

GEOCRES No. 52N-2DIST. 20 REGION W.P. No. 1303-71-02CONT. No. W. O. No. 72-11027STR. SITE No. 41N-14HWY. No. ACCESS RDLOCATION CROSSING OF ACCESS RD $\frac{1}{2}$ $\frac{1}{2}$ BAK CREEKNo of PAGES - =====OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. REMARKS:

FOUNDATION SECTION

ORIGINATED BY CK

COMPILED BY PP

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ——— w_L PLASTIC LIMIT ——— w_p WATER CONTENT ——— w		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE	WATER CONTENT % 10 20 30			
333.7 1094.9	Ground Level										
332.8 1091.6	Silty Clay	/	1	SS	-	1090	1 - 15 2 - 8 3 - 10 4 - 15 5 - 15 6 - 17 7 - 15 8 - 12 9 - 13 10 - 12 11 - 15 12 - 14 13 - 13 14 - 20 15 - 13 16 - 18 17 - 15 18 - 14 19 - 14 20 - 10 21 - 18 22 - 16 23 - 20				
3.0 0.9	Silty sand to sand, traces of clay. Loose to Compact	.	2	SS	10				0 22		0 61 (39)
		.	3	SS	7	1080					
		.	5	SS	5				0 21.8		0 97 (3)
326.5 1071.1	Probable Bedrock	.	6	SS	20				0 22		
23.8 7.3	End of Borehole	|||||				1070	refusal				

CHECKED BY AK

[illegible]

FOUNDATION SECTION

CHECKED BY JK

[illegible]

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

DESIGN SERVICES BRANCH

JOB 72-11027

LOCATION Sta. 2 + 10 0

ORIGINATED BY CK

W.P. 1303-71-00

BORING DATE March 9 & 10, 1972

COMPILED BY PP

DATUM Geodetic

BOREHOLE TYPE Washbore-BX Casing; AXT Rock Coring

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT ——— w_L PLASTIC LIMIT ——— w_p WATER CONTENT ——— w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					SHEAR STRENGTH P.S.F.				
							25	50	75	100	125	O UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE				
331.2 1086.5	Ground Level															
0.5 1084.5	330.6 Muck															
2.0 1082.5	Silty sand to sand traces of clay and gravel. Loose to Compact		1	SS	12	1080	1-2									
0.6			2	SS	6		2-6									
			3	SS	7		3-5									
			4	SS	7		4-8									
			5	SS	7		5-11									
325.2 1067.0	5.9 Sand and gravel		6	SS	78	1070	6-10									
19.5			7	RC	Rec.		7-7									
1066.0			8	RC	80%		8-8									
324.9 1060.9	Gneiss Bedrock						9-9									
25.6 7.8	End of Borehole					1060	10-9									
							11-13									
							12-13									
							13-14									
							14-10									
							15-12									
							16-15									
							17-17									
							18-20									
							19-									
							20-80									
							21-130									
							refusal									

REMARKS

331.7
1088.5

GR. SA. SI. CL.

1 53 45 1

15755 (5)

1066.5
325.0

FOUNDATION SECTION

CHECKED BY *OK*

SOIL PROFILE			SAMPLES			ELEV. SCALE ELEV.	DYNAMIC PENETRATION	RESISTANCE	LIQUID LIMIT ——— W _L	PLASTIC LIMIT ——— W _p	WATER CONTENT ——— W	BULK DENSITY Y P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		25 50 75 100 125	SHEAR STRENGTH P.S.F.	W _p ————— W _L	WATER CONTENT %	10 20 30		
							○ UNCONFINED + FIELD VANE	● QUICK TRIAXIAL × LAB. VANE					
Ground Level													
0.0 332.6 1091.1	Silty clay trace of sand. Firm	/	1	SS	8	1090							
1.2 331.3 1087.1	Silt with organics & clay	| | |	2	TW	PM								
3.0 330.8 1083.1		| | |	3	SS	3								
8.0 328.4	Silty sand to sand with traces of clay.	. . . . .	4	SS	6	1080							
		. . . . .	5	SS	7								
		. . . . .	7	SS	4	1070							
	Loose to Very Dense	. . . . .	8	SS	8								
30.1 323.0 1061.0	Sand and Gravel	. . . . .	9	SS	78/8"	1060							
33.5 10.2	End of Borehole Probable Bedrock	// // //				1050							

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 6

FOUNDATION SECTION

JOB 72-11027

LOCATION Sta. 3 + 97 40' Rt.

ORIGINATED BY CK

W.P. 1307-71-00

BORING DATE Mar. 8, 1972

COMPILED BY WV

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY *AR*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		25	50	75	100	125	WATER CONTENT % w_p — w — w_L			
334.8 1098.5	Ground Level														
0.0															
327.0 1072.7	Probable Bedrock														
25.8 7.8	End of Cone Test														

SHEAR STRENGTH P.S.F.		+ FIELD VANE		x LAB. VANE	
1-60	2-75	3-72	4-5	5-7	6-13
7-15	8-15	9-8	10-14	11-8	12-14
13-14	14-14	15-18	16-5	17-14	18-15
19-10	20-10	21-28	22-28	23-35	24-30
25-20	26-20	27-14			

frozen		refusal	
1-60	2-75	3-72	4-5
5-7	6-13	7-15	8-15
9-8	10-14	11-8	12-14
13-14	14-14	15-18	16-5
17-14	18-15	19-10	20-10
21-28	22-28	23-35	24-30
25-20	26-20	27-14	

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 7

FOUNDATION SECTION

JOB 72-11027

LOCATION Sta. 3 + 97 47' Lt.

ORIGINATED BY CK

W.P. 1303-71-00

BORING DATE March 9, 1972

COMPILED BY WU

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L		BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					PLASTIC LIMIT — w_p			
							25	50	75	100	125	WATER CONTENT — w			
SHEAR STRENGTH P.S.F.							+ FIELD VANE					WATER CONTENT %			
○ UNCONFINED							x LAB. VANE								
● QUICK TRIAXIAL															
333.0 1092.4	Ground Level													P.C.F.	GR. SA. SI. CL.
0.0						1090									

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 8

FOUNDATION SECTION

JOB 72-11027

LOCATION Sta. 3 + 51 5' Lt.

ORIGINATED BY CK

W.P. 1303-71-00

BORING DATE March 9, 1972

COMPILED BY WU

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY SR

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		25	50	75	100	125	WATER CONTENT % w_p — w — w_L			
0.0	Ground Level														
1090.9															
326.1	Probable Bedrock														
1070.0															
20.9	End of Cone Test														
6.4															

1-5
 2-10
 3-5
 4-
 5-20
 6-15
 7-10
 8-
 9-
 10-11
 11-7
 12-10
 13-8
 14-10
 15-8
 16-10
 17-7
 18-
 19-
 20-20
 21-150
 refusal

CHECKED BY

[illegible]

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 10

FOUNDATION SECTION

JOB 72-11027 LOCATION Sta. 1 + 70 5' Lt. Ø ORIGINATED BY CK
W.P. 1303-71-00 BORING DATE March 11, 1972 COMPILED BY WU
DATUM Geodetic BOREHOLE TYPE Cone Test CHECKED BY WR

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		25	50	75	100	125	WATER CONTENT % w_p — w — w_L			
0.0	Ground Level														
324.4 1061.3	Probable Bedrock														
24.9 7.6	End of Cone Test														

1080

1070

1060

1-80
2-12
3-3
4-5
5-5
6-5
7-11
8-
9-
10-16
11-10
12-10
13-12
14-
15-10
16-12
17-
18-
19-
20-14
21-12
22-15
23-15
24-25
25-150

frozen

refusal

CHECKED BY [Signature]

[illegible]

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 12

FOUNDATION SECTION

JOB 72-11027

LOCATION Sta. 1 + 35 35' Lt. Ø

ORIGINATED BY CK

W.P. 1303-71-00

BORING DATE March 12, 1972

COMPILED BY WJ

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY AL

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — W _L PLASTIC LIMIT — W _P WATER CONTENT — W		BULK DENSITY Y P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		25	50	75	100	125	W _P	W _L		
0.0	Ground Level														
323.2 1060.4	Probable Bedrock														
30.0 9.1	End of Cone Test														

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

WATER CONTENT %
 W_P — W — W_L

frozen
 refusal

1-50
 2-75
 3-50
 4-30
 5-50
 6-60
 7-80
 8-50
 9-20
 10-15
 11-10
 12-17
 13-12
 14-15
 15-15
 16-10
 17-10
 18-10
 19-17
 20-14
 21-10
 22-15
 23-15
 24-15
 25-14
 26-15
 27-
 28-
 29-20

100-

OVERSIZE DRAWING

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

To: Mr. P. D. Lester, (2) FROM: Foundations Office,
Regional Structural Planning Eng., Design Services Branch,
Northwestern Region, Central Bldg., Downsview.
Thunder Bay, Ontario.

ATTENTION: DATE: April 28, 1972.

OUR FILE REF. IN REPLY TO MAY 2 1972

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
The Proposed Structure at the
Crossing of Access Rd. and Bak Creek
District Kenora, Unsurveyed Territory
District #20 (Kenora, Ont.) - 02
W.O. 72-11027 -- W.P. 1303-71-00

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

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

AGS/ao
Attach.

cc: Messrs. D. W. Farren
B. R. Davis
A. Rutka
W. L. Lees
D. E. Thrasher
B. J. Giroux
R. Morgenroth
G. A. Wrong
B. A. Singh

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATIONS ENGINEER.

Foundations Files ✓
Documents

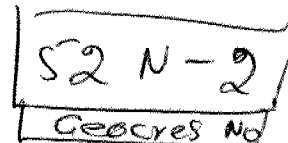


TABLE OF CONTENTS

1. INTRODUCTION.
 2. DESCRIPTION OF THE SITE.
 3. FIELD AND LABORATORY INVESTIGATION PROCEDURE.
 4. SOIL TYPES AND SOIL CONDITIONS.
 - 4.1) General.
 - 4.2) Silty Clay with Traces of Sand.
 - 4.3) Silt with Organics and Clay.
 - 4.4) Muck.
 - 4.5) Silty Sand to Sand, Traces of Clay.
 - 4.6) Bedrock.
 5. GROUNDWATER CONDITIONS.
 6. DISCUSSION AND RECOMMENDATIONS.
 - 6.1) General.
 - 6.2) Foundations.
 - a) End-Bearing Piles.
 - b) Multiplate Arch Culvert.
 - 6.3) Approach Embankments.
 7. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT
For
The Proposed Structure at the
Crossing of Access Rd. and Bak Creek
District Kenora, Unsurveyed Territory
District #20 (Kenora, Ont.)
W.O. 72-11027 -- W.P. 1303-71-00

1. INTRODUCTION:

A request for a foundation investigation for the proposed crossing at Bak Creek and Access Road, Line 'D', was received from Mr. P. D. Lester, Regional Structural Planning Engineer, in a memorandum dated January 25, 1972.

Subsequently, the Foundation Office carried out a field investigation 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 approaches.

2. DESCRIPTION OF THE SITE:

The proposed crossing is located some 60 miles north of the end of Hwy. #125. The surrounding area is gently rolling terrain and bush covered. The road allowance south of the creek have been cleared. The creek alignment in this area is straight.

The available geological data indicates that the surficial features are the results of late Wisconsin deglacial events. Glacio-Fluvial deposits, consisting of eskers and outwash plains are seen in these regions. The bedrock underlying the sandy overburden is from the Precambrian Age.

3. FIELD AND LABORATORY INVESTIGATION PROCEDURE:

A total of five sampled boreholes and twelve dynamic cone penetration tests was carried out during the course of the

field work. Boring was achieved by means of conventional diamond drilling equipments adapted for soil sampling purposes. During the field work, disturbed samples were obtained by means of standard split-spoon sampler; the energy 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 manually. Where possible, field vane tests were carried out at elevations generally 12 inches below sample depths.

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

The bedrock was proved at two borehole locations using AXT rock coring equipment.

All boreholes were surveyed on the field by the field crew. The locations and elevations of the borings are shown on Drawing No. 72-11027A 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
- Natural Moisture Content
- Grain-Size Distribution

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:

Generally uniform subsoil conditions were found to prevail over the site area. The subsoil consists of a surficial, shallow deposit of cohesive layer, followed a granular type (silty sand to sand) stratum overlying bedrock.

The boundaries between different deposits are shown on the Record of Borehole sheets attached to the Appendix. The estimated stratigraphical profile of Drawing 72-11027A is based upon this information.

From ground level downward the various strata are described in some detail with regard to soil types and soil properties, as follows:

4.2) Silty Clay with Traces of Sand:

This layer was encountered in B.H.'s #1 & #5 to a maximum depth of 4.0 ft. The undrained shear strength of the material is in the order of 600 p.s.f.

4.3) Silt with Organics and Clay:

This zone was found in B.H. #5 only, between elevation 1083 and elevation 1087. The relative density may be described as very loose. The material in the deposit consists of silt with organics and clay.

4.4) Muck:

In B.H.'s #2, #3 and #4, a shallow layer of muck was found to extend immediately from ground level to a maximum depth of 3 ft. The material in the deposit consists mainly of decayed and undecayed organic substances and it is black in colour.

4.5) Silty Sand to Sand, Traces of Clay:

This is the main deposit in this area and was encountered at each borehole location. The thickness varies between 14 and 25 ft. The lower boundary assumed to be at bedrock level. The material in the deposit consists of sand, silt and traces of clay. With increasing depth the silt content decreases. Typical grain-size distribution curves are included in the Appendix of this report (Figure 1). The natural moisture content varies from 21% to 25%.

Based on the standard penetration test the relative

density of the overall deposit may be described as loose to very dense.

4.6) Bedrock:

The bedrock was proved at two borehole locations (B.H. #2 and #4). The following description was given by Mr. K. W. Ingham, Geologist.

<u>Hole No. 2</u>	Bedrock at 1069.7
17.3 - 22.2	Banded feldspar biotite gneiss, minor thin pegmatite veing, occasional horizontal and inclined joints.

<u>Hole No. 4</u>	Bedrock at 1066.0
20.5 - 25.3	Banded feldspar biotite gneiss, lineation approximately 40°, frequent horizontal and occasional inclined joints.
25.3 - 25.6	Diabase, dark grey, very dense.

5. GROUNDWATER CONDITIONS:

Artesian water conditions were encountered upon the intersection of the bedrock surface.

B.H. #2 - Encountered at Elev. 1069.7	Stabilized at Elev. 1088.8
B.H. #4 - Encountered at Elev. 1066.5	Stabilized at Elev. 1088.5

No water level measurements were taken in B.H. #1 and #5.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to build a structure at the crossing of Bak Creek and the proposed Access Rd. The type or the length of the future bridge is not known at the time of the report writing. The elevation of the proposed profile grade varies between elevation 1112± and elevation 1117± at Station 4+00 and at Station 1+30, respectively. The bottom of the creek is at approximate elevation 1085±.

As described in the previous paragraphs, the subsoil at the proposed crossing consists of surficial deposits of muck and silty clay, followed by a loose to very dense silty sand to sand stratum underlain by bedrock.

6.2) Foundations:

a) End-Bearing Piles:

Due to the subsoil conditions at this location, the most suitable type of foundation appears to be steel 'H' piles driven to bedrock.

The elevation of the bedrock surface at any given location may be interpolated from borehole data. The maximum allowable load for a particular steel section may be assumed for design purposes.

The pile caps should be protected with a minimum 8 ft. of earth cover.

Scour protection should be provided.

b) Multiplate Arch Culvert:

As an alternative, a multiplate arch culvert may be considered as a means of crossing Bak Creek. The size of the culvert and the invert elevation are dependent on hydrological and structural requirements. The construction of the culvert, the bedding and the backfill should be in accordance with pertinent standards.

Scour protection should be provided.

6.3) Approach Embankments:

No stability problems are anticipated for the proposed approaches constructed with 2:1 forward and side slopes. The fill should consist of well compacted acceptable material. Care should be taken to ensure that no bouldery fill is placed within the approaches through which piles have to be driven, and it is recommended that this portion of the fill

contain no larger grain sizes than 3 inches.

In the case of rock fill $1\frac{1}{4}:1$ slopes appear to be adequate.

The topsoil and the surficial organic and cohesive deposits should be removed to their full depth within the entire construction area in accordance with the pertinent standards.

7. MISCELLANEOUS:

The field investigation was carried out during the period of March 6 to 11, 1972, under the supervision of Mr. C. Kooy, Field Technician.

Equipment used was owned and operated by Canadian Longyear Ltd., and Dominion Soil Investigation Ltd.

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

P. Payer
P. Payer, P. Eng.

K. G. Selby

PP/ao
April 26, 1972.








K. G. Selby, P. Eng.



APPENDIX I

CHECKED BY AK

FOUNDATION SECTION

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT ——— w_L PLASTIC LIMIT ——— w_p WATER CONTENT ——— w			BULK DENSITY γ P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					SHEAR STRENGTH P.S.F.					WATER CONTENT %
							25	50	75	100	125	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					
	Ground Level																
1094.9	Silty Clay		1	SS	-												
3.0 1090.9	Silty sand to sand, traces of clay.		2	SS	10	1090								○		0 61 (39)	
	Loose to Compact		3	SS	7												
			5	SS	5	1080								○		0 97 (3)	
			6	SS	20									○			
326.5 1071.1	Probable Bedrock																
23.8 7.3	End of Borehole					1070											

FOUNDATION SECTION


CHECKED BY AK

[illegible]

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ———— w_L PLASTIC LIMIT ———— w_p WATER CONTENT ———— w	BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.	WATER CONTENT % $w_p \quad w \quad w_L$		
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE	10 20 30		
026.1	Water (Ice) Level									
033.6	Ground Level									
	Muck									
2.5	Silty sand to sand with traces of clay and gravel.		1	SS	16	1080				1 60 33 6
			2	SS	4					
			3	SS	7					0 83 (17)
068.6	Loose to Compact					1070				
066.6	End of Borehole									
19.5	End of Cone Test Probable Bedrock					1060				

FOUNDATION SECTION

CHECKED BY 

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					PLASTIC LIMIT — w_p				
							25	50	75	100	175	WATER CONTENT — w				
SHEAR STRENGTH P.S.F.												w_p — w — w_L				
○ UNCONFINED + FIELD VANE												WATER CONTENT %				
● QUICK TRIAXIAL x LAB. VANE												10 20 30				
086.5	Ground Level														1088.5	
091.5	Muck														GR. SA. SI. CL.	
2.0	Silty sand to sand traces of clay and gravel.		1	SS	12								○		1 53 45 1	
			2	SS	6	1080							○			
			3	SS	7								○			
			4	SS	7								○			
	Loose to Compact		5	SS	7	1070							○			
067.0	Sand and gravel		6	SS	78										15755 (5)	
066.0	Feldspar Biotite Gneiss Bedrock		7	RC	Rec.										1066.5	
060.9			8	RC	7&8 Rec. 80%											
25.6	End of Borehole					1060										

FOUNDATION SECTION

CHECKED BY *AK*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT	RESISTANCE	W _L	W _P		
							25 50 75 100 125					
							SHEAR STRENGTH P.S.F.		WATER CONTENT %			
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE		W _P — W — W _L			
							1000 2000		10 20 30			
091.1	Ground Level											
0.0	Silty clay	Firm				1090	Frozen					
087.1	trace of sand.		1	SS	8							
4.0	Silt with organics		2	TW	PM							
083.1	& clay		3	SS	3							0 46 40 14
8.0	Silty sand to sand	Loose to Very Dense	4	SS	6	1080						
	with traces of clay.		5	SS	7							0 74 25 1
			7	SS	4	1070						
			8	SS	8							0 95 (5)
061.0	Sand and Gravel		9	SS	78/8"	1060						
057.6												
33.5	End of Borehole						refusal					
	Probable Bedrock					1050						

FOUNDATION SECTION

CHECKED BY AK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		25	50	75	100	125	WATER CONTENT % w_p — w — w_L				
1098.5	Ground Level						SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE									
0.0							frozen									
						1090										
						1080										
1072.7	Probable Bedrock															
25.8	End of Cone Test					1070	refusal									

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 7

FOUNDATION SECTION

JOB 72-11027

LOCATION Sta. 3 + 97 47' Lt.

ORIGINATED BY CK

W.P. 1303-71-00

BORING DATE March 9, 1972

COMPILED BY WU

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		25	50	75	100	125	WATER CONTENT % w_p — w — w_L			
022.4	Ground Level														
0.0						1090									
						1080									
070.9						1070									
21.5	End of Cone Test														

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

frozen
 refusal

GR. SA. SI. CL.

FOUNDATION SECTION

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT ——— w_L			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					PLASTIC LIMIT ——— w_p				
							25	50	75	100	125	WATER CONTENT ——— w				
SHEAR STRENGTH P.S.F.							+ FIELD VANE					WATER CONTENT %				
○ UNCONFINED							x LAB. VANE									
● QUICK TRIAXIAL																
090.9	Ground Level					1090										
C.O.																
						1080										
070.0	Probable Bedrock					1070										
20.9	End of Cone Test										refusal					

FOUNDATION SECTION

CHECKED BY AK.

[illegible]

CHECKED BY gk

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					WATER CONTENT %				
							25	50	75	100	125	w_p — w — w_L				
							SHEAR STRENGTH P.S.F.									
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE									
0.0	Ground Level						frozen									
0.0																
10.3	Probable Bedrock															
24.9	End of Cone Test						refusal									

CHECKED BY AK

SOIL PROFILE			SAMPLES			ELEV. SCALE ELEV. / FEET	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	Liquid Limit ———— w _L Plastic Limit ———— w _p	BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.	WATER CONTENT % w _p w w _L		
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE			
091.5 0.0	Ground Level						frozen			
060.1	Probable Bedrock									
31.4	End of Cone Test						refusal			

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. 12

FOUNDATION SECTION

JOB 72-11027

LOCATION Sta. 1 + 35 35' Lt. Ø

ORIGINATED BY CK

W.P. 1303-71-00

BORING DATE March 12, 1972

COMPILED BY WJ

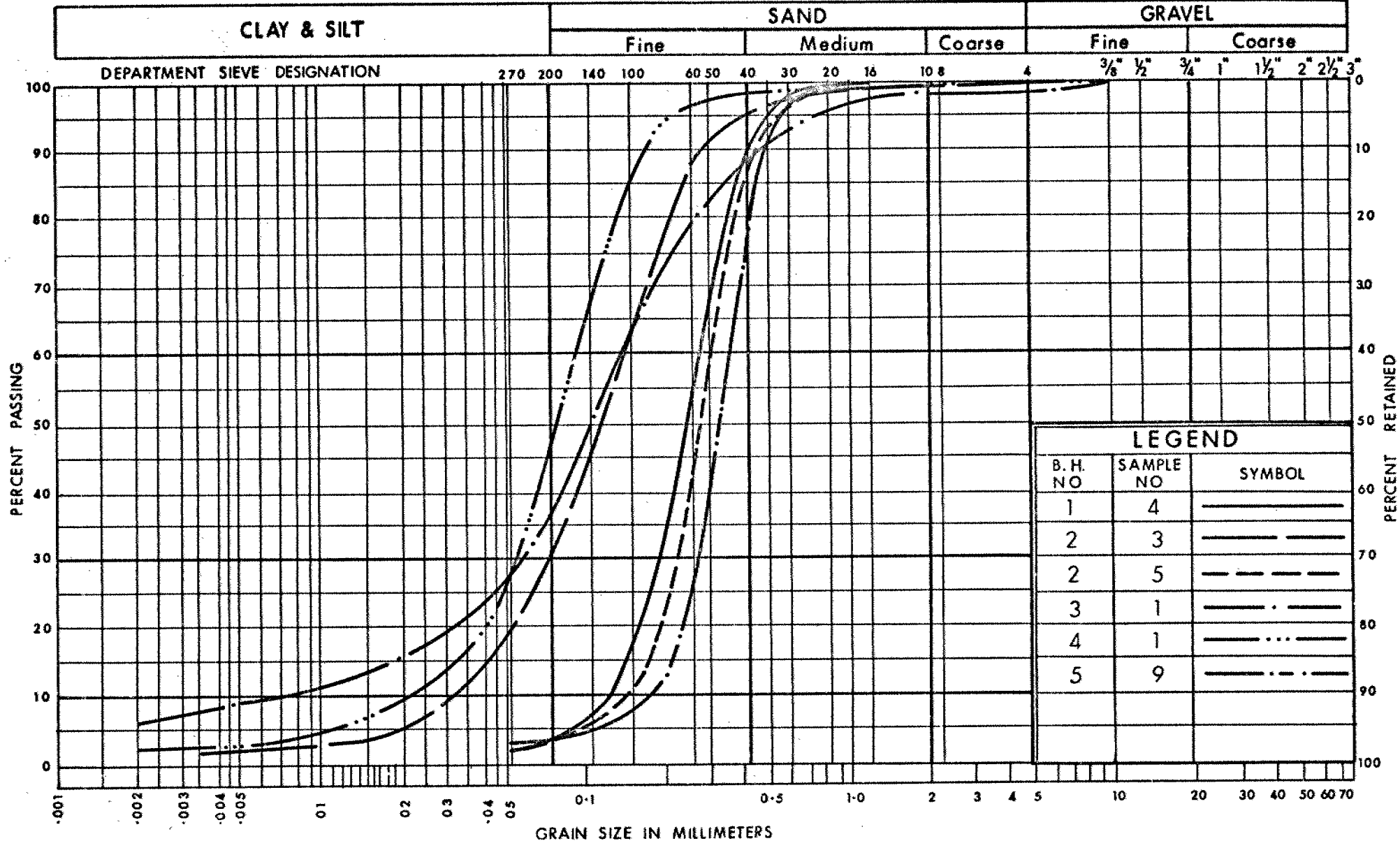
DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		25	50	75	100	125	WATER CONTENT % w_p — w — w_L					P.C.F.	GR. SA. SI. CL.
0.0	Ground Level					1090	frozen									
060.4	Probable Bedrock					1060	refusal									
30.0	End of Cone Test															

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS



DESIGN SERVICES
BRANCH

GRAIN SIZE DISTRIBUTION SILTY SAND TO SAND

W.P. No. 1303-71-00

JOB No. 72-11027

FIG. NO. 1

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 INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e \sigma$ OR $\ln \sigma$	NATURAL LOGARITHM OF σ
$\log_{10} \sigma$ OR $\log \sigma$	LOGARITHM OF σ 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

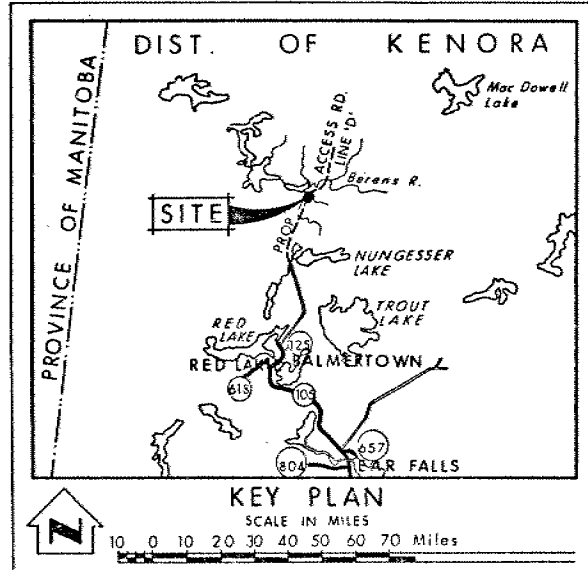
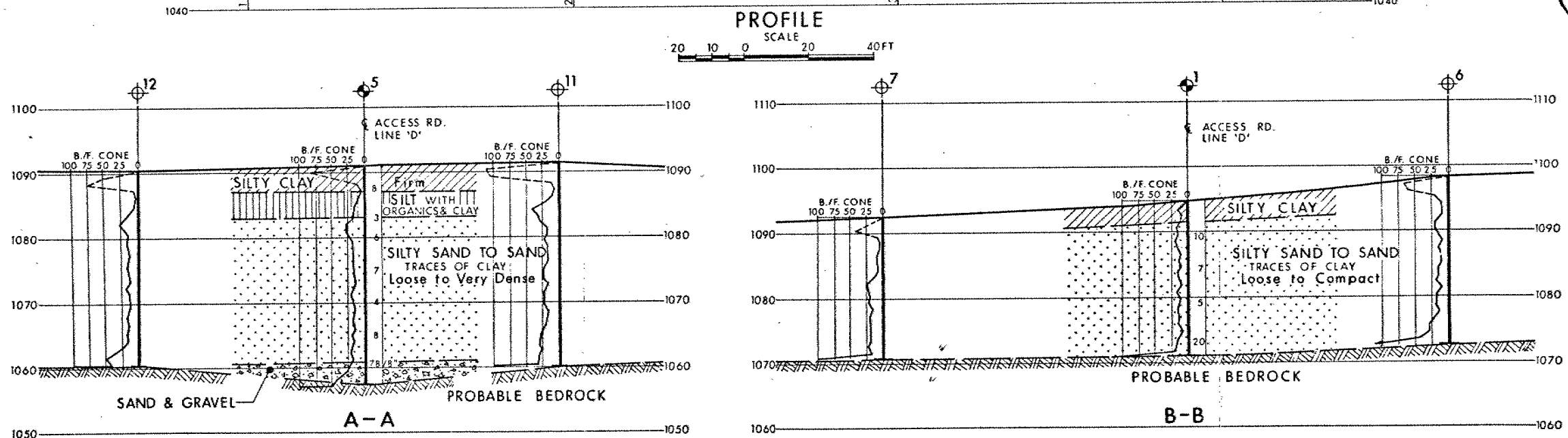
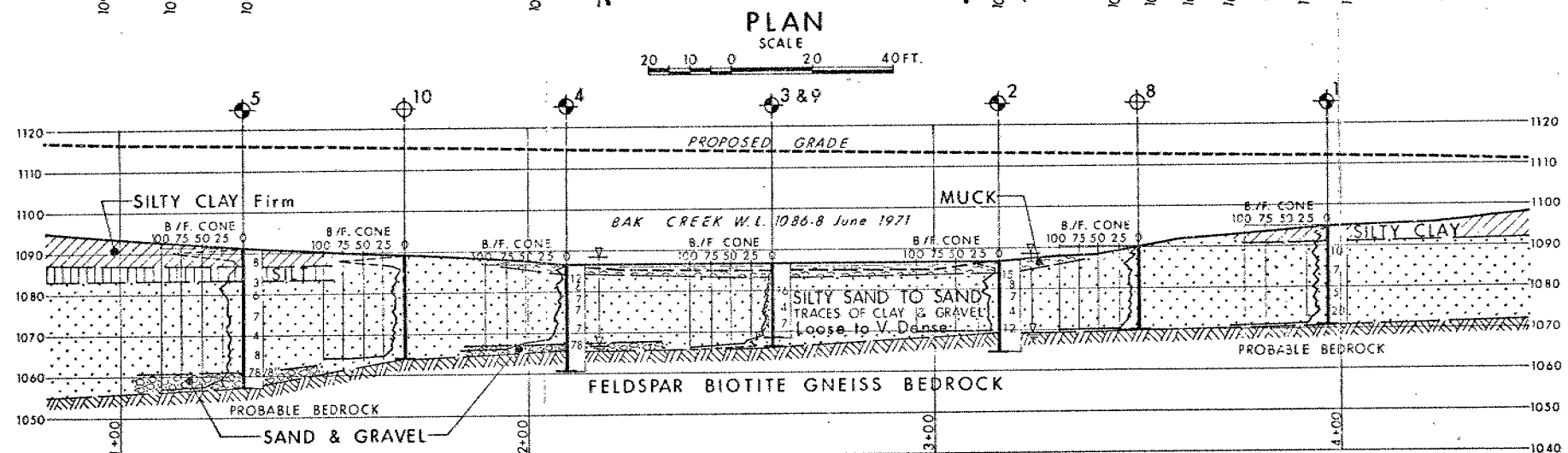
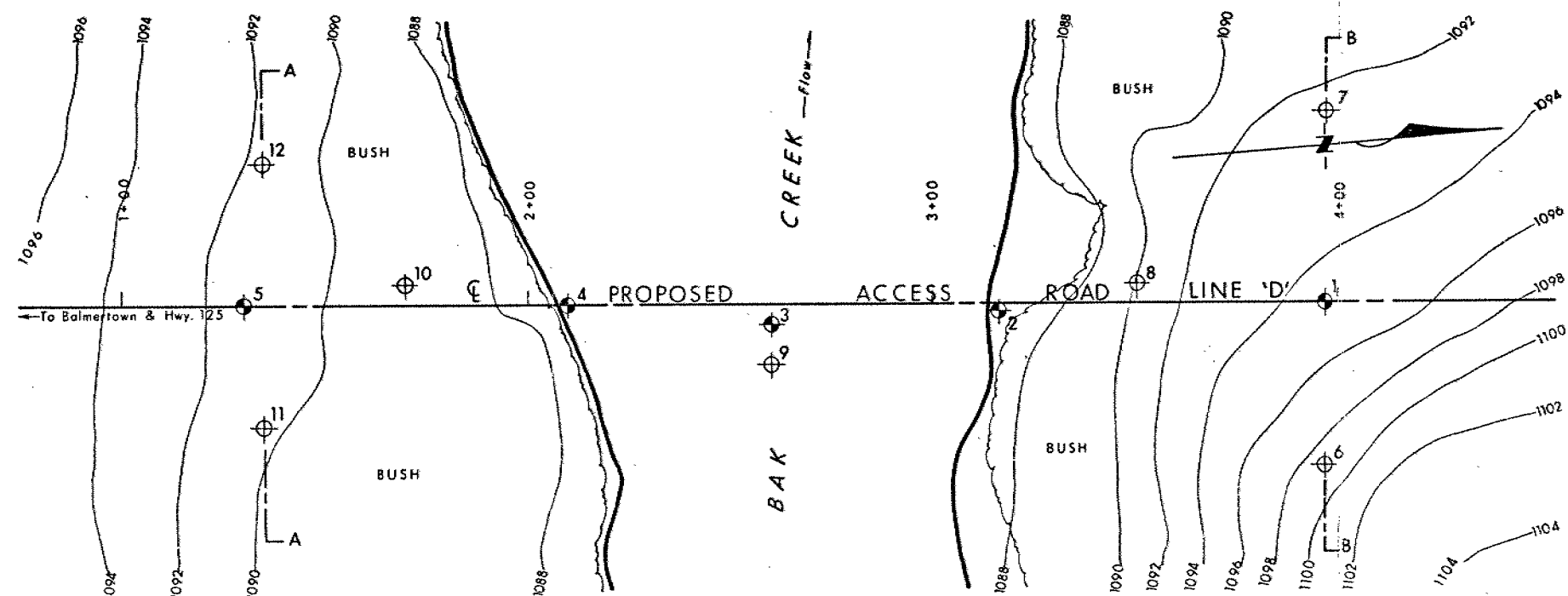
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

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



LEGEND

- Bore Hole
- Cone Penetration Test
- Bore Hole & Cone Test
- Water Levels established at time of field investigation, March 1972
- Head
- ARTESIAN CONDITION Encountered

NO.	ELEVATION	STATION	OFFSET
1	1094.9	3+97	0
2	1087.0	3+16	2' RT.
3	1086.1	2+60	5' RT.
4	1086.5	2+10	0
5	1091.1	1+30	0
6	1098.5	3+97	40' RT.
7	1092.4	3+97	47' LT.
8	1090.9	3+51	5' LT.
9	1086.1	2+60	15' RT.
10	1089.2	1+70	5' LT.
11	1091.5	1+35	30' RT.
12	1090.4	1+35	35' 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.

REVISIONS	DATE	BY	DESCRIPTION

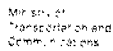
MINISTRY OF TRANSPORTATION & COMMUNICATIONS
DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE

BAK CREEK 02

HIGHWAY NO. Prop. ACCESS RD. LINE 'D' DIST. NO. 20
Dist. of KENORA UNSURVEYED TERRITORY
TWP. LOT CON.

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD. P. P.	CHECKED	WP NO. 1303-7-00	DRAWING NO.
DRAWN	CHECKED	108 NO. 72-11027	72-11027A
DATE April 24, 1972	SITE NO.	BRIDGE DRAWING NO.	
APPROVED	CONT. NO.		



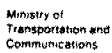
RECORD OF BOREHOLE No 1

W P 1303-71-02 LOCATION Sta. 10 + 125.2 Ø ORIGINATED BY C.K.
DIST 20 HWY BOREHOLE TYPE Washbore NX & BX Casing COMPILED BY P.P.
DATUM Geodetic DATE 1972 03 06 CHECKED BY *el*

[illegible]

+3, x5: Numbers refer to Sensitivity

OFFICE REPORT ON SOIL EXPLORATION



RECORD OF BOREHOLE No. 2

W P 1303-71-02 LOCATION Sta. 10 + 108.0 0.6 m RT. ORIGINATED BY C.K.
DIST 20 HWY BOREHOLE TYPE Washbore BX Casing AXT Rock Coring COMPILED BY P.P.
DATUM Geodetic DATE 72 03 09 & 10 CHECKED BY

[illegible]

OFFICE REPORT ON SOIL EXPLORATION

+3, x5 : Numbers refer to Sensitivity

20
15 ϕ 5 (%) STRAIN AT FAILURE
10



Ministry of
Transportation and
Communications
Ontario

HIGHWAY ENGINEERING DIVISION-ENGINEERING MATERIALS OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 3

W P 1303-71-02 LOCATION Sta. 10 + 081.8 1.4 m RT. ORIGINATED BY C.K.
DIST 20 HWY BOREHOLE TYPE Washbore NX Casing COMPILED BY P.P.
DATUM Geodetic DATE 72 03 06 CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	PLASTIC LIMIT W _p NATURAL MOISTURE CONTENT W LIQUID LIMIT W _L WATER CONTENT (%)	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES							
331.0	Ice Level											
0.0	Ice											
330.3	Muck											
0.8	Silty Sand to Sand		1	SS	16		330					1 60 33 6
	With Traces of Clay and Gravel		2	SS	4		328					
	Loose to Compact		3	SS	7		326					0 83 (17)
325.7												
325.0	End of Borehole											
5.9	Probable Bedrock											
	End of Borehole						324					

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to
Sensitivity

20
15 5 (%) STRAIN AT FAILURE
10



Ministry of
Transportation and
Communications
Ontario

HIGHWAY ENGINEERING DIVISION-ENGINEERING MATERIALS OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 4

W P 1303-71-02 LOCATION Sta. 10 + 066.6 Ø ORIGINATED BY C.K.
DIST 20 HWY BOREHOLE TYPE Washbore BX Casing AXT Rock Coring COMPILED BY P.P.
DATUM Geodetic DATE 72 03 09 & 10 CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES								
331.2	Ground Level												
330.6	Muck												
0.6	Silty Sand To Sand		1	SS	12		330						1 53 45 1
	Traces of Clay and Gravel		2	SS	6								
	Loose to Compact		3	SS	7		328						
			4	SS	7								
			5	SS	7		326						
325.2	Sand and Gravel		6	SS	78								
324.9	Feldspar Biotite		7	RC	REC		324						
5.3	Gneiss Bedrock		8		80%								
323.0													
7.8	End of Borehole												

Refusal

OFFICE REPORT ON SOIL EXPLORATION

+3, x5: Numbers refer to
Sensitivity

20
15 5 (%) STRAIN AT FAILURE
10



Ministry of
Transportation and
Communications

HIGHWAY ENGINEERING DIVISION-ENGINEERING MATERIALS OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 5

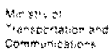
W P 1303-71-02 LOCATION Sta. 10 + 041.2 ORIGINATED BY C.K.
DIST 20 HWY BOREHOLE TYPE Washbore BX Casing COMPILED BY W.U.
DATUM Geodetic DATE 72 03 11 CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			SHEAR STRENGTH							WATER CONTENT (%)
332.6	Ground Level							20 40 60 80 100						
0.0	Silty Clay							○ UNCONFINED + FIELD VANE						
331.3	Trace of Sand. Firm		1	SS	8			● QUICK TRIAXIAL x LAB VANE						
1.2	Silt with Organics		2	TW	PM			1000 2000						
330.0	and Clay													
2.4	Silty Sand		3	SS	3									
	To Sand		4	SS	6									
	With Traces of		5	SS	7									
	Clay													
	Loose to Very		6	SS	4									
	Dense		7	SS	8									
323.0														
9.2	Sand and Gravel		8		78/	203 mm								
322.4														
10.2	Probable Bedrock													
	End of Borehole													

OFFICE REPORT ON SOIL EXPLORATION

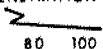
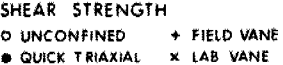
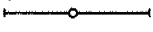

+³, x⁵: Numbers refer to
Sensitivity

20
15 + 5 (%) STRAIN AT FAILURE
10



RECORD OF BOREHOLE No 6

W P 1303-71-02 LOCATION Sta. 10 + 125.2 12.4 RT ORIGINATED BY C.K.
DIST 20 HWY BOREHOLE TYPE Cone Test COMPILED BY W.U.
DATUM Geodetic DATE 72 03 08 CHECKED BY

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE			'N' VALUES	20						40	60	80	100	WATER CONTENT (%)
334.8	Ground Level												GR SA SI CL
0.0							Frozen						
						334							
						332							
						330							
						328							
327.0											Refusal		
7.8	Probable Bedrock End of Cone Test												
						326							

+3, x5 : Numbers refer to Sensitivity

20
15 ϕ 5 (%) STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION



RECORD OF BOREHOLE No 7

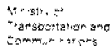
W P 1303-71-02 LOCATION Sta. 10 + 125.2 14.2 m Lt. ORIGINATED BY C.K.
DIST 20 HWY BOREHOLE TYPE Cone Test COMPILED BY W.U.
DATUM Geodetic DATE 72 03 09 CHECKED BY

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	PLASTIC LIMIT W _p NATURAL MOISTURE CONTENT W LIQUID LIMIT W _L WATER CONTENT (%)	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE							N' VALUES
333.0 0.0	Ground Level									
326.4 6.6	Probable Bedrock End of Cone Test									

+3, x5: Numbers refer to
Sensitivity

20
15-5 (%) STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION



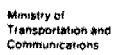
RECORD OF BOREHOLE No 8

W P 1303-71-02 LOCATION Sta. 10 + 111.4 1.4 m Lt. ORIGINATED BY C.K.
DIST 20 HWY BOREHOLE TYPE Cone Test COMPILED BY W.U.
DATUM Geodetic DATE 72 03 09 CHECKED BY

[illegible]

+3, x5: Numbers refer to Sensitivity

OFFICE REPORT ON SOIL EXPLORATION



RECORD OF BOREHOLE No. 9

W P 1303-71-02 LOCATION Sta. 10 + 081.8 3.6 m RT ORIGINATED BY C.K.
DIST HWY BOREHOLE TYPE Cone Test COMPILED BY W.U.
DATUM Geodetic DATE 72 03 08 CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT Y	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100		SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE				WATER CONTENT (%)
331.0 0.0	Ground Level												
325.0 5.9	Probable Bedrock End of Cone Test							Refusal					

⁺₃, x⁵ : Numbers refer to Sensitivity

20
15-5 (%) STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION



RECORD OF BOREHOLE No 10

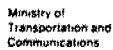
W P 1303-71-02 LOCATION Sta. 10 + 054.4 1.6 m Lt. ORIGINATED BY C.K.
DIST 20 HWY BOREHOLE TYPE Cone Test COMPILED BY W.U.
DATUM Geodetic DATE 72 03 11 CHECKED BY

[illegible]

+3, x5: Numbers refer to Sensitivity

20
15 ϕ 5 (%) STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION



RECORD OF BOREHOLE No 11

W P 1303-71-02 LOCATION Sta. 10 + 043.6 9.2 m RT ORIGINATED BY C.R.
DIST 20 HWY BOREHOLE TYPE Cone Test COMPILED BY W.U.
DATUM Geodetic DATE 72 03 12 CHECKED BY

[illegible]

+3, x5: Numbers refer to Sensitivity

20
15 ϕ 5 (%) STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION



RECORD OF BOREHOLE No 12

W P 1303-71-02 LOCATION Sta. 10 + 043.6 10.2 m Lt. ORIGINATED BY C.K.
DIST 20 HWY BOREHOLE TYPE Cone Test COMPILED BY W.U.
DATUM Geodetic DATE 72 03 12 CHECKED BY

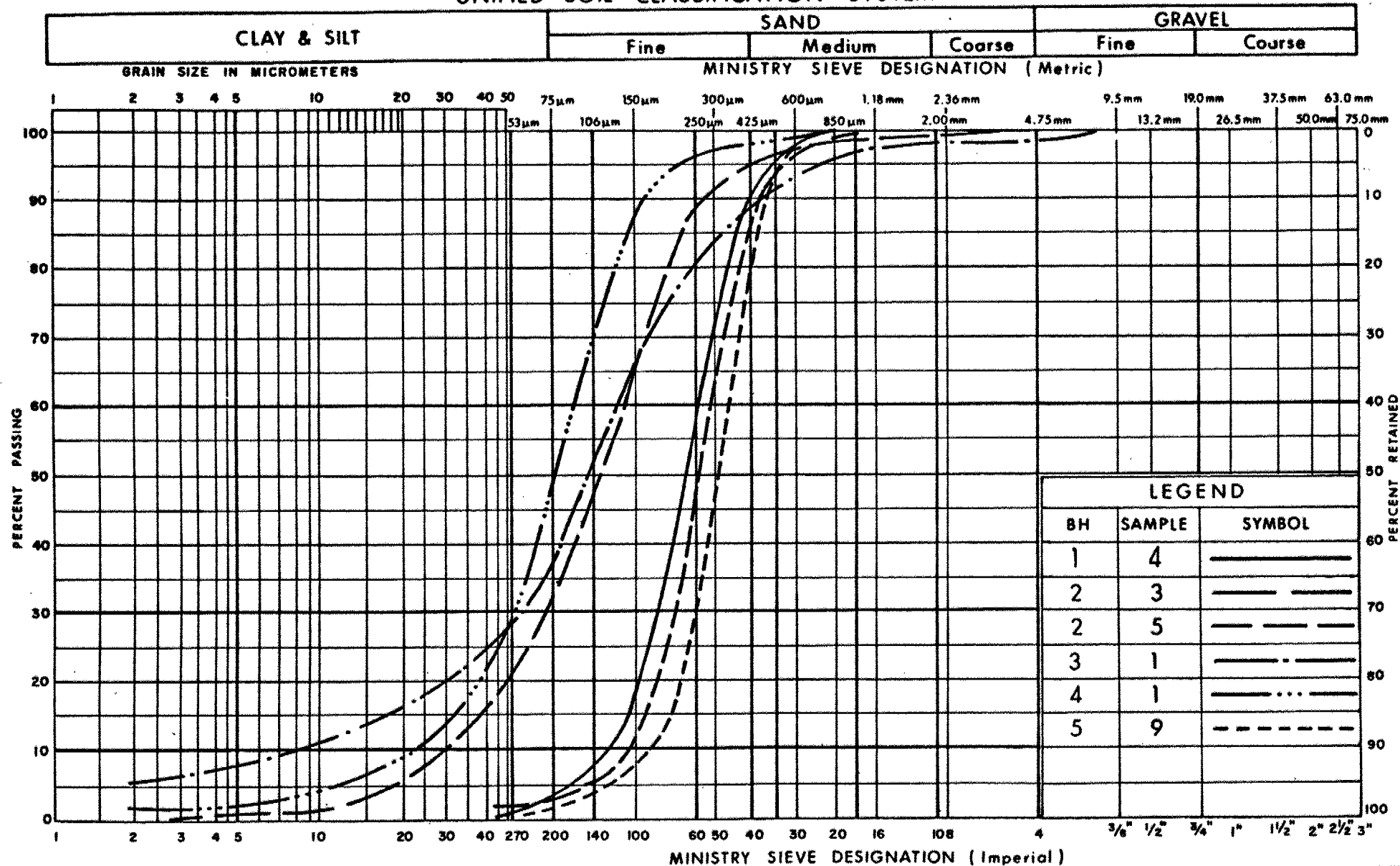
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES								
332.4	Ground Level												
0.0													
332													
330													
328													
326													
324													
323.2	Probable Bedrock End of Cone Test												
9.1													
322													

+3, x5 : Numbers refer to
Sensitivity

20
15
10
5 (%) STRAIN AT FAILURE

OFFICE REPORT ON SOIL EXPLORATION

UNIFIED SOIL CLASSIFICATION SYSTEM



Ministry of
Transportation and
Communications

GRAIN SIZE DISTRIBUTION
SILTY SAND TO SAND

FIG No 1

W P 1303-71-02

METRIC

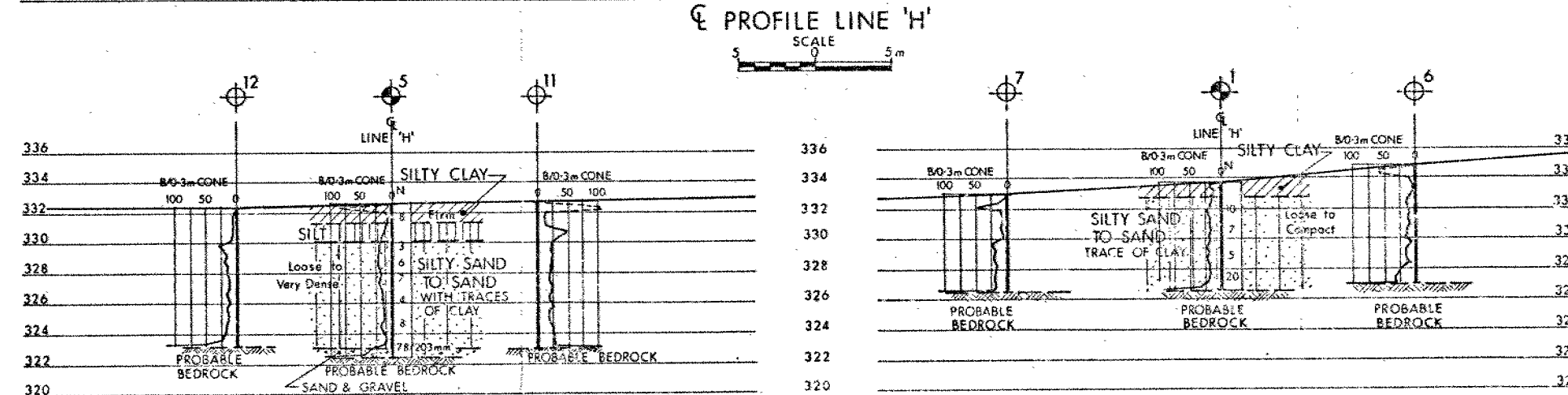
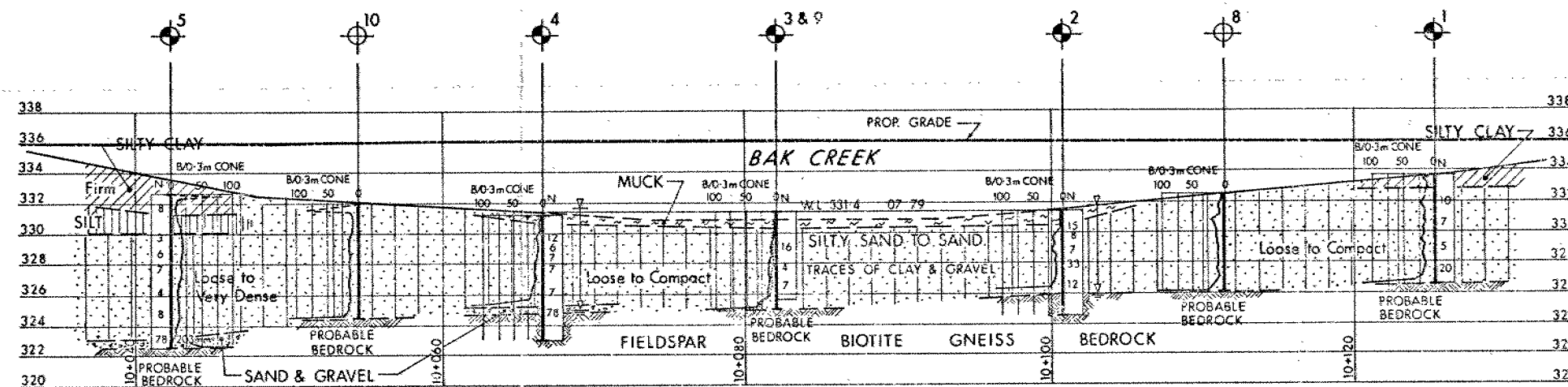
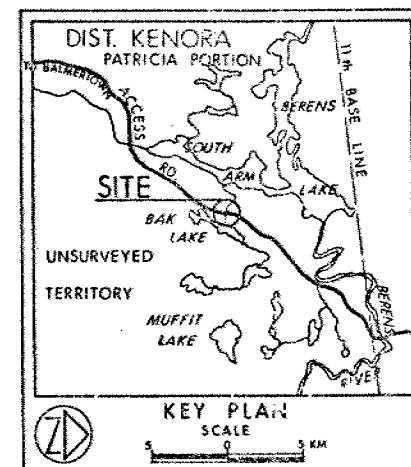
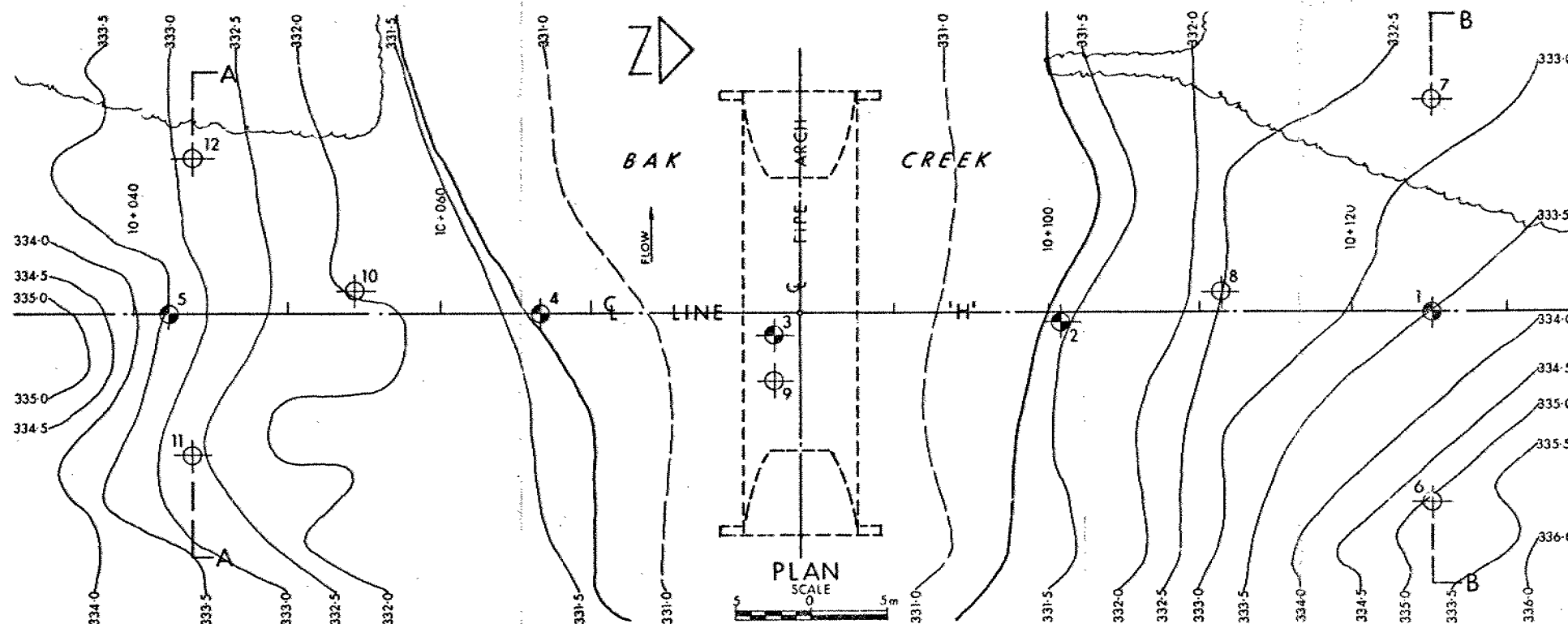
CONT No
WP No 1303-71-02



ACCESS RD. & BAK CREEK
STRUCTURE
BORE HOLE LOCATIONS & SOIL STRATA

SHEET

NOTE:
DIMENSIONS ARE IN METERS
AND/OR MILLIMETERS UNLESS
OTHERWISE SHOWN STATIONS
IN KILOMETERS + METERS



LEGEND

- Bore Hole
- ⊕ Dynamic Cone Penetration Test (Cone)
- ⊕ Bore Hole & Cone
- N Blows/0.3m (Std Pen Test, 475 J/blow)
- CONE Blows/0.3m (60° Cone, 475 J/blow)
- W L at time of investigation 72 03
- ▽ Head
- Artesian Condition
- Encountered

No	ELEVATION	STATION	OFFSET
1	333.7	10+125.2	0
2	331.3	10+108.0	0.6 RT.
3	331.0	10+081.8	1.4 RT.
4	331.2	10+066.6	0
5	332.6	10+041.2	0
6	334.8	10+125.2	12.4 RT.
7	330.0	10+125.2	14.2 LT.
8	332.5	10+111.4	1.4 LT.
9	331.0	10+081.8	3.6 RT.
10	332.0	10+054.4	1.6 LT.
11	332.7	10+043.6	9.2 RT.
12	332.4	10+043.6	10.2 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.

REVISIONS	DATE	DESCRIPTION
1	08/02/01	DRAWING RE-DONE IN METRIC
2	07/01/02	DATE 72 01 26
3	07/01/02	DATE 72 01 26

REF: PLAN E-3655-1

FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P.1303 - 71 - 02...
W.O.72-11027.....

Foundations Report by:

P. Payer

Review of Design Drawings by:

A. Prakash

Design Drawing No.'s:

11N-14-14-1,3

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. -
5. If excavation of unstuitable soil is recommended, is this shown on drawings? NO
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 is necessary.

Grade lowered by about 12 ft

Removal of superficial muck not shown

Drawings Received

March 719*73*....

Reviewed

March 1219*73*....

Signed

A. Prakash

FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P. 1303-71-02.....

W.O. 72-11027.....

Foundation Report By:

P. PAYER.....

Review of Design Drawings By:

P. PAYER.....

Design Drawing No.'s

4.1N-14-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. N.A.
5. If excavation of unsuitable soil is recommended, is this shown on Drawings? NO
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 SURFICIAL ORGANIC AND COHESIVE DEPOSITS SHOULD BE REMOVED TO THEIR FULL DEPTH AS RECOMMENDED IN FOUNDATION REPORT 72-11027. THIS IS NECESSARY FOR THE STABILITY OF THE APPROACHES. (GRADE HAS BEEN LOWERED 11.0 FT. BELOW THAT SHOWN IN FOUNDATION REPORT)

Drawings Received ... FEB. 13 19.73.
Reviewed ... FEB. 14 19.73.

Signed P. Payer.....

Mr. K. Selby,
Sup. Foundation Engineer.

K.W. Ingham

April 21, 1972

Foundation Investigation 72-11027; WP 1303-71-02
Access Road at Bak Creek

A brief description of two boreholes drilled to bedrock at this site is given below, together with the appropriate bedrock elevations.

Hole No. 2

Bedrock at 1069.7

17.3 - 22.2

Banded feldspar biotite gneiss, minor thin pegmatite veins, occasional horizontal and inclined joints.

Hole No. 4

Bedrock at 1066.0

20.5 - 25.3

Banded feldspar biotite gneiss, lineation approximately 40° , frequent horizontal and occasional inclined joints.

25.3 - 25.6

Diabase, dark grey, very dense.

KWI:mv


K. W. Ingham,
Geologist.

MEMORANDUM

K. G. SELBY

TO: Mr. A. G. Stermac,
Principal Foundations Engineer,
Foundations Office,
Downsview.

FROM: Structural Section,
Northwestern Region.

ATTENTION:

DATE: January 25, 1972.

OUR FILE REF.

IN REPLY TO:

SUBJECT:

Access Road North of Balmertown
Foundation Request--No Name Creek Site 41N-13
Bak Creek Site 41N-14

72-11027

1303-71-02

A foundation investigation is requested at the sites of No Name Creek and Bak Creek. Reference should be made to Mr. R. Young's memorandum to Mr. S. McCombie, dated January 5, of which you were sent a copy, for details of the access and timing. No reconnaissance report is forwarded as it is felt there is sufficient information in the above memorandum. No preliminary studies have as yet been carried out on the Berens River. If you feel strongly that you wish to carry out this investigation in conjunction with the No Name and Bak Creek investigations, please inform us as soon as possible.

The following plans and profiles are forwarded:

B-3000-124
B-3000-126

C-3000-169
C-3000-171

E-5113-1
E-5104-1

It is felt that the grade shown on the profiles is too high at the crossings and Regional Materials and Testing (Soils) indicate that information at the following stations would assist them in the determination of a possible lowering of the grade:

No Name	3070+00
	3082+00
	3096+70
Bak	3198+50
	6+00

Preliminary hydrology investigations and navigational requirements indicate that a 50-foot span structure would probably be specified with the grade lowering.

It is hoped to request an investigation for the Keewatin St. Clair Street Overpass, which has recently been moved up on the program, within two weeks after the site has been investigated.

P. D. LESTER,
REGIONAL STRUCTURAL PLANNING ENGINEER.

PDL/12

c.c.: Messrs. C. Grebski, W. Lees, N. Maluzynsky, R. Morgenroth,
D. Thrasher, R. Young.

Mr. T. J. ...
Responsible for ... loads Manager,
Thunder Bay.

345 1481
Structural ...
West ...
Downsview, Ontario.

January 12, 1971

Balmertown Northall

I have forwarded your letter of January 5 to Mr. Grebski
of our office.

As much as I would like to assist, the new organization
places this responsibility on Mr. Grebski's shoulders.

SMC/js

c.c. C. S. Grebski

S. McCombie
Structural Services Engineer

ANGUST RADKOWSKI

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. S. McCombie,
Structural Services Engineer,
Design Services Branch,
Downsview.

FROM: Access Roads Office,
Northwestern Region

ATTENTION:

DATE: January 5, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT:

D. H. O.
TORONTO
RECEIVED

JAN 10 1972

BRIDGE
OFFICE

This note is being written as a matter of information to all concerned, and to initiate the necessary planning for the structures mentioned hereunder.

The present indications are that the N-O-R-T construction budget will be reduced for 1972. For this reason, construction plans for the Balmertown Northerly road have been modified with some effect on the time that certain structures will be required:

Three crossings are affected, in the immediate future:

No-Name Creek, Stn. 3088+ (mile 56 $\frac{1}{2}$)

Bak Creek, Stn. 3202+ (mile 58 $\frac{1}{2}$)

Berens River, Stn. 474 (mile 67 $\frac{1}{2}$)

1 - - - - - (= 3676)

The present plan is for an equipment rental contract covering the following work, and to commence about June 1st, 1972.

1. Installation of specified pipe culverts at Kirkness Creek and at Stn. 2930 (Being ordered by the Dist.)
2. Grading, 11 miles to Bak Creek.
3. Clearing, 9 miles ahead, to Berens River.

The proposed grading section includes the site of the No-Name Creek crossing, but it is expected that a temporary detour crossing used in 1971 for medium sized dozers can again serve to provide construction access beyond No-Name Creek. Should site and foundation investigation permit the use of an appropriate culvert application, same could be installed as construction proceeds and thereby guarantee access beyond the creek.

With respect to Bak Creek, here again there is a reasonable expectation that an off-route detour of about 1/3 mile would permit a temporary crossing for some equipment to pursue the right-of-way clearing, but this has not been fully investigated. A proper crossing, however, will be required to be in service by May 15th, 1973. If this

Mr. S. McCombie

January 5, 1972.

crossing can be effected by a simple bridge design such as used at Nunesser River, the 1972 contract could possibly be extended in late summer to include erection under Kenora District supervision using the contractor's equipment and labour. Alternatively, a separate bridge contract could be called.

Critical in the whole Balmertown Northerly road scheme is the timing for crossing of the Berens River, which requires quite a major structure, perhaps 150 feet in length. No construction work, of course, can proceed beyond the Berens River until the crossing is available, and it would appear as if the normal schedule would be looking towards grade construction beyond the river in the spring of 1974. Should circumstances occur which compel the acceleration of the Balmertown Road, we would be in a position to do grading work in the late summer of 1973, if the river crossing were in service. Alternatively, I suppose a temporary crossing might be applied, but the site does not lend itself readily to a Bailey installation.

It would seem desirable, with respect to the Berens crossing, that a bridge contract be called during the summer of 1973, as soon as grade access is available to the site. Winter grade access will likely be available to the site by December of 1972.

Mr. Lester, who is away on vacation just now, is aware, generally, of the desirable timing for the No-Name Creek and Bak Creek crossings, but we have not had the opportunity to discuss with him the timing for the Berens River structure. He has indicated that he wishes to visit the sites and arrange for the necessary foundation investigations at all sites. Winter access to No-Name Creek and Bak Creek can be provided immediately this winter at modest cost by opening up the road which has not been plowed. Ordinary boring equipment could thus be taken in. It would be a little more difficult to get to the Berens River, the additional nine miles, more or less, by ski-doo, but this might not be good enough for taking in boring equipment. While I appreciate the desirability of doing all of the foundation investigations at once, it seems probable that we might have to concentrate on the two nearer crossings in the present, and follow at Berens River late in the year.

Perhaps on the basis of the above information you can judge whether this matter requires any attention prior to Mr. Lester's return, and I am sure you can count on the full co-operation of Mr. Thrasher and his staff in connection with any field work which might be undertaken immediately.

RIY/jmj

R. I. Young
ACCESS ROADS MANAGER.

cc: A. G. Stermac D. E. Thrasher
 W. L. Lees T. C. Muir
 P. D. Lester J. L. Forster

