern Region, North Bay. West Building, Downsview.

ATTENTION: DATE: April 25th, 1974.

OUR FILE REF.

IN REPLY TO MAY 1 - 1974

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
South River Bay Structure,  
Development Road 1184, South River,  
District 13, North Bay.

W.O. 73-11117 (R).

Attached we are forwarding to you our detailed foundation investigation report on the subsoil conditions existing at the abovementioned site.

We believe that the factual data and recommendations contained therein will prove adequate for your design requirements. Should additional information be required, please do not hesitate to contact our Office.

*K. G. Selby*

K.G. Selby,  
Supervising Engineer.

KGS/mj  
Attach.

c.c. E.J. Orr  
B.R. Davis  
H. McArthur  
M.J. Bernhardt  
B.J. Giroux  
J.E. Gruspier  
G.A. Wrong  
B.A. Singh  
S. McCombie  
Files  
Documents

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FOUNDATION INVESTIGATION REPORT  
For  
South River Bay Structure,  
Development Road 1184, South River,  
District 13, North Bay.  
W.O. 73-11117 (R).

1. INTRODUCTION:

A foundation investigation has been carried out at the abovementioned site to determine the existing subsoil and groundwater conditions. A request for this investigation was received in a memorandum from Mr. J.C. McAllister, Structural Planning Supervisor for the Northern Region, dated February 5th, 1974.

This report contains the results of the field and laboratory investigations together with recommendations for the structure foundations.

2. SITE DESCRIPTION:

The site of this proposed structure replacement is on Development Road 1184, some 3 miles south of the Town of South River. The existing structure is in poor shape and is located on a causeway which crosses a bay of the South River. The bay at the crossing is about 450 ft. (137.2 m) wide. The surrounding area is well treed and gently rolling in nature. There are some residential properties and small farms in the vicinity.

3. FIELD AND LABORATORY INVESTIGATION:

The field work consisted of three sampled boreholes and 5 dynamic cone tests. The washboring was done by a diamond drill adapted for soil sampling. Boreholes 4 and 5 were put through the ice. Disturbed samples were obtained at regular intervals by driving a split-spoon sampler 18" into the subsoil using a driving energy of 350 foot pounds per blow.

Soil samples were identified in the field and again upon arrival in the laboratory. Tests to determine moisture content, grain-size distribution and organic content were carried out on representative samples.

The locations and elevations of the boreholes as well as a stratigraphical profile are plotted on Drawing 73-11117A attached at the end of this Report. The surveying of the site was carried out by personnel from Northern Region, Engineering Surveys Section.

4. SUBSOIL CONDITIONS:

4.1) General.

The subsoil at this site consists of a deep deposit of non-cohesive material. The layers encountered are as follows. The causeway probably consists of rock fill as the cone tests met refusal within a very short distance. Below the water a deposit of organics was encountered. Following this is a layer of silt, traces of clay and sand and then sand, traces of silt and clay. A brief summary of each subsoil is given, as follows.

#### 4.2) Organics.

The organics in Boreholes 4 and 5 varied from 3 to 4.5 ft. (0.9 to 1.4 m). The consistency of the organics is very soft and the water content varied from 368% to 488%. The organic content was measured to be 40% to 52%.

#### 4.3) Silt, Traces of Clay and Sand.

The deposit below the organics was 18 to 21 ft. (5.5 to 6.4 m) thick and ranged between elev. 1136.2 ft. (346.3 m) and elev. 1116.0 ft. (340.2 m). The natural moisture content of this material was 25% to 29%. Grain-size analyses yielded the following distribution:

Gravel	% :	0
Sand	% :	1-7
Silt	% :	89-91
Clay	% :	6-10

The standard penetration 'N' values varied from 11 to 34 blows/foot corresponding to a relative density of compact to dense. Within the silt occasional seams of sand were observed. A typical grain-size curve envelope is included in the Appendix as Figure 1.

4.4) Sand, Traces of Silt and Clay.

Following the silt is a deep deposit of sand, traces of silt and clay. Both boreholes terminated within this layer. A transition zone was encountered in Borehole 4 where the material consisted of 50% sand and 50% silt and clay. The sand layer began at elev. 1116 ft. (340.2 m) to elev. 1118 ft. (340.8 m) and the deepest penetration was in Borehole 5 to elev. 1055 ft. (321.6 m), some 90 ft. (27.4 m) below the ice level. The natural moisture content was measured to be between 15 and 27%.

Grain-size analyses yielded the following distribution:

Gravel	(%):	0
Sand	(%):	71-94
Silt and Clay	(%):	6-29

The standard penetration 'N' values within this deposit were 7 to 20 blows/foot corresponding to a relative density of loose to compact. A typical grain-size curve envelope is included in the Appendix as Figure 2.

5. DISCUSSION AND RECOMMENDATIONS:

5.1) General.

The existing structure is a single-span concrete bridge in poor condition. The existing bridge deck is at elevation 1150.5 ft. (350.7 m) and the soffit is about elevation 1147.7 ft. (349.8 m). The proposed replacement is a 9-ft. diameter C.S.P. with an invert elevation of about 1141 ft. (347.8 m) with 0° skew.

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The grade of the road will probably have to be raised to accommodate an adequate cover for the 9 ft. diameter C.S.P.

The subsoil below the water consists of about 4 ft. (1.2 m) of organics, 20 ft. (6.1 m) of silt, traces of clay and sand, and a deep deposit of sand, traces of silt and clay. The elevation of the water was at the time of the investigation, at 1144 ft. (348.7 m).

5.2) Foundations:

The bedding for a culvert at this site will be below the water level of the bay. Therefore, the design of the bedding should be such that it may be placed underwater or an appropriate dewatering scheme should be devised so that the bedding may be placed in the dry. All organics below the culvert bedding should be removed and replaced with Granular 'B' material for a distance of at least 4 ft. (1.2 m) beyond the extremities of the pipe and up to elevation 1139 ft. (347.2 m).

The following construction procedure may be used to ensure effective performance of the pipe if a dewatering scheme is not used.

- a) A 2-ft. layer of Granular 'A' material be placed to elev. 1141 ft. (347.8 m) to the bottom of pipe invert.
- b) Place the C.S.P. and backfill with Granular 'A' material to 1 foot above the prevailing water level. Above this level, Granular 'B' backfill material should be placed and compacted to current M.T.C. standards.



This method is dependent for its success on adequate placing and levelling of the Granular 'A' referred to in (a) and on the placing of the pipe in position without deformation.

Alternatively, the site may be dewatered so that the pipe can be placed in the dry and the bedding (which in this case may consist of Granular 'B'), properly compacted. The water flow here is slight so an earth dam or sheet piling may be used. After the removal of the organics a properly graded sand and gravel filter blanket should be placed in the excavation to facilitate construction and pumping out the seepage water and also prevent boiling of the silt. After this, the water may be pumped out and the Granular 'B' and bedding placed.

Side slopes of 2:1 for earth fill and  $1\frac{1}{4}$ :1 for rockfill should be stable.

Rip-rap should be placed on the side slopes so as to protect against erosion.

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6. MISCELLANEOUS:

The field work was carried out from February 28th to March 5th, 1974, and was supervised by Mr. P. Korgemagi, Project Engineer.

The equipment used was owned and operated by Canadian Longyear Ltd. of Rexdale, Ontario.

This Report was written by Mr. P. Korgemagi and reviewed by Mr. K.G. Selby, Supervising Engineer.



*P. Korgemagi*  
P. Korgemagi, P. Eng.

*K. G. Selby*  
K.G. Selby, P. Eng.

PK/mj  
April, 1974.

A P P E N D I X    I

ABBREVIATIONS & SYMBOLS USED IN THIS REPORTPENETRATION RESISTANCE

'N'-STANDARD PENETRATION RESISTANCE : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE : - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS :-

<u>CONSISTENCY</u>	<u>c LB./SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 250	VERY LOOSE	0 - 4
SOFT	250 - 500	LOOSE	4 - 10
FIRM	500 - 1000	COMPACT	10 - 30
STIFF	1000 - 2000	DENSE	30 - 50
VERY STIFF	2000 - 4000	VERY DENSE	> 50
HARD	> 4000		

TERMS TO BE USED IN DESCRIBING SOILS:-

TRACE < 10% , SOME 10-25% , WITH 25-40% , > 40% SILTY, SANDY, GRAVELLY, CLAYEY ETC.

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.T.	SLOTTED TUBE SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE

P.H. SAMPLE ADVANCED HYDRAULICALLY

P.M. SAMPLE ADVANCED MANUALLY

SOIL TESTS

U	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
UU	UNCONSOLIDATED UNDRAINED TRIAXIAL	F.V.	FIELD VANE
CIU	CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL	C	CONSOLIDATION
CID	" " DRAINED "	S	SENSITIVITY
CAU	" " ANISOTROPIC UNDRAINED "		
CAD	" " DRAINED "		

# ABBREVIATIONS & SYMBOLS USED IN THIS REPORT

## SOIL PROPERTIES

$\gamma$	UNIT WEIGHT OF SOIL (BULK DENSITY)
$\gamma_s$	UNIT WEIGHT OF SOLID PARTICLES
$\gamma_w$	UNIT WEIGHT OF WATER
$\gamma_d$	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
$\gamma'$	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
$S_r$	DEGREE OF SATURATION
$w_L$	LIQUID LIMIT
$w_p$	PLASTIC LIMIT
$I_p$	PLASTICITY INDEX
$w_s$	SHRINKAGE LIMIT
$I_L$	LIQUIDITY INDEX $= \frac{w - w_p}{I_p}$
$I_c$	CONSISTENCY INDEX $= \frac{w_L - w}{I_p}$
$e_{max}$	VOID RATIO IN LOOSEST STATE
$e_{min}$	VOID RATIO IN DENSEST STATE
$I_D$	DENSITY INDEX $= \frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY $D_r$ IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
$m_v$	COEFFICIENT OF VOLUME CHANGE $= \frac{-\Delta e}{(1+e)\Delta \sigma}$
$c_v$	COEFFICIENT OF CONSOLIDATION
$C_c$	COMPRESSION INDEX $= \frac{\Delta e}{\Delta \log_{10} \sigma}$
$T_v$	TIME FACTOR $= \frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
$\tau_f$	SHEAR STRENGTH
$c'$	EFFECTIVE COHESION INTERCEPT
$\phi'$	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
$c_u$	APPARENT COHESION
$\phi_u$	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
$\mu$	COEFFICIENT OF FRICTION
$S_i$	SENSITIVITY

## GENERAL

$\pi$	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e \sigma$ OR $\ln \sigma$	NATURAL LOGARITHM OF $\sigma$
$\log_{10} \sigma$ OR $\log \sigma$	LOGARITHM OF $\sigma$ TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

## STRESS AND STRAIN

u	PORE PRESSURE
$\sigma$	NORMAL STRESS
$\sigma'$	NORMAL EFFECTIVE STRESS ( $\bar{\sigma}$ IS ALSO USED)
$\tau$	SHEAR STRESS
$\epsilon$	LINEAR STRAIN
$\gamma$	SHEAR STRAIN
$\nu$	POISSON'S RATIO ( $\mu$ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
$\eta$	COEFFICIENT OF VISCOSITY

## EARTH PRESSURE

d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
$\delta$	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
$K_0$	COEFFICIENT OF EARTH PRESSURE AT REST

## FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
$k_s$	MODULUS OF SUBGRADE REACTION

## SLOPES

H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
$\beta$	ANGLE OF SLOPE TO HORIZONTAL

## GRAIN SIZE DISTRIBUTION

## UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY &amp; SILT

SAND

GRAVEL

Fine

Medium

Coarse

Fine

Coarse

MINISTRY SIEVE DESIGNATION

270 200 140 100 60 30 40 30 20 16 10 8 4 3/8" 1/2" 3/4" 1" 1 1/2" 2" 2 1/2" 3"

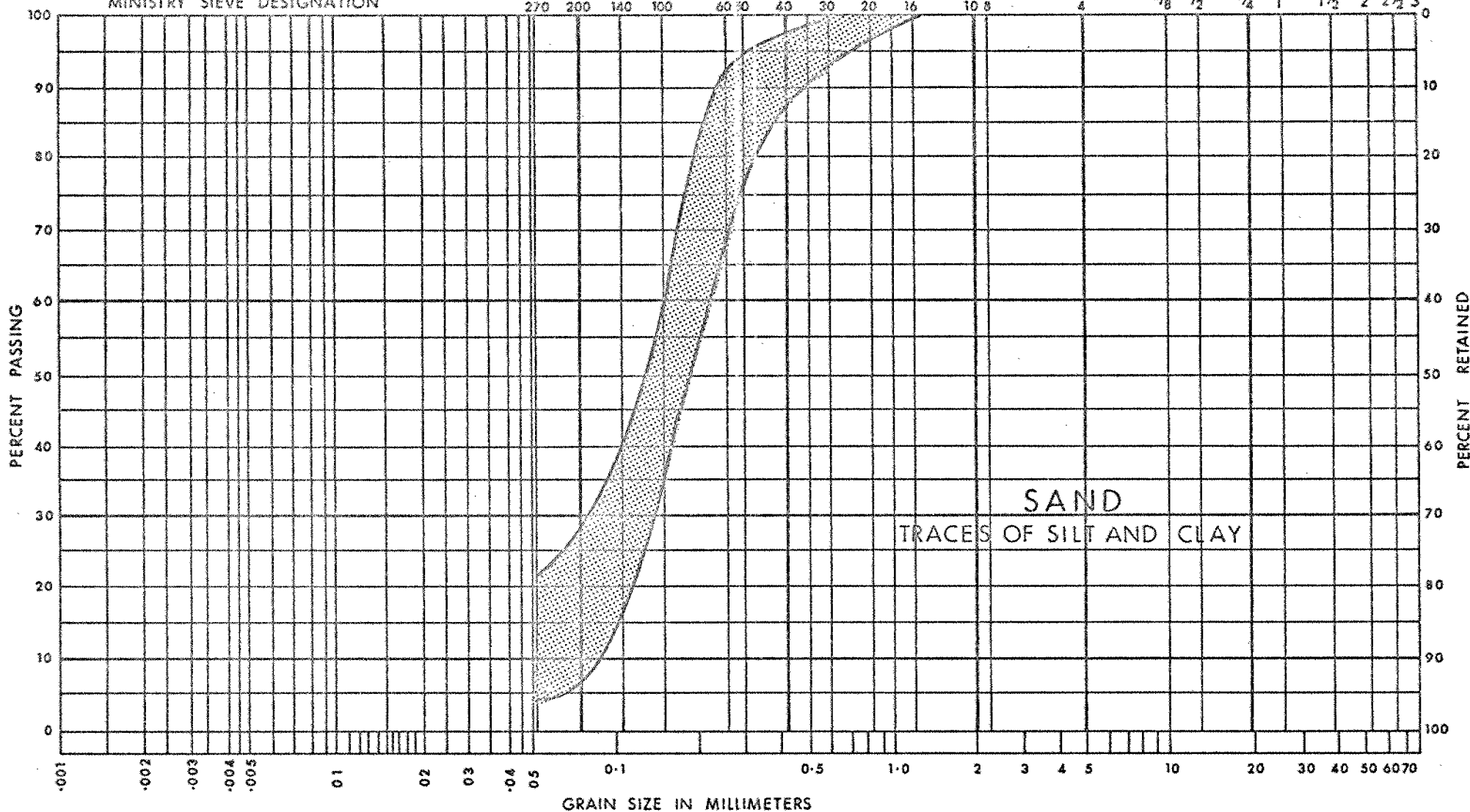


FIG. 2

# GRAIN SIZE DISTRIBUTION

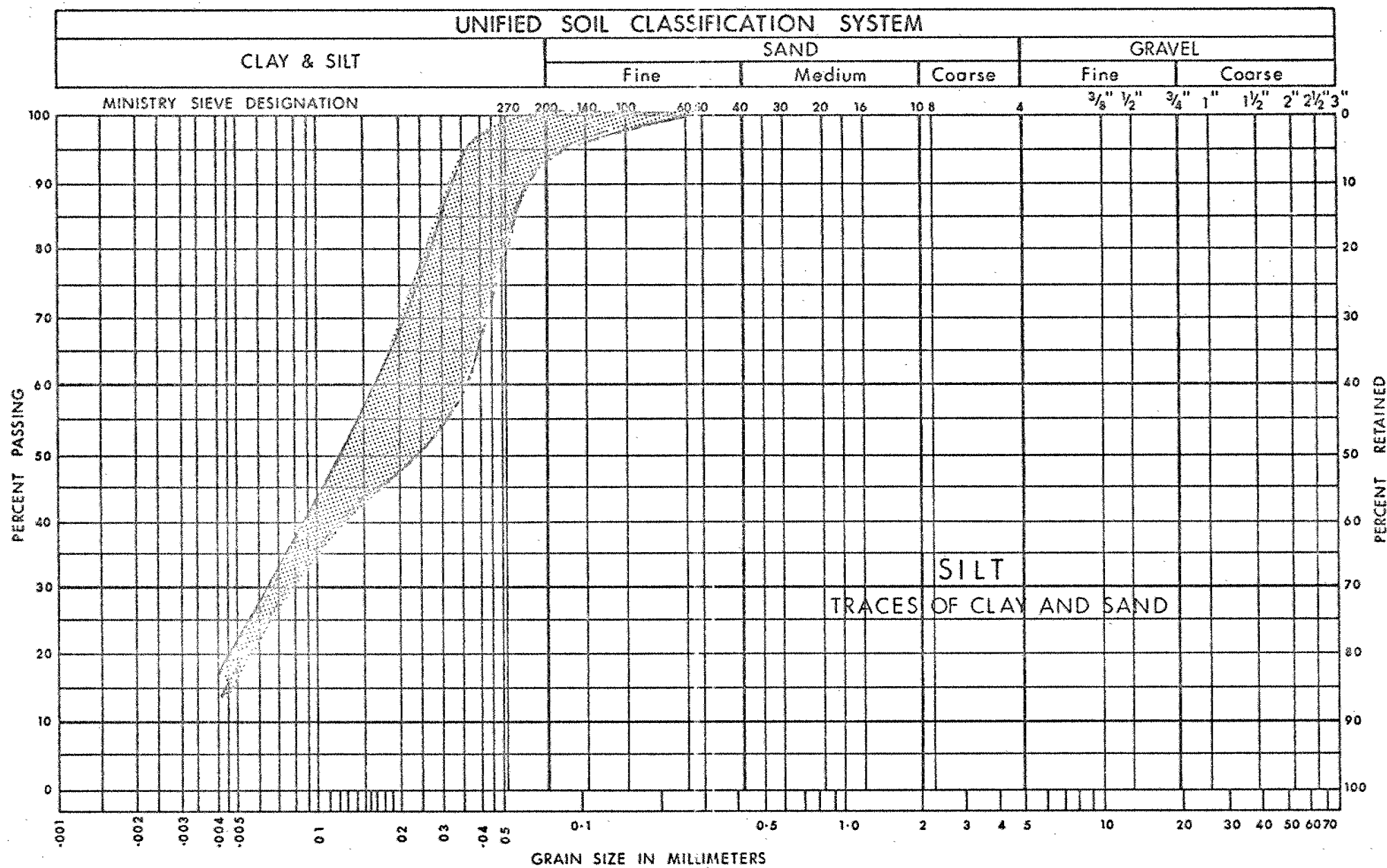


FIG. 1

## RECORD OF BOREHOLE NO 1

JOB 73-11117 (R)

LOCATION Sta. 6 + 15 8'LT

ORIGINATED BY PK

W.P. NIL

BORING DATE February 28, 1974

COMPILED BY PK

DATUM Geodetic

BOREHOLE TYPE      Wash Boring

CHECKED BY up

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT _____			LIQUID LIMIT _____w <sub>L</sub> PLASTIC LIMIT _____w <sub>p</sub> WATER CONTENT _____w			BULK DENSITY  γ P.C.F.	REMARKS
ELEV. DEPTH ft.	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT (6.3 ft)	ELEV. SCALE ft./m	SHEAR STRENGTH P.S.F. ○ UNCONFINED      + FIELD VANE ● QUICK TRIAXIAL    x LAB VANE			w <sub>p</sub> — w — w <sub>L</sub> WATER CONTENT %			
1150.3	Ground Level												
1148.9	Sand some gravel												
1.4	Boulder												
	End of Borehole												



DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

# RECORD OF BOREHOLE NO 4

JOB 73-11117 (R)

LOCATION Sta. 5 + 78 22' RT

ORIGINATED BY PK

W.P. NIL

BORING DATE March 4 to 5 1974

COMPILED BY PK

DATUM Geodetic

BOREHOLE TYPE Wash Boring & Cone Test

CHECKED BY *W.F.*

SOIL PROFILE			SAMPLES			ELEV. SCALE ft/m	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (0.3 m)					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$			BULK DENSITY $\gamma$	REMARKS			
ELEV. DEPTH ft.	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT (0.3 m)		25	50	75	100	125	SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE					WATER CONTENT % $w_p$ $w$ $w_L$		
							20	40	60	P.C.F.	GR.	SA.	SI.	CL.					
1144.0	Ice Level																		
0.0	Water																		
1140.7																			
3.3	River Bottom		1	SS	2	1140									368%	o.c. 51.85			
1136.2	Organics					347.5													
7.8			2	SS	18											0 4 88 8			
	Silt traces of		3	SS	18														
	clay and sand		4	SS	14	1130										0 3 87 10			
	Compact		5	SS	19	344.0													
						1120													
1118.0			6	SS	13	341.4										0 50 ( 50 )			
26.0																			
	Sand Traces of		7	SS	7														
	Silt and clay		8	SS	8	1110										0 71 ( 29 )			
						338.3													
	Loose to																		
	Compact		9	SS	11	1100													
						335.3													
						1090													
						332.2													
						1080													
1077.6						329.2													
66.4	End of Borehole																		
						1070													
						326.1													

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

## RECORD OF BOREHOLE NO 5

JOB 73-11117 (R)

LOCATION Sta. 5 + 99 21' LT

ORIGINATED BY PK

W.P. N11

BORING DATE February 28 to March 1 1974

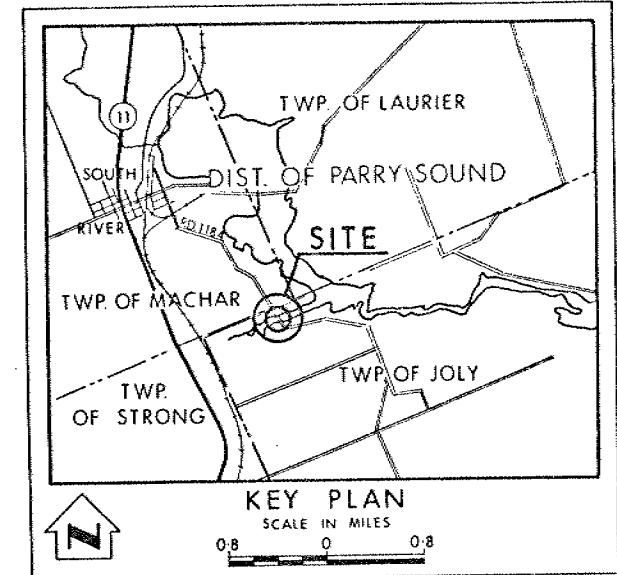
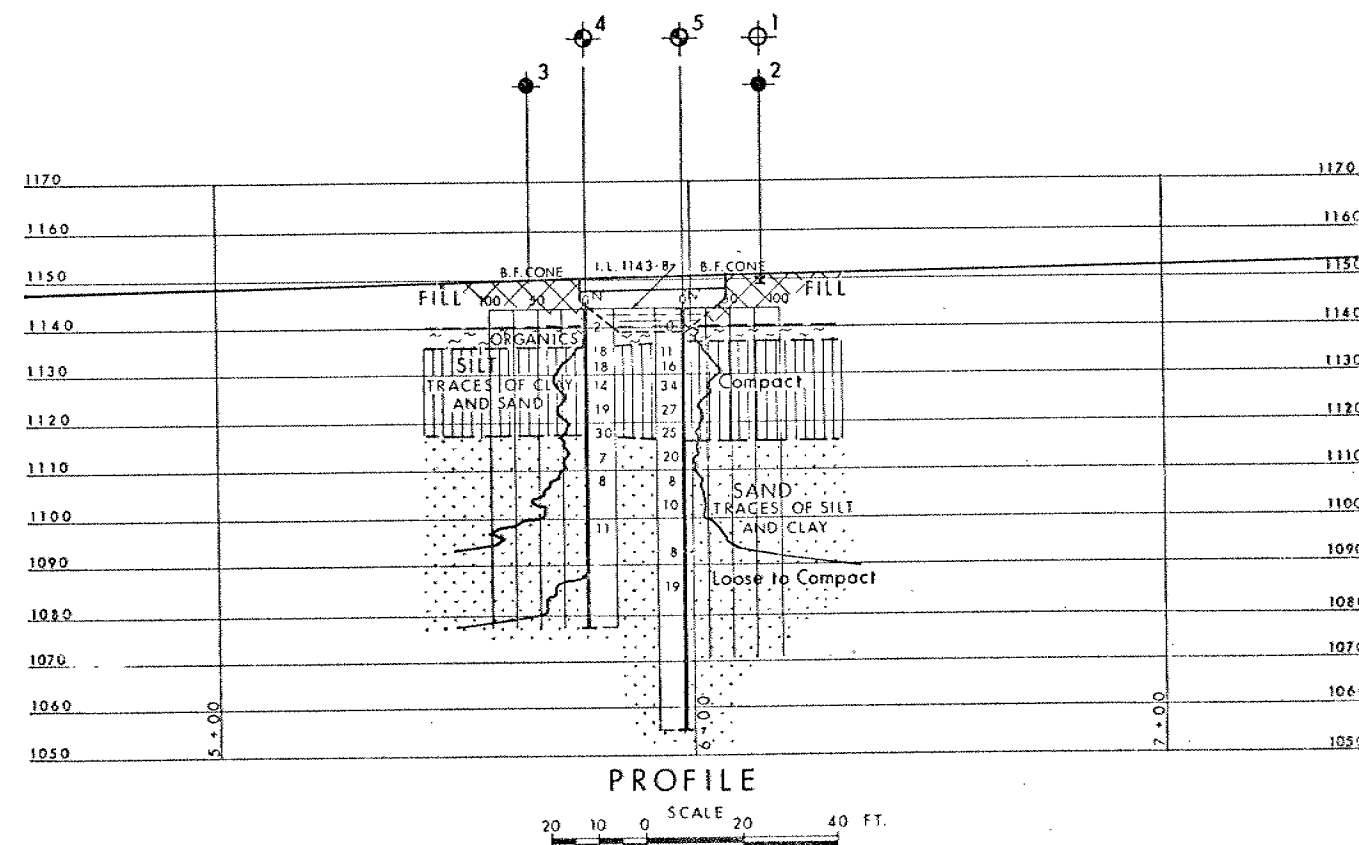
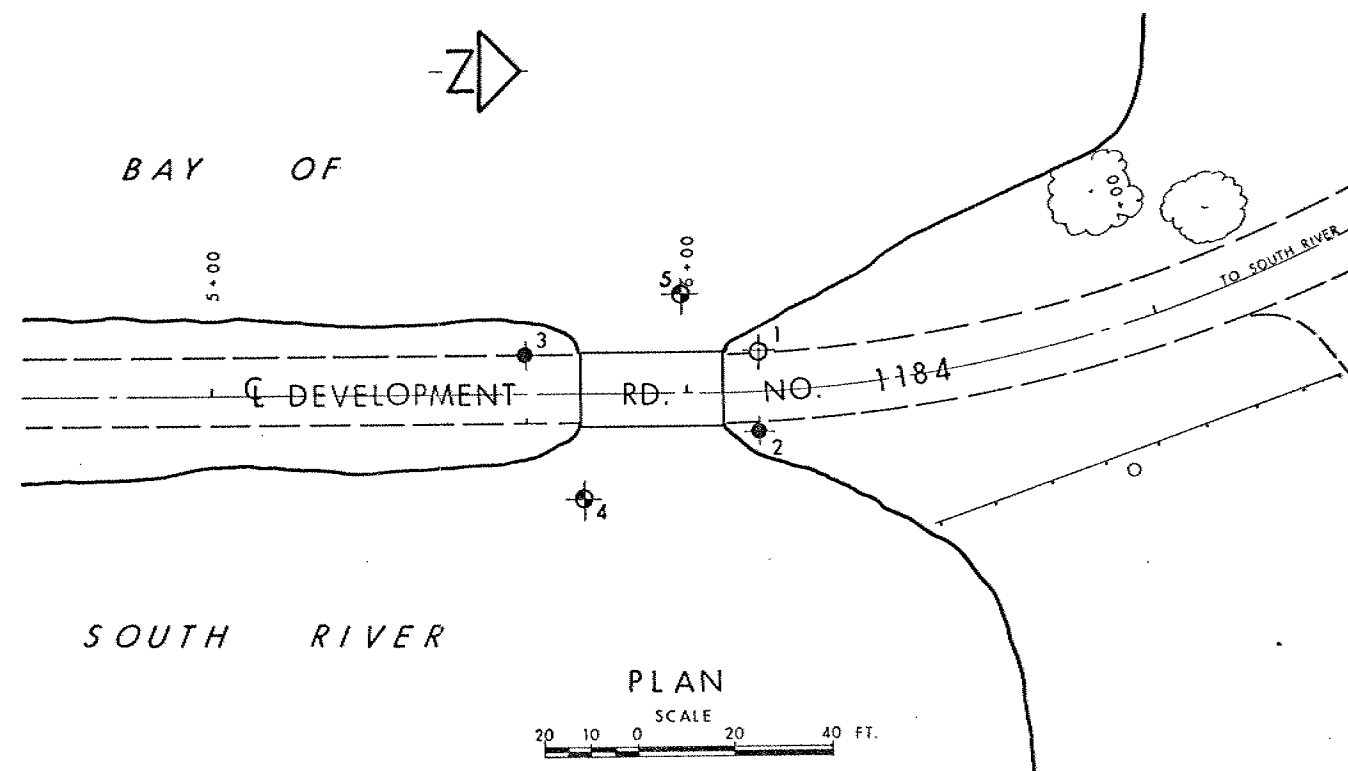
COMPILED BY PK

DATUM Geodetic

BOREHOLE TYPE Wash Boring and Cone Test

 CHECKED BY *al*

SOIL PROFILE		SAMPLES			ELEV. SCALE ft/m	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (0.3 m)					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$			BULK DENSITY $\gamma$ P.C.F.	REMARKS
ELEV. DEPTH m	ft	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT (0.3 m)	25	50	75	100	125	$w_p$	$w$	$w_L$	
348.7	1144.0	Ice Level													
0.0	0.0	Water													
347.5	1140.1	River Bottom		1	SS	0									488% o.c. 40.95%
1.2	3.9	Organics		2	SS	11									0 5 87 8
346.6	1137.0	Silt		3	SS	16									
2.1	7.0	Traces of clay and sand		4	SS	34									0 1 91 8
		Compact to Dense		5	SS	27									
340.2	1116.0			6	SS	25									0 7 87 6
8.5	28.0	Sand		7	SS	20									
		Traces of silt and clay		8	SS	8									
				9	SS	10									0 85 ( 15 )
		Loose to compact		10	SS	8									
				11	SS	19									
				12	SS										
				13	WS										0 94 ( 6 )
				14	WS										
321.6	1055.0	End of Borehole													
27.1	89.0														

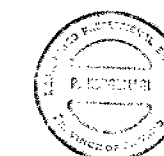


LEGEND			
	Bore Hole		
	Cone Penetration Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation.		
	1. L. Mar. 1974		
	2 & 3 Probe Holes to Rock Fill		

NO.	ELEVATION	STATION	OFFSET
1	1150.3	6+15	8' LT.
2	1150.1	6+15	8' RT.
3	1149.7	5+66	8' LT.
4	1144.0	5+78	22' RT.
5	1144.0	5+99	21' LT.

NOTE FOR CONTRACT DOCUMENTS  
The complete foundation investigation report for this structure may be examined at the Structural Office and Foundations Office, Downsview, and at the NORTH BAY District Office.

— 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

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO  
GEOTECHNICAL OFFICE—SOIL MECHANICS SECTION

## SOUTH RIVER TRIBUTARY CULVERT

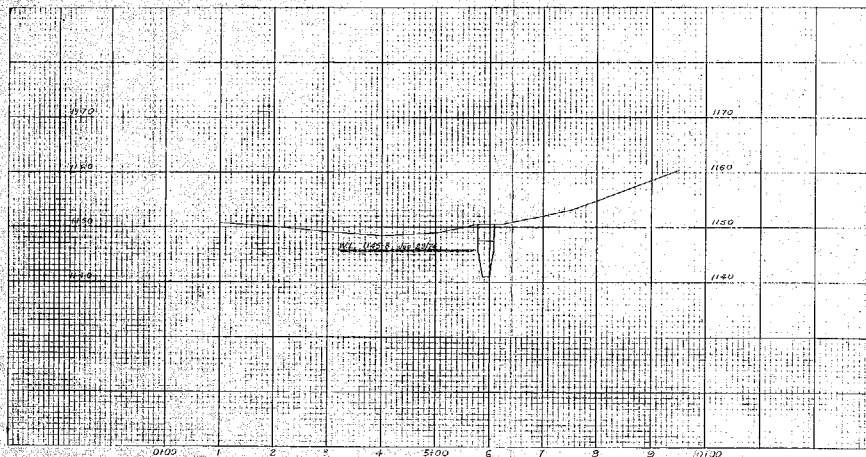
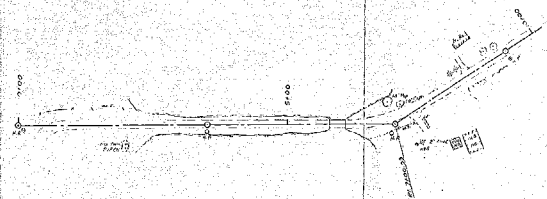
HIGHWAY NO. DEVELOPMENT RD. NO. 1184 DIST. NO. 13  
DIST. OF PARRY SOUND  
TWP. JOLY LOT 3 CON XIV

### BORE HOLE LOCATIONS & SOIL STRATA

SUBMD P.K.	CHECKED P.K.	WP NO.	DRAWING NO.
DRAWN O.L.	CHECKED	WO NO. 73-11117	73-11117A
DATE APR 11 1974	SITE NO.	BRIDGE DRAWING NO.	
APPROVED R. J. Dally	CONT. NO.		

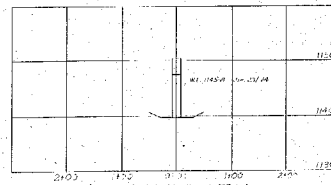
REF. MTC 55119-1

TWP OF JOLY  
LOT 3 CONCESSION XIV

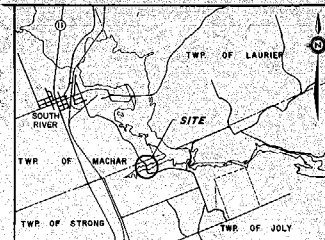


PROFILE

1" = 10' VERT.  
1" = 100' HORIZ.



CROSS SECTION OF CULVERT



KEY PLAN  
1" = 0.5 MILES

1. WATERSHED AREA
2. DESIGN FLOOD FREQUENCY
3. SPECIAL FEATURES AT SITE (DAMS, ICE, SCOUR, DRIFT, SLIDING BANKS, ETC.)
4. (A) EXISTING STRUCTURES AT SITE: UPSTREAM AND DOWNSTREAM (GIVE LOCATION, TOTAL SPAN, RY FOR ABOVE NORMAL HIGH WATER, NET AREA FOR FLOW AT M.H.W., ESTIMATED AGE)
- (B) REASON FOR CHANGE IN HEIGHT OR SPAN OF PROPOSED STRUCTURE FROM THAT OF EXISTING STRUCTURE
5. INFORMATION ON EXTREME FLOODING AT SITE OBTAINED FROM WATER ELEVATION TO BE AND REFLECTS HIGHEST AND LOWEST
6. IS IT LIKELY THAT STREAM BED WILL BE LOWERED
7. IS STRUCTURE ON A MUNICIPAL DRAIN
8. DESIGN LOADING, PLUS, INCHES ASPHALT
9. (A) NAVIGATION CLEARANCES REQUIRED, IF ANY
- (B) RAILWAY CLEARANCES REQUIRED, IF ANY
- (C) REQUIREMENTS OF OTHER AGENCIES

FINAL SUBMISSION  
TH. HAS APPROVAL BEEN OBTAINED FROM FEDERAL MINISTRY OF TRANSPORT (N.W.P. ACT) CANADIAN TRANSPORT COMMISSION RAILWAY COMPANIES

11. APPROX. VOLUME OF CONCRETE
- WEIGHT OF REINFORCEMENT
- WEIGHT OF STRUCTURAL STEEL
- LENGTH OF POST-TENSIONED BEAMS
- LENGTH OF PIPE CULVERT

CU. YD.  
TONS  
TONS  
LIN. FT.  
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NO. DATE REVISION  
SOUTH RIVER TRIBUTARY CULVERT

OWNER  
TWP. JOLY LOT 3 CON. XIV  
CO. OF REGION STRUCTURE SITE NO. MUN. DIST. 13

DESIGN ENGINEER DATE  
DESIGN  
DRAWN PROJECT NO. DRAWING NO.  
CHECK

MTS SS119-1