(RM. 110, LAB. BLDG.)

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

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

Attention: Mr. S. McCombie

Date: February 3, 1970

Our File Ref.

In reply to FEB - 5 1970

Subject:

FOUNDATION INVESTIGATION REPORT
For
Proposed Crossing
At
Hwy. #7 and C.A.H. #402, Line 'C'
District No. 1 (Chatham, Ont.)
W.J. 69-F-107 -- W.P. 42-66-07

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

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

A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

AGS/MdeF
Attach.
cc: Messrs. B. R. Davis
H. A. Tregaskes
D. W. Farren
W. Zonnenberg
F. C. Brown
A. P. Watt. (2)
J. Roy
B. A. Singh
Foundations Files
Gen. Files

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FOUNDATION INVESTIGATION REPORT
For
Proposed Crossing
At
Hwy. #7 and C.A.H. #402, Line 'C'
District No. 1 (Chatham, Ont.)
W.J. 69-F-107 -- W.P. 42-66-06

1. INTRODUCTION:

A request for a foundation investigation at the crossing of the proposed C.A.H. #402, Line 'C' and Hwy. #7 was received from Mr. A. P. Watt, Regional Bridge Planning Engineer, in a memorandum dated November 13, 1969.

A field investigation was subsequently carried out by the Foundation Section to determine the subsoil conditions existing at the site. This report contains the results of this investigation and our recommendations pertaining to the design of the proposed structure foundations and approach embankments.

2. DESCRIPTION OF THE SITE:

The site of the proposed underpass structure is situated on Hwy. #7, approx. 1 mile southwest of Warwick.

The surrounding area is flat and cultivated farmland.

Physiographically, the site is located in the region referred to as the St. Clair Clay Plain.

3. FIELD AND LABORATORY INVESTIGATION PROCEDURES:

A total of six sampled boreholes and twelve dynamic cone penetration tests was carried out during the course of the field work. Boring was achieved by means of continuous flight auger machines, and conventional diamond drilling equipment adapted for soil sampling purposes. During the field work, disturbed samples were obtained by means of a standard split-spoon sampler; the energy

3. FIELD AND LABORATORY INVESTIGATION PROCEDURES: (cont'd.) ...

used in driving it, conformed to the requirements of the Standard Penetration Test.

'Undisturbed' samples were recovered using 2-inch I.D. Shelby tubes which were pushed into the soil hydraulically, or by hand. Where possible, field vane tests were carried out at elevations 12 inches below sample depths.

Dynamic cone penetration tests were carried out adjacent to each borehole and also at 6 other locations. Driving energy to advance the cone was 350 ft.-lbs. per blow.

The bedrock was proved at one borehole location using BXL rock coring equipment.

All boreholes were surveyed in the field by personnel from London Region Engineering Surveys Section. The locations and elevations of the borings are shown on Drawing 69-F-107A which accompanies this report.

All samples were visually examined and classified at the site as well as in the laboratory. Following this inspection, laboratory tests were carried out on selected samples to determine the following physical properties:

Atterberg Limits
Moisture Content
Grain-size Distribution
Undrained Shear Strength
Bulk Density

The test results are summarized on the Record of Borehole sheets contained in the Appendix of this report.

4. SOIL TYPES AND SOIL CONDITIONS:

4.1) General:

The subsoil at the site was found to consist of five different types of deposits. A surficial sandy silt

4. SOIL TYPES AND SOIL CONDITIONS: (cont'd.) ...

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

to silty sand (fill material) is followed by zones of clayey silt and silty clay. The total thickness of these cohesive deposits is approx. 24 ft., and the consistency ranges from stiff to hard.

Beneath the cohesive zones, a compact to very dense glacial till material was observed. This deposit is underlain by black-coloured, generally sound shale bedrock.

The boundaries of the different deposits are shown on the accompanying Record of Borehole sheets. The estimated stratigraphical profile shown on Dwg. No. 69-F-107A, is based upon this information.

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

4.2) Sandy Silt to Silty Sand with some Clay - Fill:

This fill material was encountered in all boreholes and extended from ground level for a maximum depth of 6.5 ft. to approx. El. 698. The material consists mainly of sand and silt with some clay.

The relative density is classified as very loose to compact.

The natural moisture content was found to range from 19% to 32%.

Typical grain-size distribution curves are included in the Appendix (Fig. 1).

4.3) Clayey Silt with some Sand and traces of Gravel:

This stratum was observed in all boreholes beneath the fill material to a maximum depth of 24 ft. (El. 676). The continuity of the deposit was found to be interrupted from approx. El. 591 to approx. El. 680 by a zone of silty clay in B.H.'s #4, #5 and #8. In Borehole Nos. 9 and 12 the lower boundary was found to be at approx. El. 690.5.

4. SOIL TYPES AND SOIL CONDITIONS: (cont'd.) ...

4.3) Clayey Silt with some Sand and traces of Gravel: (cont'd.)

The material in the deposit consists of clayey silt with some sand and traces of gravel.

Physical properties of the material as determined from field and laboratory tests, are as follows:

Natural Moisture Content (%)	:	14 to 24
Liquid Limit (%)	:	27 to 35
Plastic Limit (%)	:	16 to 22
Bulk Density (PCF)	:	126 to 138
Unconfined Shear Strength (PSF)	:	1768 to 5460
'N' Values (Blows/foot)	:	14 to 60

Grain-size distribution curves are included in the Appendix of this report (Fig. 2).

The consistency of the overall deposit may be described as stiff to hard.

4.4) Silty Clay:

This stratum was encountered in each borehole with the exception of B.H. #1, beneath the clayey silt layer. The thickness varied from 11 ft. to 15 ft. For detailed information, reference should be made to the Record of Borehole sheets, contained in the Appendix of this report.

The material in the deposit consists mainly of clay (70%) and silt (30%). Physical properties of the material as determined from field and laboratory tests, are as follows:

4. SOIL TYPES AND SOIL CONDITIONS: (cont'd.) ...

4.4) Silty Clay: (cont'd.) ...

Natural Moisture Content (%)	:	22	to	28
Liquid Limit (%)	:	35	to	43
Plastic Limit (%)	:	20	to	24
Bulk Density (PCF)	:	122	to	131
Unconfined Shear Strength (PSF)	:	2175	to	3470
'N' Values (Blows/Ft.)	:	12	to	53

The consistency is classified as stiff to hard.

4.5) Glacial Till:

This stratum underlies the clayey silt or silty clay deposits at every borehole location and consists of a heterogeneous mixture of clay, silt, sand and gravel in the following average proportions: Gravel: 16%, Sand: 30%, Silt: 40%, and Clay: 14%. The lower boundary was determined in B.H. #12 only at El. 671.

The relative density is estimated to vary between compact and very dense. Standard penetration tests carried out in this zone, gave 'N' values ranging from 27 to over 100 blows per foot. The average natural moisture content was found to be in the order of 10%.

4.6) Shale Bedrock:

Bedrock at this site was found to consist of generally sound black-coloured shale at approx. El. 671 (B.H. #12).

5. GROUNDWATER CONDITIONS:

The following groundwater levels were observed during the field investigation:

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

B.H. #1	:	El. 700.4
4	:	El. 701.0
8	:	El. 702.9
9	:	El. 700.7
12	:	El. 702.5

It is pointed out, that the foregoing quoted figures may not represent the true groundwater levels due to the short duration of the field work.

6. DISCUSSION AND RECOMMENDATIONS:

It is proposed to build a five-span (35'-94'-94'-94'-35') underpass structure at the crossing of new Hwy. #402, Line 'C' and existing Hwy. #7. The proposed profile grade of Hwy. #7 will be approximately 20.0' above the proposed Hwy. #402 grade of El. 706.

As described in the previous paragraphs of this report, the subsoil at the site consists of a surficial relatively permeable granular type fill material, followed by cohesive deposits (clayey silt and silty clay), followed by glacial till and finally, the generally sound shale bedrock at El. 671.

Because of the compressible nature of the clayey silt and silty clay deposits, it is inevitable that consolidation settlements will occur over a long-term period due to the imposed loads of structure and embankment. Past experience, however, indicates that these settlements will be of a minor nature.

The investigation has revealed that the shear strength of the clayey silt material is adequate to provide suitable support for spread footing type foundations.

In view of the foregoing, it is recommended that the proposed piers and abutments be founded on spread footings at or below elevation 697.5' in which case, a safe bearing pressure of 3.0 TSF may be assumed for design purposes.

..... 7

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

The estimated long-term settlement at the abutments and piers will be in the order of 2 inches and 1 inch, respectively. Since the hard clayey silt material is susceptible to softening on contact with water, it is recommended that the base of the footing excavations be protected by a concrete working slab, immediately on exposure. All foundations should be protected against frost action by at least 4 feet of earth cover.

As an alternative, the proposed abutments may be constructed within the approach fills on spread footings placed on well compacted, suitable granular material, where it is estimated that a safe bearing capacity of 2.0 TSF will be achieved. The granular material should consist of G.B.C. Class 'A' and should be fully compacted according to the current D.H.O. Standards. A detailed construction scheme is outlined on Figure 3 of the Appendix. In this case, long-term settlement of the abutment is estimated to be 2 inches.

As a further alternative, the entire structure, or part of the structure, may be supported on steel H-piles driven to the shale bedrock (El. 671). A safe design load of 70 tons per pile may be used in the case of 12 BP 53 H-piles.

No stability problems are anticipated for the proposed 20-ft. high approach fills, provided that 2:1 slopes are constructed. The fill should consist of well compacted acceptable material. The topsoil stripping should be in accordance with D.H.O. Standards. Settlements over a long-term period are anticipated to be about 2 inches at the abutment locations, as mentioned above.

7. MISCELLANEOUS:

The field investigation was carried out during the period December 8 - 10, 1969, under the supervision of Messrs. A. Prakash and P. Payer, Project Foundation Engineers.

7. MISCELLANEOUS: (cont'd.) ...

Equipment was owned and operated by Dominion Soil Investigation Ltd., and G. Wimpey, Canada, Ltd.

This report was prepared by Mr. P. Payer, and was reviewed by Mr. K. G. Selby, Supervising Foundation Engineer.

January, 1970

APPENDIX I

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

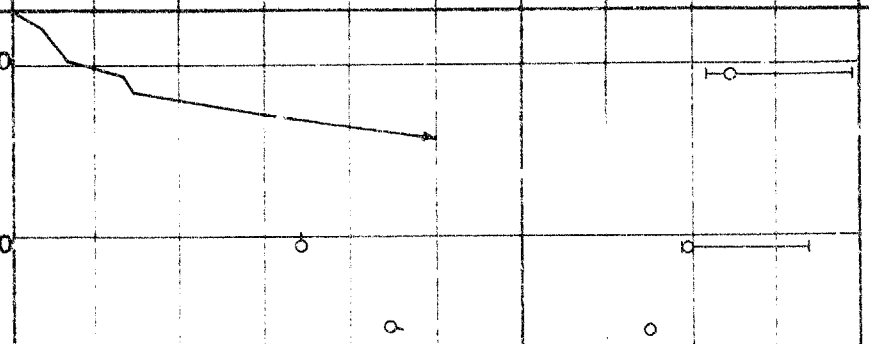
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 69-F-107 LOCATION Sta. 357 + 68 34' Lt. ORIGINATED BY PP
W.P. 42-66-07 BORING DATE December 10, 1969 COMPILED BY PP
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger CHECKED BY

ELEV. / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS / FOOT	BULK DENSITY γ P.C.F.	REMARKS GR. SA. SI. CL.
703.2	Ground Level					
0.0 / 700.2	Sandy silt to silty sand. Fill					▼ 700.4
3.0	Clayey silt with	1	SS	16		
		2	SS	53		
	some sand	3	TW	PH	133	
	Very stiff to hard	4	TW	PH	138	0 1 77 22
		5	TW	PH		
676.2 / 27.0 / 673.7	Glacial Till Very dense	6	SS	100/3"		13 29 41 17
29.5	End of Borehole					



FORM OB-MT-126 (REV. 1969)

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 69-F-107 LOCATION Sta. 357 + 93 22' Rt. ORIGINATED BY AP
W.P. 42-66-07 BORING DATE December 10, 1969 COMPILED BY PP
DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE			SAMPLES				DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT w_L PLASTIC LIMIT w_P WATER CONTENT w	BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT	ELEV SCALE	SHEAR STRENGTH P.S.F. ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB. VANE	WATER CONTENT %	P.C.F.	GR.SA.SI.CL.
704.5	Ground Level									
0.0	Probably Fill material and					700				
693.5	Clayey silt									
11.0	End of Cone Test					690				

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 69-F-107 LOCATION Sta. 358 + 03 34' Lt. ORIGINATED BY PP
W.P. 42-66-07 BORING DATE December 10, 1969 COMPILED BY PP
DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE			SAMPLES				DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100 / SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB. VANE	LIQUID LIMIT w_L PLASTIC LIMIT w_P WATER CONTENT w / w_P w w_L WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS GR.SA.SI.CL.
ELEV. DEPTH 703.2	DESCRIPTION Ground Level	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE				
0.0	Probably Fill material and					700				
693.4	Clayey silt									
9.8	End of Cone Test					690				

FORM OB-MT-126 (REV. 1969)

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 69-F-10
W.P 42-66-07
DATUM Geodetic

LOCATION Sta. 358 + 28 22' Rt.
BORING DATE December 9, 1969
BOREHOLE TYPE Cont. Flight Auger

ORIGINATED BY AP
COMPILED BY PP
CHECKED BY

SOIL PROFILE: ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	BLOWS / FOOT	BULK DENSITY γ P.C.F	REMARKS GR. SA. SI. CL.
704.7	Ground Level						
0.0	Sandy silt to silty sand with some clay Fill		1	SS	9		0 40 35 25 ▼701.0
698.7	Loose to compact.		2	SS	22		
6.0	Clayey silt with some sand.		3	SS	59		
691.0	Hard		4	TW	PH	133.5	0 3 59 38
13.7	Silty clay		5	TW	PH		
			6	SS	53		
			7	TW	PH	124	
680.0	Very stiff to hard		8	SS	27		
24.7	Clayey silt						
676.2	Hard		9	TW	PH	125.5	
28.5	Glacial Till						
673.2	Compact		10	SS	27		
31.5	End of Borehole						

ELEV SCALE: 700, 690, 680, 670

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

SHEAR STRENGTH P.S.F.: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB. VANE; 2000 4000

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

WATER CONTENT %: 10 20 30

FORM OB-MT-126 (REV. 1969)

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 5

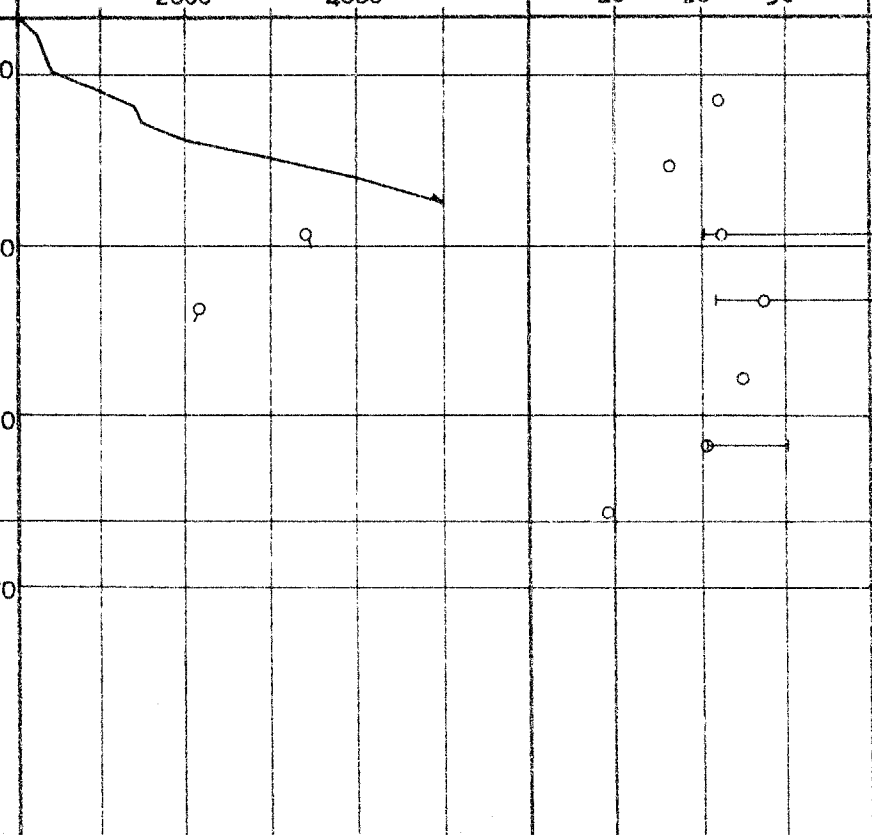
FOUNDATION SECTION

JOB 69-F-107 LOCATION Sta. 358 + 97 34' Lt. ORIGINATED BY PP

W.P. 42-66-07 BORING DATE December 10, 1969 COMPILED BY PP

DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger CHECKED BY

SOIL PROFILE: ELEV / DEPTH	DESCRIPTION	SAMPLES: NUMBER	TYPE	BLOWS / FOOT	BULK DENSITY γ P.C.F.	REMARKS GR.SA.SI.CL.
703.2	Ground Level					
0.0	Sandy silt to silty sand with some clay.					
698.2	Very loose. Fill	1	SS	2		0 10 63 27
5.0	Clayey silt with some sand.	2	SS	53		0 8 58 34
691.2	Hard					
12.0	Silty clay	3	TW	PH	131	
		4	TW	PH		
		5	SS	22		
680.2	Very stiff					
23.0	Clayey silt with some sand & trace of gravel	6	SS	14		1 9 62 28
676.7	Stiff					
26.5	Glacial Till					
673.7	Dense	7	SS	32		22 20 41 17
29.5	End of Borehole					



DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 6

FOUNDATION SECTION

JOB 69-F-107 LOCATION Sta. 359 + 22 22' Rt. ORIGINATED BY AP
W.P. 42-66-07 BORING DATE December 9, 1969 COMPILED BY PP
DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE: ELEV / DEPTH	SOIL PROFILE: DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/FOOT	ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100 / SHEAR STRENGTH P.S.F. ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB. VANE	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w — w_P w w_L WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS GR.SA.SI.CL.
704.9	Ground Level									
0.0	Probably Fill material and clayey silt					700				
693.9										
11.0	End of Cone Test					690				

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 7

FOUNDATION SECTION

JOB 69-F-107
W.P. 42-66-07
DATUM Geodetic

LOCATION Sta. 359 + 91 34' Lt.
BORING DATE December 10, 1969
BOREHOLE TYPE Cone Test Only

ORIGINATED BY AP
COMPILED BY PP
CHECKED BY

SOIL PROFILE: ELEV / DEPTH	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS / FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (20, 40, 60, 80, 100) / SHEAR STRENGTH P.S.F. (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB. VANE)	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w (w_P, w, w_L) WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS GR.SA.SI.CL.
702.8	Ground Level									
0.0	Probably fill material and clayey silt					700				
691.3										
11.5	End of Cone Test					690				

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

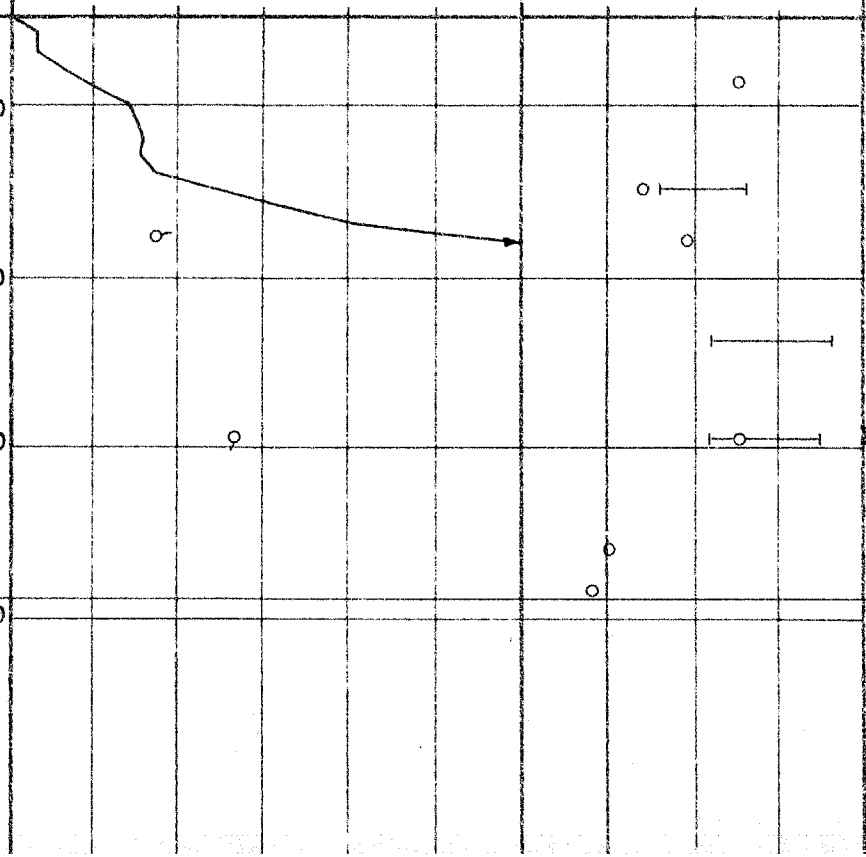
DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 8

FOUNDATION SECTION

JOB 69-F-107 LOCATION Sta. 360 + 16 22' Rt. ORIGINATED BY PP
W.P. 42-66-07 BORING DATE December 8 and 9, 1969 COMPILED BY PP
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger CHECKED BY

ELEV. / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLE NUMBER	TYPE	BLOWS/FOOT	BULK DENSITY γ P.C.F.	REMARKS GR. SA. SI. CL.
705.1	Ground Level						
0.0	Sandy silt to silty sand with some clay						▼ 702.9
699.1	Loose Fill		1	SS	5		0 16 79 5
6.0	Clayey silt with some sand & trace of gravel		2	SS	60		
			3	SS	42		2 20 59 19
690.6	Stiff to hard		4	TW	PH	129	
14.5	Silty clay		5	TW	PH		
			6	TW	PH		
			7	TW	PH		
680.0	Stiff to very stiff		8	TW	PH	125.5	0 2 47 51
25.1	Clayey silt						
676.1	Very stiff to hard		9	SS	31		
29.0	Glacial Till Gravel, sand, silt & clay.		10	SS	131		14 21 48 17
671.1	Very dense.		11	SS	100/5"		12 42 37 9
34.0	End of Borehole						



DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 9

FOUNDATION SECTION

JOB	69-F-107	LOCATION	Sta. 360 + 85 34' Lt.	ORIGINATED BY	AP
W.P.	42-66-07	BORING DATE	December 10, 1969	COMPILED BY	PP
DATUM	Geodetic	BOREHOLE TYPE	Cont. Flight Auger	CHECKED BY	HK

SOIL PROFILE: ELEV / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	TYPE	BLOWS / FOOT	BULK DENSITY γ P.C.F	REMARKS GR SA SI CL
702.7	Ground Level						
0.0 / 699.0	Sandy silt to silty sand - Compact Fill						▽ 700.7
3.7	Clayey silt with some sand		1	SS	25		0 1 61 38
			2	SS	53		
			3	TW	PH	130	
690.0	Hard		4	TW	PH		
12.7	Silty clay		5	TW	PH		
			6	SS	22		
	Very stiff						
676.7 / 26.0	Glacial Till		7	SS	80		17 38 32 13
672.2	Gravel, sand, silt & clay. Very dense.						
30.5	End of Borehole						

ELEV. SCALE: 700, 690, 680, 670

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

SHEAR STRENGTH P.S.F.: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB. VANE; 2000 4000

LIQUID LIMIT w_L — PLASTIC LIMIT w_p — WATER CONTENT w

WATER CONTENT %: 10 20 30

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

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 10

FOUNDATION SECTION

JOB 69-F-107 LOCATION Sta. 361 + 10 22' Rt. ORIGINATED BY PP
W.P 42-66-07 BORING DATE December 9, 1969 COMPILED BY PP
DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE			SAMPLES				DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100 SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB. VANE	LIQUID LIMIT w_L PLASTIC LIMIT w_P WATER CONTENT w w_P w w_L WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE				GR.SA.SI.CL.
705.1	Ground Level									
0.0	Probably Fill material and clayey silt					700				
694.1										
11.0	End of Cone Test					690				

FORM OB-MT-126 (REV. 1969)

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 11

FOUNDATION SECTION

JOB	69-F-107	LOCATION	Sta. 361 + 20 34' Lt.	ORIGINATED BY	AP
W.P.	42-66-07	BORING DATE	December 10, 1969	COMPILED BY	PP
DATUM	Geodetic	BOREHOLE TYPE	Cone Test Only	CHECKED BY	

SOIL PROFILE ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100 / SHEAR STRENGTH P.S.F. (O UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB. VANE)	LIQUID LIMIT w_L / PLASTIC LIMIT w_p / WATER CONTENT w — WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS GR.SA.SI.CL.
704.0	Ground Level									
0.0	Probably Fill material and clayey silt					700				
691.0										
13.0	End of Cone Test					690				

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

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 12

FOUNDATION SECTION

JOB 69-F-107 LOCATION Sta. 361 + 64 23' Rt. ORIGINATED BY PP
W.P. 42-66-07 BORING DATE December 8, 9 & 10, 1969 COMPILED BY PP
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger & Washboring CHECKED BY

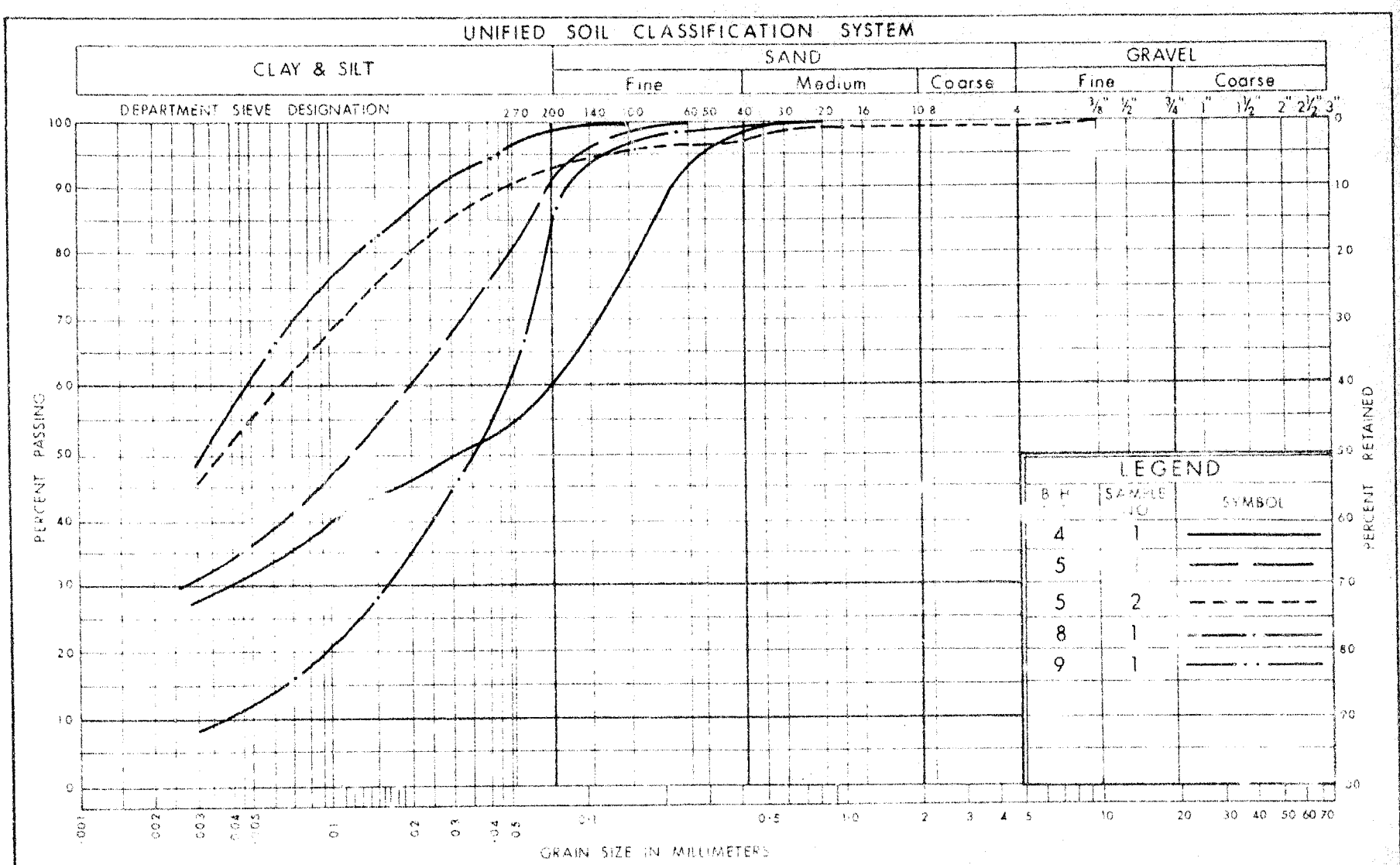
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLE NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	BULK DENSITY γ P.C.F.	REMARKS GR. SA. SI. CL.
704.0	Ground Level							
0.0	Sandy silt to silty sand with some clay							▼ 702.5
698.0	Compact Fill		1	SS	16	700		
6.5	Clayey silt with some sand.		2	SS	55			
691.0	Hard							
14.0	Silty clay		3	TW	PH	690	122	0 0 30 70
			4	SS	16			
			5	SS	18	680		
676.1	Very stiff							
28.9	Glacial Till Gravel, sand, silt & clay		6	SS	70/5"			15 33 38 14
671.0	Very dense							
34.0	Shale					670		
667.7	Bedrock		7	BXL	80%			
37.3	End of Borehole							
						660		

DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100

SHEAR STRENGTH P.S.F.
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB. VANE
2000 4000

LIQUID LIMIT — w_L
PLASTIC LIMIT — w_p
WATER CONTENT — w
w_p w w_L
WATER CONTENT % 10 20 30

FORM OB MT-17
REV. APR 1965

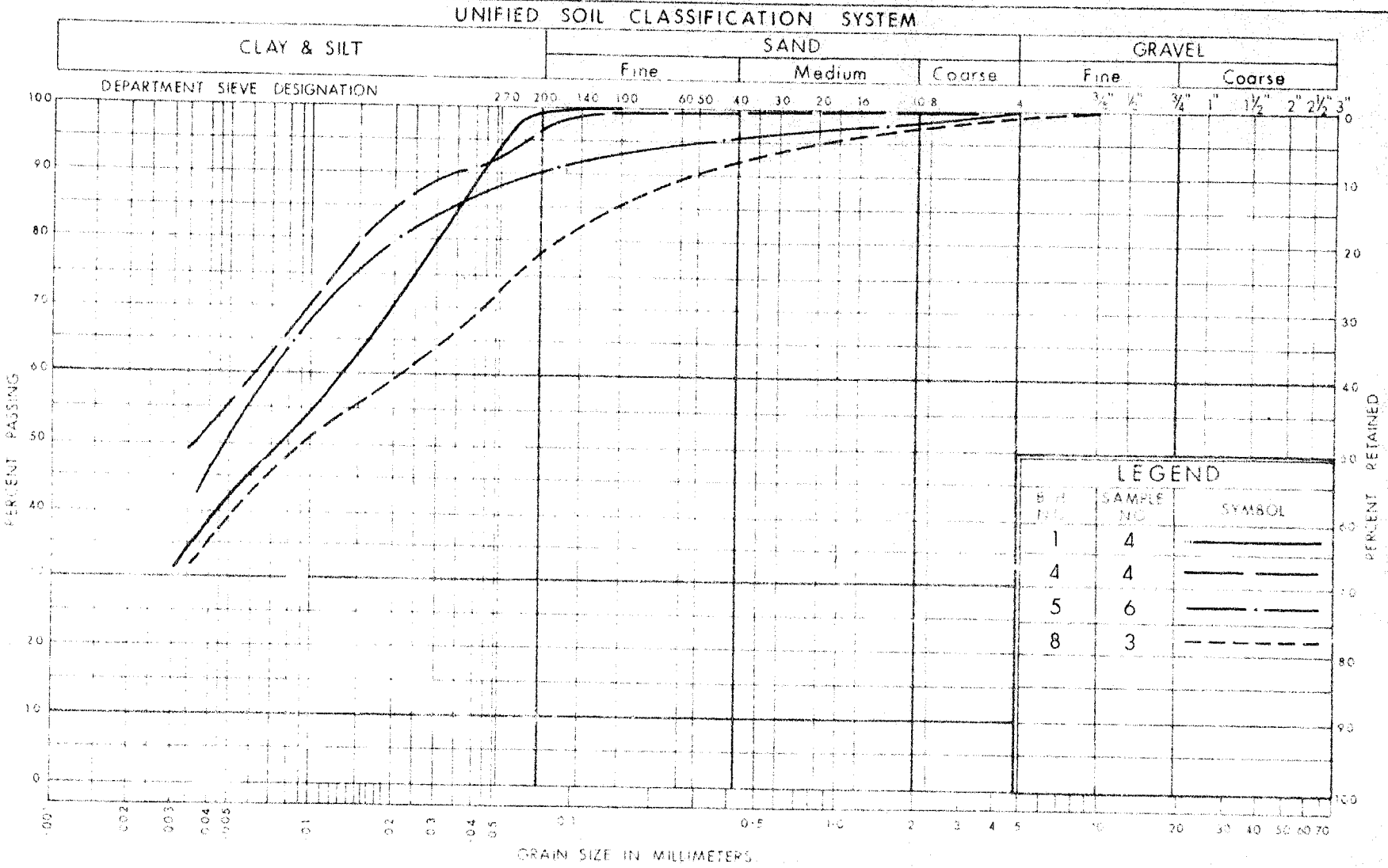


DEPARTMENT OF HIGHWAYS
MATERIALS and TESTING DIVISION

GRAIN SIZE DISTRIBUTION
SANDY SILT TO SILTY SAND

W.P. No.	42-66-07
JOB No.	69-F-107
	FIG. 1

FORM OB MT-17
REV APR. 1965

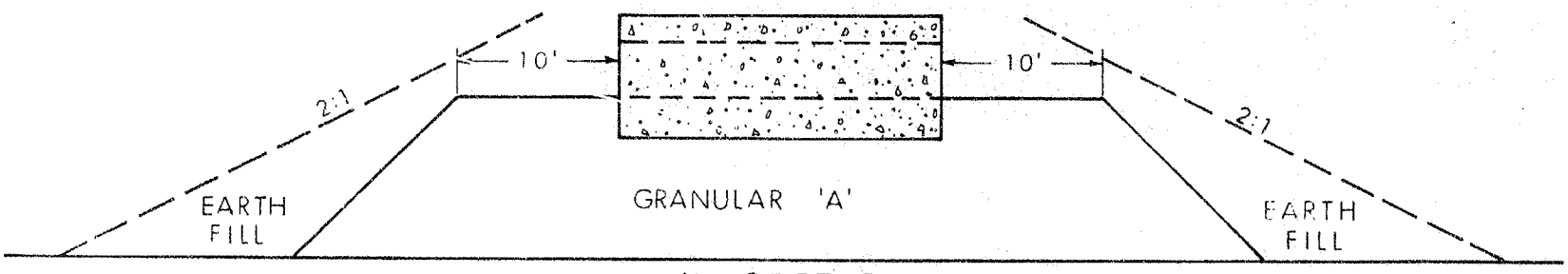


DEPARTMENT OF HIGHWAYS
MATERIALS and TESTING DIVISION

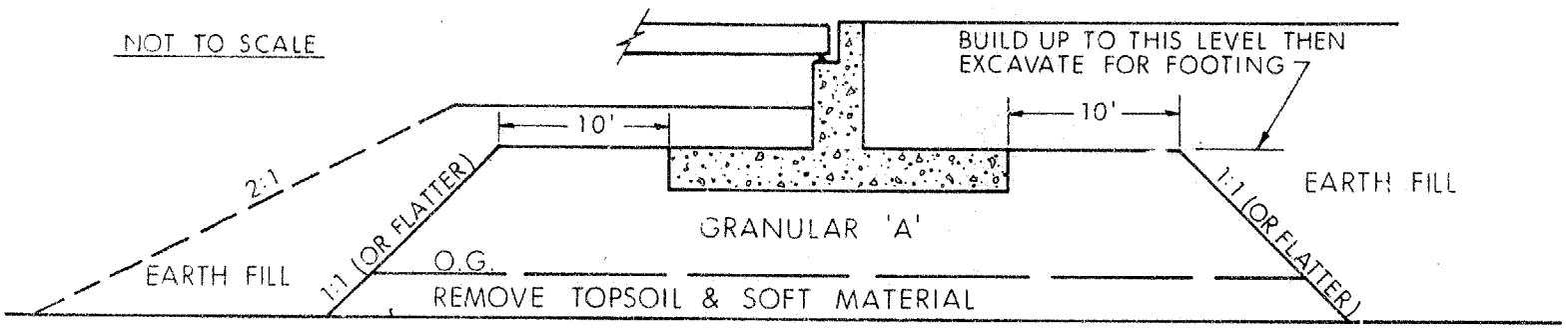
GRAIN SIZE DISTRIBUTION
CLAYEY SILT

W.P. No. 42-66-07
JOB No. 69-F-107
FIG. 2

ABUTMENT ON COMPACTED FILL SHOWING GRANULAR 'A' CORE



X - SECTION



LONGITUDINAL SECTION

NOTES

1 - REMOVE TOPSOIL &/OR SOFT SUBSOIL UNDER AREA OF COMPACTED GRANULAR 'A'.

2 - PLACE GRANULAR 'A' TO TOP OF FOOTING LEVEL, COMPACTED ACCORDING TO CURRENT D.H.O. STANDARDS.

3 - EXCAVATE COMPACTED GRANULAR 'A' MATERIAL FOR FOOTING

FIG. 3

69 - F - 107

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

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

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

DESCRIPTION OF SOIL

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

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

TYPE OF SAMPLE

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

P.H. SAMPLE ADVANCED HYDRAULICALLY

P.M. SAMPLE ADVANCED MANUALLY

SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

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

GENERAL

π	= 3·1416
e	BASE OF NATURAL LOGARITHMS 2·7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

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

EARTH PRESSURE

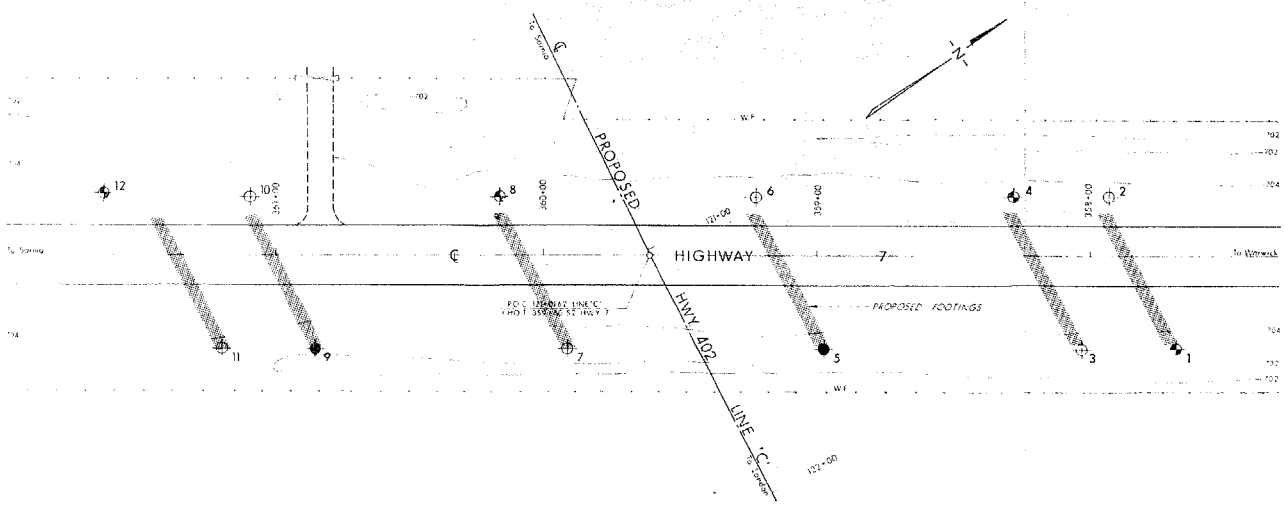
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_o	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

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

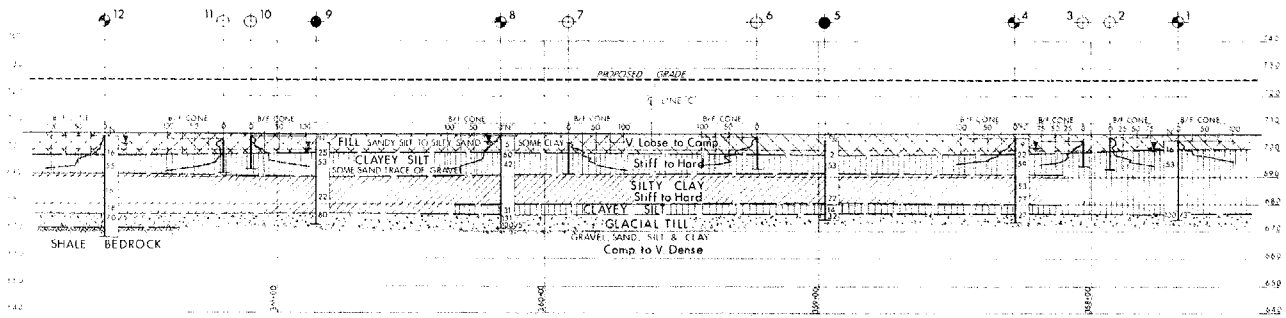
SLOPES

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



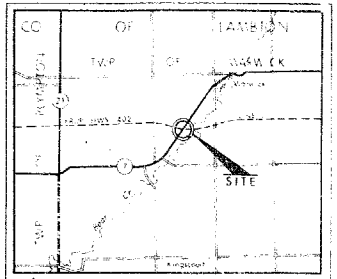
PLAN

SCALE 20 10 0 20 40 FT



℄ PROFILE

SCALE 20 10 0 20 40 FT



KEY PLAN

SCALE IN MILES

LEGEND

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

NOTE: Water level in Bore Hole 5 per instructions at time of field investigation.

NO.	ELEVATION	STATION	OFFSET
1	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]
6	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]

– NOTE –

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

PRINT RECORD		
NO	FOR	DATE

REVISIONS		
DATE	BY	DESCRIPTION

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

HIGHWAY No 7

KING'S HIGHWAY NO. 402 LINE 'C' DIST NO. 1
CO. LAMBTON
TWP. WARWICK LOT 8 CON. 2

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D P.P.	CHECKED	W.P. NO. 42-66-07	M.S.T. DRAWING NO. 69-F-107A
DRAWN S.O.	CHECKED	JOB NO. 69-F-107	
DATE 2 FEB 1970		SITE NO.	BRIDGE DRAWING NO.
APPROVED [illegible] PRINCIPAL FOUNDATION ENGINEER		CONT NO.	

REF. NO. F-4856-1

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

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

FROM: C. S. Grebski,
Structural Office,
West Building, DOWNSVIEW

ATTENTION:

DATE: September 8, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT:

Hwy. #7 Interchange Underpass,
W.P. #42-66-07, Site #14-352,
Hwy. #402 Line 'C', District #1.

69-F-107

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:dp
Attach.

cc. Foundation Office.

No comments

K. G. Bell
Sept 21 1972

Dwgs to Bd.
7 Dec. 72

FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS: W.P. 42-66-07

W.O. 69-F-107

Foundation Report By: P.P.

Review of Design Drawings By: A.K.B.

Design Drawing No.'s: D-7050-1, 3, 4

1. Does footing design comply with our report or subsequent memos? yes

2. If answer to 1. is No, is present design acceptable? —

3. Has sufficient field work been done? yes

4. Are estimated pile lengths shown on Drawings correct? If not, make a new list. yes

5. If excavation of unsuitable soil is recommended, is this shown on Drawings? NA.

6. Are approaches designed in accordance with our report? Check slopes and berm lengths. yes

7. Do you anticipate any construction problems? i.e., dewatering, stability of temporary slopes or excavations. NO

8. Summarize your comments; on separate sheet if necessary.

We suggested spread footings or piles. Designer uses H piles. It however seems to me, that the suggested spread footings would be more economical. (The width of pier footing would be some 5-6 ft larger than pile cap. Abutment footing probably 2-ft wider to support same loads as piles)

Drawings Received .....19.....

Reviewed 13 Sept. 1972

Signed A. K. Bamo

FOUNDATION OFFICE

REVIEW OF DESIGN DRAWINGS: W.P. 42-66-07
W.O. 69-11107

Foundation Report By: P. PAYER
Review of Design Drawings By: A. BARSVARY
Design Drawing No.'s.: D-7060-P1

1. Does footing design comply with our report or subsequent memos? yes

2. If answer to 1. is No, is present design acceptable? –

3. Has sufficient field work been done? yes

4. Are estimated pile lengths shown on Drawings correct? If not, make a new list. yes

5. If excavation of unsuitable soil is recommended, is this shown on Drawings? –

6. Are approaches designed in accordance with our report? Check slopes and berm lengths. yes

7. Do you anticipate any construction problems? i.e. dewatering, stability of temporary slopes or excavations. no

8. Summarize your comments; on separate sheet if necessary.

~~the comments~~

Concrete working slab below the pier footing should be provided and shown on the drawing, as suggested in the report.

Drawings Received FEB. 10th 1972
Reviewed 14 Feb 1972

Signed A. K. Barsvary

INTRODUCTION

This report contains results of the foundation investigation carried out at the following site:

W.P. 42-66-07 - Hwy. 7 Interchange Underpass
Hwy. 402, Line 'C', District 1, Chatham

For purposes of this contract all other Foundation Investigation Reports prepared by or for the Ministry in connection with the above mentioned projects are superceded by this report.

SITE DESCRIPTION

The site is situated in Lot 8, Con. 2, Twp. of Warwick, County of Lambton.

The surrounding area is flat and cultivated farmland.

Physiographically, the site is located in the region referred to as the St. Clair Clay Plain.

SUBSURFACE CONDITIONS

General

The subsoil at the site was found to consist of five different deposits. A surficial sandy silt to silty sand (fill material) is followed by zones of clayey silt and silty clay. The total thickness of these cohesive deposits is approx. 24 ft., and the consistency ranges from stiff to hard.

Beneath the cohesive zones is a compact to very dense glacial till material which is underlain by black-coloured, generally sound shale bedrock.

The boundaries of the different deposits are shown on the Record of Borehole Sheets which are contained in the Appendix to this report. The locations and elevations of borings, together with the inferred subsoil stratigraphy, are shown on Drawing No. D7060-2 of the Contract Drawings.

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

Fill Material

This fill material was encountered in all boreholes and extended from ground level for a maximum depth of 6.5 ft. to approximate elevation 698. The material consists mainly of sand and silt with some clay.

The relative density is classified as very loose to compact.

The natural moisture content was found to range from 19% to 32%.

Typical grain-size distribution curves are included in the Appendix (Fig. 1).

Clayey Silt With Some Sand and Traces of Gravel

This stratum was observed in all boreholes beneath the fill material to a maximum depth of 24 ft. (elev. 676). The continuity of the deposit was found to be interrupted from approximate elevation 591 to approximate elevation 680 by a zone of silty clay in B.H.'s No. 4, 5 and 8. In boreholes No. 9 and 12 the lower boundary was found to be at approximate elevation 690.5.

The material in the deposit consists of clayey silt with some sand and traces of gravel.

Physical properties of the material as determined from field and laboratory tests, are as follows:

Natural Moisture Content (%)	=	14 to 24
Liquid Limit (%)	=	27 to 35
Plastic Limit (%)	=	16 to 22
Bulk Density (PCF)	=	126 to 138
Unconfined Shear Strength (PSF)	=	1768 to 5460
'N' Values (Blows/foot)	=	14 to 60

Grain-size distribution curves are included in the Appendix of this report (Fig. 2).

The consistency of the overall deposit may be described as stiff to hard.

Silty Clay

This stratum was encountered in each borehole with the exception of B.H. #1, beneath the clayey silt layer. The thickness varied from 11 ft. to 15 ft. For detailed information, reference should be made to the Record of Borehole Sheets, contained in the Appendix of this report.

The material in the deposit consists mainly of clay (70%) and silt (30%). Physical properties of the material as determined from field and laboratory tests, are as follows:

Natural Moisture Content (%)	:	22 to 28
Liquid Limit (%)	:	35 to 43
Plastic Limit (%)	:	20 to 24
Bulk Density (PCF)	:	122 to 131
Unconfined Shear Strength (PSF)	:	2175 to 3470
'N' Values (Blows/ft.)	:	12 to 53

The consistency is classified as stiff to hard.

Glacial Till

This stratum underlies the clayey silt or silty clay deposits at every borehole location and consists of a heterogeneous mixture of clay, silt, sand and gravel in the following average proportions: Gravel: 16%, Sand: 30%, Silt: 40% and Clay: 14%. The lower boundary was determined in B.H. #12 only at elevation 671.

The relative density is estimated to vary between compact and very dense. Standard penetration tests carried out in this zone, gave 'N' values ranging from 27 to over 100 blows per foot. The average natural moisture content was found to be in the order of 10%.

Bedrock

Bedrock at this site was found to consist of generally sound black coloured shale at approximate elevation 671 (B.H. #12).

Groundwater

The following groundwater levels were observed during the field investigation:

B.H. # 1	:	Elev. 700.4
4	:	Elev. 701.0
8	:	Elev. 702.9
9	:	Elev. 700.7
12	:	Elev. 702.5

It is pointed out that the foregoing quoted figures may not represent the true groundwater levels due to the short duration of the field work.

P. Payer, P. Eng.
Senior Engineer

K.G. Selby, P. Eng.
Supervising Engineer

REGISTERED PROFESSIONAL ENGINEER
P. PAYER
PROVINCE OF ONTARIO

April, 1976

ENGINEERING SERVICES BRANCH - GEOTECHNICAL OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE Nº 1

W.P. 42-66-07 LOCATION Sta. 357 + 68 34' Lt. ℄ Hwy. 7 ORIGINATED BY PP

DIST 1 HWY 402 BORING DATE December 10, 1969 COMPILED BY PP.

DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger & Cone Test CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH PSF (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (400 800 1200 1600 2000)	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w (w_P — w — w_L) / WATER CONTENT % (20 40 60)	UNIT WEIGHT γ PCF	REMARKS % GR SA CL
703.2	Ground Level									
0.0 / 700.2	Sandy silt to silty sand. Fill									
3.0	Clayey silt with some sand. Very Stiff to Hard		1	SS	16	700				
			2	SS	53					
			3	TW	PH	690	3400 ○		133	
			4	TW	PH		4450 ○	○	138	0 1 77 22
			5	TW	PH	680				
676.2 / 27.0 / 673.7	Glacial Till Very Dense		6	SS	100/3"			○		13 29 41 17
29.5	End of Borehole					670				

20
15 ◇ 5 % STRAIN AT FAILURE
10

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS – ONTARIO

ENGINEERING SERVICES BRANCH – GEOTECHNICAL OFFICE – SOIL MECHANICS SECTION

RECORD OF BOREHOLE № 2

WP 42-66-07 LOCATION Sta. 357 + 93 22' Rt. ℄ Hwy. 7 ORIGINATED BY AP

DIST 1 HWY 402 BORING DATE December 10, 1969 COMPILED BY PP

DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE: ELEV / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	LIQUID LIMIT W_L / PLASTIC LIMIT W_P / WATER CONTENT W (W_P — W — W_L) WATER CONTENT %	UNIT WEIGHT γ	REMARKS % GR SA SI CL
704.5	Ground Level									
	Probably Fill Material and clayey silt					700				
692.5										
12.0	End of Cone Test					690				

20
15 ⊹ 5 % STRAIN AT FAILURE
10

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

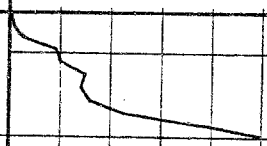
RECORD OF BOREHOLE Nº 3

WP 42-66-07 LOCATION Sta. 358 + 03 34' Lt. ℄ Hwy. 7 ORIGINATED BY PP

DIST 1 HWY 402 BORING DATE December 10, 1969 COMPILED BY PP

DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE: ELEV / DEPTH	SOIL PROFILE: DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: 'N' VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	LIQUID LIMIT W_L / PLASTIC LIMIT W_P / WATER CONTENT W (W_P — W — W_L) WATER CONTENT %	UNIT WEIGHT γ	REMARKS % GR SA SI CL
703.2	Ground Level									
0.0	Probably Fill Material and Clayey silt					700				
693.4										
9.8	End of Cone Test					690				



15 20 5 10 % STRAIN AT FAILURE

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE № 4

WP 42-66-07 LOCATION Sta. 358 + 28 22' Rt. ℄ Hwy. 7 ORIGINATED BY AP

DIST 1 HWY 402 BORING DATE December 9, 1969 COMPILED BY PP

DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger & Cone Test CHECKED BY

ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV	Shear strength PSF (○ unconfined, ● quick triaxial, + field vane, × lab vane)	Water content % (W_P, W, W_L)	UNIT WEIGHT γ PCF	REMARKS % GR SA SI CL
704.7	Ground Level								
0.0	Sandy silt to silty sand with some clay Fill	1	SS	9					0 40 35 25
698.7	Loose to Compact				700				
6.0	Clayey silt with some sand. Hard	2	SS	22					
		3	SS	59					
691.0		4	TW	PH		5050		133.5	0 3 59 38
13.7	Silty clay	5	TW	PH	690				
		6	SS	53					
	Very Stiff to Hard	7	TW	PH		3450		124	
680.0		8	SS	27	680				
24.7	Clayey Silt Hard	9	TW	PH		5375			
676.2									
28.5	Glacial Till Compact	10	SS	27				125.5	
673.2									
31.5	End of Borehole				670				

DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH PSF: 400 800 1200 1600 2000

LIQUID LIMIT —— W_L PLASTIC LIMIT —— W_P WATER CONTENT —— W

WATER CONTENT %: 20 40 60

15 20 5 10 % STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE Nº 5

WP 42-66-07 LOCATION Sta. 358 + 97 34' Lt. ℄ Hwy. 7 ORIGINATED BY PP

DIST 1 HWY 402 BORING DATE December 10, 1969 COMPILED BY PP

DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger & Cone Test CHECKED BY

ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV	UNIT WEIGHT γ PCF	REMARKS % GR SA SI CL
703.2	Ground Level						
0.0 / 698.2	Sandy silt to silty sand with some clay. Very Loose Fill						
5.0	Clayey silt with some sand.	1	SS	2			0 10 63 27
691.2	Hard	2	SS	53			0 8 58 34
12.0	Silty Clay Very Stiff	3	TW	PH	690	131	
		4	TW	PH			
680.2		5	SS	22			
23.0 / 676.7	Clayey silt with some sand, trace of gravel Stiff	6	SS	14	680		1 9 62 28
26.5 / 673.7	Glacial Till Dense	7	SS	32			22 20 41 17
29.5	End of Borehole Water Level not established				670		

DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100)

SHEAR STRENGTH PSF (400 800 1200 1600 2000): O UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE

LIQUID LIMIT w_L, PLASTIC LIMIT w_P, WATER CONTENT w — WATER CONTENT % (20 40 60)

20 15 ⊕ 5 % STRAIN AT FAILURE 10

OFFICE REPORT ON SOIL EXPLORATION

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 6

WP 42-66-07 LOCATION Sta. 359 + 22 22' Rt. ℄ Hwy. 7 ORIGINATED BY AP

DIST 1 HWY 402 BORING DATE December 9, 1969 COMPILED BY PP

DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE: ELEV / DEPTH	SOIL PROFILE: DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: 'N' VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w (w_P — w — w_L) WATER CONTENT %	UNIT WEIGHT γ	REMARKS % GR SA SI CL
704.9	Ground Level									
0.0	Probably Fill material and clayey silt					700				
692.9										
12.0	End of Cone Test					690				

20
15 ⊕ 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE Nº 7

WP 42-66-07 LOCATION Sta. 359 + 91 34' Lt. ℄ Hwy. 7 ORIGINATED BY AP

DIST 1 HWY 402 BORING DATE December 10, 1969 COMPILED BY PP

DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE: ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (c UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w (w_P — w — w_L) WATER CONTENT %	UNIT WEIGHT γ	REMARKS % GR SA SI CL
702.8	Ground Level									
0.0	Probably fill material and clayey silt					700				
690.8										
12.0	End of Cone Test					690				

15 20 5 10 % STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 8

WP 42-66-07 LOCATION Sta. 360 + 16 22' Rt. ℄ Hwy. 7 ORIGINATED BY PP
DIST 1 HWY 402 BORING DATE December 8 and 9, 1969 COMPILED BY PP
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger & Cone Test CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLE NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH PSF (○ UNCONFINED, ● QUICK TRIAXIAL, · FIELD VANE, × LAB VANE) (400 800 1200 1600 2000)	LIQUID LIMIT W_L / PLASTIC LIMIT W_P / WATER CONTENT W (W_P — W — W_L) / WATER CONTENT % (20 40 60)	UNIT WEIGHT γ PCF	REMARKS % GR SA SI CL
705.1	Ground Level									
0.0	Sandy silt to silty sand with some clay									
699.1	Loose Fill		1	SS	5					0 16 79 5
6.0	Clayey silt with some sand & trace of gravel		2	SS	60	700				
			3	SS	42					2 20 59 19
690.6	Stiff to Hard		4	TW	PH				129	
14.5	Silty Clay		5	TW	PH	690				
			6	TW	PH					
	Stiff to Very Stiff		7	TW	PH		2700			
680.0			8	TW	PH	680			125.5	0 2 47 51
25.1 / 676.1	Clayey silt Very Stiff to Hard		9	SS	31					
29.0	Glacial Till Gravel, sand, silt & Clay. Very Dense		10	SS	131					14 21 48 17
670.6			11	SS	100/5"	670				12 42 37 9
34.5	End of Borehole									

20
15 ⊕ 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS–ONTARIO

ENGINEERING SERVICES BRANCH - GEOTECHNICAL OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE № 9

WP 42-66-07 LOCATION Sta. 360 + 85 34' Lt. ℄ Hwy. 7 ORIGINATED BY AP

DIST 1 HWY 402 BORING DATE December 10, 1969 COMPILED BY PP

DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger & Cone Test CHECKED BY

SOIL PROFILE ELEV / DEPTH	DESCRIPTION	STRAT. PLOT	SAMPLES NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH PSF (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE) (400 800 1200 1600 2000)	LIQUID LIMIT W_L, PLASTIC LIMIT W_P, WATER CONTENT W — WATER CONTENT % (20 40 60)	UNIT WEIGHT γ PCF	REMARKS % GR SA SI CL
702.7	Ground Level									
0.0 / 699.0	Sandy silt to silty sand. Compact Fill									
3.7	Clayey silt with some sand. Hard		1	SS	25	700				0 1 61 3
			2	SS	53		3300			
			3	TW	PH				130	
690.0			4	TW	PH	690				
12.7	Silty Clay Very Stiff		5	TW	PH					
			6	SS	22	680				
676.7										
26.0 / 672.2	Glacial Till, gravel, sand, silt & clay. Very Dense		7	SS	80					17 38 32 13
30.5	End of Borehole					670				

20 15 ⊙ 5 % STRAIN AT FAILURE 10

OFFICE REPORT ON SOIL EXPLORATION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS–ONTARIO

ENGINEERING SERVICES BRANCH–GEOTECHNICAL OFFICE–SOIL MECHANICS SECTION

RECORD OF BOREHOLE № 10

WP 42-66-07 LOCATION Sta. 361 + 10 22' Rt. of Hwy. 7 ORIGINATED BY PP

DIST 1 HWY 402 BORING DATE December 9, 1969 COMPILED BY PP

DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE: ELEV / DEPTH	SOIL PROFILE: DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: 'N' VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w (w_P — w — w_L) / WATER CONTENT %	UNIT WEIGHT γ	REMARKS % GR SA SI CL
705.1	Ground Level									
0.0	Probably Fill material and clayey silt					700				
693.1										
12.0	End of Cone Test					690				

15 20 5 10 % STRAIN AT FAILURE

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE № 11

WP 42-66-07 LOCATION Sta. 361 + 20 34' Lt. ℄ Hwy. 7 ORIGINATED BY AP

DIST 1 HWY 402 BORING DATE December 10, 1969 COMPILED BY PP

DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE: ELEV / DEPTH	SOIL PROFILE: DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: 'N' VALUES	GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	LIQUID LIMIT W_L / PLASTIC LIMIT W_P / WATER CONTENT W (W_P — W — W_L) WATER CONTENT %	UNIT WEIGHT γ	REMARKS % GR SA SI CL
704.0 Ground Level										
0.0	Probably Fill material and clayey silt.					700				
691.0										
13.0	End of Cone Test					690				

20
15 ⊹ 5 % STRAIN AT FAILURE
10

ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE № 12

WP 42-66-07 LOCATION Sta. 361 + 64 23' Rt. ℄ Hwy. 7 ORIGINATED BY PP

DIST 1 HWY 402 BORING DATE December 8, 9, & 10, 1969 COMPILED BY PP

DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger & Washboring & Cone Test CHECKED BY

ELEV / DEPTH	SOIL PROFILE: DESCRIPTION	STRAT. PLOT	SAMPLES: NUMBER	TYPE	'N' VALUES	GROUND WATER ELEV	UNIT WEIGHT γ PCF	REMARKS % GR SA SI CL
705.0	Ground Level							
0.0	Sandy silt to silty sand with some clay							
698.5	Compact Fill		1	SS	16	700		
6.5	Clayey silt with some sand.							
691.0	Hard		2	SS	55			
14.0	Silty Clay		3	TW	PH	690	122	0 0 30 70
	Very Stiff		4	SS	16			
676.1			5	SS	18	680		
28.9	Glacial Till Gravel, sand, silt and clay. Very Dense		6	SS	70/5"			15 33 38 14
34.0	Shale Bedrock		7	BXL	80%	670		
667.7								
37.3	End of Borehole					660		

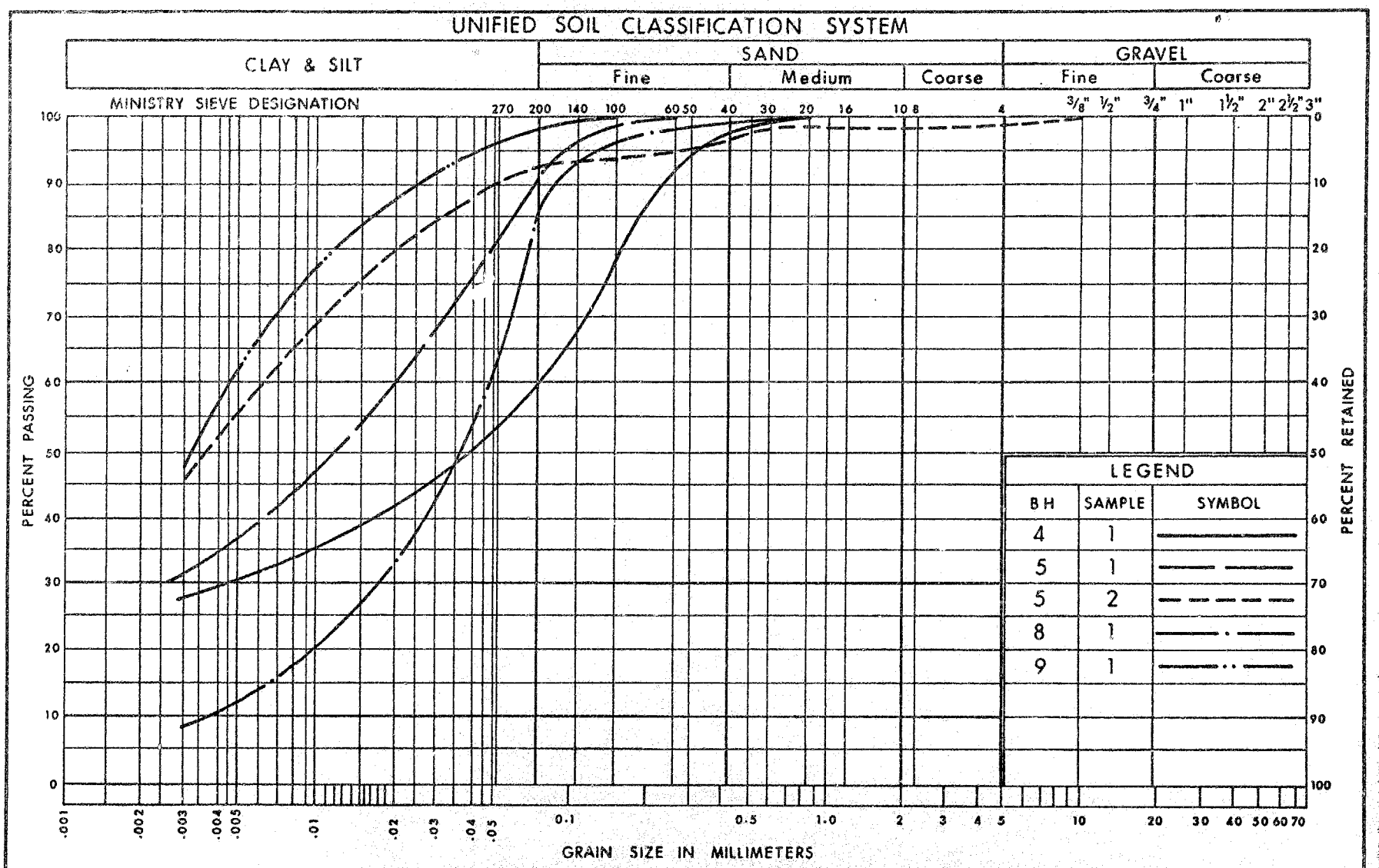
DYNAMIC CONE PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH PSF: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE; 400 800 1200 1600 2000

LIQUID LIMIT W_L PLASTIC LIMIT W_P WATER CONTENT W (W_P — W — W_L)

WATER CONTENT %: 20 40 60

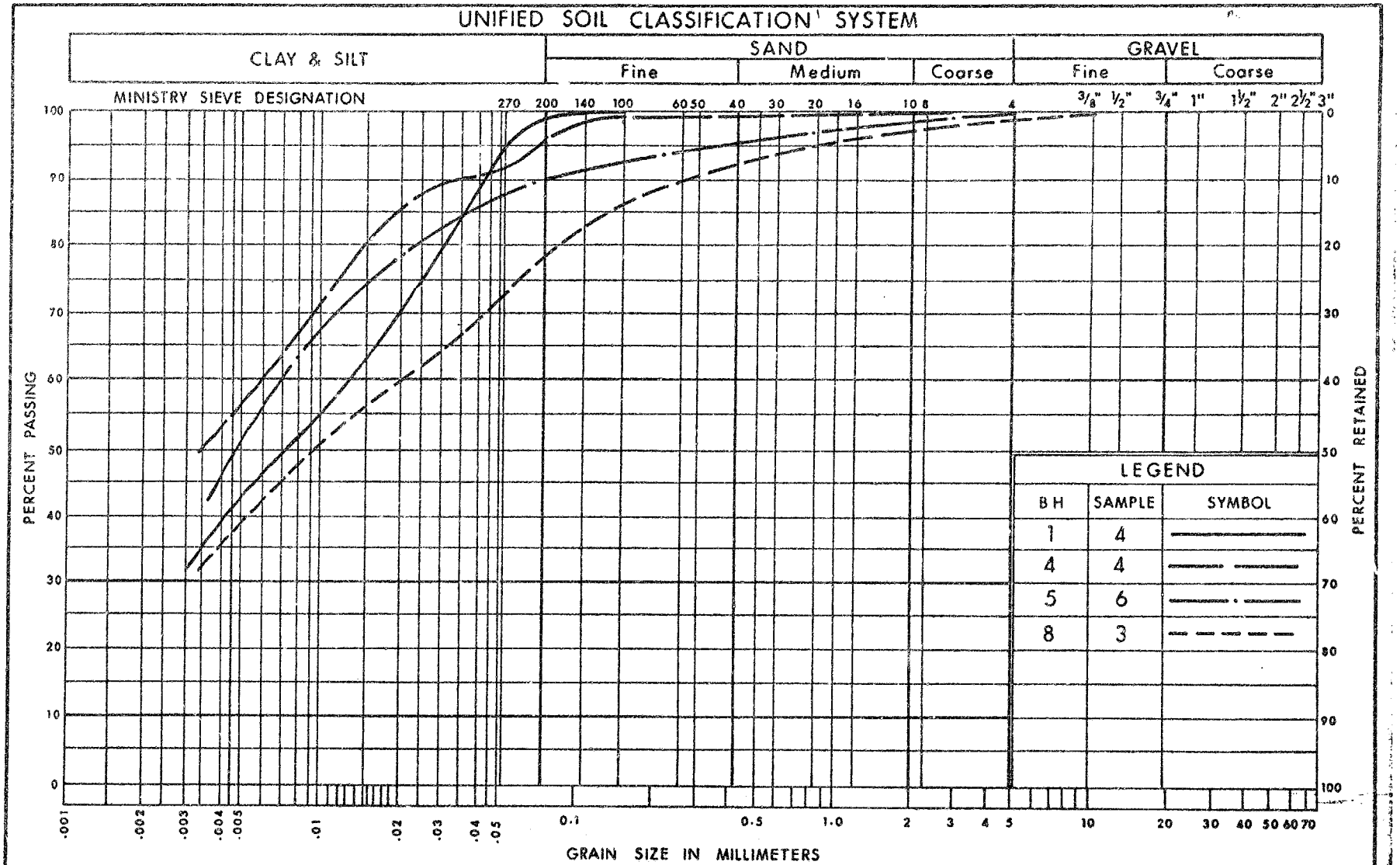
15 20 10 5 % STRAIN AT FAILURE



Ministry of Transportation and Communications
Ontario
ENGINEERING SERVICES BRANCH

GRAIN SIZE DISTRIBUTION
SANDY SILT TO SILTY SAND

FIG No 1
W P 42-66-07



Ministry of Transportation and Communications
Ontario
ENGINEERING SERVICES BRANCH

GRAIN SIZE DISTRIBUTION
CLAYEY SILT

FIG No 2
W P 42-66-07

FORM OB-CC-7

Ministry of Transportation and Communications
Ontario

LISTING OF VERIFIED BIDS - NOTICE OF AWARD OF CONTRACT

TENDER OPENING NO. 51

CONTRACT NO. 76-47

DATE March 23rd, 19 77

DESCRIPTION

GRADING, DRAINAGE, GRANULAR BASE, HOT MIX PAVING AND STRUCTURES
NECESSARY AVAILABLE RATING IS (8) IN (G) (S) (SS) OR (P)

From Highway 7 Easterly to Lambton - Middlesex County Line

HIGHWAY 402 CHATHAM DISTRICT MILEAGE: 8.7

George Wimpey Canada Limited	$ 4,520,131.65
E & E Seegmiller Limited	4,679,709.79
Marentette Brothers Limited & Subsidiaries	4,798,611.90
Alnor Holdings Limited & Alnor Earthmoving Limited	5,161,639.03
Pitts Engineering Construction Limited	5,187,226.00
Armbro Materials & Construction Limited	5,261,685.34
Bot Holdings Limited Bot Construction Limited Bot Construction (Canada)Limited Clarkson Construction Company Limited	5,291,573.90

AWARDED TO: GEORGE WIMPEY CANADA LIMITED,
80 NORTH QUEEN ST.,
TORONTO, ONTARIO.
M8Z 2C9

WP.

	GEO. No
42-66-07	40I13-36
42-66-08/09	40I13-29A & B
42-66-10	40I13-30
42-66-11	40I13-31
42-66-12	40I13-32

DATE MARCH 29th 19 77

RECEIVED
GEOTECHNICAL OFFICE
APR 01 1977
SOIL MECHANICS
MINISTRY OF TRANSPORTATION & COMMUNICATIONS

1298

Mr. E. J. Willis,
Supervisor,
Contract Documentation,
Systems Design Office.

Quality Assurance Section

January 5, 1977

Contract 76-47; Highway 402

As requested by you, I have spoken with J. Forster concerning the possible need for a filter underneath the rip rap at Bear Creek and he indicated that he had discussed the matter with K. Selby of the Soil Mecahnics Section and that it was considered that there was no need for filter. K. Selby phoned me later in the day following further review of the soils profile data and indicated that the original recommendation was still valid.

S. A. Cant,
Soils Quality Assurance Engineer.

SAC:mv

c.c. J. Forster
K. Selby

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

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

FROM: C. S. Grebski,
Structural Office,
West Building, DOWNSVIEW

ATTENTION:

DATE: September 8, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT:

Hwy. #7 Interchange Underpass,
W.P. #42-66-07, Site #14-352,
Hwy. #402 Line 'C', District #1.

69-F-107

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:dp
Attach.

cc. Foundation Office.

No comments
[illegible]
Sept. 1 972

[illegible]
7 Nov 72
[illegible]

FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P. 42-66-07

W.O. 69-F-107

Foundation Report By: P.P.

Review of Design Drawings By: A.U.B.

Design Drawing No.'s: D-7060-1, 3, 4

1. Does footing design comply with our report or subsequent memos? yes

2. If answer to 1. is No, is present design acceptable? —

3. Has sufficient field work been done? yes

4. Are estimated pile lengths shown on Drawings correct? If not, make a new list. yes

5. If excavation of unsuitable soil is recommended, is this shown on Drawings? NA

6. Are approaches designed in accordance with our report? Check slopes and berm lengths. yes

7. Do you anticipate any construction problems? i.e., dewatering, stability of temporary slopes or excavations. NO

8. Summarize your comments; on separate sheet if necessary.

We suggested spread footings or piles. Designer uses 4 piles. It however seems to me, that the suggested spread footings would be more economical. (The width of pier footing would be one [illegible] ft larger than pile cap. Abutment footing probably 2 ft wider to support same loads as piles.)

Drawings Received .....19.....

Reviewed 13 Sept 1972

Signed [illegible]

FOUNDATION OFFICE

REVIEW OF DESIGN DRAWINGS:

W.O. 42-66-07

W.O. 69-11107

Foundation Report By: P. PAYER

Review of Design Drawings By: A. BARSVARY

Design Drawing No.'s.: D-7060-P1

1. Does footing design comply with our report or subsequent memos? yes

2. If answer to 1. is No, is present design acceptable? -

3. Has sufficient field work been done? yes

4. Are estimated pile lengths shown on Drawings correct? If not, make a new list. yes

5. If excavation of unsuitable soil is recommended, is this shown on Drawings? -

6. Are approaches designed in accordance with our report? Check slopes and berm lengths. yes

7. Do you anticipate any construction problems? i.e. dewatering, stability of temporary slopes or excavations. no

8. Summarize your comments; on separate sheet if necessary.

~~No comments~~

Concrete working slab below the pile footing should be provided and shown on the drawing, as suggested in the report.

Drawings Received FEB. 10th 1972

Reviewed " 28 1972

Signed O. L. Dawson

Dist. 1 Hwy 402

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 69-F-107
W P 42-66-07
DATUM Geodetic

LOCATION Sta. 357 + 68 34' Lt. ℄ Hwy 7
BORING DATE December 10, 1969
BOREHOLE TYPE Cont. Flight Auger & Cone Test

ORIGINATED BY PP
COMPILED BY PE
CHECKED BY

ELEV / DEPTH	SOIL PROFILE DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT	ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100 / SHEAR STRENGTH P.S.F. ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	LIQUID LIMIT / PLASTIC LIMIT / WATER CONTENT / WATER CONTENT % 10 20 30	BULK DENSITY γ PCF	REMARKS GR SA SI CL
703.2	Ground Level									
0.0 / 700.2	Sandy silt to silty sand. Fill									
3.0	Clayey silt with some sand		1	SS	16	700				▼ 700.4
			2	SS	53					
			3	TW	PH	690	2400		133	
	Very stiff to hard		4	TW	PH		4450		138	0 1 77 22
			5	TW	PH	680				
676.2 / 27.0	Glacial Till									
673.7	Very dense		6	SS	100/3"					13 29 41 17
29.5	En of Borehole					670				

FORM OB-MT-126 (REV 1969)

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 69-F-107
W.P 42-66-07
DATUM Geodetic

LOCATION Sta. 357 + 93 22' Rt. ℄ Hwy 7
BORING DATE December 10, 1969
BOREHOLE TYPE Cone Test Only

ORIGINATED BY AP
COMPILED BY PP
CHECKED BY

SOIL PROFILE: ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	BLOWS/FOOT	ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT (20 40 60 80 100) / SHEAR STRENGTH P.S.F. (o UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB. VANE)	LIQUID LIMIT, PLASTIC LIMIT, WATER CONTENT (WATER CONTENT %)	BULK DENSITY C.F.	REMARKS GR.SA.SI.CL.
704.5	Ground Level									
0.0	Probably Fill material and					700				
2 / 694.5	Clayey silt									
~~11.0~~ 12.0	End of Cone Test					690				

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 69-F-107 | LOCATION Sta. 358 + 03 34' Lt. ℄ Hwy. 7 | ORIGINATED BY PP
W.P 42-66-07 | BORING DATE December 10, 1969 | COMPILED BY PP
DATUM Geodatic | BOREHOLE TYPE Cone Test Only | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100 / SHEAR STRENGTH P.S.F ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB. VANE	LIQUID LIMIT —— w_L PLASTIC LIMIT - - - w_P WATER CONTENT —— w / w_P w w_L / WATER CONTENT %	BULK DENSITY γ P.C.F	REMARKS GR SA SI CL
703.2	Ground Level									
0.0	Probably Fill material and Clayey silt					700				
693.4										
9.8	End of Cone Test					690				

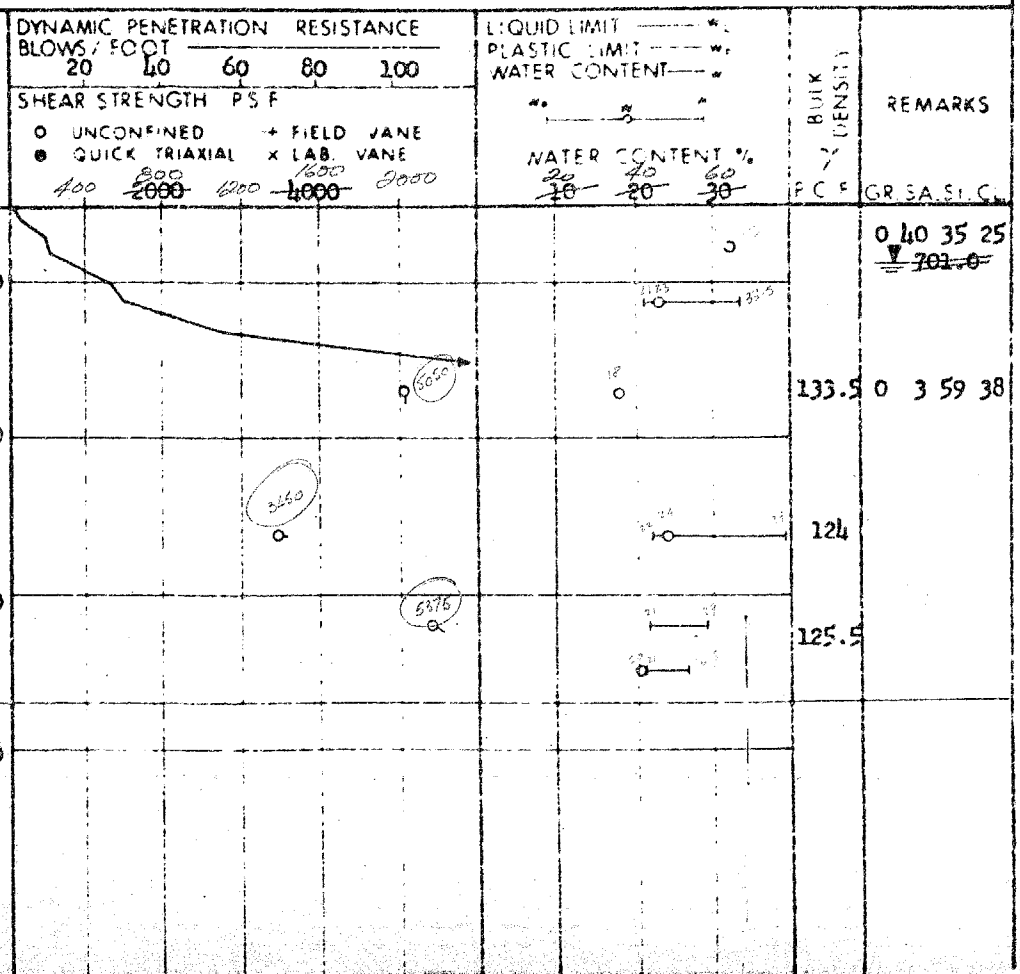
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 69-F-107 | LOCATION Sta. 358 + 28 22' Rt. ℄ HWY 7 | ORIGINATED BY AP
W P 42-66-07 | BORING DATE December 9, 1969 | COMPILED BY PP
DATUM Geodetic | BOREHOLE TYPE Cont. Flight Auger & CONE TEST | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	BLOWS/FOOT	REMARKS
704.7	Ground Level					
0.0	Sandy silt to silty sand with some clay Fill		1	SS	9	0 40 35 25 ▼ ~~701.0~~
698.7	Loose to compact.		2	SS	22	
6.0	Clayey silt with some sand.		3	SS	59	
691.0	Hard		4	TW	PH	133.5 0 3 59 38
13.7	Silty clay		5	TW	PH	
			6	SS	53	
			7	TW	PH	124
680.0	Very stiff to hard		8	SS	27	
24.7	Clayey silt		9	TW	PH	
676.2	Hard					125.5
28.5	Glacial Till		10	SS	27	
673.2	Compact					
31.5	End of Borehole					



DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 69-F-107 | LOCATION Sta. 358 + 97 34' Lt. ℄ HWY 7 | ORIGINATED BY PP
W P 42-66-07 | BORING DATE December 10, 1969 | COMPILED BY PP
DATUM Geodetic | BOREHOLE TYPE Cont. Flight Auger & CONE TEST | CHECKED BY

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLE NUMBER	TYPE	BLOWS / FOOT	ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (20 40 60 80 100)	SHEAR STRENGTH P.S.F. (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	LIQUID LIMIT, PLASTIC LIMIT, WATER CONTENT (WATER CONTENT %)	BULK DENSITY γ P.C.F.	REMARKS GR. SA. SI. CL.
703.2	Ground Level										
0.0	Sandy silt to silty sand with some clay.										
698.2	Very loose. Fill					700					
			1	SS	2						0 10 63 27
5.0	Clayey silt with some sand.										
			2	SS	53						0 8 58 34
691.2	Hard										
12.0	Silty clay		3	TW	PH	690				131	
			4	TW	PH						
			5	SS	22						
680.2	Very stiff										
23.0	Clayey silt with some sand & trace of gravel					680					
676.7	Stiff			SS	14						1 9 62 28
26.5	Glacial Till										
673.7	Dense		7	SS	32						22 20 41 17
29.5	End of Borehole										
						670					

W.L NOT ESTABLISHED

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 6

FOUNDATION SECTION

JOB 69-F-107 LOCATION Sta. 359 + 22 22' Rt. ℄ Hwy. 7 ORIGINATED BY AP
WP 42-66-07 BORING DATE December 9, 1969 COMPILED BY PP
DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE: ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	BLOWS/FOOT	ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100 / SHEAR STRENGTH P.S.F. ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB. VANE	LIQUID LIMIT —— —— % PLASTIC LIMIT —— —— % WATER CONTENT —— —— % WATER CONTENT %	BULK DENSITY γ	REMARKS
704.9	Ground Level									
0.0	Probably Fill material and clayey silt					700				
692.9 ~~693.9~~										
~~11.0~~ 12.0	End of Cone Test					690				

F C S GR SA SI CL

FORM OB-MT-120 (REV 1969)

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 7

FOUNDATION SECTION

JOB 69-F-107 LOCATION Sta. 359 + 91 34' Lt. ℄ Hwy 7 ORIGINATED BY AP
W P 42-66-07 BORING DATE December 10, 1969 COMPILED BY PP
DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY

SOIL PROFILE: ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES: NUMBER	TYPE	BLOWS/FOOT	ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100 / SHEAR STRENGTH PSF ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	LIQUID LIMIT — PLASTIC LIMIT — WATER CONTENT — WATER CONTENT %	BULK DENSITY PCF	REMARKS GR SA SI CL
702.8	Ground Level									
0.0	Probably fill material and clayey silt					700				
690.8										
12.0	End of Cone Test					690				

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 8

FOUNDATION SECTION

JOB 69-F-107
W.P. 42-66-07
DATUM Geodetic

LOCATION Sta. 360 + 16 22' Rt. ℄ HWY. 7
BORING DATE December 8 and 9, 1969
BOREHOLE TYPE Cont. Flight Auger & CONE TEST

ORIGINATED BY PP
COMPILED BY PP
CHECKED BY AK

ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS/FOOT	BULK DENSITY P.C.F.	REMARKS GR. SA. SI. CL.
705.1	Ground Level					
0.0	Sandy silt to silty sand with some clay					▼ 702.9
699.1	Loose Fill	1	SS	5		0 16 79 5
6.0	Clayey silt with some sand & trace of gravel	2	SS	60		
		3	SS	42		2 20 59 19
	Stiff to hard	4	TW	PH	129	
690.6						
14.5	Silty clay	5	TW	PH		
		6	TW	PH		
		7	TW	PH		
	Stiff to very stiff					
680.0						
25.1	Clayey silt	8	TW	PH	125.5	0 2 47 51
676.1	Very stiff to hard	9	SS	31		
29.0	Glacial Till					
676.6	Gravel, sand, silt & clay.	10	SS	131		14 21 48 17
671.1	Very dense.	11	SS	100/5"		12 42 37 9
~~31.0~~ 34.5	End of Borehole					

STRAT PLOT

ELEV SCALE: 700, 690, 680, 670

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

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

400 ~~2000~~ 800 1200 ~~1600~~ 2000

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

WATER CONTENT %: ~~30~~ 20 ~~20~~ 40 ~~30~~ 60

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 9

FOUNDATION SECTION

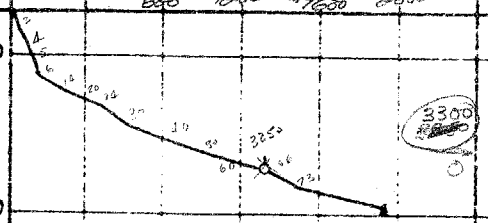
JOB	69-F-107	LOCATION	Sta. 360 + 85 34' Lt. ℄ Hwy. 7
W.P.	42-66-07	BORING DATE	December 10, 1969
DATUM	Geodetic	BOREHOLE TYPE	Cont. Flight Auger & CONE TEST

ORIGINATED BY AP
COMPILED BY PP
CHECKED BY

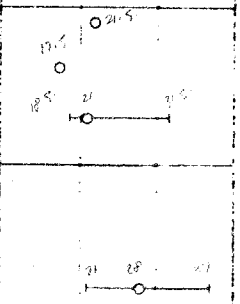
ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLE NUMBER	TYPE	BLOWS / FOOT	ELEV SCALE	REMARKS
702.7	Ground Level						
0.0	Sandy silt to silty sand - Compact Fill						▼ 700.7
699.0			1	SS	25	700	0 1 61 38
3.7	Clayey silt with some sand		2	SS	53		
			3	TW	PH		
690.0	Hard						
12.7	Silty clay		4	TW	PH	690	
			5	TW	PH		
			6	SS	22		
	Very stiff					680	
676.7							
26.0	Glacial Till Gravel, sand, silt & clay. Very dense.		7	SS	80		17 38 32 13
672.2							
30.5	End of Borehole					670	

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

SHEAR STRENGTH P.S.F.
○ UNCONFINED ✦ FIELD VANE
● QUICK TRIAXIAL × LAB. VANE
400 ~~2000~~ 800 620 ~~4000~~ 1600 2800



LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w
WATER CONTENT %: ~~10~~ 20 ~~20~~ 40 ~~30~~ 60



BULK DENSITY γ PCF: 130

FORM OS-MT-126 (REV. 1969)

OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 10

FOUNDATION SE

JOB 69-F-107
W.P. 42-66-07
DATUM Geodetic

LOCATION Sta. 361 + 10 22' Rt. E Hwy. 7
BORING DATE December 9, 1969
BOREHOLE TYPE Cone Test Only

ORIGINATED BY PP
COMPILED BY PP
CHECKED BY

SOIL PROFILE: ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100 / SHEAR STRENGTH PSF ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB. VANE	LIQUID LIMIT w_L / PLASTIC LIMIT w_P / WATER CONTENT w — WATER CONTENT %	BULK DENSITY γ PCF	REMARKS GR SA SI CL
705.1	Ground Level									
0.0	Probably Fill material and clayey silt					700				
693.1 ~~694.1~~										
~~11.0~~ 12.0	End of Cone Test					690				

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 11

FOUNDATION SECTION

JOB	69-F-107	LOCATION	Sta. 361 + 20 34' Lt. ℄ Hwy 7	ORIGINATED BY	AF
W.P.	42-66-07	BORING DATE	December 10, 1969	COMPILED BY	PP
DATUM	Geodetic	BOREHOLE TYPE	Cone Test Only	CHECKED BY	

SOIL PROFILE ELEV / DEPTH	DESCRIPTION	STRATA PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT	ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100 / SHEAR STRENGTH PSF ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE	LIQUID LIMIT —— %, PLASTIC LIMIT —— %, WATER CONTENT —— % / WATER CONTENT %	BULK DENSITY γ PCF	REMARKS GR SA SI CL
701.0	Ground Level									
0.0	Probably Fill material and clayey silt					700				
691.0										
13.0	End of Cone Test					690				

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 12

FOUNDATION SECTION

JOB 69-F-107
WP 42-66-07
DATUM Geodetic

LOCATION Sta. 361 + 64 23' Rt. ℄ Hwy. 7
BORING DATE December 8, 9 & 10, 1969
BOREHOLE TYPE Cont. Flight Auger & Washboring & Cone Test

ORIGINATED BY PP
COMPILED BY PP
CHECKED BY LK

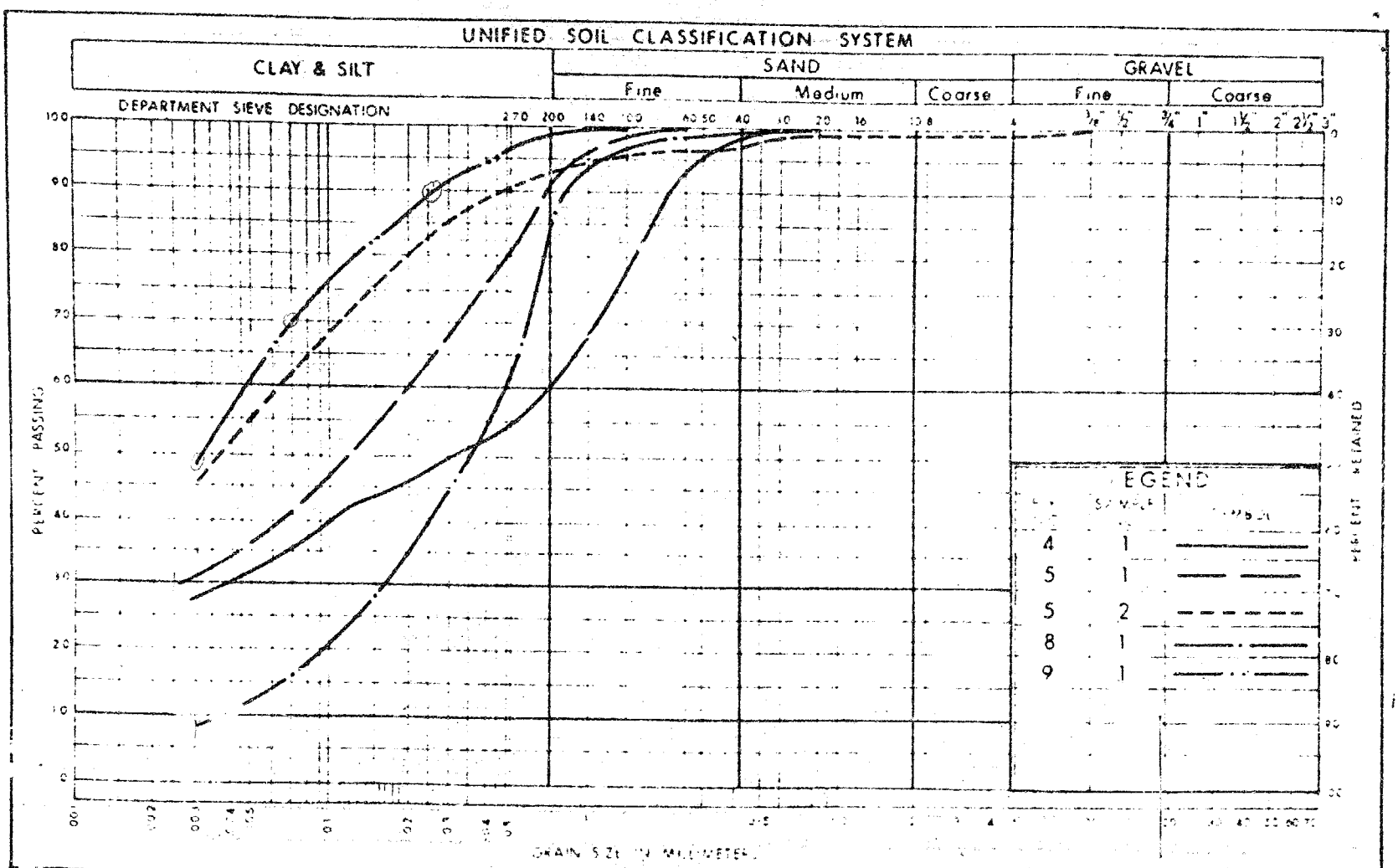
ELEV / DEPTH	SOIL PROFILE DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	BLOWS/FOOT	ELEV SCALE	BULK DENSITY γ PCF	REMARKS GR SA SI CL
705.0	Ground Level							
0.0	Sandy silt to silty sand with some clay							
698.0	Compact Fill		1	SS	16	700		
6.5	Clayey silt with some sand.							
691.0	Hard		2	SS	55			
14.0	Silty clay		3	TW	PH	690	122	0 0 30 70
			4	SS	16			
676.1	Very stiff		5	SS	18	680		
28.9	Glacial Till Gravel, sand, silt & clay		6	SS	70/5"			15 33 38 14
671.0	Very dense							
34.0	Shale					670		
667.7	Bedrock		7	BXL	80%			
37.3	End of Borehole					660		

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

SHEAR STRENGTH PSF
○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE
400 ~~2000~~ 800 1200 ~~4000~~ 1600 2000

LIQUID LIMIT —— w_L
PLASTIC LIMIT —— w_P
WATER CONTENT —— w
w_P w w_L
WATER CONTENT % ~~10~~ ~~20~~ ~~30~~

▼ 702.5

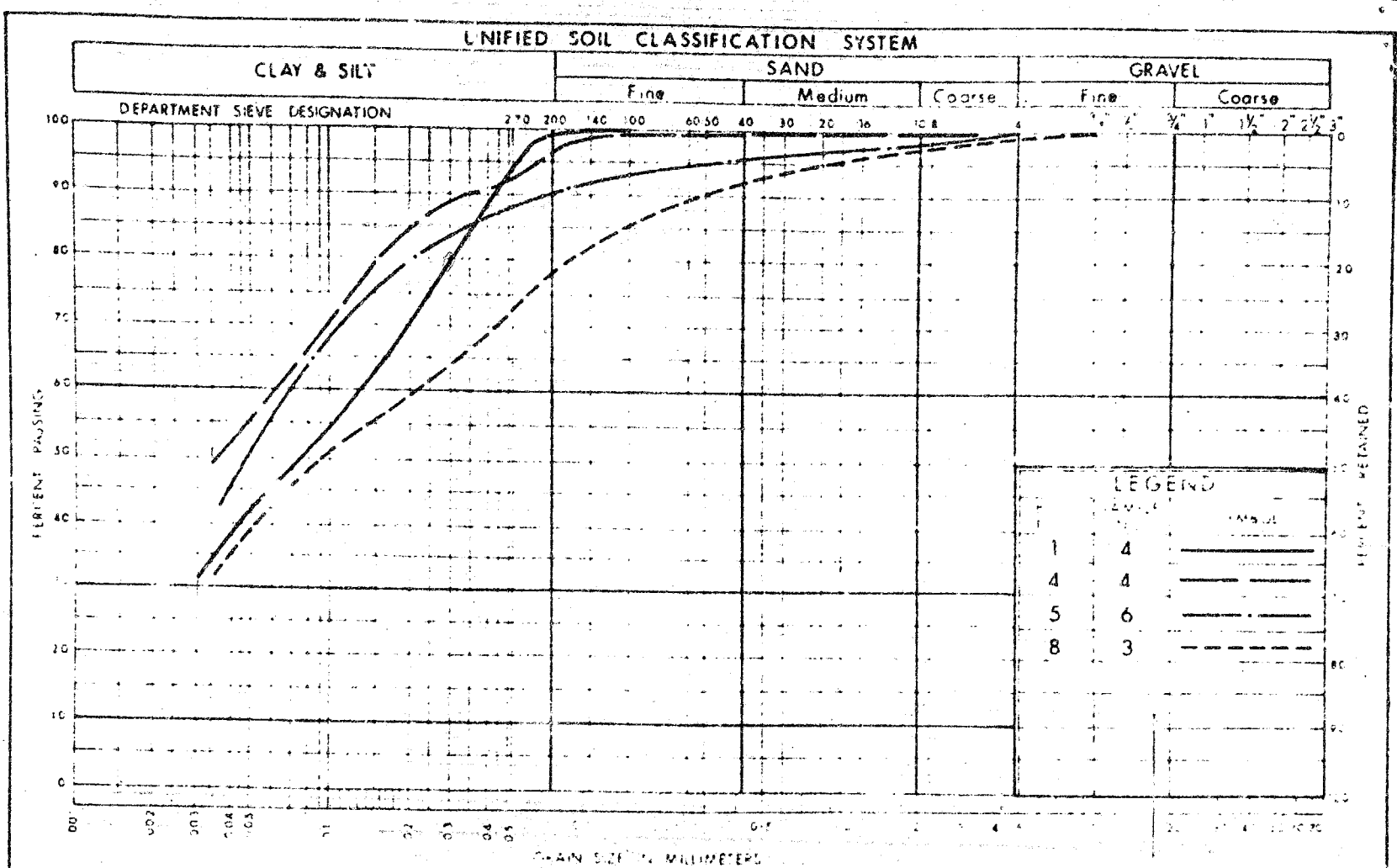


DEPARTMENT OF HIGHWAYS
MATERIALS and TESTING DIVISION

GRAIN SIZE DISTRIBUTION
SANDY SILT TO SILTY SAND

A.F.N. 42-66-07
J.O.B. No. 69-F-107
FIG. 1

FORM 08 MT-17
REV APR 1965



DEPARTMENT OF HIGHWAYS
MATERIALS and TESTING DIVISION

GRAIN SIZE DISTRIBUTION
CLAYEY SILT

WP No 42-66-07
JOB No 69-F-107
FIG. 2

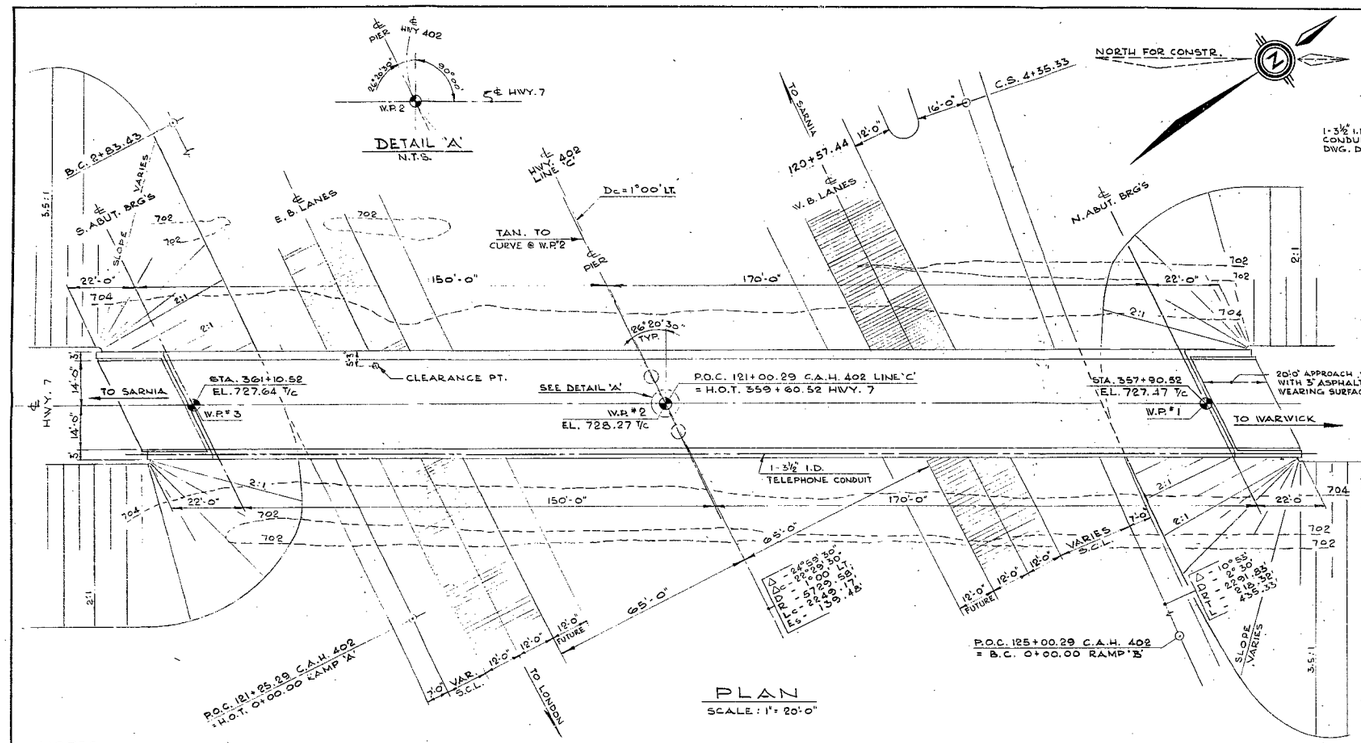
#69-F-107

W.P. 42-66-07

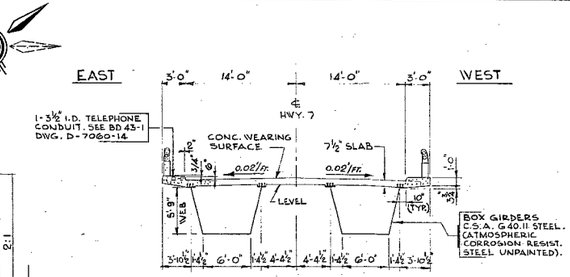
H.W.Y. #402, LINE 'C'

AND H.W.Y. #7 AND C.A.H.

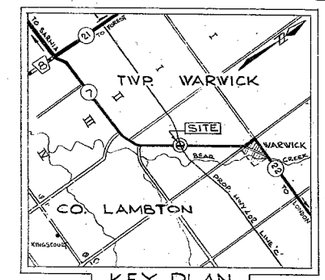
INTERCHANGE UNDERPASS.



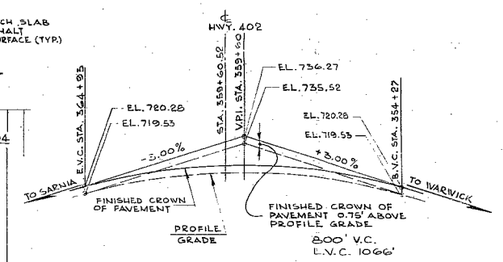
PLAN
SCALE: 1" = 20'-0"



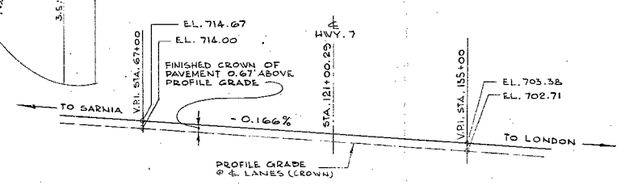
TYP. DECK SECTION
SCALE: ⅛" = 1'-0"



KEY PLAN
SCALE 1 IN. = 1 MI.



PROFILE OF HWY. 7
N.T.S.



PROFILE OF HWY. 402
N.T.S.

NOTES:

CLASS OF CONCRETE

DECK, CURBS AND PARAPET WALLS	4000 P.S.I.
PIER COLUMNS	4000 P.S.I.
REMAINDER	3000 P.S.I.

AND/OR AS NOTED ON DRAWINGS

CLEAR COVER ON REINF. STEEL

FOOTINGS, ABUTMENTS, PIER COLUMNS, DECK: TOP 3", BOT. 3"
CURBS, PARAPET WALLS, APPROACH SLABS, 2", 1½", 2"
AND/OR AS NOTED ON DRAWINGS.

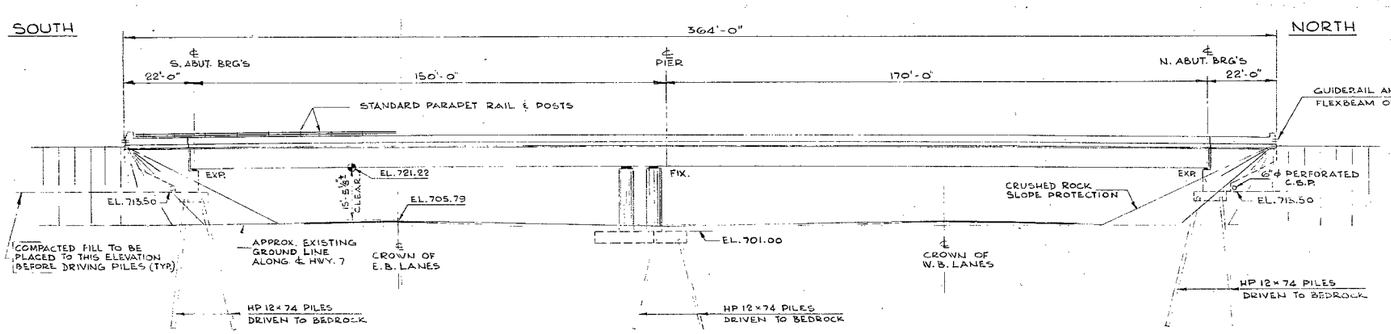
CONSTRUCTION NOTES

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF ± ⅛ INCH. NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED.

NOTES

- T/C DENOTES ELEVATIONS ARE TOP OF CONCRETE WEARING SURFACE.
- W.P. DENOTES WORKING POINT.

B.M. 702.62
GEODETIC DATUM
CUT '+' ON S. CORNER 1' CONC. RET. WALL 490' LT. 125+14 LINE 'C'



ELEVATION
SCALE: 1" = 20'-0"

LIST OF DRAWINGS

D-7060-1 GENERAL LAYOUT
- 2 BOREHOLE LOCATIONS AND SOIL STRATA
- 3 FOOTING LAYOUT
- 4 FOOTING AND COLUMN REINFORCING
- 5 ABUTMENTS
- 6 STRUCTURAL STEEL I
- 7 STRUCTURAL STEEL II
- 8 STRUCTURAL STEEL III
- 9 STRUCTURAL STEEL IV
- 10 DECK
- 11 PARAPET WALL DETAILS
- 12 STANDARD STEEL PARAPET RAIL
- 13 APPROACH SLABS
- 14 STANDARD DETAILS I

REGISTERED PROFESSIONAL ENGINEER
CIVIL
K. Z. STOLARSKI
PROVINCE OF ONTARIO

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

PRINT RECORD		
No.	FOR	DATE

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

69-F-107

HIGHWAY 7 INTERCHANGE UNDERPASS

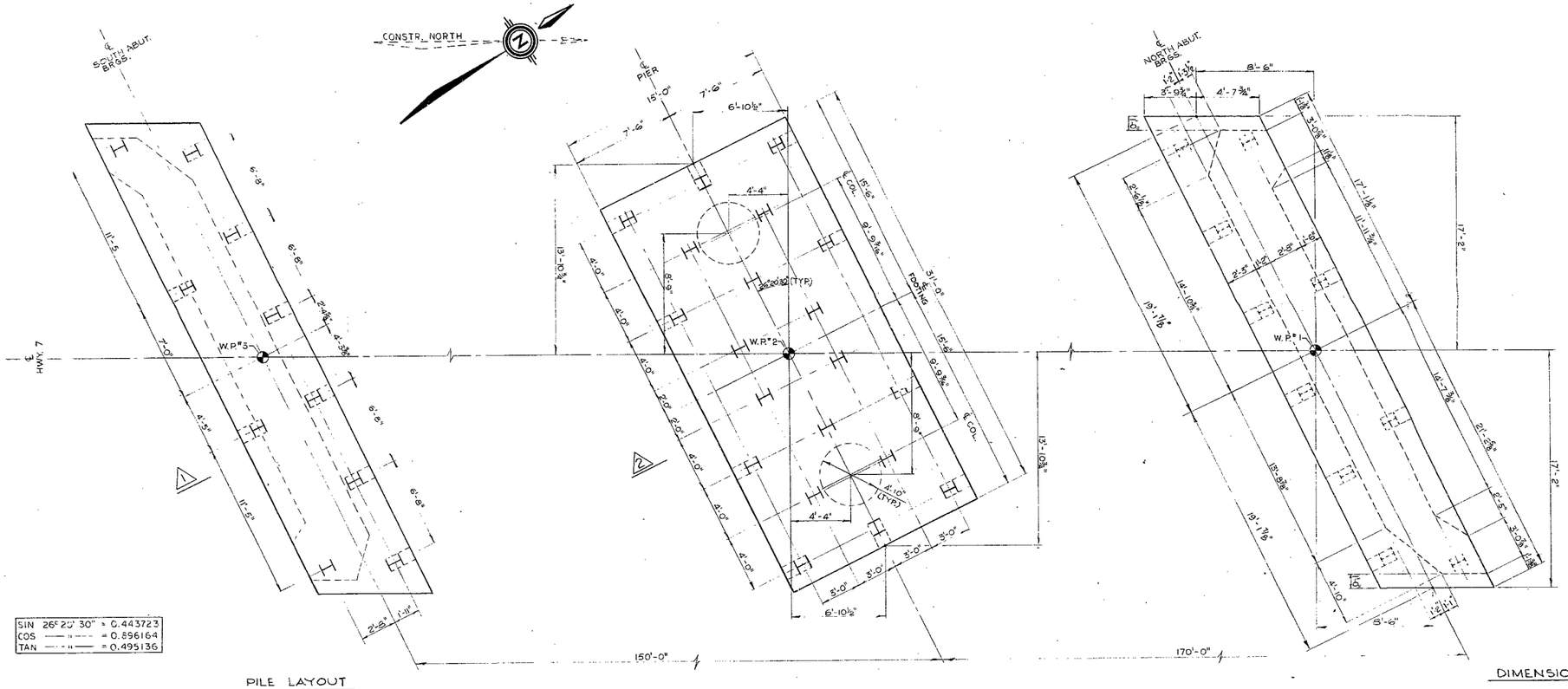
KING'S HIGHWAY No. 402 LINE 'C' — DIST. No. 1
CO. OF LAMBTON
TWP. OF WARWICK — LOT 8 — CON. 2 SOUTH OF EGREMONT RD.

GENERAL LAYOUT

APPROVED _____ STRUCTURAL ENGINEER

DESIGN	K.Z.S.	CHECK	K.P.
DRAWING	S.M.	CHECK	K.Z.S.
DATE	AUG./72	LOADING	HS20-44

SITE No. 14-352 — W.P. No. 42-66-07
CONTRACT Nos.
DRAWING No. D-7060-1

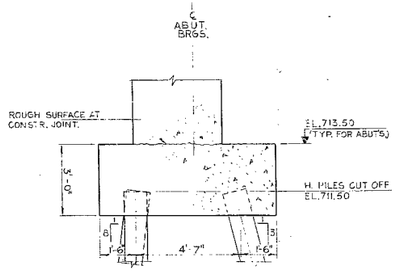


PILE LAYOUT

FOOTING LAYOUT PLAN

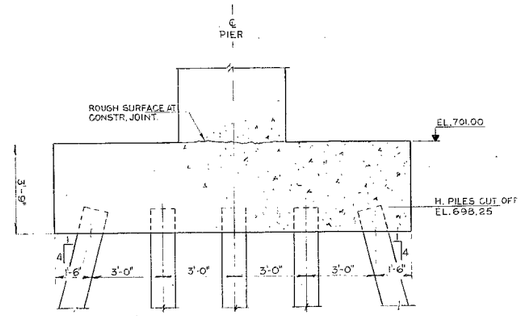
SCALE: ¼" = 1'-0"

DIMENSIONS



1

SCALE: ⅜" = 1'-0"



2

SCALE: ⅜" = 1'-0"

PILES

LOCATION	NO	LENGTH		TYPE
N. ABUT.	6	44'-0"	BATTERED 1:3	HP 12 x 74
" "	2	43'-0"	" " 1:6	
" "	2	42'-0"	VERTICAL	
PIER	10	30'-0"	BATTERED 1:4	
" "	10	29'-0"	VERTICAL	
S. ABUT.	6	44'-0"	BATTERED 1:3	
" "	2	43'-0"	" " 1:6	
" "	2	42'-0"	VERTICAL	

H-PILES SHALL BE DRIVEN TO BEDROCK.
DESIGN LOAD = 95 TONS.

NOTES:

- NORTH AND SOUTH ABUTMENT FOOTINGS ARE SIMILAR.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH DWG. D-7060-4

FOR REDUCED PLAN

USE SCALE BELOW

0 1 2 3

3 INCHES ON ORIGINAL PLAN

PRINT RECORD		
No.	FOR	DATE

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

69-F-107

HIGHWAY 7 INTERCHANGE UNDERPASS

KING'S HIGHWAY No. 402 LINE "C" DIST. No. 1
CO. OF LAMBTON
TWP. OF WARWICK LOT 8 CON. 2 (TWP. OF BREMONT 30)

FOOTING LAYOUT

APPROVED _____ STRUCTURAL ENGINEER

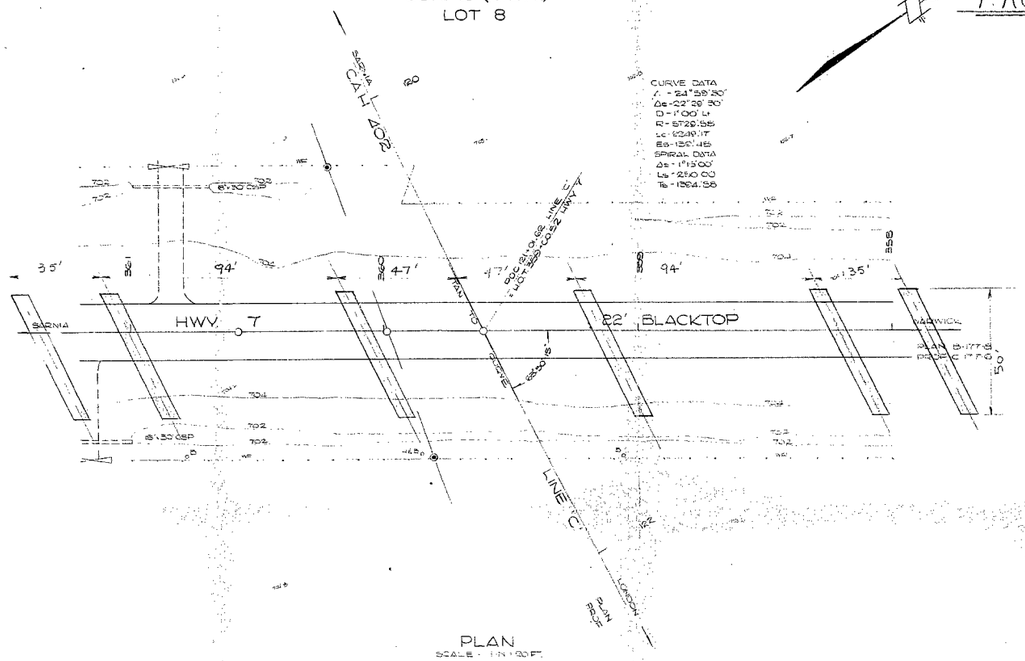
DESIGN	K.Z.S.	CHECK	
DRAWING	ZR	CHECK	K.Z.S.
DATE	AUG./72	LOADING	HS20-44

SITE No.	14-352	W.P. No. 42-66-07
CONTRACT Nos.		
DRAWING No.	D-7060-3	

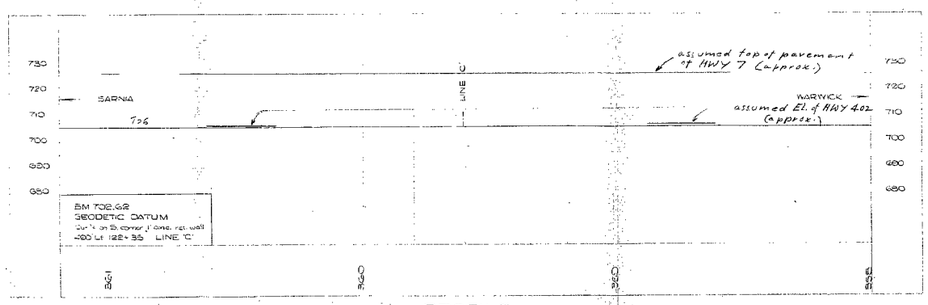
TRANSLAR 2H-6-71

CO. LAMBTON
TWP. WARWICK
CON. 2 (S.E.R.)
LOT 8

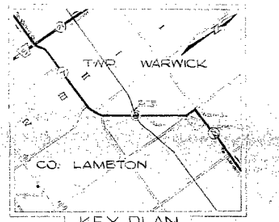
PROBABLE FOOTING LOCATIONS



PLAN
SCALE: 1 IN = 80 FT.



PROFILE
SCALE: HOR 1 IN. = 80 FT.
VER



KEY PLAN
SCALE 1 IN. = MI.

69-F-107

STR W.P. 42-66-07

DATE	REVISIONS & ADDITIONS	BY	CHKD
	~~Report has expired~~		
	Feb 5/70		

DEPARTMENT OF HIGHWAYS ONTARIO
DESIGN BRANCH
ENGINEERING SURVEYS OFFICE

BRIDGE SITE

PROPOSED CROSSING
AT
KING'S HWY. 7
AND
C.A.H. 402 LINE 'C'

LOT 8 CON 2 (SOUTH OF EGREMONT RD)
TOWNSHIP OF WARWICK COUNTY OF LAMBTON

SCALE	DISTRICT	REGION
AS SHOWN	CHATHAM	SOUTH WESTERN

W.O. 2262-42-68 Date of Surv. NOV 68 Plan NOV 68 SITE 14-352

SURVEY BY
Chief of Party: G. TELFORD
Supervisor: W. SMYTH

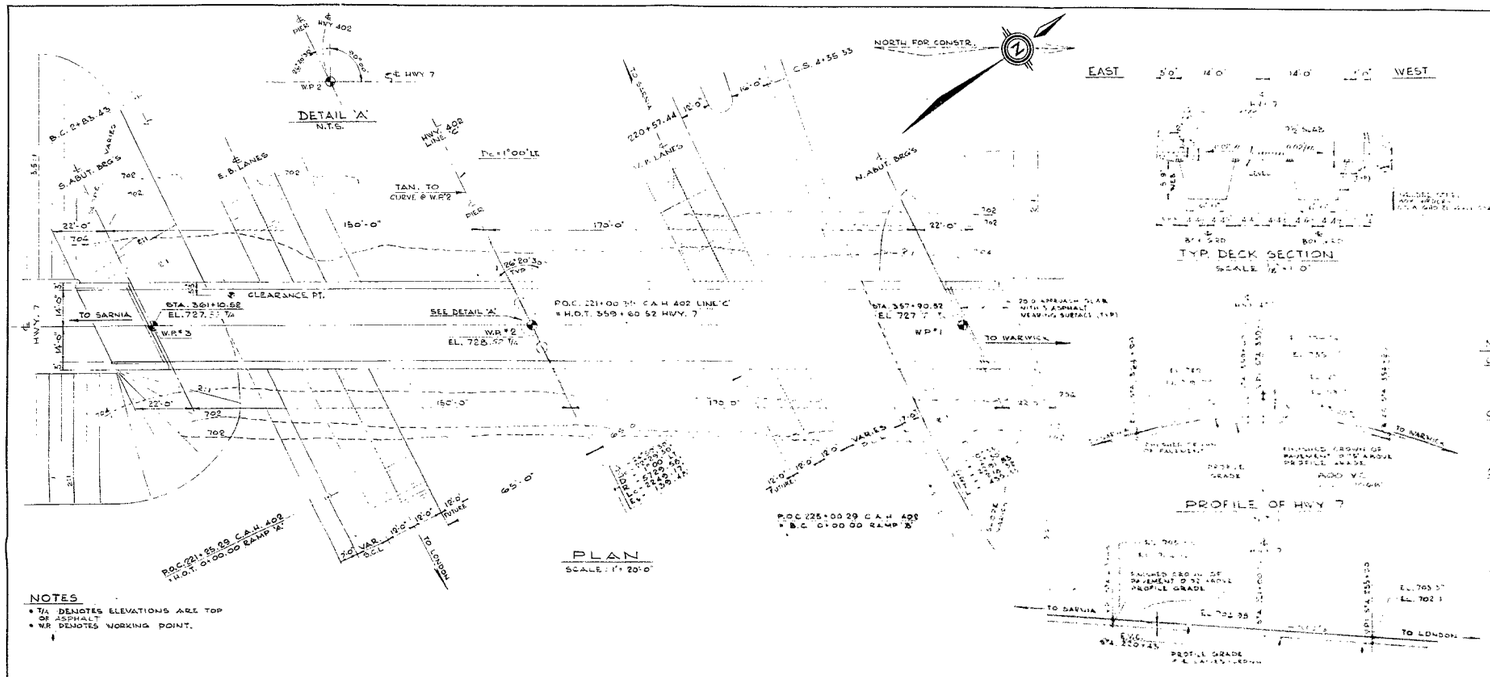
DRAWN BY
Draftsman: L. MULDERSY & B. ROY
Supervisor: P.J. RULE

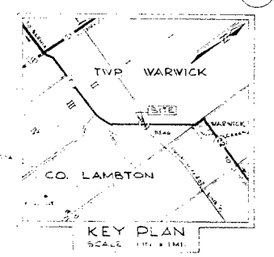
CHECKED BY
Draftsman: G. DARE
Supervisor: P.J. RULE

PLAN E-4858-1

40I13-36

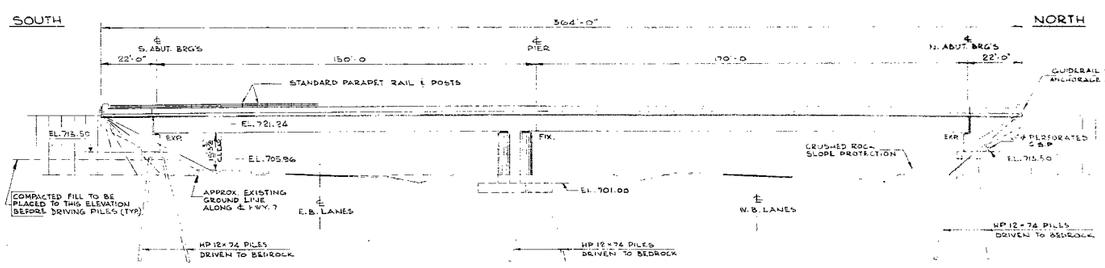
Feb. 5





NOTES

- ⅞ DENOTES ELEVATIONS ARE TOP OF ASPHALT
- W.P. DENOTES WORKING POINT.



NOTES:

CLASS OF CONCRETE

DECK CURBS AND PARAPET WALLS	4000 P.S.I.
PIER COLUMNS	4000 P.S.I.
REMAINDER	3000 P.S.I.

AND/OR AS NOTED ON DRAWINGS

CLEAR COVER ON REINF. STEEL

FOOTINGS, ABUTMENTS, PIER COLUMNS, DECK TOP, BOT. 3" 3" 1"
CURBS, PARAPET WALLS, APPROACH SLABS, 2" 2"
AND/OR AS NOTED ON DRAWINGS

CONSTRUCTION NOTES

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF ± ¼ INCH. NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED.

CONCRETE QUANTITIES

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

1. CONCRETE IN PIER, ABUTMENTS AND WINGWALLS	56 cu. yd. 4000 P.S.I. 135 cu. yd. 3000 P.S.I.
2. CONCRETE IN DECK	336 cu. yd.
3. CONCRETE IN PARAPET WALLS	46 cu. yd.
4. CONCRETE IN APPROACH SLABS	38 cu. yd.

STRUCTURAL STEEL QUANTITIES

TOTAL 187 TONS

B.M. 702.62
GEODETIC DATUM
CUT + ON S. CORNER 1' CONC. RET. WALL
490' LT 225+14 LINE 'C'

PRINT RECORD

No.	FOR	DATE

LIST OF DRAWINGS

- D-7060-1 GENERAL LAYOUT
- 2 BOREHOLE LOCATIONS AND SOIL STRATA
- 3 FOOTING LAYOUT
- 4 FOOTING AND COLUMN REINFORCING
- 5 ABUTMENTS
- 6 STRUCTURAL STEEL I
- 7 STRUCTURAL STEEL II
- 8 STRUCTURAL STEEL III
- 9 STRUCTURAL STEEL IV
- 10 DECK
- 11 PARAPET WALL DETAILS (2'-0" HIGH)
- 12 STEEL PARAPET RAILING (DOUBLE TUBE)
- 13 20 FT APPROACH SLAB (FOR CURB OR SIDEWALK)
- 14 STANDARD DETAILS I
- 15 STANDARD DETAILS II
- 16 AS CONSTRUCTED ELEV. & DIV.

REVISIONS

DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

HIGHWAY 7 INTERCHANGE UNDERPASS

KING'S HIGHWAY No. 402 LINE 'C' DIST. No. 1
CO. OF LAMBTON
TWP. OF WARWICK LOT 8 CON. 2 SOUTH OF EGERTON RD.

GENERAL LAYOUT

APPROVED (STRUCTURAL ENGINEER)

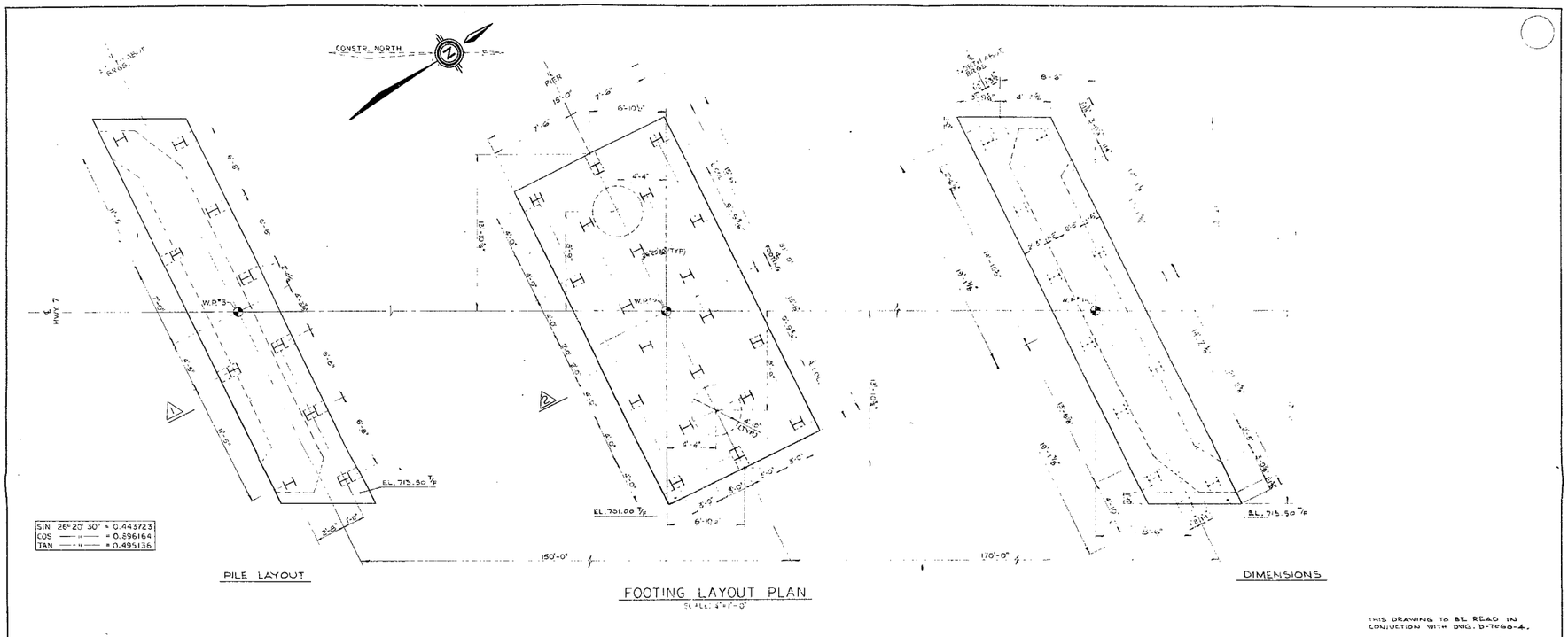
DESIGN	K.Z.S.	CHECK	K.P.
DRAWING	S.M.	CHECK	K.Z.S.
DATE	SEPT/72	LOADING	HS20-44

SITE No. 14-352 W.P. No. 42-66-07
CONTRACT No.
DRAWING No. D-7060-1

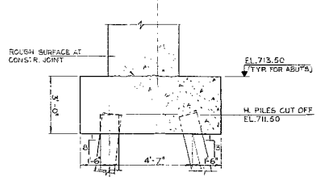
ONTARIO ASSOCIATION OF ARCHITECTS — C-VIL — K. Z. STOLARSKI — PROVINCE OF ONTARIO

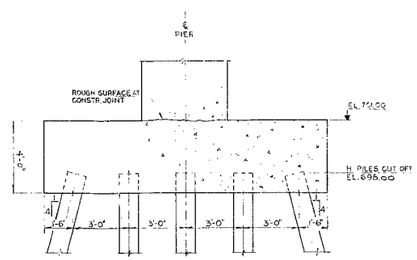
FOR REDUCED PLAN
USE SCALE BELOW
0 1 2 3
3 INCHES ON ORIGINAL PLAN

40 I 13-36 D



THIS DRAWING TO BE READ IN CONJUCTION WITH DRG. D-7060-4.





PILES

LOCATION	NO.	LENGTH		TYPE
N. ABUT.	6	44'-0"	BATTERED 1:3	HP 12 x 74
— " —	2	45'-0"	— " — 1:8	
— " —	2	42'-0"	VERTICAL	
PIER	10	30'-0"	BATTERED 1:4	
— " —	10	29'-0"	VERTICAL	
S. ABUT.	6	44'-0"	BATTERED 1:3	
— " —	2	45'-0"	— " — 1:8	
— " —	2	42'-0"	VERTICAL	

NOTES:

- DIMENSIONS AND PILE LAYOUT SIMILAR FOR ALL ABUT. FOOTINGS
- PILE LAYOUT GIVEN AT UNDERSIDE OF FOOTING
- PILES TO BE DRIVEN TO BEDROCK

FOR REDUCED PLAN

USE SCALE BELOW

0 1 2 3

3 INCHES ON ORIGINAL PLAN

PRINT RECORD		
No.	FOR	DATE

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

HIGHWAY 7 INTERCHANGE UNDERPASS

KING'S HIGHWAY No. 402 LINE "C" DIST. No. 1

CO. OF LAMBTON

TWP. OF WARWICK LOT 8 CON. 2 (CONT. OF SOMERVILLE RD.)

FOOTING LAYOUT

APPROVED — CHIEF ENGINEER

DESIGN	K. Z. S.	CHECK	K.Z.	SITE No.	14-352
DRAWING	ZK	CHECK	K.Z.S.	W.P. No.	42-66-07
DATE	SEPT/72	LOADING	HS20-44	CONTRACT No.	
				DRAWING No.	D-7060-3

K. Z. STOLARSKI