

70-F-82

70-F-82

37-66-09

Hwy. 417 & Co. Rd. 13

31G-69

W.O.

W.P.

LOCATION

GEOCRES NO.

• DATA ON FILE IN SOIL MECHANICS SECTION

REFER TO: Contract 73-134

REMARKS

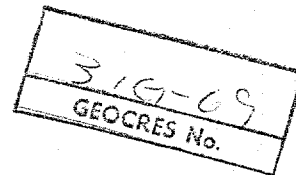
GEOCRES

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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: December 9, 1970

OUR FILE REF.

IN REPLY TO

DEC 30 1970

SUBJECT:

Geocres 319-69

FOUNDATION INVESTIGATION REPORT

For

The Proposed Underpass Structure at the
Crossing of Hwy. #417 and Co. Rd. #13
Twp. of E. Hawkesbury, County of Prescott
District No. 9 (Ottawa)

W.O. 70-11082

--

W.P. 37-66-09

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.

AGS/MdeF
Attach.


A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. B. R. Davis

H. A. Tregaskes

D. W. Farren

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(2)

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Foundations Files

Gen. Files ✓

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FOUNDATION INVESTIGATION REPORT
For
The Proposed Underpass Structure at the
Crossing of Hwy. #417 and Co. Rd. #13
Twp. of E. Hawkesbury, County of Prescott
District No. 9 (Ottawa)
W.O. 70-11082 -- W.P. 37-66-09

1. INTRODUCTION:

The Foundation Section was requested to carry out a subsurface investigation for the proposed underpass structure at the crossing of Hwy. #417 and County Road No. 13. The request was contained in a memo from the Eastern Region Bridge Section (Mr. T. C. Kingsland, Regional Bridge Planning Engineer), dated October 6, 1970. An investigation was subsequently carried out by the Foundation Section to determine the subsoil, bedrock and groundwater conditions at the site.

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

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site is located on County Rd. #13, approximately 4 miles east of the Village of Vankleek in the Township of East Hawkesbury, County of Prescott. The surrounding terrain, which is grass-covered and being used as farmland, is flat to gently undulating in relief between elevations 258 and 268.

The site is situated in the complex physiographic region known as the "Glengarry Till Plain". This area is characterized by the presence of an undulating to rolling glacial till plain composed of long drumlinoidal ridges as well as a few well defined drumlins. The glacial till deposit is generally less than 35 feet in depth. Localized low-lying areas are often in-filled with soft compressible clay subsoils

2. DESCRIPTION OF THE SITE AND GEOLOGY: (cont'd.) ...

which were laid down in the geologic past in Glacial Lake Champlain. In some instances, recent swamp deposits surficially cover these depressed areas. The thickness of these surficial materials are generally less than 30 feet.

The overburden is underlain by limestone bedrock of the Trenton and Black River formation, Ordovician Period.

3. FIELD AND LABORATORY INVESTIGATIONS:

Eight sampled boreholes, four of which were accompanied by a dynamic cone penetration test, were put down during the course of the field investigation. The borings were advanced by means of conventional diamond drill rigs adapted for soil sampling purposes. In addition, two boreholes, put down in January and February, 1969, as part of the preliminary investigation for Hwy. #417, are included because of their close proximity to the site.

Samples of the glacial till were obtained in a 2" O.D. split-spoon sampler, which was hammered into the ground in accordance with the specifications for the Standard Penetration Test. The dynamic cone penetration tests were advanced using the same method. Samples of the cohesive stratum were obtained in 2" I.D. Shelby tubes, which were manually pushed into the soil. In situ vane tests were also carried out within this zone to determine the undrained shear strength and the sensitivity of the clay. Bedrock was proven at 3 of these locations by obtaining BX rock core samples.

The groundwater level conditions across the site were determined by recording the water levels in the open boreholes during the course of the investigations.

The locations and elevations of all the boreholes are shown on Drawing W.O. 70-11082A. An estimated stratigraphical profile, along the centre-line of County Road No. 13, is also presented on the drawing. The surveying was carried out by the

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

personnel from the Kingston Regional Engineering Survey Section. All elevations are referenced to Geodetic datum.

All the samples were subjected to careful visual examination both in the field and in the laboratory. Laboratory tests were performed on selected samples to determine the physical properties of the various soil types, namely:

Natural Moisture Content
Grain-Size Distribution
Atterberg Limits
Undrained Shear Strengths
Consolidation Characteristics

The results of the laboratory testing are plotted on the "Record of Borelog" sheets and summarized on Figures #1 to 3 inclusive, all of which are included in this report.

4. SUBSOIL AND BEDROCK CONDITIONS:

4.1) General:

West of Station 101+00 the overburden is composed of a dense to very dense basically granular glacial till; numerous boulders are present throughout the deposit. The glacial till which, in this area varies from 25 to 27 feet in thickness, is underlain by limestone bedrock. East of the aforementioned station, the till deposit is overlain by a soft to firm, sensitive clay stratum. The overall thickness of this stratum varies from 5 feet, at Station 101+00, to as much as 28 feet at Station 104+00; the upper 2 to 5 feet of the clay has been subjected to desiccation.

County Rd. #13 traverses this area on an earth fill which varies anywhere from 3.5 to 7 feet in height.

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

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

The boundaries of the various deposits are shown on the accompanying borelog sheets. The inferred stratigraphical profile, along the centre-line of County Road No. 13, is plotted on Drawing 70-11082A.

From ground surface downward, the various soil types encountered are as follows:

4.2) Roadway Fill:

County Rd. #13 crosses this area on an earth fill embankment which varies from 3.5 to 7 feet in height. The fill is primarily composed of a loose to very dense ('N' values 5 to 65 blows/ft.) sand.

4.3) Clay to Silty Clay (Sensitive):

From original ground surface downward, east of Station 101+00, is a deposit of sensitive clay to silty clay with a trace of sand and gravel. The thickness of the deposit ranges from 5 feet at B.H. #3 to 28 feet at B.H. #8 - i.e., it increases in an easterly direction. The upper 2 to 5 feet of this deposit has been subjected to desiccation, thus forming a crust.

The engineering properties of the clay to silty clay, which are plotted on the "Record of Borelog" sheets, are also summarized in tabular form, as follows:

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

4.3) Clay to Silty Clay (Sensitive): (cont'd.) ...

<u>Identity Tests:</u>	<u>Desiccated Zone</u>	<u>Lower Zone Range (Average)</u>
Bulk Density (γ) (p.c.f.)	-	94 - 107 (98)
Liquid Limit (W_L) (%)	37 and 62)	63 - 96 (73)
Plastic Limit (W_P) (%)	28 and 36)	25 - 29 (27)
Natural Moisture Content (W) (%)	33 and 48)	54 - 91 (72)
Liquidity Index (I_L)	0.7 and 0.5)	0.7 - 1.4 (0.9)

Compressibility Characteristics:

Initial Void Ratio (e_o)	-	1.9 and 2.4)	} 2 Tests
Compression Index (C_c)	-	1.3 and 1.7)	
Degree of Preconsolidation (p.c.f.) ($P_c - P_o'$)	-	1,800 and 800)	

<u>Undrained Shear Strength (C_u)</u> (p.s.f.)	1,300 - 2,000	300 - 900
Standard Penetration Resistance ($'N'$) (blows/ft.)	9 - 14	-
Sensitivity (S_t)	-	3 - 10

The Atterberg limit test results, given in the table, are also summarized on the Plasticity Chart, Figure #1. The testing indicates that the cohesive subsoil is inorganic, with the plasticity generally in the high range. The natural moisture content of the lower zone is consistently at or above the liquid limit; this was exemplified by the relatively high liquidity

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

4.3) Clay to Silty Clay (Sensitive): (cont'd.) ...

index values obtained. These values are an indication of the very sensitive nature of the subsoil.

The field and laboratory undrained shear strength testing results indicate that the consistency of the clay varies from soft to firm, being stiff in the upper desiccated zone.

The consolidation characteristics of the subsoil were determined by carrying out two laboratory oedometer tests, the results of which are shown as Void Ratio vs. Pressure plots on Fig. #2. The results of these tests indicate that the lower portion of the cohesive stratum is preconsolidated by about 700 to 800 p.s.f. in excess of the existing overburden pressure. The desiccated crust would be preconsolidated to a degree greater than this range. The relatively high values obtained for the initial void ratio (e_0) and the compression index (C_c) are typical of those found from laboratory testing on the sensitive marine clay encountered in the Ottawa - Hawkesbury area.

4.4) Heterogeneous Mixture of Silt, Sand and Gravel - Trace of Clay - (Glacial Till):

Underlying the thin topsoil cover, west of Station 101+00, and the clay to silty clay deposit east of this station, is a stratum of glacial till, composed of a heterogeneous mixture of silt, sand and gravel with a trace of clay. The thickness of this deposit varies from 12 feet at B.H. #8 to 33 feet at B.H. #2; the magnitude of this range is indicative of the irregular nature of the deposit. Occasional clayey silt seams, up to 5 inches thick, were encountered within this stratum (refer to B.H.'s #1, 2 and 4). Numerous boulders, up to 24 inches in size, are present throughout. Grain-size distribution curves, obtained on samples of the granular glacial till, are plotted in envelope form on Figure #3, in Appendix I.

Standard penetration testing carried out within this deposit, gave 'N' values which range from 14 blows/ft. to in

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

4.4) Heterogeneous Mixture of Silt, Sand and Gravel -
Trace of Clay - (Glacial Till): (cont'd.) ...

excess of 100 blows/ft. Based on these values, it is estimated that the relative density of the material varies from compact to very dense.

4.5) Bedrock:

Bedrock was established at B.H.'s #2, 3 and 8 by obtaining up to 10 feet of BX size rock core samples. The bedrock was encountered at a depth of about 34.5 to 44 feet below ground surface - i.e., between elevation 214 and 226. In general, the surface of the bedrock dips in an easterly direction.

The bedrock is composed of grey limestone with occasional seams of shale. The upper 6 to 12 inches of the bedrock is in a weathered and fractured condition, below this depth the bedrock is relatively sound as indicated by the high percentage of core recovered.

5. GROUNDWATER CONDITIONS:

The groundwater level conditions across the site, during the period of investigation (October, 1970), were observed by taking readings in the open boreholes. The results of the readings are summarized on Drawing No. 70-11082A.

The observations indicate that the groundwater level is located between elevation 253 and 261, which corresponds to depths of from 3 to 7 feet below the existing ground surface.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to construct a two-span (120'-118'), 34-ft. wide underpass structure at the crossing of County Road No. 13 and Hwy. #417, at a point about 4 miles east of the

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

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

Village of Vankleek Hill. Details of the proposed scheme are provided on Plan No. E-4701-1. The proposed profile grade of County Road No. 13, in the vicinity of the structure will be about elevation 275 near the West abutment and about elevation 272 near the East abutment. At these grades the maximum height of the approach fills will be of the order of 21 feet.

West of Station 101+00 the overburden is composed of a dense to very dense glacial till, which is directly underlain by limestone bedrock. East of this station this sequence is overlain by a soft to firm, sensitive marine clay, which varies from 4 to 28 feet in thickness.

The presence of the soft compressible cohesive subsoil, along the East approach to the structure, is of primary importance, since it will be necessary to ensure the stability of the embankment section as well as the structure foundations. These will be discussed in detail in the sub-sections to follow.

6.2) Approach Embankments:

The East approach fill will be underlain by soft compressible clay, while the West approach fill will be placed directly on competent glacial till. Stability and settlement considerations will vary markedly along either approach. The comments and recommendations pertaining to each approach will be presented separately in the sub-sections to follow.

6.2.1) East Approach Fill:

The critical condition for stability of an embankment on slightly overconsolidated cohesive subsoils, as is the case at this site, generally occurs during or immediately following the construction period. This being the case, a total stress analysis ($\phi = 0$) provides a suitable means of assessing the

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

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

6.2.1) East Approach Fill: (cont'd.) ...

stability of the embankment section. In this method of analysis, stability is governed by the stress-strain and undrained shear strength characteristics of the foundation and embankment soils.

Analyses have been carried out, therefore, in terms of total stresses, both manually and by the use of the electronic computer, to determine the stability of the approaches.

The geometric sections at the approaches, and the soil properties for the fill and natural subsoil, assumed for computational purposes, are presented on Figure #4, in Appendix I of this report. The results of the analyses, including the heights of fill involved and berm requirements, are presented in the following table. It should be noted that standard 2:1 slopes were used in the computations.

	<u>Height of Fill</u>	<u>Berm Requirements (Mid-Height)</u>
Longitudinal Direction	22 ft.	15 ft.
Transverse Direction	21 ft.	55 ft.
	18 ft.	45 ft.
	15 ft.	30 ft.
	11 ft.	Nil

Notes:

- 1) A smooth transition should be effected between the berm requirements for various heights of fill.
- 2) The surface of the berms should slope away from the core of the fill at a gradient of 20:1 for drainage purposes.

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

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

6.2.1) East Approach Fill: (cont'd.) ...

Referring to the table, it can be seen that, if the profile grades proposed are adopted, then berms will be required in both the longitudinal and transverse directions along the East approach.

The sensitive clay stratum will undergo settlement due to consolidation, over a period of time, under the weight of this approach fill. Settlement computations were, therefore, carried out, the results of which are summarized on Figure #4.

The maximum consolidation settlement will take place about 60 feet behind the East abutment where the height of fill-thickness of compressible clay is most critical. It is estimated that this consolidation settlement could be of the order of 24 inches. The total amount of the predicted settlement should take place within a period of 6 to 7 years. About 50% should, however, occur within 18 months.

Since the predicted settlements will occur relatively quickly, it would be advantageous to place the fills prior to construction of the structure, in order to minimize post-construction maintenance. If scheduling permits, a period of at least 18 months should be provided for this purpose. In any event, final paving along this approach should be delayed as long as possible.

As discussed in the previous paragraphs, if the compressible clay stratum is left in place along the East approach, then:

a) berms will be required in both the longitudinal and transverse directions. The 15-foot wide longitudinal berm will require lengthening the structure over that proposed, and

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

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

6.2.1) East Approach Fill: (cont'd.) ...

b) consolidation settlements of considerable magnitude will be induced in the foundation subsoil by the fill loadings.

The thickness of the clay, in the immediate vicinity of the East abutment, varies from about 9 to 17 feet. Because of the nominal thickness of this deposit, it is considered that it would be feasible to completely sub-excavate the material in the vicinity of the east end of the structure and by so doing, eliminate the berms in this area as well as the consolidation settlement that would have been induced in the cohesive subsoil.

The cohesive subsoil should be completely sub-excavated from within the plan limits of the proposed approach fills. The recommended geometry of the sub-excavation is shown on Figure #5.

It should be noted that the sub-excavation will have to extend for a reasonable distance behind the East abutment (recommend minimum of 20 feet), in order to obtain the most beneficial results. East of this section, however, where the clay will be left intact, berms will be required in the transverse direction and consolidation settlement will be induced in the foundation subsoil. Recommendations presented previously will be applicable in this area.

6.2.2) West Approach Fill:

This earth fill embankment, which will have a maximum height of 22 feet, will be placed directly on the competent glacial till. No stability problems are anticipated, provided standard 2:1 slopes are employed.

Settlement will be induced in the foundation subsoil by the surcharge loading of the earth fill. Since the subsoil is composed of a competent glacial till, this settlement will be

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

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

6.2.2) West Approach Fill: (cont'd.) ...

negligible in magnitude and elastic in nature - i.e., take place during or immediately following the construction period.

6.3) Structure Foundations:

6.3.1) Centre Pier (Refer to B.H.'s #3 and 9):

Competent granular glacial till is present at a shallow depth below ground surface at this location. This pier could, therefore, be founded on a spread footing located within the glacial till - i.e., at or below elevation 252. In any event a minimum of 4 feet of earth cover should be provided to the underside of the footing for frost protection purposes. A footing founded as recommended could be designed using an allowable bearing value of up to 4.0 t.s.f.

The pier footing excavation will extend through the stiff clay stratum into the glacial till. The base of the excavation will be about 5 feet below the groundwater level recorded during the period of the investigation. The base of the excavation, located in the granular glacial till, may 'boil' due to the unbalanced hydrostatic water pressure head existing. Further, some groundwater seepage may occur within the excavation. A dewatering scheme will, therefore, be required to control the aforementioned. One acceptable scheme would be to construct a drainage ditch around the perimeter of the proposed footing limits. The invert of this ditch should extend a minimum of 2 feet below the base of footing level. The ditch should gravity-drain to a sump from where the water can be pumped away from the construction area.

The foundation subsoil will be subjected to some elastic settlement due to the applied footing pressure. The settlement beneath a footing of the size contemplated (8 to 10 feet in width),

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

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

6.3.1) Centre Pier (Refer to B.H. #3): (cont'd.) ...

which imposes the aforementioned pressure, would be of the order of 1/2 inch, provided the granular foundation subsoil is not loosened by groundwater seepage or uncontrolled surface run-off. In this regard, it is recommended that a pad of lean concrete or, alternatively, a mat of granular material be placed on the base of the excavation as soon as the footing level is reached.

6.3.2) Abutments:

The abutments can be supported on end-bearing piles driven to practical refusal within the lower bouldery portion of the glacial till or to bedrock. For estimating purposes, the pile elevations can be assumed as follows:

<u>Abutment</u>		<u>Estimated Pile Tip Elev.</u>		<u>Remarks:</u>
East	North End	222 to 223	-	To Bedrock
	to South End	230 to 234	-	Refusal within Glacial Till
West	-	248 to 250	-	Refusal within Glacial Till

The allowable pile load would be dependent on the section chosen - for example, 14 BP 74 steel H-piles may be designed for 95 tons/pile. If the compressible clay stratum is left intact beneath the East abutment, however, the piles will be subjected to a negative skin frictional load due to consolidation of the cohesive subsoil under the weight of the approach fills. In order to take this effect into consideration, it is recommended that the ultimate capacity of the pile section

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

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

6.3.2) Abutments: (cont'd.) ...

chosen be reduced by about 15 percent at this location. For example, the above section can be designed for 80 tons/pile.

No bouldery or rock fill should be placed in areas where piles are to be driven. Further, the pile driving in the field should be controlled by using the Hiley Dynamic Pile Driving Formula, in accordance with current D.H.O. practices.

7. MISCELLANEOUS:

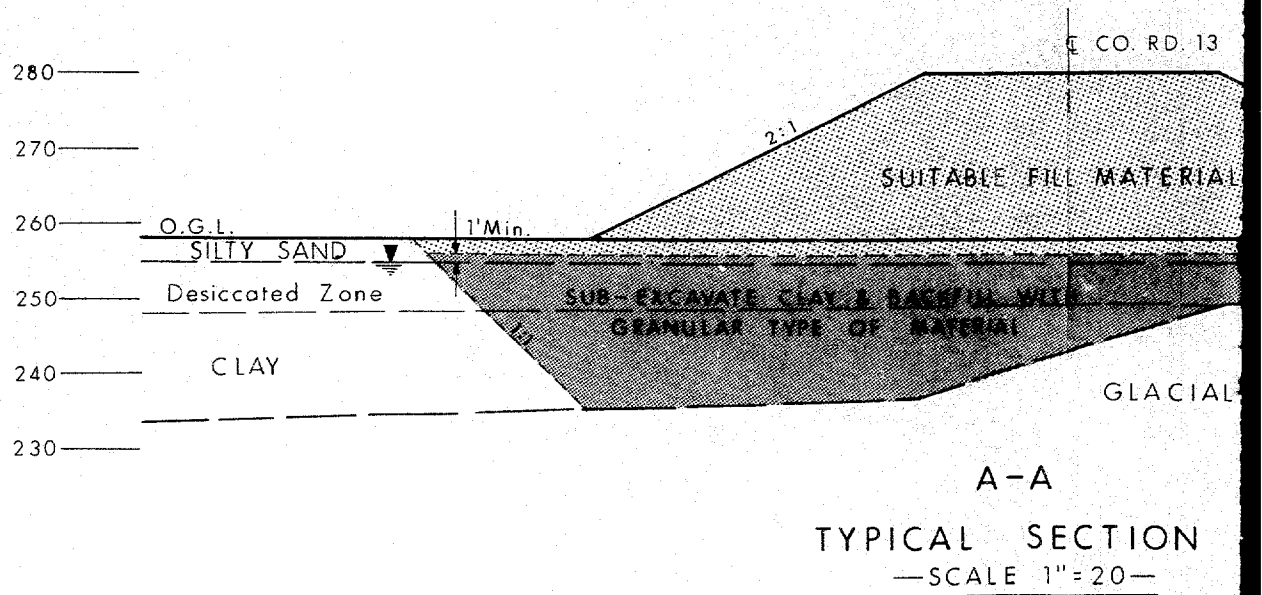
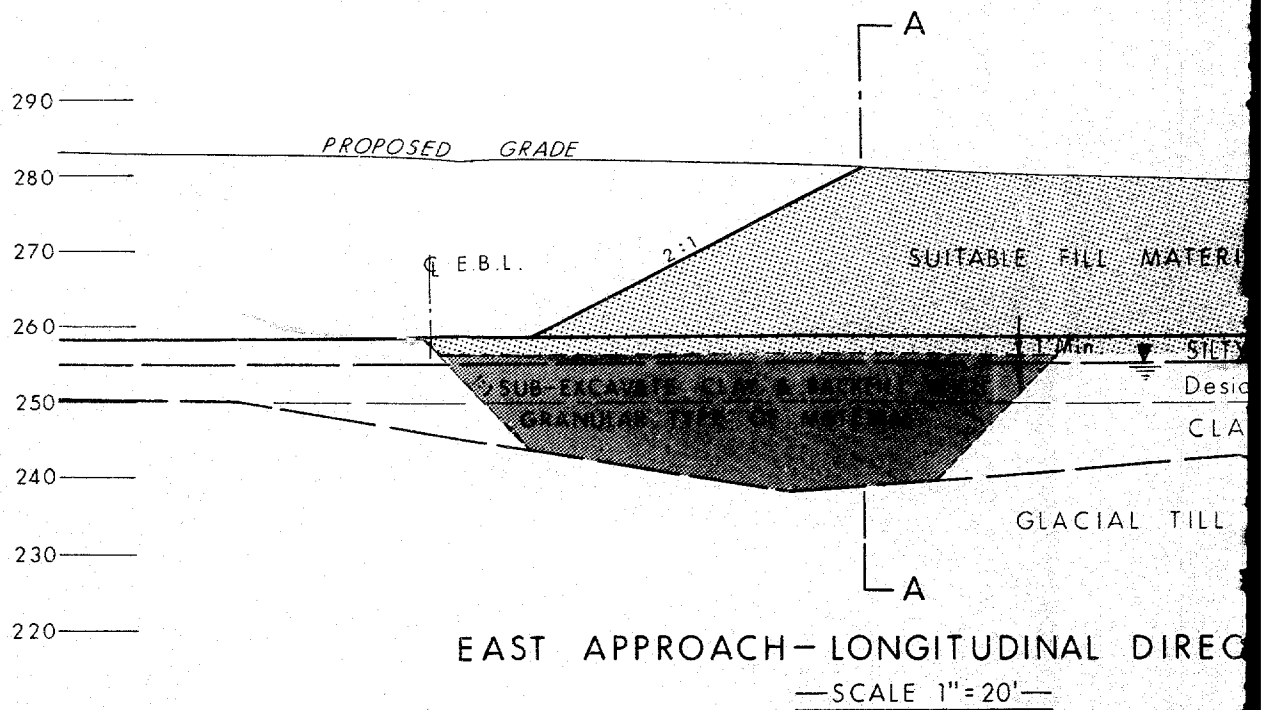
The field work, performed during the period of October 23 and November 12, 1970, was carried out under the immediate supervision of Mr. S. Ahmad, Project Foundation Engineer, who wrote this report.

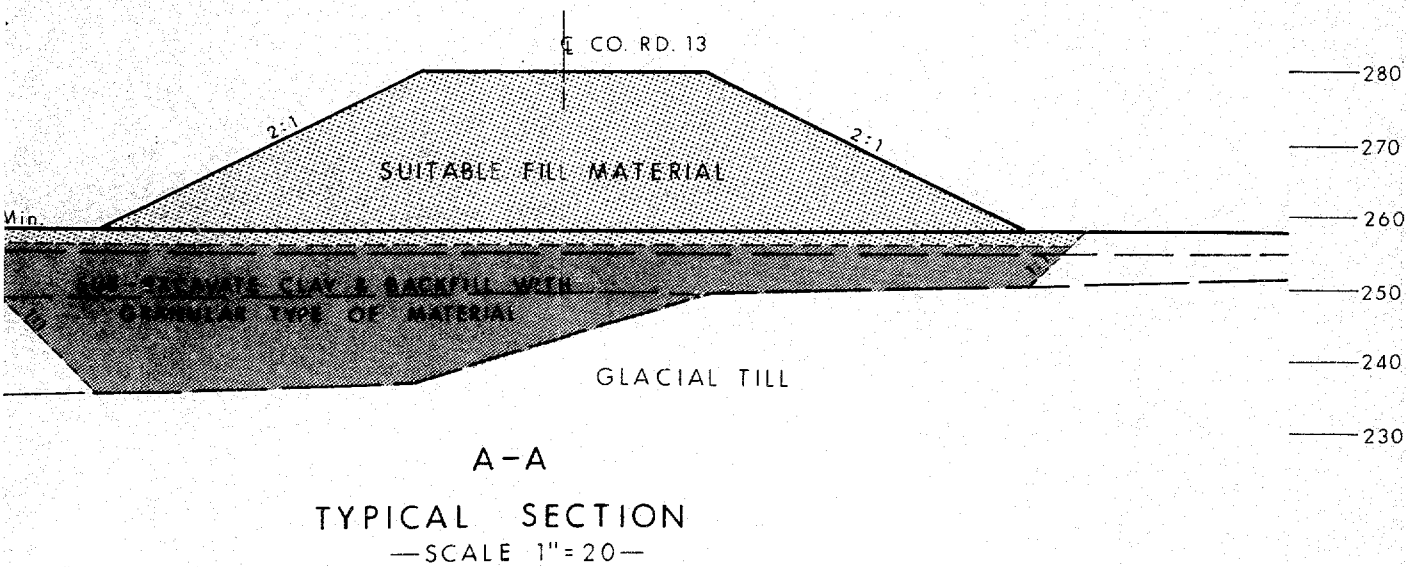
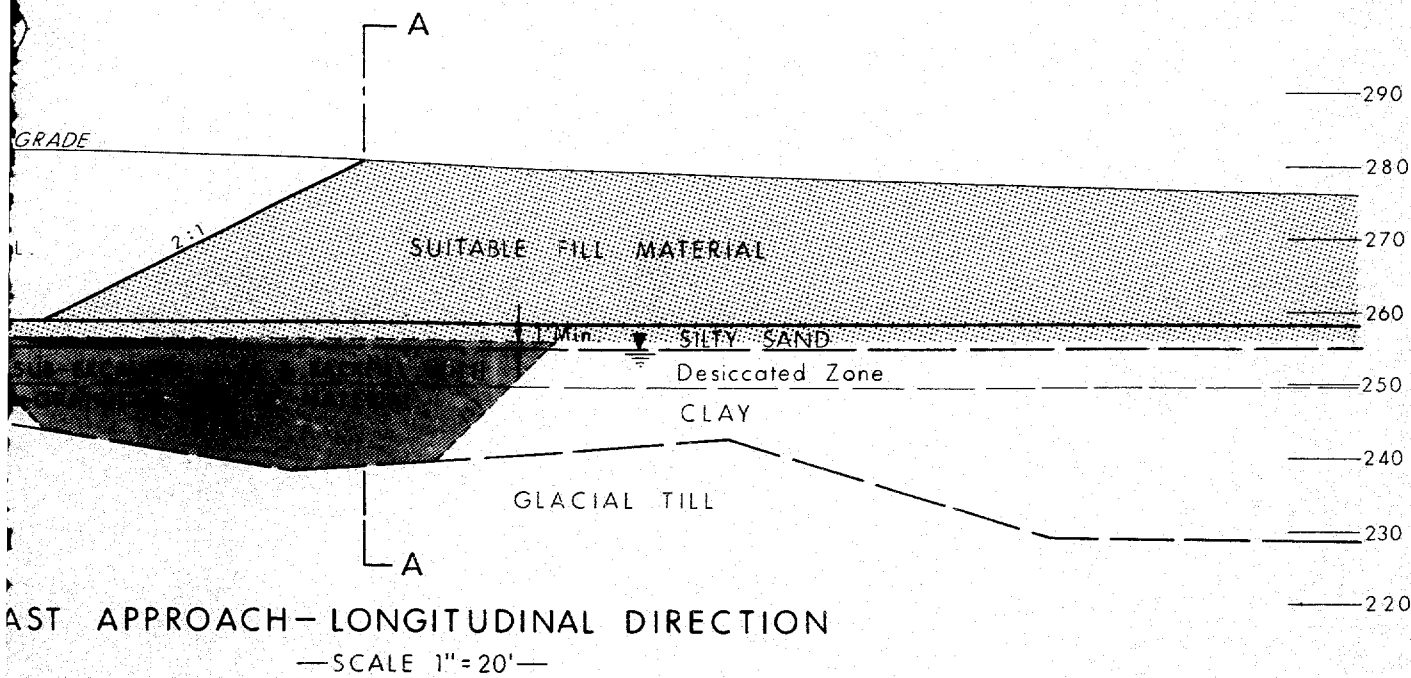
The equipment was owned and operated by the F. E. Johnston Drilling Company Ltd.

This report was carried out under the general supervision of Mr. M. Devata, Supervising Foundation Engineer, who also reviewed this report.

December, 1970

APPENDIX I





ONTARIO

DEPARTMENT OF HIGHWAYS
**MATERIALS and
 TESTING
 OFFICE**

SUB-EXCAVATION OF SOFT CLAY STRATUM
 HWY. 417 & CO. RD. 13 EAST APPROACH

DATE Dec. 21, 1970

W.P. NO. 37-66-09

FIGURE NO. 5

FOUNDATION SECTION

JOB	70-11082	LOCATION	Sta. 98 + 50 o/s 20' Lt. Ø	ORIGINATED BY	SA
W.P.	37-66-09	BORING DATE	Oct. 28/70	COMPILED BY	SA
DATUM	Geodetic	BOREHOLE TYPE	Washboring - BX Casing	CHECKED BY	

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — w_L		BULK DENSITY γ P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS/FOOT	WATER CONTENT — w	WATER CONTENT %				
265.9	Ground Surface												
0.0	Silty sand - Roadway Fill												
258.8	Very Dense Brown		1	SS	65	260							261.2 in open BH Nov. 1/70
7.1	Het. mix. of silt, sand & gravel (Glacial Till)		2	SS	123/11"								
	layers of clayey silt up to 5" thick throughout		2A	RC	20%								
	Boulders up to 24" size throughout the deposit		3	SS	95/5"	250							13 47 33 7
	Very Dense Grey		3A	RC	25%								
		4	SS	131									
		5	SS	71	240								
		5A	RC	25%									
		6	SS	100/5"									
230.8	Probable Bedrock												
35.1	End of Borehole					230							

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 70-11082 LOCATION Sta. 99 + 40 o/s 17' Lt. 0 ORIGINATED BY SA
 W.P. 37-66-09 BORING DATE Oct. 23, 1970 COMPILED BY SA
 DATUM Geodetic BOREHOLE TYPE Washboring-BX Casing-BXL Rock Core CHECKED BY SA

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS			
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					SHEAR STRENGTH P.S.F.					WATER CONTENT %		
							20	40	60	80	100	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					w_p — w — w_L		
263.4	Ground Surface																		
0.0	Silty sand & gravel (Roadway Fill)																		
259.1	Compact Brown		1	SS	17	260													
4.3	Het. mix. of silt, sand & gravel, traces of clay		2	BXL	20%														
	Glacial Till		3	SS	65														
	occ. layers of clayey silt up to 3" thick		3A	BX	30%	250													
			4	SS	101/10"														
			5	SS	68/3"														
	boulders up to 24" in size throughout the deposit		5A	RC	25%														
			6	SS	60/2"														
	Very Dense		7	SS	62	240													
	Grey	8	SS	90/6"															
		8A	BX	30%	230														
226.1		9	SS	120/10"															
37.3	Limestone Bedrock with occ. seams of shale																		
	Sound		10	BXL	95%	220													
216.1	Grey																		
47.3	End of Borehole																		

259.2

in open BH
Nov. 1/708 40 46 6
17 40 33 10

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 70-11082 LOCATION Sta. 100 + 62 o/s 20' Rt. 0
 W.P. 37-66-09 BORING DATE Oct. 28/70
 DATUM Geodetic BOREHOLE TYPE Washboring-BX Casing
 ORIGINATED BY SA
 COMPILED BY SA
 CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS				
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					SHEAR STRENGTH P.S.F.					WATER CONTENT %			
							20	40	60	80	100	UNCONFINED		FIELD VANE			w_p — w — w_L			
												○	+	●			×			
260.9	Ground Level																			
0.0	Silty sand & gravel (Roadway Fill)		1	SS	5	260										257.2 in open BH Nov. 1/70 20 51 26 3				
257.4	Loose Brown																			
3.5	Organic clay with trace of sand and gravel.		2	SS	12															
252.4	Stiff Grey																			
8.5	Het. mix. of silt, sand & gravel, trace of clay (Glacial Till)		3	SS	40	250														
	Dense to Very Dense Grey		4	SS	72															
	Boulders up to 2 1/4" in size throughout the deposit		4A	BX	40%	240														
			5	SS	76															
			6	SS	89															
			7	SS	60 1/2"	230														
226.4			7A	BX	40%															
34.5	Limestone Bedrock with occasional seams of shale.			8	BXL	90%														
217.4	Sound Grey					220														
43.5	End of Borehole																			

257.2
 in open BH
 Nov. 1/70
 20 51 26 3

21 25 46 6

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 70-11082 LOCATION Sta. 102 + 80 o/s 20' Rt. 4 ORIGINATED BY SA
 W.P. 37-66-09 BORING DATE Oct. 29/70 COMPILED BY SA
 DATUM Geodetic BOREHOLE TYPE Washboring-BX Casing CHECKED BY SA

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT ——— w_L PLASTIC LIMIT ——— w_p WATER CONTENT ——— w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT %				
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					w_p ——— w ——— w_L				
258.3	Ground Level						200	400	600	800	1000	20	40	60		
0.0	Silty sand (Roadway Fill)															
254.8	Loose Brown															
3.5	Desiccated Zone		1	SS	9											
	Stiff															
	Clay to silty clay, trace of sand & gravel		2	TW	PM	250		+s6.6	σ_x s5.1						99	
			3	TW	PM	240		+s4.0								
	Grey		4	TW	PM			+s4.6	x s6.0						94	
	Soft to Firm		5	TW	PM	230		+s5.6								
229.0																
29.3	Het. mix. of silt, sand & gravel, trace of clay (Glacial Till)		6	SS	97					100/10"						40 42 17 1
	Very Dense Grey															
220.3	Probable Bedrock					220										
38.0	End of Borehole															

255.2
 in open BH
 Nov. 1/70

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 6

FOUNDATION SECTION

JOB 70-11082 LOCATION Sta. 101 + 80 o/s 20' Lt. Ø ORIGINATED BY SA
 W.P. 37-66-09 BORING DATE Nov. 12, 1970 COMPILED BY SA
 DATUM Geodetic BOREHOLE TYPE Washboring-NX Casing CHECKED BY JK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT % w_p — w — w_L						
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE											
259.2	Ground Level						200	400	600	800	1000		20	40	60			
0.0	Silty sand Roadway Fill																	
253.2	Brown																	
6.0	Desiccated Zone Stiff		1	TW	PM	250												
	Clay to silty clay, trace of sand & gravel		2	TW	PM								2152 x 3.1				105	
	Grey		3	TW	PM													
237.2	Soft to Firm		4	TW	PM	240												
235.7	Glacial Till. V.Dense		5	SS	52													
23.5	End of Borehole																	
						230												

▼ 255.5
in open BH
Nov. 6/70

2152 x
s3.1

+s5.7

+s4.5

x s3.6

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 8

(Previous Site 26
68-F-90) FOUNDATION SECTION

JOB 70-11082

LOCATION Sta. 104 + 10 o/s 15' Rt. 0

ORIGINATED BY VK

W.P. 37-66-09

BORING DATE Jan. 29, 30, 31 and 3, 1969

COMPILED BY VK

DATUM Geodetic

BOREHOLE TYPE Washboring-NX, BX Casing-BXL Rock Core

CHECKED BY *SK*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT %				
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					w_p — w — w_L				
						200	400	600	800	1000	20 40 60					
258.3	Ground Level															
0.0	Silty sand & gravel (Roadway Fill)															
254.3	Compact		1	SS	12											
4.0	Desiccated Crust (mottled brown) Stiff		2	TW	PM					1380 σ						
	Clay to silty clay, trace of sand (occ.seams & partings of silt & sand up to 1" thick throughout) (grey,random red-brown laminations)		3	TW	PM	250				x s10				107.5		
			4	TW	PM					σ				95		
			5	TW	PM	240				σ x s7				96 91		
						230										
226.3	Soft to Firm		6	TW	PM					x s5						
32.0	Het.mix.of clayey silt, sand & gravel (Glacial Till) (boulders up to 10" in size below elev. 240) (Brown)		7	SS	34	220										
			8	SS	29											
			9	BXL	22%											
214.3	Dense to Very Dense		10	BXL	25%											
44.0	Limestone Bedrock occ. shaley seams		11	BXL	90%	210										
209.3	Grey Sand															
49.0	End of Borehole															

253.3
in open BH


DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 9

FOUNDATION SECTION

JOB 70-11082 LOCATION Sta. 100 + 63 o/s 17' Lt. 0
 W.P. 37-66-09 BORING DATE December 11, 1970
 DATUM Geodetic BOREHOLE TYPE Washboring-NX Casing
 ORIGINATED BY RWH
 COMPILED BY BTB
 CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					w_p — w — w_L WATER CONTENT %				
260.6	Ground Level					260										
259.6	Topsoil															
1.0	Silty clay, trace of sand. (Brown)		1	SS	16											▼ 257.0
254.6	Very Stiff		2	SS	35											WL in open
6.0	Het. mix. of silt, sand & gravel, trace of clay (Glacial Till)		3	SS	40	250										BH Dec. 11/70
	Brown to Grey		4	SS	25											
244.1	Compact to Dense															
16.5	End of Borehole					240										

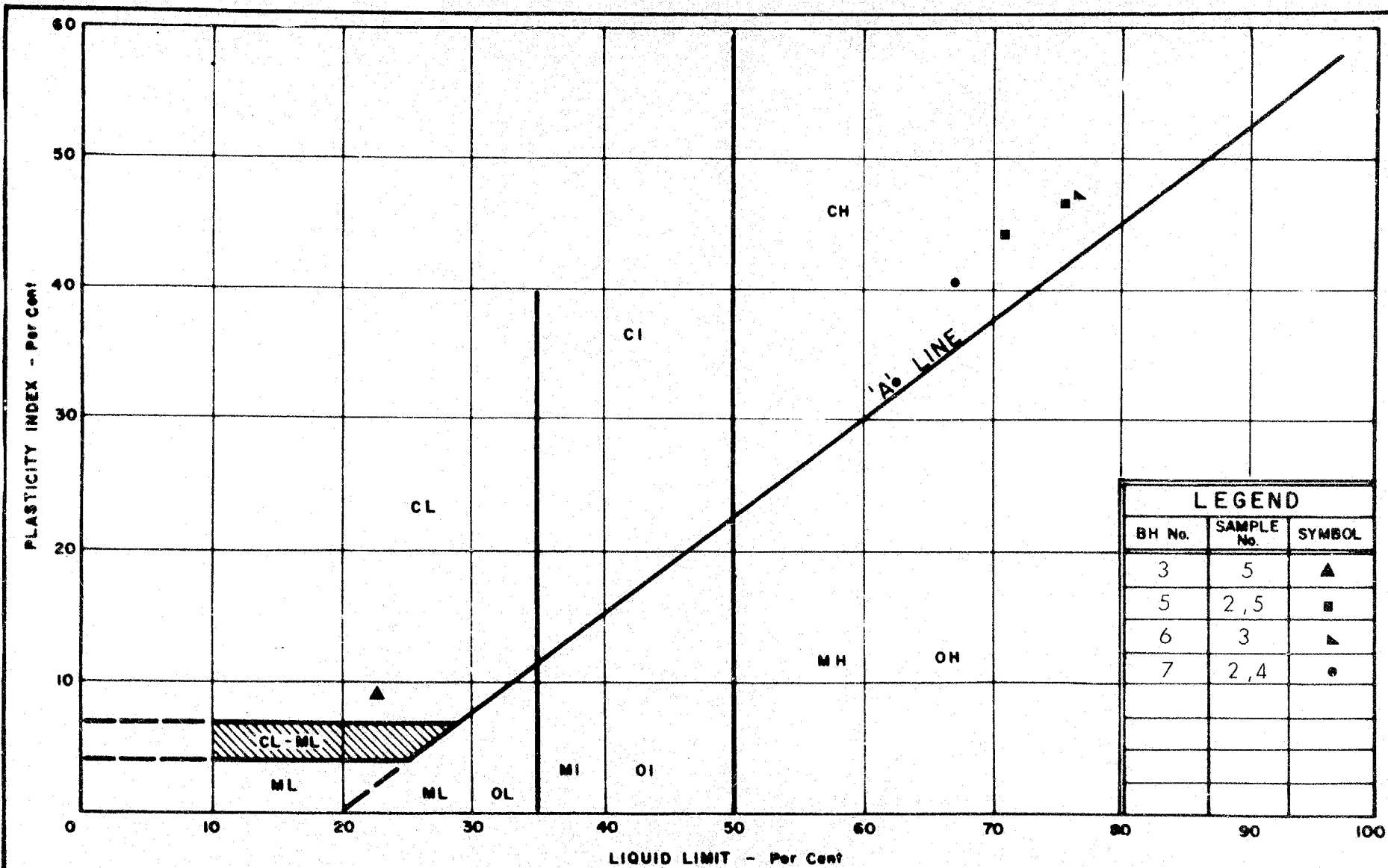
 257.0

 WL in open
 BH Dec. 11/70

FOUNDATION SECTION

JOB	70-11082	LOCATION	Sta. 101 * 27 o/s 15' Lt. C	ORIGINATED BY	RAH
W.P.	37-66-09	BORING DATE	December 11, 1970	COMPILED BY	BTD
DATUM	Geodetic	BOREHOLE TYPE	Washboring- NX Casing	CHECKED BY	<i>[Signature]</i>

[illegible]



DEPARTMENT OF HIGHWAYS
 MATERIALS and
 TESTING
 DIVISION

PLASTICITY CHART

WP. No. 37-66-09

JOB No. 70-11082

Fig. No. 1

VOID RATIO - PRESSURE CURVES

JOB NO. 70-11082

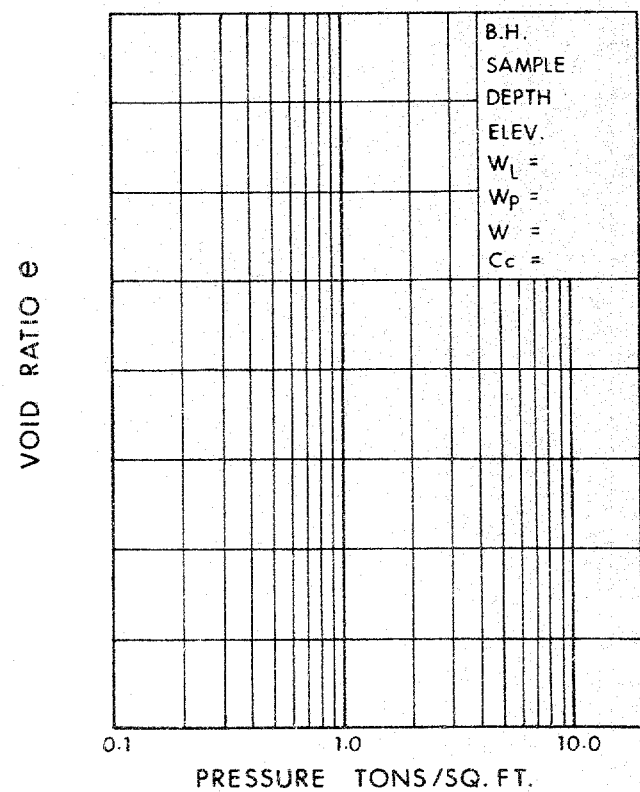
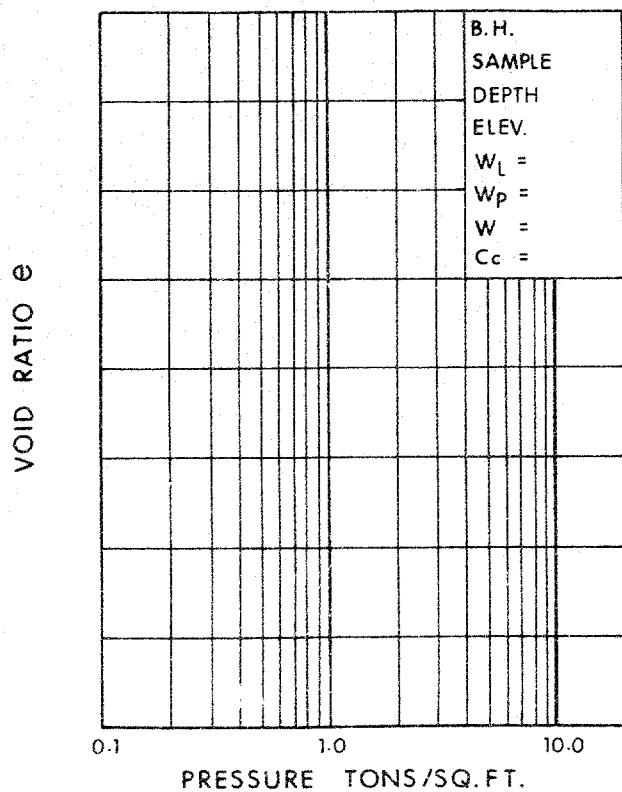
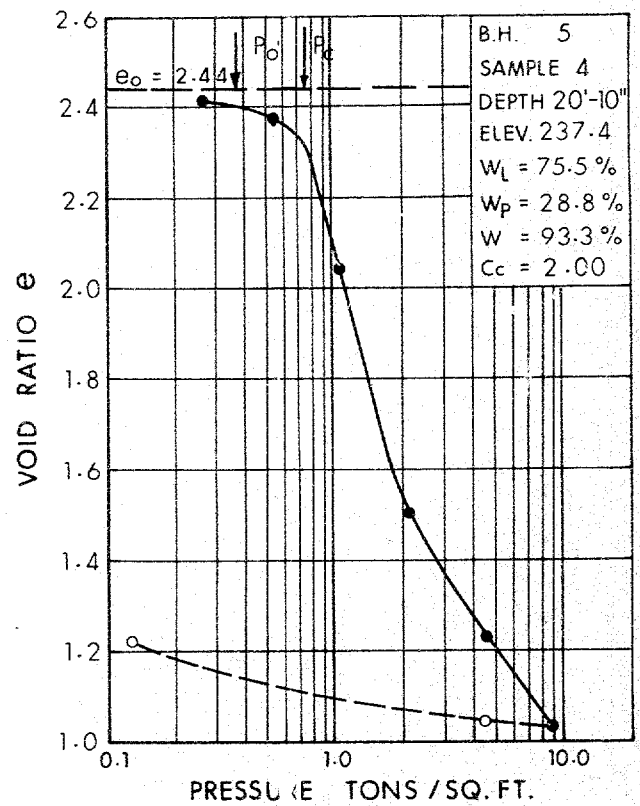
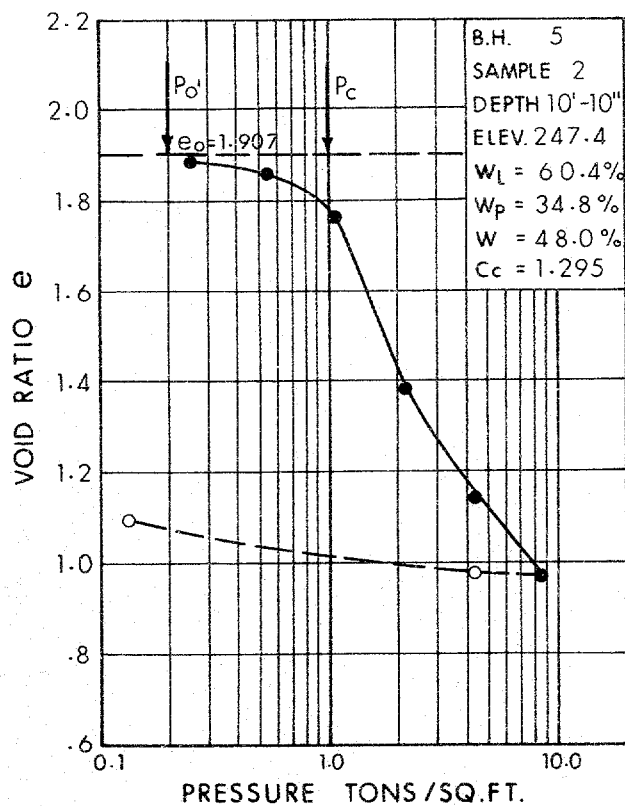
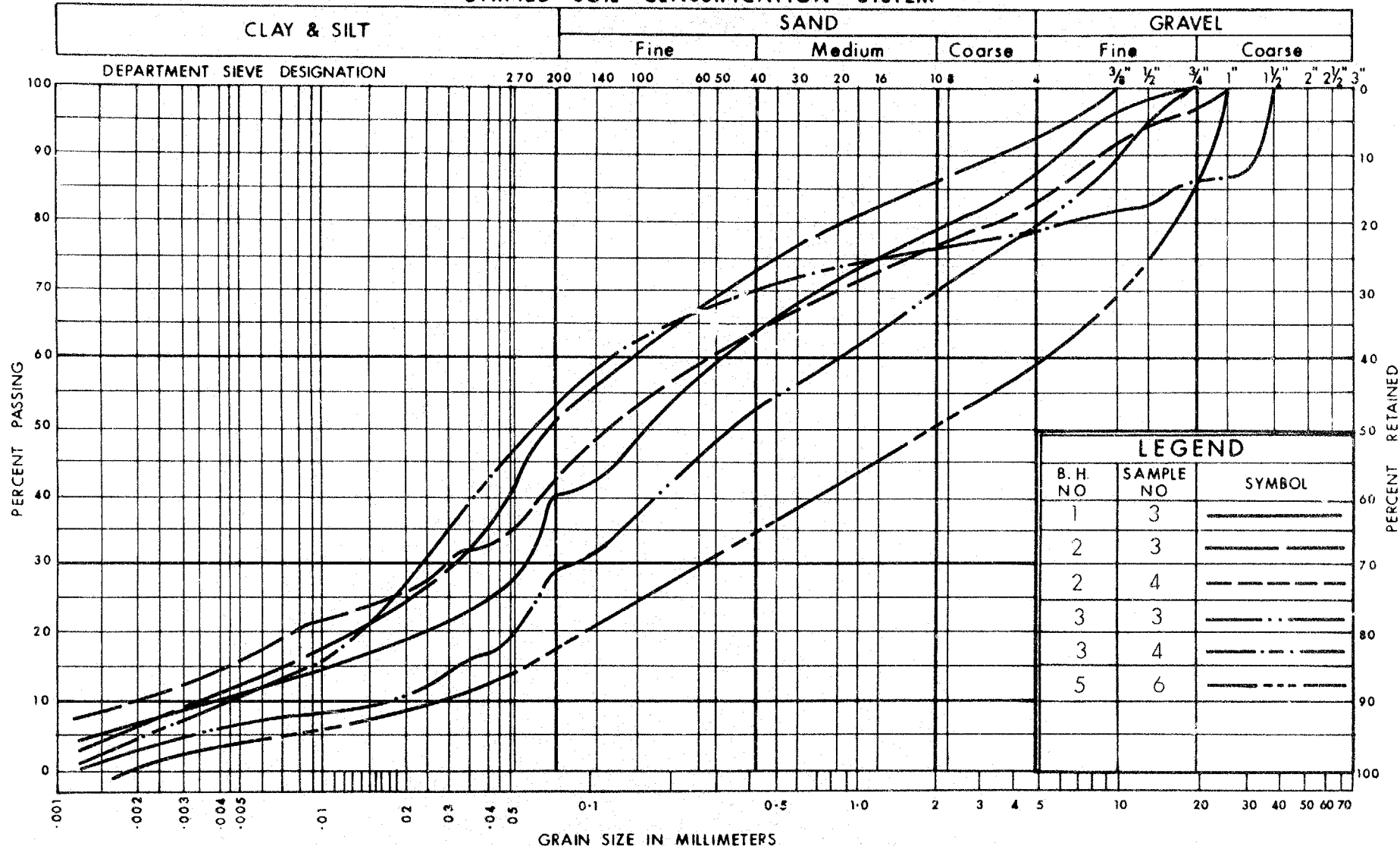


FIG. 2

UNIFIED SOIL CLASSIFICATION SYSTEM



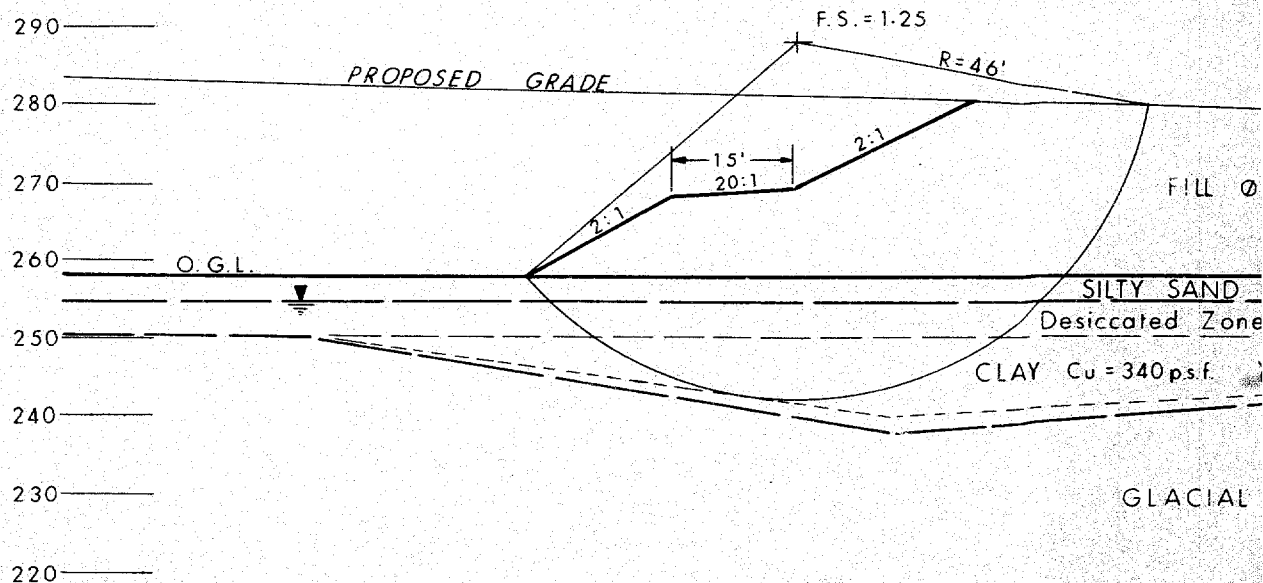
DEPARTMENT OF HIGHWAYS
**MATERIALS and
TESTING
DIVISION**

GRAIN SIZE DISTRIBUTION GLACIAL TILL

W.P. No. 37-66-09

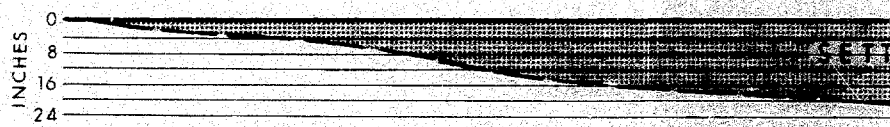
JOB No: 70-11082

Fig. No 3



EAST APPROACH - LONGITUDINAL

-SCALE 1" = 20'-

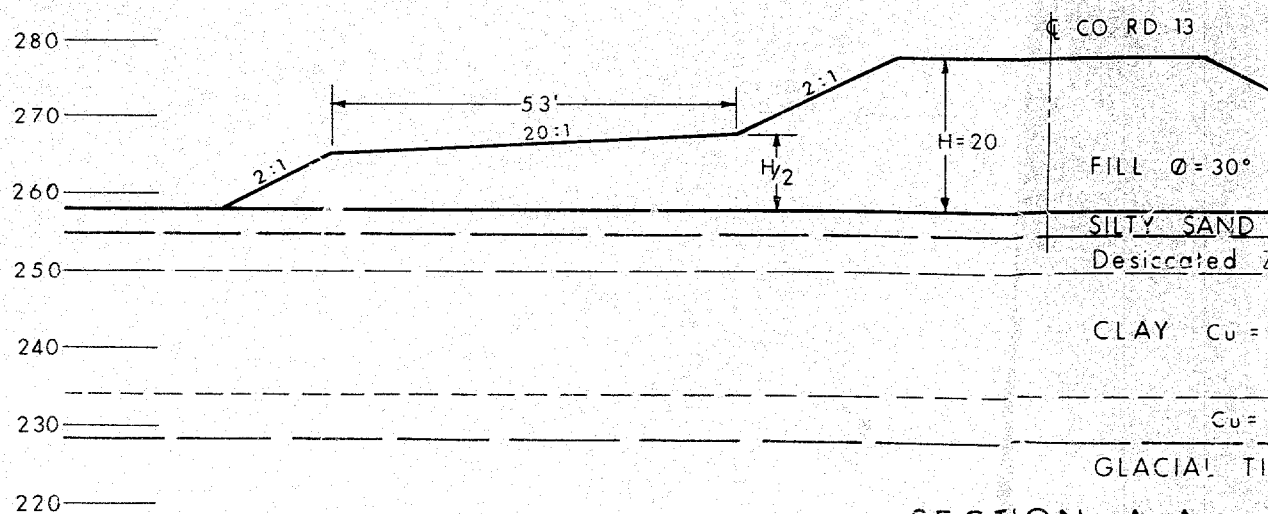


ESTIMATED MAXIMUM CONSOLIDATION

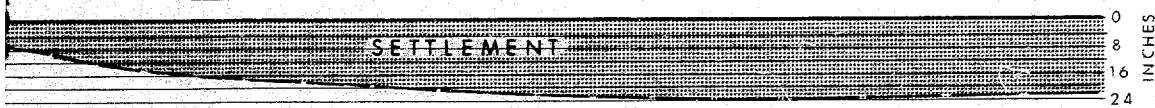
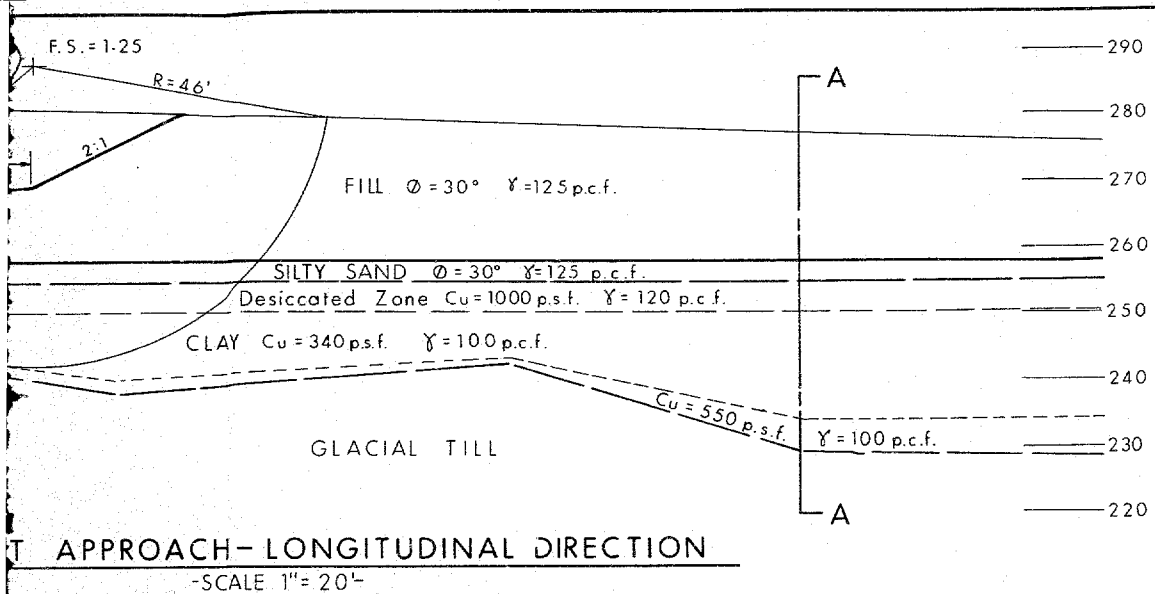
ESTIMATED TIME - RATE OF SETTLEMENT

100% IN 6-7 YEARS

50% IN 18 MONTHS



SECTION A-A SCALE

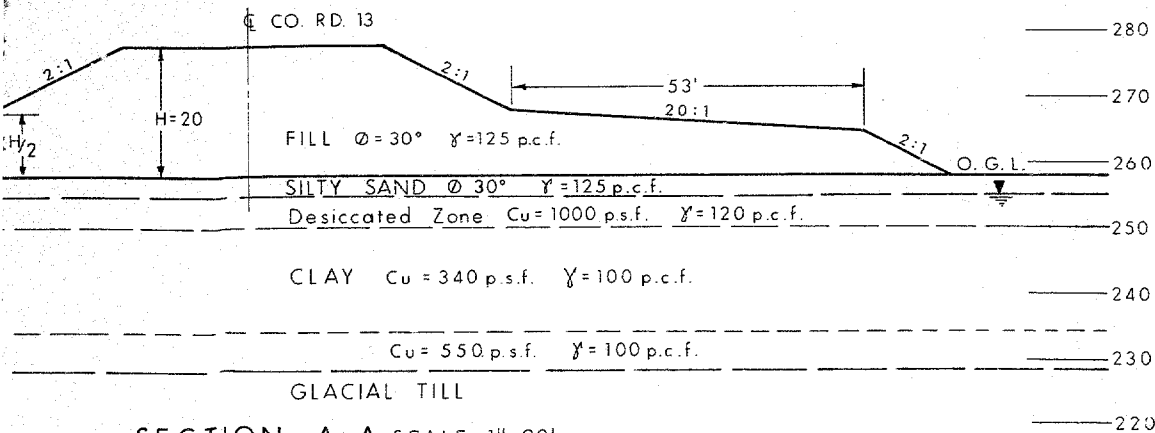


ESTIMATED MAXIMUM CONSOLIDATION SETTLEMENT

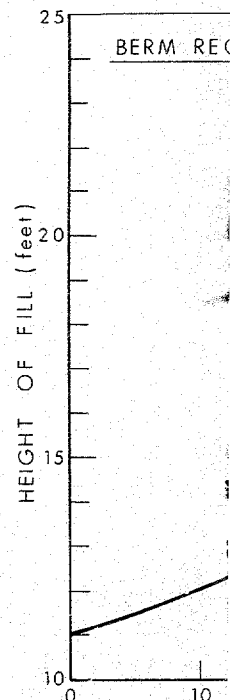
ESTIMATED TIME-RATE OF SETTLEMENT

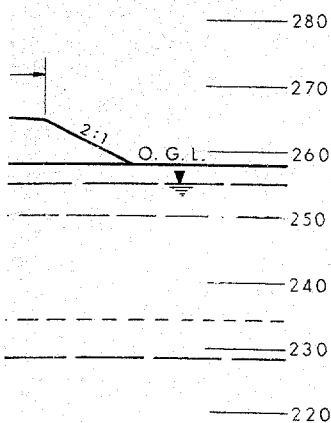
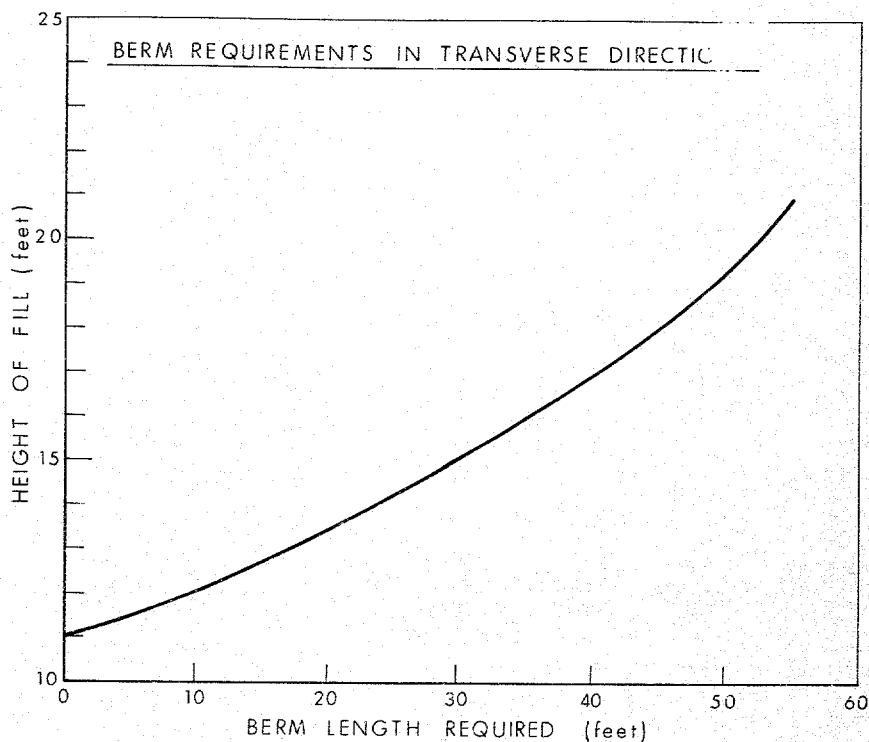
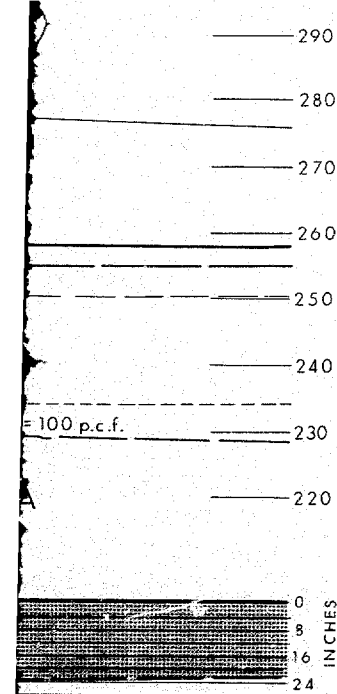
100% IN 6-7 YEARS

50% IN 18 MONTHS




SECTION A-A SCALE 1" = 20'





—LEGEND—

- + — CRITICAL CIRCLE
- F.S. — FACTOR OF SAFETY
- H — HEIGHT OF FILL
- WATER LEVEL

 <p>DEPARTMENT OF HIGHWAYS MATERIALS and TESTING OFFICE ONTARIO</p>	<p>SUMMARIZED RESULTS OF STABILITY AND SETTLEMENT ANALYSES HWY. 417 & CO. RD. 13-EAST APPROACH</p>	
DATE Dec. 16, 1970	W.P. NO. 37-66-02	FIGURE NO. 4

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

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

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

DESCRIPTION OF SOIL

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

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

TYPE OF SAMPLE

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

SOIL TESTS

Qu	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
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
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
$\bar{\sigma}$	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 (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

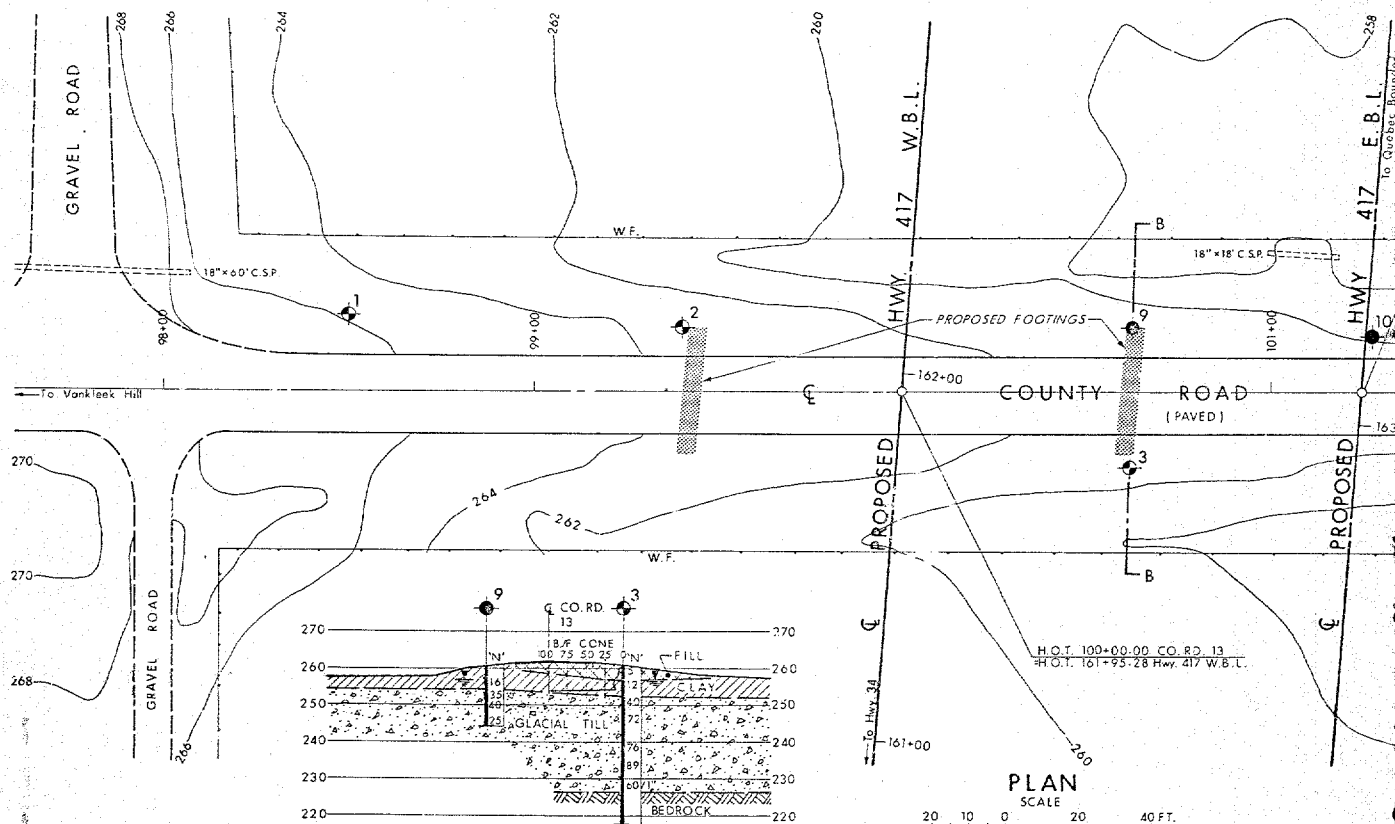
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

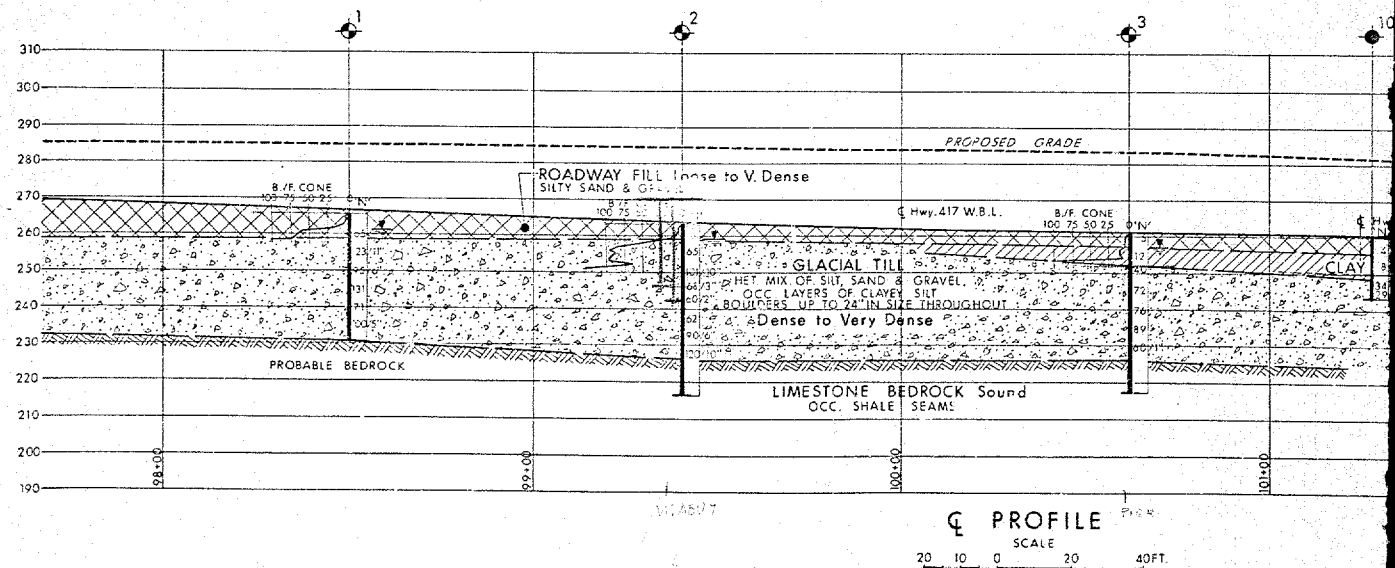
B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

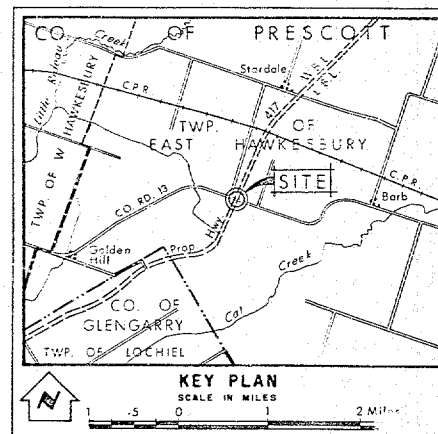
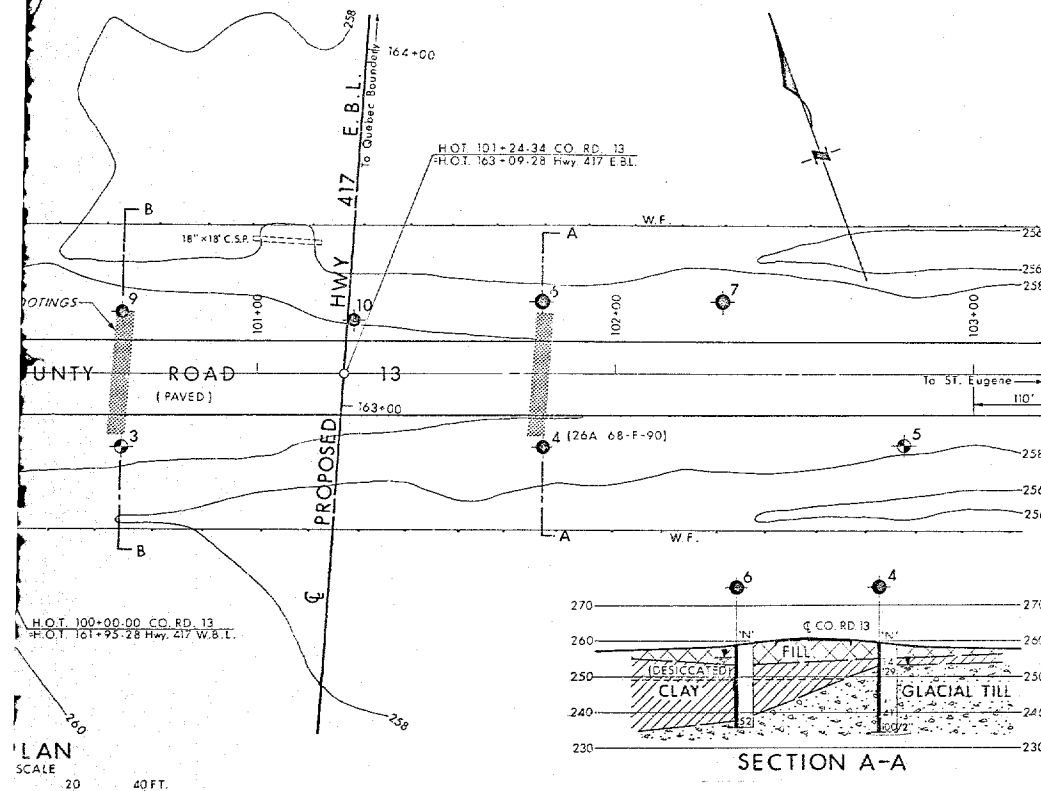
SLOPES

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

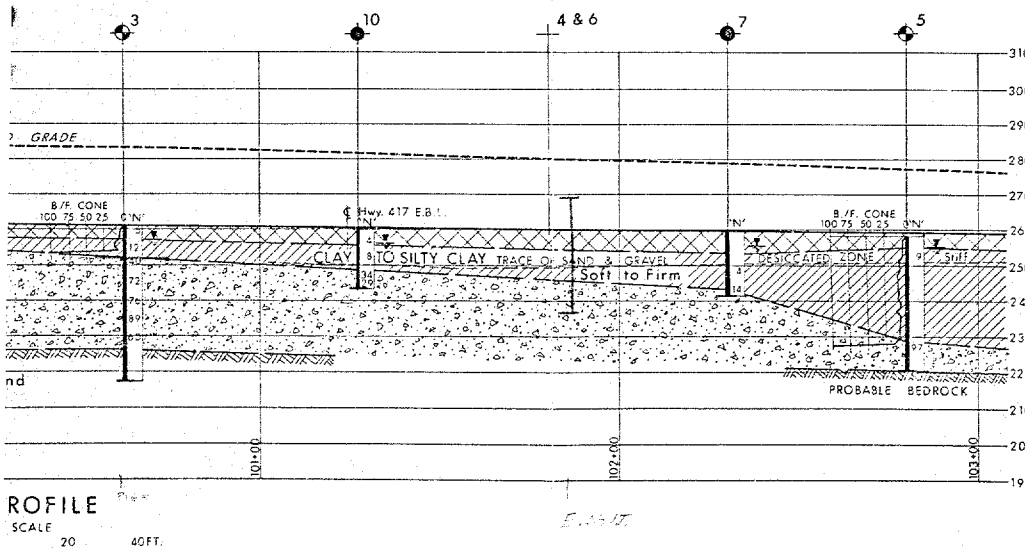
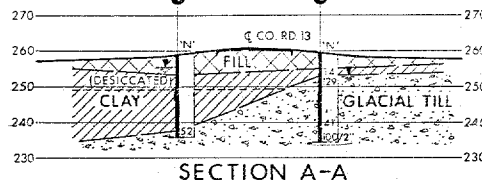


SECTION B-B





LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation, Nov. 1970		
NO.	ELEVATION	STATION	OFFSET
1	265.9	98+50	20' LT.
2	263.4	99+40	17' LT.
3	260.9	100+62	20' RT.
4	259.4	101+80	20' RT.
5	258.3	102+80	20' RT.
6	259.2	101+80	20' LT.
7	259.3	102+30	20' LT.
8	258.3	104+10	15' RT.
9	260.6	100+63	17' LT.
10	259.8	101+27	15' 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.

REVISION	DATE	BY	DESCRIPTION

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

COUNTY ROAD 13

KING'S HIGHWAY NO. 417 E.B.L. & W.B.L. DIST. NO. 9
CO. PRESCOTT
TWP. E. HAWKESBURY LOT 31 CON. IV & V

BORE HOLE LOCATIONS & SOIL STRATA

SUBMIT. S. A.	CHECKED	W.P. NO. 37-66-09	M.S.T. DRAWING NO.
DRAWN	CHECKED	JOB NO. 70-11082	70-11082 A
DATE Dec. 18, 1970	SITE NO.	BRIDGE DRAWING NO.	
APPROVED <i>[Signature]</i>	CONT NO.		

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-110 82 SITE PROP. 417 & Co. Rd. 17 BOREHOLE No. 1 GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	5'-3"- 6'-9"	3/4	ANGULAR	5	60	35	Low	DULL	QUICK		EARTHY	BROWN	HIGH	DENSE	SILTY SAND WITH TRACE OF GRAVEL	SF
2	10'-6"- 11'-11"	1/2	SUB ROUNDED	20	45	35	Low	DULL	QUICK		"	GREY	"	VERY DENSE	SILTY SAND WITH SOME GRAVEL (GLACIAL TILL)	SF
3	15'-3"- 15'-9"	1/2	"	20	45	35	"	"	"		"	"	"	"	SILTY SAND WITH SOME GRAVEL (GLACIAL TILL)	SF
4	20'-5"- 21'-11"	1/2	"	20	50	30	"	"	"		"	"	"	"	SILTY SAND WITH SOME GRAVEL (GLACIAL TILL)	SF
5	25'-3"- 26'-9"	1/2	"	20	40	40	"	"	"		"	"	"	"	SILTY SAND WITH SOME GRAVEL (GLACIAL TILL)	SF
6	30'-0"- 30'-5"	1/4	"	15	45	40	"	"	"		"	"	"	"	SILTY SAND WITH SOME GRAVEL (GLACIAL TILL)	SF

NOTES:- VISUAL CLASSIFICATION MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT <u>70-11082</u> SITE <u>PROP. 47 & Co. Rd 13.</u> BOREHOLE No. <u>2</u> GROUND ELEVATION _____																	
SAMPLE NO.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL	
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE													
				GRAVEL	SAND	SILT & CLAY											
1	2'-0" - 4'-0"	3/4	SUB ROUNDED	15	45	40	Low	Dull	Quick		Earthy	BROWN	HIGH	DENSE	SILTY SAND WITH SOME GRAVEL - TRACES OF ORGANIC (FILL)	SF	
2															BOULDER		
3	7'-0" - 8'-6"	1/4	"	15	45	40	"	"	"		"	GREY	"	"	SILTY SAND WITH SOME GRAVEL - (GLACIAL TILL)	SC	
4	12'-11" - 13'-5"	1/2	"	15	50	35	"	"	"		"	"	"	V. DENSE	SILTY SAND WITH SOME GRAVEL - (GLACIAL TILL)	SF	
5	16'-0" - 16'-9"	1/2	"	15	50	35	"	"	"		"	"	"	DENSE	SILTY SAND WITH SOME GRAVEL - (GLACIAL TILL)	SF	
6	20'-3" - 20'-11"	1/2	"	15	60	15	"	"	"		"	"	"	DENSE	SAND WITH SOME SILT AND GRAVEL (GLACIAL TILL)	SF	
7	25'-0" - 26'-6"	1/4	"	15	40	45	"	"	"		"	"	"	DENSE	SANDY SILT WITH SOME GRAVEL (GLACIAL TILL)	ML	
8	30'-0" - 30'-6"	3/8	"	15	45	40	"	"	"		"	"	"	VERY DENSE	SILTY SAND WITH SOME GRAVEL (GLACIAL TILL)	SF	
9	35'-7" - 36'-11"	1/4	"	15	45	40	"	"	"		"	"	"	VERY DENSE	SILTY SAND WITH SOME GRAVEL (GLACIAL TILL)	SF	

NOTES:- VISUAL CLASSIFICATION MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-11082 SITE 417 & Co. Rd. No. 13 BOREHOLE No. 3 GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	2'-0" 1'-6"	-	-		80	20	Low	Dull	Quick		EARTHY ORGANIC	BROWN	Slow	Loose	SAND WITH SOME SILT AND ORGANIC INCLUSION	SF
2	1'-6" 6'-0"	-	-		2	98	High	Dull	Slow		EARTHY	"	High	Stiff	CLAYEY SILT	CL
3	8'-0" 9'-6"	1/4	SUB ROUNDED	15	50	35	Low	"	Quick		"	GREY	"	DENSE	SILT SAND WITH SOME GRAVEL - GLACIAL TILL	SF
4	13'-0" 14'-6"	1/2	"	15	35	50	"	"	"		"	"	"	VERY DENSE	SANDY SILT WITH SOME GRAVEL - GLACIAL TILL	ML
5	20'-6" 22'-0"	1/2	"	3	5	92	High	"	Slow		"	"	"	HARD	CLAYEY SILT WITH TRACE OF SAND - GLACIAL TILL AND GRAVEL	CL
6	26'-0" 27'-6"	1/4	"	5	35	60	Low	"	Quick		"	"	"	DENSE	SANDY SILT WITH SOME GRAVEL - GLACIAL TILL	ML
7	31'-0" 31'-7"	1/2	"	15	60	25	Low	"	"		"	"	"	VERY DENSE	SILTY SAND WITH SOME GRAVEL	SF

NOTES:- VISUAL CLASSIFICATION MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT <u>70-11082</u>		SITE <u>PROP 417 & Co. Rd. No. 13</u>		BOREHOLE No. <u>5</u>		GROUND ELEVATION _____										
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION			DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL		
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	5'-0" 6'-6"	-	-	-	-	100	HIGH	SHINY	NONE		EARTHY	BROWN	HIGH	SOFT FIRM	SILTY CLAY	CI
2	10'-0" 11'-6"															
3	15'-0" 16'-6"															
4	20'-0" 21'-6"															
5	25'-0" 26'-6"															
6	30'-0" 31'-6"	1/2	SUB ROUNDED	15	50	35	LOW	DULL	Quick		EARTHY	GREY	HIGH	DENSE		

NOTES:- VISUAL CLASSIFICATION MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. T.C. Kingsland,
Reg. Bridge Planning Engineer,
Kingston Regional Office,
Kingston, Ontario

Bridge Office,
Downsview

April 23, 1971

County Rd. 13 Interchange Underpass
4.5 Miles West of Hwy. 17
W.P. 37-66-09, Site No. 27-222
Highway 417, District No. 9

70-11-082

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-6973-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$176,000. This cost includes tender, materials, engineering and sundry construction.

Any comments or revisions you may have should be submitted within three weeks.

C.S. Grebski,
Bridge Design Engineer

CSG:rd

Attach.

c.c. B. Davis
A. Stermac (2)
J. Anderson
R. Forrest

No comments -
M. Devata
3rd May/71

70-11-082

DEPARTMENT OF HIGHWAYS ONTARIO

FORM
SB-OS-62

ACTION SLIP

DATE 3rd Aug /71

TO Mr A. A. Witcki, Structural Office
M. Devata

FROM _____

☐

NOTE AND
FILE

☐

PREPARE REPLY FOR
MY SIGNATURE

☐

NOTE AND
RETURN TO ME

☐

TAKE APPROPRIATE
ACTION

☐

RETURN WITH MORE
DETAILS

☐

PER YOUR
REQUEST

☐

NOTE
AND SEE ME

☐

FOR YOUR
SIGNATURE

☐

PLEASE
ANSWER

☐

FOR YOUR
INFORMATION

☐

FOR YOUR
APPROVAL

☐

INVESTIGATE AND
REPORT

☐

RETURN WITH YOUR
COMMENTS

☐

COMMENTS

We have no comments
with regard to your revised
Dwg D-6973-1.

1971 JUL 4 PM 2:23

DOWN KINR 4 AUG 4/71 2.15 PM

A STERMAC PR FDNS ENGR

ATT M DEVATA

RE WP 37-66-02 WO 11082 JCT

COUNTY RD NO. 13 AND 417

BASED ON THE PRE-ENGINEERING SOILS DATA IN THIS AREA, THE PROPOSED
FILLS WILL CONSIST OF A GRANULAR TYPE GLACIAL TILL WITH A UNIT
WEIGHT OF 140-145 LBS. WOULD THIS EFFECT THE RESULTS OF YOUR
STABILITY ANALYSIS, AS YOU ASSUMED 125 LBS. PLEASE REVIEW AND REPLY.

E R SAINT M AND T

JM

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MEMORANDUM

To: Mr. A. Stermac,
Principal Foundation Engineer,
Materials & Testing.

FROM: C. S. Grebski,
Structural Office.

ATTENTION:

DATE: August 26, 1971.

OUR FILE REF.

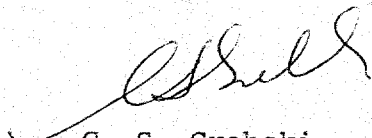
IN REPLY TO

SUBJECT: County Rd. #13 Interchange,
Underpass,
W.P. 37-66-09, Site #27-222,
Highway #417, District #9.

70-11-082

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,
Structural Design Engineer.

CSG/mh
ENCL*

cc: Foundation Office.

Comments were submitted in a memo to
Bridge Office

M. Devata
Sept 22/71.

dk
15 Sep 71

Mr. L. R. Saint,
Regional Materials Engineer,
Eastern Region,
Kingston, Ontario.

Foundations Office,
Design Services Branch,
Central Bldg., Downsview.

September 21, 1971.

Berm Requirements - East Approach to the
Underpass Structure at the Crossing of
Hwy. #417 and Co. Rd. #13, Twp. of E.
Hawkesbury, County of Prescott, District #9
(Ottawa), H.O. 71-11082, W.P. 77-66-19.

Further to your teletype we have reviewed the berm requirements along the aforementioned approach taking into consideration that a granular type of glacial till, with a compacted in-place bulk unit weight of the order of 140 to 145 p.c.f., will be used as fill on this site. In the foundation report previously submitted an in-place bulk unit of 125 p.c.f. was assumed for the fill for computational purposes. The berm requirements, along the east approach, for the latter fill weight were summarized on Figure #4 in the report.

The mid-height berms, in the transverse direction along the east approach, will have to be longer than those proposed in the report in order to allow for the fact that the fill will have a higher in-place unit weight than that originally assumed. The proposed berm lengths, in this direction, for various heights of fill are plotted on the figure attached to this letter. A berm will not be required in the longitudinal or forward direction along this approach since the soft compressible cohesive stratum is to be completely sub-excavated in this area.

The west approach fill will be directly underlain by a competent glacial till stratum. Therefore, berms will not be required in either the forward or transverse direction.

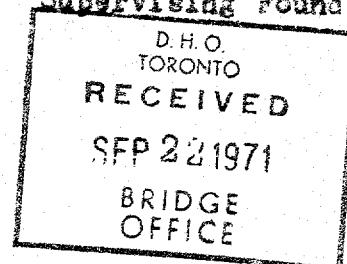
MD/BTD/ao

cc: Messrs. S. Markiewicz
T. C. Kingsland
K. Bessi

For:

B. T. Darch,
Senior Foundation Engineer,
M. Devata,
Supervising Foundation Engineer

Foundations Files
Documents



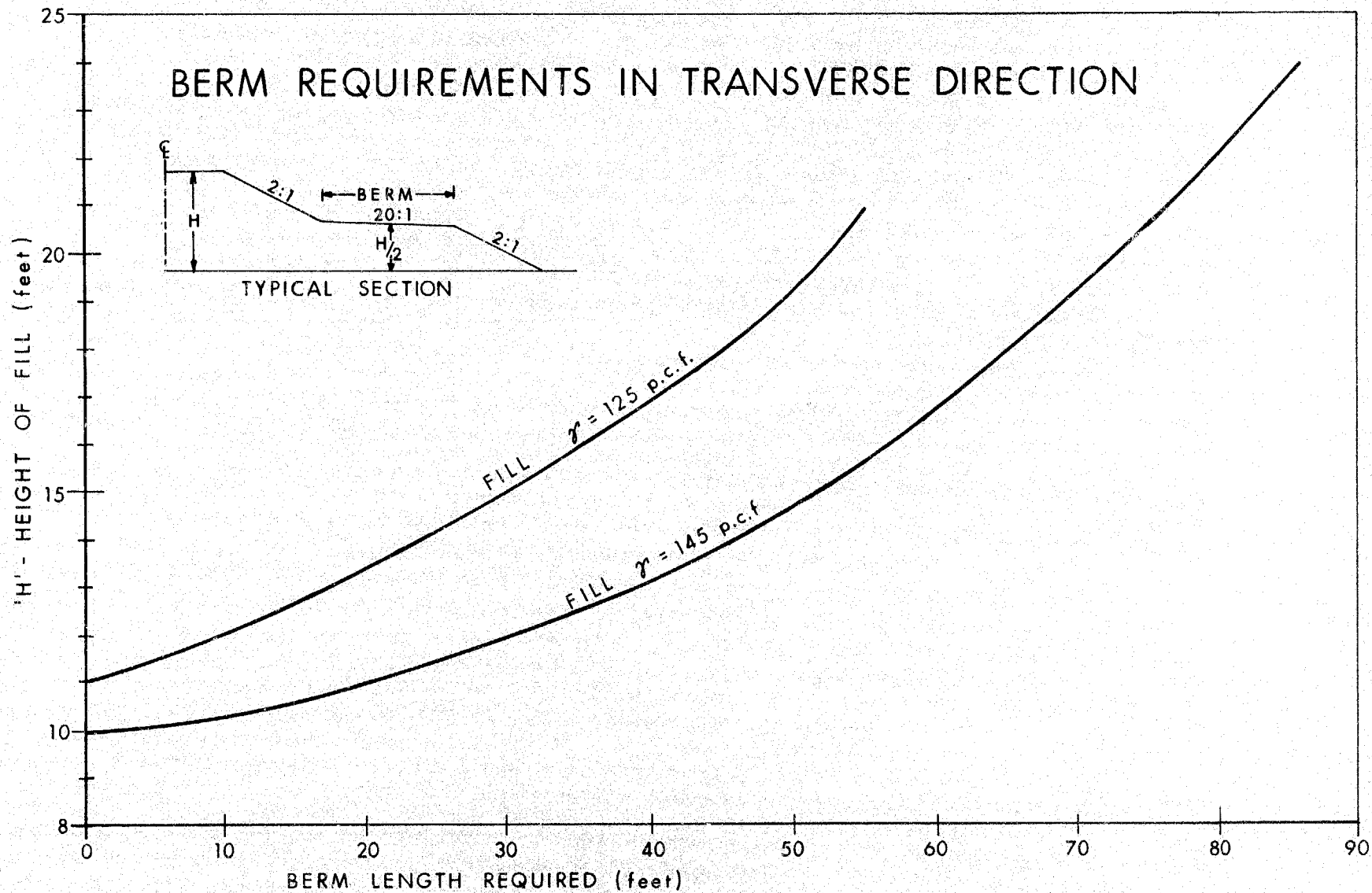
4 Rd. EI 281-27
RSta 102+18
East G.I.

257 000

20

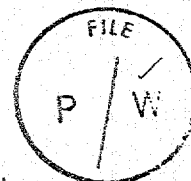
Berm reqd. 86' agreed
by Found. office Sept 22/71

HWY. No. 417 & CO. ROAD 13 - EAST APPROACH



~~XXXXXXXXXXXXXXXXXXXX~~

MEMORANDUM



27-222
TO: Mr. C. S. Grebski,
Structural Design Engineer,
Structural Design Section,
West Bldg., Downsview.

FROM: Foundations Office,
Design Services Branch,
Central Bldg., Downsview.

ATTENTION:

DATE: September 22, 1971.

OUR FILE REF.

IN REPLY TO

SUBJECT: Underpass Structure at the Crossing of Hwy. #417 and
Co. Rd. #13, Twp. of E. Hawkesbury, County of Prescott,
District #9 (Ottawa), W.O. 70-11082, W.P. 37-66-09.

We have reviewed Bridge Drawings No. D-6973-1 and 3 for the
aforementioned structure and submit the following comments:

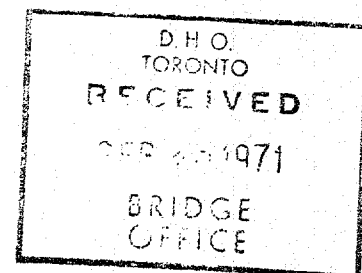
The berms in the transverse direction, along the east
approach, will have to be longer than those recommended
in the foundation report for this structure (refer to
Figure #4 in the report). This is necessary because
the in-place bulk unit weight of the material to be
used as fill on this site will be higher than that assumed
in the report (145 p.c.f. compared to 125 p.c.f. as
per teletype from Mr. E. R. Saint, Regional Materials
Engineer, Eastern Region). The revised berm lengths for
various fill heights are plotted on the figure attached
to this letter

*86' long berms provided in Transverse
direction at abutments.*

B. T. Darch.

MD/BTD/ao
cc: Documents
Foundations Files

For: B. T. Darch,
Senior Foundation Engineer,
M. Devate,
Supervising Foundation Engineer.



MEMORANDUM

To: Mr. M. Devata,
Supervising Foundations Engineer,
Foundations Office,
DOWNSVIEW, Ontario.

FROM: Systems Design Section,
KINGSTON, Ontario.

ATTENTION:

DATE: September 28th, 1971.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 37-66-09 - County Road 13 Underpass Structure

Attached please find a partial print of our cross-section roll for the east approach embankment to the above structure along with a partial print of the preliminary bridge plan.

On the latter we have indicated the plan limits of the berms. On the cross-section we have indicated the cross-sectional limits of the berms. The governing criteria for 'H', and the depth and width of muskeg excavation in the vicinity of the abutments.

We would be pleased if you would scrutinize the sections and inform us whether or not the foundation report has been properly interpreted.

For your information, the following are some comments and suggestions which would enable this office to easier understand the Foundation Report.

Figure No. 4

(a) H - Height of fill

Apparently the definition of 'H' differs between your office and ours.

The standards (DD-200 series) define 'H' as "the difference between the edge of the shoulder rounding and the original ground at the toe of slope".

OK ✓
As per Mr. E. Saint, Regional Materials and Testing Engineer, your definition is the difference between the maximum point on the cross-section and the o.g. at the toe of slope.

The difference between these two definitions even on a tangent section could be in excess of 6" due to the crossfall. This could result in a difference of 4' to 5' in the width of the berms from your table of Berm requirements in transverse direction.

It would therefore be helpfull if a definition of 'H' was included in your legend, and if that definition would in fact be illustrated properly on your section A-A.

(b) Table of Berm requirements in Transverse Direction

The curve on this table ends at a height of 21'. The total height of fill exceeds 23'.

NEW
CURVE
ISSUED.
Cont'd.....

This is a minor point, since we can and have extended the curve in this office.

However, it does make your report insufficient for the user.

(c) Figure #5

Subexcavation for soft clay stratum.

There is a conflict in the depth of excavation between the longitudinal direction (profile) drawing and the section A-A.

Apparently the longitudinal drawing shows the proposed grade on centre-line although the depth of excavation shown appears to be plotted from the offset borings. The section, however, shows a reasonable interpolation of the depth of excavation on centreline.

An indication on the profile concerning the offset distance of the excavation line would help the user.

On our cross-section roll, we have used the bore hole data as shown on your drawing No. 70-11082A, and interpolated cross-sectionally and longitudinally as required.

The above comments are not meant to be critical, but rather, are offered in the hope that we might achieve a better understanding between our sections.

Hoping to hear from you shortly.



J. R. Bestvater,
FOR: A. E. Irving,
SR. PROJECT DESIGN ENGINEER.

JRB/AEI/mac

c.c. - E. Saint

Department of Highways Ontario

Copy for the information of

Mr. M. Devata.

~~Mr. T. C. Kingsland,~~
Regional Bridge Planning
Engineer,
Eastern Region, Kingston.

Structural Office,
West Building,
Downsview, Ontario.

October 1, 1971.

County Road #13 Interchange Underpass,
W.P. 37-66-09, Site #27-222,
Highway #417, District #9 - Ottawa.

70-11-081

Enclosed for your information are three prints of revised plan D6973-1. The length of the side berms at the East approach has been increased to 86' to comply with the latest recommendations of the Foundation Section.

K. G. Bassi

K. G. Bassi,
Regional Structural Design Engineer.

KGB/mh

ENCL*

cc: M. Devata.

no comments
B.T.D.

Dec. 16, 1971

00014

70-11-082
1971 DEC 28 AM 9:21

K

KINR DOWN 1 DEC 28/71 9.15A VR

A E IRVIN SR PROJ DES ENGR

RE SOUTH APPROACH FILL AT COUNTY ROAD NO.13 WP37-66-03

DISTRICT 9 OTTAWA

WE HAVE RECEIVED THE DETAILS OF YOUR DRAWING NO.14 OF THE
CONTRACT DRAWINGS AND APPEARS TO BE AS PER OUR FOUNDATION REQUIRE-
MENTS

M DEVATA SUPVRNG FOUNDATION ENGR

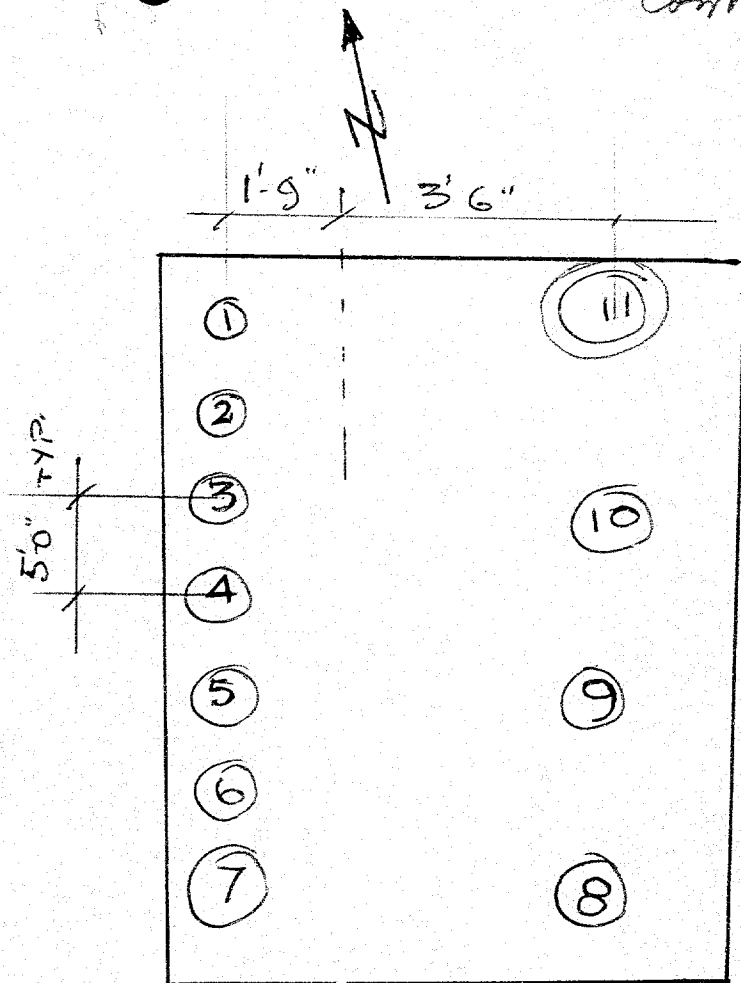
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EAST ABOUT FTG.

COUNTY RD #13 INTERCHANGE U/PASS.

CONT 73-134.

RECEIVED
NOV 19 1977
DISTRICT 9, OTTAWA

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-134 STRUCTURE CTY RD 13 INTERCHANGE U/PASS
CONTRACTOR DUPRESNE PILING DESIGN LOAD OF PILE TO BEDROCK/REFUSAL
HAMMER DETAILS: TYPE DROP HAMMER WEIGHT 2 TONS WEIGHT OF FALL OR ENERGY 5'-7'
TYPE OF ANVIL OR CAP STEEL HELMET/TIMBER PAD WEIGHT OF ANVIL OR CAP 1/2 TON
PILE DETAILS STEEL "N" PILES HP12x53. BATTER 1-12.
PILE NO. 11 LOCATION EAST ABUTMENT DATE DRIVEN 14 NOV/73.

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

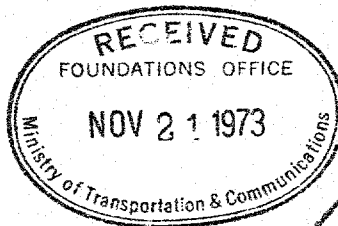
DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE	32.10					
FINAL CUT OFF ELEVATION	263.50					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
DESIGN SERVICES BRANCH
DEPARTMENT OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED a.g. Price
NAME (PRINT) ALAN G. PRICE
DATE 14 NOV/73.
ATTACH SKETCH OF PILE NUMBERING SYSTEM

268.5
32.8
235.7

TIP



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.

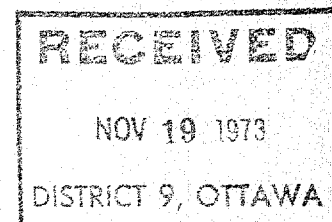
Pile Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 $\frac{3}{4}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{3}{4}$ " x $\frac{1}{2}$ " steel plate shoe.

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.



DRIVING STEEL "H" PILES 12x53

DUFRESNE PILING LTD.

DROP HAMMER (2TON)
CAP (.25 TON)

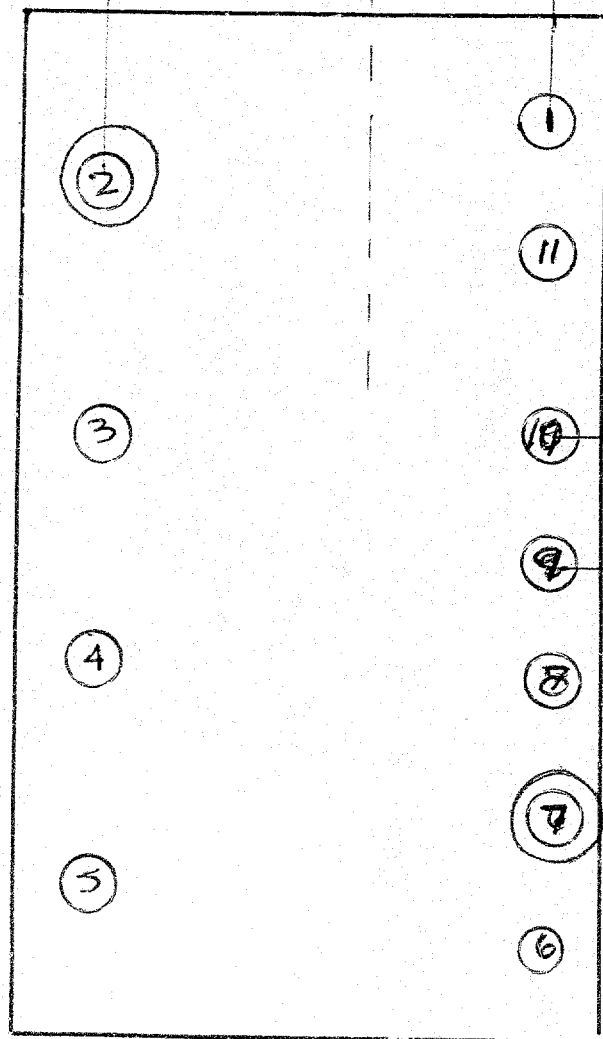
CONT 73-13A



3'-6" 1'-9"

WEST
ABUTMENT

⊙ PILES THAT
WERE SPLICED



N.T.S.

CTY RD 13 INTERCHANGE U/PASS.

Cont 73-134.

Nov 27/73.

Dear Sir.

Enclosed are pile reports for
CTY RD 13 INTERCHANGE U/PASS.

Difficulty was encountered with
piles meeting M.T.C requirements
according to Hiley formula &
pile driving charts therefore
the one's I felt doubtful about
I drove them to a point
of refusal when $\frac{1}{4}$ " pen for 4 blows.

Yours Respectfully.

A. G. Puri

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-134 STRUCTURE STY RD 13 INTERCHANGE /PASS
CONTRACTOR DUFFRANE PILING DESIGN LOAD OF PILE 70 TON
HAMMER DETAILS: TYPE PROP WEIGHT 2 TON HEIGHT OF FALL OR ENERGY 7'
TYPE OF ANVIL OR CAP STEEL/TIMBER TOP WEIGHT OF ANVIL OR CAP 0.25 TON
PILE DETAILS H Pile 12x53
PILE NO. 1 LOCATION WEST ABUTMENT DATE DRIVEN NOV 23/73

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

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	3	10	10	10	11	13
MEASURED REBOUND IN INCHES	3/16"	3/16"	1/4"	3/4"	3/8"	1/2"
FINAL LENGTH OF PILE <u>21'10"</u>	FINAL CUT OFF ELEVATION <u>270.50</u>					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER

DESIGN SERVICES BRANCH

DEPARTMENT OF
TRANSPORTATION AND
COMMUNICATIONS

DOWNSVIEW, ONTARIO

SIGNED

NAME (PRINT) A.G. PRICE

DATE NOV 23/73

ATTACH SKETCH OF PILE NUMBERING SYSTEM

NOTE ON BACK

1.4 270.5
21.2
TIP 249.3

The rebounds shown are for a set of four blows. The final rebound ($1\frac{1}{2}$ ") was for 4 blows where penetration was $3\frac{1}{16}$ " (Final rebound $1\frac{1}{2}$ " $\frac{1}{16}$ " penetration)

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. $12\frac{1}{2}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. $12\frac{1}{2}$ " x $\frac{1}{2}$ " 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.

FOUNDATION OFFICE

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-134 STRUCTURE CPI RD 13 INTERCHANGE U/PASS

CONTRACTOR DVERESNE PILING DESIGN LOAD OF PILE 70 TON

HAMMER DETAILS: TYPE DROP WEIGHT 2 TON HEIGHT OF FALL OR ENERGY 3'-7'

TYPE OF ANVIL OR CAP STEEL / TIMBER TOP WEIGHT OF ANVIL OR CAP 25 TON

PILE DETAILS 4. PILE 12x53

PILE NO. 2 LOCATION WEST ABUTMENT DATE DRIVEN NOV 23/73

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

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE	35'-8"					FINAL CUT OFF ELEVATION 270.50

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
DESIGN SERVICES BRANCH
DEPARTMENT OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED A.G. Price
NAME (PRINT) A.G. PRICE
DATE NOV 23/73

ATTACH SKETCH OF PILE NUMBERING SYSTEM

Refusal Used
4' pen for 4 blows.
270.5

to NOT

micron

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. 12 $\frac{1}{2}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{1}{2}$ " x $\frac{1}{2}$ " 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.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-134 STRUCTURE CY RD B INTERCHANGE U/PASS

CONTRACTOR DUFFONG PILING DESIGN LOAD OF PILE 70 TON

HAMMER DETAILS: TYPE DROP WEIGHT 2 TON HEIGHT OF FALL OR ENERGY 5-7'

TYPE OF ANVIL OR CAP STEEL/TIMBER TOP WEIGHT OF ANVIL OR CAP 0.25 TON

PILE DETAILS 11 PILES 12x33

PILE NO. 3 LOCATION WEST ABUTMENT DATE DRIVEN NOV 26/73

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

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	6	6	6	6	7	8
MEASURED REBOUND IN INCHES	3/16"	3/16"	3/16"	1/4"	3/8"	1/2"
FINAL LENGTH OF PILE	32'-10"					FINAL CUT OFF ELEVATION 270.50

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
DESIGN SERVICES BRANCH
DEPARTMENT OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED A.G. Price
NAME (PRINT) A.G. PRICE
DATE NOV 26/73

ATTACH SKETCH OF PILE NUMBERING SYSTEM

270.5
32.8
237.7

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. 12 $\frac{3}{4}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{3}{4}$ " x $\frac{1}{2}$ " 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.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-134 STRUCTURE CTY RD 13 INTERCHANGE 4/PASS
CONTRACTOR DUFRESNE PILING DESIGN LOAD OF PILE 70 TON
HAMMER DETAILS: TYPE D20P WEIGHT 2 TON HEIGHT OF FALL OR ENERGY 5'-7'
TYPE OF ANVIL OR CAP STEEL/TIMBER TOP WEIGHT OF ANVIL OR CAP 25 TON
PILE DETAILS H-PILE 12x53
PILE NO. 4 LOCATION WEST ABUTMENT DATE DRIVEN NOV 23/73

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

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE <u>32'-7"</u>	FINAL CUT OFF ELEVATION <u>270.50</u>					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
DESIGN SERVICES BRANCH
DEPARTMENT OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED a.g. Price
NAME (PRINT) A.G. PRICE
DATE NOV 23/73

ATTACH SKETCH OF PILE NUMBERING SYSTEM

Drove to Refusal

270.5
32.6
237.9

TIP

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. 12 $\frac{3}{4}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{3}{4}$ " x $\frac{1}{2}$ " 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.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73 134 STRUCTURE CTV RD 13 INTERCHANGE U/PASS
 CONTRACTOR DUFRESNE PILING DESIGN LOAD OF PILE 70 TON
 HAMMER DETAILS: TYPE DROP WEIGHT 2 TON HEIGHT OF FALL OR ENERGY 5.7'
 TYPE OF ANVIL OR CAP STEEL/TIMBER TOP WEIGHT OF ANVIL OR CAP 0.25 TON
 PILE DETAILS H PILE 12x53
 PILE NO. 11 LOCATION WEST ABUTMENT DATE DRIVEN NOV 23/73

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.
48'-0"	1	2		26			51			76	
	2	2		27			52			77	
	3	2		28			53			78	
	4	3		29			54			79	
	5	3		30			55			80	
	6	3		31			56			81	
	7	3		32			57			82	
	8	3		33			58			83	
	9	6		34			59			84	
	10	6		35			60			85	
	11	9		36			61			86	
	12	9		37			62			87	
	13	17		38			63			88	
	14	16		39			64			89	
	15	16		40			65			90	
	16	24		41			66			91	
	17	22		42			67			92	
	18	38		43			68			93	
	19	58		44			69			94	
	20			45			70			95	
	21			46			71			96	
	22			47			72			97	
	23			48			73			98	
	24			49			74			99	
	25			50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	8	10	10	11	12	12
MEASURED REBOUND IN INCHES	3/16"	3/16"	1/4"	1/4"	1/2"	5/8"
FINAL LENGTH OF PILE <u>20'-7"</u>	FINAL CUT OFF ELEVATION <u>270.50</u>					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
 DESIGN SERVICES BRANCH
 DEPARTMENT OF
 TRANSPORTATION AND
 COMMUNICATIONS
 DOWNSVIEW, ONTARIO

SIGNED A.G. Price
 NAME (PRINT) A.G. PRICE
 DATE NOV 23/73

ATTACH SKETCH OF PILE NUMBERING SYSTEM

114
 270.5
 20.0
 250.5
 TIP

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. 12 $\frac{1}{2}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{1}{2}$ " x $\frac{1}{2}$ " 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 TRANSPORTATION AND COMMUNICATIONS - ONTARIO

Form OB-MT-285
(REVISED NOV. 1971)

DESIGN SERVICES BRANCH
FOUNDATION OFFICE

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-134 STRUCTURE CTY RD 13 INTERCHANGE U/PASS
 CONTRACTOR DOFRING PILING DESIGN LOAD OF PILE 70 TON
 HAMMER DETAILS: TYPE DROP WEIGHT 2 TON HEIGHT OF FALL OR ENERGY 5'-7"
 TYPE OF ANVIL OR CAP STEEL/TIMBER TOP WEIGHT OF ANVIL OR CAP 0.25 TON
 PILE DETAILS H PILE 12x53
 PILE NO. 10 LOCATION WEST ABUTMENT DATE DRIVEN NOV 23/73

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.
275	1	3		26			51			75	
	2	2		27			52			77	
	3	3		28			53			78	
	4	4		29			54			79	
	5	4		30			55			80	
	6	4		31			56			81	
	7	6		32			57			82	
	8	6		33			58			83	
	9	7		34			59			84	
	10	7		35			60			85	
	11	9		36			61			86	
	12	11		37			62			87	
	13	HIT BOULDER		38			63			88	
	14			39			64			89	
	15			40			65			90	
	16			41			66			91	
	17			42			67			92	
	18			43			68			93	
	19			44			69			94	
	20			45			70			95	
	21			46			71			96	
	22			47			72			97	
	23			48			73			98	
	24			49			74			99	
	25			50			75			100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE <u>14'-8"</u>	FINAL CUT OFF ELEVATION <u>270.50</u>					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
 DESIGN SERVICES BRANCH
 DEPARTMENT OF
 TRANSPORTATION AND
 COMMUNICATIONS
 DOWNSVIEW, ONTARIO

SIGNED A. G. Price
 NAME (PRINT) A. G. PRICE
 DATE NOV 23/73

ATTACH SKETCH OF PILE NUMBERING SYSTEM

Refusal used
 1/4" pen for 4 blows.
 1:4 270.5
 14.5
 TIP 256.0

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. 12 $\frac{1}{2}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{1}{2}$ " x $\frac{1}{2}$ " 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.

FOUNDATION OFFICE

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 13-134 STRUCTURE STY RD 13 INTERCHANGE U/PASS
CONTRACTOR DUFRENE PILING DESIGN LOAD OF PILE 70 TON
HAMMER DETAILS: TYPE DROP WEIGHT 2700 HEIGHT OF FALL OR ENERGY 5-7'
TYPE OF ANVIL OR CAP STEEL/TIMBER TOP WEIGHT OF ANVIL OR CAP 25 TON
PILE DETAILS H. Pile 12x53
PILE NO. 9 LOCATION WEST ABUTMENT DATE DRIVEN NOV 23/73

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

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	7	7	11	13	13	15
MEASURED REBOUND IN INCHES	3/16"	3/16"	3/8"	3/8"	3/8"	1/2"
FINAL LENGTH OF PILE	19'10"					
FINAL CUT OFF ELEVATION	270.50					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER

NO PENETRATION
ON 3/8" & 1/2" REBOUNDS
1.4 170.5
19.2
251.3

DESIGN SERVICES BRANCH
DEPARTMENT OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED A.G. Price
NAME (PRINT) A.G. PRICE
DATE NOV 23/73

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. 12 $\frac{3}{4}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{3}{4}$ " x $\frac{1}{2}$ " 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 TRANSPORTATION AND COMMUNICATIONS - ONTARIO

Form OB-MT-285

DESIGN SERVICES BRANCH

(REVISED NOV. 1971)

FOUNDATION OFFICE

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-134 STRUCTURE CITY RD 13 INTERCHANGE U/PASS

CONTRACTOR DUFRESNE PILING DESIGN LOAD OF PILE 70 TON

HAMMER DETAILS: TYPE DROP WEIGHT 2 TON HEIGHT OF FALL OR ENERGY 5'-7'

TYPE OF ANVIL OR CAP STEEL/TIMBER TOP WEIGHT OF ANVIL OR CAP 2.5 TON

PILE DETAILS H. P. L. 12x53

PILE NO. 8 LOCATION WEST ABUTMENT DATE DRIVEN NOV 23/73

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

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	6	6	7	9	10	10
MEASURED REBOUND IN INCHES	3/8"	3/8"	3/8"	1/2"	7/8"	7/8"
FINAL LENGTH OF PILE	23'-4"					
FINAL CUT OFF ELEVATION	270.50					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER

DESIGN SERVICES BRANCH

DEPARTMENT OF

TRANSPORTATION AND

COMMUNICATIONS

DOWNSVIEW, ONTARIO

SIGNED

NAME (PRINT)

DATE

NOV 23/73

ATTACH SKETCH OF PILE NUMBERING SYSTEM

1/8" PENETRATION
5/8" REBOUND
114 270.5
22.6
247.9



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. 12 $\frac{3}{4}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{3}{4}$ " x $\frac{1}{2}$ " 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.

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 9 CONTRACT NO. 73-134 STRUCTURE CTY RD 13 INTERCHANGE U/PASS
CONTRACTOR DUFFS & PILING DESIGN LOAD OF PILE 70 TON
HAMMER DETAILS: TYPE Drop WEIGHT 2 TON HEIGHT OF FALL OR ENERGY 5-7'
TYPE OF ANVIL OR CAP STEEL/TIMBER TOP WEIGHT OF ANVIL OR CAP • 25 TON
PILE DETAILS H-Pile 12x53
PILE NO. 1 LOCATION WEST ABUTMENT DATE DRIVEN NOV 26/53

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

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH						
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE <u>28'-11"</u>	FINAL CUT OFF ELEVATION <u>270.50</u>					

REPORT TO BE SENT TO: - PRINCIPAL FOUNDATION ENGINEER
see back.
1:4 270.5
28.0
242.5
TIP

DESIGN SERVICES BRANCH
DEPARTMENT OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED A.G. Price
NAME (PRINT) A.G. PRICE
DATE NOV 26.

ATTACH SKETCH OF PILE NUMBERING SYSTEM

Pile No 7 was spliced, & driven to
refused, as for end bearing piles.

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. 12 $\frac{1}{2}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{1}{2}$ " x $\frac{1}{2}$ " 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.

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 219-69

DIST. 9 REGION EASTERN

W.P. No. 37-66-09

CONT. No. 73-134

W. O. No. 70-P-82

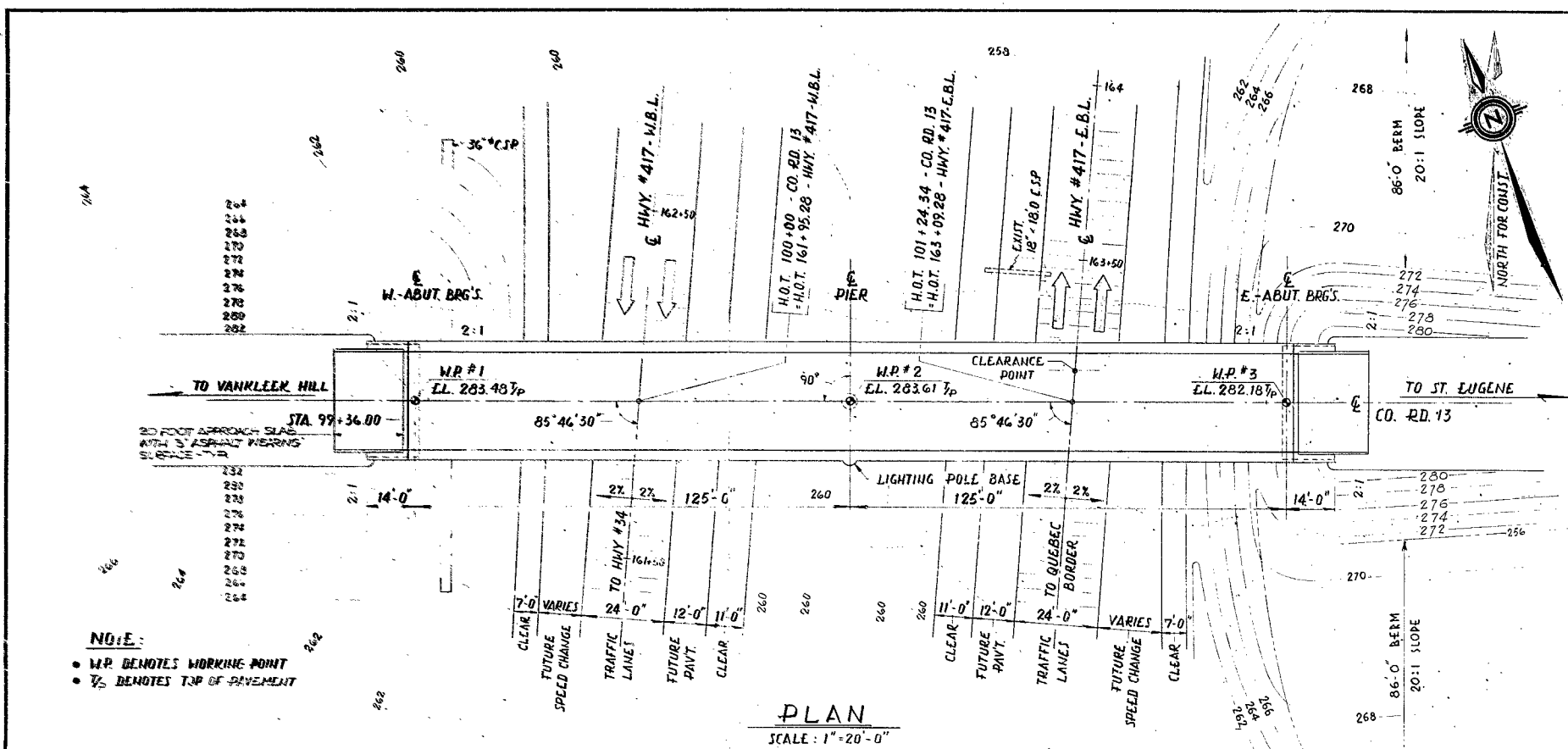
STR. SITE No. 27-222

HWY. No. 417

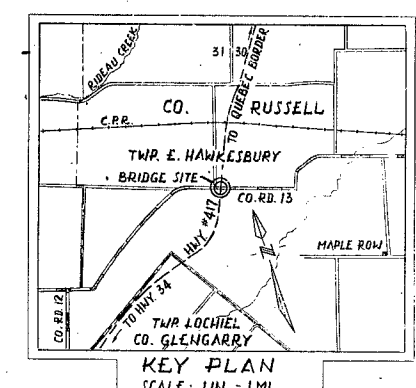
LOCATION HWY. 417 AND CO. RD. 13

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 2

REMARKS: DOCUMENTS TO BE UNFOLDED
BEFORE MICROFILMING



- LIST OF DRAWINGS**
- D-6973-1 GENERAL LAYOUT
 - 2 BORE HOLE LOCATIONS / SOIL STRATA
 - 3 FOUNDATION LAYOUT, REINF. / PIER
 - 4 ABUTMENTS
 - 5 DECK DETAILS
 - 6 PRESTRESSING DETAILS I
 - 7 DECK REINFORCEMENT I
 - 8 DECK REINFORCEMENT II
 - 9 PARAPET WALL DETAILS
 - 10 STANDARD STEEL PARAPET RAIL
 - 11 DETAILS OF CONC. SLOPE PAVING
 - 12 STANDARD DETAILS I
 - 13 STANDARD DETAILS II
 - 14 20 FOOT APPROACH SLAB
 - D-6973-15 BRIDGE ELECTRICAL DETAILS TYPE D



REFERENCE BENCH MARK

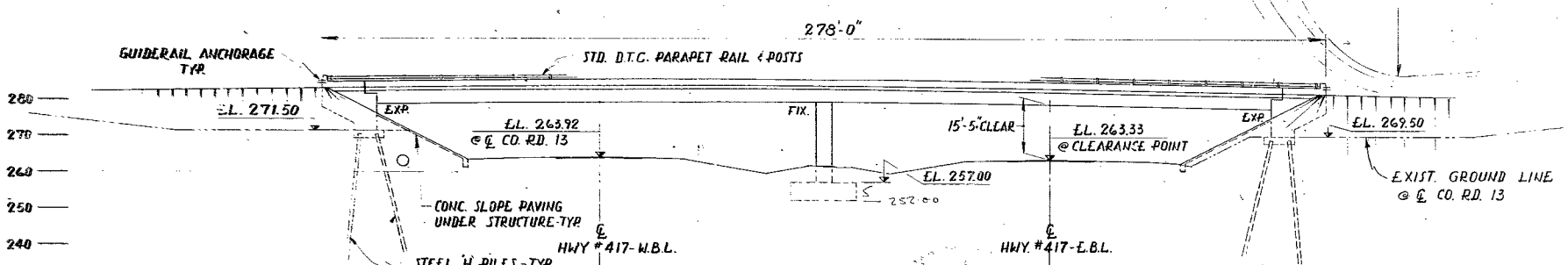
D.H.O. PRECISE B.M. 559-69, E.L. 276.563
 ONE AND ONE-HALF STOREY FRAME HOUSE (OWNED BY MR. JAMES HOUGHTON ON SOUTH SIDE OF ST. EUGENE ROAD (PRESCOTT / RUSSELL CO. RD. #13) BEING 4.6 MILES EAST ALONG ST. EUGENE ROAD (PRESCOTT / RUSSELL CO. RD. #13) FROM KNOX PRESBYTERIAN CHURCH IN THE TOWN OF VANKLEEK HILL, 184 FEET WEST OF PRESCOTT / RUSSELL CO. RD. #12 NORTH AND 59 FEET SOUTH OF ST. EUGENE RD. (PRESCOTT / RUSSELL CO. RD. #13). TABLET IS SET HORIZONTALLY IN EAST FACE OF CONCRETE FOUNDATION, BEING 9 FEET SOUTH OF NORTH-EAST CORNER AND 0.7 FEET BELOW FRAMEWORK.

NOTES

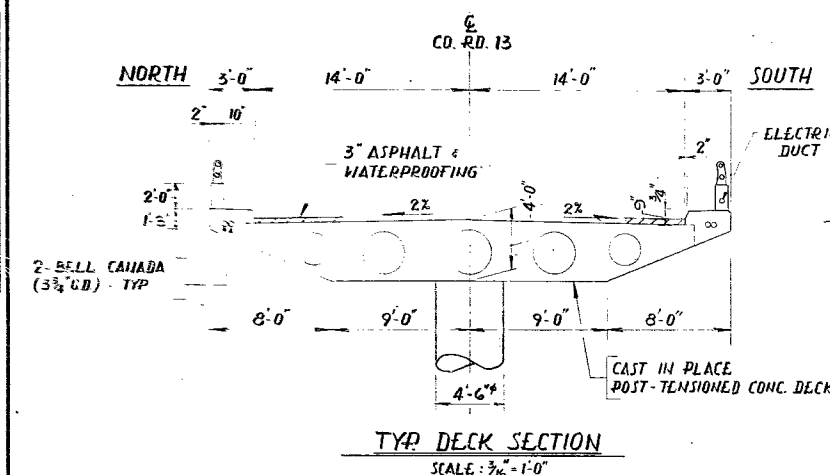
CLASS OF CONCRETE
 DECK, CURBS & PARAPET WALLS 5000 P.S.I.
 PIER COLUMN 5000 P.S.I.
 REMAINDER 3000 P.S.I.

CLEAR COVER ON REINF. STEEL
 FOOTINGS & ABUTMENTS - 3"
 PIER, CURBS & APPR. SLABS - 2"
 TOP OF DECK - 2", BOT. - 1 1/2"
 PARAPET WALLS - 1 1/2"

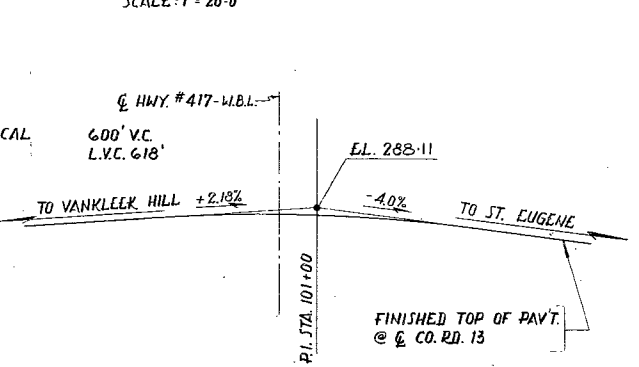
CONSTRUCTION NOTES
 THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF ± 1/8".
 NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED, STRESSED AND GROUTED.



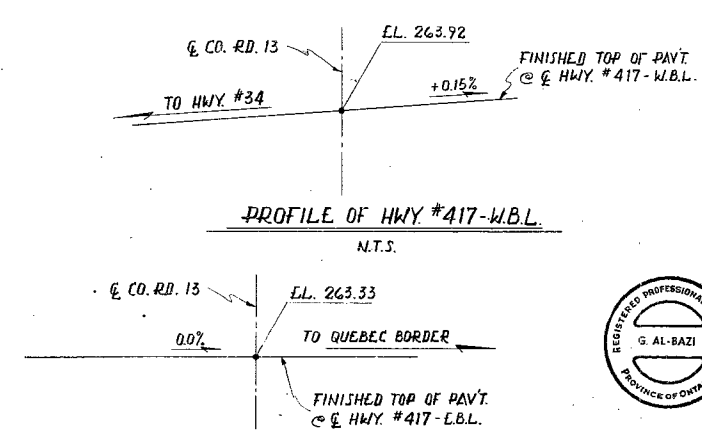
ELEVATION
SCALE: 1" = 20'-0"



TYP. DECK SECTION
SCALE: 3/16" = 1'-0"



PROFILE OF CO. RD. 13
N.T.S.



PROFILE OF HWY #417-W.B.L.
N.T.S.

PROFILE OF HWY #417-E.B.L.
N.T.S.



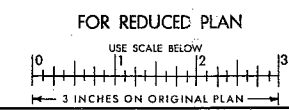
REVISIONS		
NO.	DATE	DESCRIPTION

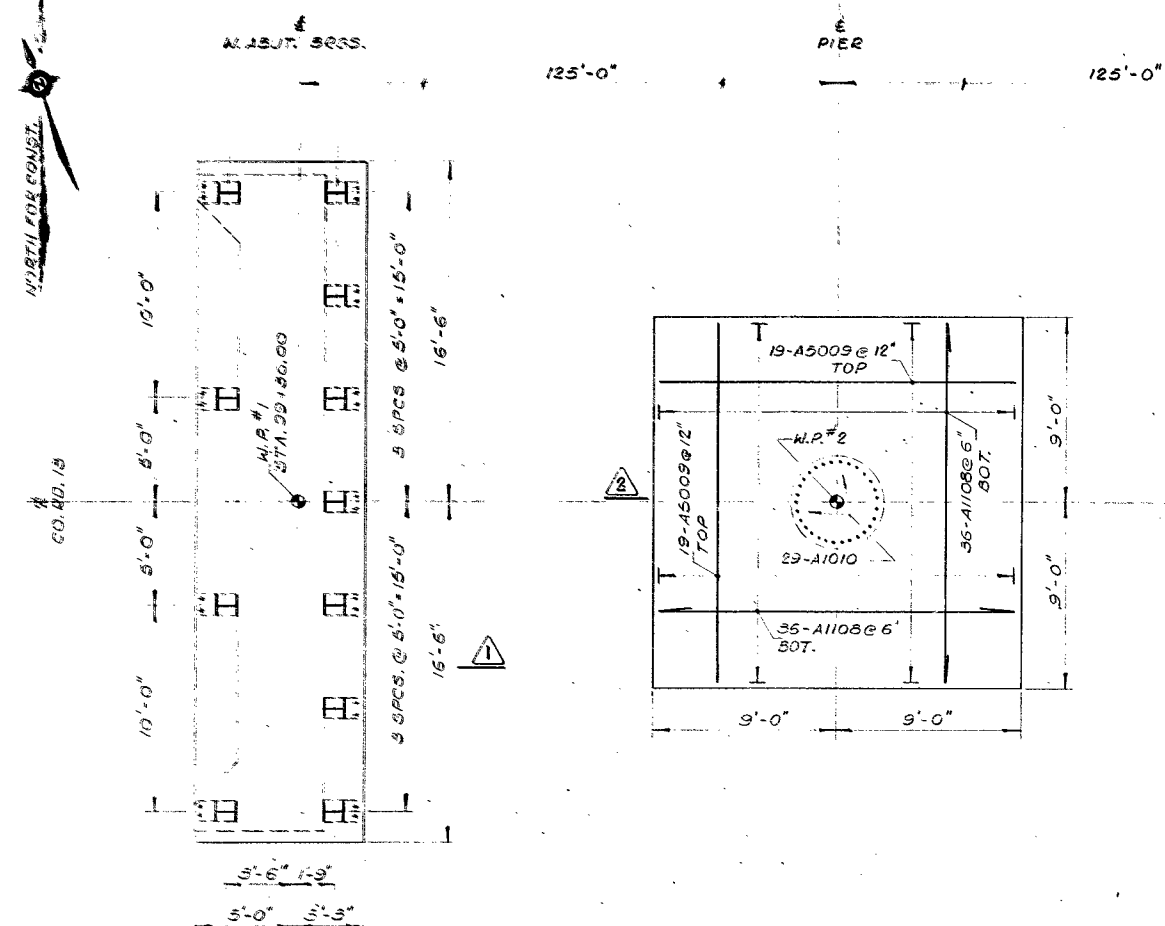
COUNTY RD. 13 INTERCH. U.P.A.S.
 4.5 MILES WEST OF HWY 17

KING'S HIGHWAY No. 417 DIST. No. 9
 CO. PRESCOTT
 TWP. E. HAWKESBURY LOT 31 CON. IV & V

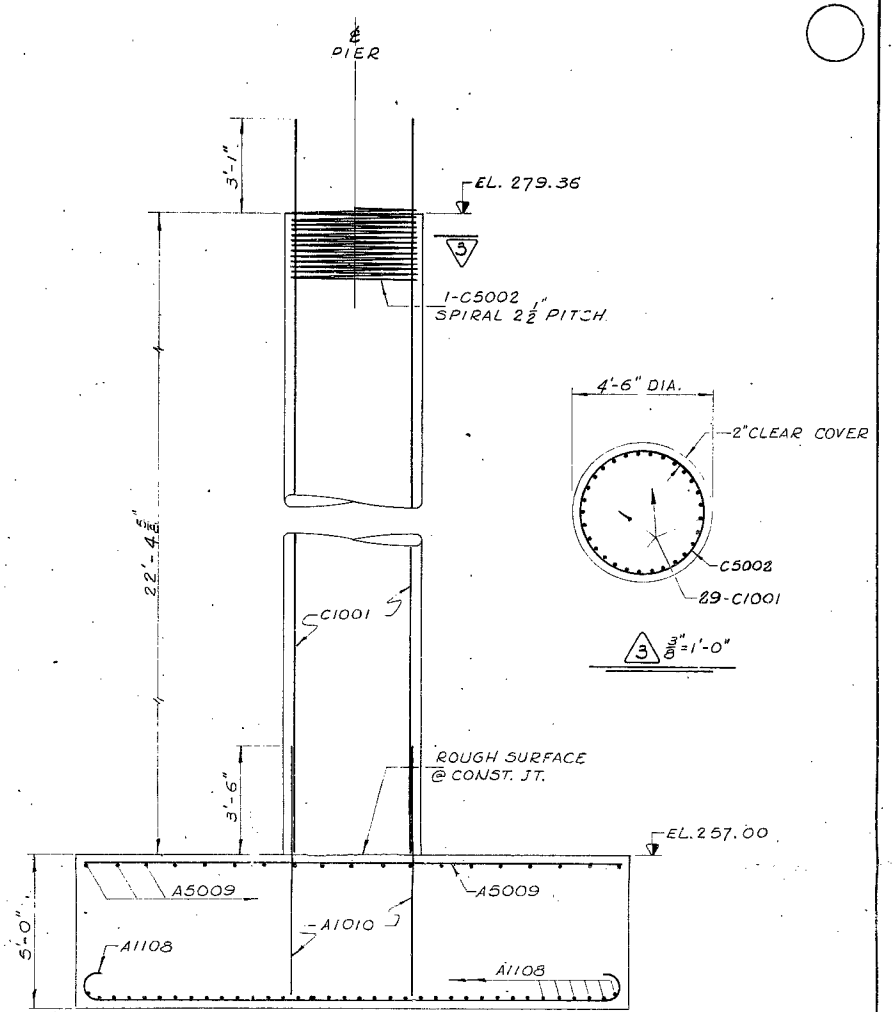
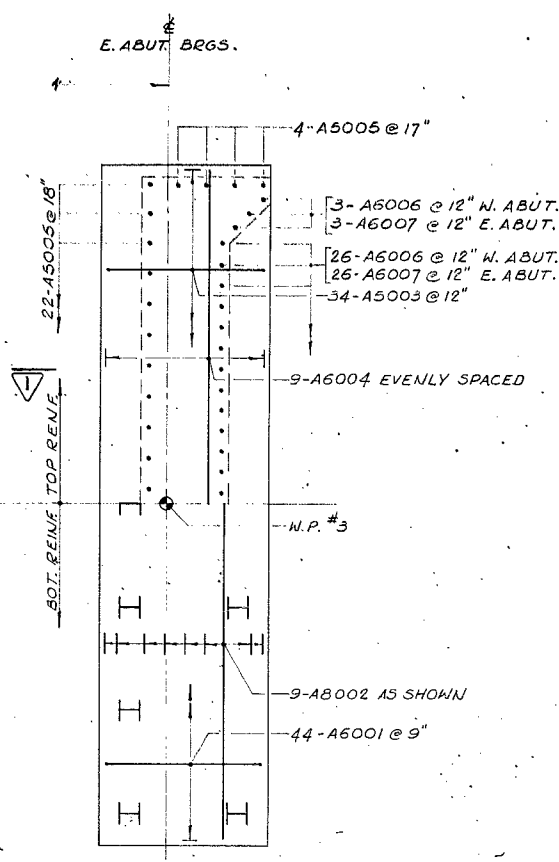
- GENERAL LAYOUT -

APPROVED	BRIDGE ENGINEER	SITE No.	27-222	W.P. No.	37-66-09
DESIGN	G.A.	CHECK	Y.V.	CONTRACT	No.
DRAWING	A.A.	CHECK	G.A.	DRAWING	No.
DATE	AUG. 1/71	LOADING	HS20-44	D-6973-1	



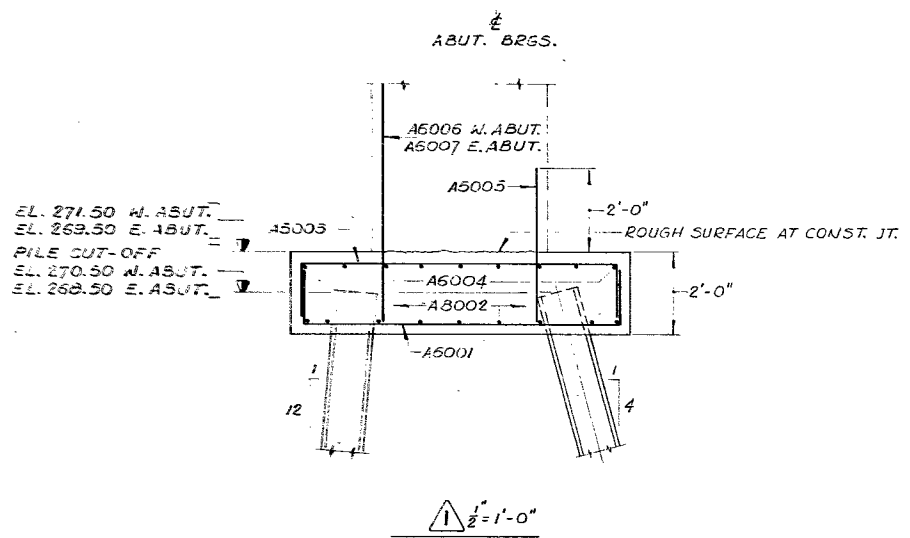


PLAN
SCALE: 1/4" = 1'-0"



NOTES:

- PILE SPACING TO BE MEASURED AT UNDERSIDE OF FOOTING.
- PILES TO BE DRIVEN IN ACCORDANCE WITH STD. BD-32-7 AT THE W. ABUT. AND TO BEDROCK AT THE E. ABUT.
- BOTTOM OF PIER FOOTINGS TO BE POURED AGAINST UNDISTURBED GROUND.



PILE DATA

LOCATION	QTY.	TYPE	LENGTH	DESIGN LOAD
W. ABUT.	11	HPI2x53	24'-0"	70T/PILE
E. ABUT.	6	HPI2x53	48'-0"	
E. ABUT.	5	HPI2x53	40'-0"	

REVISIONS	DATE	BY	DESCRIPTION

CO. RD. 13 INTERCH. U'PASS.
4.5 MILES WEST OF HWY. 17
KING'S HIGHWAY No. 417 DIST. No. 9
CO. PRESCOTT
TWP. HAWKESBURY LOT 31 CON. IV & V
FOUNDATION LAYOUT, REINF. & PIER
APPROVED: [Signature] SITE No. 27-222 W.P. No. 57-66-09
DESIGN: G.A. CHECK: [Signature] CONTRACT No. [Signature]
DRAWING: S.S. CHECK: [Signature] DRAWING No. D-6973-3
DATE: AUG. 71 LOADING: 14320-44

