

#64-F-69

W.P. #917-64

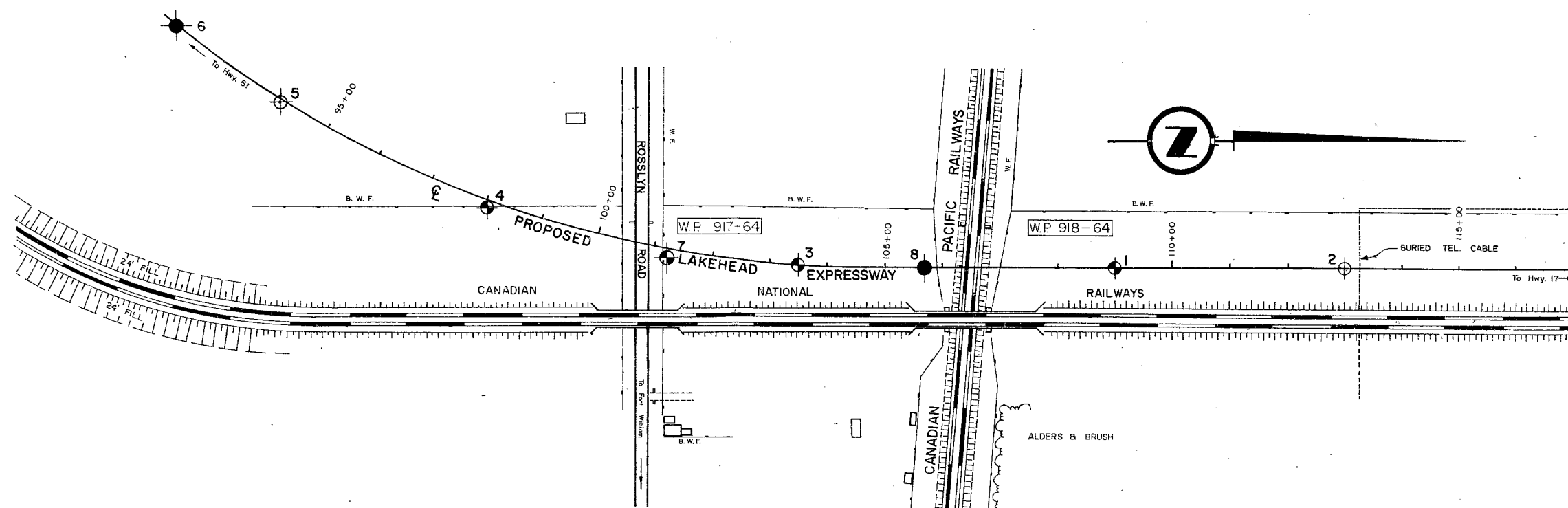
W.P. #918-64

THUNDER BAY

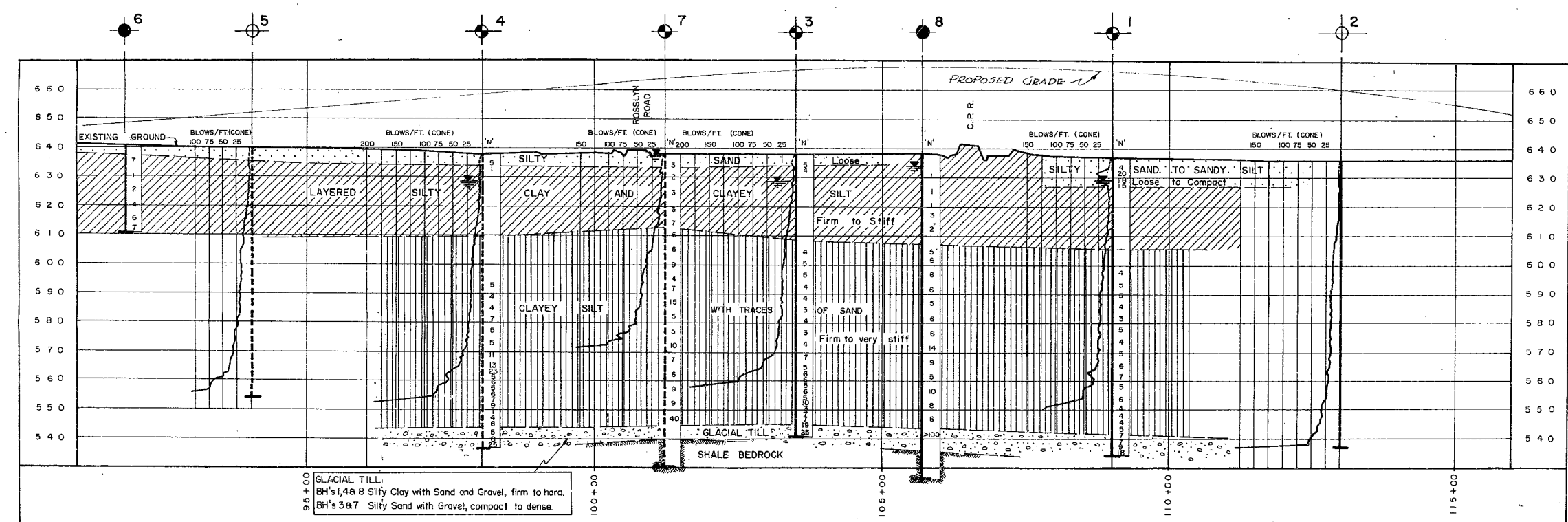
EXPRESSWAY

(LAKEHEAD)

ROSSLYN RD.

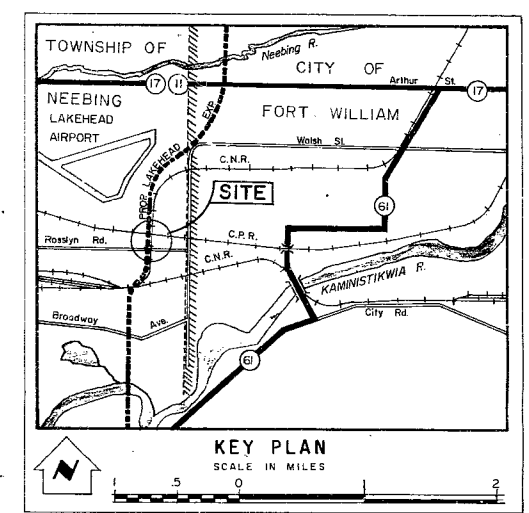


PLAN  
SCALE IN FEET  
100 50 0 100 200



PROFILE LINE 'A'

HORIZONTAL SCALE  
100 50 0 100 200  
VERTICAL SCALE  
20 10 0 20 40



LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation.

NO.	ELEVATION	STATION	OFFSET
1	637.1	109+10	0
2	635.8	113+00	0
3	637.9	103+50	0
4	637.8	98+08	13' RT.
5	639.7	94+05	5' RT.
6	641.0	91+80	0
7	638.2	101+23	15' RT.
8	637.9	105+70	0

NOTE

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

REVISIONS	DATE	BY	DESCRIPTION

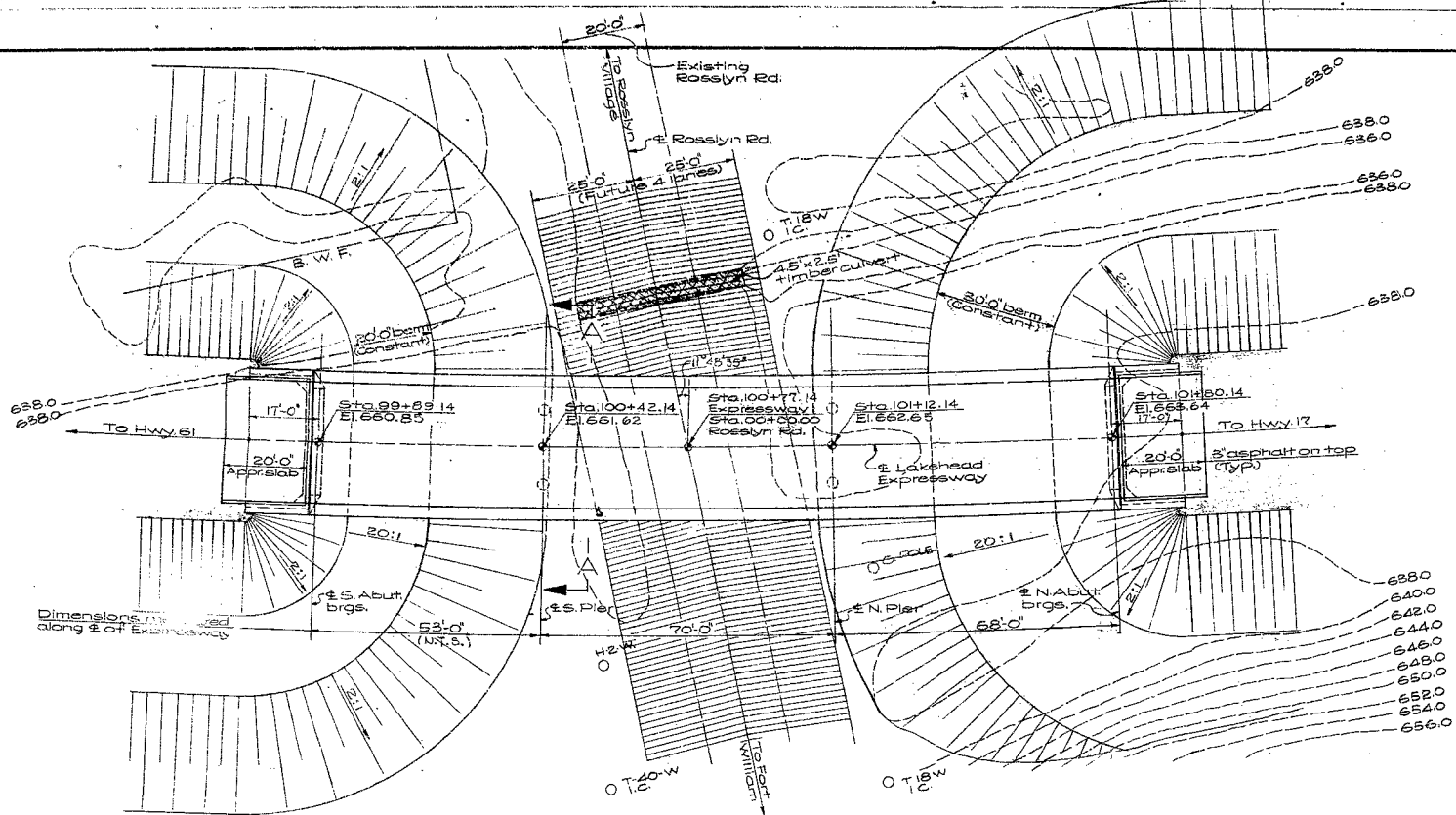
DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION - FOUNDATION SECTION

ROSSLYN ROAD & C.P.R.

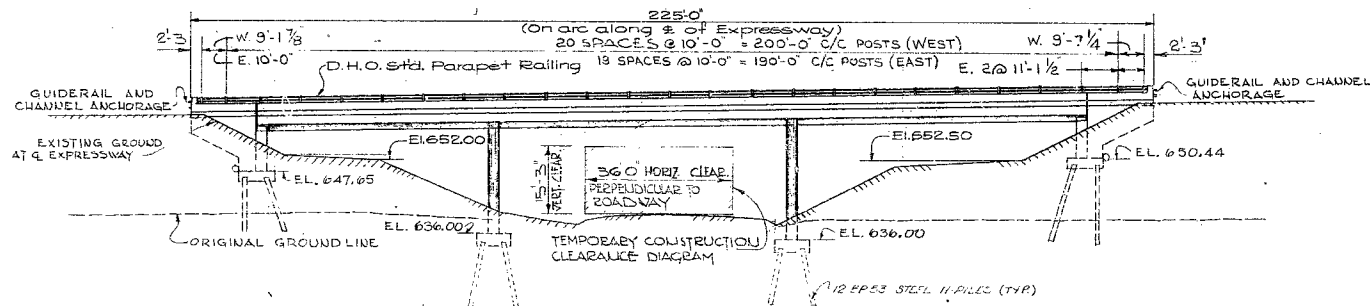
T&E  
KING'S HIGHWAY NO. LAKEHEAD EXPRESSWAY DIST. NO. 19  
CO. DIST. OF THUNDER BAY  
TWP. NEEBING LOT 12 CON. I

BORE HOLE LOCATIONS & SOIL STRATA

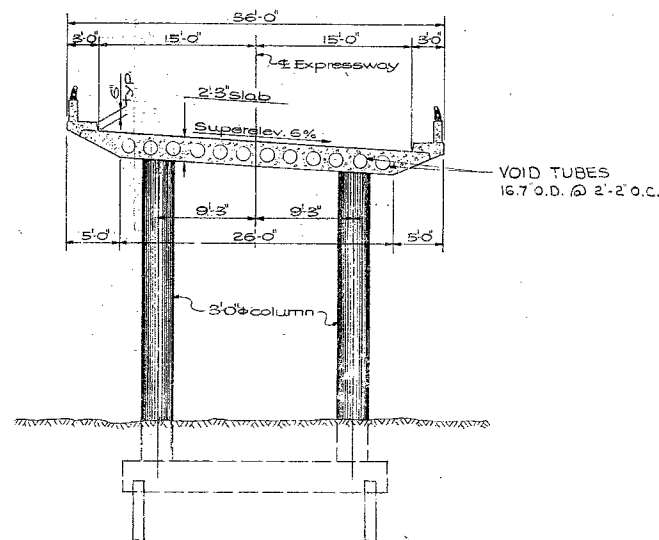
SUBM'D R.M.	CHECKED	W.P. NO. 917-64	M.B.R. DRAWING NO.
DRAWN P.T.	CHECKED	JOB NO. 64-F-69	64-F-69 A
DATE 14 AUG. 1964	SITE NO.	BRIDGE DRAWING NO.	
APPROVED	PRINCIPAL FOUNDATION ENGINEER	CONT. NO.	



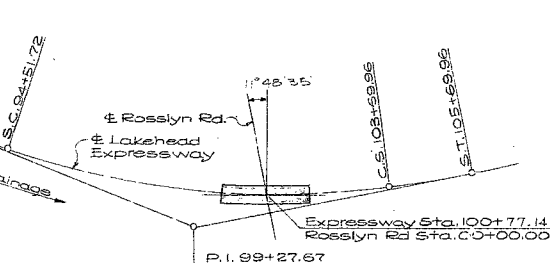
PLAN  
1"=20'-0"



ELEVATION  
1"=20'-0"



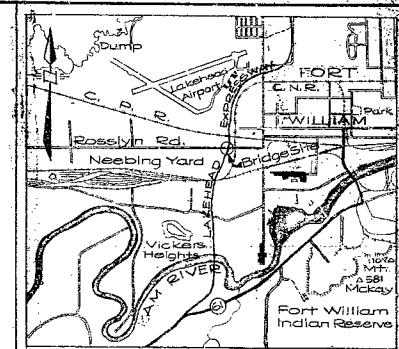
A-A  
1"=10'-0"



HORIZONTAL ALIGNMENT  
N.T.S.

CURVE DATA	
Δ	33° 32' 50"
Δc	27° 32' 50"
Dc	3° 00' LT.
Lc	1909.86'
Lc	918.24'
E <sub>s</sub>	85.78'
SPIRAL DATA	
Q	3° 00'
L <sub>s</sub>	200.00'
T <sub>s</sub>	475.95'

REFERENCE DWGS.  
Location Plan S-645-1  
Location Profile C-345-7  
Site Plan E-4500-1



KEY PLAN  
1:25=1 mi.

### GENERAL NOTES

#### CLASS OF CONCRETE

DECK, COLUMN PIERS, PARAPET WALLS 5000 PSI.  
REMAINDER 3000 PSI.

#### CLEAR COVER ON REINFORCING STEEL

FOOTINGS 3"  
ABUTMENTS 3"  
COLUMNS 2"  
DECK TOP 2"  
DECK BOTTOM 1 1/2"  
CURBS 2"  
PARAPET WALLS 1 1/2"

#### CONSTRUCTION NOTES

- THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITH TOLERANCE OF ± 1/8".
- NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARINGS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED.

### LIST OF DRAWINGS

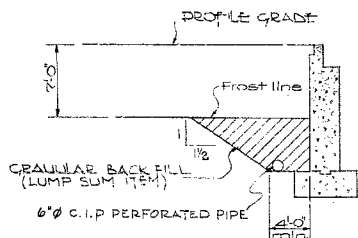
- GENERAL PLAN
- BORE HOLE LOCATIONS & SOIL STRATA
- FOOTINGS, PILES & COLUMN DETAILS
- ABUTMENTS & WINGWALLS
- DECK
- APPROACH SLABS
- STANDARD STEEL PARAPET RAIL
- MISCELLANEOUS DETAILS



REVISIONS	DATE	BY	DESCRIPTION

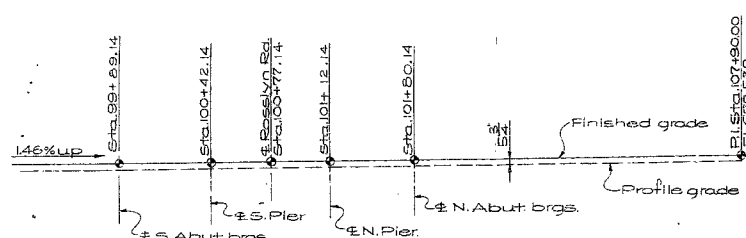
DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
KEMBUR ENGINEERING CONSULTANTS PORT ARTHUR, ONT.			
ROSSLYN RD. OVERPASS 1.7 Miles East of Hwy. 61			
KING'S HIGHWAY No. Lakehead Expressway		DIST. No. 19	
Dist. of Thunder Bay			
TWP. Neesing		LOT 12 CON. I & II	
GENERAL PLAN			
APPROVED	DESIGN	SITE No. 48C-102	W.P. No. 917-64
DESIGN	CHECK	CONTRACT	
DRAWING	CHECK	DRAWING	
DATE	LOADING	DRAWING	

No.	FOR	DATE
1	DES.	7/1/66
2	CHK.	7/1/66
3	APP.	7/1/66

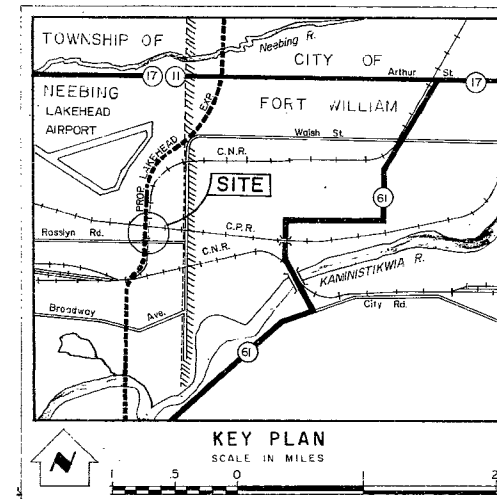
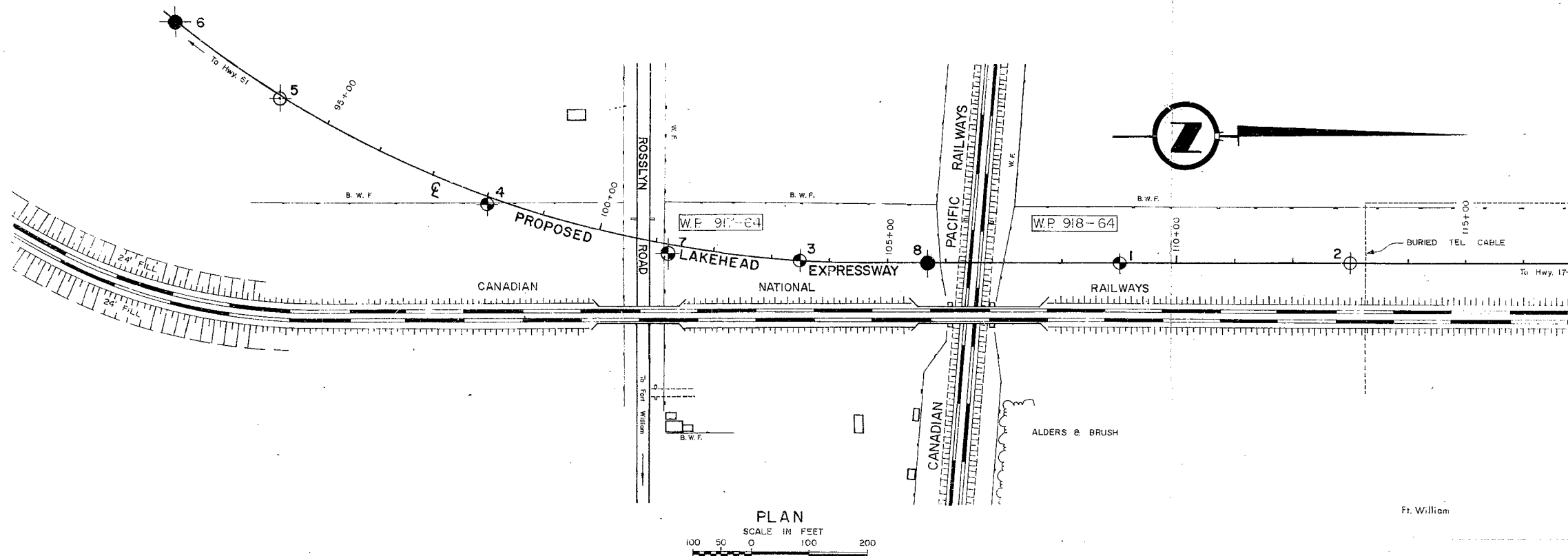


GRANULAR BACKFILL  
1"=1'-0"

NOTE  
SECTION PERPENDICULAR TO ABUTMENT  
LATERAL LIMITS - INSIDE FACE TO INSIDE FACE OF WINGWALLS



PROFILE OF EXPRESSWAY  
N.T.S.

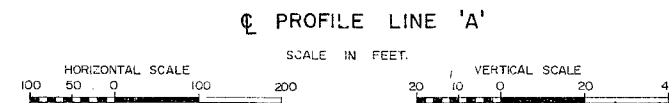
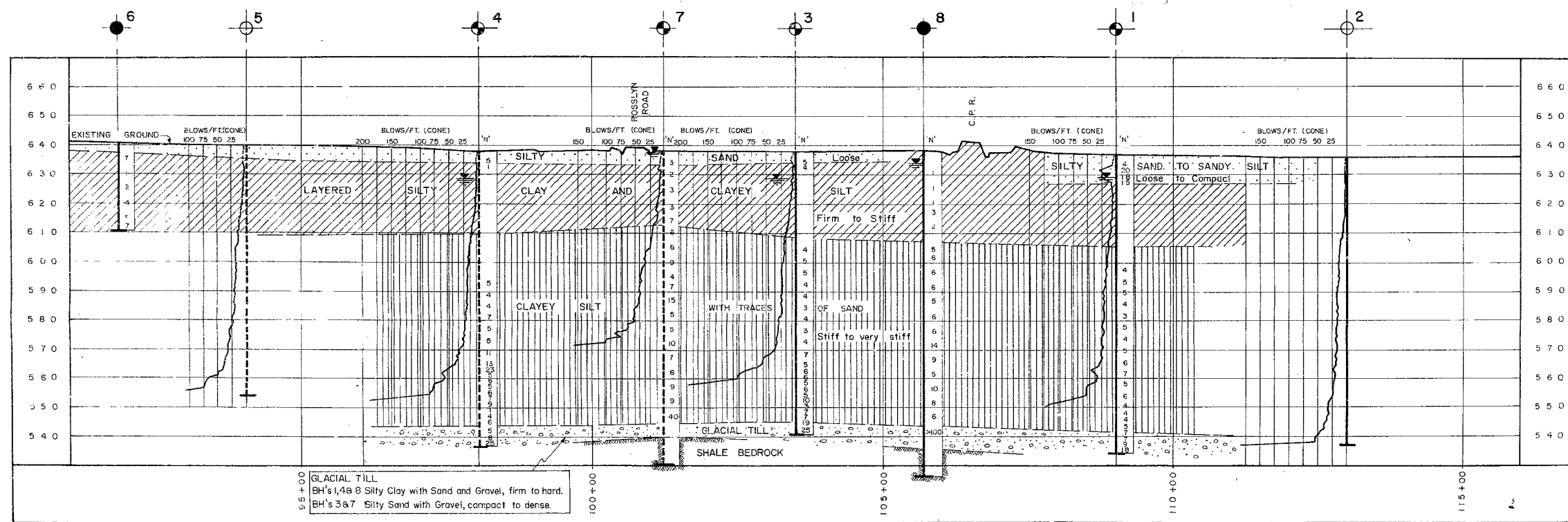


LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation.		

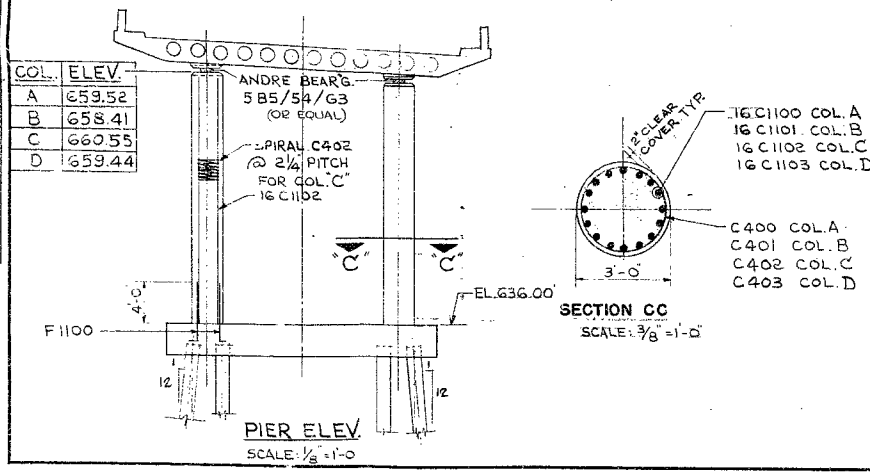
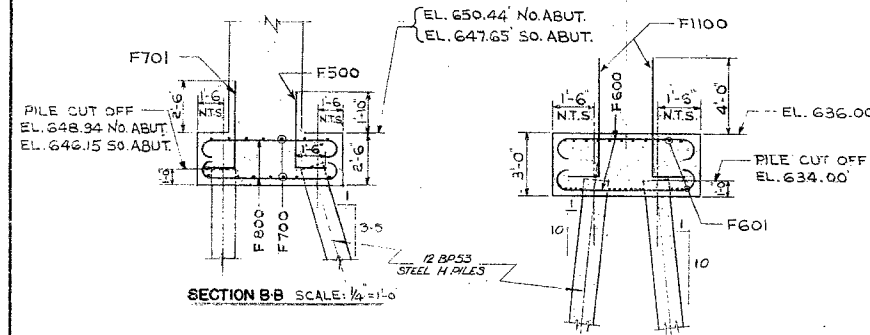
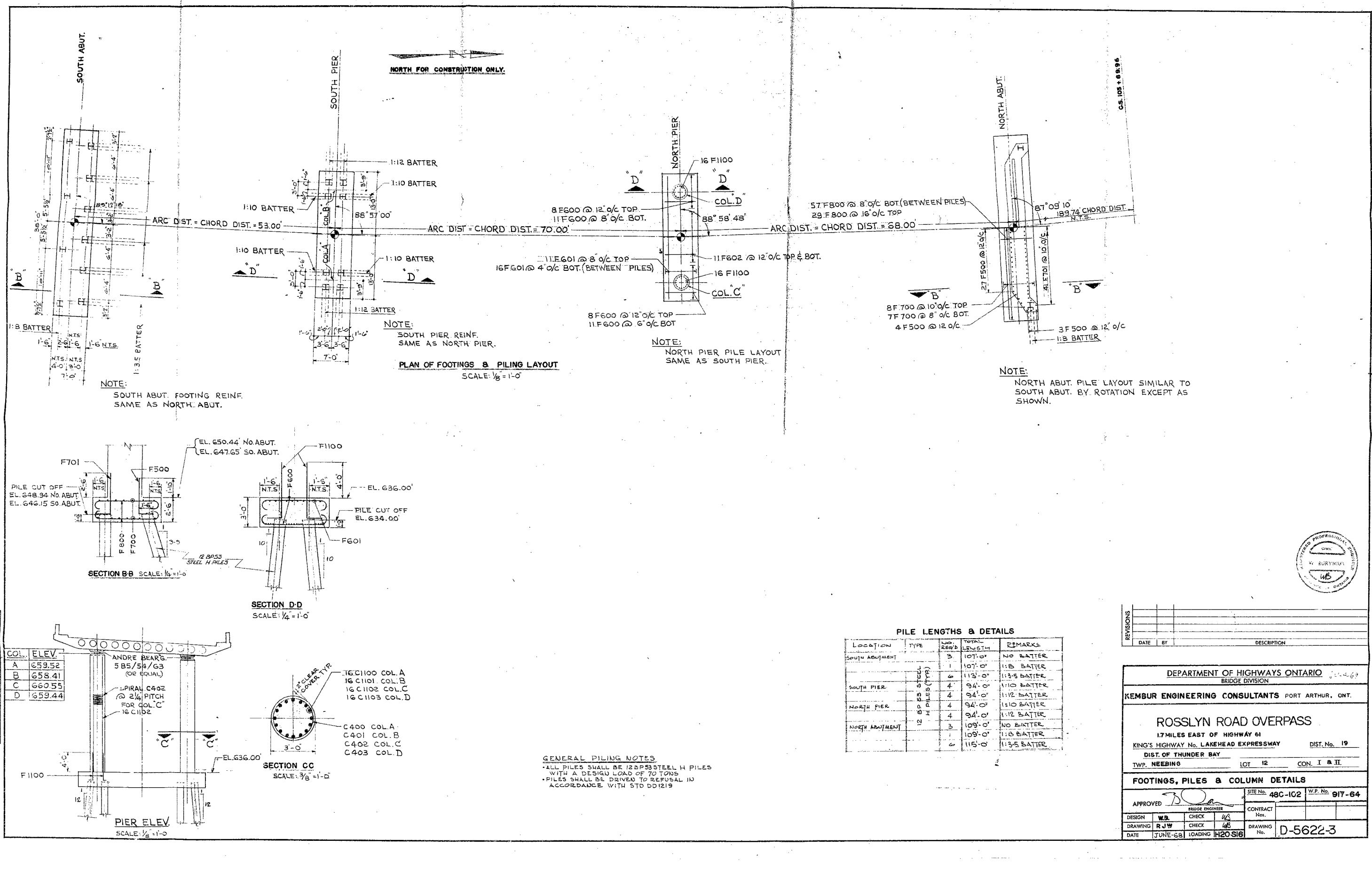
  

NO.	ELEVATION	STATION	OFFSET
1	637.1	109+10	CL
2	635.8	113+00	CL
3	637.3	103+50	CL
4	637.8	98+08	13' RT.
5	639.7	94+02	5' RT.
6	641.0	91+80	CL
7	638.2	101+23	15' RT.
8	637.0	105+70	CL

**- NOTE -**  
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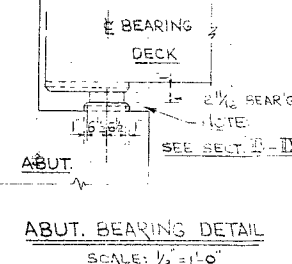
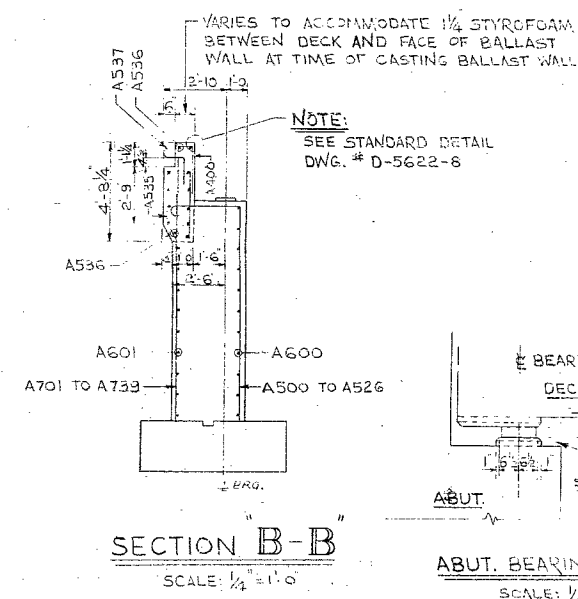
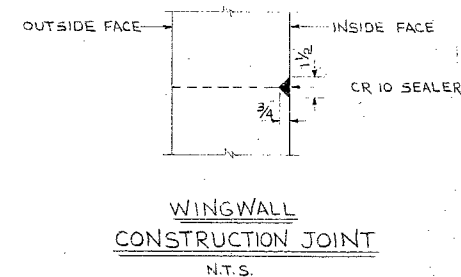
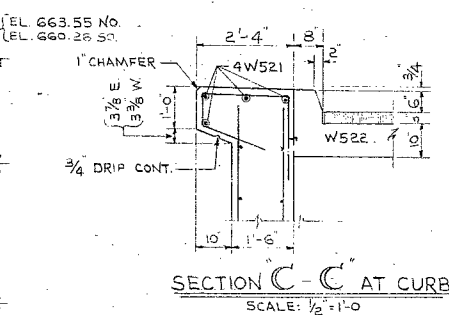
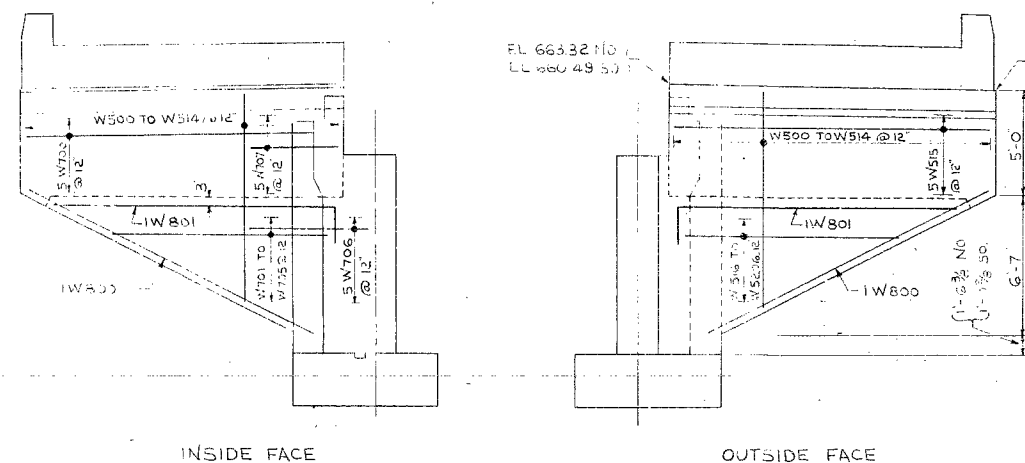
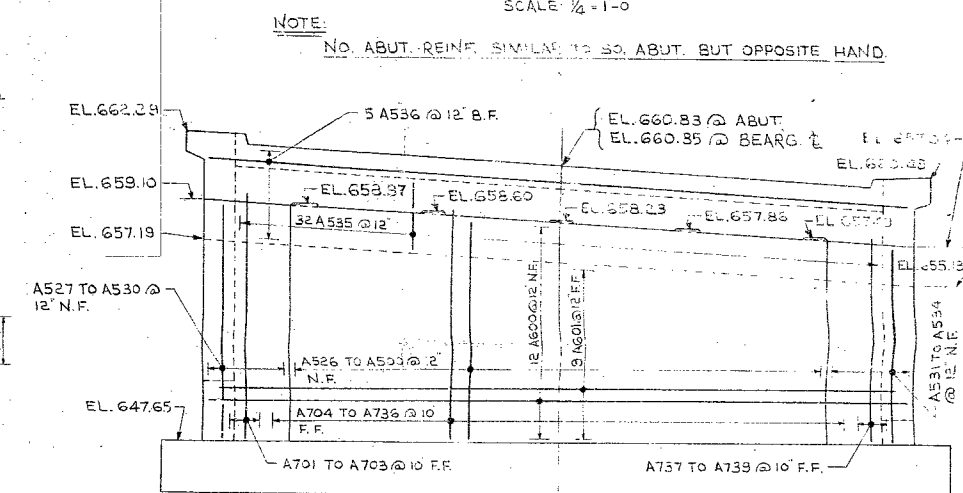
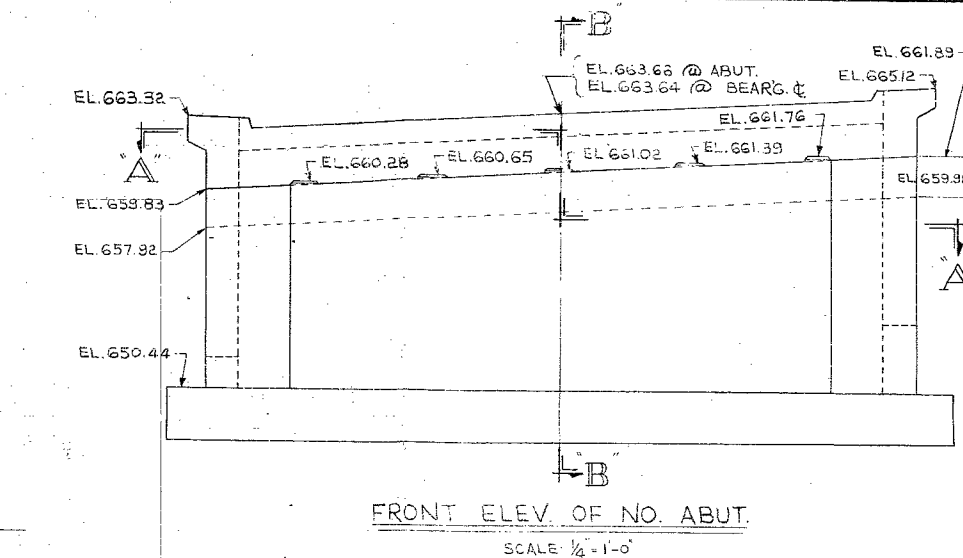
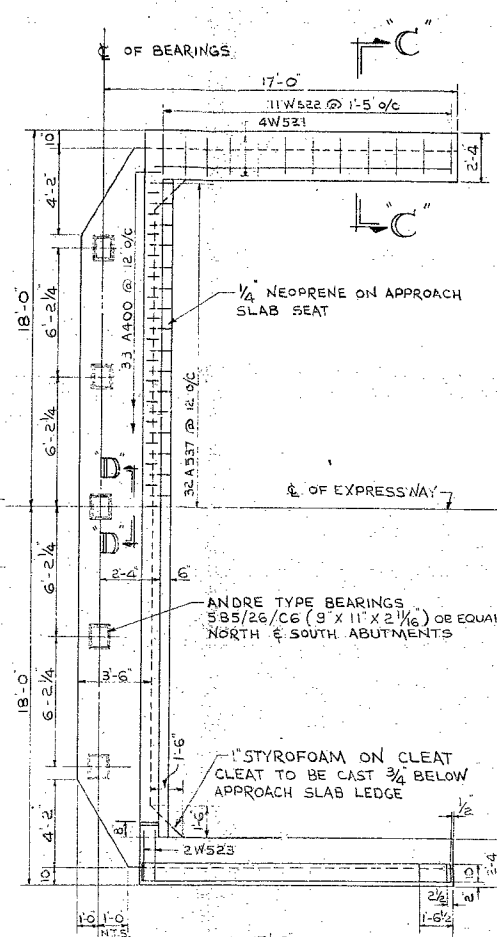
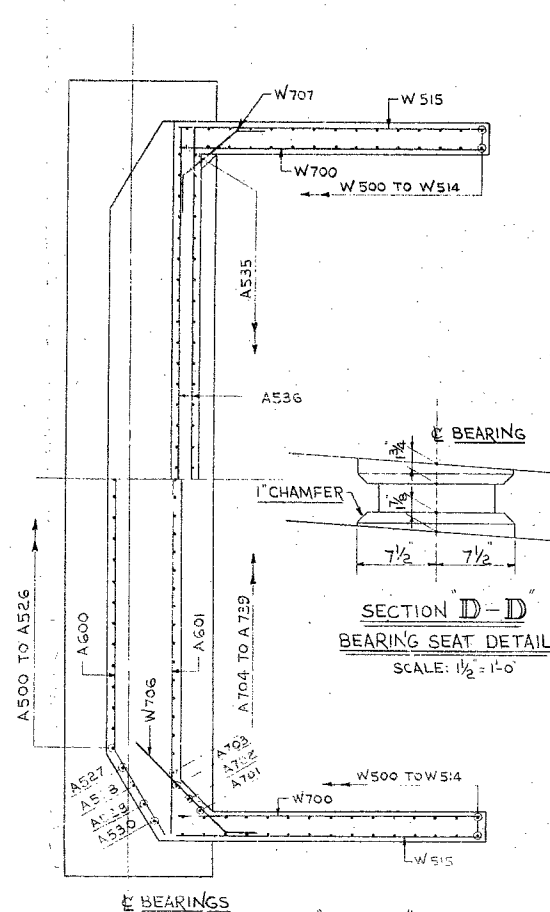
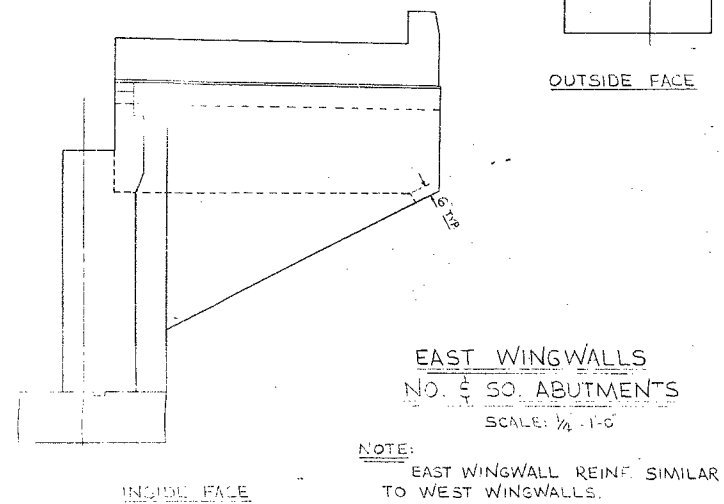
DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS & RESEARCH DIVISION - FOUNDATION SECTION		
<b>ROSSLYN ROAD &amp; C.P.R.</b>		
KING'S HIGHWAY NO. LAKEHEAD EXPRESSWAY DIST. NO. 19		DIST. OF THUNDER BAY
TWP. NEEBING LOT 12 CON. I		CORR. I
<b>BORE HOLE LOCATIONS &amp; SOIL STRATA</b>		
SUBM'D R.M. CHECKED <input checked="" type="checkbox"/>	W.P. NO. 917-64	M.B.R. DRAWING NO. 64-F-69 A
DRAWN R.T. CHECKED <input checked="" type="checkbox"/>	JOB NO. 64-F-69	BRIDGE DRAWING NO.
DATE 14 AUG. 1964	SITE NO. 48C-10P	CONT. NO.
APPROVED <i>A. J. Thomas</i>		<b>D-5622-2</b>



GENERAL PILING NOTES  
• ALL PILES SHALL BE 120P53 STEEL H PILES  
• WITH A DESIGN LOAD OF 70 TONS  
• PILES SHALL BE DRIVEN TO REFUSAL IN  
• ACCORDANCE WITH STD DD1219

PILE LENGTHS & DETAILS				
LOCATION	TYPE	NO. REQS.	TOTAL LENGTH	REMARKS
SOUTH ABUTMENT	120P53 STEEL H PILES (TP)	3	107'-0"	NO BATTER
		1	107'-0"	1:8 BATTER
SOUTH PIER	120P53 STEEL H PILES (TP)	6	113'-0"	1:3.5 BATTER
		4	94'-0"	1:10 BATTER
NORTH PIER	120P53 STEEL H PILES (TP)	4	94'-0"	1:12 BATTER
		4	94'-0"	1:10 BATTER
NORTH ABUTMENT	120P53 STEEL H PILES (TP)	3	109'-0"	NO BATTER
		1	109'-0"	1:8 BATTER
		6	115'-0"	1:3.5 BATTER

REVISIONS	
DATE	DESCRIPTION
DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION	
KEMBUR ENGINEERING CONSULTANTS PORT ARTHUR, ONT.	
ROSSLYN ROAD OVERPASS	
1.7 MILES EAST OF HIGHWAY 61	
KING'S HIGHWAY No. LAKEHEAD EXPRESSWAY	DIST. No. 19
DIST. OF THUNDER BAY	
TWP. NEEBING	LOT 12 CON. I & II
FOOTINGS, PILES & COLUMN DETAILS	
APPROVED	SITE No. 48C-102 W.P. No. 917-64
DESIGN W.B. CHECK	CONTRACT No.
DRAWING R.J.W. CHECK	DRAWING No. D-5622-3
DATE JUNE-68	LOADING H20S16

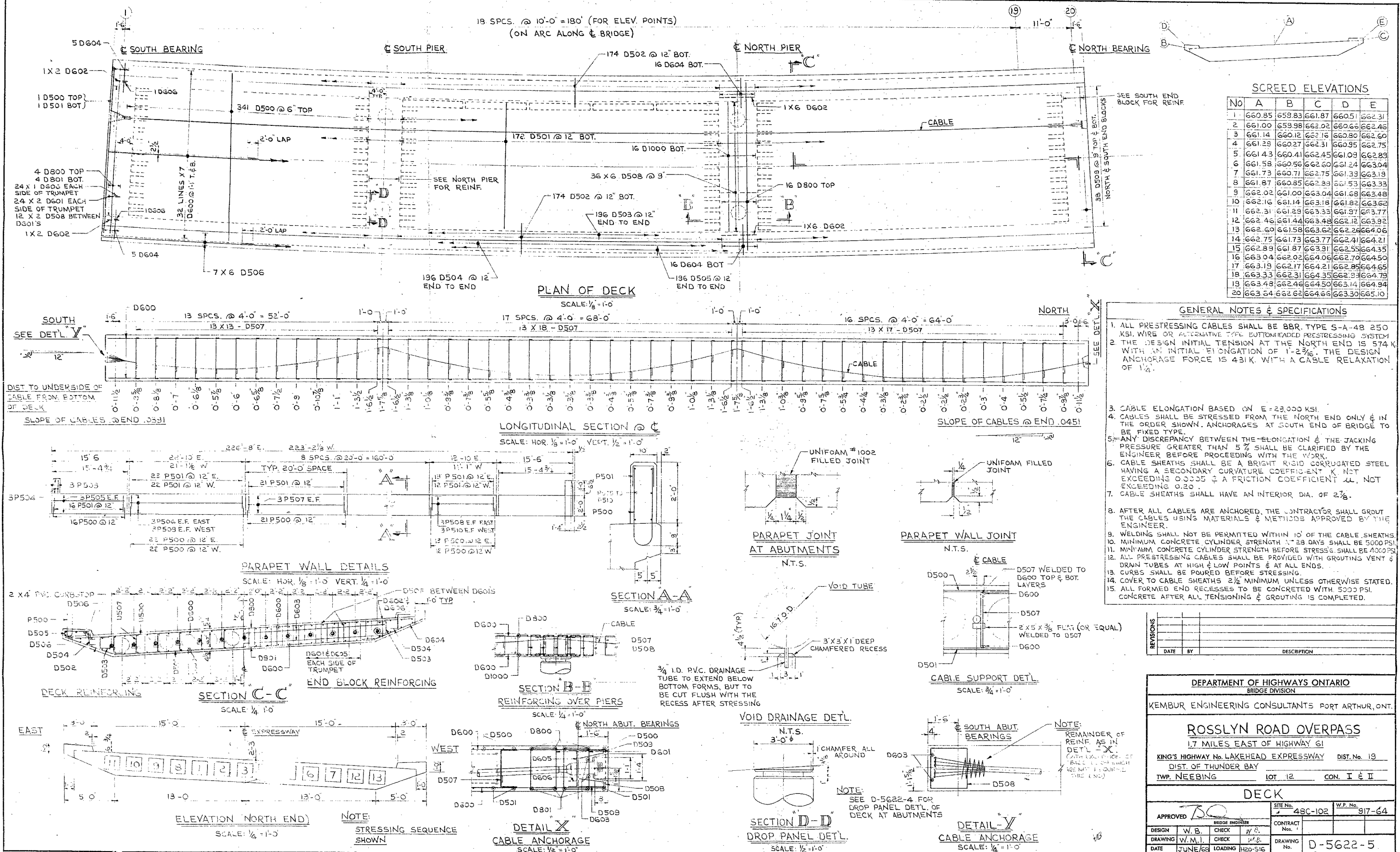
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DEPARTMENT OF HIGHWAYS ONTARIO  
BRIDGE DIVISION  
KEMBUR ENGINEERING CONSULTANTS PORT ARTHUR, ONT.

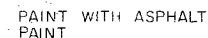
ROSSLYN ROAD OVERPASS  
1.7 MILES EAST OF HIGHWAY 61  
KING'S HIGHWAY No. LAKEHEAD EXPRESSWAY DIST. No. 19  
DIST. OF THUNDER BAY  
TWP. NEEBING LOT 12 CON. I & II

APPROVED <u>BO</u>					SITE No. <u>48C-102</u>		W.P. No. <u>917-6</u>	
BRIDGE ENGINEER					CONTRACT No.			
DESIGN	W. B.	CHECK	<u>W.B.</u>					
DRAWING	W. M. L.	CHECK	<u>W.M.L.</u>		DRAWING No.		<u>D-5622-4</u>	
DATE	<u>JUNE 26</u>	LOADING	<u>1200-SIG</u>					

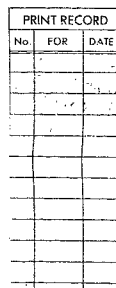
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TYPICAL CURB DETAIL

[illegible]

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
<h2 style="margin: 0;">ROSSLYN ROAD OVERPASS</h2> <p style="margin: 0;">1.7 MILES EAST OF HIGHWAY 61</p>			
KING'S HIGHWAY No. <u>LAKEHURST EXPRESSWAY</u>		DIST. No. <u>19</u>	
<b>DIST. OF THUNDER BAY</b>			
TWP. <u>NEENING</u>	LOT <u>12</u>	CON. <u>1 &amp; II</u>	
APPROACH		SLABS	
APPROVED <u>[Signature]</u> BRIDGE ENGINEER		SITE No. <u>48C-102</u> W.P. No. <u>917-64</u>	
DESIGN <u>[initials]</u> CHECK <u>[initials]</u>		CONTRACT No. <u>          </u>	
DRAWING <u>          </u> CHECK <u>[initials]</u>		DRAWING No. <u>D-5622-6</u>	
DATE <u>JUNE-68</u> LOADING <u>H20-S16</u>			

APPROVED 24<sup>th</sup> Aug. 1965  
ORIGINAL DATE  
[Signature]  
BRIDGE DESIGN ENGINEER



CAP ENDS AT PARAPET  
END POSTS ONLY.

WHERE POST LAYOUT IS NOT SHOWN,  
POSTS SHALL BE EQUALLY SPACED EXCEPT  
THAT POSTS AT EXPANSION AND CONSTRUCTION  
JOINTS SHALL BE MOVED AS REQUIRED TO  
ATTAIN 9" CLEARANCE.  
(SEE TABLE BELOW FOR POST SPACING LIMITS.)

(SEE TABLE BELOW FOR POST SPACING LIMITS.)

DISTANCE END TO END OF RAIL	POST SPACING	
	MINIMUM	MAXIMUM
UNDER 40'	9'-0"	12'-0"
OVER 40'	10'-0"	12'-0"

\* POST LAYOUT SHALL BE SYMMETRICAL  
ABOUT A BRIDGE SPAN.

GALVANIZED  
DIAMETER

NOTE:  
ALL UNSPECIFIED RADII 1/8"

GALVANIZED  
DIAMETER

SQUARE CORNERS  
AROUND BOLT HOLES  
TYPICAL

SIDE ELEVATION

FRONT ELEVATION

1" TYPICAL

STANDARD LENGTH 21'-11"

1" TYPICAL

SPLICE

ALL RAILS 3/2" O.D. TUBE 1/8" WALL THICKNESS.

SPLICE

9" MIN. 9" MIN.  
TYP. TYP.

ALTERNATE  
JOINT LOCATIONS

ELEVATION  
SCALE: 3/4" = 1'-0"

GALVANIZED TUBE O.D. 3.536"  
3.489"

OUTSIDE DIA OF UNGALVANIZED  
SPLICE TUBE TO BE 3/64" ± 1/64"  
LESS THAN MEASURED I.D.  
OF THE UNGALVANIZED OUTER  
TUBE.

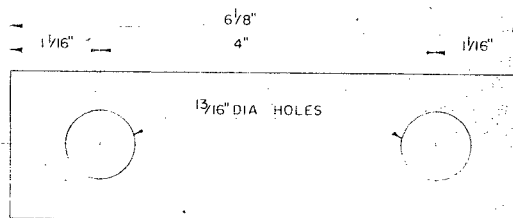
CAP ASSEM.

SPLICE TUBE

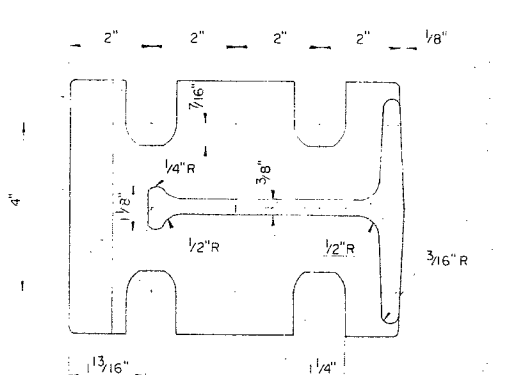
1/2" HOLE FOR 1/4" SELF TAPPING  
SET SCREW  
(DRILLED IN FIELD BY CONTRACTOR)

RAIL ASSEMBLY  
(NTS)

NOTE: THE GALVANIZE COATING  
ON THESE MATING SURFACES  
OF TUBE STRUCTURES (PER SPEC)  
TO HAVE UNIFORM THICKNESS  
AND NOT TO EXCEED .005" TH.  
(FOR SLIDE FITS)



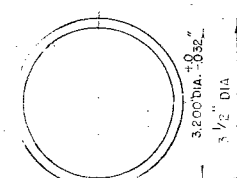
WASHER DETAIL  
(FULL SCALE)



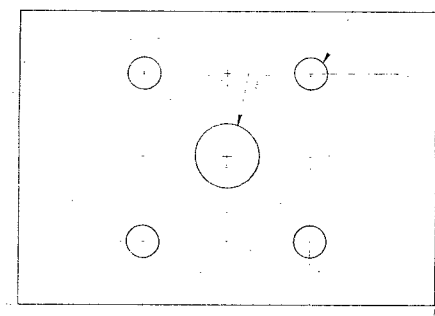
SECTION A-A

1/8" RADIUS

RAIL CAP



5" 1/2" DIA 3/4" DIA (4 HOLES)



\* NOTE:  
SCALE: 1/2" = 1" (EXCEPT WHERE OTHERWISE INDICATED)

#### GENERAL NOTES:

- (1) RAIL ELEMENTS SHALL BE STRUCTURAL TUBING SUPPLIED IN ACCORDANCE WITH A.S.T.M. A36.
- (2) STEEL IN POSTS AND RAIL CAPS SHALL BE CAST STEEL SUPPLIED IN ACCORDANCE WITH A.S.T.M. A27-60 GR. 60-35.
- (3) RAIL TUBING SHALL BE SUPPLIED WITH SPLICE IN LENGTHS OF 21'-11" (EXCLUDING "PLICE") EXCEPT AS NOTED.
- (4) POSTS, RAILS, WASHERS AND CAPS SHALL BE GALVANIZED IN ACCORDANCE WITH A.S.T.M. A123.
- (5) SET SCREWS SHALL BE OF MINIMUM PLATED TO 200 IN. WITH A SPECIAL BRIGHT DIP FINISH TO STD. SPEC. Q 9-F-4164 CLASS III. ALL GALVANIZING SHALL BE DONE AFTER FABRICATION.
- (6) ELECTRODES SHALL BE TO A LOW HYDROGEN SPECIFICATION E7015, E7016 OR E7018.
- (7) ANCHORAGE AND BOLTS SHALL BE RICHMOND TYPE D-GR.1 OR EQUAL, MODIFIED AS SHOWN. INSERTS AND ANCHOR BOLTS SHALL BE GALVANIZED IN ACCORDANCE WITH A.S.T.M. A153-61. BOLTS SHALL BE GIVEN A LIBERAL COATING OF WHITE NON-STAINING GREASE.

#### ERECTION NOTES:

- (1) RAIL TUBING SHALL BE BENT TO FOLLOW CURVATURE OF ROAD.
- (2) RAIL POSTS SHALL BE SET PERPENDICULAR TO GRADE.
- (3) WHERE LAYOUT OF POSTS IS NOT SHOWN, POST LOCATION SHALL BE DETERMINED BY THE CONTRACTOR.
- (4) SET SCREWS SHALL NOT BE TIGHTENED ON POSTS ADJACENT TO EXPANSION JOINTS.
- (5) RAIL SHALL BE CUT AS REQUIRED WITH PIPE CUTTERS AND CUT SURFACE TREATED WITH ZINC RICH PAINT.
- (6) WHEN CONNECTING TO EXISTING RAIL, RAIL MUST BE MADE CONTINUOUS AND POST SPACING DETERMINED WITH REFERENCE TO EXISTING POST.

ITEM	NO.	L.F.	BENDING RADIUS	LOCATION
POST	46			
ANCHORAGE	8			
END CAPS	8			
3/2" TUBE WITH SPLICE (21'-11" LENGTH)	36			
1/2" TUBE WITHOUT SPLICE (21'-3 1/2" LENGTH)	2			EAST
	2			WEST

\* INCLUDING SET SCREWS FOR POSTS AND BOLTS, WASHERS AND TEMPLATE  
FOR ANCHORAGES.  
\* INCLUDING SET SCREWS.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
KEMBUR ENGINEERING CONSULTANTS (PORT ARTHUR, ONT.)			
ROSSLYN ROAD OVERPASS 17 MILES EAST OF HIGHWAY 61			
KING'S HIGHWAY No. LAKEHEAD EXPRESSWAY		DIST. No. 13	
DIST. OF THUNDER BAY		CON. I & II	
TWP. NEEBING		LOT 12	
=STANDARD STEEL PARAPET RAIL=			
APPROVED	BRIDGE ENGINEER	SITE No.	W.P. No.
DESIGN	W.B. CHECK	480-102	317-24
DRAWING	W.M.L. CHECK	CONTRACT	No.
DATE	JULY 31	LOADING	1300-376
		DRAWING	No.
			D-5622-7

**SPLICE & DRIVING SHOE DETAILS FOR STEEL 'H' PILES**  
BD 82-1  
REV. SEPT. 67

**TABLE 1: PILE & PLATE SPECIFICATIONS**

PILE	10 B.P. 42	12 B.P. 53	12 B.P. 74	14 B.P. 73
PILE	10 B.P. 42	12 B.P. 53	12 B.P. 74	14 B.P. 73
FLANGE PLATES	9" x 1/2" x 12"	11" x 1/2" x 12"	11" x 1/2" x 12"	13" x 1/2" x 12"

**NOTES:**

- THE PILE SPLICE SHALL BE A FULL BUTT WELD AS SHOWN, PERPENDICULAR TO & OF PILE.
- WELDING SHALL CONFORM TO THE LATEST ISSUE OF C.S.A. SPECIFICATION W59 AND SHALL BE DONE BY A WELDER QUALIFIED UNDER C.S.A. SPECIFICATION W47.

**PLAN**  
LOCATION OF BRIDGE SITE & DATE FIGURES

**NOTE:** SEE BD 100-2 FOR SIZE & SPACING OF FIGURES. BD 100-2 TO BE SUPPLIED BY DISTRICT.

**PILE DRIVING STEAM AND DIESEL HAMMERS**  
No. DD-1219  
Date \_\_\_\_\_ Rev. \_\_\_\_\_

**TABLE 1: HAMMERS**

TYPE	WEIGHT (Tons)	PURPOSE
10B3	0.8	For Timber Piles
10B3	1.5	
10B3	2.5	
10B3	3.5	
10B3	4.5	
10B3	5.5	
10B3	6.5	
10B3	7.5	
10B3	8.5	
10B3	9.5	
10B3	10.5	
10B3	11.5	
10B3	12.5	
10B3	13.5	
10B3	14.5	
10B3	15.5	
10B3	16.5	
10B3	17.5	
10B3	18.5	
10B3	19.5	
10B3	20.5	
10B3	21.5	
10B3	22.5	
10B3	23.5	
10B3	24.5	
10B3	25.5	
10B3	26.5	
10B3	27.5	
10B3	28.5	
10B3	29.5	
10B3	30.5	
10B3	31.5	
10B3	32.5	
10B3	33.5	
10B3	34.5	
10B3	35.5	
10B3	36.5	
10B3	37.5	
10B3	38.5	
10B3	39.5	
10B3	40.5	
10B3	41.5	
10B3	42.5	
10B3	43.5	
10B3	44.5	
10B3	45.5	
10B3	46.5	
10B3	47.5	
10B3	48.5	
10B3	49.5	
10B3	50.5	
10B3	51.5	
10B3	52.5	
10B3	53.5	
10B3	54.5	
10B3	55.5	
10B3	56.5	
10B3	57.5	
10B3	58.5	
10B3	59.5	
10B3	60.5	
10B3	61.5	
10B3	62.5	
10B3	63.5	
10B3	64.5	
10B3	65.5	
10B3	66.5	
10B3	67.5	
10B3	68.5	
10B3	69.5	
10B3	70.5	
10B3	71.5	
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10B3	75.5	
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10B3	78.5	
10B3	79.5	
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10B3	83.5	
10B3	84.5	
10B3	85.5	
10B3	86.5	
10B3	87.5	
10B3	88.5	
10B3	89.5	
10B3	90.5	
10B3	91.5	
10B3	92.5	
10B3	93.5	
10B3	94.5	
10B3	95.5	
10B3	96.5	
10B3	97.5	
10B3	98.5	
10B3	99.5	
10B3	100.5	

**FORMULAS:**

- $R = \frac{aWh}{S+72}$  tons (Hiley formula)
- where:  $R$  = Ultimate load in tons
- $S$  = Measured penetration of pile per blow of hammer in inches
- $C$  = Measured rebound of pile per blow of hammer in inches
- $Wh$  = Gross energy of hammer blow with a reduction due to the effect of single action or double action as against a perfect free fall, this reduction is included in plotting of the curves.
- $n$  = Efficiency of blow =  $\frac{W+P}{W}$
- where:  $n$  = 0.32 for steel (These values of  $n$  have been found by experiment.)
- $P$  = Weight of pile + 0.25 ton for helmet.
- $W$  = Weight of hammer in tons
- The  $P/W$  curves form the required reduction of total energy ( $Wh$ ) of the hammer blow according to the ratio of  $P/W$ .
- $L = R/Q$  tons
- where:  $L$  = Working load on pile in tons
- $Q$  = Factor of safety
- Use  $Q=3$  unless otherwise authorized by the Bridge Engineer.

**Example 1:**

Observed measured rebound =  $C = 0.8$  in.  
Observed measured set per blow =  $S = 0.33$  in.  
12 in. steel tube at 28 lb. per ft. 30 ft. long plus helmet weighing 0.25 ton giving  $P = 0.67$  ton. Oelmaag D12 hammer,  $W = 1.38$  tons,  $P/W = 0.485$ .

**Chart:**

With  $C = 0.8$  in. proceed horizontally to the right to cut line  $S = 0.33$  in. and vertically down to cut curve D12 then horizontally to the left to cut  $P/W = 0.485$  and read ultimate load  $R = 120$  tons approximately.

**Example 2:**

Working load on pile is 20 tons, pile is 12 in. tube, 40 ft. long, D/A Mackinnon Terry hammer 10B3,  $W = 1.5$  tons,  $P = 0.54 + 0.25 = 0.79$  ton,  $P/W = 0.525$ . Assume  $Q = 3$ , then  $R = 60$ .

**Chart:**

With  $R = 60$  tons trace up to cut  $P/W = 0.525$  and horizontally to the right to cut curve 10B3 then vertically up. The range of reading will now be between  $C = 0$  in. and  $S = 0.72$  in. and  $C = 0.45$  in. and  $S = 0$  (refusal). A test pile must be driven of a length compatible with the soil strength recommendation (if any). The driving must continue until a pair of readings is obtained corresponding to a pair on the chart, the required pair being decided upon by the Bridge Engineer.

**DEPARTMENT OF HIGHWAYS-ONTARIO**

**PILE DRIVING STEAM AND DIESEL HAMMERS**

APPROVED \_\_\_\_\_  
Date Aug 4/59  
Bridge Engineer

**INSTALLATION OF GUIDE RAIL AND CHANNEL ANCHORAGE TO STRUCTURES**  
APRIL 1966  
BD 45-2

**FRONT ELEVATION**

**SECTION A-A**

**SECTION B-B**

**NOTES:**

- Approx. weight: Guide rail anchorage 32 lbs. Channel anchorage 1.3 lbs.

**DECK EXPANSION JOINT TYPE II WITH NEOPRENE JOINT SEAL**  
REV. OCT. 1967

**SECTION ALONG JOINT**

**NOTES:**

- JOINT SEALS TO BE PRESSED INTO JOINT USING MANUFACTURER'S APPROVED LUBRICANT APPLIED TO BOTH WALLS OF GROOVE.
- JOINTS SHALL BE CLEAN, DRY AND FREE FROM ALL FOREIGN MATERIALS.
- ALL METAL SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH A.S.T.M. - A123.
- ANCHOR STUDS TO BE AT 16" C/P3 EACH SIDE FOR CURB PLATES.
- STEEL ANGLES AND PLATES SHALL BE IN ACCORDANCE WITH C.S.A. SPECIFICATION G40.4.
- WELDING SHALL BE IN ACCORDANCE WITH C.S.A. SPECIFICATION W59.

**DEPARTMENT OF HIGHWAYS-ONTARIO**  
BRIDGE DIVISION

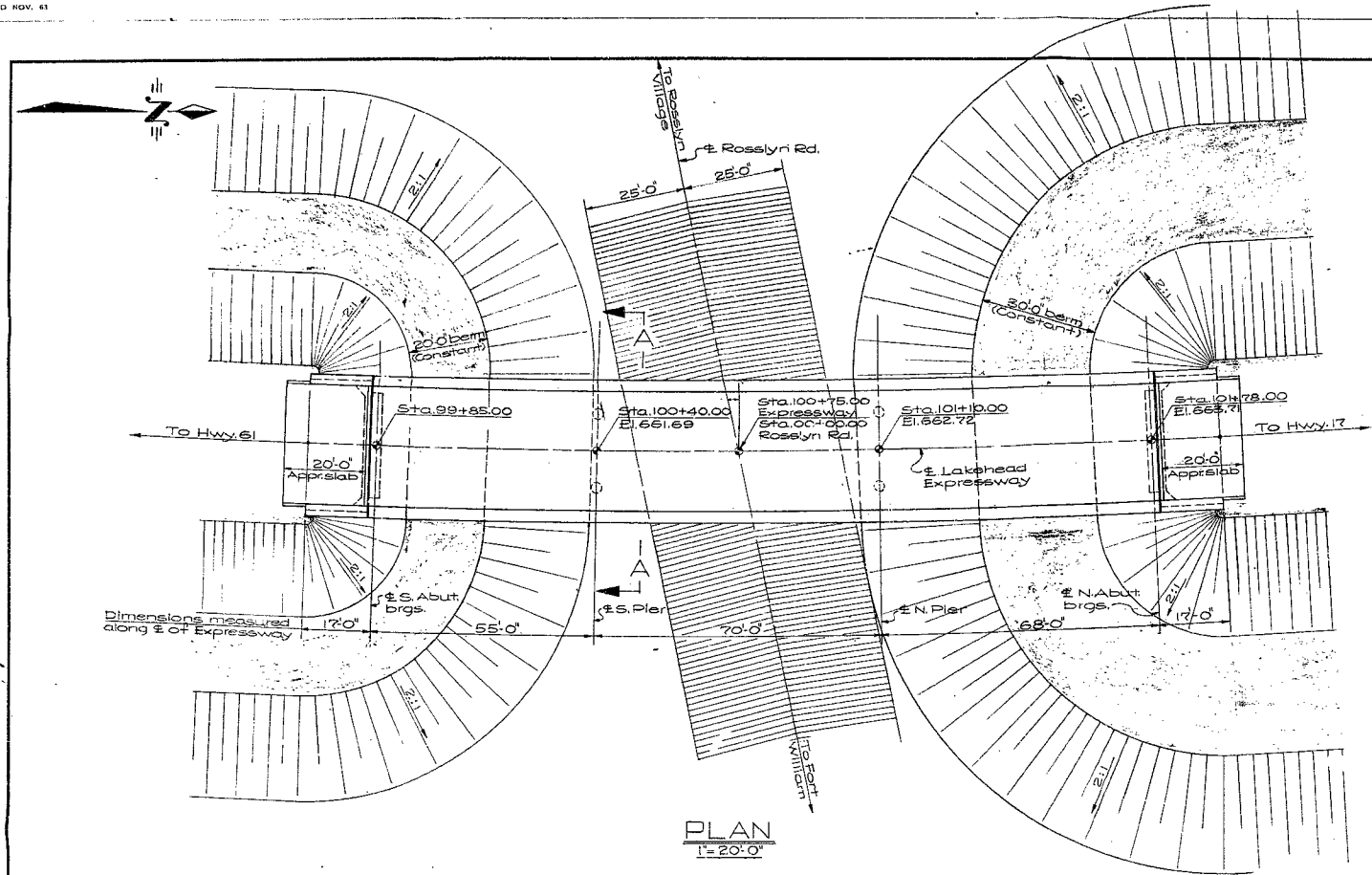
**ROSSLYN RD. OVERPASS**  
T.M. BR. 1 A-111-1

KING'S HIGHWAY No. 146-142 (EXPRESSWAY) DIST. No. 15  
D.C. OF THUNDER BAY  
TWP. ABBEY LOT 2 CON. 142

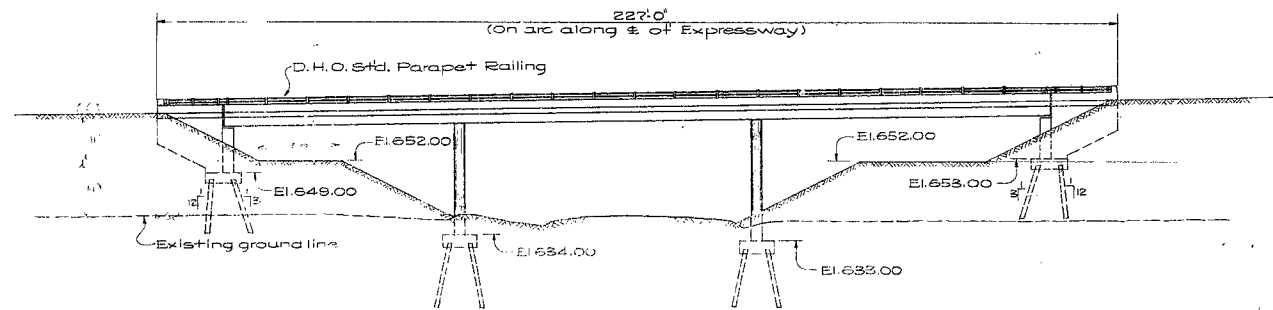
APPROVED \_\_\_\_\_  
DATE 31 DEC 68

DESIGN \_\_\_\_\_  
CHECK \_\_\_\_\_  
DRAWING No. 3-5522-5

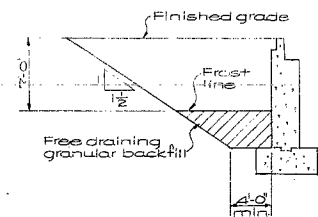
CONTRACT No. \_\_\_\_\_  
DRAWING No. \_\_\_\_\_



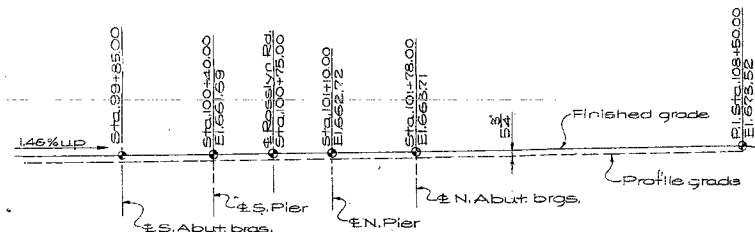
PLAN  
1"=20'-0"



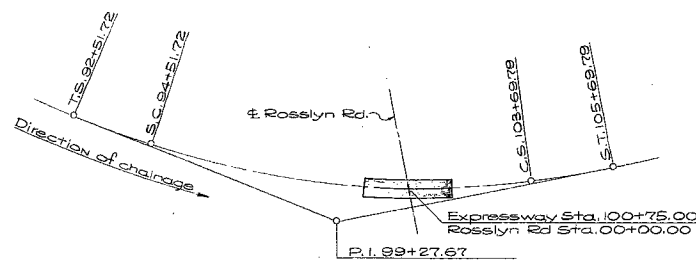
ELEVATION  
1"=20'-0"



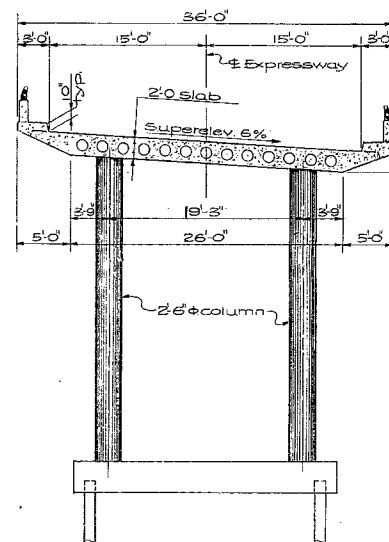
GRANULAR BACKFILL



PROFILE OF EXPRESSWAY

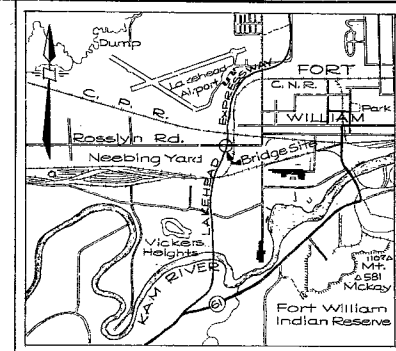


HORIZONTAL ALIGNMENT



A-A  
1"=10'-0"

Curve Data	
Δ	33°32'50"
Δc	27°32'50"
Dc	3'00' Lt.
Rc	1909.86'
Lc	918.24'
Es	85.78'
Spiral Data	
Δ	3'00'
Ls	200.00'
Ts	675.95'

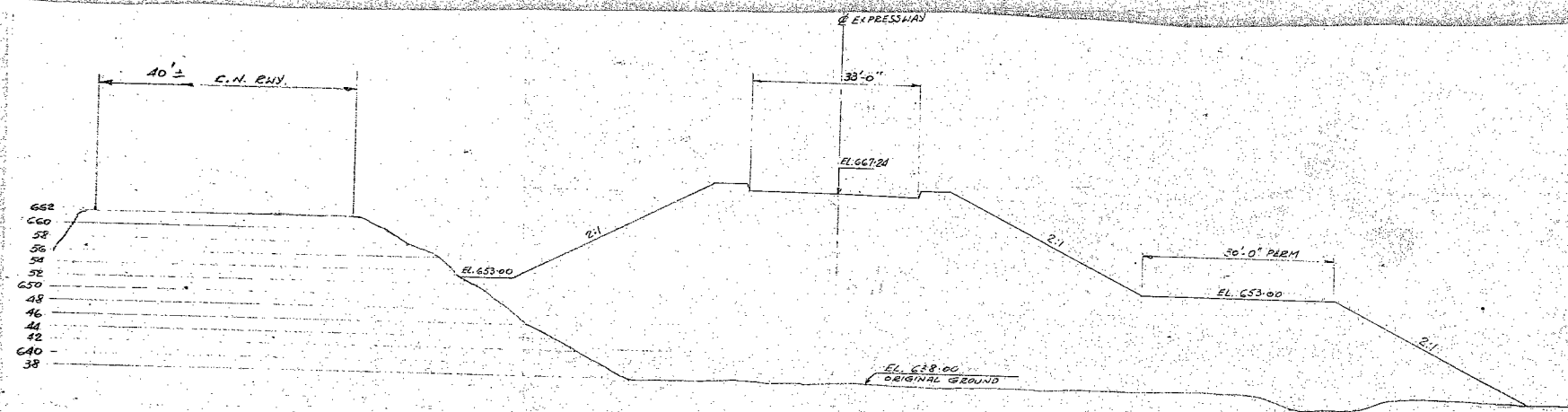


KEY PLAN  
1/25"=1 mi

B.M. El. 637.56  
N.W. in root of 0.8" birch 228.0' Rt.  
of Sta. 102+51.00

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
ROSSLYN RD. OVERPASS			
KING'S HIGHWAY No. Lakehead Expressway		DIST. No. 19	
Co. Dist. of Thunder Bay			
TWP. Neening		LOT 12	CON. 1
PRELIMINARY			
APPROVED		SITE No.	W.P. No.
DESIGN		CONTRACT	
CHECK		DRAWING	
DATE		LOADING	



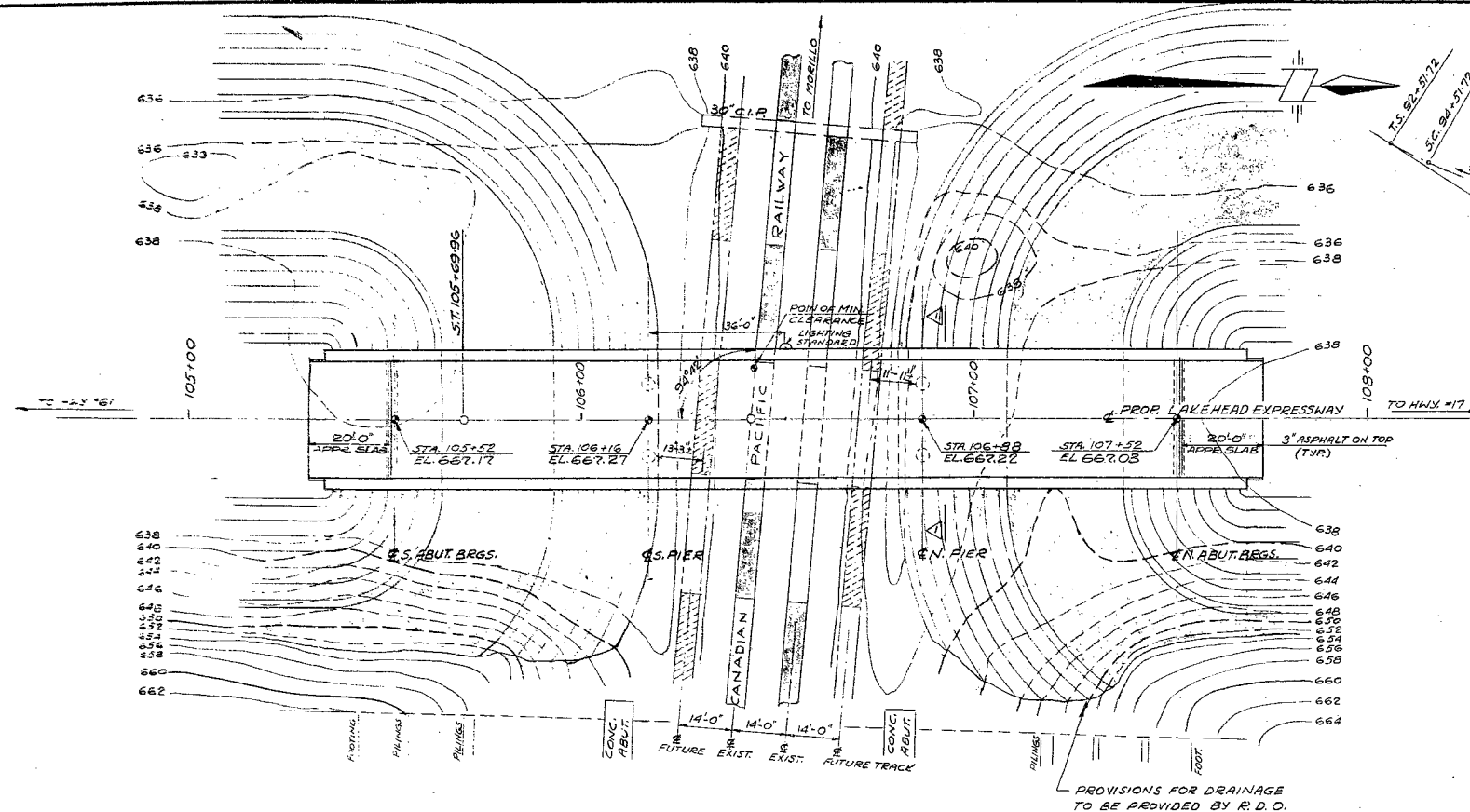
CROSS SECTION @ STA. 105+30

C.P.R. OVERHEAD  
LAKEHEAD EXPRESSWAY

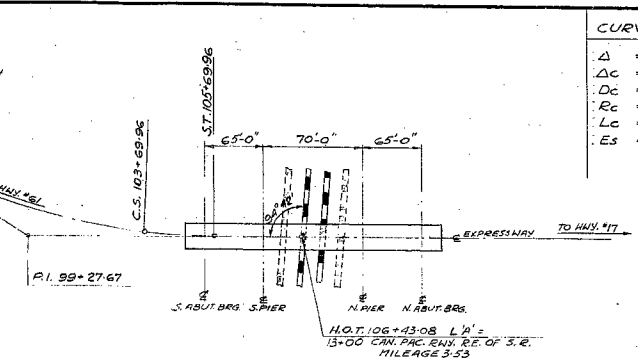
W.P. 918-64

D-5623

64-F-69

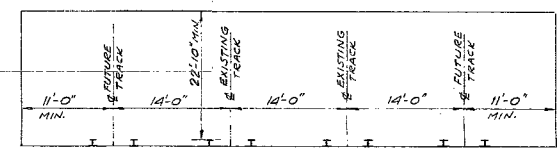


**PLAN**  
1" = 20'-0"

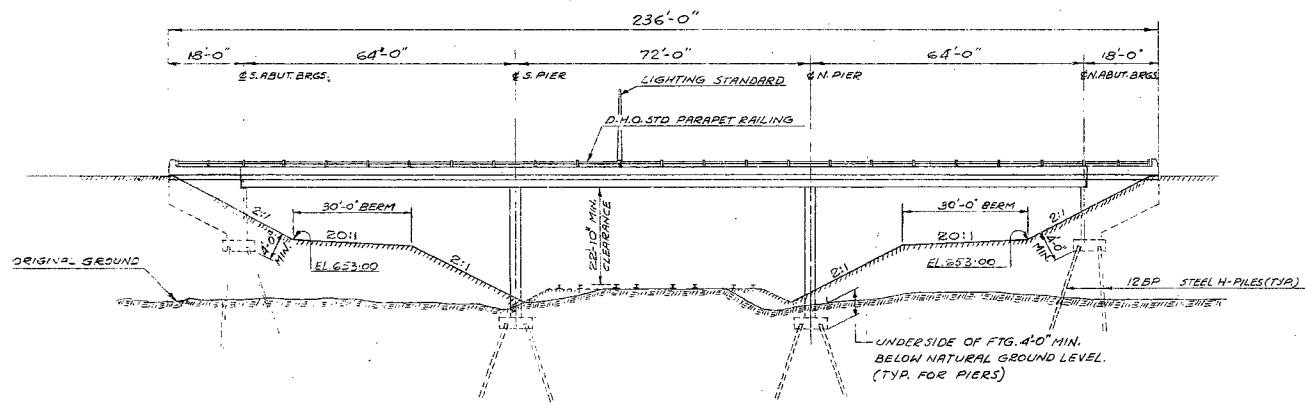


**HORIZONTAL ALIGNMENT**  
N.T.S.

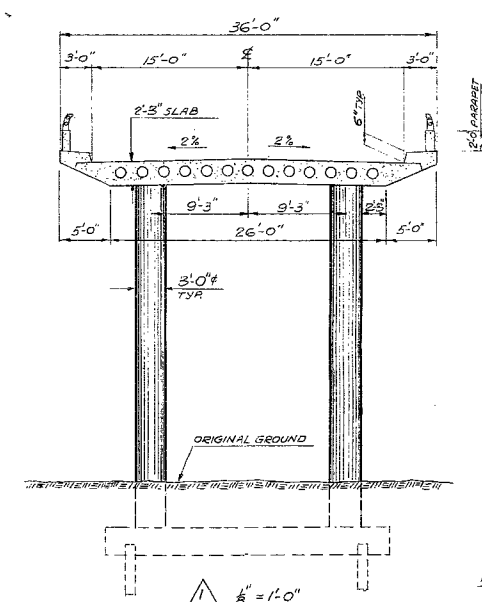
**PROFILE OF EXPRESSWAY**



**CROSS SECTION OF C.P.R.**  
N.T.S.



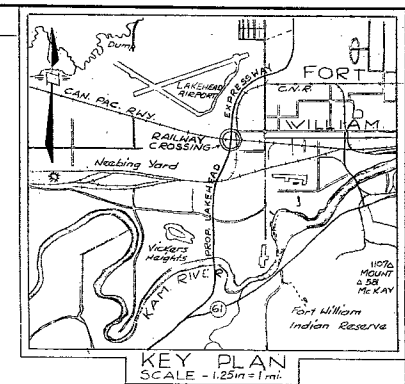
**EAST ELEVATION**  
1" = 20'-0"



**REFERENCE DRAWINGS**

LOCATION PLAN B-645-1  
LOCATION PROFILE C-645-7  
STE PLAN E-4503-1  
RAILWAY PLAN G-3200

CURVE DATA	SPIRAL DATA
$\Delta = 33^\circ 32' 50''$	$G_s = 3^\circ 00'$
$\Delta C = 27^\circ 32' 50''$	$L_s = 200' 00''$
$D_c = 3^\circ 00'$	$T_s = 675' 95''$
$R_c = 1909' 86''$	
$L_c = 918' 24''$	
$E_s = 85' 78''$	

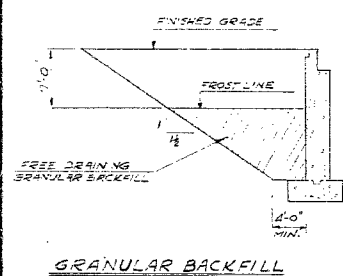


**KEY PLAN**  
SCALE - 1:25,000

B.M. ELEV. 638.55  
N. & W. IN TOP OF 0.4 POPLAR STA  
245' 0" RT. OF STA. 108+38

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
<b>C.P.R. OVERHEAD</b> 2.0 MI. E. OF EXISTING HWY. #61			
KING'S HIGHWAY No. LAKEHEAD EXPRESSWAY		DIST. No. 19	
DIST. OF THUNDER BAY		TWP. NEEDING	
LOT 12		CON. 1 & 2	
PRELIMINARY			
APPROVED		SITE No. 48C-95 W.P. No. 918-64	
DESIGN	CHECK	CONTRACT	No.
DRAWING	G. P. CHECK	DRAWING	No.
DATE	1965	LOADING	H20 S16
		D-5623-P	



**GRANULAR BACKFILL**

## DEPARTMENT OF HIGHWAYS ONTARIO

## MEMORANDUM

TO: Mr. A. M. Toye,  
Bridge Engineer,  
Bridge Division.

FROM: Foundation Section,  
Materials and Testing Div.,  
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

DATE: January 12, 1965

OUR FILE REF.

IN REPLY TO

SUBJECT:

## FOUNDATION INVESTIGATION REPORT

For

Proposed Structures and Embankments  
at the Crossing of C.P.R. and  
Rosslyn Road with the Lakehead  
Expressway - District No. 19  
W.J. 64-F-69 -- W.P. 917-64  
W.P. 918-64

Attached, we are forwarding to you, our detailed foundation investigation report on the subs:il conditions existing at the above structure 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.

KYL/MdeF  
Attach.

cc: Messrs. A. M. Toye (2)  
H. A. Tregaskes  
H. D. McMillan  
H. W. Hurrell  
V. A. Snell  
F. Norman  
A. Watt  
F. De Visser  
Foundations Office  
Gen. Files ✓

*[Signature]*  
for A.G. Stermac,  
PRINCIPAL FOUNDATION ENGINEER

## TABLE OF CONTENTS

1. INTRODUCTION.
2. DESCRIPTION OF SITE.
3. FIELD INVESTIGATION PROCEDURE.
4. LABORATORY TESTS.
5. SUBSOIL CONDITIONS:
  - 5.1) General.
  - 5.2) Silty Sand to Sandy Silt.
  - 5.3) Layered Silty Clay to Clayey Silt.
  - 5.4) Clayey Silt with Traces of Sand.
  - 5.5) Glacial Till.
  - 5.6) Shale Bedrock.
6. GROUND WATER CONDITIONS.
7. DISCUSSION AND RECOMMENDATIONS:
  - 7.1) General.
  - 7.2) Structure Foundations.
  - 7.3) Approach Fills.
8. SUMMARY.
9. MISCELLANEOUS.



# FOUNDATION INVESTIGATION REPORT

For

Proposed Structures and Embankments  
at the Crossing of C.P.R. and  
Rosslyn Road with the Lakehead  
Expressway - District No. 19.  
W.J. 64-F-69    --    W.P. 917-64  
   W.P. 918-64

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## 1. INTRODUCTION:

A preliminary foundation investigation at the proposed structure sites, consisting of three sampled boreholes and one dynamic cone penetration test was carried out by H. Q. Golder and Associates Ltd. in March 1962, and the results were submitted in their preliminary report to De Leuw, Cather of Canada, dated October 1963.

At the above-mentioned location an additional investigation consisting of three sampled boreholes and five dynamic cone penetrations was carried out as requested by Mr. S. McCombie, Bridge Planning Engineer, Bridge Division.

Presented in this report are the results of both investigations, together with our recommendations pertaining to the design of structure foundations and approach embankments.

## 2. DESCRIPTION OF SITE:

The proposed structure site is located in the west end of Fort William. The surrounding land is relatively flat with the exception of a 35-ft. high railway embankment parallel to and 90 ft. from the proposed centreline.

cont'd. /2 ...

2. DESCRIPTION OF SITE: (cont'd.) ...

Fort William and Port Arthur are underlain by a complex series of late Precambrian rocks, which, when not exposed at the surface, are covered by unconsolidated Pleistocene and recent deposits. The deposits which were laid down during and subsequent to the Wisconsin Ice Age, consist generally of stratified silts, sands and clays, mainly of lacustrine and deltaic origin. These deposits overlies glacial till which rests directly on bedrock.

3. FIELD INVESTIGATION PROCEDURE:

Three boreholes and five cone penetration tests were carried out during the course of the field investigation.

Boring was achieved by means of conventional diamond drilling equipment adapted for soil sampling purposes. Undisturbed soil samples were obtained by means of 2-in. Shelby tubes, which were pushed manually into the soil. Disturbed samples were recovered by means of a split-spoon sampler using a driving energy of 350 ft.-lbs. In-situ vane tests were carried out whenever possible in cohesive deposits to determine the shear strength of the deposit.

4. LABORATORY TESTS:

Samples were visually examined and identified in the laboratory as well as in the field. Tests were carried out in the laboratory on a selection of samples for the determination of Atterberg limits, moisture contents, bulk densities, grain-size distributions, shear strength measurements and consolidation.

cont'd. /3 ...

4. LABORATORY TESTS: (cont'd.) ...

The laboratory test results have been summarized and are included in this report in Appendix I.

5. SUBSOIL CONDITIONS:

5.1) General:

The subsoil conditions at the site were found to be generally uniform with minor variations only. Detailed descriptions of various soil types encountered in each boring are given in Appendix I of this report. The soil descriptions shown for B.H.'s 49, 7 & 8 by H. Q. Golder) have been modified to conform with the classification system used by the Foundation Section.

The estimated stratigraphical profile of Dwg. No. 64-F-69A is based upon this information.

From ground level downwards, the various soil types encountered are as follows:

5.2) Silty Sand to Sandy Silt:

A surface layer of silty sand to sandy silt was observed in all boreholes except B.H. 8. The thickness of the layer varied from 3 ft. in B.H. 6 to 10 ft. in B.H. 1. Standard penetration test ('N') values in the stratum ranged from 4 to 18, indicating a relative density of loose to compact.

5.3) Layered Silty Clay to Clayey Silt:

A layered deposit consisting of alternate layers of clayey silt and silty clay was encountered immediately below the silty sand deposit or ground surface in all the boreholes. The lower boundary

cont'd. /4 ...

5. SUBSOIL CONDITIONS: (cont'd.) ...

5.3) Layered Silty Clay to Clayey Silt: (cont'd.) ...

of this stratum varies from elev. 610 to elev. 605. The thickness of this layer was found to vary from 22 ft. in B.H. #1 to 32 ft. in B.H. #8.

The silty clay layers are approximately 3/8" to 3/4" thick and are generally spaced 1/4" to 1/2" apart.

The Atterberg limits, moisture contents and bulk densities for the stratum are as follows:

	Clay Layers	Clayey Silt Layers
Liquid Limit (WL)	36% - 58%	26% - 33%
Plastic Limit (Wp)	18% - 28%	16% - 20%
Moisture Content (W)	30% - 50%	24% - 35%
Bulk Density	105 p.c.f. - 128 p.c.f.	

In-situ Vane Shear Strength ..... 680 p.s.f. - 1,760 p.s.f.  
Undisturbed Shear Strength ..... 500 p.s.f. - 1,840 p.s.f.  
'N' Values ..... 1 blow/ft. - 7 blows/ft.

The shear strength of the deposit was found to generally increase with depth. Based on the above values, the consistency of the stratum may be described as firm to stiff.

Consolidation tests on the silty clay layers gave a compression index ( $C_c$ ) of 0.7 to 0.9, while consolidation tests on the clayey silt layers gave  $C_c$  values from 0.18 to 0.32.

The results of these tests have been summarized and are included in the Appendix to this report.

cont'd. /5 ...

5. SUBSOIL CONDITIONS: (cont'd.) ...

5.4) Clayey Silt with Traces of Sand:

Extending immediately below the stratum of layered silty clay and clayey silt is a deposit of clayey silt with traces of sand. The stratum extends to an approximate elevation 544 and is about 65 ft. in thickness.

Atterberg test results and moisture contents for the stratum are given below:

Liquid Limit	(W <sub>L</sub> )	--	21%	-	32%
Plastic Limit	(W <sub>P</sub> )	--	15%	-	21%
Moisture Content	(W)	--	14%	-	31%
Density		--	120 p.c.f.	-	131 p.c.f.

The shear strengths were found to be as follows:

In-situ Vane Shear Strength	--	700 p.s.f.	-	2,300 p.s.f.
Undrained Shear Strength	--	700 p.s.f.	-	2,800 p.s.f.

Based on the above values, the consistency of the stratum may be described as firm to stiff.

Consolidation tests were carried out on selected samples from this stratum. Compression index (C<sub>c</sub>) values thus determined, ranged from 0.15 to 0.25. The results of these tests have been summarized and are included in the Appendix to this report.

5.5) Glacial Till:

Underlying the stratum of clayey silt with sand and immediately above the bedrock is a deposit of glacial till. In boreholes 1, 4 & 8 the till is mainly composed of silty clay with sand and gravel, while in boreholes 3 & 7, it is composed of silty sand with gravel.

cont'd. /6 ...

5. SUBSOIL CONDITIONS: (cont'd.) ...

5.5) Glacial Till: (cont'd.) ...

The 'N' values in the cohesive portions of the glacial till ranged from 5 to > 100, while in the noncohesive portions the 'N' values ranged from 19 to 28.

5.6) Shale Bedrock:

Underlying the glacial till is shale bedrock. The bedrock was contacted at elev. 540 in B.H. #7 (Rosslyn Rd.) and elev. 535 in B.H. #8 (C.P.R.). The bedrock is dark grey shale in sound condition. It was proved by drilling 10 ft. of AXT core in B.H.'s #7 & #8.

6. GROUND WATER CONDITIONS:

During the original investigation by H. Q. Golder & Assoc., standpipes were installed in the subsoil in conjunction with B.H.'s #7 & #8. The standpipes were encased in cylindrical columns of sand and placed quite near the respective boreholes. Measurements indicated the water levels to be at elevations 638 and 634, respectively. During the second investigation, the water level observed in the boreholes was found to be at approximate elevation 629.

The exact water levels observed during the investigations are shown on Dwg. No. 64-F-69A.

7. DISCUSSION AND RECOMMENDATIONS:

7.1) General:

It is proposed to construct an overpass structure (approx. Sta. 100+75) and an overhead structure (approx. Sta. 106+50) where

cont'd. /7 ...

7. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

7.1) General: (cont'd.) ...

the Lakehead Expressway crosses Rosslyn Rd. and C.P.R. tracks, respectively, at the western outskirts of Fort William. At the time of the writing of this report it was understood that single-span structures were proposed for both locations.

Subsoil at the site is as follows:

- 0' - 7' Silty sand and sandy silt.
- 7' - 26' Layered silty clay and clayey silt.
- 26' - 95' Clayey silt with traces of sand.
- 95' - 102' Glacial till.
- 102' - Shale bedrock.

7.2) Structure Foundations:

Because of the presence of loose sand and firm clay in the upper portion of the subsoil, adequate bearing capacity may not be achieved for spread footing support. Therefore, it is recommended that the structure be supported on a piled foundation. One of the following types of pile foundations may be adopted with the final choice depending upon economical considerations.

a) Friction Piles:

#12 timber piles driven to an estimated tip elevation 590 (approximate length of pile in place 45 ft.) can provide a safe design load of 15 tons/pile.

If this type of foundation is adopted, a simply supported structure should be built since differential settlements are possible.

cont'd. /8 ...



7. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

7.2) Structure Foundations: (cont'd.) ...

b) End-Bearing Piles:

As an alternative, the proposed structure may be supported on end-bearing piles driven to practical refusal to the bedrock. For example, a 12 BP 74 steel H-pile driven to the bedrock can provide a safe design load of 70 tons per pile.

7.3) Approach Fills:

The proposed profile grade is at approximate elevations 663 and 668 at Rosslyn Road and C.P.R. crossing, respectively. This requires a maximum height of embankment of 33 ft. with a top width of 48 ft. and side slopes of 2 horizontal to 1 vertical.

The critical condition for stability of an embankment on medium stiff clays generally occurs during or immediately after construction. Since it is probable that negligible consolidation of the clay would take place during construction, the  $\phi = 0$  method of stability analysis would be applicable. In this method of analysis, stability is governed by the applied loads and by the stress-strain and undrained shear strength properties of the foundation and embankment soils.

Analyses have been carried out in terms of total stresses, both manually and by the use of electronic computer, to determine the stability of the fill sections. On the basis of these analyses it was concluded that for a minimum F.S. of 1.3, berms will be required for fills exceeding 20 ft. in height.

A graph showing the F.S. versus height of fill indicates that without berms a F.S. of unity may be obtained for a 27-ft.

cont'd. /9 ...

7. DISCUSSION AND RECOMMENDATIONS: (cont'd.) ...

7.3) Approach Fills: (cont'd.) ...

embankment. This result is consistent with the construction case of the existing railway embankment adjacent to the proposed highway. The above graph, showing the variation of factors of safety with fill height is included in the Appendix to this report.

The required height and length of berms is given on Dwg. No. 64-F-69B, also attached to this report.

Settlement of the proposed highway embankment and the existing railway embankment will occur due to consolidation of the subsoil below, and adjacent to, the proposed embankment under the additional weight of the fill.

To estimate the probable settlement, H. Q. Golder & Associates and this Section carried out a detailed settlement analysis for the proposed fills. The results of the consolidation tests are given in the Appendix of this report and are summarized in the Appendix to this report.

Based on the consolidation test results, it is estimated that for the 33-ft. high embankment, the maximum consolidation settlement would be in the order of 24 inches at the centre of the embankment. Settlement of the existing railway embankment could be approximately 8 to 10 inches. Therefore, it is recommended that the approach fills including the berms, should be constructed and left in place for as long as possible prior to the construction of the structures.

cont'd. /10 ...

8. SUMMARY:

Single-span structures are proposed at the crossing of Rosslyn Road and C.P.R. with the Lakehead Expressway. Subsoil at the site generally consists of a thin layer of silty sand followed by layered silty clay and clayey silt, which is underlain by clayey silt with traces of sand. Underlying the clayey silt with sand and immediately above the shale bedrock is a deposit of glacial till.

The structure should be supported on friction piles or end-bearing piles as discussed in 7.2.

Berms are required for fills exceeding 20 ft. in height. The required berm length and height are given on Dwg. No. 64-F-69B.

Settlements will be in the order of 24 inches at the location where the embankment is 33 ft. high. The approach fills should be constructed and left in place as long as possible prior to the construction of the structures.

9. MISCELLANEOUS:

The field work was performed by H. Q. Golder and Associates (March 1962) and by the Department of Highways, Fort William Regional Soils Section (February 1964).

The preparation of this report was undertaken by Mr. R. Magi, Project Foundation Engineer and it was reviewed by Mr. M. Devata, Sr. Foundation Engineer.

Equipment was owned and operated by Boyles Bros. Ltd., of Port Arthur.

January 1965

64-F-69

CONSOLIDATION TESTS - SUMMARY OF RESULTS

Layered Silty Clay and Clayey Silt - Silty Clay Layers

<u>BH</u>	<u>SA</u>	<u>Depth</u>	<u>Elev<sup>n</sup></u>	<u>L<sub>L</sub></u>	<u>P<sub>L</sub></u>	<u>e<sub>o</sub></u>	<u>C<sub>c</sub></u>	<u>P<sub>o</sub>, t.s.f.</u>	<u>P<sub>c</sub>, t.s.f.</u>
7	3	11.5	627	63	22	1.13	0.73	0.4	2.2
7	5	17.0	621	48	18	0.92	0.37	0.5	2.3
7	7	21.0	617	40	18	1.22	0.74	0.7	3.7
8	1	5.0	632	55	22	1.60	0.90	0.3	1.8
8	3	12.0	627	66	22	1.22	0.90	0.5	1.9

Layered Silty Clay and Clayey Silt - Clayey Silt Layers

8	5	16.5	622	35	18	0.93	0.32	0.7	2.0
---	---	------	-----	----	----	------	------	-----	-----

Clayey Silt with traces of Sand

7	11	31.0	607	28	17	0.69	0.21	1.0	2.3
---	----	------	-----	----	----	------	------	-----	-----

In the above table:

e<sub>o</sub> = initial void ratio

C<sub>c</sub> = laboratory compression index

P<sub>o</sub> = estimated present overburden pressure, t.s.f.

P<sub>c</sub> = estimated maximum past overburden pressure, t.s.f.

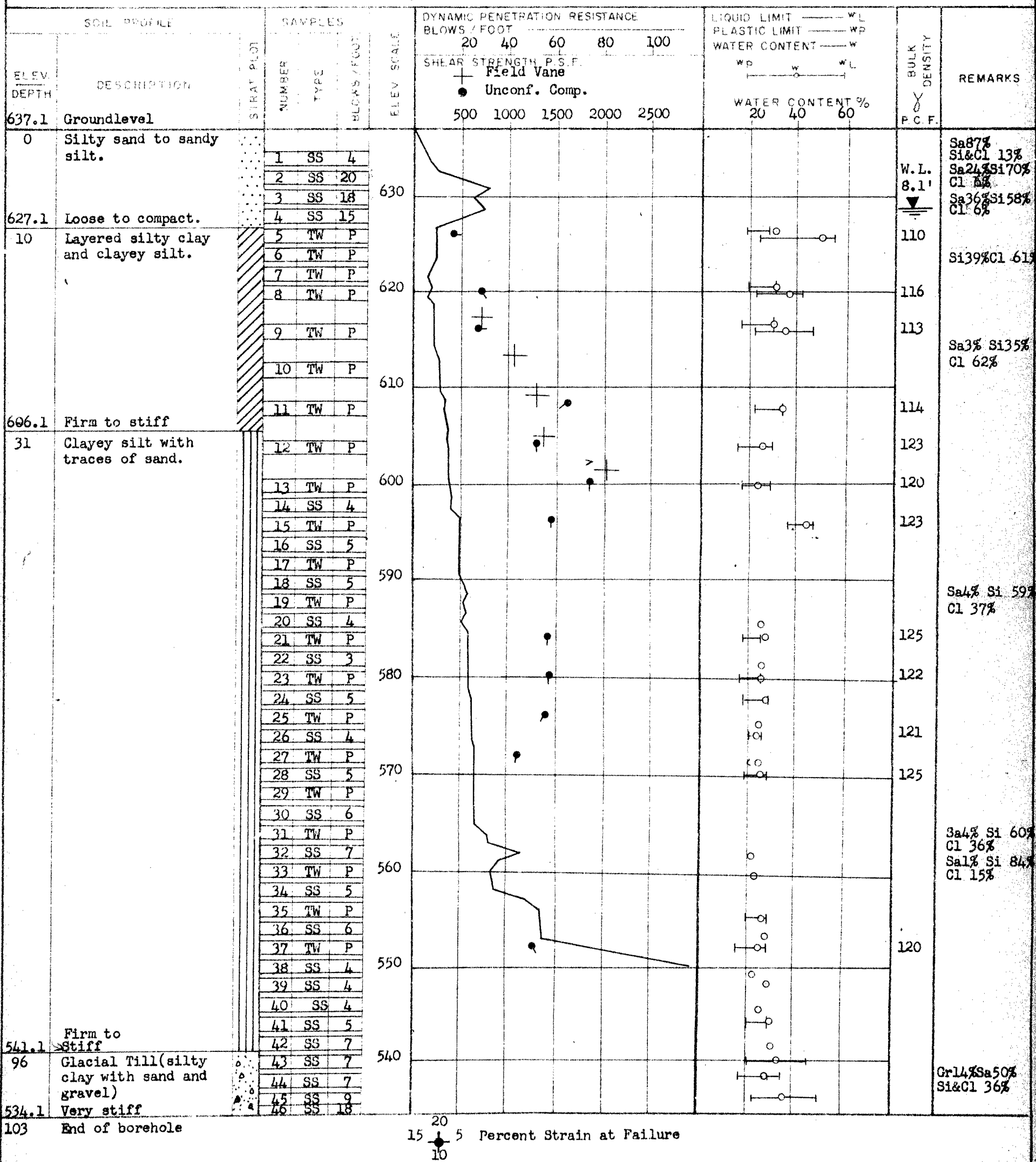
APPENDIX I.

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

# RECORD OF BOREHOLE NO. 1

FOUNDATION SECTION

JOB 64-F-69 LOCATION Sta. 109+10 E ORIGINATED BY F.N.  
W P 917-64 & 918-64 BORING DATE Feb. 11, 1964. COMPILED BY R.M.  
DATUM 637.1 BOREHOLE TYPE Washboring & Cone Penetration. CHECKED BY M.D.



FOUNDATION SECTION

JOB	64-F-69	LOCATION	Sta. 113/00 E	ORIGINATED BY	F.M.
W.P.	917-64 & 918-64	BORING DATE	Feb. 11, 1964.	COMPILED BY	R.M.
DATUM	635.8	BOREHOLE TYPE	Cone Penetration	CHECKED BY	M.D.

[illegible]

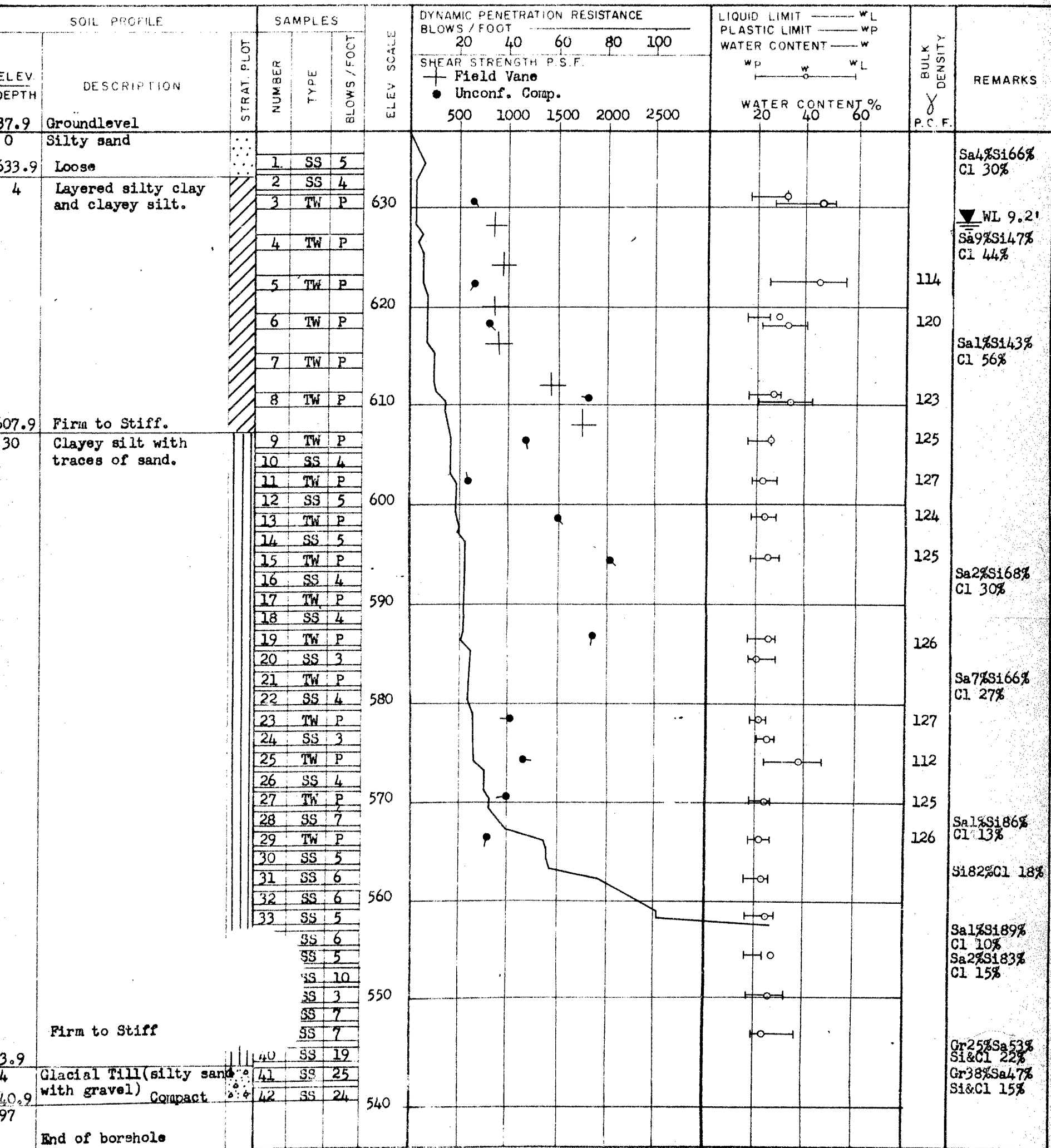


DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

JOB 64-F-69 LOCATION Sta. 103+50 E ORIGINATED BY F.N.  
W P 917-64 & 918-64 BORING DATE Feb. 14, 1964. COMPILED BY R.M.  
DATUM 637.9 BOREHOLE TYPE Washboring & Cone Penetration CHECKED BY M.D.



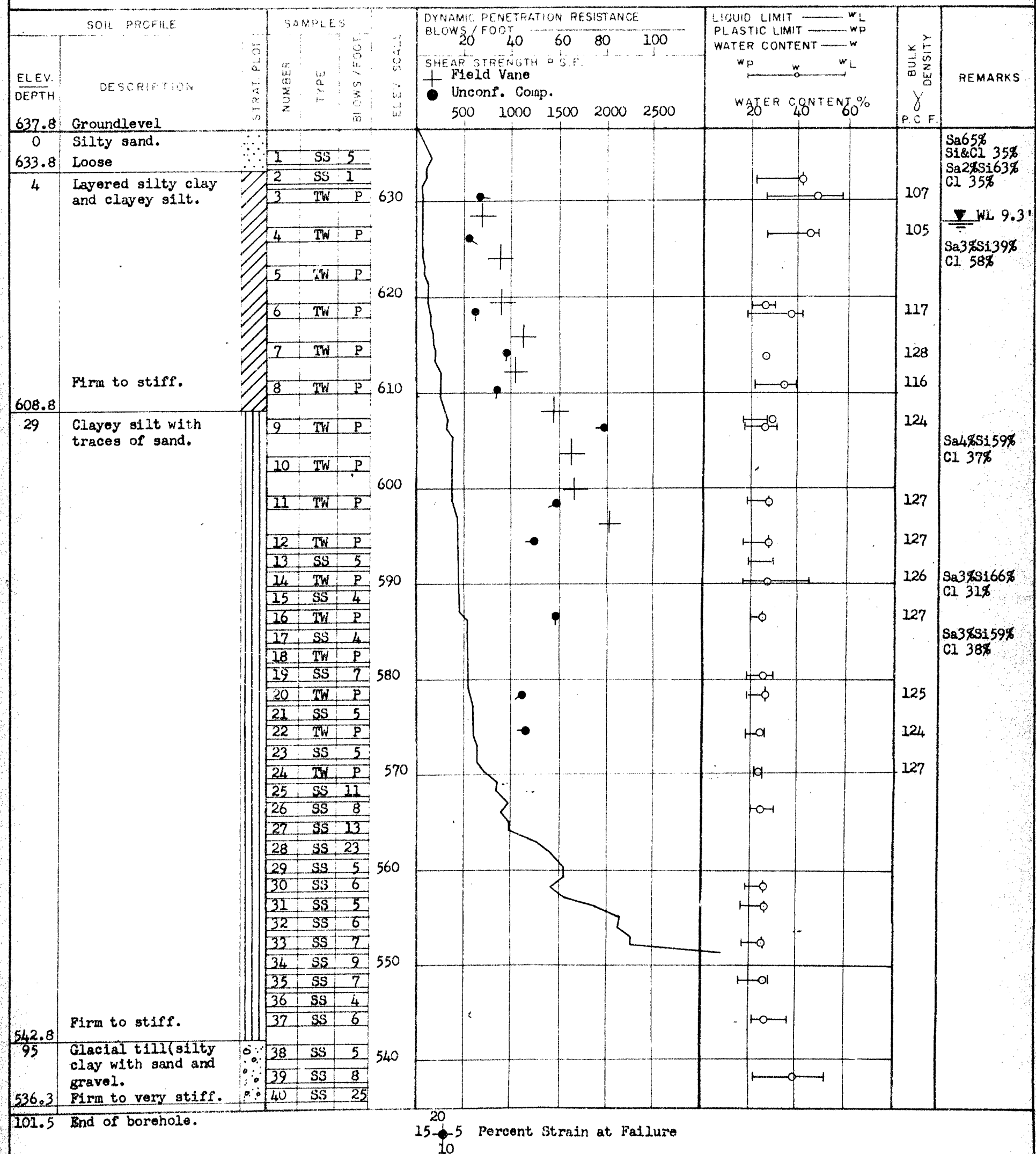
15 5 Percent Strain at Failure  
10

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

## RECORD OF BOREHOLE NO. 4

FOUNDATION SECTION

JOB 64-F-69 LOCATION Sta. 98+08 13' Rt. ORIGINATED BY F.N.  
W.P. 917-64 & 918-64 BORING DATE March 3, 1964. COMPILED BY R.M.  
DATUM 637.8 BOREHOLE TYPE Washboring & Cone Penetration. CHECKED BY M.D.







DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

## RECORD OF BOREHOLE NO. 7

FOUNDATION SECTION

JOB 64-F-69

LOCATION Sta. 101/23 15' Rt.

ORIGINATED BY Golder &amp; Assoc.

W.P. 917-64 &amp; 918-64

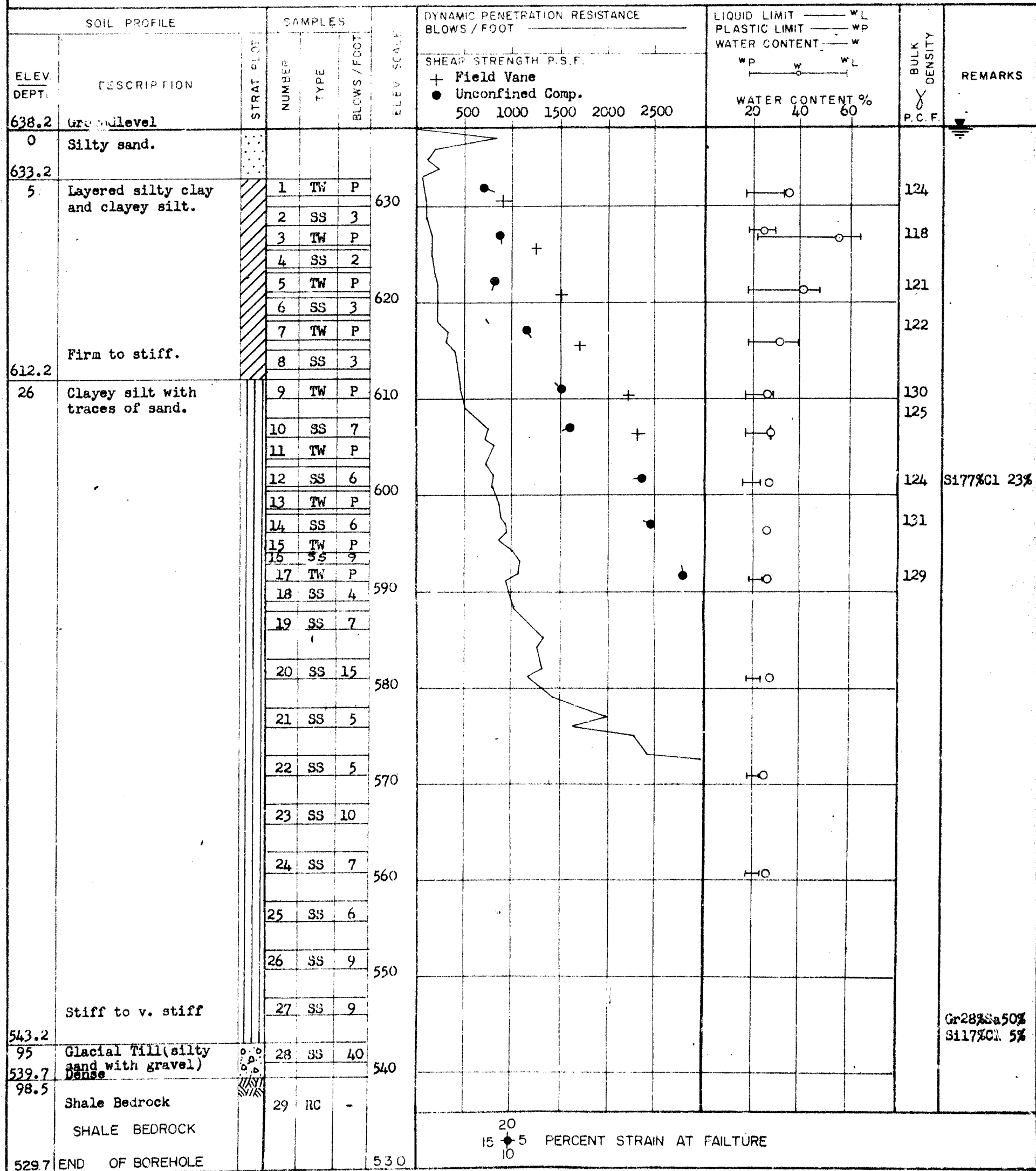
BORING DATE Mar. 22, 1962.

COMPILED BY Golder &amp; Assoc.

DATUM 638.2

BOREHOLE TYPE Washboring

CHECKED BY



DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

## RECORD OF BOREHOLE NO.

8

FOUNDATION SECTION

JOB 64-F-69

LOCATION Sta. 105+70 E

ORIGINATED BY Golder & Assoc.

W. P. 917-64 & 918-64

BORING DATE Mar. 27, 1962.

COMPILED BY Golder & Assoc.

DATUM 637.9

BOREHOLE TYPE Washboring.

CHECKED BY \_\_\_\_\_

[illegible]

# UNIFIED SOIL CLASSIFICATION SYSTEM

Clay & Silt

Sand

Gravel

Fine

Medium

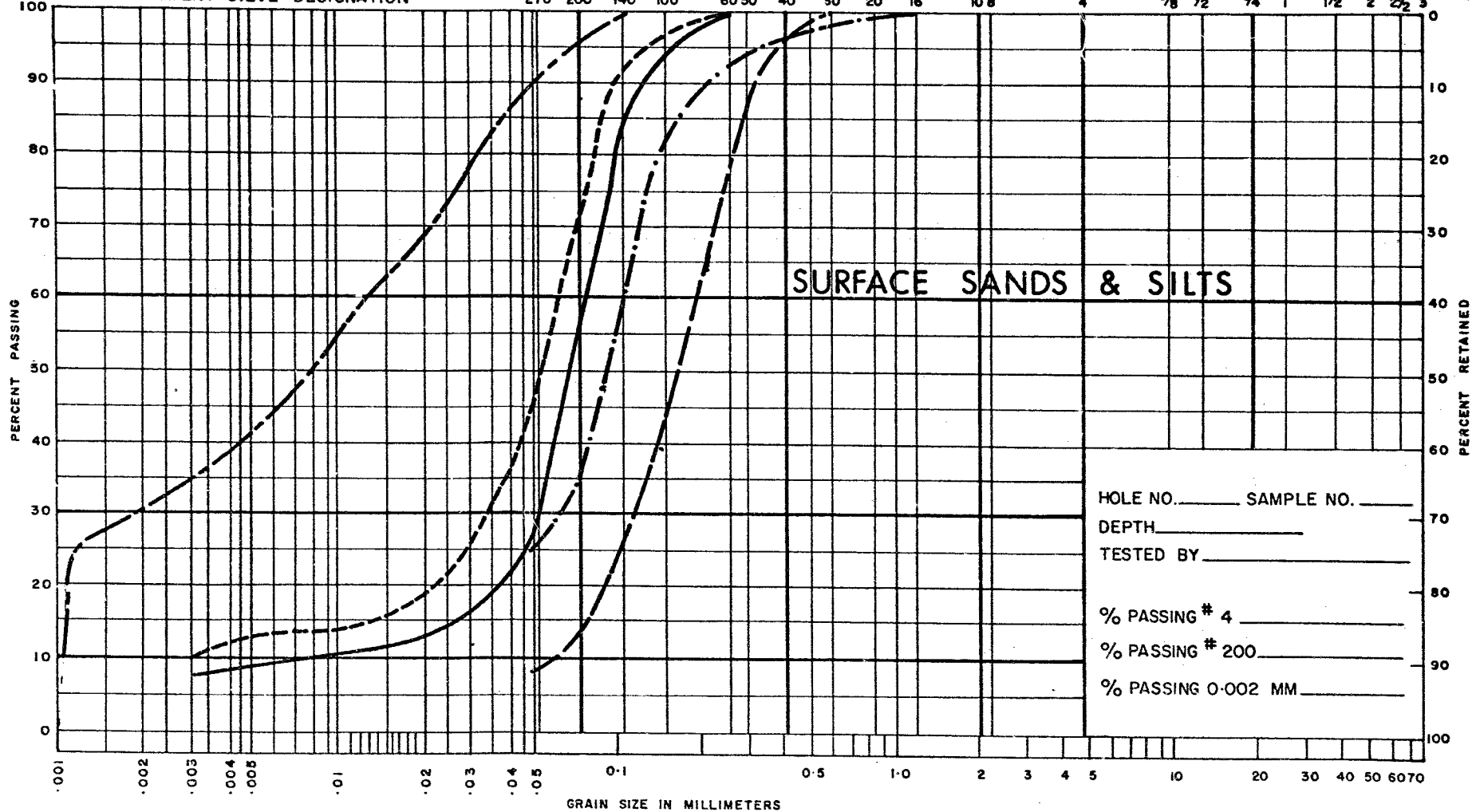
Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION

270 200 140 100 60 50 40 30 20 16 10.8 4 3/8" 1/2" 3/4" 1" 1 1/2" 2" 2 1/2" 3"



HOLE NO. \_\_\_\_\_ SAMPLE NO. \_\_\_\_\_  
 DEPTH \_\_\_\_\_  
 TESTED BY \_\_\_\_\_  
 % PASSING # 4 \_\_\_\_\_  
 % PASSING # 200 \_\_\_\_\_  
 % PASSING 0.002 MM \_\_\_\_\_

NOTES B.H. N°1, SA. 1 \_\_\_\_\_  
 B.H. N°1, SA. 2 \_\_\_\_\_  
 B.H. N°1, SA. 4 \_\_\_\_\_  
 B.H. N°3, SA. 2 \_\_\_\_\_  
 B.H. N°4, SA. 1 \_\_\_\_\_

DEPARTMENT OF HIGHWAYS — ONTARIO  
 MATERIALS & TESTING DIVISION  
 GRAIN SIZE DISTRIBUTION

JOB NO. 64 - F - 69 W.P. NO. 917 - 64, 918 - 64  
 LOCATION ROSSLYN RD. - C.P.R. & LAKEHEAD EXP'Y.



# UNIFIED SOIL CLASSIFICATION SYSTEM

Clay & Silt

Sand

Gravel

Fine

Medium

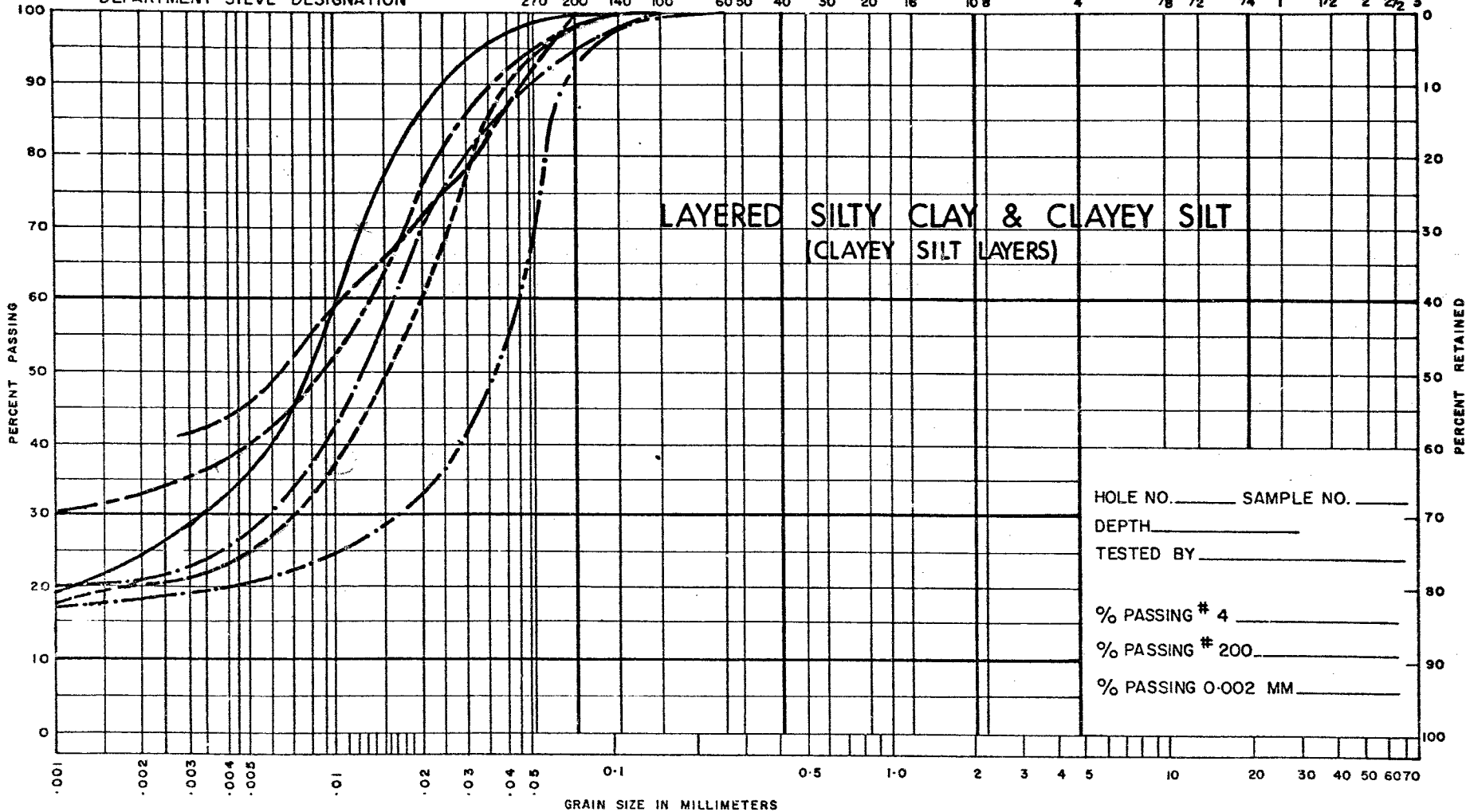
Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION

270 200 140 100 60 50 40 30 20 16 10 8 4 3/8 1/2 3/4 1 1 1/2 2 2 1/2 3



HOLE NO. \_\_\_\_\_ SAMPLE NO. \_\_\_\_\_

DEPTH \_\_\_\_\_

TESTED BY \_\_\_\_\_

% PASSING # 4 \_\_\_\_\_

% PASSING # 200 \_\_\_\_\_

% PASSING 0-002 MM \_\_\_\_\_

NOTES B. H. N° 3, SA. 4 \_\_\_\_\_ B. H. N° 8, SA. 9 \_\_\_\_\_

B. H. N° 7, SA. 3 \_\_\_\_\_

B. H. N° 7, SA. 5 \_\_\_\_\_

B. H. N° 8, SA. 1 \_\_\_\_\_

B. H. N° 8, SA. 3 \_\_\_\_\_

DEPARTMENT OF HIGHWAYS — ONTARIO  
MATERIALS & TESTING DIVISION  
GRAIN SIZE DISTRIBUTION

JOB NO. 64 - F - 69 W. P. NO. 917 - 64, 918 - 64

LOCATION ROSSLYN RD. - C. P. R. & LAKEHEAD EXP'Y.

# UNIFIED SOIL CLASSIFICATION SYSTEM

Clay & Silt

Sand

Gravel

Fine

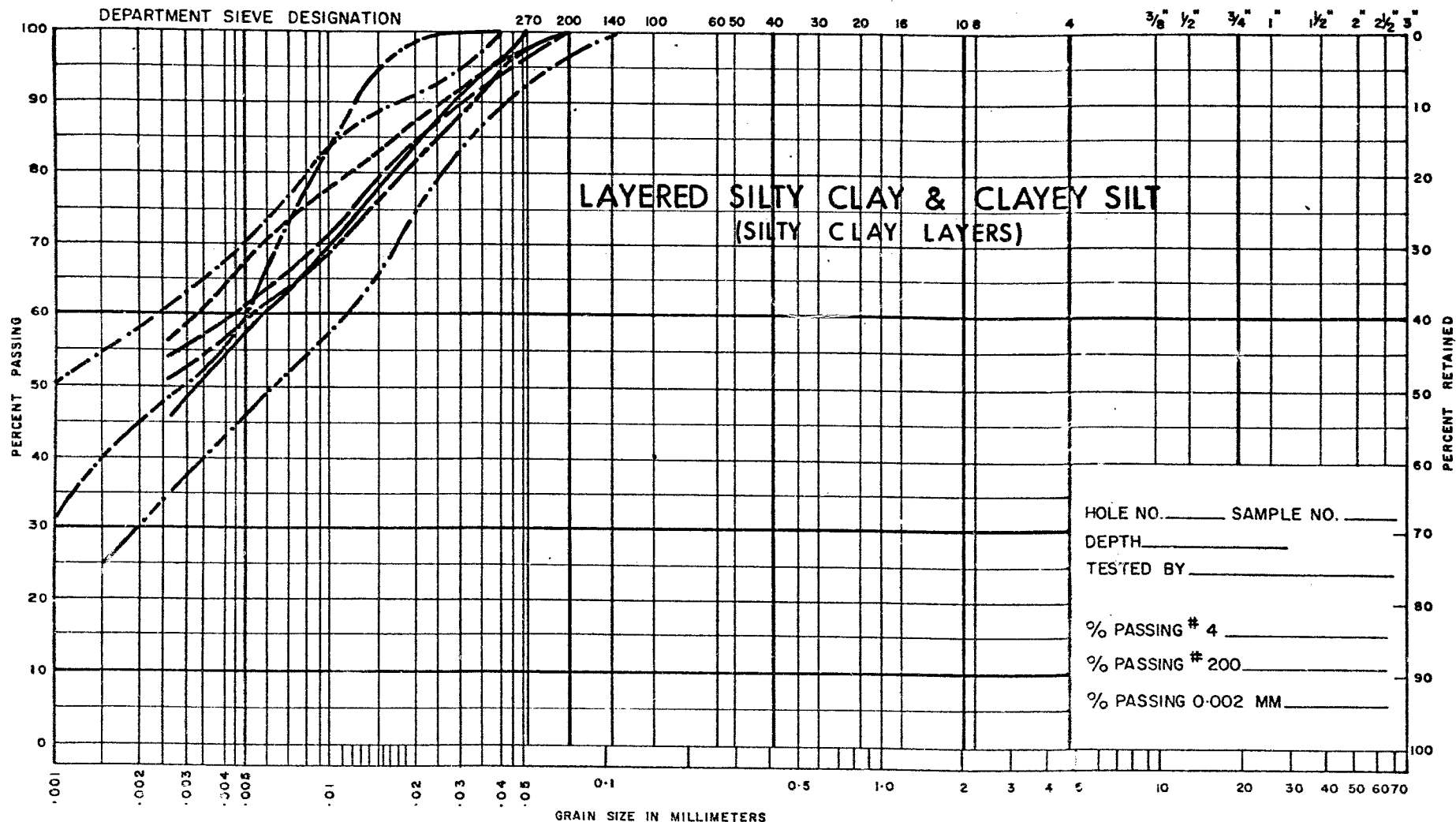
Medium

Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION



NOTES B.H. N° 1, SA. 7 ————— B.H. N° 7, SA. 5 - - - - -  
B.H. N° 1, SA. 10 - - - - - B.H. N° 7, SA. 7 - - - - -  
B.H. N° 3 SA. 7 ————— B.H. N° 8, SA. 9 - - - - -  
B.H. N° 4 SA. 5 —————  
B.H. N° 7 SA. 3 —————

DEPARTMENT OF HIGHWAYS — ONTARIO  
MATERIALS & TESTING DIVISION  
GRAIN SIZE DISTRIBUTION

JOB NO. 64 - F - 69 W.P. NO. 917 - 64, 918-64  
LOCATION ROSSLYN RD. - C.P.R. & LAKEHEAD EXP'Y.

# UNIFIED SOIL CLASSIFICATION SYSTEM

Clay & Silt

Sand

Gravel

Fine

Medium

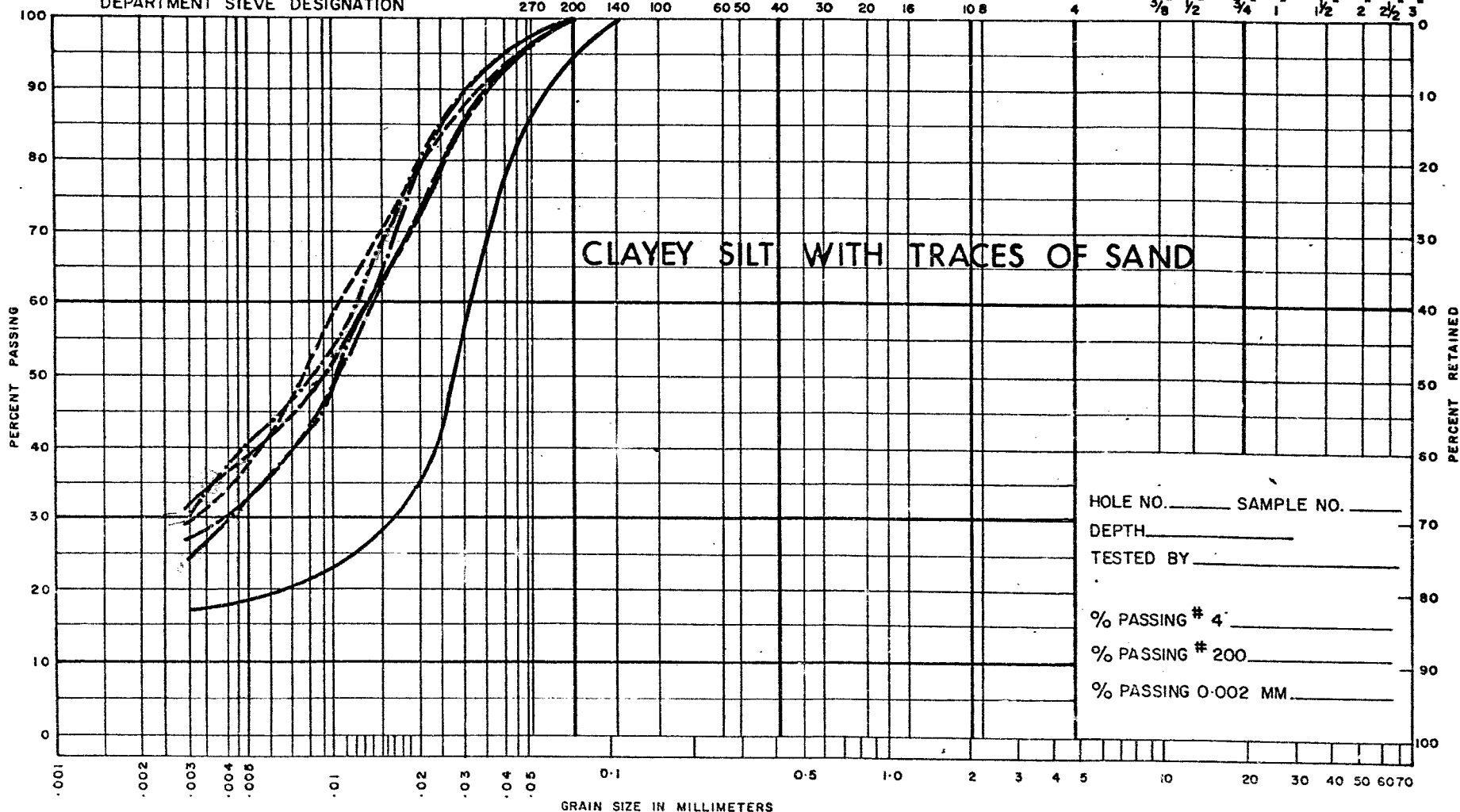
Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION

270 200 140 100 60 50 40 30 20 16 10 8 4 3/8 1/2 3/4 1 1 1/2 2 2 1/2 3



NOTES B.H. N°1, SA. 19 ————— B.H. N°4, SA. 18 - - - - -  
 B.H. N°1, SA. 31 - - - - -  
 B.H. N°1, SA. 33 —————  
 B.H. N°4, SA. 10 ——— - -  
 B.H. N°4, SA. 15 ——— - -

DEPARTMENT OF HIGHWAYS — ONTARIO  
 MATERIALS & TESTING DIVISION  
 GRAIN SIZE DISTRIBUTION

JOB NO. 64-F-69 W.P. NO. 917-64, 918-64  
 LOCATION ROSSLYN RD.-C.P.R. & LAKEHEAD EXP'Y.

## UNIFIED SOIL CLASSIFICATION SYSTEM

Clay &amp; Silt

Sand

Gravel

Fine

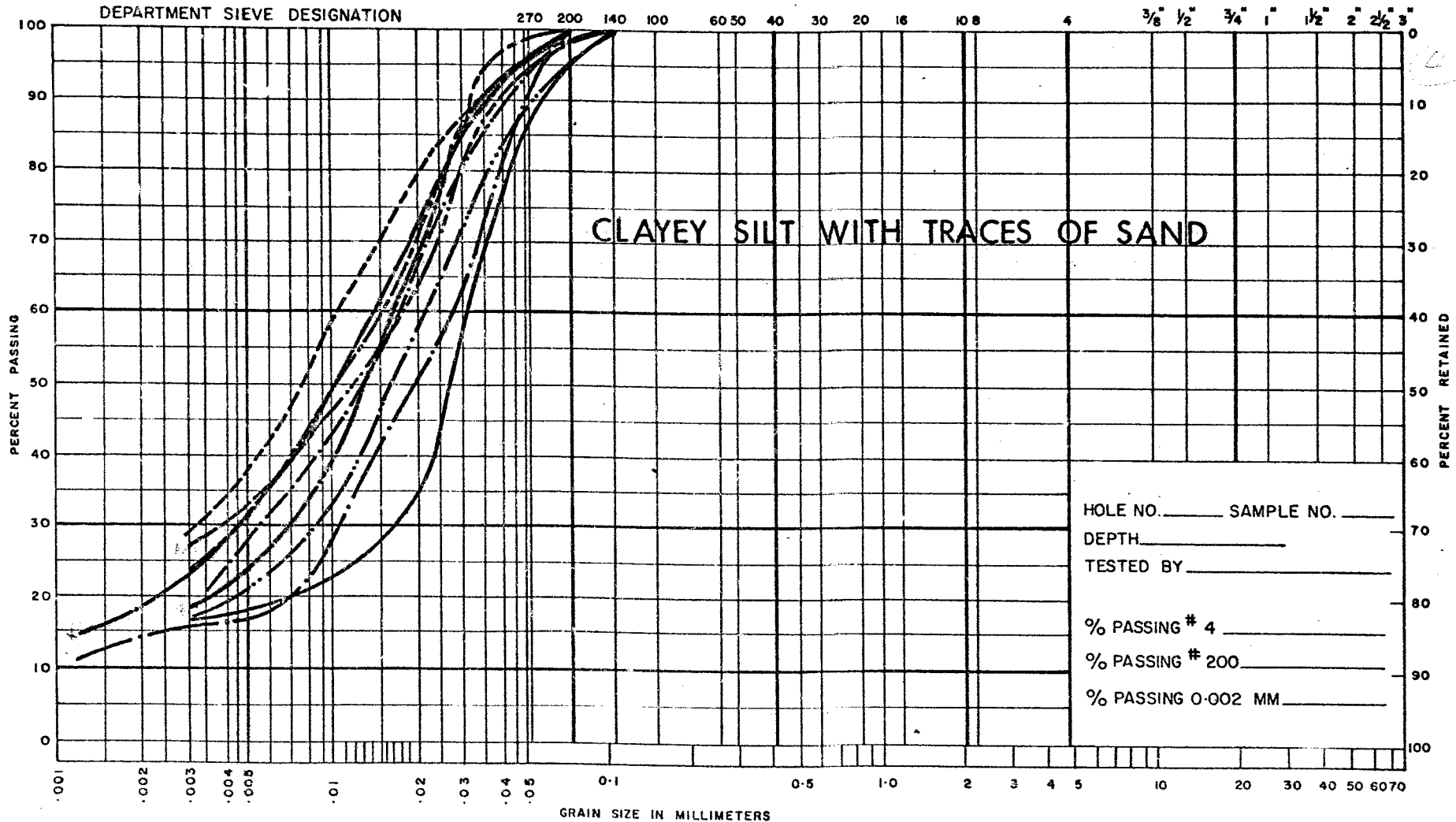
Medium

Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION



HOLE NO. \_\_\_\_\_ SAMPLE NO. \_\_\_\_\_

DEPTH \_\_\_\_\_

TESTED BY \_\_\_\_\_

% PASSING # 4 \_\_\_\_\_

% PASSING # 200 \_\_\_\_\_

% PASSING 0.002 MM \_\_\_\_\_

NOTES B.H. N° 1, SA. 19 \_\_\_\_\_ B.H. N° 3, SA. 29 \_\_\_\_\_

B.H. N° 1, SA. 31 \_\_\_\_\_ B.H. N° 3, SA. 31 \_\_\_\_\_

B.H. N° 1, SA. 33 \_\_\_\_\_ B.H. N° 3, SA. 35 \_\_\_\_\_

B.H. N° 3, SA. 17 \_\_\_\_\_ B.H. N° 3, SA. 36 \_\_\_\_\_

B.H. N° 3, SA. 22 \_\_\_\_\_

DEPARTMENT OF HIGHWAYS — ONTARIO

MATERIALS &amp; TESTING DIVISION

## GRAIN SIZE DISTRIBUTION

JOB NO. 64-F-69 W.P. NO. 917-64, 918-64

LOCATION ROSSLYN RD. - C.P.R. &amp; LAKEHEAD EXP'Y.

## UNIFIED SOIL CLASSIFICATION SYSTEM

Clay &amp; Silt

Sand

Gravel

Fine

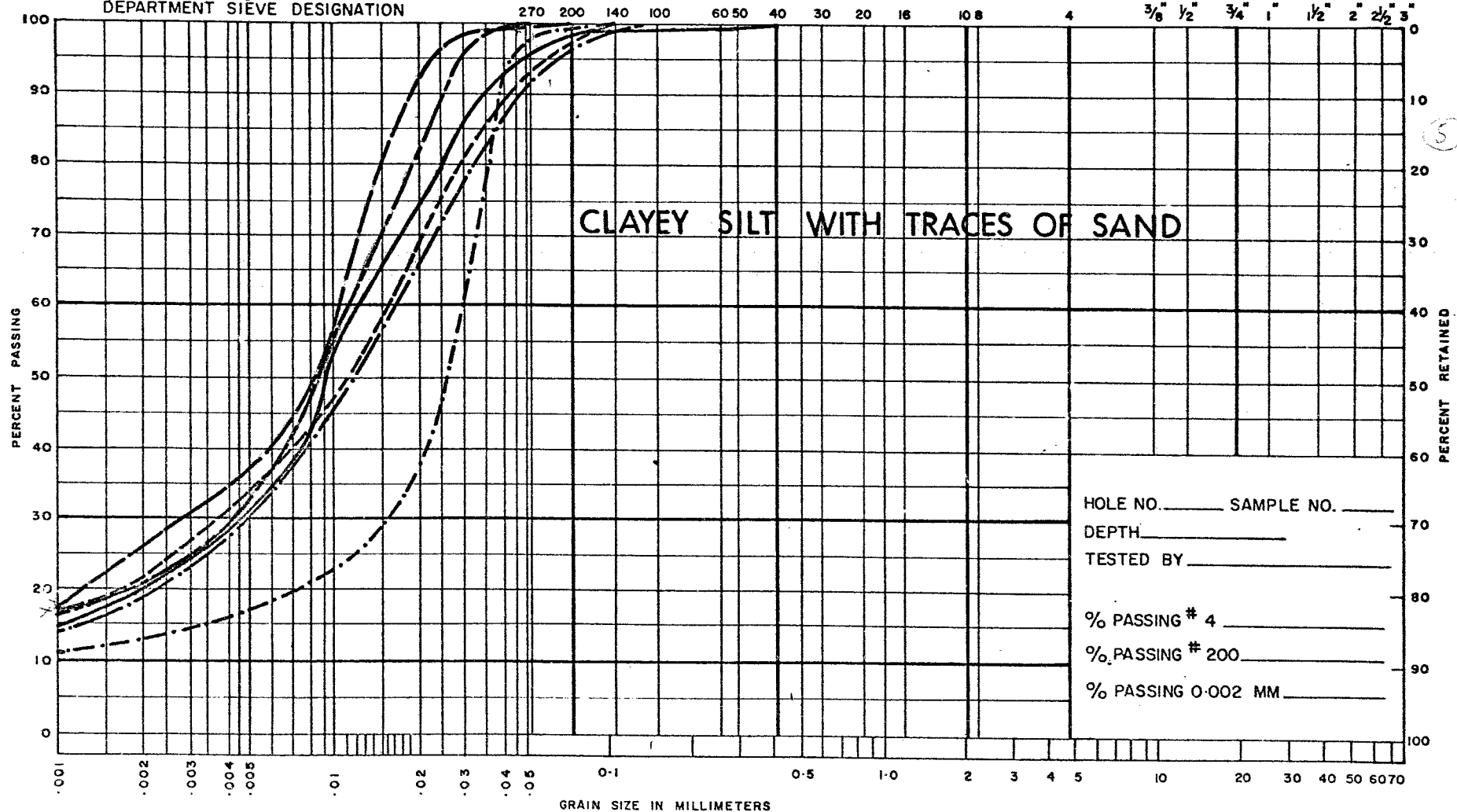
Medium

Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION



NOTES B.H. N° 7, SA. 13 ————— B.H. N° 8, SA. 19 - - - - -

B.H. N° 8, SA. 10 - - - - -

B.H. N° 8, SA. 12 —————

B.H. N° 8, SA. 13 —————

B.H. N° 8, SA. 17 —————

DEPARTMENT OF HIGHWAYS -- ONTARIO  
MATERIALS & TESTING DIVISION

## GRAIN SIZE DISTRIBUTION

JOB NO. 64-F-69 W.P. NO. 917-64, 918-64

LOCATION ROSSLYN RD - C.P.R. &amp; LAKEHEAD EXP'Y

# UNIFIED SOIL CLASSIFICATION SYSTEM

Clay & Silt

Sand

Gravel

Fine

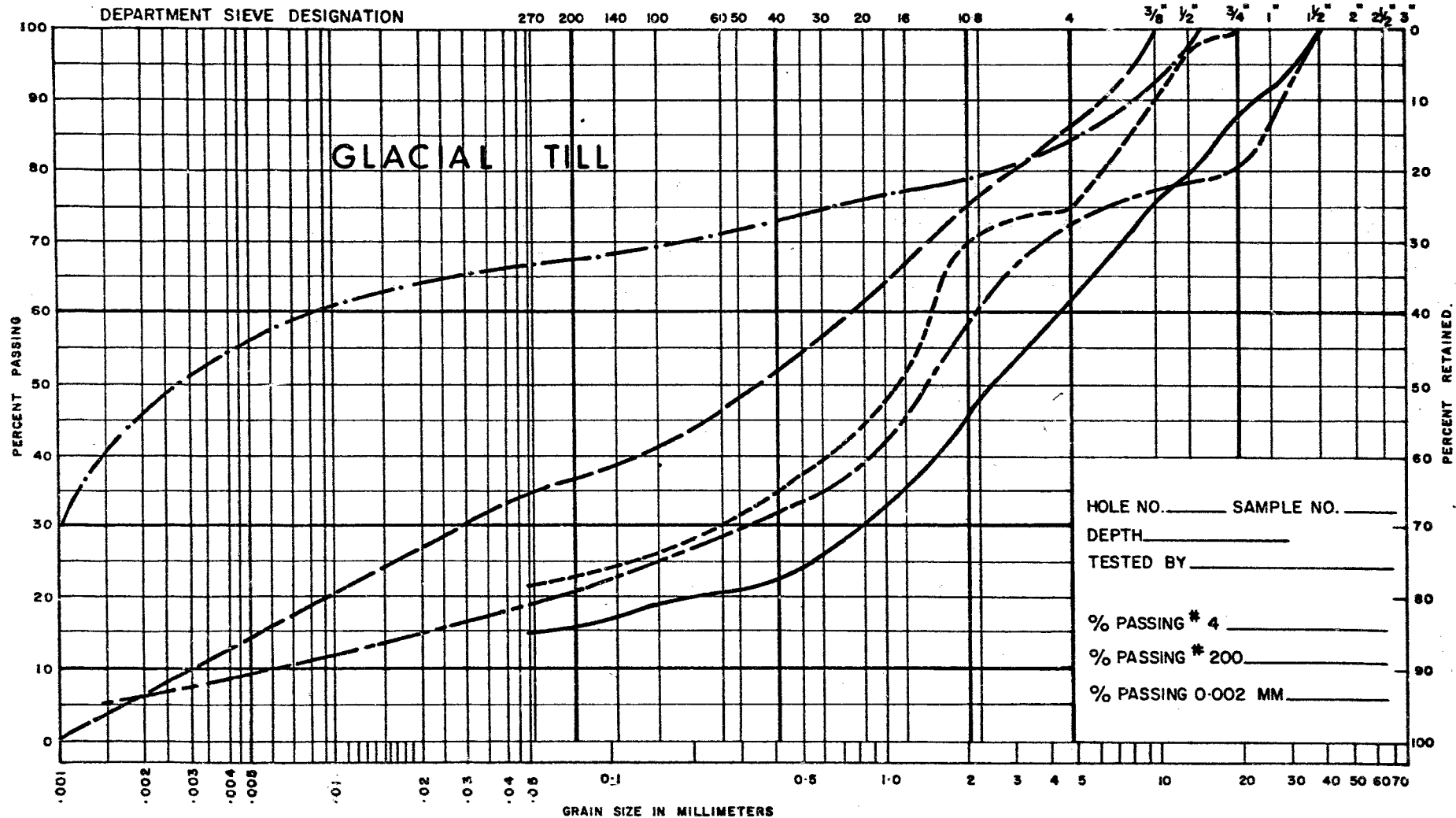
Medium

Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION



NOTES

B.H. N° 1, SA. 46 \_\_\_\_\_

B.H. N° 3, SA. 41 \_\_\_\_\_

B.H. N° 3, SA. 42 \_\_\_\_\_

B.H. N° 7, SA. 28 \_\_\_\_\_

B.H. N° 8, SA. 23 \_\_\_\_\_

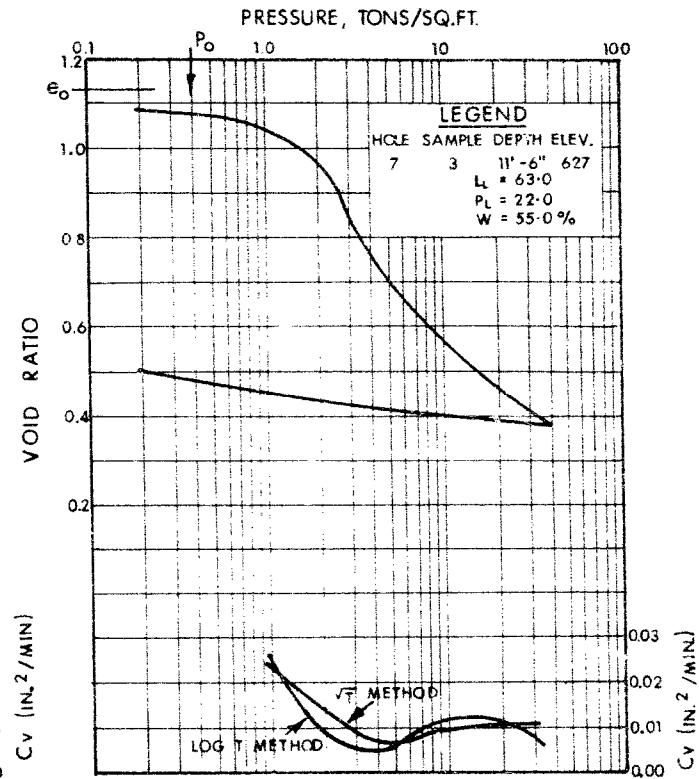
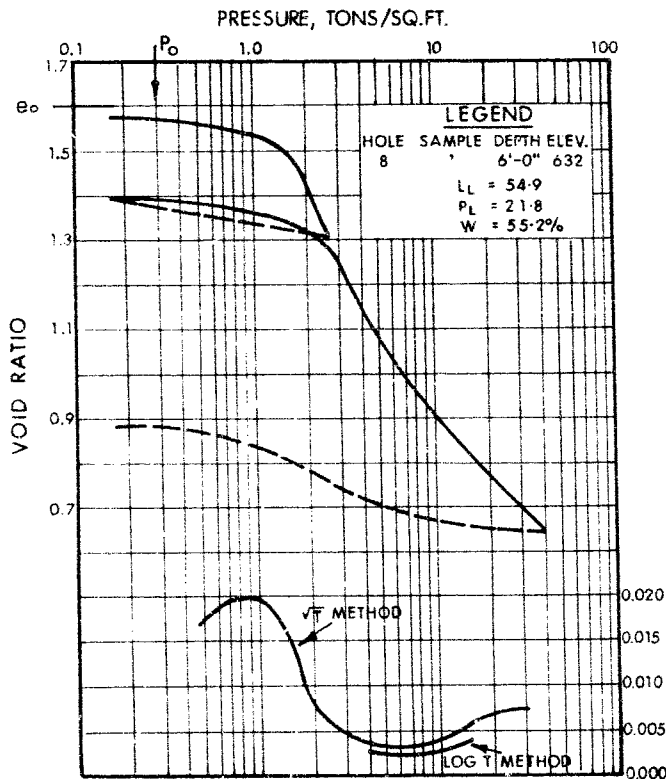
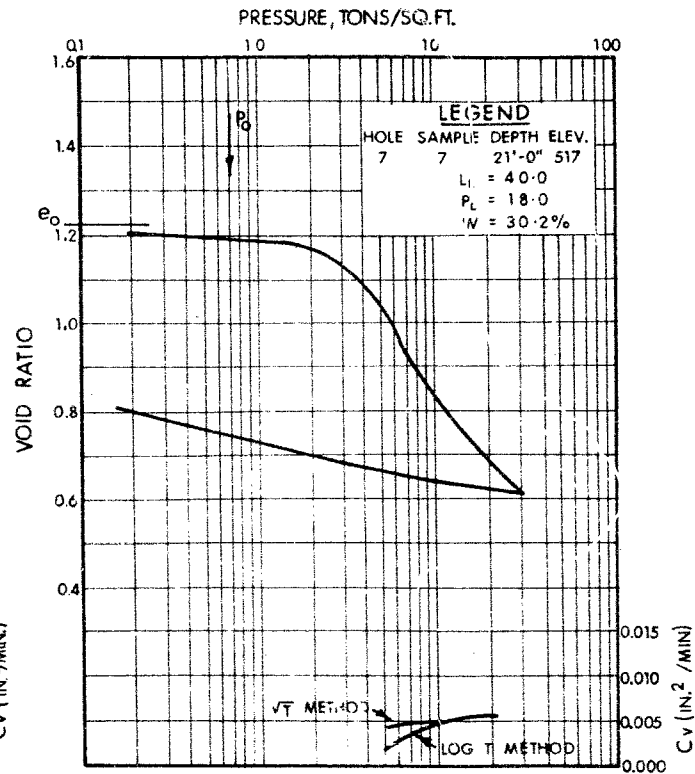
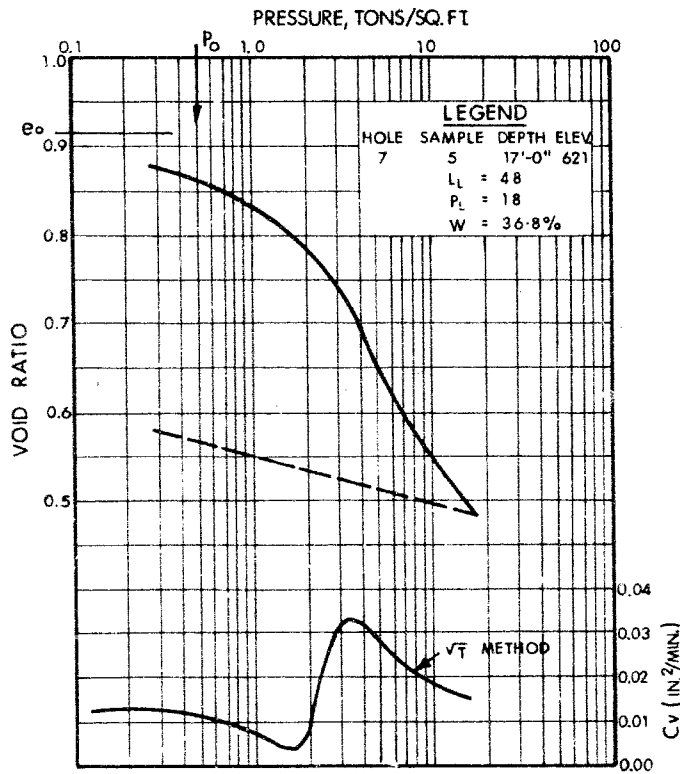
DEPARTMENT OF HIGHWAYS — ONTARIO  
MATERIALS & TESTING DIVISION  
**GRAIN SIZE DISTRIBUTION**

JOB NO. 64-F-69 W.P. NO. 917-64, 918-64

LOCATION ROSSLYN RD. - C.P.R. & LAKEHEAD EXP'Y.

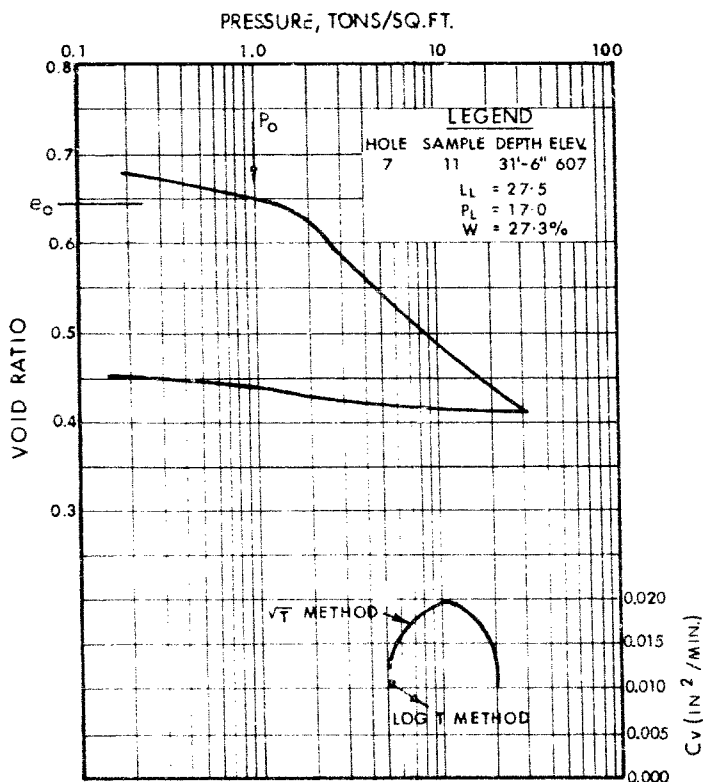
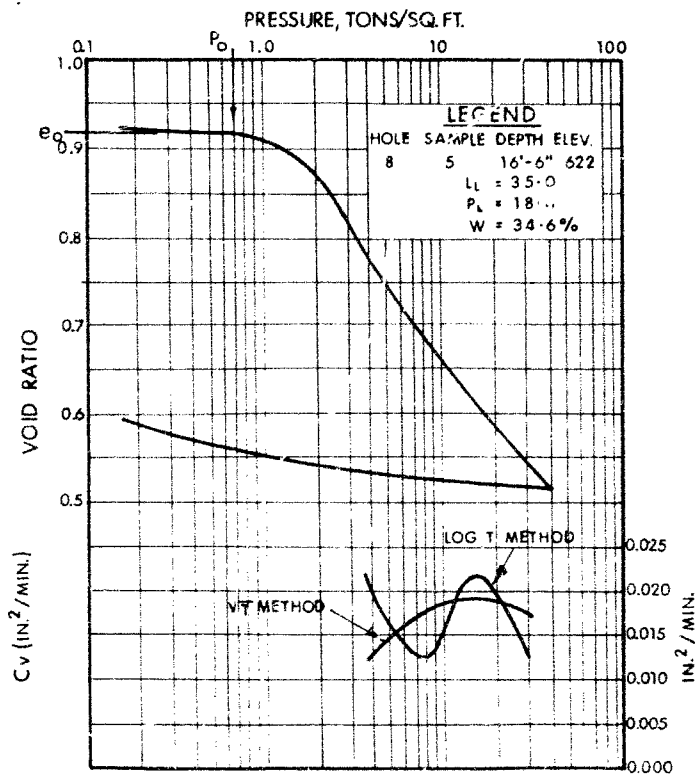
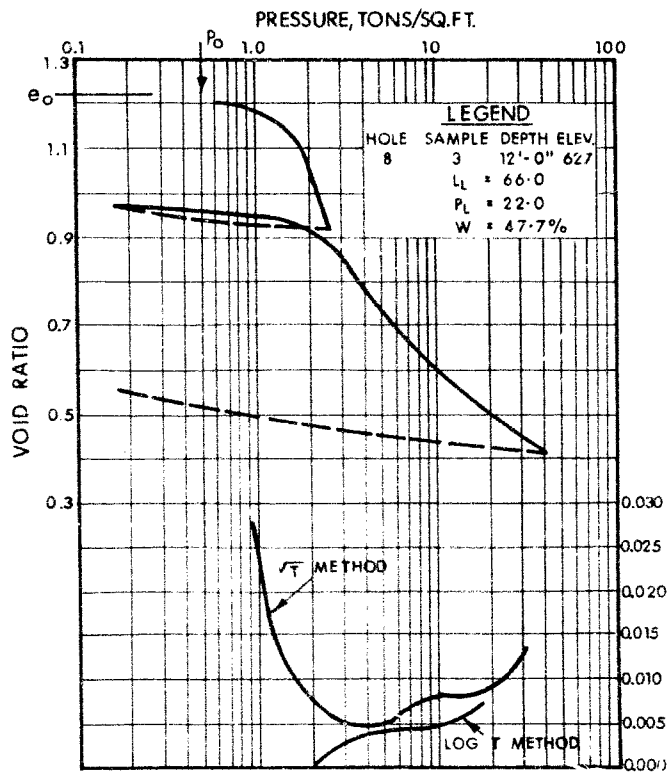
# VOID RATIO - PRESSURE CURVES

JOB N° 64-F-69

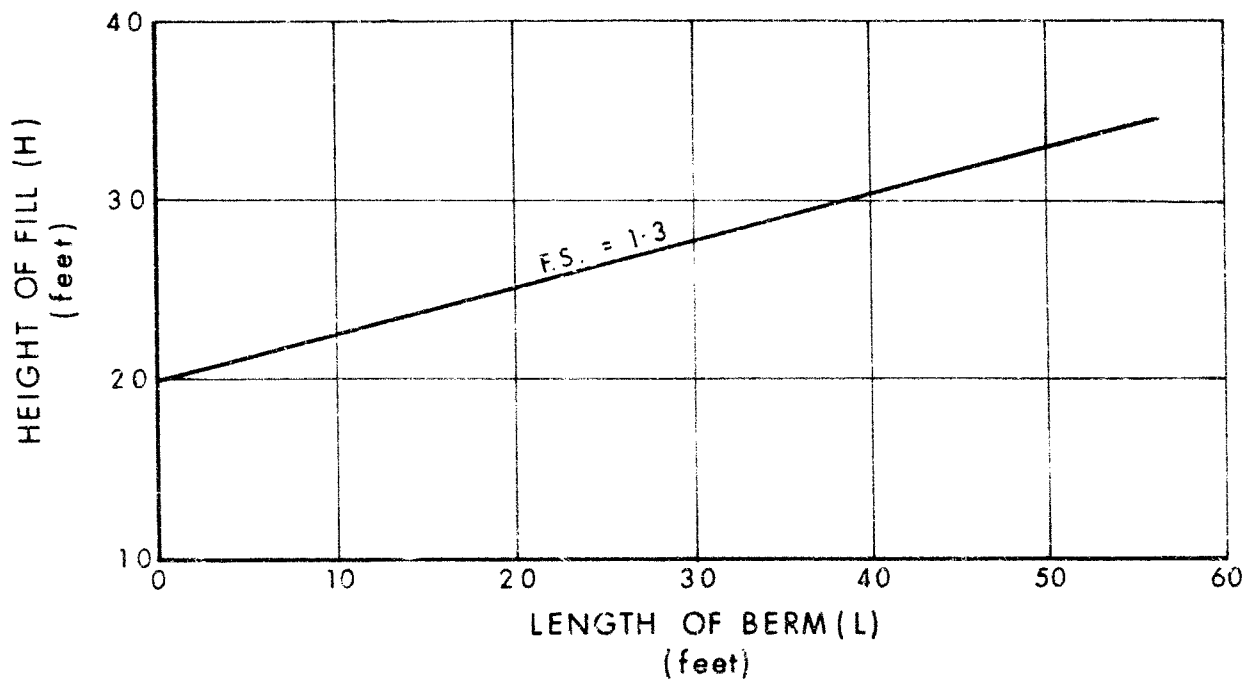
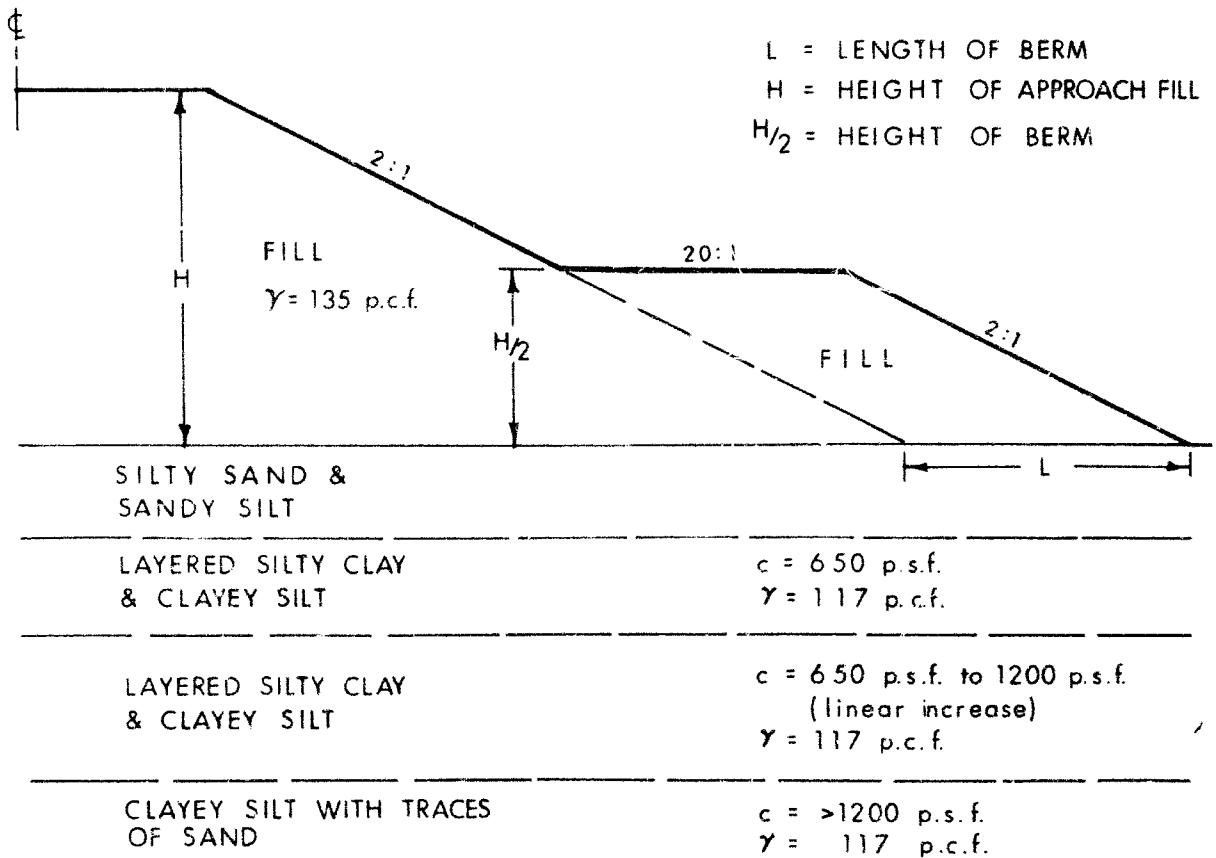


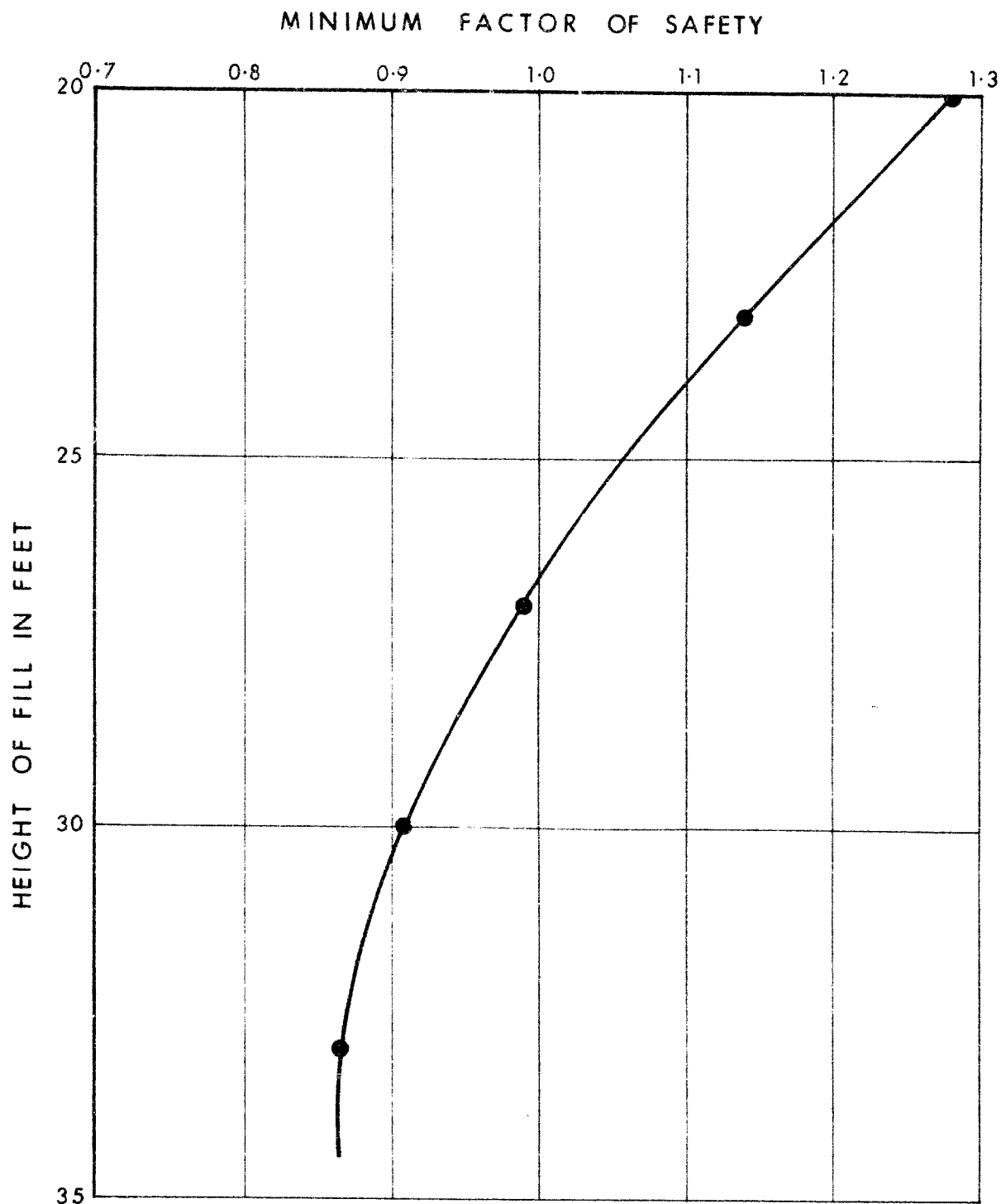
# VOID RATIO - PRESSURE CURVES

JOB N° 64-F-69

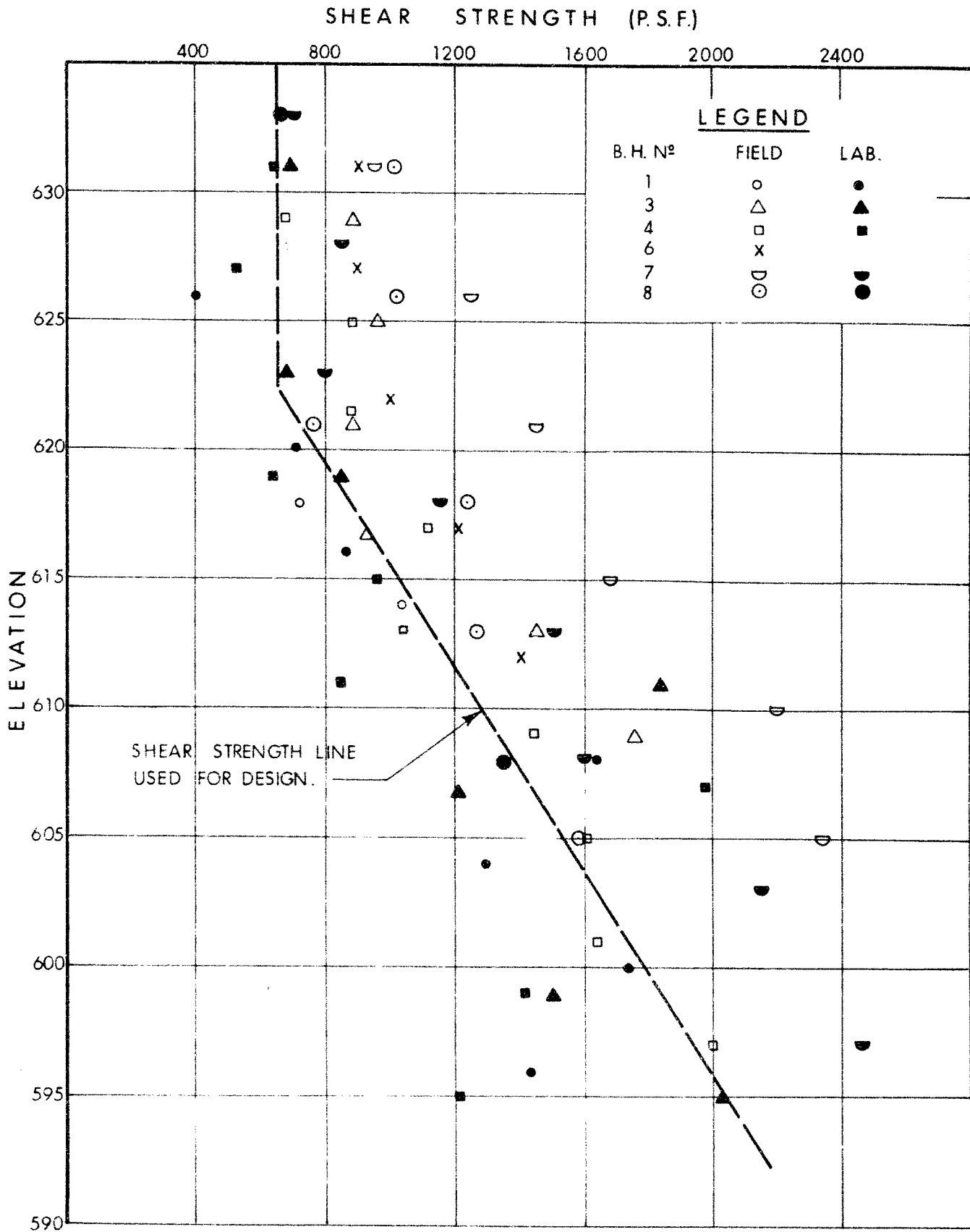


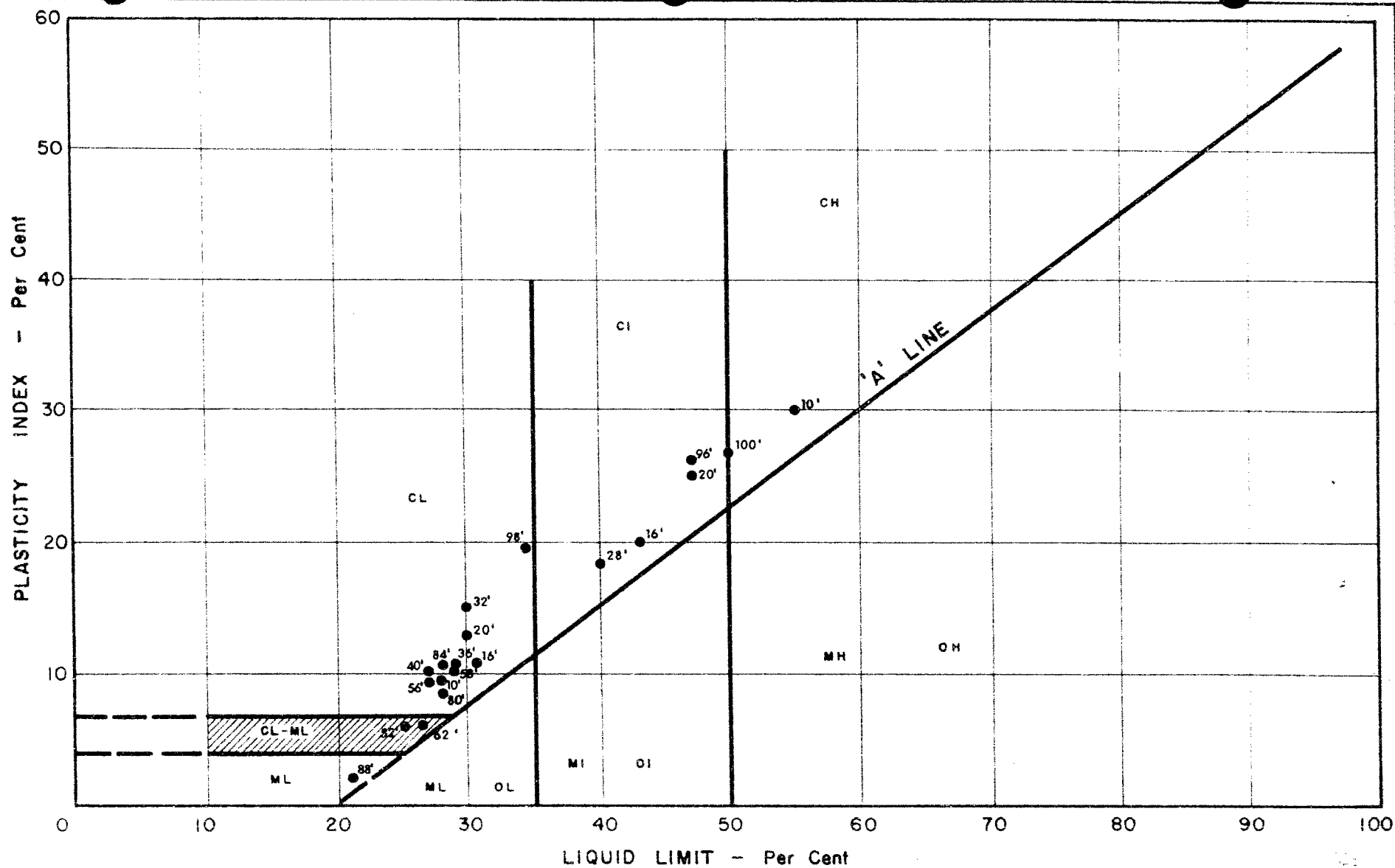






MINIMUM FACTOR OF SAFETY vs HEIGHT OF FILL  
(WITHOUT BERMS)





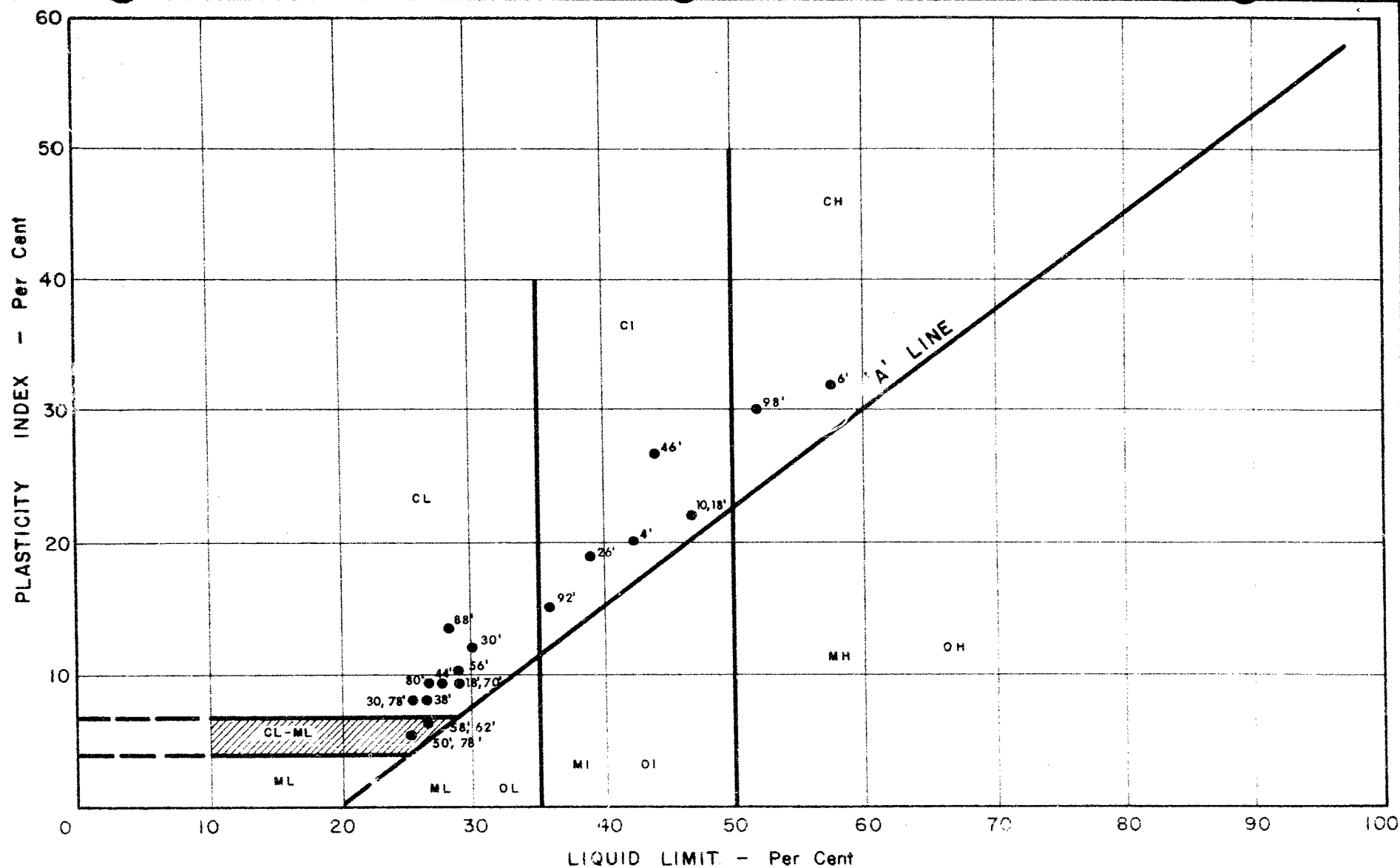
NOTES • - B.H. No. 1

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION  
PLASTICITY CHART

Job No. 64-F-69 W.P. No. 917-64, 918-64  
Location ROSSLYN RD. - C.P.R. & LAKEHEAD EXP'Y.

[illegible]

Job No. 64 - F - 69 W.P. No. 917-64, 918-64  
Location ROSSLYN RD.-CPR & LAKEHEAD EX'Y.



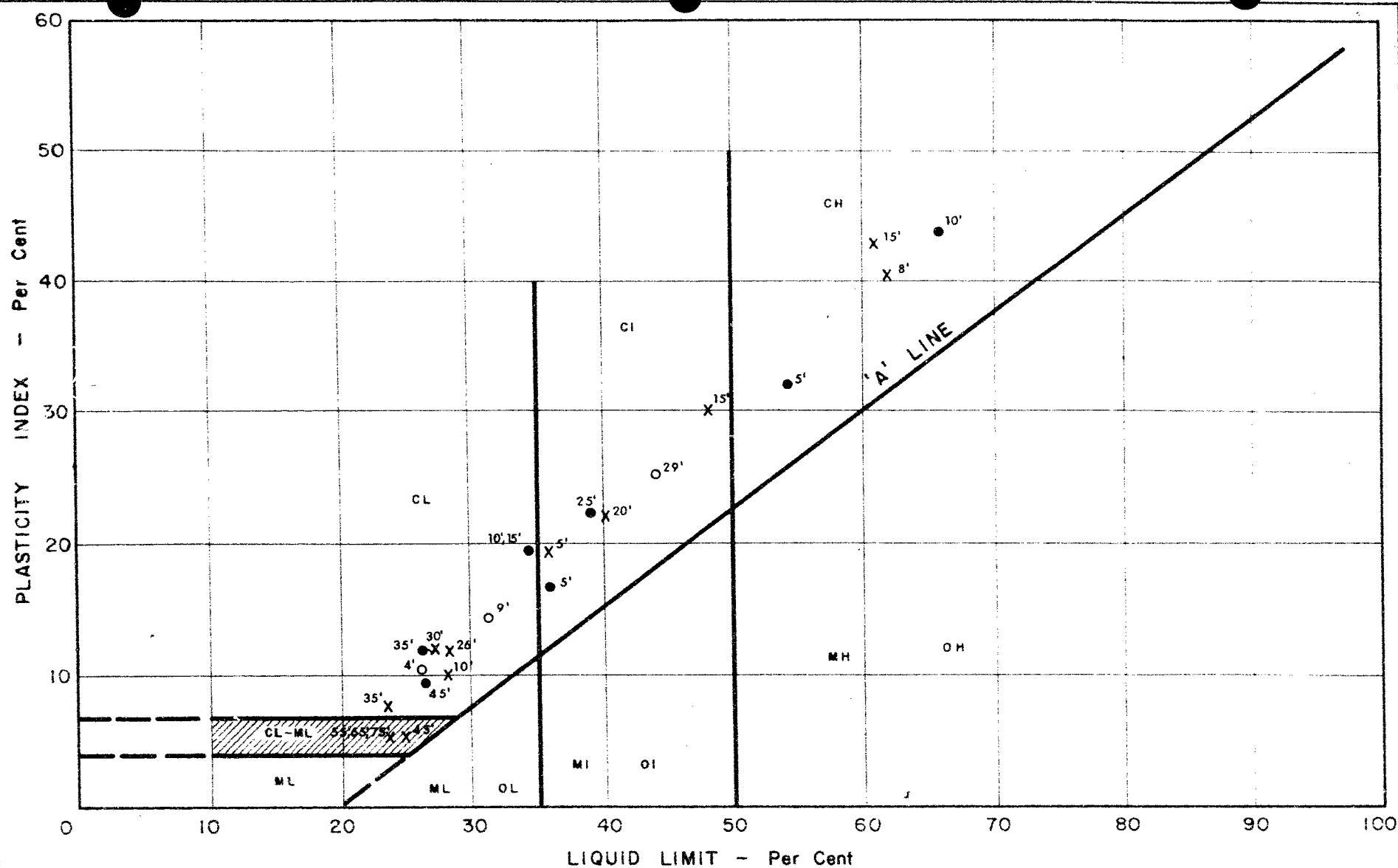
NOTES • - B.H. No 4

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & RESEARCH DIVISION

### PLASTICITY CHART

Job No. 64-F-69 W.P. No. 917-64, 918-64

Location ROSSLYN RD. - C.P.R. & LAKEHEAD EXP'Y.



NOTES

- - B. H. No. 6
- × - B. H. No. 7
- - B. H. No. 8

DEPARTMENT OF HIGHWAYS - ONTARIO  
 MATERIALS & RESEARCH DIVISION  
 PLASTICITY CHART

Job No. 64-F-69 W.P. No. 917-64, 918-64

Location ROSSLYN ROAD-C.P.R. & LAKEHEAD EXP'Y

## ABBREVIATIONS USED IN THIS REPORT

### PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - 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>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

### TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H.	SAMPLE ADVANCED HYDRAULICALLY	
	P.M.	SAMPLE ADVANCED MANUALLY	

### SOIL TESTS

Q <sub>u</sub>	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Q <sub>cu</sub>	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q <sub>d</sub>	DRAINED TRIAXIAL	S	SENSITIVITY



# ABBREVIATIONS 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
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
	IN TERMS OF EFFECTIVE STRESS $\tau_f = c' + \sigma' \tan \phi'$
$c_u$	APPARENT COHESION
$\phi_u$	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF TOTAL STRESS $\tau_f = c_u + \sigma \tan \phi$
$\mu$	COEFFICIENT OF FRICTION
$S_t$	SENSITIVITY

## GENERAL

$\pi$	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a 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

Mr. S. McCombie,  
Bridge Planning Engr.,  
Bridge Division.

Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

February 12, 1965

Rosslyn Road and C.P.R.  
Lakehead Expressway  
W.P. 917-64; W.P. 918-64  
District No. 19

With regard to the discussion we had in connection with the above project, we would like to submit the following suggestions for your consideration:

According to the results of the subsoil investigations carried out at the site, berms are required for embankments exceeding 20 feet in height. This recommendation incorporates a factor of safety of 1.3 considered to be reasonable for this particular case. Due to the necessity to have berms in both the lateral and longitudinal directions, single-span structures are ruled out. (Our report is not too clear in this respect)

The embankment is highest at the C.P.R. crossing, the height being 33 ft. This will require berms approx. 45 ft. long, adding about 90 ft. to the length of the bridge.

We understand that stage construction is contemplated at this site, meaning that the embankments will be built first and the structures at a later date. In connection with this construction schedule, we would like to propose that a portion of the fill south of Rosslyn Road or north of the C.P.R. crossing be built to a height of 33 feet without berming. This would provide some important information about soil behaviour and could lead to a reduction in berm lengths, resulting in considerable savings.

Two important facts should be borne in mind when consideration is given to this proposal:

1) The stability calculations have been carried out by neglecting the strength of the embankment fill material. This was done because of the incompatibility of failure strains of the fill and subsoil materials. Whether this limitation is warranted or not, nobody knows yet. Very likely, each case should be considered separately. However, a field test could provide some information on whether this assumption is justified in this particular case.

cont'd. /2 ...

February 12, 1965

2) The existing C.N.R. embankment to the east of the proposed alignment shows no signs of failure and a one-span closed-end abutment structure is built over the two C.P.R. tracks. The embankment is about 26 feet high. According to our calculations (which could be on the conservative side due to the fact mentioned under 1.), the factor of safety should be around one. Obviously, it is in excess of one because the fill is there.

The above reasoning is not strictly correct because the subsoil properties could have improved during the relatively long construction period, making the structure safer than it would be if the construction had been as rapid as it is nowadays.

If failure would occur, it would be in the lateral direction, at a safe distance from where it could do any damage. Some instrumentation would be carried out to enable a more rational interpretation of results.

It would be appreciated if immediate attention is given to this proposal so, if accepted, the necessary details could be worked out.

AGS/MdeF

*Altarmac*  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGINEER

cc: Foundations Office  
Gen. Files

TELETYPE

DOWN FTWR 5 APRIL 6/65 1110A PRIORITY

M DEVATA SR FOUNDATIONS ENGR MAT AND TESTING

THE FOLLOWING IS INFORMATION ON THE TWO STRUCTURES YOU REQUESTED  
APRIL 1/65

"CNR ROSSLYN ROAD" 3 SPAN STEEL GIRDERS SIMPLY SUPPORTED ON EACH  
SPAN. 2 IDENTICAL CONCRETE PIERS. ABUTMENTS SUPPORTED ON TIMBER  
JOISTS OVER TIMBER PILE BENTS DRIVEN THROUGH FILL TO A TOTAL DEPTH OF  
60 FT. ROSSLYN ROAD ELEVATION 639.0'. CNR BASE OF TRACK ELEVATION  
666.30'. STRUCTURE IS OF OPEN ABUTMENT TYPE. APPROACH FILLS ABOUT  
28 FEET HIGH WITH ESTIMATED SLOPES OF 1 1/2 TO 1. BRIDGE SHOWS DATE  
PLATE 1931. CNR-CPR CROSSING

THIS STRUCTURE IS PRACTICALLY IDENTICAL TO CNR-ROSSLYN ROAD EXCEPT  
THAT THE BASE OF CNR TRACK ELEVATION IS 667.7' AND THE BASE OF CPR  
TRACK ELEVATION IS 640.5'

BOTH STRUCTURES LIE ON VERY FLAT AREA ABOUT 600 FEET APART

F NORMAN REG MAT ENGR

JO

64-F-69

00379

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DOWN FTWR 7 APRIL 1/65 430P. PRIORITY

RECEIVED 1 PM 4:51

M DEVATA FOUNDATIONS SECTION MAT AND TESTING

RE: WP 929-65 LAKEHEAD EXPRESSWAY

THE CROSS SECTIONS YOU REQUESTED WERE MAILED TODAY APRIL 1, 1965

F NORMAN REG MAT ENGR

JO

Hwy. 401 & Keele St.,  
Downsview, Ontario.

August 31, 1965

Materials and Testing Division

Mr. B. Chappell,  
Regional Chief Engineer,  
Rm. 460, C.N.R. Station,  
Broadway & Main,  
Winnipeg 1, Manitoba.

Dear Sir:

Re: Subway - Mile 7.69 Kashabowie Subdivision - Lakehead  
Expressway Undercrossing.

Thank you for your letter of August 26, 1965, regarding the above-mentioned structure. From the information supplied, it appears that the problems you probably still are experiencing, are due to the movement of the fill.

We were told that some problems were encountered by you at this crossing and that you have suggested that pile loading tests for our structure be carried out. We were in agreement in principle with your suggestion; however, we find it now difficult to explain what information these field tests could provide towards a better understanding of what is going on at your above-mentioned site.

As far as the bearing capacity of the piles is concerned, we are quite confident that this could be predicted reasonably satisfactorily and this problem would, therefore, not require special attention.

The reported movements at your site constitute, in our opinion, a much more serious problem. It would appear that the subsoil is stressed to such an extent that creep movements take place without causing a sudden failure. Should this be the case, the ultimate height of the approach fill becomes the governing factor.

We would appreciate having your comments concerning the above reasoning.

Yours very truly,

*A. G. Stermac*

A. G. Stermac,  
Principal Foundation Engineer

AGS/Mdef

cc: Mr. F. De Visser

Foundations Office  
Gen. Files

Mr. B. R. Davis,  
Bridge Design Engineer,  
Bridge Division.

Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

Attention: Mr. C. Grebski

April 8, 1965

Proposed Structure and Embankments at the  
Crossing of C.P.R. and Rosslyn Road with  
the Lakehead Expressway -- District No. 19.  
W.J. 64-F-69 -- W.P. 917-64 & 918-64

With reference to the discussion we had in connection with the above structure, we have again reviewed our recommendations and herewith submit the following comments for your consideration:

The existing railway fill is approximately 28 ft. high and does not show any signs of instability. However, in spite of this fact, we would recommend that berms be built as suggested in our Report 64-F-69 because the risks of failure are too great. It should be borne in mind that with the present rate of construction, the loading of the subsoil occurs much faster and the likelihood of failure becomes greater. In our opinion, the consequences resulting from a fill failure in the direction of the railway tracks could be very damaging and therefore, make the risk taking absolutely prohibitive.

AGS/MdeF

cc: Foundations Office ✓  
Gen. Files

*H. L. Sully*  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGINEER

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. Rutka,  
Materials and Research Engineer,  
Lab. Building,  
DOWNSVIEW, Ontario.

FROM: F. DeVisser,  
208 Simpson Street,  
Fort William, Ontario.

DATE: June 28, 1965.

OUR FILE REF.

IN REPLY TO

SUBJECT:

Re: C. P. R. Overhead  
2 miles east of existing Highway #61,  
L. E. W. #61, District 19

Enclosed please find one print of preliminary  
Plan D-5623-P for the subject structure.

If you have any comments, please let me  
know.

*F. De Visser per mcr.*

FDV/mcr

Enc.

F. DeVISSER,  
Regional Bridge Location Engineer.

*see provided photo on drive to bridge, to approx  
86 of 530-535 ft*

*a.g.*

*Informed Frank DeVisser*

*ON Envelope*

*July 9/65*

*918-69 - 64-5-69*



## MEMORANDUM

To: Mr. A. Rutka,  
Materials and Research Engineer,  
Lab. Building,  
Downsview, Ontario.

FROM: F. DeVisser,  
208 Simpson Street,  
Fort William, Ontario.

DATE: June 28, 1965.

OUR FILE REF.

IN REPLY TO

## SUBJECT:

Re: Rosslyn Road Overpass  
1.7 miles east of Highway 61,  
L. E. W. Highway 61, District 19.

Enclosed please find one print of preliminary  
Plan D-5622-P1 for the subject structure.

Would you please let me have your comments.

*F. De Visser per mkr*

FDV/mr

F. DeVISSER,  
Regional Bridge Location Engineer.

Enc.

*re: Periodic H files are shown to board  
(App. 86. 540.0 m)*

*Informed Frank Devissier by phone  
on 6/28/65*

*64-F-69  
917-64*

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. H.W. Russell,  
Reg. Road Design Superintendent,  
Post Office Building,  
Port Arthur

Bridge Division,  
Downsview, Ontario

February 22, 1968

Attn: Mr. R.A. Jarvis

W.P. 917-64 - Rosslyn Road Overpass  
W.P. 918-64 - C.F.R. Overhead  
District 19 - Fort William

64-F-69

Your memo of February 20, 1968, to Mr. Stoyanoff has been referred to me for reply.

I would like to point out that we intend to change the type of piling on these two jobs from prestressed concrete to steel H piles (12 BF 53). As both types of piling can carry the stated design load of 70 tons, there will not be any change in the number of piles or the total lineal feet of piling.

The reason for this change is the high bid price which we received for prestressed concrete piles on the Kan River Bridge (Contract 67-29), also some construction problems developed with the concrete piles due to the fact that rock elevations were not exactly as shown on the bridge plans.

We anticipate that the bridge plans will be revised by April 1st, 1968, to show this change.

CSG:rd

G.S. Grebaki,  
Bridge Design Engineer

c.c. K. Bassi  
M. Stoyanoff  
A. Stermac

Department of Highways Ontario

Copy for the information of

Mr. A. Rutka

Mr. V. A. Snell,  
District Engineer,  
Fort William.

F. Norman,  
Regional Materials Engineer,  
Port Arthur.

May 7, 1968.

Contract 67-99 Lakehead Expressway  
Highway 61 to Highway 17

64-1-68

You will recall that last construction season we did not complete the deep fill approaches to the Rosslyn Road and C.P.R. Overheads as scheduled. A further 6 to 10 feet remains to complete these fills. The design calls for a 12-month settlement period after completion of the fills, since the underlying soils are compressible and a settlement of up to 24 inches is expected after 12 months.

You asked me to measure the settlement this spring after 6 months of partial loading to determine if there is any possibility of maintaining the original construction schedule on the two bridges.

We recently measured settlements of 3-3/4 inches and 4-1/4 inches at two locations under the deepest parts of the fills, thus indicating that we are still far short of the predicted 24 inches.

It seems likely, therefore, that we shall achieve our original settlement only by loading the fill completely for the full period of time. This will obviously delay the award of the two subject structures until 1969, if winter construction is to be avoided.

We intend to take further settlement measurements throughout this summer.

  
F. NORMAN,  
REGIONAL MATERIALS ENGINEER.

FM:VM

c.c. Messrs. A. Rutka ✓  
W. Wigle

## MEMORANDUM

**To:** Mr. A. Stermac,  
Principal Foundation Engineer,  
Room 107, Lab. Building

**FROM:** Bridge Division,  
Downsview, Ontario

**DATE:** June 26, 1968

**OUR FILE REF.**

**IN REPLY TO**

**SUBJECT:** Rosslyn Road Overpass  
1.7 Miles East of Hwy. 61  
W.P. 917-64, Site 48C-102  
L.H.E., District 19

64-P-69

Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

CSG:rd

Attach.



C.S. Grebski,  
Bridge Design Engineer

5 JULY 68

NO COMMENTS

A L B.

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. G. Stermac,  
Principal Foundation Engineer,  
Laboratory Bldg., Downsview.

FROM: Bridge Division,  
Downsview, Ont.

ATTENTION:

DATE: July 3, 1968.

OUR FILE REF:

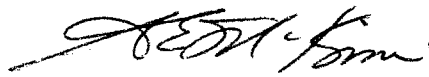
IN REPLY TO

SUBJECT:

Rosslyn Rd. Overpass  
Lakehead Expressway - Dist. 19  
W.P. 917-64 Site 48C102 D5622 - 1 to 8

64-F-69

We are forwarding herewith for your information  
the above bridge drawings. Any comments you might have  
regarding these should be made as soon as possible.



A. E. McKim,  
Bridge Control Engineer.

AEMcK/vh

Encls.

NO COMMENTS

A.E.M.

287

Department of Highways Ontario  
Copy for the information of  
M. Devata

Mr. W. Wigle,  
Program Engineer,  
Downsview, Ontario.

F. Norman,  
Regional Materials Engineer,  
Port Arthur, Ontario.

October 3, 1968.

Lakehead Expressway W.P.'s 917-64 and 918-64

64-F-69

Rosslyn Road and C.P.R. Overheads

This is to confirm our recent telephone conversation in regard to the settlement of the approaches and the programming of construction of the above-mentioned structures.

Because of underlying compressible soils, the Soils Consultants predicted settlements of up to 24 inches under the proposed fills, with the major part of the settlement anticipated within 12 months of completion of the fills. The structures were thus programmed for construction starting late in 1968, allowing the fills 12 months to stand after completion in 1967.

Unfortunately, there were delays in the grading work which resulted in the fills not being finished until mid-summer 1968.

The question is now, "Can we start building the two concrete bridges before settlement under the fills is complete?".

Since the structures are founded on end bearing piles, they do not rely on bearing support from the underlying compressible soils. It would be reasonable then, to allow the structural work to progress at the same time that settlement of the fills is occurring. Voids will be created under the pile cap footing slabs as settlement takes place, but these may be filled and tamped at a later stage. The only parts of the structures which must wait until settlement is virtually complete are the approach slabs.

Recent measurements indicate a maximum fill settlement of 7-1/4 inches, six weeks after completion of the fills. It would appear then, that settlement is proceeding satisfactorily so far and we shall continue to take these readings until the pattern is established.



F. NORMAN,  
REGIONAL MATERIALS ENGINEER.

fn.vvm

c.c. Messrs. A. Rutka  
M. Devata  
V. Snell

Mr. B. R. Davis,  
Bridge Design Engineer,  
Bridge Division.

*Signature to the ...*  
*C.P.R. & Rosslyn Road.*  
Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

Attention: Mr. C. Grebski

April 8, 1965

Proposed Structure and Embankments at the  
Crossing of C.P.R. and Rosslyn Road with  
the Lakehead Expressway -- District No. 19.

W.J. 64-F-69 -- W.P. 917-64 & 918-64

With reference to the discussion we had in connection with the above structure, we have again reviewed our recommendations and herewith submit the following comments for your consideration:

The existing railway fill is approximately 28 ft. high and does not show any signs of instability. However, in spite of this fact, we would recommend that berms be built as suggested in our Report 64-F-69 because the risks of failure are too great. It should be borne in mind that with the present rate of construction, the loading of the subsoil occurs much faster and the likelihood of failure becomes greater. In our opinion, the consequences resulting from a fill failure in the direction of the railway tracks could be very damaging and therefore, make the risk taking absolutely prohibitive.

AGS/MaeF

cc: Foundations Office  
Gen. Files

*H. G. Stermac*  
for A. G. Stermac,  
PRINCIPAL FOUNDATION ENGINEER

23