

61-30 SEPT 1979

GEOCRES No. 31F-81

DIST 9 REGION Eastern

W.P. No. 2-67-03

CONT. No. 79-28

W. O. No. \_\_\_\_\_

STR. SITE No. 29-159

HWY. No. 17N

LOCATION CPR Overhead Structure  
Hwy. 17N (Pembroke By-pass)

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 4

REMARKS: documents to be unfolded  
before microfilming

FOUNDATION INVESTIGATION REPORT  
FOR  
C.P.R. OVERHEAD STRUCTURE  
HWY. 17N (PEMBROKE BY-PASS)  
LOT 27, CON. 1 TWP. OF WESTMEATH  
COUNTY OF RENFREW DISTRICT 9 (OTTAWA)  
SITE 29-159 W.P. 2-67-03

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1. INTRODUCTION

A preliminary investigation was carried out in November and December 1974 to select an appropriate crossing of C.P.R. and Hwy. 17N. Subsequently an additional investigation was carried out to determine the subsoil condition for the preliminary alternatives of Lines 'T' and 'Z' in July, 1975 and the results were submitted in a memo dated July 29, 1975.

The Soil Mechanics Section was requested to carry out a foundation investigation for the finalized alignment of Hwy. 17N (Line 'A') and C.P.R. crossing. The request was received from Mr. T.C. Kingsland, Regional Structural Planning Engineer, Kingston Region, in a memorandum dated Sept. 15, 1975.

Subsequently, a field investigation was carried out during the period of October 6-8, 1975, under the supervision of Mr. H.D. Reed, Technician, Geotechnical Office.

This report contains the results of the investigation, together with recommendations pertaining to the foundations of the proposed structure as well as the stability and settlement considerations of the approach embankments.

## 2. SITE DESCRIPTION

The site is located some 5 miles southeast of Pembroke and approx. 3/4 of a mile south of a C.N.R. subway, at mileage 86.86, Chalk River Sub-division. At this location the Kathmae siding tracks run parallel to the C.P.R. tracks.

Topographically the area in general is fairly flat and bush covered, with bedrock outcroppings throughout and localized swamps in the general vicinity.

Physiographically this region is known as the Ottawa Valley Clay Plains.

## 3. FIELD INVESTIGATION PROCEDURES

A total of 10 augered boreholes and 6 dynamic cone penetration tests was carried out by means of a hollow stem auger (B-56) muskeg vehicle mounted machine with diamond drilling capabilities.

At boreholes 2,4,7 and 10 bedrock was proven by obtaining BX rock core samples. The remaining boreholes were augered to bedrock surface. The boreholes were placed to determine the bedrock profile along the proposed footings as marked out on the 'E' plan. (E-5266-1) Elevations and locations of all the boreholes were taken by Mr. Ron Denison, Surveyor with Engineering Surveys, Kingston Region, and are shown on drawing 26703-A attached to this report.

During the field work, disturbed samples were obtained by standard split spoon sampling methods. All samples were visually examined in the field as well as in the

laboratory. Following this inspection, testing was carried out to determine the following physical characteristics of the overburden:

- a. grain size distribution
- b. atterberg limits

The results of the tests are plotted on record of borehole sheets in the appendix of the report.

#### 4. SUBSOIL AND BEDROCK CONDITIONS

##### 4.1 General

Overburden in general consists of a black organic material encountered at all boreholes over a deposit of grey silt in some locations and mottled clayey silt in others, overlying a granular deposit above the bedrock.

##### 4.2 Overburden

Black organic material overlies the site area and is on the average 1 ft. thick except at boreholes 7 and 8 which were placed in the ditch on the east side of the tracks, where it was some 2 ft. to 3 ft. deep. This organic material is generally fibrous, mixed with decayed vegetation and some silt and sand.

Silt was encountered in boreholes 3 and 10 only, underlying the organic material and consists of a 1½ ft. to 2 ft. pocket or layer of compact, dry, grey silt.

Clayey silt was encountered in five boreholes (2,5,6 7 and 8) underlying the organic material and in general consisted of a 1½ ft. layer of soft to firm grey-brown mottled clayey silt.

Granular deposit was found in all boreholes overlying the bedrock and mainly consists of a 1½ ft. to 8 ft. deposit of loose to compact ('N' values 8-23 blows per ft.), grey silty sand, some gravel and a trace of clay. However in boreholes 1,9 and 10 this deposit was 1 ft. to 2 ft. thick and generally dense to very dense ('N' values 40-79 blows per ft.), consisting of a reddish brown sand with a trace of gravel and some rock fragments.

#### 4.3 Bedrock (Gneiss)

Bedrock was encountered very close to the surface in eight boreholes, ranging from 1 ft. to 6 ft. below the ground surface (elev. 454 to 458) and in boreholes 7 and 8 at the east pier location the bedrock was found to be 12 ft. below the ground level (elev. 445 ±). The bedrock core samples were inspected in the laboratory by Mr. Bern Glassford, Geologist, and was found to be a hard, grey gneiss, medium textured bedrock and generally sound.

Refer to the subsoil and bedrock details on the record of borehole sheets in the appendix of the report as well as the geologist diamond drill record (Fig 2).

### 5. GROUNDWATER CONDITIONS

Groundwater levels were observed in five of the ten boreholes during the field investigation and were found to be 1 ft. to 2 ft. below ground level, between elevations 456.6, and 457.1.

### 6. DISCUSSION AND RECOMMENDATIONS

#### 6.1 General

It is proposed to build a 3 span (70' each span)

structure where Hwy. 17N crosses existing C.P.R. tracks. The present ground elevation ranges from 457.3 to 461.0 and the proposed grade of Hwy. 17 (Line 'A') at this crossing being at elevation 492 ±. The existing C.P.R. tracks are located on a small embankment (3 to 5 ft. high) the tracks being at elevation 463 ±. This places the approach embankments some 30 to 35 ft. high.

## 6.2 Approach Embankments

In order to ensure the stability of the approaches in the vicinity of the structure it is recommended that the surficial organic deposit as well as any clayey silt deposits that may be encountered should be excavated to its full depth within the full base width of the proposed embankment. The excavation should extend for a minimum distance of 100' behind the abutments in the longitudinal direction and backfilled with a granular type material.

On site observations revealed the presence of bedrock at or very near the ground surface for some 200 ft. behind the abutments. The embankments for the approaches can be constructed with acceptable earth material using 2:1 slopes. No settlement problem are anticipated since the soft compressible organic and cohesive material will be removed prior to construction of the approach embankments.

## 6.3 Foundation Considerations

### Abutments

Perched abutments can be placed within the fill and supported on spread footings founded on a well compacted granular pad. (As per Fig. 1 in appendix of report) An allowable pressure of 2.5 t.s.f. may be used for design.

As an alternative the abutments may be supported on end bearing piles driven through the fill to bedrock.

The maximum allowable capacity for pile section chosen may be used for design purposes. No bouldery fill should be placed in the area where piles are to be driven.

#### West Pier

The bedrock at this location is covered by 3 ft. to 6 ft. of overburden. The West Pier can be supported on spread footings founded on bedrock. A design load of 20 t.s.f. may be used.

#### East Pier

The overburden consists of up to 4 ft. of organics and clayey silt over a 7 ft. to 8 ft. loose to compact sand deposit. Such deposits will not provide adequate bearing capacity for the pier foundations. It is therefore recommended that the proposed East Pier be founded on bedrock. A design load of 20 t.s.f. may be used.

The excavation will extend below the prevailing groundwater level. Due to the pervious nature of the sand deposit, seepage into the excavation can be anticipated. For this reason and for the protection of the C.P.R. tracks it may be desirable to use sheeted excavation techniques.

As an alternative the piers may be supported on concrete caissons extended to the bedrock. The same caissons may be continued to act as pier columns. This would obviate any excavation close to the tracks and consequently eliminate any track protection requirements. An allowable load of 200 tons per caisson for a 36 inch diameter caisson may be used for design purposes. For resisting any lateral thrust the caissons can be socketed into the rock, this aspect can be reviewed further during design process.

7. MISCELLANEOUS

The drilling equipment used was owned and operated by Atcost Soil Drilling Inc. under the supervision of Mr. H.D. Reed, Technician, Geotechnical Office.

This report was prepared by Mr. H.D. Reed and reviewed by Mr. M. Devata, Supervising Engineer.



H.D. Reed  
Technician

M. Devata  
Supervising Engineer

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO  
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

## RECORD OF BOREHOLE NO 1

WP 2-67-03 LOCATION Co-Ords. 629,400 N 862,371 E ORIGINATED BY HR  
 DIST 9 HWY 17N BORING DATE Oct 7/75 DYNAMIC CONE Dynamic Cone COMPILED BY MK  
 DATUM Geodetic BOREHOLE TYPE 3 1/2" Hollow Stem; penetration test CHECKED BY [Signature]

SOIL PROFILE		STRAT. PLOT	SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $W_L$ PLASTIC LIMIT $W_P$ WATER CONTENT $W$			UNIT WEIGHT $\gamma$	REMARKS
ELEV DEPTH	DESCRIPTION		NUMBER	TYPE	'N' VALUES		20	40	60	80	100	$W_P$	$W$	$W_L$		
458.8	Ground Level															
0.0	Black Org. Mat'l															
456.8																
2.0	Red-Brown Sand															
455.3	Dense		1	SS	40											7.75 (18)
3.5	End of Borehole Probable bedrock															W.L. not Observed
						450										

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO  
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

**RECORD OF BOREHOLE No 2**

WP 2-67-03 LOCATION Co-Ords. 629,380 N 862,365 E ORIGINATED BY HR  
 DIST 9 HWY 17N BORING DATE Oct 7/75 COMPILED BY MK  
 DATUM Geodetic BOREHOLE TYPE 3 1/2" H.S. Augers; BX Casing; BXL Core; Test CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$			UNIT WEIGHT $\gamma$	REMARKS		
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	$w_p$	$w$	$w_L$			GR	SA
458.6	Ground Elev.																	
0.0	Black Organic Material	[Pattern]																
456.1	2.5 Grey-Brown Mottled Clayey Silt Soft to Firm	[Pattern]	1	SS	5													
454.2	4.4 Black Org. Sand	[Pattern]																
4.9	Gneiss Bedrock Sound	[Pattern]	2	RC BXL	REC 100%													
448.5						450												
10.1	End of Borehole					440												

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO  
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

## RECORD OF BOREHOLE NO 3

WP 2-67-03 LOCATION Co-Ords. 629,423 N 862,336 E ORIGINATED BY HR  
 DIST 9 HWY 17N BORING DATE Oct. 7/75 COMPILED BY MK  
 DATUM Geodetic BOREHOLE TYPE 3 1/2" H.S. Auger, Cone Test CHECKED BY J.R.

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $W_L$ PLASTIC LIMIT $W_P$ WATER CONTENT $W$			UNIT WEIGHT $\gamma$	REMARKS		
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	$W_p$	$W$	$W_L$			GR	SA
460.7	Ground Elev.																	
459.7	Black Org. Mat'l																	
1.0	Grey Silt Compact																	Caved at El. 456.7
457.7	Gr-Brown Silty Sand Some gravel, Trace Clay, Dense		1	SS	45													20 40 23 7
453.3	Bedrock		2	SS	100/4													71 23 (6)
6.4	End of Borehole																	
						450												

20  
15  $\phi$  5 % STRAIN AT FAILURE  
10

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO  
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

**RECORD OF BOREHOLE NO 4**

WP 2-67-03 LOCATION Co-Ords. 629,405 N 862,404 E ORIGINATED BY HR  
 DIST 9 HWY 17N BORING DATE Oct. 7/75 COMPILED BY MK  
 DATUM Geodetic BOREHOLE TYPE 3 1/2" H.S. Auger, BX Casing, BXL Core CHECKED BY [Signature]

SOIL PROFILE		SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$			UNIT WEIGHT $\gamma$	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		'N' VALUES	SHEAR STRENGTH					WATER CONTENT %			
						20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE					$w_f$ — $w$ — $w_L$				% GR SA SI CL
458.0	Ground Elev.														
456.9	Black Org. Mat'l														
1.1	Gneiss Bedrock Sound		1	RC BXL	100% REC										W.L. Not Observed
451.7	End of Borehole														
6.3						450									
						440									

OFFICE REPORT ON SOIL EXPLORATION

RECORD OF BOREHOLE NO 5

WP 2-67-03 LOCATION Co-Ords. 629,362 N 862,433 E ORIGINATED BY HR  
 DIST 9 HWY 17N BORING DATE Oct 7/75 COMPILED BY MK  
 DATUM Geodetic BOREHOLE TYPE 3 1/2" Hollow Stem Auger, Cone Test CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$ $w_p$ — $w$ — $w_L$ WATER CONTENT % 10 20 30	UNIT WEIGHT Y	REMARKS % GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES					
458.5	Ground Elev.									
459.0	Black Org. Mat'l									
456.2	Mott. Clayey Silt	Firm	1	SS	6					
454.7	Grey Silty Sand									
3.8	End of Borehole Probable Bedrock									
						450				

20  
15  $\phi$  5 % STRAIN AT FAILURE  
10

OFFICE REPORT ON SOIL EXPLORATION

RECORD OF BOREHOLE NO 6

WP 2-67-03 LOCATION Co-Ords. 629,383 N 862,414 E ORIGINATED BY HR  
 DIST 9 HWY 17N BORING DATE Oct 7/75 COMPILED BY MK  
 DATUM GEODETTIC BOREHOLE TYPE 3 1/2" Hollow Stem Auger CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$			UNIT WEIGHT $\gamma$	REMARKS		
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	$w_p$	$w$	$w_L$			GR	SA
458.6	Ground Elev.																	
457.8	Black Org. Mat'l	[Pattern]																
1.0	Mottled Clayey Silt	[Pattern]																
456.1																		
2.5																		
454.1	Grey Silty Sand	[Pattern]																
4.5	End of Borehole Probable Bedrock	[Pattern]																
						450												

OFFICE REPORT ON SOIL EXPLORATION

RECORD OF BOREHOLE NO 7

WP 2-67-03 LOCATION Co-Ords. 629,390N 862,473 E ORIGINATED BY HR  
 DIST 9 HWY 17N BORING DATE Oct 7/75 COMPILED BY MK  
 DATUM Geodetic BOREHOLE TYPE H.S. Auger, BX Casing, BXL Core CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$			UNIT WEIGHT $\gamma$	REMARKS		
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	$w_p$	$w$	$w_L$			GR	SA
457.3	Ground Elev.																	
0.0	Black Organic Material	[Pattern]																
454.3																		
3.0	Mottled Clayey Silt	[Pattern]	1	SS	5													
453.1	Soft to firm	[Pattern]																
4.2	Grey Silty Sand with gravel, Trace of clay loose to compact	[Pattern]	2	SS	23	450												36 35 28 1
			3	SS	8													
445.4																		
11.9	Gneiss Bedrock Sound	[Pattern]	4	RC BXL	100% REC													
440.2																		
17.1	End of Borehole Bedrock					440												

OFFICE REPORT ON SOIL EXPLORATION

RECORD OF BOREHOLE NO 8

WP 2-67-03 LOCATION Co-Ords. 629,344 N 862,501 E ORIGINATED BY HR  
 DIST 9 HWY 17N BORING DATE Oct 8/75 COMPILED BY MK  
 DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger, Cone Test CHECKED BY LR

SOIL PROFILE		STRAT. PLOT	SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_p$ WATER CONTENT $w$ $w_p$ — $w$ — $w_L$ WATER CONTENT %	UNIT WEIGHT $\gamma$	REMARKS		
ELEV DEPTH	DESCRIPTION		NUMBER	TYPE	'N' VALUES		20	40	60	80	100				20	30
457.3	Ground Elev.															
0.0	Black Organic Material															
454.3																
3.0	Grey Clayey Silt		1	SS	9											
452.8																
4.5	Grey silty sand Some gravel, trace of clay compact		2	SS	11	450										20 49 27 4
			3	SS	15											
444.8			4	SS	20/6"											
12.5	End of Borehole Probable bedrock															
						440										

OFFICE REPORT ON SOIL EXPLORATION

RECORD OF BOREHOLE NO 9

WP 2-67-03 LOCATION Co-Ords. 629,307 N 862,539 E ORIGINATED BY HR  
 DIST 9 HWY 17N BORING DATE Oct 8/75 COMPILED BY MK  
 DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger; Cone Test CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			GROUND WATER	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $w_L$ PLASTIC LIMIT $w_P$ WATER CONTENT $w$			UNIT WEIGHT $\gamma$	REMARKS		
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	$w_p$	$w$	$w_L$			GR	SA
460.5	Ground Elev.																	
459.5	Black Org. Material																	
1.0	Red-Brown Sand, Dense		1	SS	20/60													3 84 (13)
457.5																		Hole Dry
3.0	End of Borehole Probable bedrock																	
						450												

OFFICE REPORT ON SOIL EXPLORATION

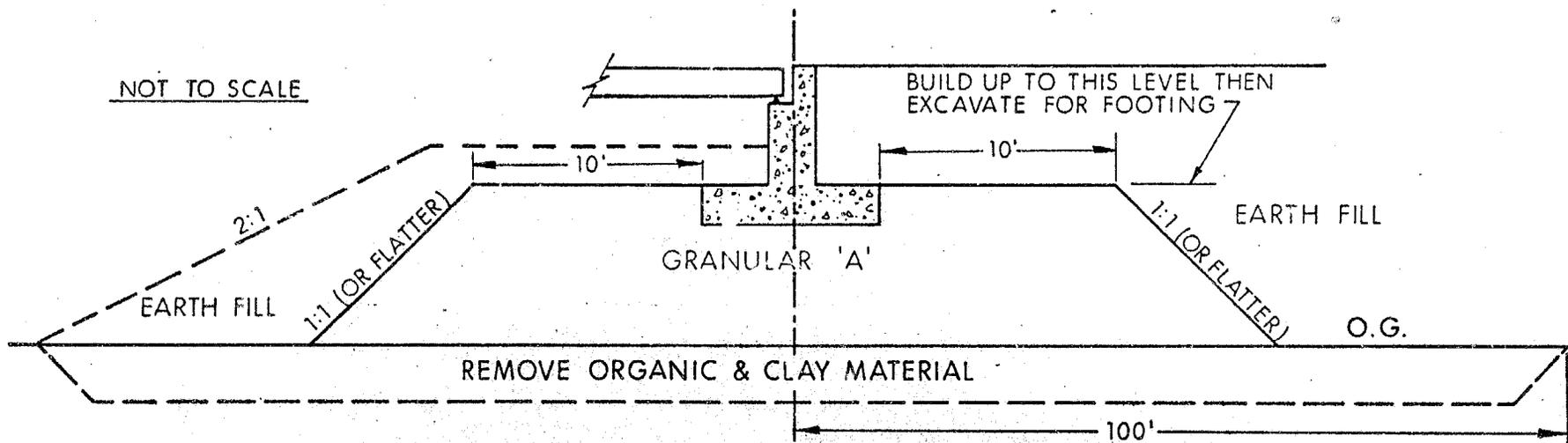
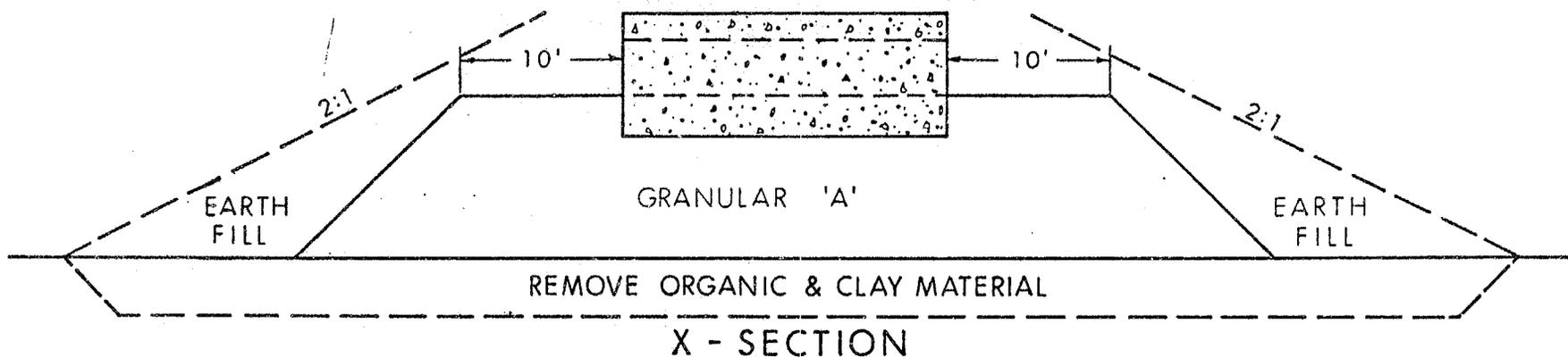
RECORD OF BOREHOLE No 10

WP 2-67-03 LOCATION Co-Ords. 629,322 N 862,567 E ORIGINATED BY HR  
 DIST 9 HWY 17N BORING DATE Oct 8/75 COMPILED BY MK  
 DATUM Geodetic BOREHOLE TYPE H.S. Auger, BX Casing, BXL Core CHECKED BY HR

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT $W_L$ PLASTIC LIMIT $W_P$ WATER CONTENT $W$			UNIT WEIGHT $\gamma$	REMARKS		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	$W_P$	$W$	$W_L$			GR	SA
461.0	Ground Elev.																	
460.5	Black Org. Mat'l																	
459.0	Grey Silt																	
457.7	Sand, Some rock fragments, very dense		1	SS	79/	9"												27 61 (12)
451.7	Gneiss Bedrock Sound		2	RC EXL	100% REC													W.L. Not Observed
9.3	End of Borehole																	

OFFICE REPORT ON SOIL EXPLORATION

# ABUTMENT ON COMPACTED FILL SHOWING GRANULAR 'A' CORE



## NOTES

- 1 - REMOVE ORGANIC & CLAY SUBSOIL UNDER AREA OF EMBANKMENT
- 2 - PLACE GRANULAR 'A' TO TOP OF FOOTING LEVEL, COMPACTED ACCORDING TO CURRENT M.T.C. STANDARDS.
- 3 - EXCAVATE COMPACTED GRANULAR 'A' MATERIAL FOR FOOTING.



DIAMOND DRILL RECORD

HOLE NO. \_\_\_\_\_ SHEET NO. \_\_\_\_\_

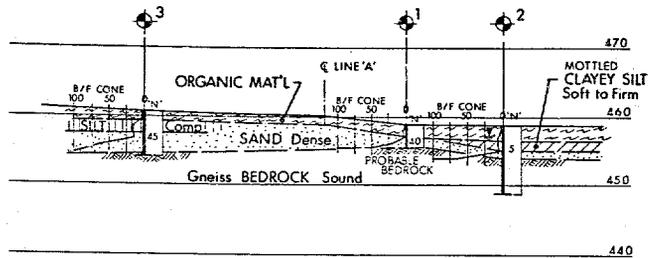
PROPERTY LOCATION W.P. 2-67-03  
 LOCATION Pembroke Vicinity  
 LATITUDE \_\_\_\_\_  
 DEPARTURE \_\_\_\_\_  
 BEARING \_\_\_\_\_

DIP  
90°  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 TOTAL FOOTAGE \_\_\_\_\_

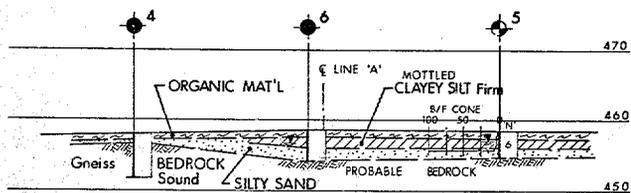
FOOTAGE		FORMATION	SAMPLE NUMBER	REMARKS
FROM	TO			
		HOLE #2		
4'11"	8'5"	Gneiss, grey colour, medium texture, hard		lineation 30° high % biotite mica
8'5"	9'4"	Pegmatitic vein, pink colour, med. to fine texture		chiefly feldspar, quartz and hornblende minerals
		HOLE #4		
1'11"	6'3"	Gneiss, grey colour, medium texture, hard		high % biotite mica lineation 30°
		HOLE #7		
11'11"	17'11"	Gneiss, dark grey colour, medium texture, hard		lineation at 45° vertical joint 14' - 15'
		HOLE #10		
3'3"	9'3"	Gneiss, grey colour, medium texture, hard		lineation at 45°

DATE OF EXAMINATION October 21, 1975

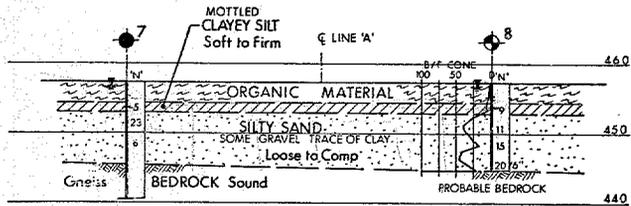
B. K. Glassford



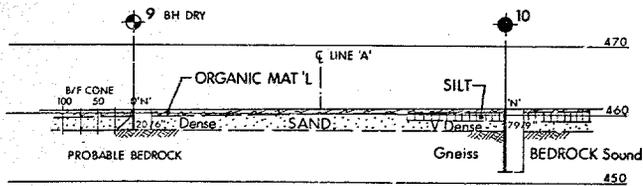
A-A



B-B



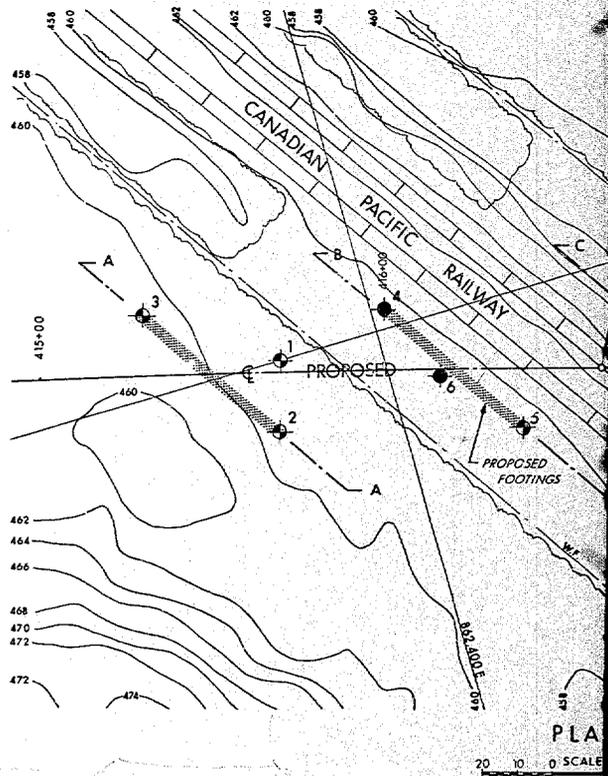
C-C



D-D

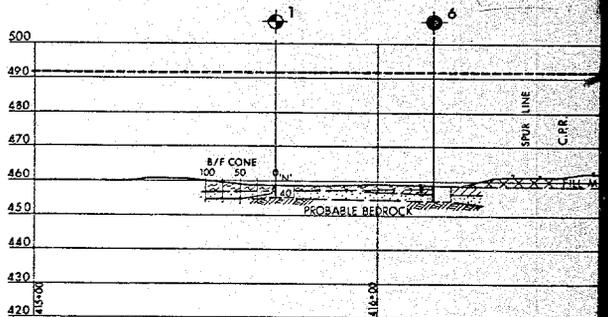
SECTIONS

10 5 0 SCALE 10 20 FT.



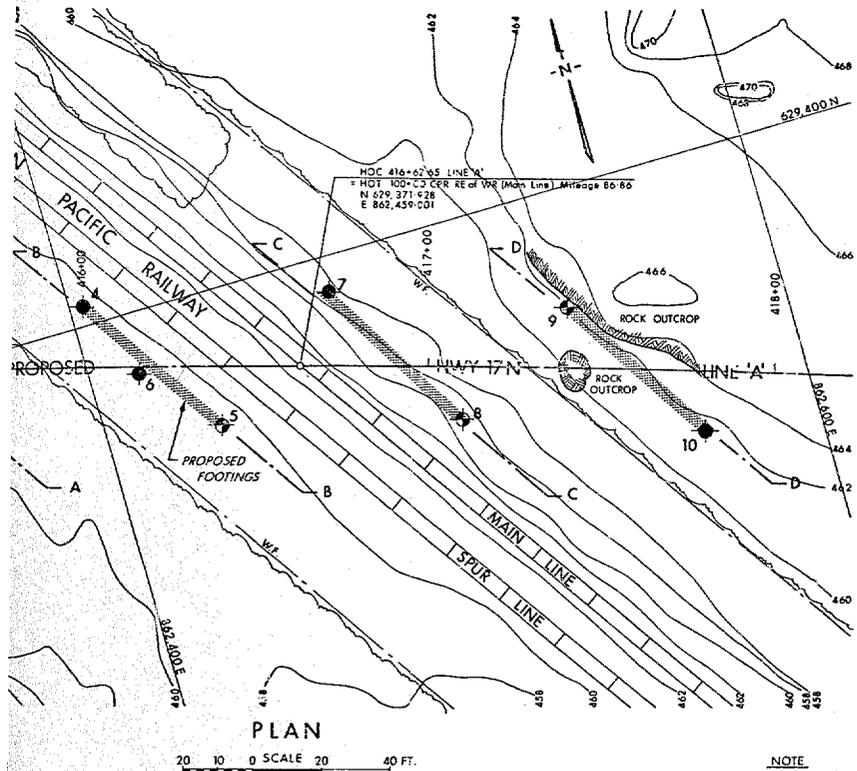
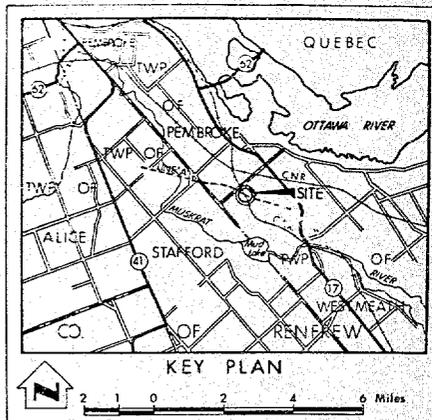
PLAN

20 10 0 SCALE



PROF

20 10 0 SCALE



**LEGEND**

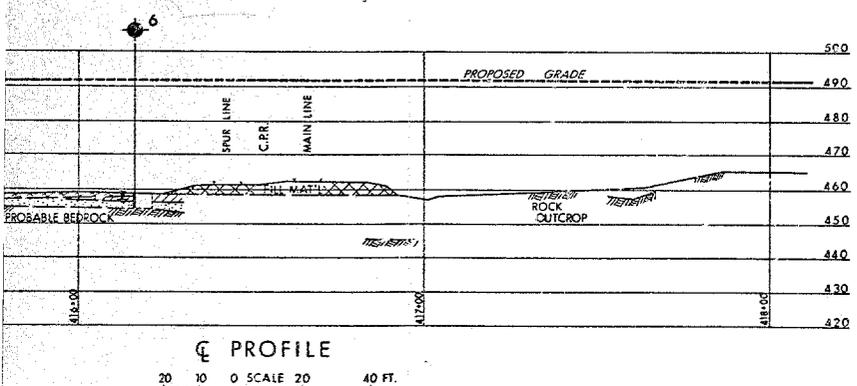
- Bore Hole
- ⊕ Dynamic Cone Penetration Resistance Test  
B/F CONE - Blows/Ft. Cone Test (350 Ft. lbs. energy/blow)
- ⊕ Bore Hole & Cone Test
- ⊕ Water Levels established at time of field investigation. OCT. 1975

NO.	ELEVATION	CO-ORDINATES	
		NORTH	EAST
1	458-8	629,400	862,371
2	458-6	629,380	862,365
3	460-7	629,423	862,336
4	458-0	629,405	862,404
5	458-5	629,362	862,433
6	458-6	629,383	862,414
7	457-3	629,390	862,473
8	457-3	629,344	862,501
9	460-5	629,367	862,539
10	461-0	629,322	862,567

**NOTE**  
 WL NOT OBSERVED IN  
 BH'S 1, 3, 4 & 10

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

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



REVISIONS	DATE	BY	DESCRIPTION

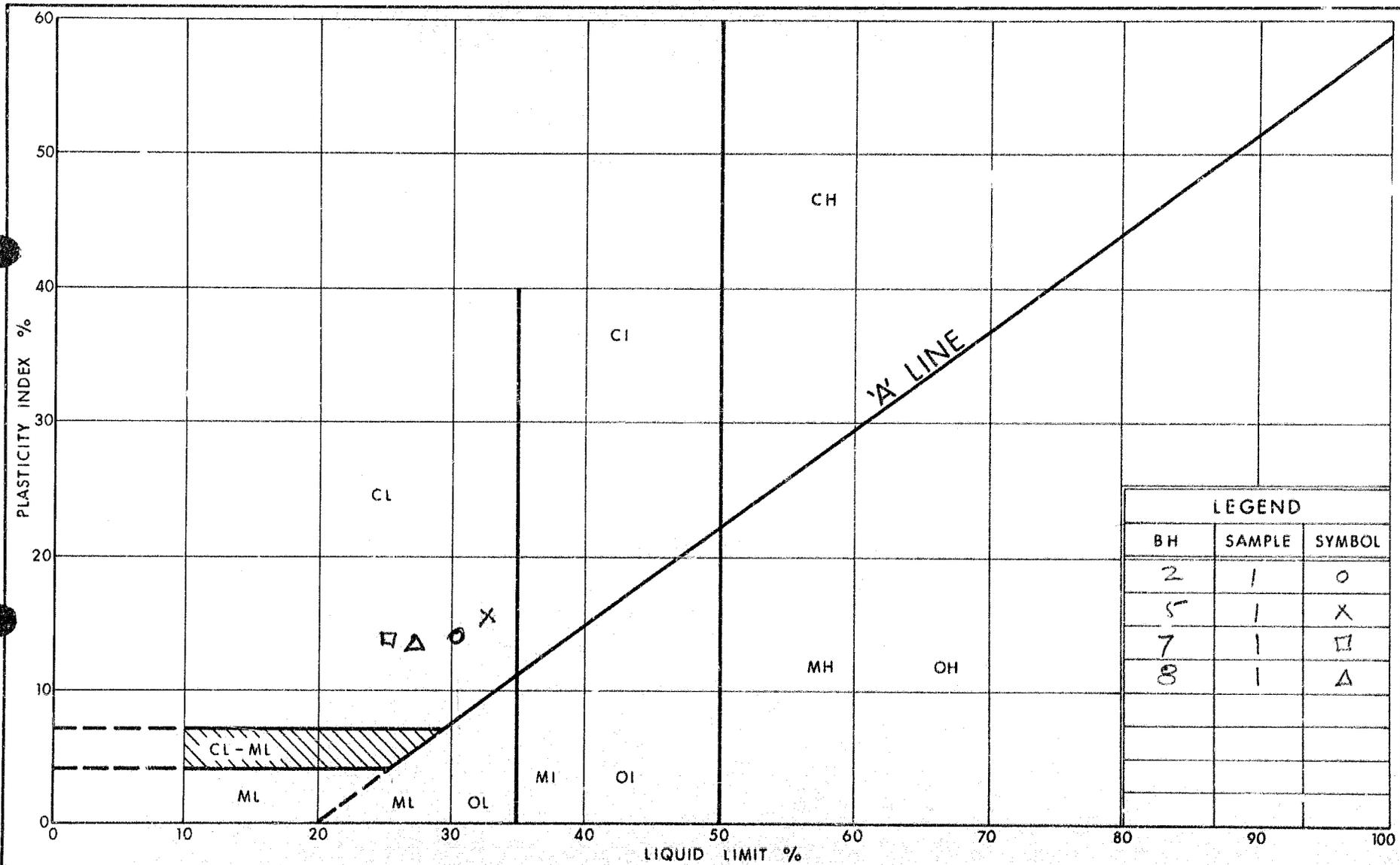
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO  
 ENGINEERING SERVICES BRANCH—GEOTECHNICAL OFFICE—SOIL MECHANICS SECTION

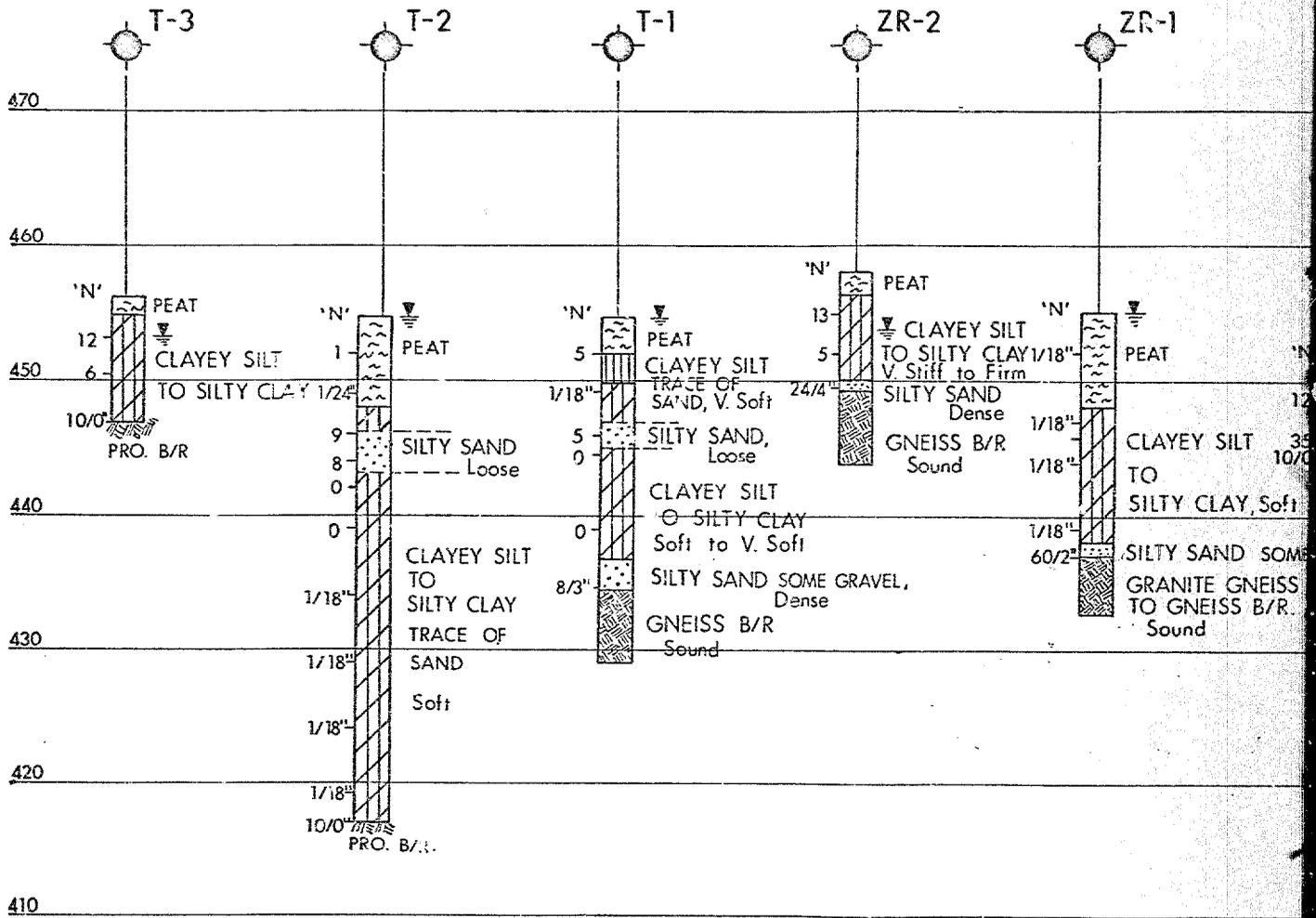
**CANADIAN PACIFIC RAILWAY**

HIGHWAY NO 17 N LINE 'A' DIST. NO 9  
 CO RENFREW  
 TWP WESTMEATH LOT 27 CON 1

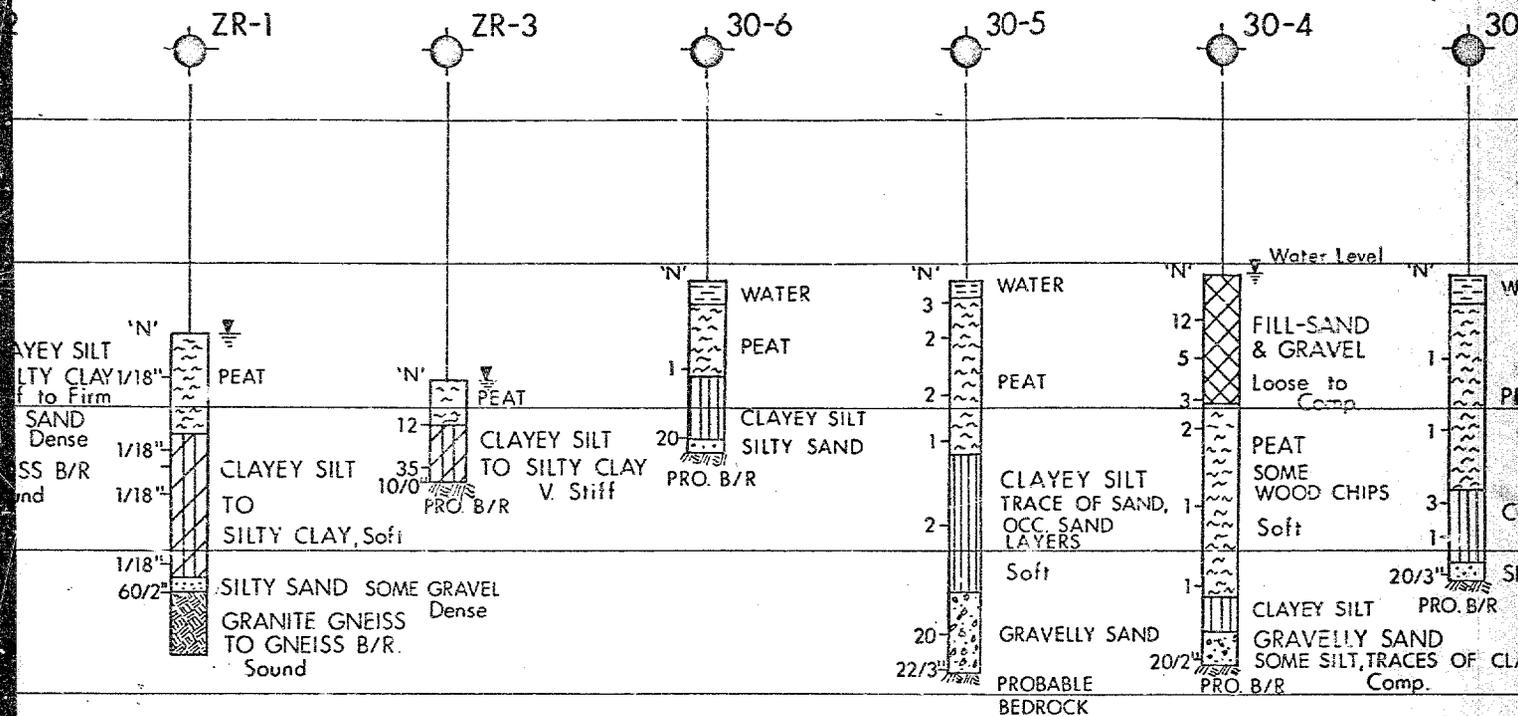
**BORE HOLE LOCATIONS & SOIL STRATA**

SUB'D H.R. CHECKED <input checked="" type="checkbox"/>	WP NO 2-67-03	DRAWING NO
DRAWN S.D. CHECKED <input checked="" type="checkbox"/>	NO NO	26703-A
DATE 3 DEC 1975	SITE NO 29-159	BRIDGE DRAWING NO
APPROVED	CONT NO	





BORE  
SCALE

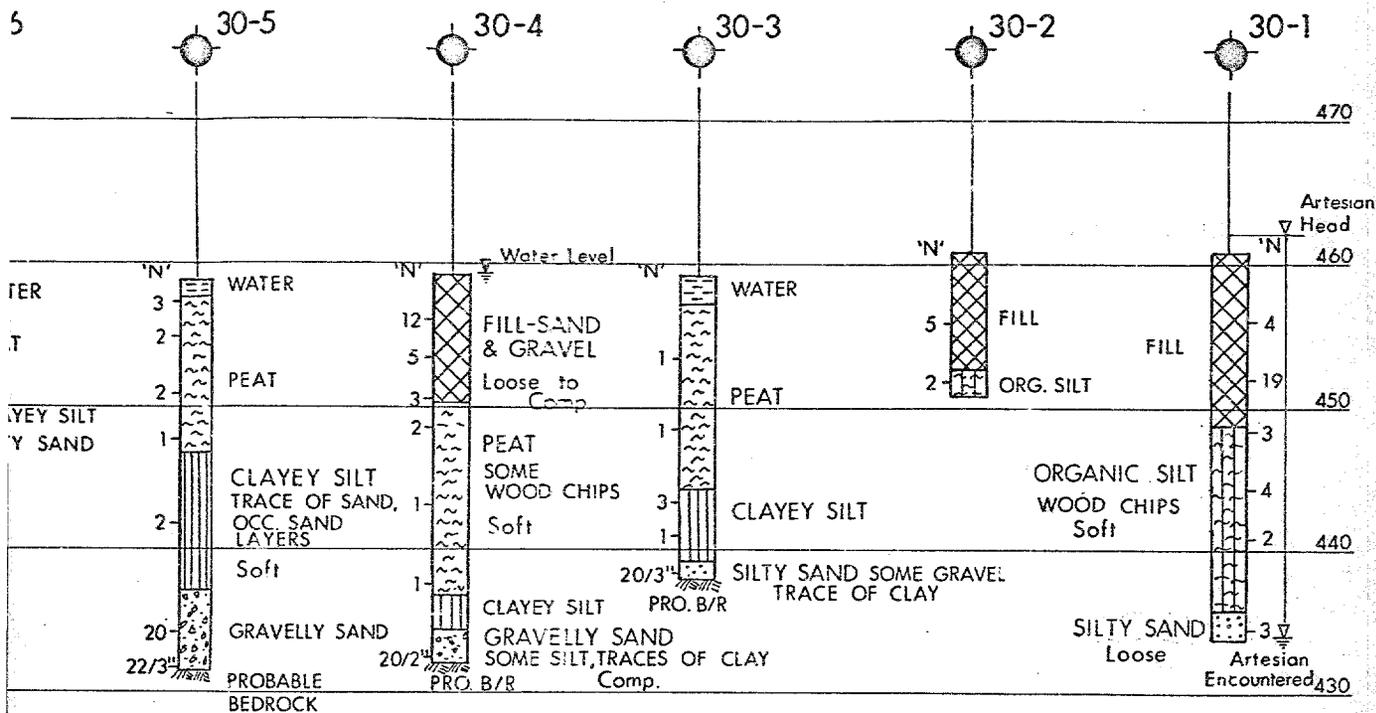


BORE HOLES

SCALE 1" = 10'

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS  
 ENGINEERING SERVICES BRANCH  
 SOIL MECHANICS SECTION

DATE 15 AUG, 1975



MINISTRY OF TRANSPORTATION AND COMMUNICATIONS  
 ENGINEERING  
 SERVICES BRANCH  
 SOIL MECHANICS SECTION

PRELIMINARY INVESTIGATION  
 HWY. 17N & C.P.R. OVERHEAD STRUCTURE  
 (PEMBROKE BYPASS)

DATE 15 AUG, 1975

W.P. NO. 1-67-01

DRAWING NO. 73-11042G

DOCUMENT IDENTIFICATION

GEOCRES No. 31 F - 81

DIST 9 REGION EASTERN

W.P. No. 2-67-03

CONT. No. 79-28

W. O. No. \_\_\_\_\_

STR. SITE No. 29-159

HWY. No. 17N

LOCATION CPR OVERHEAD STRUCTURE

HWY 17N (PEMBROKE BY-PASS)

OVERHEAD SPANNS TO BE INCLUDED IN THE REPORT 4

REMARKS: \_\_\_\_\_

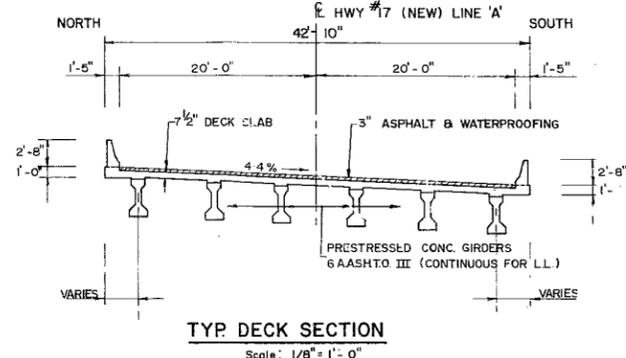
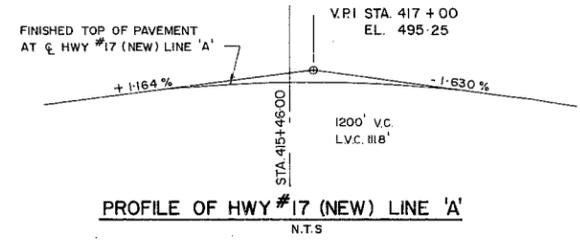
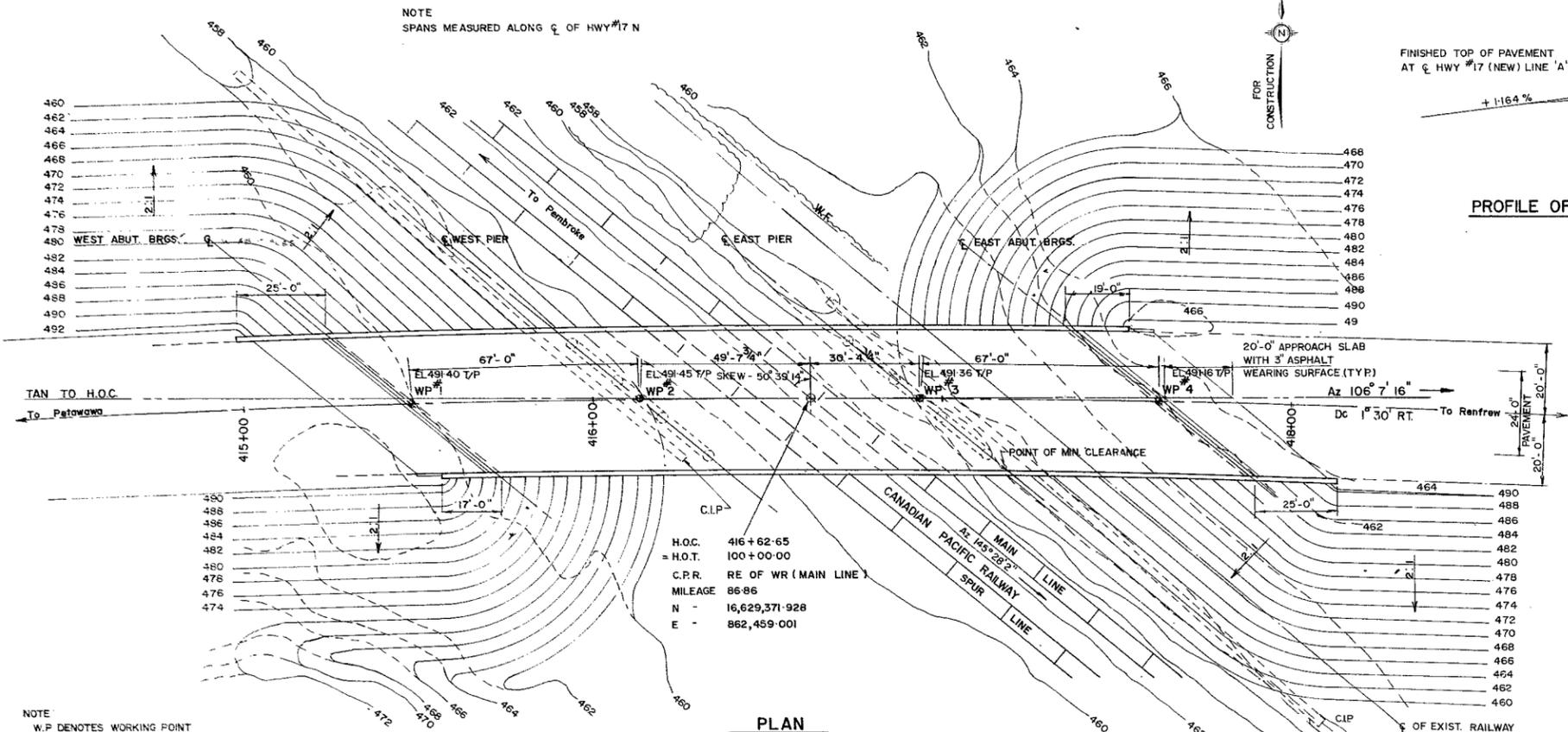
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31F-81

DIST No 9	
CONT No	
WP No 2-67-03	
C.P.R. OVERHEAD	SHEET
APPR. 5.0 ML. EAST OF HWY #41	
GENERAL LAYOUT	
<b>J.L. RICHARDS &amp; ASSOCIATES</b> LIMITED CONSULTING ENGINEERS AND PLANNERS OTTAWA CANADA	



- LIST OF DRAWINGS
- 29-159-1 GENERAL LAYOUT
  - 2 BOREHOLE LOCATION & SOIL STRATA
  - 3 FOUNDATION LAYOUT & REINFORCEMENT
  - 4 WEST ABUTMENT
  - 5 EAST ABUTMENT
  - 6 WING WALLS
  - 7 PIERS
  - 8 PRESTRESSED GIRDERS & BEARINGS
  - 9 DECK
  - 10 CONCRETE BARRIER WALL (2'-8" HIGH)
  - 11 STEEL RAILING (SINGLE TUBE)
  - 12 20' APPROACH SLAB
  - 13 TRACK PROTECTION & STANDARD DETAILS I
  - 14 STANDARD DETAILS II
  - 29-159-15 AS CONSTRUCTED ELEVATIONS & DIMENSIONS

B.M. 460-55  
GEODETIC DATUM  
N & W IN NW ROOT OF 0.8' POP.  
103' RT 418+64 (LINE 'A')

NOTES:  
CLASS OF CONCRETE  
DECK, BARRIER WALLS & PIERS --- 4000 P.S.I.  
PRESTRESSED GIRDERS --- 5000 P.S.I.  
REMAINDER (INCLUDING PIER FTG'S) --- 3000 P.S.I.

CONCRETE QUANTITIES

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

	C.Y.	P.S.I.
CONCRETE IN PIERS	210	4000
CONCRETE IN WING WALLS & ABUTMENTS	329	3000
CONCRETE IN DECK AND DIAPHRAGMS	302	4000
CONCRETE IN BARRIER WALLS	39	4000
CONCRETE IN APPROACH SLABS (N.I.C.)	50	3000

CLEAR COVER TO REIN. STEEL

FOOTINGS, ABUTMENTS & PIER COL'S	3"
PIER CAPS & CRASH BEAMS	2"
DECK	2" TOP, 1 1/2" BOT.
DIAPHRAGMS & BARRIER WALLS	1 1/2"
APPROACH SLABS	2"

CONSTRUCTION NOTES

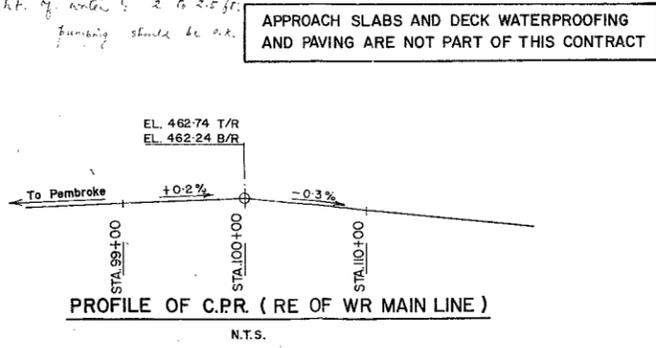
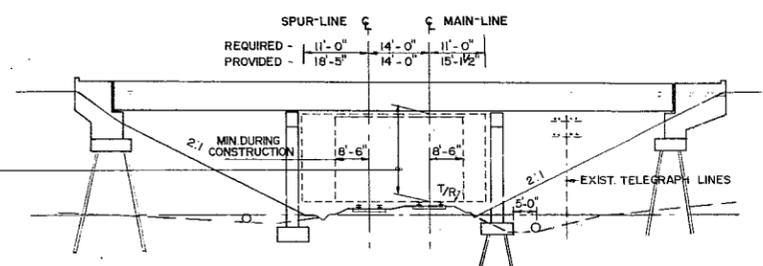
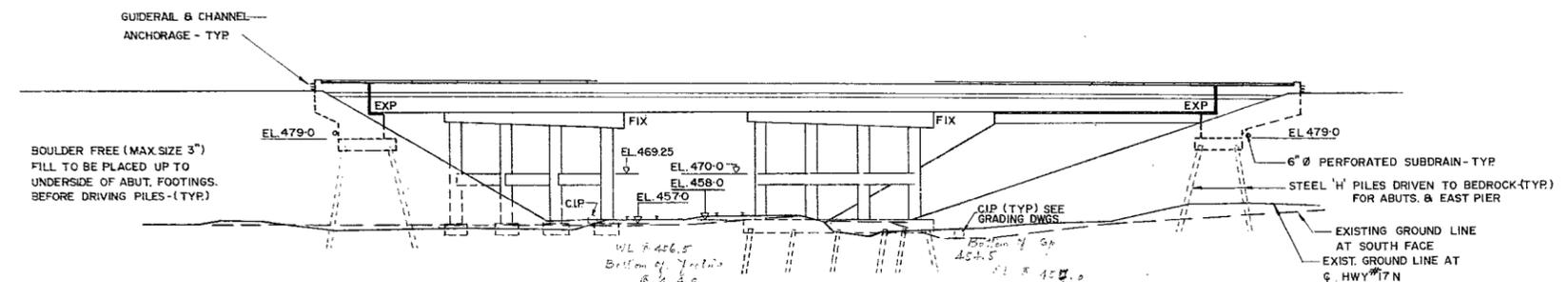
THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF 1/8". NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED

REIN. STEEL - SHALL BE C.S.A. G30 SERIES  
GRADE 60 - PIER COL'S & DECK  
GRADE 50 - REMAINDER

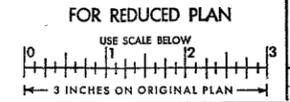
NOTE  
W.P. DENOTES WORKING POINT  
T/P DENOTES TOP OF PAVEMENT  
T/R DENOTES TOP OF RAIL  
B/R DENOTES BOTTOM OF RAIL

SKIEW DATA 50° 39' 14"

SIN 0.773330  
COS 0.634003  
COTAN 0.819835  
SEC 1.577278



APPROACH SLABS AND DECK WATERPROOFING AND PAVING ARE NOT PART OF THIS CONTRACT



REVISIONS	DATE	BY	DESCRIPTION

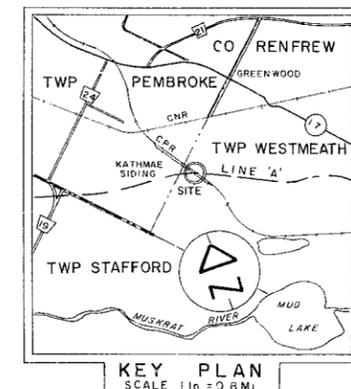
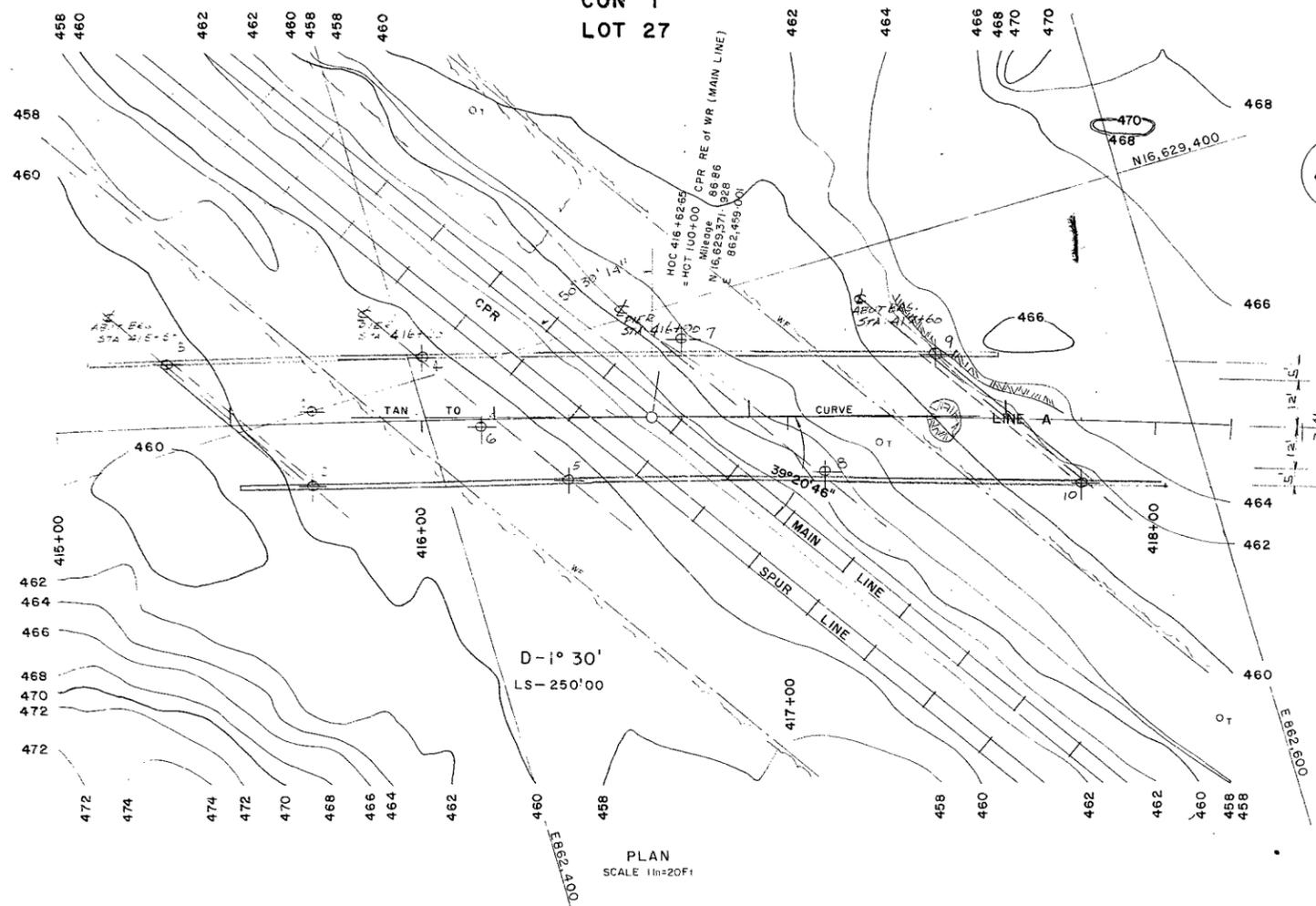
DESIGN LIM CHECK GAC LOADING HS 20-44 DATE JULY 77

DRAWING ARM CHECK LJM SITE No 29-159 DWG 1

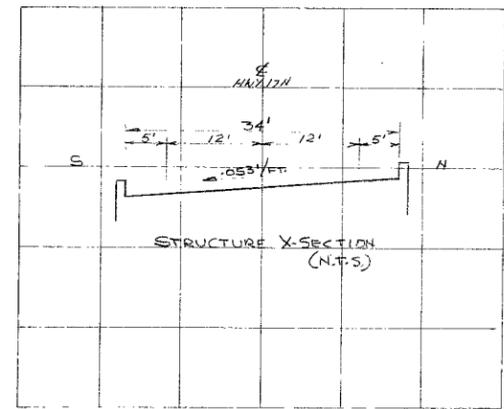
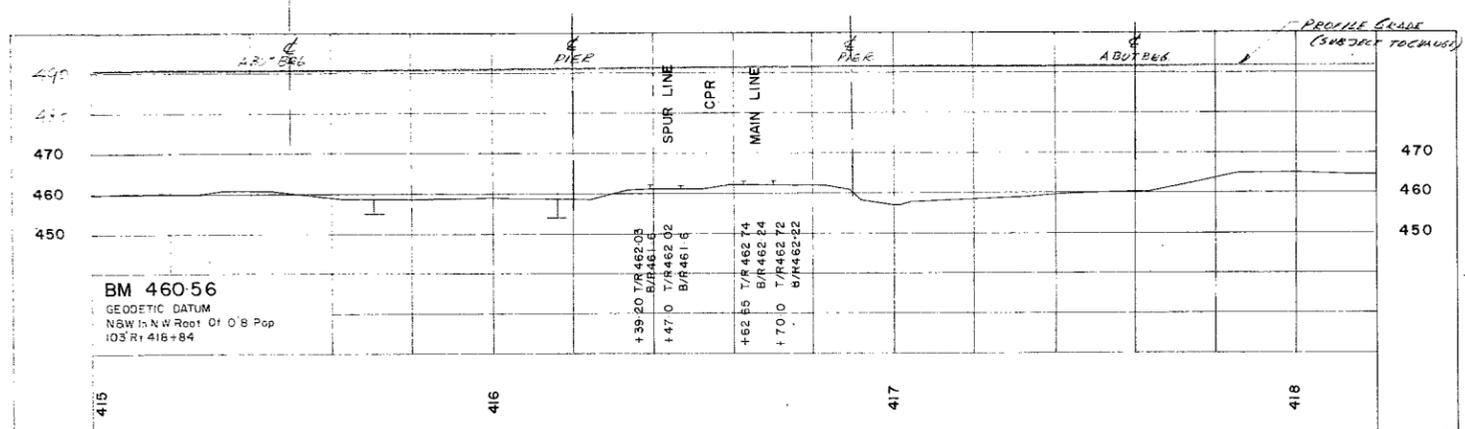
E-2500-1

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

### CO RENFREW TWP WESTMEATH CON 1 LOT 27



WP 10-67-01  
STR WP2-67-03



317-81

DATE	REVISIONS & ADDITIONS	BY	CHK'D
See H/T	SPEECH SHOWING LOCATION OF PROPOSED STRUCTURE AS SUBMITTED FOR FOUNDATION INVESTIGATIONS		
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS ONTARIO ENGINEERING SERVICES BRANCH      ENGINEERING PLANS OFFICE			
BRIDGE SITE			
PROPOSED CROSSING AT CANADIAN PACIFIC RAILWAY AND PROPOSED HIGHWAY 17 NEW LINE 'A' MILEAGE 86-86 CHALK RIVER SUBDIVISION LOT 27      CON 1 TWP WESTMEATH      CO RENFREW			
SCALE AS SHOWN	DISTRICT 9 OTTAWA	REGION EASTERN	
WP 10-67-01	Date of Survey - AUG 1975 Date of Plan - SEPT 1975	SITE 29-159	
SURVEY BY: Chief of Party - E BEEMER Supervisor - C M BAKER		DRAWN BY: Draftsman - P TRENHAILE Supervisor - G LALANDE	
CHECKED BY: Draftsman - D JOHNSON Supervisor - G LALANDE		PLAN E-5266-1	

E-2500-1

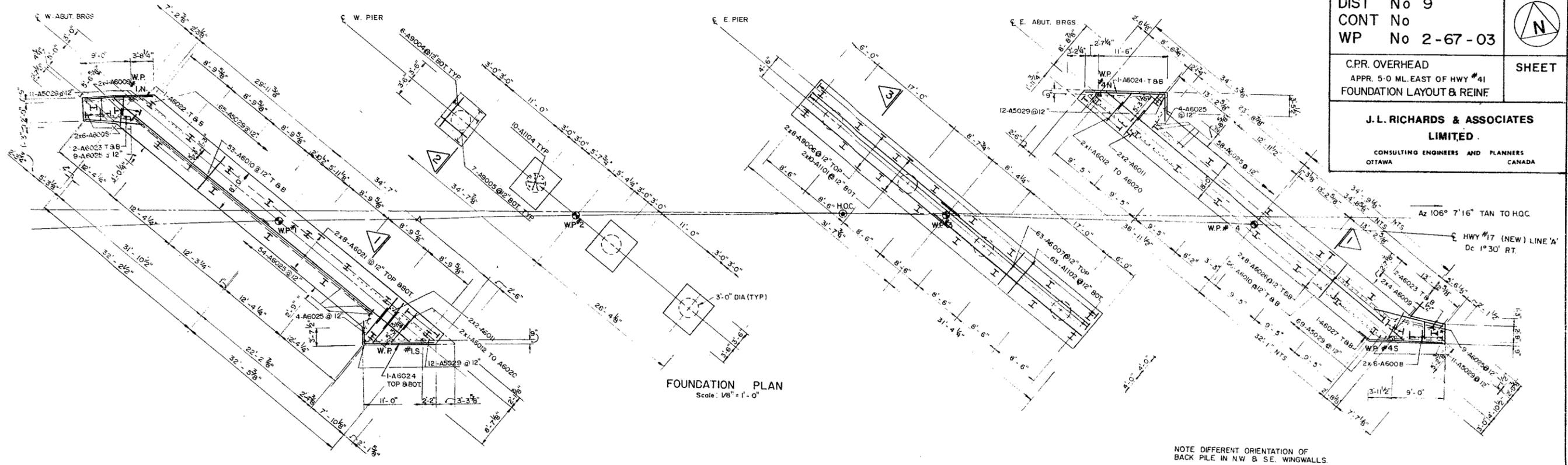
E-2500-1

E-2500-1

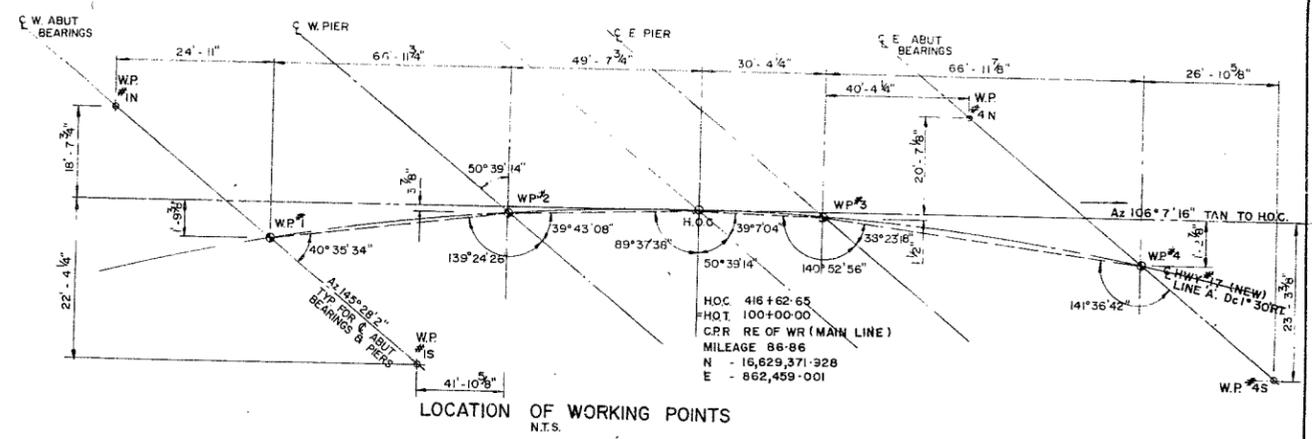
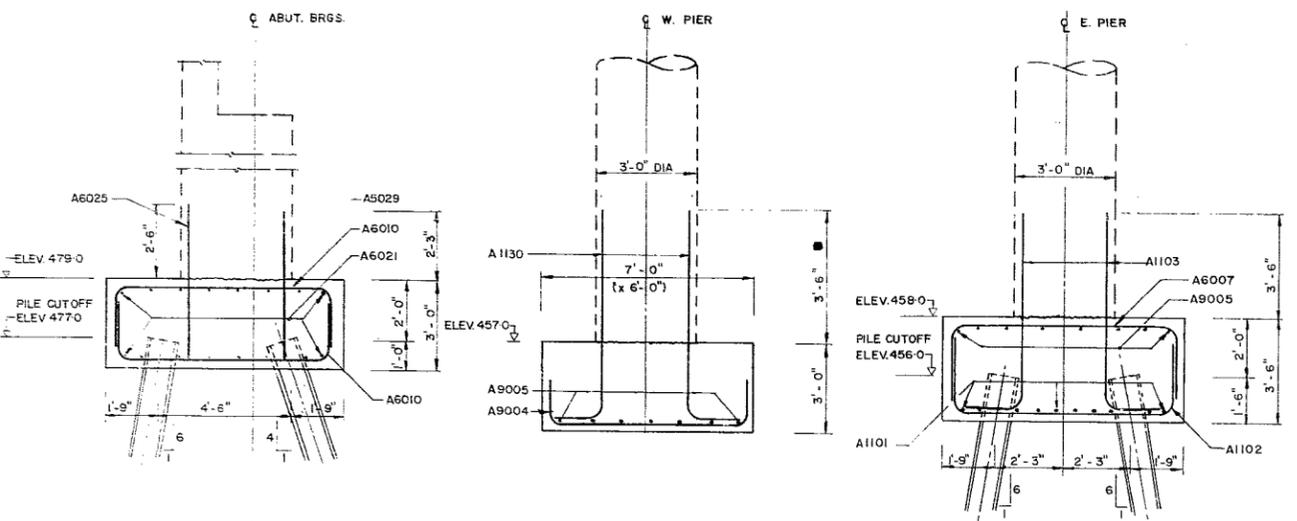
6/27/74 GLL

31F-81

DIST No 9	
CONT No	
WP No 2-67-03	
C.P.R. OVERHEAD APPR. 5.0 ML. EAST OF HWY #41 FOUNDATION LAYOUT & REIN.	
<b>J.L. RICHARDS &amp; ASSOCIATES                  LIMITED</b> CONSULTING ENGINEERS AND PLANNERS OTTAWA CANADA	



NOTE DIFFERENT ORIENTATION OF BACK PILE IN NW & SE. WINGWALLS.



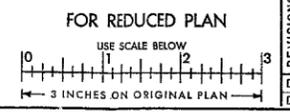
**PILE DATA**

LOCATION	No	TYPE	LENGTH
W. ABUT.	14	12HP53	25'
E. PIER	16	12HP53	13'
E. ABUT.	14	12HP53	22'

**NOTES:**  
 SPACING OF PILES TO BE MEASURED AT UNDERSIDE OF FOOTINGS  
 PILES TO BE DRIVEN TO BEDROCK  
 W. PIER FOOTING TO BE PLACED ON SOUND BEDROCK

**WORKING POINT COORDINATES**

LOCATION	PT.	N	E
WEST ABUTMENT	#1N	16,629,429.136	862,328.201
	#1S	16,629,402.603	862,346.458
WEST PIER	#2	16,629,375.872	862,364.892
	H.O.C.	16,629,371.928	862,459.001
EAST PIER	#3	16,629,363.385	862,488.124
EAST ABUTMENT	#4N	16,629,372.085	862,532.642
	#4S	16,629,343.707	862,552.170
	#5	16,629,315.068	862,571.878



REVISIONS	DATE	BY	DESCRIPTION

DESIGN LJM CHECK GAC LOADING HS 20-44 DATE JUL/77  
 DRAWING O.F. CHECK LJM SITE No 29-159 DWG 3



