DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Office,
Admin. Bldg.

From: Foundation Section,
Materials & Testing Office,
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

Date: November 20, 1969

Our File Ref.

In Reply to NOV 28 1969

Subject:

FOUNDATION INVESTIGATION REPORT
For
Proposed Crossing at Hwy. 417
Eastbound Lane and Westbound Lane
And Regional Road 8 Relocation
Twp. of Cumberland, Co. of Russell
District No. 9 (Ottawa)
W.J. 69-F-85 -- W.P. 34-66-16

Attached we are forwarding to you, our detailed foundation investigation report on the subsoil 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.

A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

AGS/MdeF
Attach.
cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
S. J. Markiewicz
C. R. Robertson
T. C. Kingsland (2)
J. E. Gruspier
B. A. Singh

Foundations Files
Gen. Files

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FOUNDATION INVESTIGATION REPORT
For
Proposed Crossing at Hwy. 417
Eastbound Lane and Westbound Lane
And Regional Road 8 Relocation
Twp. of Cumberland, Co. of Russell
District No. 9 (Ottawa)
W.J. 69-F-85 -- W.P. 34-66-16

1. INTRODUCTION:

The Foundation Section was requested to carry out a subsurface investigation at the site of the above mentioned proposed crossing. The request was contained in a memo from the Bridge Section (Mr. T. C. Kingsland, Regional Bridge Planning Engineer), dated September 19, 1969. An investigation was subsequently carried out by this Section in order to determine the subsoil and groundwater conditions at the site. This report contains the results of this investigation, together with our recommendations pertaining to the foundations of the proposed structure and the stability of the approach embankments.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site is located about 2 miles west of Vars, just south of the existing 2-lane paved Regional Road #8 which extends westerly from Vars. At this location, the ground surface is flat and generally poorly drained. The area is used for agricultural purposes.

Physiographically, the site is located within the "Russell and Prescott Sand Plains" region. The sand mantle, which covers a major portion of this physiographic region elsewhere, is absent at this site. The surficial deposit, instead, consists of "Leda Clay" which is followed by a glacial till deposit underlain by shale bedrock of the Lorraine Formation, Ordovician Period.

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3. FIELD AND LABORATORY WORK:

Nine sampled boreholes, seven of which were accompanied by dynamic cone penetration tests, were carried out at the site by means of three diamond drill rigs adapted for soil sampling purposes. In addition, two separate dynamic cone penetration tests were carried out in order to supplement the information from the boreholes.

Samples at the surface and within the glacial till deposit were obtained in a 2-inch O.D. split-spoon sampler, which was hammered into the soil in accordance with the specifications for the Standard Penetration Test. The same method was used to advance the dynamic cone penetration tests. The cohesive overburden was sampled with 2-inch I.D. Shelby tubes which were manually pushed into the soil. In addition, field vane tests were carried out to determine the undrained shear strength characteristics of the cohesive overburden. Bedrock was proven by diamond core drilling in AXT size in five of the boreholes.

The locations and elevations of all borings were surveyed by personnel from the Kingston Region Engineering Surveys Section, and are shown on Dwg. 69-F-85A, together with an estimated stratigraphical profile across the site. The elevations given in this report are referenced to a geodetic datum.

All the soil and rock core samples were subjected to a careful visual examination in the field and subsequently in the laboratory. Following this examination, laboratory tests were carried out on selected samples to determine the various physical properties of the subsoil, namely:

Natural Moisture Contents
Atterberg Limits
Bulk Densities
Grain-Size Distributions
Undrained Shear Strengths
Consolidation Characteristics

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3. FIELD AND LABORATORY WORK: (cont'd.) ...

The results of the various laboratory tests are plotted on the individual Record of Borelog sheets and are summarized on the Figures contained in the Appendix to this report.

4. SUBSOIL CONDITIONS:

4.1) General:

Underlying a surficial cover of topsoil across the site is a deposit of clay ranging in thickness between 7 and 19 ft. The clay deposit is underlain by an essentially granular type of glacial till deposit of 8 to 21 ft. thickness, which in turn is followed by sound shale bedrock, encountered across the site at depths of 23 to 31 ft. below the ground surface.

4.2) Clay:

Underlying a thin cover of topsoil or 4 ft. of fill material (B.H. 3) is a clay stratum ranging randomly in thickness between 19 ft. at Borehole 1, and 8 ft. at Borehole 6. The upper 3 to 4 ft. of this deposit contains some sand and exhibits reddish-grey to grey colour banding. The remainder of the deposit is generally grey in colour. Occasional very thin partings of silt and fine sand occur at random throughout the deposit.

The physical properties of the clay deposit, as determined by field and laboratory testing, are summarized below:

	Range	(Average)
Natural Moisture Content (W) - %	54 - 89	74
Liquid Limit (W_L) - %	57 - 87	72
Plastic Limit (W_P) - %	22 - 29	25
Liquidity Index (L_I)	0.8 - 1.4	1.1
Bulk Density (γ) - PCF	92 - 102	94

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

4.2) Clay: (cont'd.) ...

Undrained Shear Strength (C_u) - PSF:-

		Range (Avg.)	Sensitivity
i)	Field Vanes	480 - 800 (600)	4 - 16
ii)	Laboratory Vanes	460 - 770 (600)	3 - 7
iii)	Laboratory Tests	420 - 580 (500)	-

Consolidation Test:-

i)	Initial Void Ratio (e_o)	2.28
ii)	Compression Index (C_c)	1.5
iii)	Preconsolidation Pressure (P'_c)	0.9 TSF

The Atterberg limits are shown on the Plasticity Chart, Figure 1 in the Appendix, and indicate that the soil is highly plastic. The liquidity indices indicate that the soil is sensitive to remoulding and this is corroborated by the fact that the sensitivity of the soil, as measured in the field, was as high as 16. The average undrained shear strength of this deposit is 600 PSF, based on field and laboratory test results. The consistency of the overall deposit generally ranges between soft and firm.

One consolidation test on a representative sample indicates the deposit to have been preconsolidated above the existing effective overburden pressure by about 1200 to 1400 PSF. The compression index, C_c, from this test was found to be 1.5.

4.3) Heterogeneous Mixture of Silt, Sand and Gravel with a Trace to Some Clay (Glacial Till):

Underlying the clay stratum across the site is a glacial till deposit consisting of a heterogeneous mixture of silt, sand and gravel with a trace to some clay. The glacial till deposit

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

4.3) Heterogeneous Mixture of Silt, Sand and Gravel with a Trace to Some Clay (Glacial Till): (cont'd.) ...

was encountered between elevations 226 and 238 across the site; the thickness varied randomly between 8 and 21 ft.

The glacial till is essentially of a granular nature; however, at some locations, slightly cohesive zones were encountered below about elevation 219. The gravel sizes encountered within the glacial till deposit were found to be predominantly of shale origin.

Laboratory tests on representative samples indicate the moisture content of the overall deposit to range between 7 and 11 per cent. Atterberg limit tests on slightly cohesive samples indicate liquid and plastic limits of about 16 and 14 per cent, respectively. The grain-size distributions of the glacial till are shown on Figure 2 in the Appendix.

The Standard Penetration Resistance 'N' values in this deposit generally increased with depth, and ranged between 18 and 44 blows/ft. in the upper 5 ft. of the deposit, increasing to 100 blows/ft. with depth. These 'N' values indicate the relatively density of the deposit to range from compact to very dense, being generally dense. The slightly cohesive zones are considered to be of a generally hard consistency.

4.4) Shale Bedrock:

Shale bedrock with occasional limestone interbeds, was encountered across the site immediately below the glacial till deposit, at depths ranging from 23 to 31 ft. below the ground surface. The bedrock elevation across the site varies randomly between 215 and 223. Core recoveries were generally in excess of 75 per cent. Examination of the recovered rock cores indicates that the bedrock is basically sound throughout.

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5. GROUNDWATER CONDITIONS:

Water level observations carried out during the investigation, indicate that the groundwater level is situated about 4 ft. below t e ground surface across the site - i.e., at about elevation 242.

During the period of this investigation, some 2 inches of rainfall occurred in a period of about 4 days at the site. After this rainfall, the site was waterlogged, indicating poor surficial drainage over the general area.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to construct an underpass to carry relocated Regional Road #8 over the East and West Bound lanes of Hwy. #417 some 2 miles west of Vars. Based on a preliminary foundation investigation carried out by this Section (refer Foundation Report W.J. 68-F-88), the Bridge Planning Section proposed two alternate schemes, one incorporating stabilizing berms in the longitudinal direction and the other where fill heights would be restricted to a height at which berms would not be required. The respective structure spans for these schemes are shown on Drawing 69-F-85A at the rear of this report.

This investigation has revealed the presence of an 8 to 19 ft. thick stratum of soft to firm clay overlain by a thin cover of topsoil or fill material. The clay stratum is underlain by a granular type of glacial till deposit of some 8 to 21 ft. thickness, followed by shale bedrock encountered across the site at depths of 23 to 31 ft. below the ground surface.

Since the stability of the approach embankments is critical at this site, this will be discussed first:

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

6.2) Approach Embankments:

6.2.1) Stability Considerations -

Stability computations were carried out, with the use of an electronic computer, in terms of total stresses for circular arc type failure surfaces, incorporating a minimum factor of safety of 1.3. The properties of the fill material and subsoil used in these computations are shown on Figure 3 in the Appendix. These computations indicate that:

(a) fills up to 18 ft. in height will be stable if constructed with standard 2:1 slopes.

(b) fills in excess of 18 ft. in height will require half-height stabilizing berms in both the longitudinal and transverse directions. For example, fills 24 ft. in height will require half-height berms of 20 ft. in length.

(c) The berm length requirements for various heights of fill are given on Figure 3 in the Appendix, which also illustrates typical sections in the longitudinal and transverse directions.

6.2.2) Settlement Considerations -

Settlement computations indicate that the maximum consolidation settlement of the clay deposit will be in the order of about 1.5 ft. under a fill height of 24 ft. Since consolidation settlement is proportional to the thickness of the compressible layer, it is estimated that the maximum settlement will occur in the vicinity of Station 29+00 since the clay stratum is 16 ft. thick at this location. In the vicinity of Station 32+30, the total consolidation settlement under 24 ft. of fill will be about 1 ft.

It is estimated that about 50 per cent of the total consolidation settlement will be realized in a period of 6 to 9

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

6.2) Approach Embankments: (cont'd.) ...

6.2.2) Settlement Considerations - (cont'd.) ...

months after application of the embankment load and that the total settlements will be realized within a period of 5 years. These estimates of the time-rate of settlement are considered to be reasonable in view of our past experience with similar subsoil and embankment loading conditions.

Since settlements will occur in a relatively short period of time, consideration should be given to constructing the approach embankments well in advance of the structure foundations, if scheduling and other reasons permit. For example, if fills are constructed and left in place for 9 to 12 months, more than 50 per cent of the total consolidation settlement will be realized in this time period.

6.3) Structure Foundations:

Due to the presence of the compressible clay stratum immediately below the ground surface, it is recommended that the entire structure be supported on end-bearing piles driven to bedrock. The design loads will depend on the pile section chosen. For example, 12 BP 74 steel H-piles may be designed for 90 tons/pile. Care should be taken to ensure that no bouldery fill is placed in areas through which piles will be driven.

The pile caps should be provided with a minimum thickness of 5 ft. of soil cover for frost protection. Due to the relatively impermeable nature of the subsoil, no major dewatering problems are anticipated during construction of the pile caps.

In our opinion, a structure scheme incorporating stabilizing berms in both the longitudinal and transverse

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

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

directions would be acceptable from the foundation point of view, since settlements will not be a major problem.

7. MISCELLANEOUS:

The field work for this project was carried out during the period of October 30 - November 6, 1969, under the supervision of Mr. C. Mirza, Project Foundation Engineer, who also prepared this report.

The equipment was owned and operated by the F. E. Johnston Drilling Co. Ltd.

General supervision of the project and review of the report were undertaken by Mr. M. Devata, Supervising Foundation Engineer.

November 1969

APPENDIX I

FORM 08-MT-126 (REV 1969) OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB	69-F-85	LOCATION	Sta 26+39 ℄ Reg. Rd 8 Reloc'n. (Rev.) O/S 8' Rt	ORIGINATED BY	CM
W.P	34-66-[illegible]	BORING DATE	October 31, & November 5-6, 1969	COMPILED BY	CM
DATUM	Geodetic	BOREHOLE TYPE	Washboring, NX & BX Casing; Cone	CHECKED BY	[illegible]

ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS / FOOT
245.9	Ground Level				
0.0	Topsoil				
1.0	Clay		1	SS	4
	Soft to Firm		2	TW	PM
	Sensitive		3	TW	PM
	Grey		4	TW	PM
			5	TW	PM
225.9					
20.0	Glacial Till		6	SS	41
	Het. Mix of silt, sand & gravel (shale frag.) with Tr. to some clay		7	SS	68
214.9	Dense to V. Dense or Hard; Grey		8	SS	151
31.0	Shale Bedrock with Limestone Interbeds - Sound		9	AXT RC	75% Rec
208.1			10	AXT RC	100% Rec
37.8	End of Borehole				

ELEV SCALE

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT — 20 40 60 80 100

SHEAR STRENGTH P S F
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB. VANE
400 800 1200 1600 2000

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_p
WATER CONTENT —— w
w_p w w_L
WATER CONTENT %
25 50 75

BULK DENSITY
P C F

ELEV	SHEAR STRENGTH	WATER CONTENT	BULK DENSITY
240	+15, ×7, +16, ×6, +16 ●	○	93
		○	93
230	+11, ×6, +15		
		O H	
220			
210			
200			

REMARKS
GR. SA. SI. CL.

W.L. Elev 242.2

18-45-34-3

No recovery

FORM OB-MT-126 (REV. 1969) OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 69-F-85 LOCATION Sta. 27+41 ℄ Reg. Rd. 8 Reloc'n (Rev.) O/S 16' Lt. ORIGINATED BY CM
W.P. 34-66-16 BORING DATE October 31 & November 5, 1969 COMPILED BY CM
DATUM Geodetic BOREHOLE TYPE Washboring - BX Casing CHECKED BY

SOIL PROFILE ELEV. DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT	ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT — SHEAR STRENGTH P.S.F. ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB. VANE	LIQUID LIMIT w_L PLASTIC LIMIT w_P WATER CONTENT w — WATER CONTENT % 25 50 75	BULK DENSITY γ P.C.F.	REMARKS GR.SA.SI.CL.
246.0	Ground Level									
0/0	Topsoil									
1.0	Clay Grey		1	SS	4	240				W.L. Elev 242.0
227.5						230				
18.5	Glacial Till Het. Mix of Silt, sand & gravel (Shale frag.) with tr. to some clay Dense to V. Dense		2	SS	44			O H		28-48-21-3
			3	SS	79					
217.3	Grey		4	SS	226/10"	220				Practical Refusal
28.7	End of Borehole Probably Bedrock									
						210				

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2 A

FOUNDATION SECTION

JOB 69-F-85 LOCATION Sta. 27+38 ℄ Reg. Rd. 8 Reloc'n (Rev.) O/S 11' Rt ORIGINATED BY CM
W.P. 34-66-16 BORING DATE October 31, 1969 COMPILED BY CM
DATUM Geodetic BOREHOLE TYPE Dynamic Cone Penetration Test CHECKED BY

ELEV / DEPTH	SOIL PROFILE DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FOOT
246.0	Ground Level				
0.0	Probably Clay				
228.0					
18.0	Probably Glacial Till				
217.1					
28.9	End of Cone Test Probably Bedrock				

ELEV SCALE

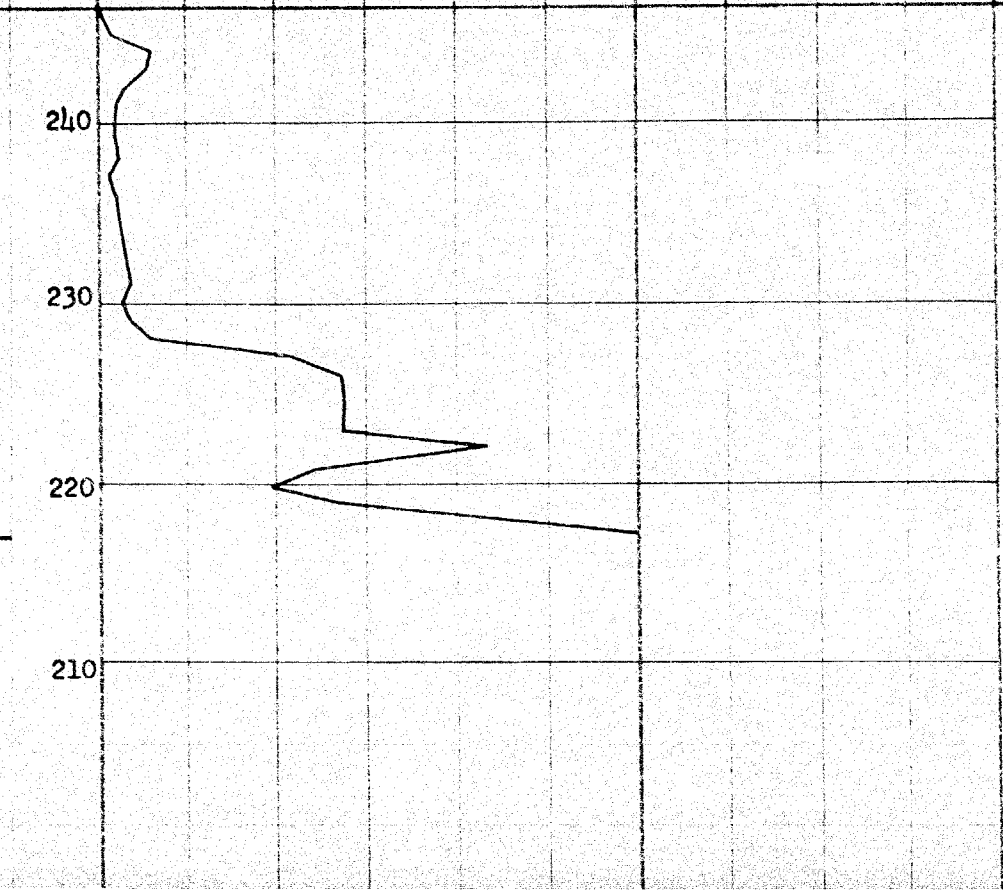
DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT
20 40 60 80 100

SHEAR STRENGTH P.S.F.
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB. VANE

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_p
WATER CONTENT —— w
w_p w w_L
WATER CONTENT %

BULK DENSITY γ P.C.F.

REMARKS
GR. SA. SI. CL.



Practical Refusal

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 69-F-85 LOCATION Sta. 28+48 ℄ Reg. Rd. 8 Reloc'n (Rev.) O/S 1' Rt ORIGINATED BY CM
W.P. 34-66-16 BORING DATE October 31 & November 4-5, 1969 COMPILED BY CM
DATUM Geodetic BOREHOLE TYPE Washboring-NX, BX & AX Casings; Cone CHECKED BY

ELEV. / DEPTH	SOIL PROFILE DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE
247.5	Ground Level					
0.0	Fill Material					
243.5	Clayey silt with sand & some gravel - Firm		1	SS	5	
4.0			2	TW	PM	
	Clay					240
	Soft to Firm		3	TW	PM	
	Sensitive		4	TW	PM	
	Grey		5	TW	PM	
229.2						230
18.3	Glacial Till		6	SS	30	
	Het. Mix of silt, sand & gravel (shale frag) Dense to V. Dense Grey					
	Zone of Het. mixture of clayey silt, sand & gravel below el 219.0		7	SS	52	220
216.0	Hard; Dark Grey		8	SS	68	
31.5	Shale Bedrock with Limestone Interbeds			AXT	Rec	
			9	RC	60%	
	Sound		10	AXT	71%	210
	Occ. fractured zones			AXT	Rec	
204.7			11	RC	90%	
42.8	End of Borehole					200

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT
20 40 60 80 100

SHEAR STRENGTH P.S.F.
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB. VANE
400 800 1200 1600 2000

+3
+9
+6
+10

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w
w_P w w_L
WATER CONTENT %
25 50 75

BULK DENSITY γ P.C.F.	REMARKS GR. SA. SI. CL.
	W.L. 243.0
93	
97	
	16-53-30-1

FORM OB-MT-126 (REV 1969) OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 69-F-85
W.P. 34-66-16
DATUM Geodetic

LOCATION Sta. 29+29 ℄ Reg. Rd. 8 Reloc'n (Rev.) O/S 21' Rt.
BORING DATE October 30 & November 4 1969
BOREHOLE TYPE Washboring - BX Casing; Cone

ORIGINATED BY CM
COMPILED BY CM
CHECKED BY

ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT
246.3	Ground Level				
0.0	Top Soil				
1.0	Clay Firm Grey		1	SS	7
230.3					
16.0	Glacial Till Het. Mix of silt, sand & gravel (Shale frag.) Dense - Grey		2	SS	40
			3	SS	36
	Zone of het. mix of clayey silt, sand & gravel below El 219		4	SS	46
215.5	Hard; dark grey		5	SS	100
30.8	End of Borehole Probably Bedrock				

ELEV. SCALE: 240, 230, 220, 210

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT — 20 40 60 80 100

SHEAR STRENGTH P.S.F.
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB. VANE

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w
w_P w w_L
WATER CONTENT % — 25 50 75

BULK DENSITY γ P.C.F.

REMARKS
GR. SA. SI. CL.

▼ W.L. 242.1

44-27-28-1

Drill with Bicone Bit

Refusal to Bicone Bit

FORM OB-MT-126 (REV. 1969) OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 69-F-85 LOCATION Sta. 30+74 ℄ Reg. Rd. 8 Reloc'n (Rev.) 0/S 10' Lt. ORIGINATED BY CM
W.P. 34-66-16 BORING DATE November 5, 1969 COMPILED BY CM
DATUM Geodetic BOREHOLE TYPE Washboring - BX Casing CHECKED BY

SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE
246.3	Ground Level					
0.0	Top Soil					
1.0	Clay		1	SS	3	240
	Soft					
236.3	Grey					
10.0	Glacial Till		2	SS	50	
	Het. mix of silt, sand & gravel (shale fragments) with trace to some clay					230
	- V. Dense					
	Grey					220
215.3	Shale Bedrock with		3	AXT RC	Rec 100%	
214.5	Limestone Interbeds, sound)					
31.8	End of Borehole					210

DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT

SHEAR STRENGTH P.S.F.
o UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB. VANE

LIQUID LIMIT w_L
PLASTIC LIMIT w_P
WATER CONTENT w
w_P — w — w_L
WATER CONTENT %
25 50 75

o

BULK DENSITY γ P.C.F.

REMARKS GR. SA. SI. CL.

W.L. 242.3

28-32-35-5

Drill with Bicone Bit

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 5 A

FOUNDATION SECTION

JOB 69-F-85 LOCATION Sta. 30+74 ℄ Reg. Rd. 8 Reloc'n (Rev.) 0/S 10' Rt ORIGINATED BY CM
W.P. 34-66-16 BORING DATE October 31, 1969 COMPILED BY CM
DATUM Geodetic BOREHOLE TYPE Dynamic Cone Petration Test CHECKED BY

SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FOOT	ELEV. SCALE
246.2	Ground Level					
0.0	Probably Clay					
238.2						240
8.0	Probably Glacial Till					
232.3						230
13.9	End of Cone Test					

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT — 20 40 60 80 100

SHEAR STRENGTH P.S.F.
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB. VANE

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w

w_P — w — w_L

WATER CONTENT %

BULK DENSITY γ P.C.F.

REMARKS

GR. SA. SI. CL.

Practical Refusal

FORM OB-MT-126 (REV 1969) OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 6

FOUNDATION SECTION

JOB 69-F-85 LOCATION Sta. 32+01 ℄ Reg. Rd. 8 Reloc'n. (Rev.) O/S 10' Lt. ORIGINATED BY CM

W.P. 34-66-16 BORING DATE October 30 & November 4, 1969 COMPILED BY CM

DATUM Geodetic BOREHOLE TYPE Washboring - EX Casing; Cone CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE
246.4	Ground Level					
0.0	Top Soil					
1.0	Clay Firm Grey		1	SS	5	240
237.9						
8.5	Glacial Till Het. Mix of silt, sand & gravel (shale fragments) with traces to some clay Compact to V. Dense Grey		2	SS	22	
			3	SS	43	230
			4	SS	108	
			5	SS	60/6"	220
216.9						
29.5	End of Borehole Probably Bedrock					210

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT
20 40 60 80 100

SHEAR STRENGTH P.S.F.
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB. VANE

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_o
WATER CONTENT —— w

WATER CONTENT %
25 50 75

BULK DENSITY γ P.C.F.

REMARKS

GR. SA. SI. CL.

W.L. 242.4

26-38-33-3

Drill with Bicone Bit

Refusal to Bicone Bit

FORM OB-MT-126 (REV. 1969) OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 7

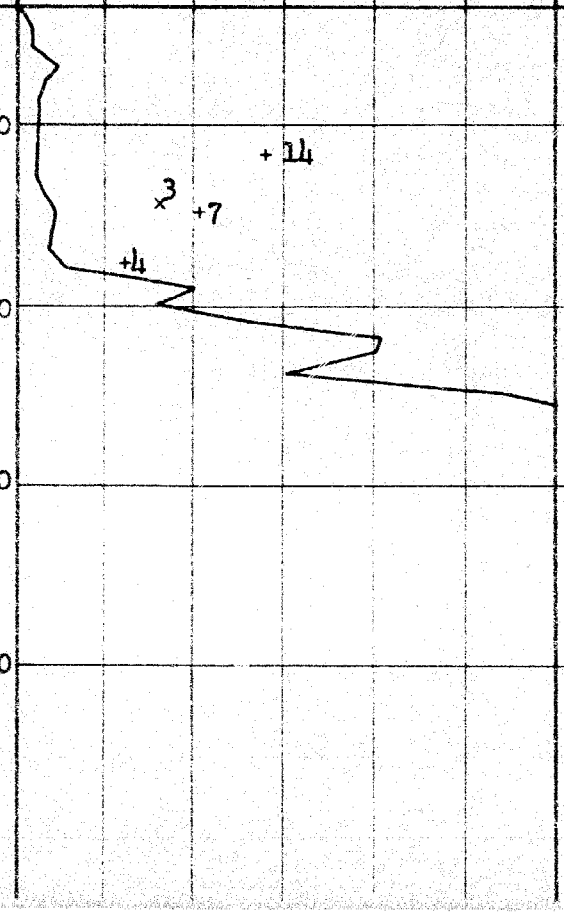
FOUNDATION SECTION

JOB 69-F-85 LOCATION Sta. 32+95 ℄ Reg. Rd. 8 Reloc'n (Rev.) 0/S 25' Rt. ORIGINATED BY CM
W.P. 34-66-16 BORING DATE October 30 & November 3, 1969 COMPILED BY CM
DATUM Geodetic BOREHOLE TYPE Washboring - NX & BX Casing; Cone CHECKED BY

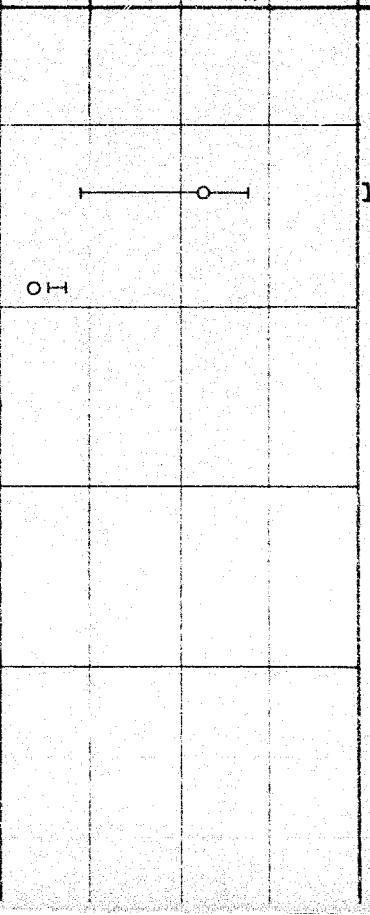
SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT
246.2	Ground Level				
0.0	Top Soil		1A	CS	
1.0	Clay Stiff to soft Sensitive Grey		1	TW	PM
			2	TW	PM
			3	TW	PM
231.7					
14.5	Glacial Till Het. Mix of clayey silt, sand & gravel (shale fragments) Hard Dark Grey		4	SS	26
			5	SS	58
221.0			6	SS	100/2"
25.2	Shale Bedrock with Limestone Interbeds Sound			AXT	Rec
216.0			7	RC	92%
30.2	End of Borehole				

ELEV. SCALE

DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT
20 40 60 80 100
SHEAR STRENGTH P.S.F.
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB. VANE
400 800 1200 1600 2000



LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w
w_P w w_L
WATER CONTENT %
25 50 75



BULK DENSITY γ P.C.F.	REMARKS GR. SA. SI. CL.
	W.L. 242.8
102	
	38-34-23-5
	No Recovery

FORM OB-MT 26 (REV 1969) OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 8

FOUNDATION SECTION

JOB 69-F-85 LOCATION Sta. 33+80 ℄ Reg. Rd. 8 Reloc'n (Rev.) ORIGINATED BY CM
W.P. 34-66-16 BORING DATE October 30 & November 4, 1969 COMPILED BY CM
DATUM Geodetic BOREHOLE TYPE Washboring - BX Casing; Cone CHECKED BY

ELEV / DEPTH	SOIL PROFILE DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100 / SHEAR STRENGTH PSF ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB. VANE	LIQUID LIMIT w_L / PLASTIC LIMIT w_p / WATER CONTENT w / WATER CONTENT % 25 50 75	BULK DENSITY γ P.C.F.	REMARKS GR.SA.SI.CL.
246.2	Ground Level									
0.0	Top Soil									
1.0	Clay Firm Grey		1	SS	5	240				W.L. 242.5
230.2										
16.0	Glacial Till Het. mix of silt, sand & gravel (shale frag.) with tr. to some clay		2	SS	38	230		OH		17-49-32-2
			3	SS	53					
222.1	Dense to V dense Grey		4	SS	100/1"					No recovery
24.1	End of Borehole Probably Bedrock					220				Practical Refusal

FORM OB-MT-126 (REV 1969) OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 9

FOUNDATION SECTION

JOB 69-F-85 LOCATION Sta. 34+77 ℄ Reg. Rd. 8 Reloc'n. (Rev.) O/S 21' Lt. ORIGINATED BY CM
W.P. 34-66-16 BORING DATE October 30-31st, November 3, 1969 COMPILED BY CM
DATUM Geodetic BOREHOLE TYPE Washboring - NX & BX Casings; Cone CHECKED BY

SOIL PROFILE ELEV. / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT
246.2	Ground Level				
0.0	Top Soil		1	SS	8
1.2	Clay		2	SS	14
	Firm		3	SS	15
	Sensitive				
	Grey		4	TW	PH
235.7			5	TW	PH
10.5	Glacial Till		6	SS	18
	Het. mix of silt sand & gravel (shale frag.) with tr. to some clay		7	SS	124
	Compact - V. Dense				
223.7	Grey		8	SS	69
22.5	Shale Bedrock with Limestone Interbeds - Sound		9	AXT RC	Rec 75%
	Occ fractured zones		10	AXT RC	Rec 74%
214.2					
32.0	End of Borehole				

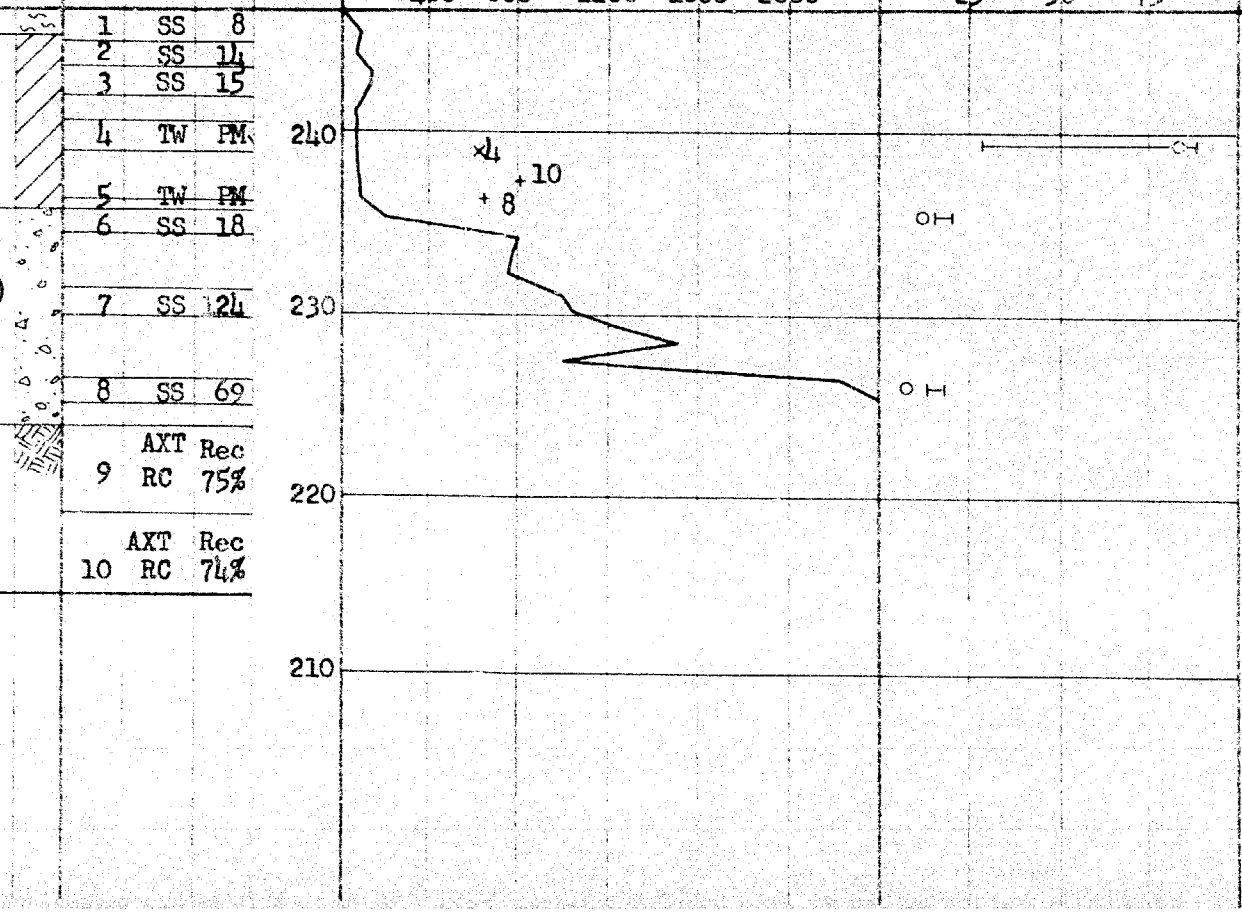
ELEV SCALE

DYNAMIC PENETRATION RESISTANCE
BLOWS / FOOT
20 40 60 80 100
SHEAR STRENGTH P.S.F.
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
400 800 1200 1600 2000

LIQUID LIMIT w_L
PLASTIC LIMIT w_p
WATER CONTENT w
WATER CONTENT %
25 50 75

BULK DENSITY P.C.F.

REMARKS
GR. SA. SI. CL.

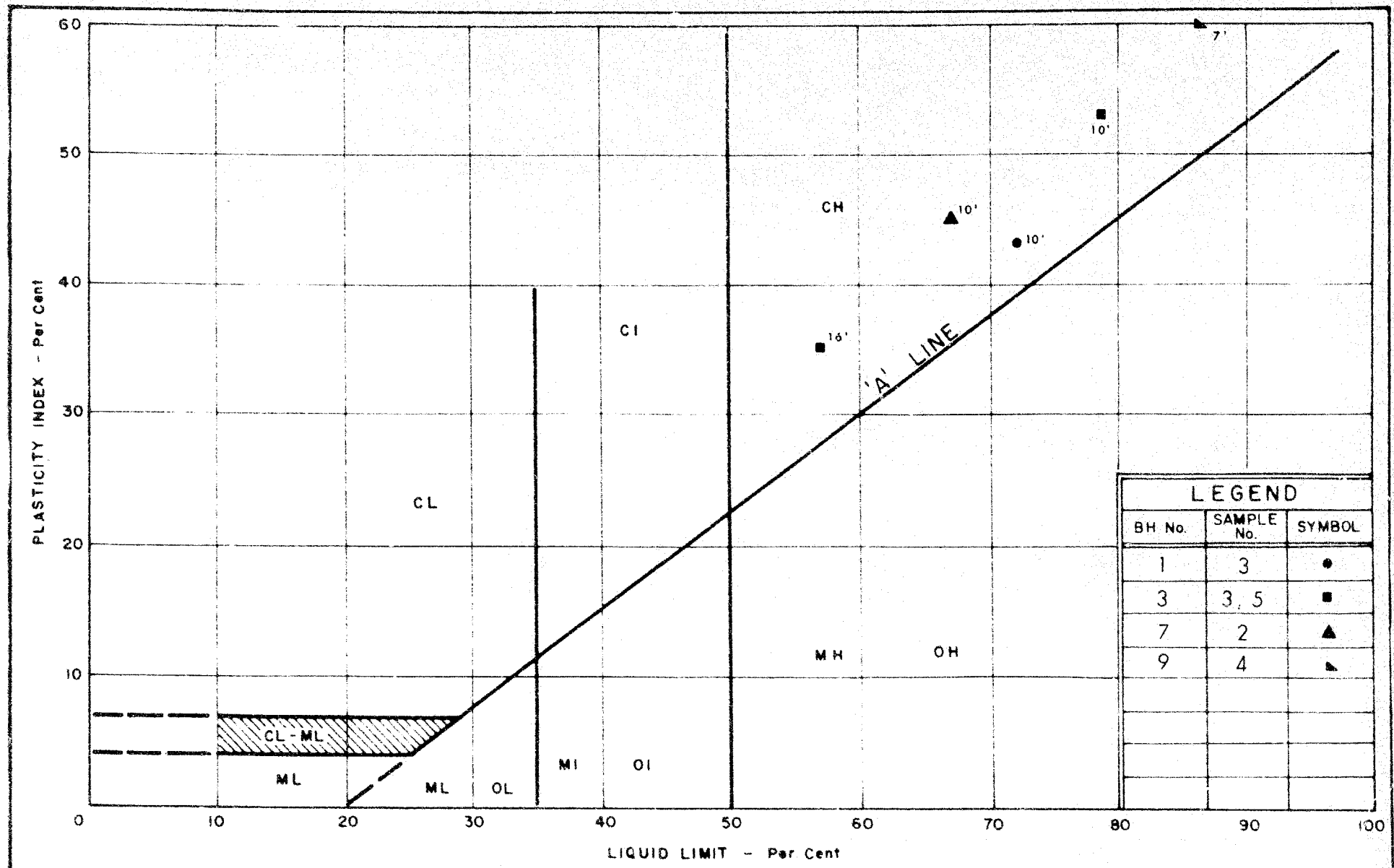


W.L. 242.2

No recovery 13-39-46-2

18-42-36-4

FORM OB-MT-252
REVISED JUL[illegible] 1966



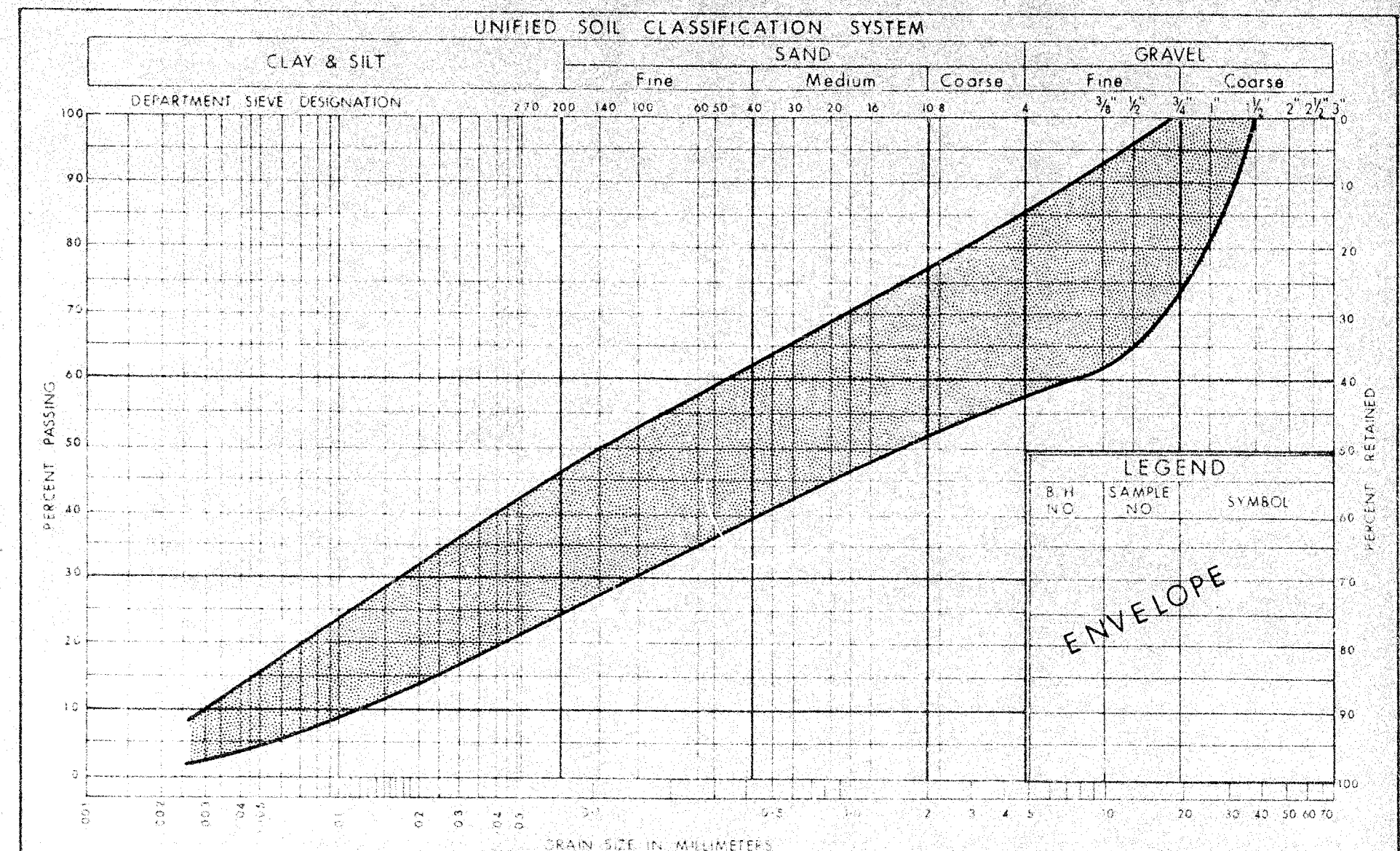
DEPARTMENT OF HIGHWAYS
MATERIALS and TESTING DIVISION

PLASTICITY CHART

CLAY

W.P. No. 34-66-16
JOB No. 69-F-85
Fig NO. 1

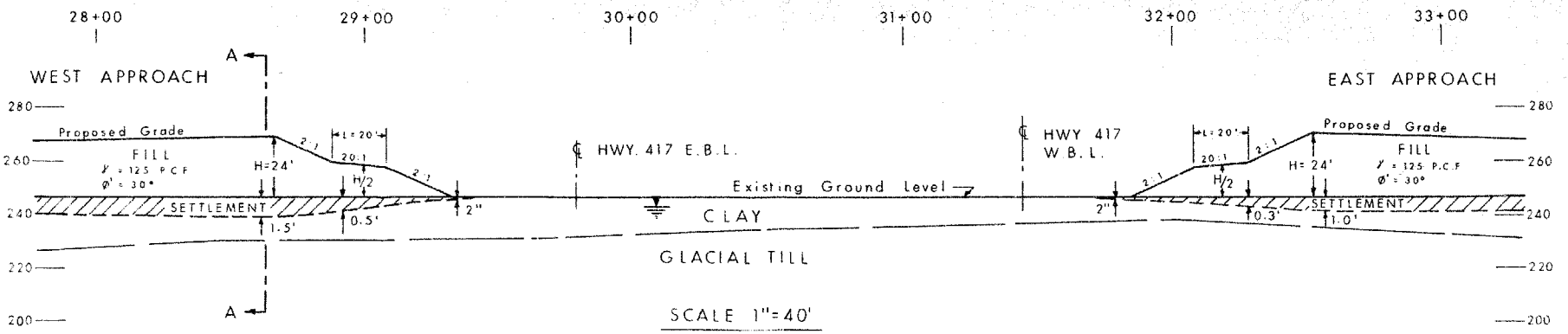
FORM DB MT - 17
REV APR 1965



DEPARTMENT OF HIGHWAYS
MATERIALS and TESTING DIVISION

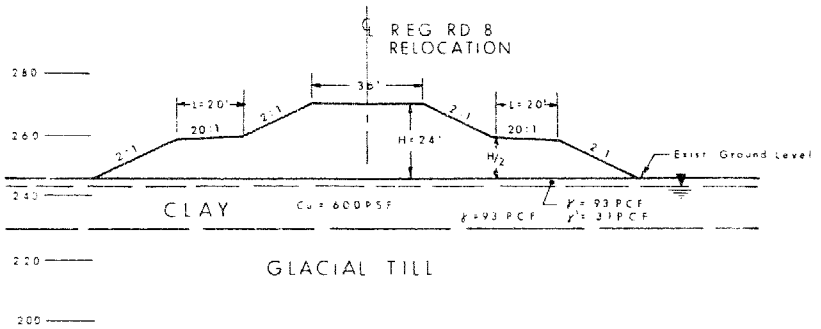
GRAIN SIZE DISTRIBUTION
GLACIAL TILL

W P No. 34 - 66 - 16
JOB No. 69 - F - 85
Fig. NO. 2

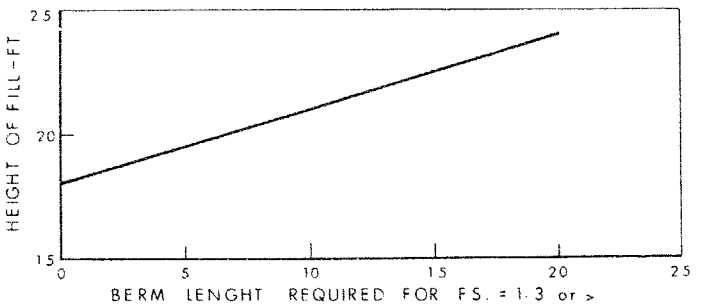


SCALE 1"=40'

℄ PROFILE REGIONAL ROAD 8 RELOCATION
LONGITUDINAL BERM REQUIREMENTS



SECTION A-A



BERM LENGTH REQUIREMENT VS. HEIGHT OF FILL
(LONGITUDINAL & TRANSVERSE DIRECTION)

DEPARTMENT OF HIGHWAYS ONTARIO — MATERIALS and TESTING DIVISION	SUMMARIZED RESULTS OF STABILITY & SETTLEMENT ANALYSES APPROACH EMBANKMENTS W.P. 34-66-16 DIST 9 W.P 69-F-85	
DATE Nov. 24, 1969	APPROVED	Fig. NO. 3

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 :-

CONSISTENCY	'N' BLOWS / FT.	c LB. / SQ. FT.	DENSENESS	'N' BLOWS / FT.
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_u	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Q_{cu}	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q_d	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	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
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF EFFECTIVE STRESS $\tau_f = c' + \sigma' \tan \phi'$
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
	IN TERMS OF TOTAL STRESS $\tau_f = c_u + \sigma \tan \phi$
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	= 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
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ε	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNGS MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

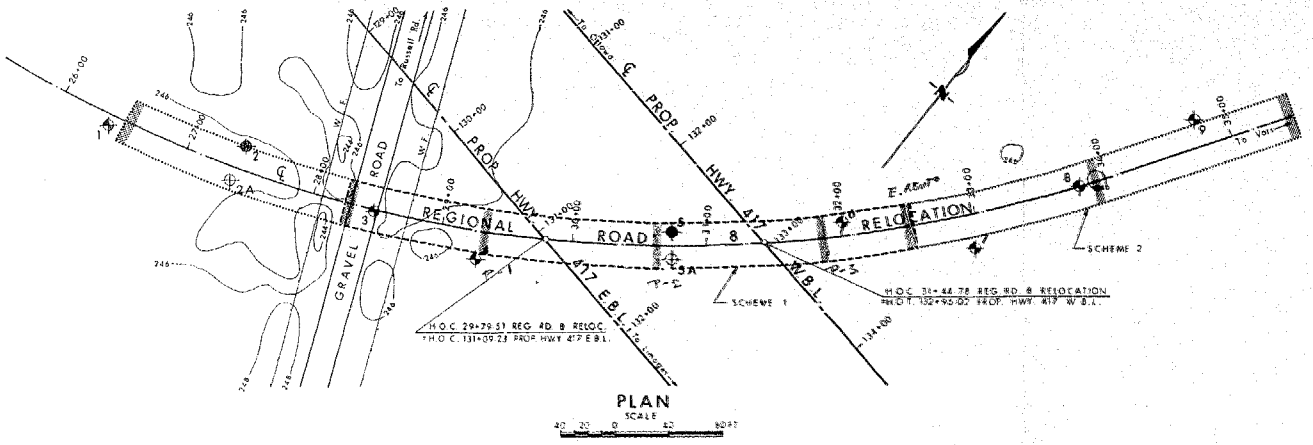
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_o	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

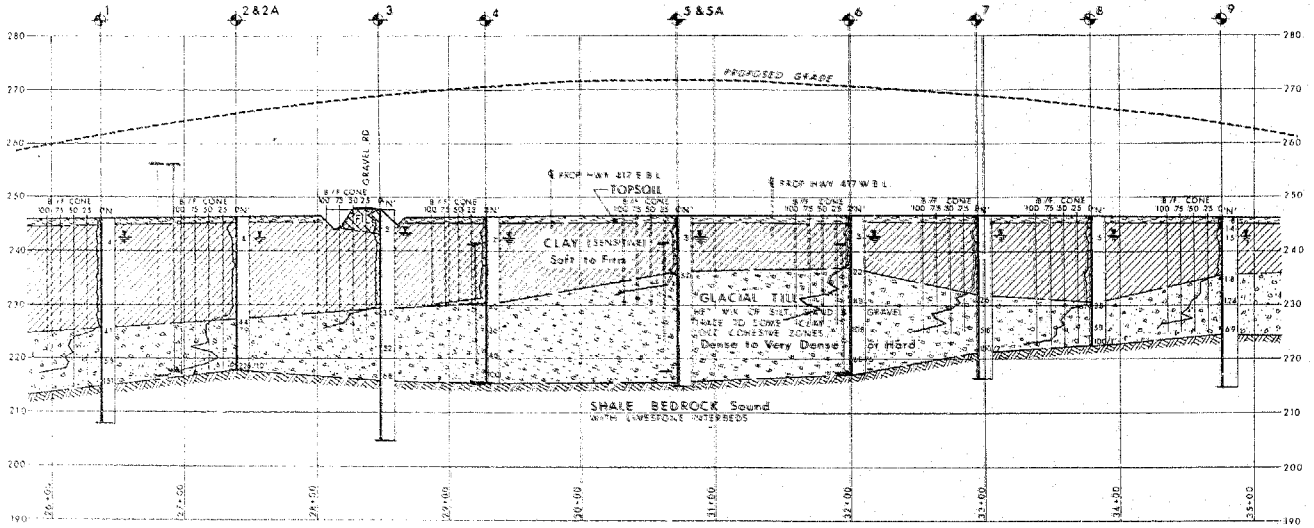
B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY. DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

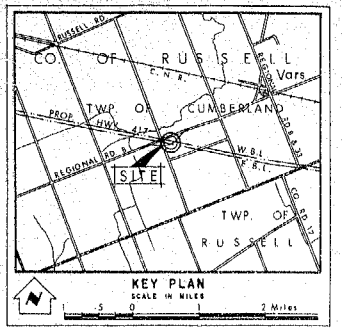
H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL



PLAN
SCALE
40 20 0 40 80 FT



PROFILE
SCALES
HORIZ. 40 20 0 40 80 FT
VERT. 10 5 0 10 20 FT



LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation. Oct. and Nov. 1969

NO.	ELEVATION	STATION	OFFSET
1	245.4	26+39	8' RT.
2	246.0	27+41	16' LT.
2A	246.0	27+38	11' RT.
3	247.5	28+48	1' RT.
4	246.3	29+29	23' RT.
5	246.3	30+74	10' LT.
5A	246.2	30+74	10' RT.
6	246.4	32+01	10' LT.
7	246.2	32+95	25' RT.
8	246.2	33+80	℄
9	246.2	34+77	21' LT.

- 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.

PRINT RECORD

NO	YOM	DATE

REVISIONS

DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE - FOUNDATION SECTION

REGIONAL RD. 8 RELOCATION

KING'S HIGHWAY NO. 417 DIST NO. 9
CO. RUSSELL
TWP. CUMBERLAND LOT 26 CON. VIII & IX

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D C.M.	CHECKED	W.P. NO. 34-66-16	M.B.T. DRAWING NO. 69-F-85A
DRAWN	CHECKED	JOB NO. 69-F-85	
DATE Nov. 19, 1969		SITE NO.	BRIDGE DRAWING NO.
APPROVED		CONT NO	

REF. NO. E-4676-1

FIELD RECONNAISSANCE REPORT 69F85

FF-69
SEPT. 1968

REQUIRED BY FOUNDATION SECTION
FOR

W.P. NO. 34-66-16 HIGHWAY NO. 417 DISTRICT 9 SITE PLAN NO. E-4676-1 PROFILE NO. 9FP48
RIVER CROSSING ☐ GRADE SEPERATION ☒ R.R.X. ☐ OTHER (SPECIFY) _____
ALTERNATE SCHEME (IF ANY) _____

EXISTING SITE CONDITIONS

DESCRIPTION:

TOPOGRAPHY: HILLY ☐ ROLLING ☐ VALLEY ☐ GULLIED ☐ FLAT ☒
VEGETATION: TREES ☐ BRUSH ☐ GRASS ☒ SWAMP ☐ FARM CROPS ☐ CLEARED ☐
SNOW COVER: 0"-6" ☐ 6"-12" ☐ >12" ☐
ROCK OUTCROP (SPECIFY LOCATIONS) None

UNDERGROUND UTILITIES: UTILITY COMPANY TELEPHONE NO. FOR DEFINITE LOCATION

1 None
2 _____
Aerial 3 Hydro wires along Regional Road #8
4 _____
5 _____

EXISTING STRUCTURE(S): None

FOUNDATIONS: SPREAD FOUNDATIONS ☐ SIZE _____ ELEVATION(S) _____
PILES ☐ TYPE _____ LENGTH(S) _____
DESIGN LOAD _____ T.S.F. _____ TONS/PILE
CONDITION OF STRUCTURE _____

APPROACHES: CUT ☐ FILL ☐ SIDE SLOPES _____
BERMS YES ☐ NO ☐

OTHER OBSERVATIONS (USE BACK OF SHEET TO DESCRIBE ANY FAILURES IN AREA, PAST PERFORMANCE OF EXISTING APPROACHES & STRUCTURE, ETC.)

ACCESSIBILITY

IS STRUCTURE LOCATED ON D.H.O. RIGHT OF WAY? YES ☐ NO ☒ IF NO,
HAS PERMISSION BEEN OBTAINED TO ENTER PROPERTY? YES ☒ NO ☐ IF NO,
PROPERTY OWNER(S):

	NAME	ADDRESS	TELEPHONE NO.
1			
2			
3			
4			

WHO WILL OBTAIN NECESSARY PERMISSION? _____
HAS SITE BEEN SURVEYED & STAKED? YES ☒ NO ☐ IF YES, DATE OF MOST RECENT SURVEY _____
WILL CLEARING BE NECESSARY TO ENTER SITE AREA? YES ☐ NO ☒
IS SITE ACCESSIBLE TO WHEELED VEHICLES? YES ☒ NO ☐

IF RIVER CROSSING: N/A
WILL A RAFT BE NECESSARY? YES ☐ NO ☐ IF YES, GIVE MAX. DEPTH OF WATER _____ FT.
CURRENT: SWIFT ☐ MODERATE ☐ SLOW ☐

DRILLING OPERATIONS

NEAREST SOURCE OF WATER (GIVE HAULING DISTANCE, IF KNOWN) Creek near site, 0.2 mi.
ADDITIONAL INVESTIGATION REQUIRED FOR THE FOLLOWING PURPOSES:
ALTERNATE SCHEME: YES ☐ NO ☐ IF YES, SPECIFY _____
HYDROLOGIC REASONS: YES ☐ NO ☐ IF YES, SPECIFY (SCOUR, ETC.) _____

REMARKS

NEAREST AVAILABLE ACCOMODATION: Crysler Hotel, Crysler.
OTHER COMMENTS: _____

DATE September 19, 1969.
REGIONAL BRIDGE ~~LOCATION~~ PLANNING ENGINEER E.C. Kenyon

69-F-83
-84
-85

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

From: Bridge Section,
Kingston, Ontario.

Attention: Mr. M. Devata,
Supervising Foundation Engr.

Date: October 20, 1969.

Our File Ref.

In reply to

Subject: W.P. 35-66-07, Site 27-207 - Co. Rd. 17 Interchange Underpass
W.P. 35-66-09, Site 27-206 - Co. Rd. 5 Interchange Underpass
W.P. 34-66-16, Site 27-198 - Sideroad to Vars Underpass
Highway 417, District 9

Further to my foundation requests dated September 19, 1969, I confirm that the following are the revised locations for the required boreholes at the above structures. I shall be glad if you will amend your copies of the plans accordingly. The chainages listed relate to the respective centre lines of the structures.

	Borehole Chainage	Borehole Chainage	
		Str. with Berms	Str. without Berms
W.P. 35-66-07 (Plan E-4677-1)	29 + 27 30 + 64 31 + 91		
W.P. 35-66-09 (Plan E-4678-1)		29 + 01 30 + 64 32 + 22	28 + 43 29 + 56 30 + 64 31 + 72 33 + 00
W.P. 34-66-16 (Plan E-4676-1)		28 + 44 29 + 35 30 + 80 32 + 12 32 + 97	26 + 40 27 + 44 28 + 44 29 + 35 30 + 80 32 + 12 32 + 97 33 + 87 34 + 85

T. C. Kingsland
Regional Bridge Planning Engineer

TCK/hl
c.c.
Bridge Office Files Section (Mr. S. McCombie)
Mr. K. Bassi

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

From: Bridge Section,
Kingston, Ontario.

Attention: Mr. M. Devata

Date: November 14, 1969.

Our File Ref.

In reply to

Subject: W.P. 34-66-16, Site 27-198,
Sideroad to Vars Underpass,
(1.8 Miles West of Vars),
Highway 417, District 9

Further to my letter of September 19, 1969, I now enclose two prints of revised Bridge Site Plan E-4676-1 on which we have marked the revised column and abutment locations to conform to the new line for the Sideroad to Vars which now has a 6° instead of the 7° curve shown on the original drawing.

I will let you know at a later date if boreholes additional to those already carried out need to be arranged.

T. C. Kingsland
Regional Bridge Planning Engineer

TCK/hl
Encls.

c.c. Bridge Office Files Section (Mr. S. McCombie)
Mr. R. Forrest
Mr. K. Bassi (with Plan for Bridge Office Files)

69-F-85

OK

MX DOWN JULY 10/73 1:30P VR

OTTA 9 - J A CRUICKSHANK - DIST CONSTR ENGR

ATTN: G MULLINS

00341

KINR 4 - CC : H MYERS - REGN'L MATERIALS OFFC

RE : HIGHWAY 417 UNDERPASS W.P.34-66-16.

THIS IS TO CONFIRM OUR DISCUSSION FOR W.P.34-66-16 DATED JULY 10/73. THE FORWARD SLOPES SHOULD BE MAINTAINED AS DESIGNED (3 3/4 HORIZONTAL TO 1 VERTICLE).

P PAYER - SR FOUNDATIONS ENGR, FOUNDATIONS OFFC

HCA

SUMMARY OF PILE DRIVING RECORDS

W.O. 69-F-85 W.P. 34-66-16 CONT. 72-62 DIST. 9

SITE HWY 417 ℄ REC. DR. # 8

DATE DRIVEN JULY 1972 WEIGHT OF ANVIL 500 LBS.

HAMMER TYPE GRAVITY DROP WEIGHT 2.5 TON ENERGY 25,000 - 40,000 FT. LBS.

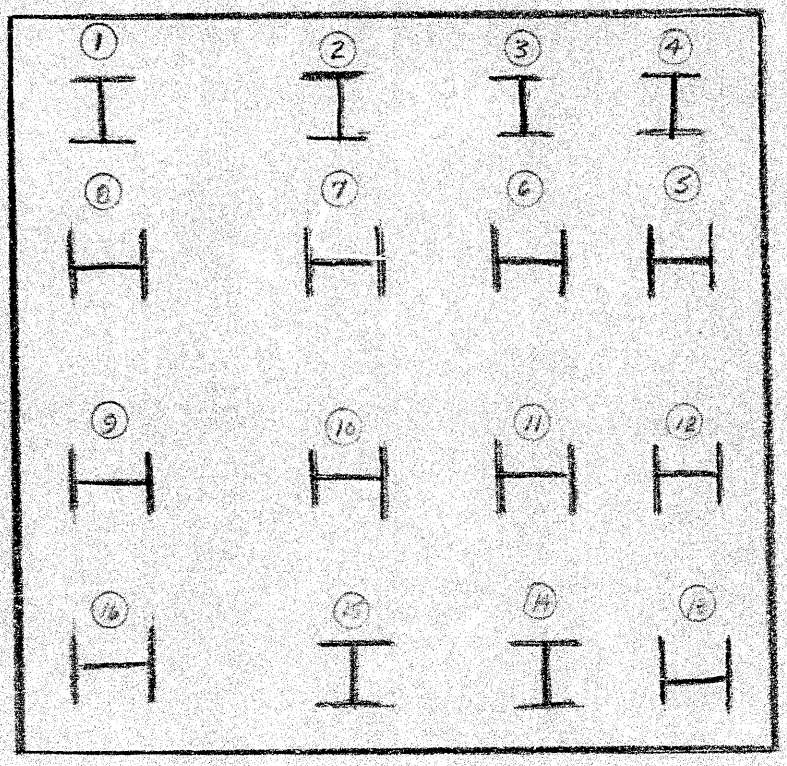
LOCATION OF PILES	PILE				ESTIMATED TIP EL. (ft.)	DIFFERENCE Longer(+) Shorter(-) Than Estimated (ft.)	REMARKS
	TYPE	NO.	LENGTH (ft.)	TIP EL. (ft.)			
PIER #1	12-BP-74	13	25.8	215.7	215 - 223	—	DRIVEN TO REFUSAL
PIER #2	〃	10	23.6	217.9	〃	—	
PIER #3	〃	10	24.1	217.4	〃	—	
WEST ABUTMENT	〃	5	38.3	217.7	〃	—	
〃	〃	22	39.1	216.9	〃	—	

SIDE ROAD to VARS UNDERPASS

CONTRACT

N

NORTH FOR CONSTRUCTION



PIER No 1

Form OB-MT-285 OVER

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
FOUNDATION SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 72-62 STRUCTURE SIDE ROAD 20 VARS. / COUNTY ROAD NO 8. BRIDGE

CONTRACTOR PEEL CONSTRUCTION CO DESIGN LOAD OF PILE 90 TONS

HAMMER DETAILS: TYPE GRAVITY DROP WEIGHT 2½ TONS HEIGHT OF FALL OR ENERGY 5'-6

TYPE OF ANVIL OR CAP _____ WEIGHT OF ANVIL OR CAP 5004 LBS

PILE DETAILS 12BP. x 74 H. PILES

PILE NO. 13 LOCATION PIER NO 1 DATE DRIVEN July 26/72

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
30'	1	1		26	13		51			76	
	2	3		27	14		52			77	
	3	3		28	13		53			78	
	4	1		29	19	PILE	54			79	
	5	2		30	34		55			80	
	6	1		31		NOT	56			81	
	7	2		32		DRIVEN	57			82	
	8	1		33			58			83	
	9	1		34			59			84	
	10	1		35			60			85	
	11	1		36			61			86	
	12	1		37			62			87	
	13	1		38			63			88	
	14	1		39			64			89	
	15	1		40			65			90	
	16	1		41			66			91	
	17	1		42			67			92	
	18	6		43			68			93	
	19	7		44			69			94	
	20	8		45			70			95	
	21	8		46			71			96	
	22	9		47			72			97	
	23	10		48			73			98	
	24	11		49			74			99	
	25	11		50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	5	5	6	7	7	7
MEASURED REBOUND IN INCHES						

FINAL LENGTH OF PILE 25.9 FINAL CUT OFF ELEVATION 241.5

REPORT TO BE SENT TO:- PRINCIPAL FOUNDATION ENGINEER
MATERIALS & TESTING DIVISION
DEPARTMENT OF HIGHWAYS
DOWNSVIEW, ONTARIO

241.5
25.8
TIP. 215.7

SIGNED G R Van Dusen
NAME (PRINT) G R VAN DUSEN
DATE July 26/72.

DRIVEN FROM ORIGINAL GROUND THEN EXCAVATED FOR FOOTINGS.

ATTACH SKETCH OF PILE NUMBERING SYSTEM

Notes:-

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12¾" O.D. steel tube x 0.25l" @ 33 lbs. per ft. Vertical. 12¾" x ½" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

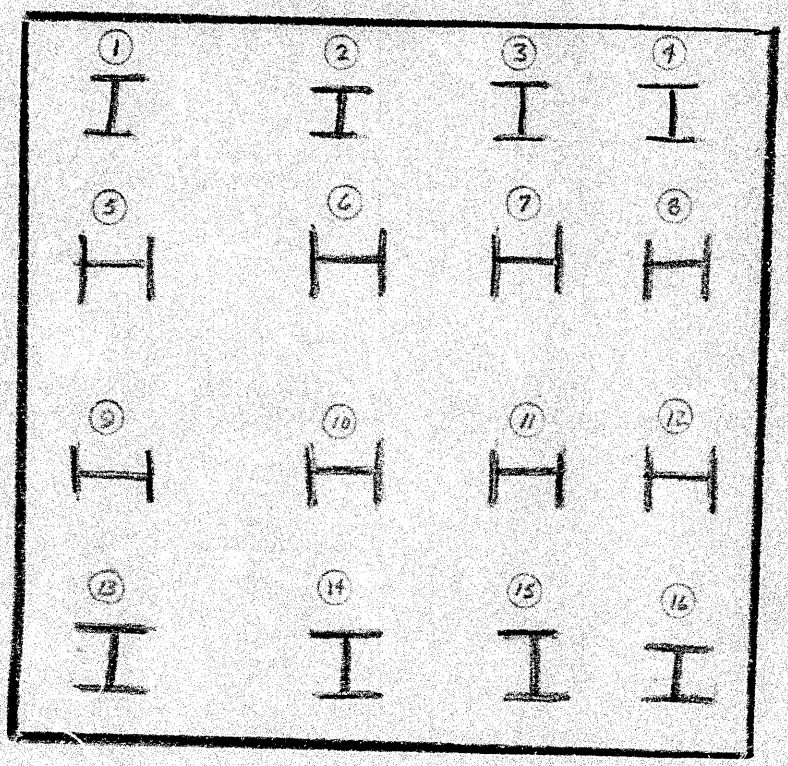
Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

SIDE ROAD TO VARS UNDERPASS

CONT. 72.62

N

NORTH FOR CONSTRUCTION



PIER NO 2

Form 08-MT-285 OVER

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
FOUNDATION SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 72-62 STRUCTURE SIDE ROAD 40 YARS. County Road No 8 Bridge

CONTRACTOR Peel construction Co DESIGN LOAD OF PILE 90 Tons

HAMMER DETAILS: TYPE Gravity Drop WEIGHT 2½ Tons HEIGHT OF FALL OR ENERGY 5'-6"

TYPE OF ANVIL OR CAP _____ WEIGHT OF ANVIL OR CAP 5,000 LBS.

PILE DETAILS 12 B.P.X 74 H. Piles.

PILE NO. 10 LOCATION Pier No. 2 DATE DRIVEN July 27/72.

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
30'	1	2		26	28		51			76	
	2	2		27	33		52			77	
	3	3		28	35"	Driven to Bed	53			78	
	4	4		29			54			79	
	5	3		30			55			80	
	6	2		31			56			81	
	7	2		32			57			82	
	8	4		33			58			83	
	9	3		34			59			84	
	10	3		35			60			85	
	11	5		36			61			86	
	12	11		37			62			87	
	13	14		38			63			88	
	14	13		39			64			89	
	15	18		40			65			90	
	16	20		41			66			91	
	17	15"		42			67			92	
	18	14		43			68			93	
	19	17		44			69			94	
	20	19		45			70			95	
	21	20		46			71			96	
	22	21		47			72			97	
	23	24		48			73			98	
	24	25"		49			74			99	
	25	28		50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	5"	5"	5"	7	7	8
MEASURED REBOUND IN INCHES						

FINAL LENGTH OF PILE 23.7. FINAL CUT OFF ELEVATION 241.50

REPORT TO BE SENT TO:- PRINCIPAL FOUNDATION ENGINEER
MATERIALS & TESTING DIVISION
DEPARTMENT OF HIGHWAYS
DOWNSVIEW, ONTARIO

241.5
23.6
217.9

SIGNED G.R. VanDusen
NAME (PRINT) GORDON R. VAN DUSEN
DATE July 27/72

ATTACH SKETCH OF PILE NUMBERING SYSTEM

Driven from original ground then excavated footings

TP

Notes:-

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12¾" O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12¾" x ½" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

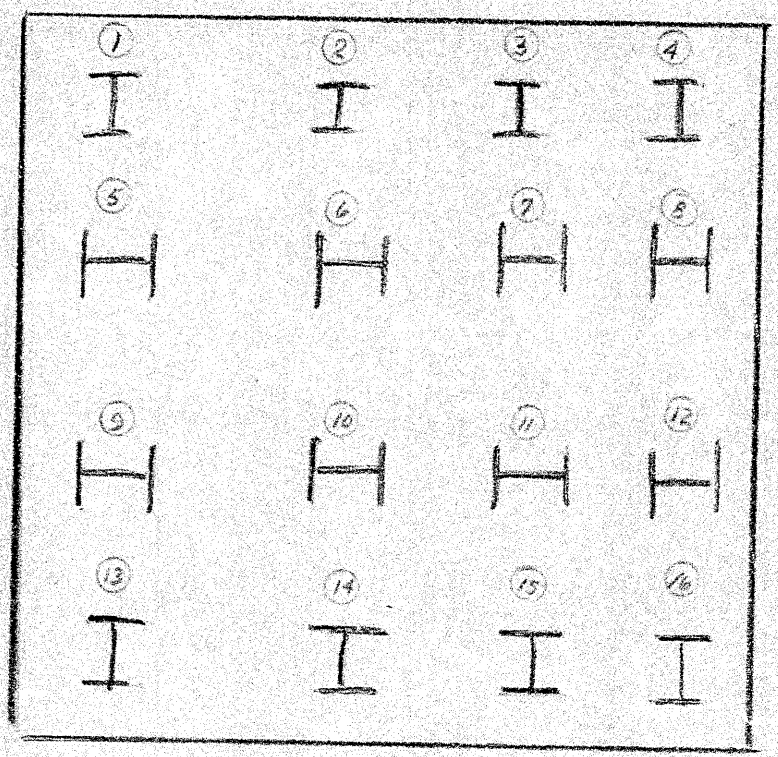
Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

SIDE ROAD TO VAPS UNDERPASS

CONT 12-62

N

NORTH FOR CONSTRUCTION



PIER NO 3

Form OB-MT-285 OVER

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
FOUNDATION SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 72-62 STRUCTURE SIDE ROAD 20 VARS COUNTY ROAD R.-IDGE NO 8

CONTRACTOR PECK CONST CO. DESIGN LOAD OF PILE 90 TONS

HAMMER DETAILS: TYPE GRAVITY DROP WEIGHT 2½ TONS HEIGHT OF FALL OR ENERGY 5'-0"

TYPE OF ANVIL OR CAP _____ WEIGHT OF ANVIL OR CAP 500 LBS

PILE DETAILS 12. B.P. x 74'

PILE NO. 10 LOCATION PIER NO 3 DATE DRIVEN July 30/72

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
28'	1	1		26	26	DRIVEN FOR BEARING	51			76	
	2	1		27	28		52			77	
	3	1		28	30		53			78	
	4	1		29			54			79	
	5	3		30			55			80	
	6	3		31			56			81	
	7	2		32			57			82	
	8	2		33			58			83	
	9	2		34			59			84	
	10	4		35			60			85	
	11	6		36			61			86	
	12	5		37			62			87	
	13	4		38			63			88	
	14	4		39			64			89	
	15	4		40			65			90	
	16	7		41			66			91	
	17	10		42			67			92	
	18	14		43			68			93	
	19	12		44			69			94	
	20	13		45			70			95	
	21	13		46			71			96	
	22	18		47			72			97	
	23	20		48			73			98	
	24	17		49			74			99	
	25	20		50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	5	5	6	6	7
MEASURED REBOUND IN INCHES						

FINAL LENGTH OF PILE 24.1' FINAL CUT OFF ELEVATION 241.50

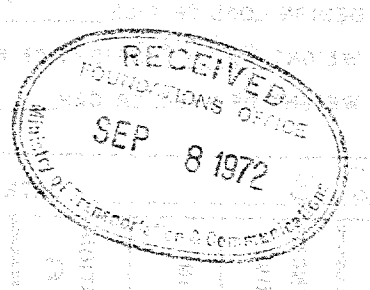
REPORT TO BE SENT TO:- PRINCIPAL FOUNDATION ENGINEER
MATERIALS & TESTING DIVISION
DEPARTMENT OF HIGHWAYS
DOWNSVIEW, ONTARIO

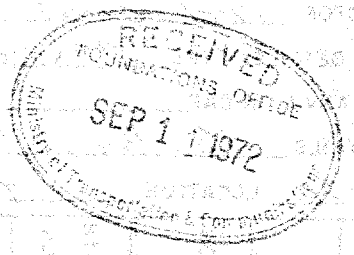
241.5
24.1
217.4

SIGNED G R Van Dusen
NAME (PRINT) G R VAN DUSEN
DATE July 30/72

ATTACH SKETCH OF PILE NUMBERING SYSTEM

DRIVEN FROM ORIGINAL GROUND
THEN EXCAVATED FOOTINGS





Notes:-

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12¾" O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12¾" x ½" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

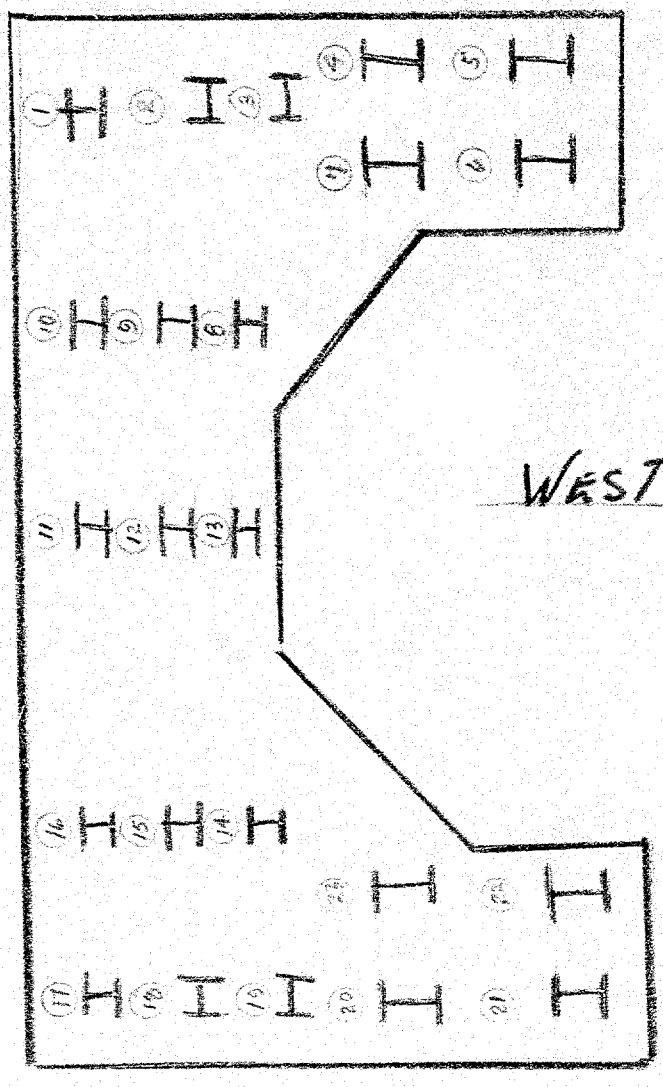
The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

N

SIDE ROAD TO VARS UNDER PASS

CONT. 16-62



Form OB-MT-285 OVER

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
FOUNDATION SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 72-62 STRUCTURE SIDE ROAD 10 OVER GO UNDERPASS BRIDGE

CONTRACTOR PEEL CONST. DESIGN LOAD OF PILE 70 TONS

HAMMER DETAILS: TYPE GRAVITY DROP WEIGHT 2½ TON HEIGHT OF FALL OR ENERGY 8

TYPE OF ANVIL OR CAP _____ WEIGHT OF ANVIL OR CAP 500 LBS

PILE DETAILS STEEL H. PILES 12 B.P. 53.

PILE NO. 5 LOCATION WEST ABUTMENT DATE DRIVEN July 24/72

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.
45.7'	1	3		26	6		51			76	
	2	6		27	11		52			77	
	3	7		28	13		53			78	
	4	7		29	10		54			79	
	5	8		30	12		55			80	
	6	8		31	15		56			81	
	7	7		32	13		57			82	
	8	7		33	13		58			83	
	9	10		34	18		59			84	
	10	8		35	24		60			85	
	11	7		36	24		61			86	
	12	7		37	29		62			87	
	13	5		38			63			88	
	14	5		39			64			89	
	15	5		40			65			90	
	16	5		41			66			91	
	17	4		42			67			92	
	18	4		43			68			93	
	19	4		44			69			94	
	20	4		45			70			95	
	21	4		46			71			96	
	22	3		47			72			97	
	23	4		48			73			98	
	24	4		49			74			99	
	25	4		50			75			100	

NOTE: PILED TO REFUSAL

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	4	4	5	4	7
MEASURED REBOUND IN INCHES						

FINAL LENGTH OF PILE 38.4 FINAL CUT OFF ELEVATION 256.60

256
38.4
217.6

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
MATERIALS & TESTING DIVISION
DEPARTMENT OF HIGHWAYS
DOWNSVIEW, ONTARIO

SIGNED G.R. VanDusen
NAME (PRINT) Gordon VanDusen
DATE July 24/72
ATTACH SKETCH OF PILE NUMBERING SYSTEM

Notes:-

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12¾" O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12¾" x ½" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

Form OB-MT-285 OVER

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
FOUNDATION SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 72-62 STRUCTURE SIDE ROAD & CARS UNDERPASS BRIDGE B.

CONTRACTOR PEEL CONST CO. PRIME DESIGN LOAD OF PILE 70 TONS

HAMMER DETAILS: TYPE GRAVITY DROP WEIGHT 2½ TONS HEIGHT OF FALL OR ENERGY 8

TYPE OF ANVIL OR CAP WEIGHT OF ANVIL OR CAP 500 LBS

PILE DETAILS STEEL H PILES 12 B.P. 53 LBS.

PILE NO. 22 LOCATION WEST ABUTMENT FT6 DATE DRIVEN July 25/72

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS / FT.
15.7'	1	2		26	4		51			76	
	2	3		27	9		52			77	
	3	4		28	9		53			78	
	4	4		29	12		54			79	
	5	7		30	12		55			80	
	6	7		31	14		56			81	
	7	8		32	15		57			82	
	8	8		33	15		58			83	
	9	8		34	16		59			84	
	10	10		35	20		60			85	
	11	9		36	25		61			86	
	12	8		37	35		62			87	
	13	8		38	39		63			88	
	14	6		39			64			89	
	15	6		40			65			90	
	16	5		41			66			91	
	17	4		42			67			92	
	18	1		43			68			93	
	19	4		44			69			94	
	20	4		45			70			95	
	21	4		46			71			96	
	22	4		47			72			97	
	23	4		48			73			98	
	24	3		49			74			99	
	25	4		50			75			100	

DRIVEN TO REFUSAL

NOTE: FELL 13"

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	4	4	5	5	6
MEASURED REBOUND IN INCHES						

FINAL LENGTH OF PILE 39.1' FINAL CUT OFF ELEVATION 256.0

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
MATERIALS & TESTING DIVISION
DEPARTMENT OF HIGHWAYS
DOWNSVIEW, ONTARIO

SIGNED G.P. Van Dusen
NAME (PRINT) GORDON VAN DUSEN
DATE July 25/72

256.0
39.1
216.9

ATTACH SKETCH OF PILE NUMBERING SYSTEM

Notes:-

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12¾" O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12¾" x ½" steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

FROM: C. S. Grebski,
Bridge Office

ATTENTION:

DATE: August 5, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT: Sideroad to Vars Underpass
1.8 Miles West of Vars
W.P. 34-66-16, Site # 27-198
Highway No. 417, District No. 9

69-F-85

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.

C. S. Grebski,
Bridge Design Engineer

CSG:DE

Attach.

c.c. Foundation Office

3. Aug 970

NO COMMENTS

A.K.B.

No Comments.
M. Devata

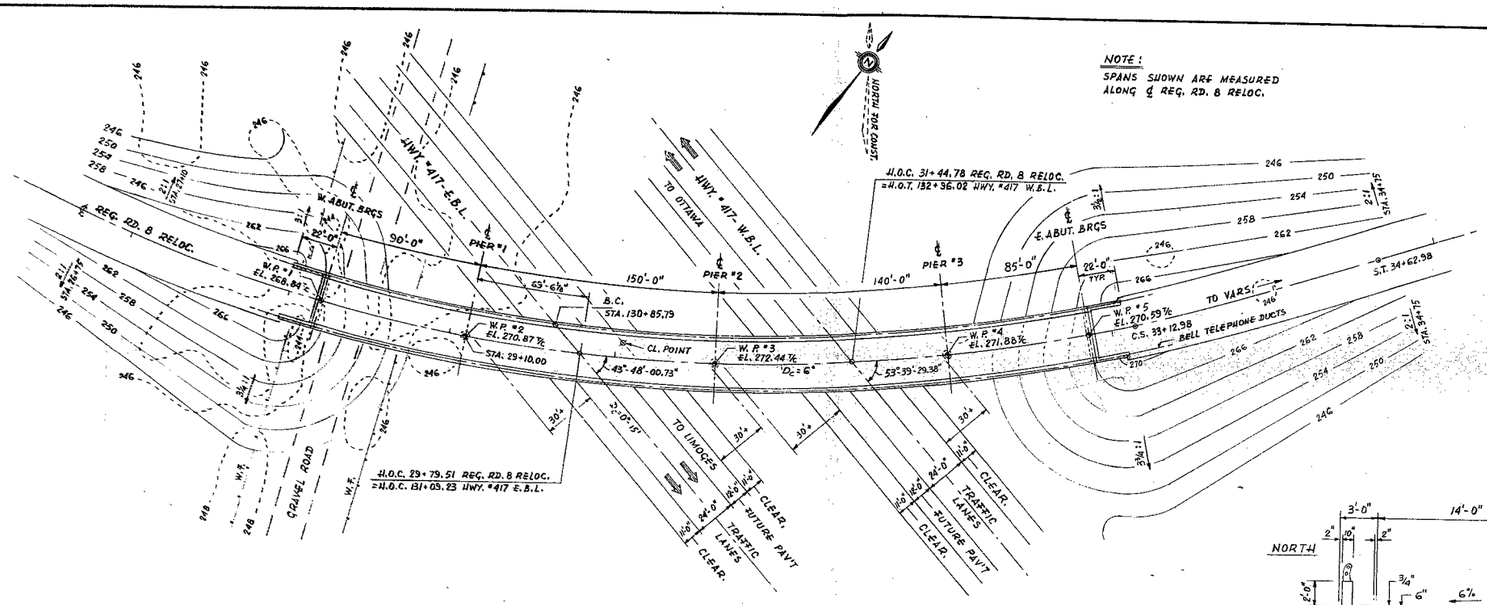
#69-F-85

W.P. 34-66-16

H.W.Y. #417 (E.B.L. AND W.B.L.)

REGIONAL ROAD #8

RELOCATION

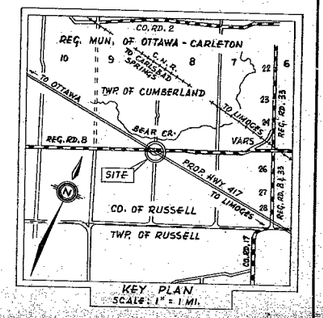


PLAN

SCALE: 1" = 40 FT.

LIST OF DRAWINGS

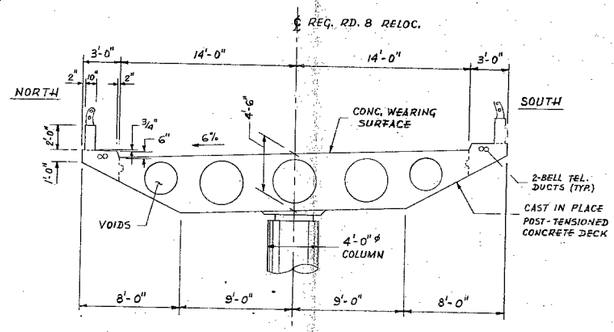
D-6787-1	GENERAL LAYOUT
-2	BORE HOLE LOCATIONS & SOIL STRATA
-3	FOOTING LAYOUT
-4	PIERS, BEARINGS & EXPANSION JOINT
-5	EAST ABUTMENT
-6	WEST ABUTMENT
-7	DECK DETAILS
-8	CABLE DETAILS I
-9	CABLE DETAILS II
-10	DECK REINFORCEMENT I
-11	DECK REINFORCEMENT II
-12	PARAPET WALL DETAILS
-13	STANDARD STEEL PARAPET RAIL
-14	STANDARD DETAILS I
-15	STANDARD DETAILS II
D-6787-16	DETAILS OF CONC. SLOPE PAVING



KEY PLAN
SCALE: 1" = 1 MI.

B.M. ELEV. 246.62
GEODETIC DATUM

N. & W. IN ROOT OF 1" POP. 335'.0 RT. OF 127+75 E.B.L.



TYP DECK SECTION

SCALE: 3/16" = 1'-0"

NOTES:

CLASS OF CONCRETE

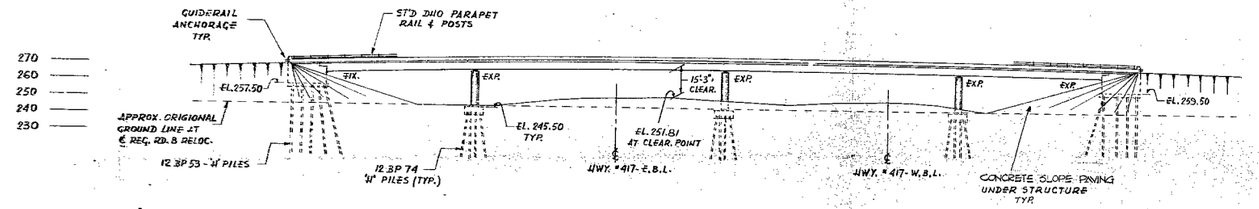
DECK, CURBS, PARAPET WALLS & COLUMNS — 5000 P.S.I.
PIER FOOTING — 4000 P.S.I.
REMAINDER — 3000 P.S.I.

CLEAR COVER ON REINF.

FOOTINGS, ABUTMENTS & WINGWALLS — 3"
COLUMNS — 3"
PARAPET WALLS — 1½"
DECK TOP & CURBS — 2"
DECK BOTTOM — 1½"

CONSTRUCTION NOTE

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF ± ⅛". NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE DECK HAS BEEN STRESSED AND GROUTED



SOUTH ELEVATION

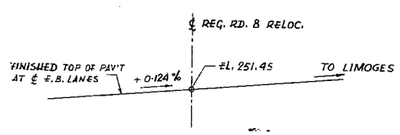
SCALE: 1" = 40 FT.

NOTES

* W.P. DENOTES WORKING POINT.
* T/C DENOTES TOP OF CONCRETE WEARING SURFACE.

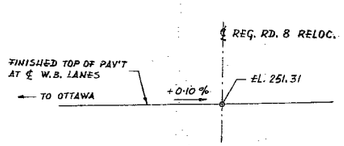
REG. RD. 8 RELOC.
CURVE DATA
Δ = 52°-01'
ΔC = 45°-01'
Δs = 7°-30'
Dc = 6° LT.
Ts = 541.39'
Ls = 150.00'
Lc = 716.94'

HWY. #417 - E.B. LANES
CURVE DATA
Δ = 4°-33'-30"
Dc = 0°-15' RT
T = 912.15'
L = 1823.34'



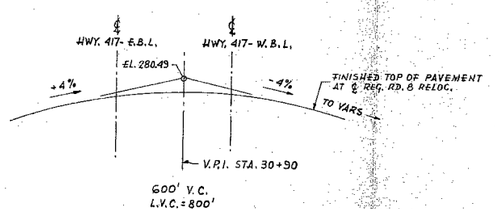
PROFILE OF HWY. #417 - E.B. LANES

N.T.S.



PROFILE OF HWY. #417 - W.B. LANES

N.T.S.



PROFILE OF REG. RD. 8 RELOC.

N.T.S.

REGISTERED PROFESSIONAL ENGINEER
R. S. REEL
PROVINCE OF ONTARIO

FOR REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

PRINT RECORD		
No.	FOR	DATE

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

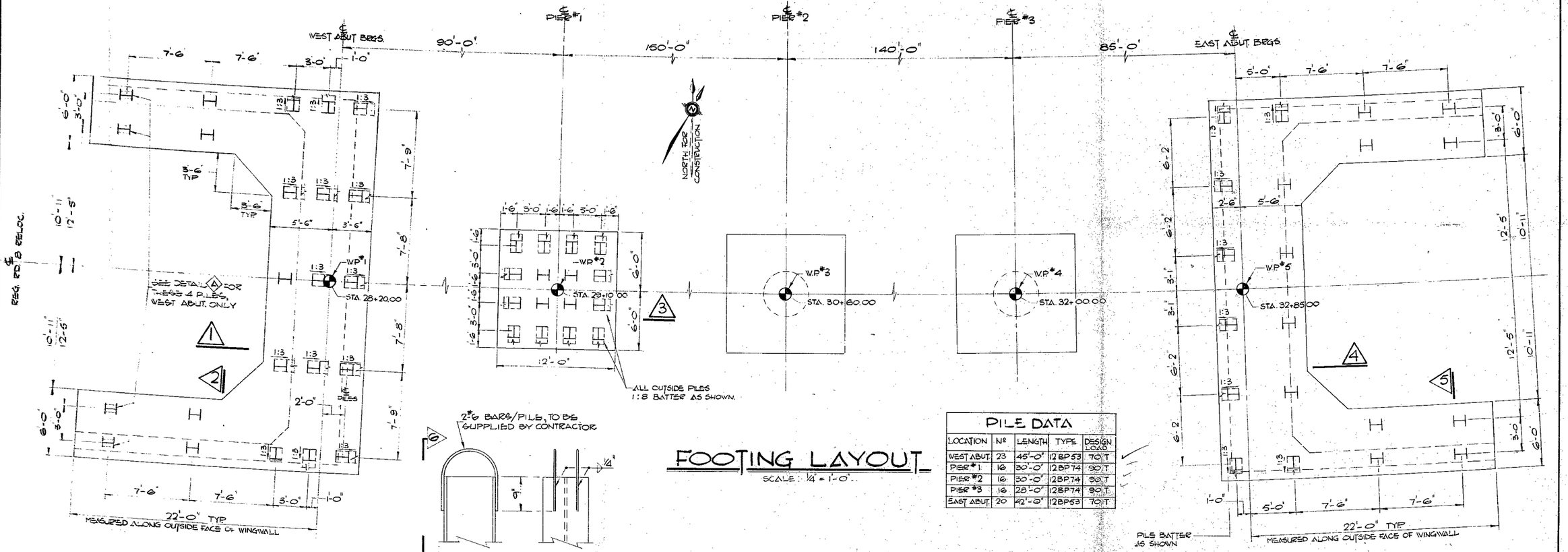
69-F-85

SIDEROAD TO VARS UNDERPASS
1.8 MI. WEST OF VARS

KING'S HIGHWAY No. 417 — DIST. No. 9
REG. MUN. OF OTTAWA-CARLETON
TWP. CUMBERLAND — LOT 26 — CON. VIII & IX

GENERAL LAYOUT

APPROVED	BRIDGE ENGINEER			SITE No. 27-198	W.P. No. 34-66-16
DESIGN	R.S.R.	CHECK	Eng. Staff	CONTRACT Nos.	
DRAWING	P.K.	CHECK	R.S.R.		
DATE	JULY 1970	LOADING	HS 20-44	DRAWING No.	D-6787-1



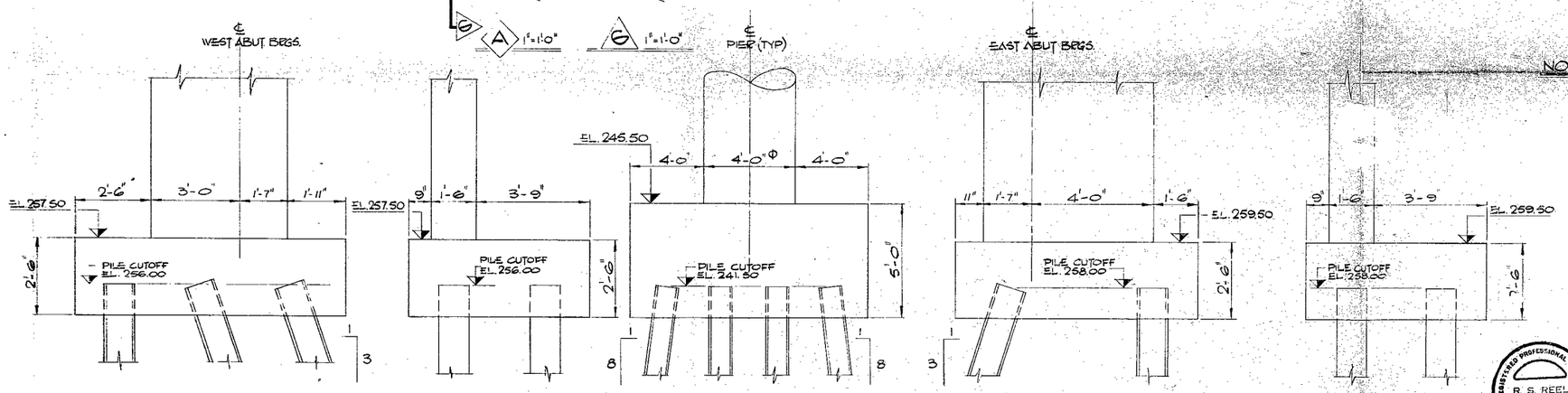
FOOTING LAYOUT

SCALE : ¼" = 1'-0"

PILE DATA				
LOCATION	Nº	LENGTH	TYPE	DESIGN LOAD
WEST ABUT.	23	45'-0"	12BP53	70 T
PIER #1	16	30'-0"	12BP74	90 T
PIER #2	16	30'-0"	12BP74	90 T
PIER #3	16	28'-0"	12BP74	90 T
EAST ABUT.	20	42'-0"	12BP53	70 T

A 1"=1'-0"

B 1"=1'-0"



NOTES:

- PILES SHALL BE DRIVEN TO REFUSAL IN ACCORDANCE WITH STD BD82-7 (SEE DWG. D-6787-15)
- SPACING OF PILES SHALL BE MEASURED AT UNDERSIDE OF FOOTING.
- FOOTING & PILE LAYOUT FOR PIERS #2 & #3 SAME AS FOR PIER #1.

PRINT RECORD		
No.	FOR	DATE

REVISIONS		
DATE	BY	DESCRIPTION

FOR REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

REGISTERED PROFESSIONAL ENGINEER R. S. REEL PROVINCE OF ONTARIO

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

69-F-85

SIDEROAD TO VARS UNDERPASS
1.8 MI. WEST OF VARS.

KING'S HIGHWAY No. 417 DIST. No. 9
CO. REG. MUN. of OTTAWA-CARLETON
TWP. CUMBERLAND LOT 26 CON. VIII & IX

FOOTING LAYOUT

APPROVED _____ BRIDGE ENGINEER

DESIGN	R.S.R.	CHECK	Impl.P
DRAWING	TBL.	CHECK	R.S.R.
DATE	JULY '76	LOADING	H-S20-44

SITE No. 27-198 W.P. No. 34-66-16
CONTRACT Nos.
DRAWING No. D-6787-3