

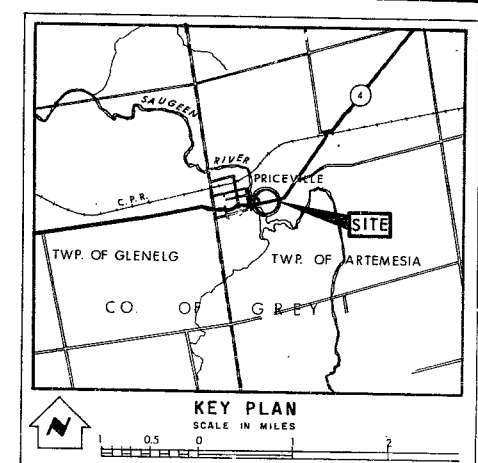
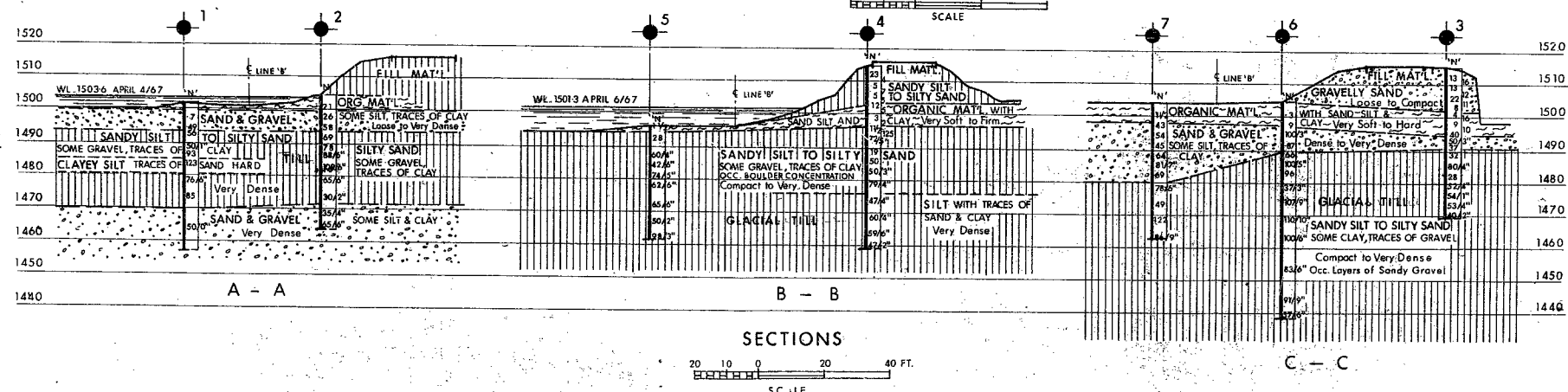
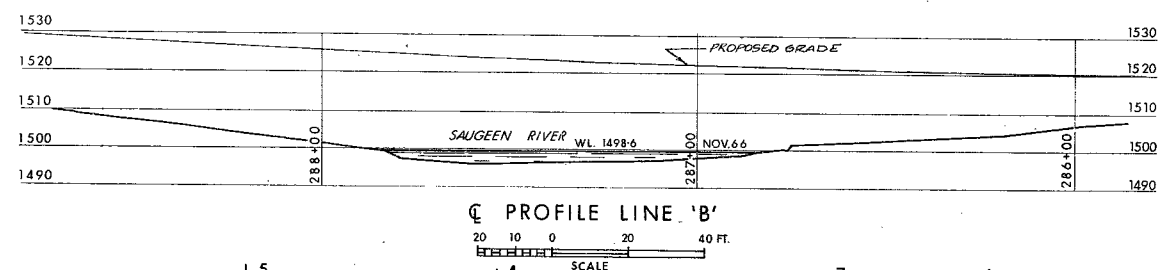
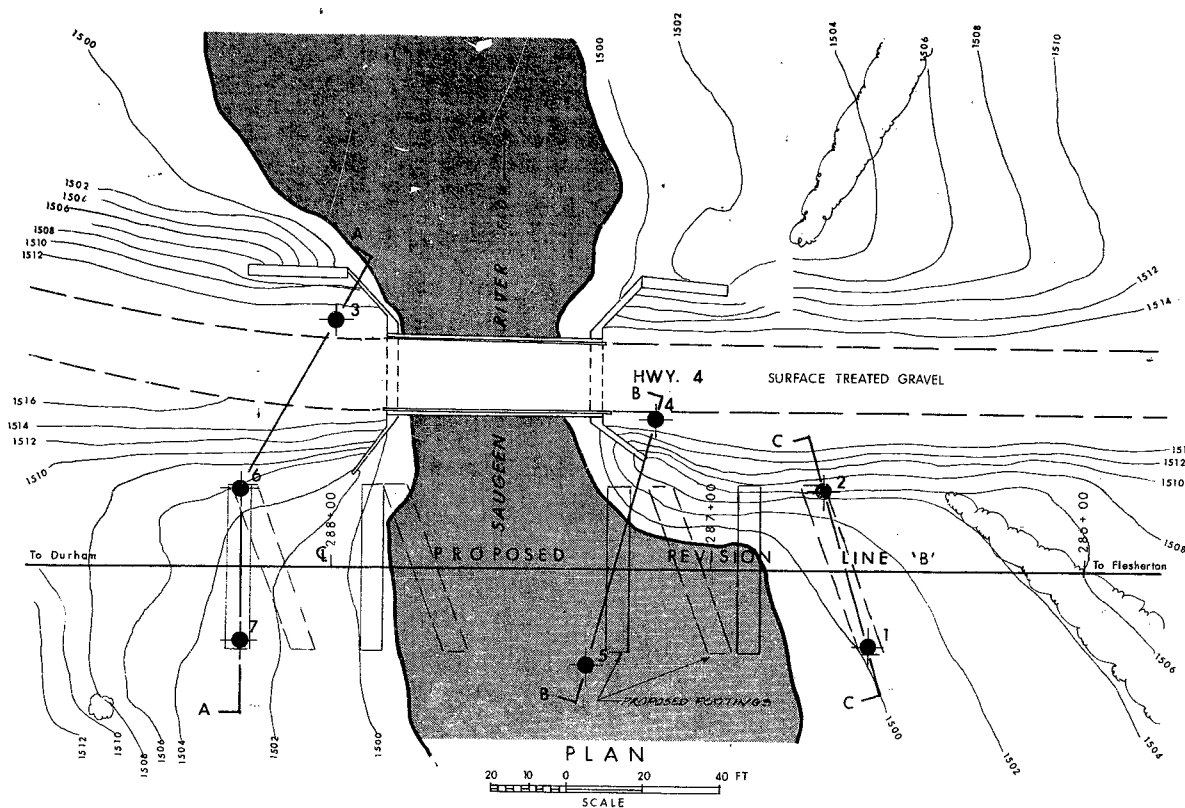
#67-F-22

W.P. # 342-63

HWY # 4

SAUGEN

RIVER

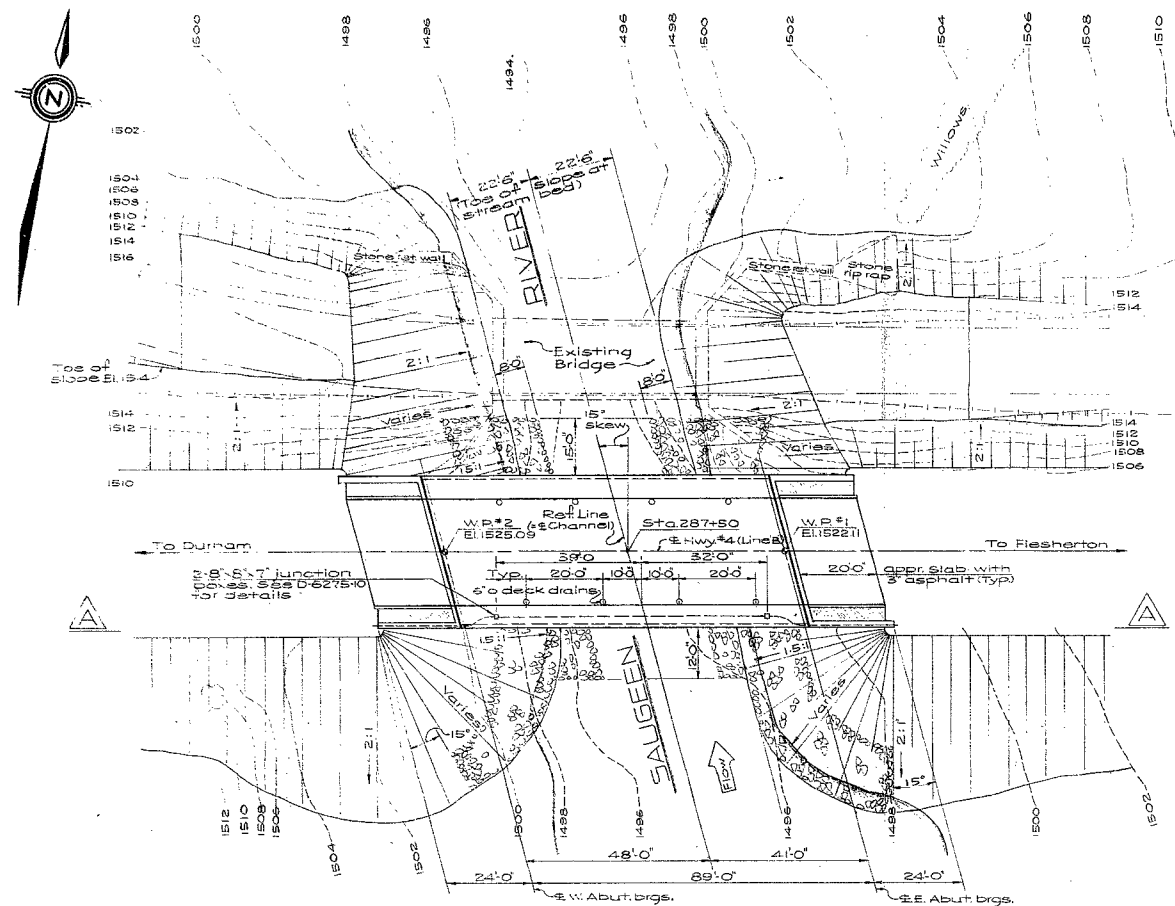


LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation. APRIL 1967		
NO.	ELEVATION	STATION	OFFSET
1	1501.9	286 + 58	20' LT.
2	1504.5	286 + 70	20' RT.
3	1515.0	288 + 00	65' RT.
4	1515.0	287 + 14	39' RT.
5	1497.2	287 + 32	25' LT.
6	1504.3	288 + 25	20' RT.
7	1503.9	288 + 25	20' 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.

DEPARTMENT OF HIGHWAYS - ONTARIO			
MATERIALS & TESTING DIVISION - FOUNDATION SECTION			
SAUGEEN RIVER			
KING'S HIGHWAY NO. 4 LINE 'B'		DIST. NO. 5	
CO. GREY			
TWP. ARTEMESIA		LOT 4 CON. I S.D.R.	
BORE HOLE LOCATIONS & SOIL STRATA			
SUB'D P.P.	CHECKED	W.P. NO. 342-63	M.B.T. DRAWING NO.
DRAWN M.D.	CHECKED	JOB NO. 67-F-22A	67-F-22A
DATE 12 MAY 1967	SITE NO.	BRIDGE DRAWING NO.	
APPROVED <i>[Signature]</i>		CONT. NO.	

REF. NO. E-4396-1

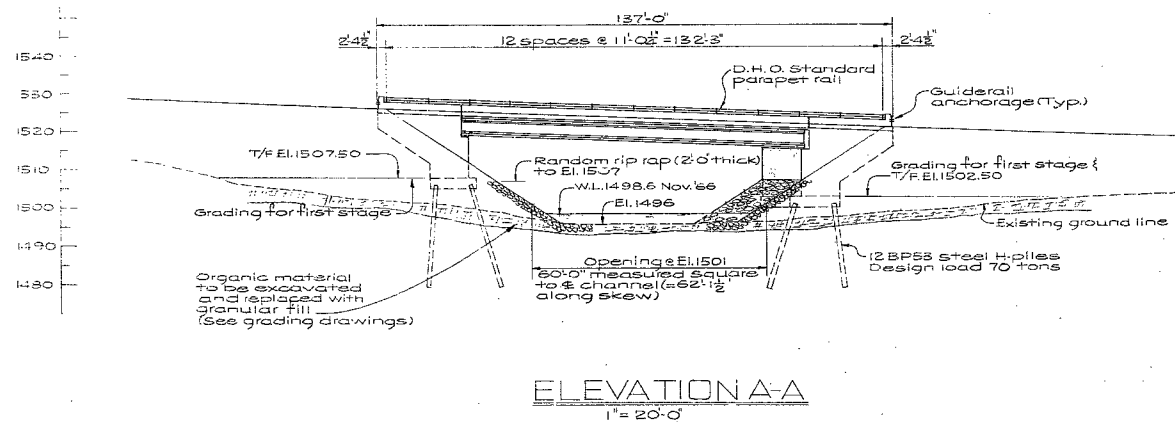


Functions of 15° Skew	
Sin	0.258819
Cos	0.965925
Tan	0.267949
Sec	1.035276

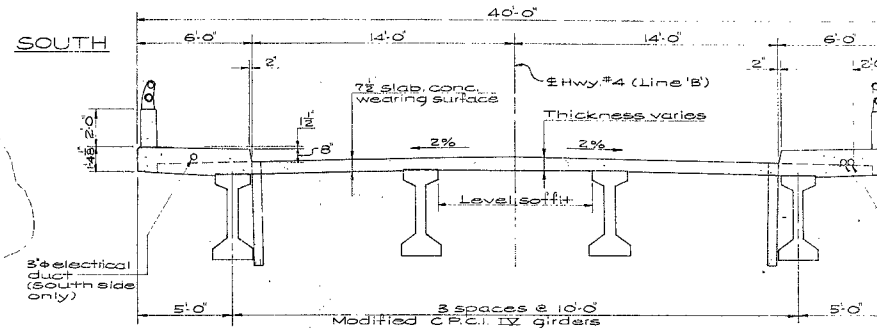
W.P. = Working Point
Elevations given at W.P.
to top of concrete

For details of embankment see grading drawings.

PLAN
1" = 20'-0"



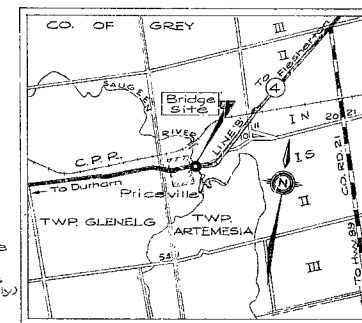
ELEVATION A-A
1" = 20'-0"



DECK CROSS SECTION
1" = 1'-0"

LIST OF DRAWINGS

- D-6275-1 General Layout
- " 2 Bore Hole Locations and Soil Strata
- " 3 Footing Layout
- " 4 Abutments
- " 5 Prestressed Girders & Bearings
- " 6 Deck
- " 7 Parapet Wall Details
- " 8 Standard Steel Parapet Rail
- " 9 Approach Slabs
- " 10 Bridge Electrical Details
- " 11 Standard Details



KEY PLAN
1" = 1 mile

NOTES

- Class of Concrete**
- Prestressed concrete girders — 5,000 P.S.I.
- Deck, curbs & parapet walls — 4,000 P.S.I.
- Elsewhere — 3,000 P.S.I.
- Clear Cover on Reinforcing Steel**
- Footings & abutments — 3"
- Deck — 1 1/2" top, 1" bottom
- Curbs & approach slabs — 2"
- Parapet walls — 1 1/2"
- Construction Notes**
- The Contractor is responsible for finishing the bearing seats dead level to the specified elevations with a tolerance of 1/8 inch.
- No concrete shall be placed above the abut. bearing seats until the concrete in the deck has been placed.

D.H.O. B.M. No. 65-248 Elev. 1586.068
Yellow brick United Church building on the north side of Hwy. No. 4, situated in the centre of the hamlet of Priceville, being 39' north of centreline of pavement. Tablet is set horizontally in the east side of stone foundation being 5.5' north of the south-east corner, 4.5' below brickwork.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION	
67-P-22	
SAUGEEN RIVER BRIDGE IN PRICEVILLE	
KING'S HIGHWAY No. 4	DIST. No. 5
CO. of Grey	TWP. Artemesia
LOT 4	CON. I.S.D.R.
GENERAL LAYOUT	
APPROVED	SITE No. 8-115 W.P. No. 342-63
DESIGN	BRIDGE ENGINEER
DRAWING	CONTRACT No.
DATE June 68	DRAWING No. D-6275-1

MEMORANDUM

TO: Mr. B. F. Davis,
Bridge Engineer,
Bridge Division,
Admin. Bldg.

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

Attention: Mr. S. McCombie

DATE: May 11, 1967

OUR FILE REF.

IN REPLY TO

MAY 23 1967

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For

Proposed New Structure at the Crossing
Of Saugeen River and Hwy. #4, Lot 4,
Con. I, Twp. of Artemesia, Co. of Grey,
District #5 (Owen Sound, Ont.)
W.J. 67-F-22 -- W.P. 342-63

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 feel free to contact our Office.

AGS/MdeF
Attach.

cc: Messrs. B. F. Davis (2)
H. A. Tregaskes
D. W. Farren
A. Gater
H. F. Gilbert
A. P. Watt
J. Roy
B. A. Singh

Foundations Files
Gen. Files /

A. G. Stermac
A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

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 - 5.3) Fill Material.
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 - 5.6) Sandy Silt to Silty Sand with some Gravel and traces of Clay.
 - 5.7) Silt.
 6. GROUNDWATER CONDITIONS.
 7. DISCUSSION AND RECOMMENDATIONS:
 - 7.1) Structure Foundations.
 - 7.2) Structure Approaches.
 8. SUMMARY.
 9. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT
For
Proposed New Structure at the Crossing
Of Saugeen River and Hwy. #4, Lot 4,
Con. I, Twp. of Artemesia, Co. of Grey,
District #5 (Owen Sound, Ont.)
W.J. 67-F-22 -- W.P. 342-63

1. INTRODUCTION:

A foundation investigation for the proposed new structure at the crossing of Saugeen River and Hwy. #4, Line 'B', was requested by Mr. A. P. Watt, Regional Bridge Location Engineer, in a memorandum dated March 8, 1967.

Following this request, a field investigation was subsequently carried out by the Foundation Section, to determine the subsoil conditions existing at the proposed structure site.

This report contains the information resulting from the field investigation, together with recommendations pertaining to the design of the proposed structure foundations.

2. DESCRIPTION OF THE SITE:

The proposed structure site is located at the crossing of Saugeen River and proposed revision, Hwy. #4, Line 'B' in the village of Priceville.

The surrounding area is undulating terrain.

Physiographically, the site is located in the region referred to as the Horseshoe Moraines.

3. FIELD INVESTIGATION PROCEDURE:

A total of seven boreholes was carried out during the field investigation.

Boring was achieved by means of conventional diamond drilling equipment adapted for soil sampling purposes. During the field work, disturbed samples were obtained at various intervals.

3. FIELD INVESTIGATION PROCEDURE: (cont'd.) ...

The samples were recovered by a split-spoon sampler, and the number of blows was recorded. The energy used in driving it, conformed to the requirements of the Standard Penetration Test.

The locations and elevations are shown on Dwg. 67-F-22A, which forms part of this report.

4. LABORATORY TESTS:

The samples were visually examined and classified at the site as well as in the laboratory. Tests were carried out in the laboratory for classification purposes. These tests consisted of: natural moisture content, Atterberg limits, and grain-size distribution determinations. The test results are shown on the Borehole Record sheets in the Appendix of this report.

5. SOIL TYPES AND SOIL CONDITIONS:

5.1) General:

The subsoil at the site consists of a 2-ft. to 7-ft. thick deposit of organic material at the surface, followed by granular type deposits.

Detailed descriptions of the various soil types observed are shown on the Borelog sheets contained in the Appendix.

The estimated stratigraphical profile is shown on Dwg. 67-F-22A. The various soil types are described in detail as follows:

5.2) Organic Material:

This deposit was encountered in all boreholes and extended from ground level for a maximum depth of 7 ft. The lower boundary was found to vary from El. 1494 to El. 1500.

cont'd. /3 ...

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

5.2) Organic Material: (cont'd.) ...

The material consists of decayed and undecayed organic matter, sand, silt, clay and, in some cases, occasional boulders.

The consistency ranges from very soft to very stiff.

5.3) Fill Material:

The material of the existing embankment was found to vary from one side of the river to the other. The height of the embankment is approx. 13 ft.

The embankment on the west side consists mainly of gravelly sand with traces of silt and clay.

The average moisture content was found to be in the order of 10%. The relative density may be described as loose to compact.

The east embankment contains somewhat finer material and could be classified as sandy silt to silty sand with some clay and traces of gravel.

The moisture content was found to vary from 7% to 20%.

The 'N' values ranged from 4 to 23 blows per foot, which indicates a very loose to compact relative density.

Grain-size distribution curves (east and west) are included in the Appendix of this report.

5.4) Sand and Gravel:

This stratum was found to underlie the organic material in Boreholes No's 1, 2, 3, 6, and 7. The lower boundary varied between El. 1484 and El. 1494. In Boreholes No's 1 and 2 the same type of material was observed again at approx. El. 1470, and extended to the depth of exploration.

The chief components were found to be sand and gravel with some silt and traces of clay.

The 'N' values ranged from 7 to over 100 blows per foot.

Typical grain-size curves are included in the Appendix - (Fig. 3).

cont'd. /4 ...

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

5.5) Glacial Till:

The sand and gravel zone was found to be underlain by a glacial till deposit in all boreholes, with the exception of Boreholes No's 1 and 7. The lower boundary varied from El. 1483 to El. 1461.

The material consists of sandy silt to silty sand with some gravel and traces of clay, with the following average proportions: gravel 11%, sand 41%, silt 41%, clay 9%.

The average moisture content was found to be 10%.

The relative density may be described as compact to very dense.

5.6) Sandy Silt to Silty Sand with some Gravel and traces of Clay:

This deposit was encountered in Boreholes No's 1, 3, 6 and 7, and extended to the depth of exploration at most of the boring locations.

The material in the deposit consists of sandy silt to silty sand with some gravel and traces of clay.

Standard Penetration tests, carried out in this zone, gave 'N' values of 28 to over 100 blows per foot.

The moisture content ranged from 7% to 22%. Typical grain-size curves are included in the Appendix of this report.

In Borehole No. 1, a hard clayey silt with traces of sand was observed between El. 1480.5 and El. 1484.5.

5.7) Silt:

A very dense deposit of silt with traces of sand and clay was found to underlie the glacial till in B.H. No. 4. The lower boundary was not determined since the borings were terminated in this layer.

cont'd. /5 ...

6. GROUNDWATER CONDITIONS:

Most of the borings were located either in the river bed or adjacent to it. The water levels in these were the same as the water level in the river.

7. DISCUSSION AND RECOMMENDATIONS:

It is proposed to construct a new bridge at this site to replace the existing structure. The new centre-line will be about 52 ft. upstream from the present centre-line, and the total length of the new bridge will be approximately 145 ft. The exact footing locations were not available at the time of the field investigation.

It is also proposed to construct a dam to retain about 8 feet of water either at the site of the new structure, or at the site of the existing structure, if possible, utilizing the existing embankments as part of the dam. The design and construction of the latter proposal will be the responsibility of the Ontario Department of Energy and Resources Management.

Subsoil over the site area consists of granular type deposits apart from the upper 2 to 7 feet which is in a very soft to very stiff state and contains, in places, large amounts of organics.

The existing embankment consists of very loose to compact granular soil which has been placed directly onto the aforementioned organic soil.

For the proposed structure and approaches, the following recommendations are made:

7.1) Structure Foundations:

Two types of foundations are being considered for the proposed structure:

1) The entire structure may be supported on large displacement piles, driven into the very dense sandy silt to silty sand stratum. For 12-3/4" O.D. x 1/4" wall steel tube piles, a safe design load of 70 tons per pile should be achieved at approx.

cont'd. /6 ...

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

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

El. 1480. However, the driving of piles in the field should be controlled by the use of the Hiley Formula as per current D.H.O. Standards DD 1218 and DD 1219.

2) The proposed piers may be founded on spread footings at or below El. 1493, where a safe bearing pressure of 2.5 t.s.f. may be assumed for design purposes. However, a minimum of 4 ft. cover, should be provided for frost protection purposes.

If excavations are carried below the water level, it will be necessary to employ a suitable dewatering scheme. Due to the presence of occasional boulder concentrations, some difficulties may be expected for sheet pile driving.

Material recovered in the boreholes indicated that a certain portion of the subsoil is susceptible to scour; therefore, preventative measures should be carried out.

7.2) Structure Approaches:

No stability problems are anticipated for the proposed embankment if constructed with 2:1 slopes. All soft, organic material should be removed within the construction area prior to placing fill.

8. SUMMARY:

A foundation investigation at the site of Hwy. #4, Line 'B' and Saugeen River is reported.

In general, the subsoil was found to consist of organic material at the surface, followed by granular type deposits.

Two types of structures are being considered:

cont'd. /7 ...

8. SUMMARY: (cont'd.) ...

1) The entire bridge may be supported on large displacement piles. At approx. El. 1480, a safe design load of 70 tons per pile should be achieved. Pile driving in the field should be controlled by the use of the Hiley Formula.

2) The proposed piers may be founded on spread footings at or below El. 1493. A minimum of 4 ft. cover should be provided for frost protection purposes. A safe bearing pressure of 2.5 t.s.f. may be used for design purposes. A sufficient dewatering scheme should be employed. Scour protection may be needed. No stability problems are anticipated for the proposed approach fills, if the recommendations are followed.

Details are given in the foregoing section: "Discussion and Recommendations".

9. MISCELLANEOUS:

The field work was carried out from March 31 to April 12, 1967. The equipment used for the subsoil exploration was owned and operated by Master Soil Investigation Ltd., and Canadian Longyear Ltd.

The field investigation was supervised directly by Mr. P. Payer, Project Foundation Engineer, who also prepared this report.

The report was reviewed by Mr. K. G. Selby, Supervising Foundation Engineer.

May 11, 1967

APPENDIX I

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-F-22

LOCATION Sta. 286 / 58. Offset 20' Lt.

ORIGINATED BY PP

W. P. 342-63

BORING DATE April 4, 1967

COMPILED BY AP

DATUM Geodetic

BOREHOLE TYPE Washboring, BX Casing

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 62-F-22

LOCATION Sta. 286 + 70 Offset 20' Rt.

ORIGINATED BY PP

W. P. 342-63

BORING DATE April 3, 1967

COMPILED BY AP

DATUM Geodetic

BOREHOLE TYPE Washboring, BX Casing

CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT						LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS				
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F.						WATER CONTENT % 10 20 30			Gr.	Sa.	Si.	Cl.	
1504.5	GROUND LEVEL																			
0.0	Organic material with sand, silt & clay.																			
1499.5	Very stiff.		1	SS	21	1500									45.0					
5.0	Sand & gravel with some silt & traces of clay.		2	SS	26															
1493.0	Compact to V.Dense.		3	SS	58												29	40	30	1
11.5	Glacial Till		4	SS	69															
	Silty sand with some gravel & traces of clay.		5	SS	78	1490														
			6	SS	88 7/8"															
			7	SS	102 9/16"															
	Very Dense.		8	SS	65 7/8"	1480											12	46	31	11
			9	SS	30 1/2"															
1471.0						1470														
33.5	Sand and gravel with some silt and clay.		10	SS	35 1/4"												36	32	21	11
1463.0	Very Dense																			
			11	SS	65 7/8"															
41.5	End of Borehole					1460														

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-F-22 LOCATION Sta. 288 / 00, Offset: 65' Rt.

ORIGINATED BY PP

W.P. 342-63 BORING DATE April 5, 1967

COMPILED BY AP

DATUM Geodetic BOREHOLE TYPE Washboring, NX Casing

CHECKED BY

FOUNDATION SECTION

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT						LIQUID LIMIT ——— WL PLASTIC LIMIT ——— WP WATER CONTENT ——— W			BULK DENSITY P.C.F.	REMARKS						
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.						WATER CONTENT % 10 20 30				Gr.	Sa.	Si.	Cl.			
													WP	W	WL								
1515.0	GROUND LEVEL																						
0.0	Fill Material		1	SS	13	1510													26	62	(12)		
	Gravelly sand with traces of silt & clay.		2	SS	16																		
	Loose to compact.		3	SS	13															37	47	(16)	
			4	SS	12															35	51	(14)	
			5	SS	22															10	72	(18)	
			6	SS	11															5	94	(11)	
			7	SS	8																		
1501.5		8	SS	4	1500																		
13.5	Organic Material with sand, silt & clay.	9	SS	16															22	59	(19)		
	Soft to Hard	10	SS	9																			
		11	SS	10																			
1494.5		20.5	Sand & gravel, traces of silt & clay.D.to V.D	12		SS	40													46	43	(11)	
		1490.5	24.5	Glacial till, sandy silt to silty sand with some gravel & traces of clay. Dense to V.Dense		13	SS	50/3"												25	35	34	6
			15	SS		32																	
		16	SS	80/4"														8	33	45	14		
1483.0		17	SS	28	1480													0	35	(65)			
32.0	Sandy silt with some clay.	18	SS	52/4"																			
	Compact to V.Dense.	19	SS	54/1"															0	23	64	13	
		20	SS	53/4"																			
1468.5		21	SS	40/2"	1470																		
46.5	End of Borehole					1460																	

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-F-22

LOCATION Sta. 287 + 14. Offset 39' Rt.

ORIGINATED BY PP

W.P. 342-63

BORING DATE April 6, 1967

COMPILED BY AP

DATUM Geodetic

BOREHOLE TYPE Washboring, NX Casing

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS						
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WATER CONTENT % 10 20 30				Gr	Sa	Si	Cl			
1515.0	GROUND LEVEL																				
0.0	Fill material, sandy silt to silty sand with some clay & traces of gravel. Very Loose to compact		1	SS	23	1510										5	50	41	4		
			2	SS	4											1	47	50	2		
			3	SS	5											2	42	51	5		
			4	SS	7											10	46	42	2		
			5	SS	5											5	49	(46)			
			6	SS	5											1	83	(16)			
1502.5			7	SS	12																
12.5	Organic material with sand, silt & clay.		8	SS	5	1500															
			9	SS	3																
			10	SS	2																
1496.5	Very soft to firm.		11	SS	12																
19.5	Glacial till.		12	SS	125																
			13	SS	72/5"																
	Silty sand to sandy silt with some gravel and traces of clay.		14	SS	19	1490															
			15	SS	50																
			16	SS	50/3"																
	Compact to very dense		17	SS	79/4"	1480															
1476.0																					
39.0	Silt with traces of sand & clay. Grey Very Dense.		18	SS	47/4"	1470											0	5	87	8	
			19	SS	60/4"																
			20	SS	59/6"													0	7	91	2
						1460															
1458.5			21	SS	47/2"																
56.5	End of Borehole					1450															

MATERIALS & TESTING DIVISION

FOUNDATION SECTION















MATERIALS & TESTING DIVISION

JOB	<u>67-F-22</u>	LOCATION	<u>Sta. 287 + 33 Offset 25' L.</u>	ORIGINATED BY	<u>PP</u>
W.P.	<u>342-63</u>	BORING DATE	<u>April 6, 7 & 11, 1967</u>	COMPILED BY	<u>PP</u>
DATUM	<u>Geodetic</u>	BOREHOLE TYPE	<u>Washboring, NX & BX Casing</u>	CHECKED BY	<u>SR</u>

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— WL			BULK DENSITY P.C.F.	REMARKS						
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	BLOWS / FOOT	PLASTIC LIMIT ——— WP	WATER CONTENT ——— W	WATER CONTENT % 10 20 30								
													SHEAR STRENGTH P.S.F.					
1501.3	WATER LEVEL																	
0.0						1500												
1497.2	GROUND LEVEL																	
4.1	Organic material & boulders.		1	SS	11													
1494.3																		
7.0	Glacial till, sandy silt to silty sand with some gravel and traces of clay, occasional boulder concnetrations.		2	SS	28													
						1490												
			3	SS	60/4"													
			4	SS	42/6"													
			5	SS	74/5"	1480												
			6	SS	62/6"													
			7	SS	65/6"													
	Compact to Very Dense					1470												
			8	SS	50/2"													
1461.4			9	SS	98/3"													
39.9	End of Borehole					1460												

FOUNDATION SECTION

CHECKED BY AK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS					
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WATER CONTENT % 10 20 30				Gr.	Sa.	Si.	Cl.		
1504.3	GROUND LEVEL																			
0.0	Organic material with sand, silt & clay.		1	SS	3	1500								67.8		1	34	61	4	
1497.3	Soft to Stiff.		2	SS	9															
7.0	Sand & Gravel with some silt & traces of clay.		3	SS	100/3"															
1489.8	Very Dense.		4	SS	87	1490											40	37	(23)	
14.5	Glacial Till, sandy silt with traces of gravel & clay.V.Dense.		5	SS	66															
1484.3			6	SS	100/5"															
14.0	Sandy silt to silty sand with occasional layers of sandy gravel.		7	SS	96	1480											0	19	72	9
			8	SS	37/3"															
			9	SS	107/9"															
			10	SS	110/10"	1470														
	Very Dense.		11	SS	100/6"															
			12	SS	83/6"	1460														
			13	SS	91/9"	1450														
1437.8			14	SS	57/6"	1440														
66.5	End of Borehole					1430														

FOUNDATION SECTION

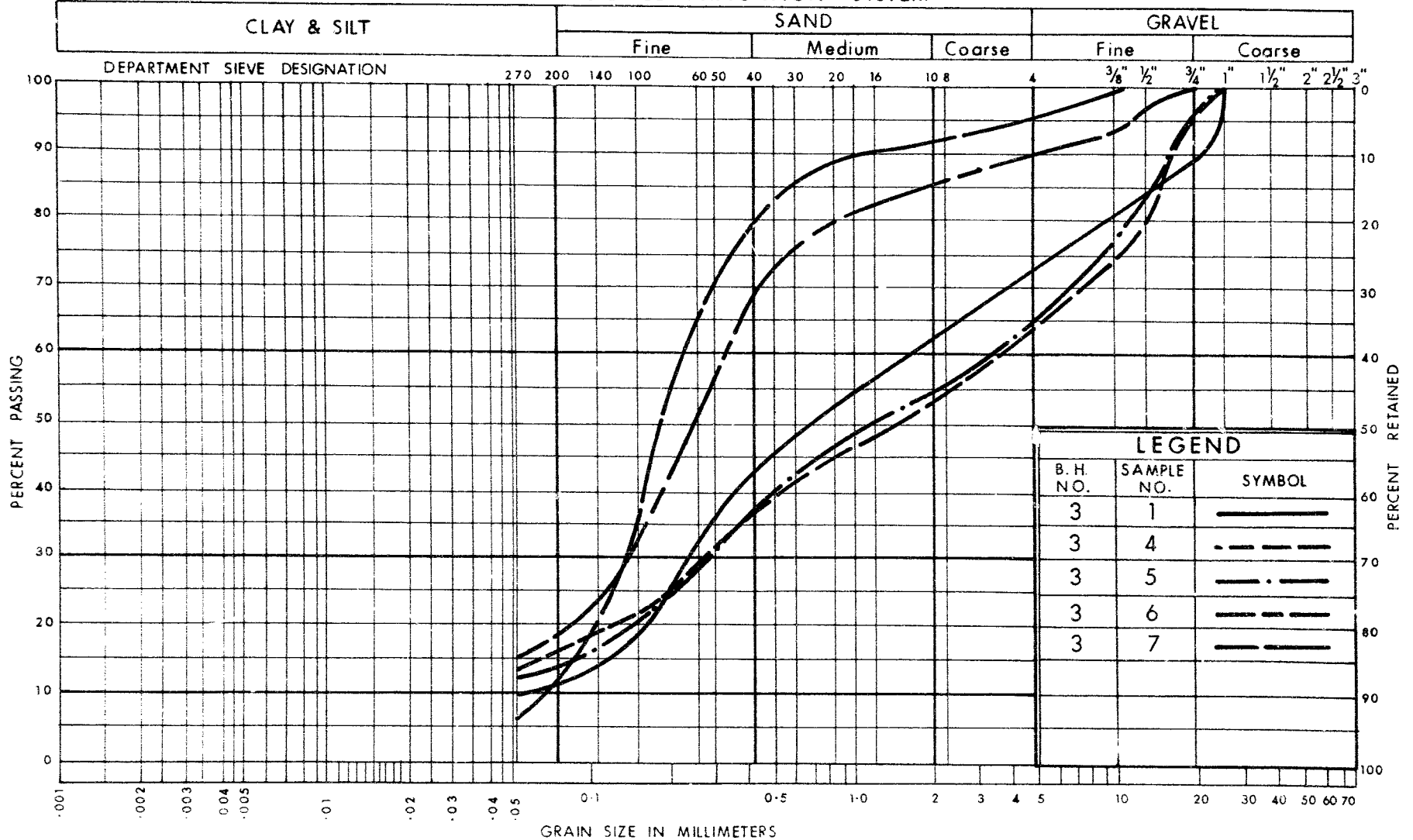
ORIGINATED BY PP

COMPILED BY AP

CHECKED BY

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F.					WATER CONTENT % 10 20 30				
												WP — W — WL 10 20 30				
1503.9	GROUND LEVEL															
0.0	Organic Material with sand, silt & clay. Very soft.		1	SS	11	1500								37.8		
1498.9			2	SS	43											
5.0	Sand & gravel with some silt and traces of clay. Dense to Very Dense		3	SS	54											
			4	SS	45	1490										
			5	SS	64											
1483.9			6	SS	81/7"											
20.0	Sandy silt to silty sand with some clay & traces of gravel. Very Dense.		7	SS	69	1480										
			8	SS	78/6"											
			9	SS	49	1470										
			10	SS	122											
1462.4			11	SS	86/9"											
41.5	End of Borehole					1460										

UNIFIED SOIL CLASSIFICATION SYSTEM



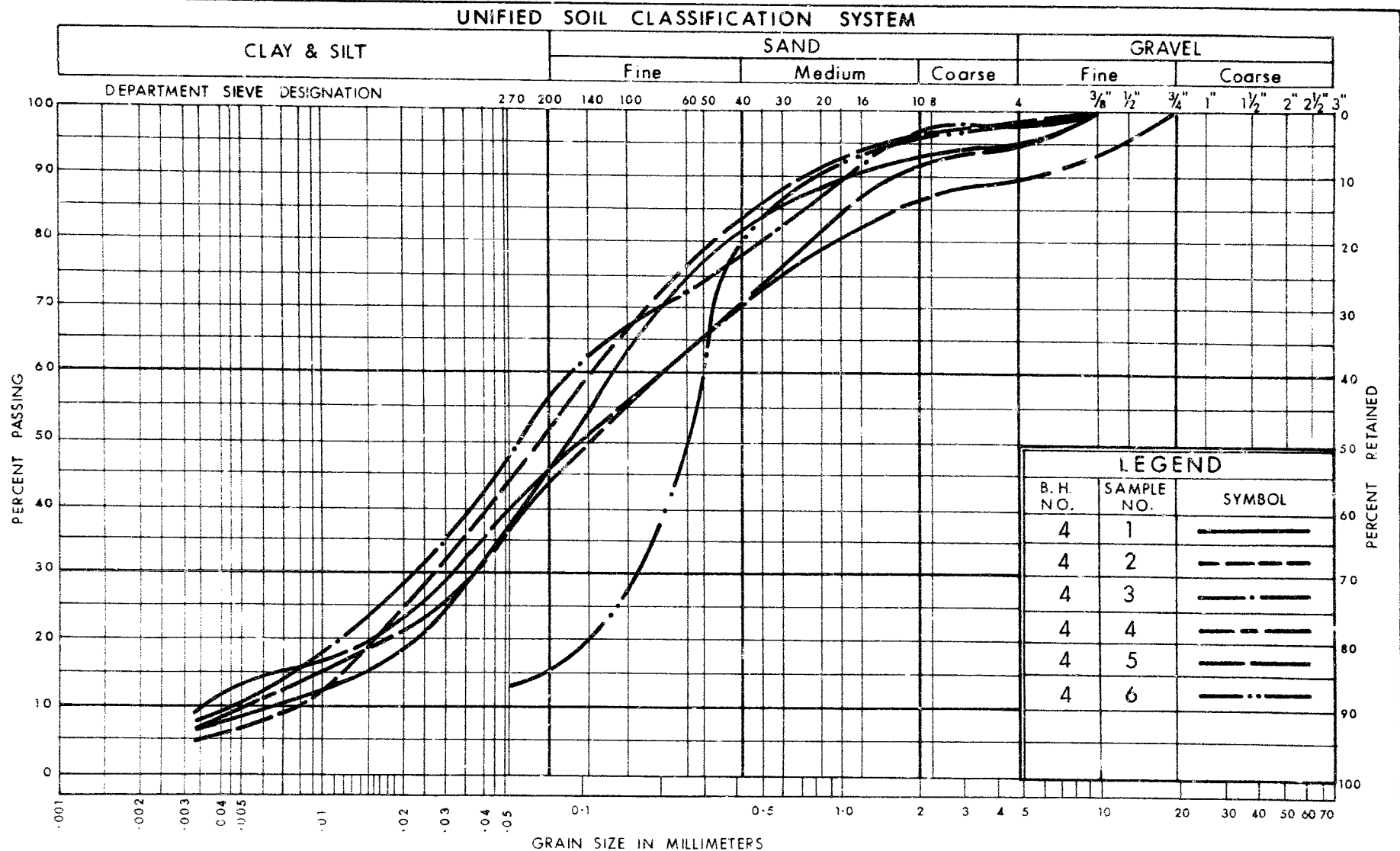
DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION WEST EMBANKMENT

W.P. No. 342-63

JOB No. 67-F-22

FIG.1



DEPARTMENT OF HIGHWAYS
**MATERIALS and
TESTING
DIVISION**

ONTARIO

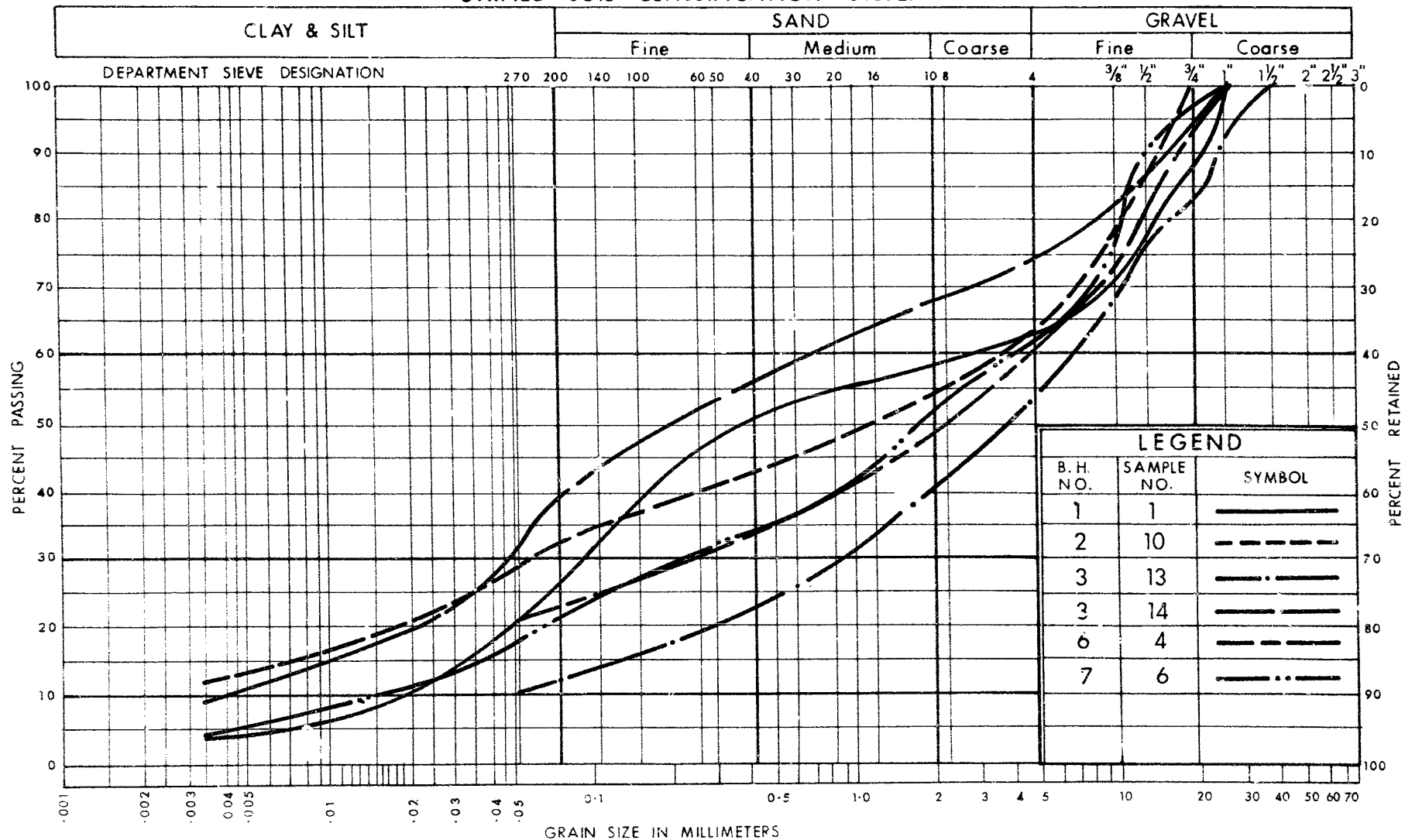
GRAIN SIZE DISTRIBUTION EAST EMBANKMENT

W.P. No. 342-63

JOB No. 67-F-22

FIG. 2

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION

W.P. No. 342-63

JOB No. 67-F-22

FIG. 3

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

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

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

DESCRIPTION OF SOIL

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

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

TYPE OF SAMPLE

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

SOIL TESTS

Q _u	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Q _{cu}	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q _d	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

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

IN TERMS OF
EFFECTIVE STRESS
 $\tau_f = c' + \sigma' \tan \phi'$

IN TERMS OF
TOTAL STRESS
 $\tau_f = c_u + \sigma \tan \phi$

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 (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

Hwy. 401 & Keele St.
Downsview, Ontario

Materials and Testing Division

March 15, 1967

Master Soil Investigation
104 Kenhar Drive
Weston, Ontario

Dear Sirs:

This is to confirm our request of March 10, 1967 for the supply of one diamond drill together with all the necessary equipment, as specified under the terms of our Contract Agreement, near Priceville, Ontario (Hwy. 4 & C.P.R. Crossing) on March 13, 1967.

This project bears Job Number 67-P-18. 67-P-22

Yours truly,

K. Selby
Supervising Foundation Engineer
for: A. D. Starnac
Principal Foundation Engineer

cc: J. Bonine
A. Starnac

Foundation Files
General files

MEMORANDUM

Mr. A. G. Stermac
Principal Foundation Engineer
Lab Building
D O W N S V I E W

FROM: A. P. Watt

DATE: March 8, 1967

FILE REF.

IN REPLY TO

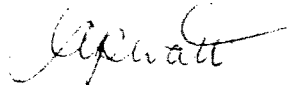
SUBJECT:

W.P. 342-63, Bridge Site 8-115,
Saugeen River Bridge,
In Priceville
Highway 4,
District 5, Owen Sound.

Would you kindly arrange to have a foundation investigation conducted at the above location. I have enclosed two copies of the site plan number E-4396-1 with the probable footings locations marked in red and blue. The footing locations marked in red would be for a structure with a possible dam having a head pond of eight feet high incorporated into the structure. The footing locations marked in blue would be for a structure with a possible dam located between the abutments of the old bridge.

Attached please find a copy of the preliminary structure site report for your use.

Accommodations are available at Durham, Ontario.



A. P. WATT
REGIONAL BRIDGE LOCATION ENGINEER

APW:gf
ATTN:

c.c. Mr. S. McCombie
Mr. A. Crowley
Mr. R. Forrest

Handwritten notes:
A. P. Watt - Date - March 15/67
Completed 1-11-67 PWA 10/67

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

~~Mr. A. Watt,~~

Reg. Bridge Location Engineer,
London Regional Office

Bridge Office,
Downsview

January 30, 1969

Saugeen River Bridge in Priceville
W.P. 342-63, Site 8-115
Highway 4, District No. 5

67-F-22

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-6275-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$81,000. This cost includes tender, materials, engineering and sundry construction.

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

CSG:rd

C.S. Grebaki,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac (2)
J. Anderson

No COMMENTS.

FEB. 5/69.

TD
AK

MEMORANDUM

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

From: C.S. Grebski,
Bridge Office

ATTENTION:

DATE: June 6, 1969

OUR FILE REF.

IN REPLY TO

SUBJECT: Saugeen River Bridge in Priceville
W.P. 342-63, Site 8-115
Highway 4, District No. 5

67-F-22

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

Kindly give us your comments at your earliest
convenience.

CSG:rd

Walter Li
for C.S. Grebski,
Bridge Design Engineer

Attach.

c.c. Foundation Section

No comments

W. G. Sullivan
June 9th 1969