



OFFICE LOCATION --

DOWNSVIEW AVE.,

KEELE ST. -- HIGHWAY 201

TORONTO, ONTARIO.

ONTARIO

DEPARTMENT OF HIGHWAYS

POSTAL ADDRESS --

DEPARTMENT OF HIGHWAYS,

PARLIAMENT BUILDINGS,

TORONTO 1, ONTARIO.

Bridge Division,
April 24, 1961.

MEMORANDUM TO:

Mr. L. G. Soderman,
Principal Soils & Foundation Eng.,
Department of Highways,
Materials and Research Section,
Downsview, Ontario.

RE: W.P. 94-60,
Pautois Creek,
Hwy. #17, District #13.

Attached please find print of preliminary plan
D 48/2-P1 for the above crossing.

The foundation design is in line with the recom-
mendations made in your report dated 30th, January, 1961.

JCMCA/mg

J. C. McAllister

J. C. McAllister,
for S. McCombie,
Bridge Planning Engineer.

April 27, 1961

Ken Gilby



ONTARIO

DEPARTMENT OF HIGHWAYS

Memo to Mr. A. M. Toye, Date January 30, 1961.
Bridge Engineer. Subject D.H.O. FOUNDATION INVESTIGATION
From Materials and Research Section: REPORT.
Attention: Mr. S. McCombie.

Re: Proposed Enlargement of Bridge over Pautois
Creek on Hwy. 17, 12 miles West of Mattawa.
W.P. 94-60 Dwg. No. E-3809-1 (Dept. of Hwys.)
W.J. 60-F-98 Dwg. No. 60-F-98. (Dept. of Hwys.)
District #13, Mattawa, Ontario.

This memo accompanies our detailed foundation report
for the above site.

We believe you will find the information contained
therein, self-explanatory; however, should you require further
assistance in connection with this project, please do not
hesitate to contact our Office.

L. G. Soderman,
PRINCIPAL FOUNDATION ENGR.
Per:

AGS/MdeF
Attach.

A. G. Sternac
(A. G. Sternac)
SR. PROJECT FOUNDATION ENGR.)

cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
H. D. McMillan
C. K. Hunter
D. Foster
S. R. Sait
A. Watt
Foundations Office
Gen. Files.

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Foundation Investigation
For
Proposed enlargement of Bridge over Pautois
Creek on Hwy. 17, 12 miles West of Mattawa.

W.P. 94-60 Dwg. No. E-3809-1 (Dept. of Hwys.)
W.J. 60-F-98 Dwg. No. 60-F-98. (Dept. of Hwys.)
District #13, Mattawa, Ontario.

1. INTRODUCTION:

An investigation was carried out to determine the subsoil characteristics of a proposed enlargement of a reinforced concrete bridge where Hwy. 17 crosses Pautois Creek in the Township of Calvin 15 miles West of Mattawa. The present bridge is 25.0' wide, has a 29.0' span and is approached on either side by 10.0' high embankments which slope down to water logged ground on the east side. This report contains exact field and laboratory findings and foundation recommendations. Borehole logs and profiles, field and laboratory test results are found under Appendix I.

2. DESCRIPTION OF SITE & GEOLOGY:

The site lies within the Canadian Shield. The surrounding country undulates between outcrops of granite gneiss, the depressions being filled with glacio-fluvial deposits. In particular at the bridge site granite gneiss outcrops 50' to the west of the bridge and the depression is filled with fine uniform sand. At the time of construction of the present bridge, the creek had, apparently settled into its present cu and the previous meander was filled with an embankment.

At the time of exploration the site was covered with 12" of snow and frozen to a depth of 12". The creek was frozen to a depth of 5" with top elevation of 558.25.

3. FIELD INVESTIGATION PROCEDURE:

The field work, consisting of four boreholes taken down to bedrock and four cone penetration tests similarly driven two feet away from each borehole was carried out by The Canadian Longyear Co., using two diamond core drills and standard wash boring procedures.

Samples were obtained in the cohesionless layers by a 2" O.D. split spoon sampler and where these were lost, by side slit sampler. Bedrock samples were obtained by an AX diamond core drill. A standard split spoon sampler was used and values were obtained at various depths. Visual identification of all samples was carried out in the field and repeated in the laboratory. The elevation of the water table was taken as that of the level of the ice in the creek i.e., 588.25'.

The locations of the boreholes can be seen on the plan of the site at the back of this report.

4. LABORATORY INVESTIGATIONS:

All samples were again identified in the laboratory and due to the uniformity of the strata and material, representative samples were selected for classification tests.

Exact borehole logs, graphs of standard penetration and cone penetration test results and grain size distribution curves are contained in the Appendix.

5. SUBSOIL CONDITIONS:

5.1 General

The site area is underlain by a layer of sandy clay in B.H.'s 1 and 2 and clayey sand in B.H.'s 3 and 4 varying

cont'd /3 ...

5. SUBSOIL CONDITIONS: (Cont'd.)...

5.1 General

in depth from 4.0' to 9.0'. Under this is a layer of fine medium silty sand varying in thickness from 18.0' to 30.0'. Following this is a layer of fine to coarse sand and gravel laid down on top of bedrock.

5.2 Heterogeneous layer of sand and silt with organic matter.

This heterogeneous stratum of sand and silt and organic matter is found at a lowest elevation of 550.0'. An 'N' value of 5 could be given to it.

5.3 Fine grey sand:

A layer of medium dense, fine, grey sand lies below the above stratum. This is a glacial fluvial deposit, laid down by streams in the glaciated valley following the retreat of the ice.

The colour varies from grey to a greyish brown. Generally the sand has a uniform grain size in the fine grained range. 'N' values vary widely, from 10 to 30, and for investigation purposes an 'N' value of 15 has been chosen.

5.4 Fine-coarse sand and gravel:

Beneath the fine grey sand there is a layer of fine-coarse sand and gravel varying in thickness from 1.5' in B.H. 1 to 13.0' in B.H. 4. In B.H. 4 alternate layers of fine grey sand and fine-coarse sand and gravel occur. Generally the layer is in a dense condition with a minimum 'N' value of 25.

5.5 Granite Gneiss Bedrock:

Bedrock was proved in all boreholes by obtaining a

cont'd /4 ...

5. SUBSOIL CONDITIONS: (Cont'd.)...

5.5 Granite Gneiss Bedrock:

10.0' core recovery in each hole. It is found at elevations 524.0 at B.H. 2, and 528.0 at B.H. 1 on the west bank and elevations 508.5 at B.H. #2 and 510.8' at B.H. 4 and the east bank. The rock slopes from B.H. 1 to B.H. 2 roughly at a slope 3 to 1 and from B.H. 3 to B.H. 4 at 5.0 to 1.

6. WATER CONDITIONS:

The elevation of the water table at the time of the investigation was taken as that of the water in Paultois Creek, 558.25'. This creek has a flood period when the water level rises to an elevation of 561.79' in the month of March.

7. CONCLUSIONS AND RECOMMENDATIONS:

The possibility of using spread footings was investigated using information provided by H.J. Gibbs and W.G. Holtz, 1957 International conference Vol. I P.35. on the relationship between 'N' values and relative density. On this information an 'N' value of 30 was assumed and although 15 was obtained in the field.

Calculations based on the above assumption gave an allowable bearing pressure of 2 tons/sq. ft. for a maximum settlement of approximately one inch. This bearing pressure applies to a footing placed at elevation 550'-0" or lower.

Because of the unwatering problems associated with placing a footing at this elevation and the fact that competent bedrock has been clearly established at a relatively shallow depth, it is suggested that the most appropriate solution to the foundation problem at this site is to support the structure on end-bearing steel H-piles driven to bedrock.

7. CONCLUSIONS AND RECOMMENDATIONS: (Cont'd.)...

If the spread footing solution to this problem is adopted an unwatering problem will be encountered. In order to excavate to elevation 550'-0" it will be necessary to sheet right around the excavation. Sheet piling must be carried to elevation 535'-0" if excavation is carried out during the highwater period, when the river level rises to elevation 562' to prevent boiling in the bottom of the excavation. If the excavation can be completed and the footing placed while the water level remains below elevation 560'-0" then the sheet piling may be driven to elevation 540'-0".

Whichever design is adopted provision must be made to provide permanent scour protection.

8. SUMMARY:

8.1 The soil profile of the site consists

- i) A heterogeneous layer of sand-silt-clay and organic material.
- ii) A layer of medium dense, fine, grey sand, some 30.0' thick running into a layer of fine-coarse sand and gravel.
- iii) Bedrock of granite gneiss.

8.2 Steel H-piles driven to bedrock are considered to be the most appropriate means of supporting the abutments of this bridge.

8.3 Protection to the foundation and overburden against scour must be provided.

cont'd /6 ...

9. MISCELLANEOUS:

Field work, beginning on December 18th, 1960, and completed on December 22, 1960, was supervised by V. Korlu and Mr. T. F. Widdis.

REPORT PREPARED BY:

John Brown

for T. F. Widdis
Project Foundation Eng.

January 1961.

REPORT APPROVED BY:

A. G. Stermac

A. G. Stermac
Senior Foundation Eng.

APPENDIX I.

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-98

W.P. 94-60

HOLE NO.	SAWP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET. RESIST. BLOWS FT	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH PSI	UNIT WEIGHT PCF	REMARKS
1	T1	3'-4.5'	Silty sand with organic matter.	P	-	-	-	-	-	
	T2	6'-8'	Fine sand. Grey in colour.	17	-	-	-	-	-	
	S3	8'-9'	" Loose "	9	-	-	-	-	-	
	S4	14'-15.5'	" Dense "	30	-	-	-	-	-	
	S5	20'-21.5'	" medium dense "	14	-	-	-	-	-	
	S6	25'-26.5'	Fine sand. Dense. Grey in colour	33	-	-	-	-	-	
	S7	30'-31.5'	Fine sand. Medium dense "	27	-	-	-	-	-	
	S8	33'-33.3'	Fine sand. Very dense grey in colour 3" Recovery	12-3"	-	-	-	-	-	
	R09	33.3'-42.2'	Bedrock							

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-98

W.P. 94-60

WELL NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET. RESIST. BLOWS/FT	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH (PSF)	UNIT WEIGHT (PCF)	REMARKS
2	T1	3'-4.5'	Sandy silt, with organic matter grey-brown in colour.	P	-	-	-	-	-	
	S2	6'-7.5'	Silty fine sand, with organic matter, very loose, grey to brown in colour.	2	-	-	-	-	-	
	S3	9'-10.5'	Fine-coarse sand with fine gravel & organic matter loose grey to brown in colour	10	-	-	-	-	-	
	S4	15'-16.5'	Fine sand, medium dense, grey in colour	24	-	-	-	-	-	
	S5	20'-21.5'	Fine sand medium dense grey in colour.	14	-	-	-	-	-	
	S6	25'-26.5'	Fine sand, loose.	9	-	-	-	-	-	
	S7	30'-31.5'	" " medium dense "	16	-	-	-	-	-	
	S8	35'-36.5'	Fine sand " "	12	-	-	-	-	-	
	S9	40'-41.5'	Fine to coarse sand: medium dense grey in colour	14	-	-	-	-	-	
	S10	45'-46.0'	Coarse sand&gravel medium dense	12	-	-	-	-	-	
		46.0'-46.5'	Fine sand medium dense grey in colour							
	S11	50'-51.0'	Coarse sand and gravel V. dense	175	-	-	-	-	-	
		51.0'-51.5'	Fine sand. Very dense. Grey.							
	RC12	54.5'-60'	Bedrock granite gneiss. 10' Recovery	-	-	-	-	-	-	
	RC13	60'-65.5'	" " " "	-	-	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-98

W.P. 24-60

HOIST NO.	SAMP NO.	SAMPLER DEPTH FEET	MATERIAL DESCRIPTION	PERCENT OF SAND BELOW 4.75	MOISTURE CONT. %	ASTM STANDARD	LIQUID LIMIT %	SAND WASH 4.75-20	SAND WASH 20-75	REMARKS
3	S1	3'-4.5'	Sandy silt with organic matter Loose grey-brown in colour	8	-	-	-	-	-	
	S2	6'-7.5'	Fine sand, loose, grey in colour	7	-	-	-	-	-	
	S3	9'-10.5'	" medium dense. "	14	-	-	-	-	-	
	S4	13'-16.5'	Fine sand, " brown in colour	15	-	-	-	-	-	
	S5	20'-21.5'	Fine sand, " brown -grey in colour.	17	-	-	-	-	-	
	S6	25'-26.5'	" " "	13	-	-	-	-	-	
	S7	30'-31.5'	" " "	19	-	-	-	-	-	
	S8	35'-36.5'	" " "	28	-	-	-	-	-	
	RC4	39'-44.5'	Bedrock granite gneiss 10.0' Recovery.	-	-	-	-	-	-	
		47'-10'-44.5'-49'	" "	-	-	-	-	-	-	

SUMMARY OF FIELD & LABORATORY TESTS

JOB 60-F-98

W.P. 94-60

HOE NO.	SAMP NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENETN RESIST. BLOWS FT	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH P.S.F.	UNIT WEIGHT P.C.F.	REMARKS
4	S1	3'-4.5'	Silty fine sand with organic matter. Very loose, grey-brown in colour.	4	-	-	-	-	-	
	S2	6'-7.5'	Fine to coarse sand with fine gravel, organic matter. V. dense	22	-	-	-	-	-	
	S3	9'-10.5'	Fine sand with organic matter, medium dense grey in colour	20	-	-	-	-	-	
	S4	15'-16.5'	Fine sand, dense, grey-brown in colour.	39	-	-	-	-	-	
	S5	20'-21.5'	Fine sand medium dense brown	28	-	-	-	-	-	
	S6	25'-26.5'	" dense, brown-grey in colour	31	-	-	-	-	-	
	S7	30'-31.5'	Fine sand, dense, grey-brown in colour	36	-	-	-	-	-	
	S8	35'-36.5'	Fine sand, dense, grey-brown in colour	77	-	-	-	-	-	
	S9	40'-41.5'	Medium-coarse sand & gravel very dense red-grey in colour	61	-	-	-	-	-	
	S10	45'-46.5'	Fine coarse sand & gravel very dense red-grey in colour	52	-	-	-	-	-	S denotes split spoon sample
	S11	50'-51.5'	Fine sand, very dense grey in colour	58	-	-	-	-	-	T " shelly tube sample
	RC12	53.2'-59.3'	Bedrock granite gneiss 10.0' Recovery	-	-	-	-	-	-	W " wash sample
	RC13	59.3'-64'	" " "	-	-	-	-	-	-	RC " rock core

DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 94-60 BORE HOLE NO. 1
 JOB 60-F-98 STATION 420-07 (36.5 Rt.)
 DATUM 501.0' COMPILED BY B.K.
 BORING DATE Dec. 18/60 CHECKED BY T.W.

2" DIA. SPLIT TUBE
 2" SHELBY TUBE
 2" SPLIT TUBE
 2" DIA. CONE
 2" SHELBY
 CASING

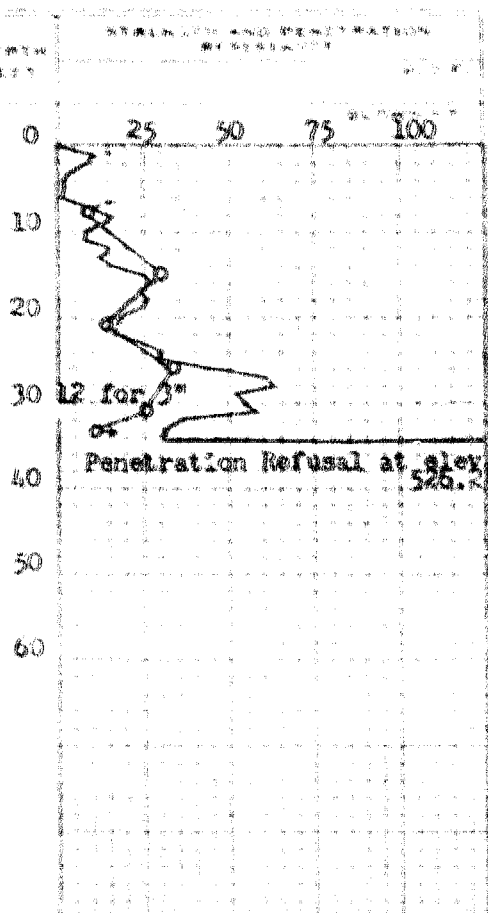
LEGEND

UNCONFINED COMPRESSION (QU) O
 VANE TEST (AND SENSITIVITY) S
 NATURAL MOISTURE AND LIQUID LIMIT Y
 PLASTIC LIMIT

DEPTH FEET	DESCRIPTION	DEPTH FEET
0	Groundlevel	561.0
1	Silty sand with organic matter	557.0
5		556.5
	Fine uniform sand medium dense grey in colour.	
30		528.0
	Granite gneiss. Full recovery.	
40		518.8

End of borehole

Penetration resistance profile shown; obtained by driving a 2" dia. cone from groundlevel to depth noted with an energy of 350 ft. lb. per blow.



DEPTH FEET	UNCONFINED COMPRESSION (QU)	VANE TEST (AND SENSITIVITY)	NATURAL MOISTURE AND LIQUID LIMIT	PLASTIC LIMIT
1				
5				
10				
15				
20				
25				
30				
35				
40				
45				
50				
55				
60				

DEPARTMENT OF HIGHWAYS - ONTARIO

W F 94-60 BORE HOLE NO 2

JOE 00-7-98 STATION 420/62 (36.5' Ht)

DATA 561.01 COMPILED BY B.K.

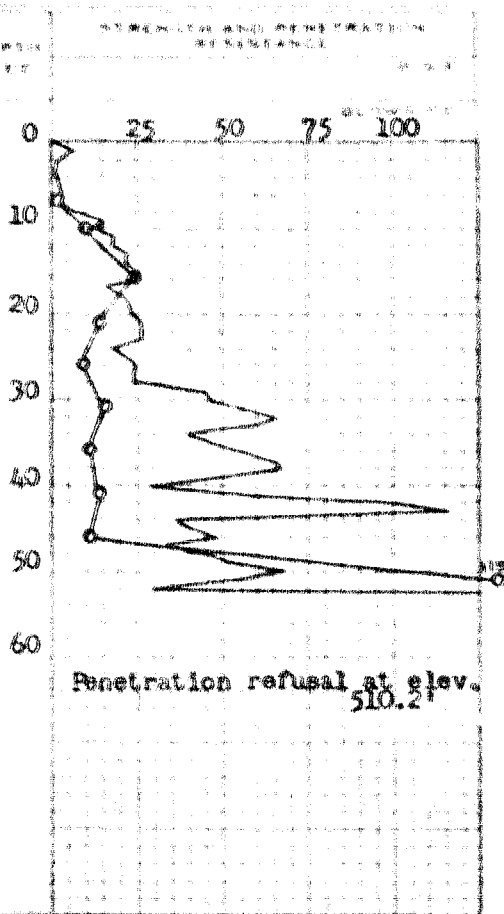
DRILLING DATE Dec. 19/60 CHECKED BY T.W.

7-70A SPLIT TUBE
7-70B SPLIT TUBE
7-70C SPLIT TUBE
7-70D COVE
7-70E SPLIT
7-70F SPLIT

LEGEND

EXPOSURE TO COMPRESSION (OW) 0
WENT INTO SENSITIVE (S) 0
NATURAL MOISTURE AND 0
KIND OF MOISTURE 0
PRESSURE UNIT 0

DEPTH	DIAMETER	REMARKS	DEPTH
		↓ Groundlevel	563.0
		Silty fine sand, with organic matter	0
		Very loose. Grey-brown in colour	568.3
		Pine-coarse sand with organic matter.	574.0
		Loose grey-brown in colour.	588.0
		Fine uniform sand. Medium dense	20
		Grey in colour	30
		Fine-coarse sand with gravel medium	523.0
		dense grey in colour.	517.0
		Fine uniform sand, medium dense	50
		Grey in colour.	508.5
		Granite gneiss. Full Recovery	60
		End of borehole	497.5



	T1	-
	S2	-
	S3	-
	S4	-
	S5	-
	S6	-
	S7	-
	S8	-
	S9	-
	S10	-
	S11	-
	RC12	-
	RC13	-

DEPARTMENT OF HIGHWAYS - ONTARIO

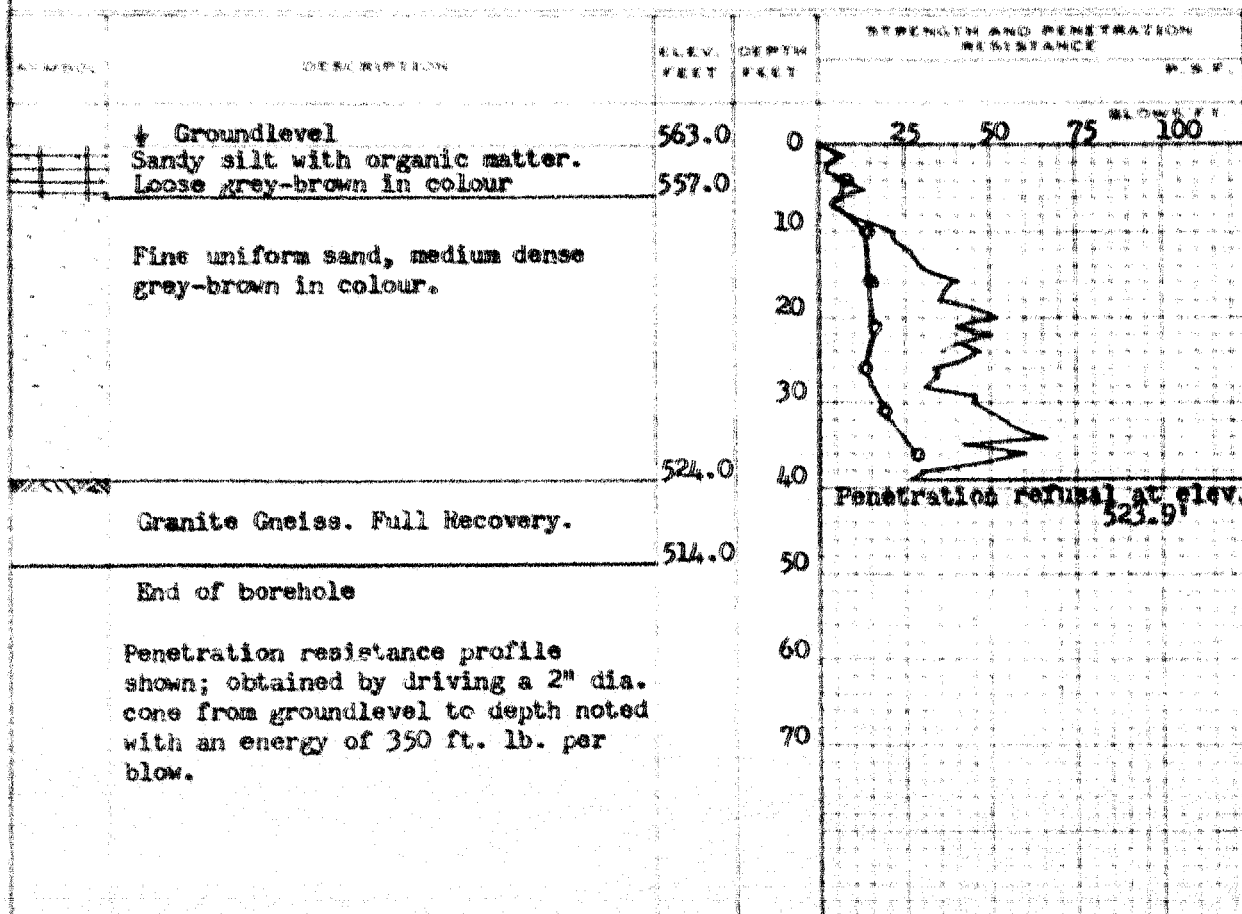
MATERIALS AND RESEARCH SECTION

W.P. 94-60 BORE HOLE NO. 3
 JOB 60-F-98 STATION 420/01 (42' Lt.)
 DATUM 563.0' COMPILED BY B.K.
 BORING DATE Dec. 30/60 CHECKED BY T.W.

2" DIA SPLIT TUBE
 2" SHELBY TUBE
 2" SPLIT TUBE
 2" DIA CONE
 2" SHELBY
 CASING

LEGEND

1/2 UNCONFINED COMPRESSION (Q_u)
 VANE TEST (C) AND SENSITIVITY (S)
 NATURAL MOISTURE AND
 LIQUIDITY INDEX
 LIQUID LIMIT
 PLASTIC LIMIT



CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.N.
ADDITIONAL COMMENTS		
	S1	-
	S2	-
	S3	-
	S4	-
	S5	-
	S6	-
	S7	-
	S8	-
	RC9	-
	RC10	-

DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. 94-60

BORE HOLE NO. 4

JOB 60-F-98

STATION 420/68 (36' Lt)

DATUM 564.0'

COMPILED BY B.K.

BORING DATE Dec. 21/60

CHECKED BY T.W.

2" DIA SPLIT TUBE

2" SHELBY TUBE

2" SPLIT TUBE

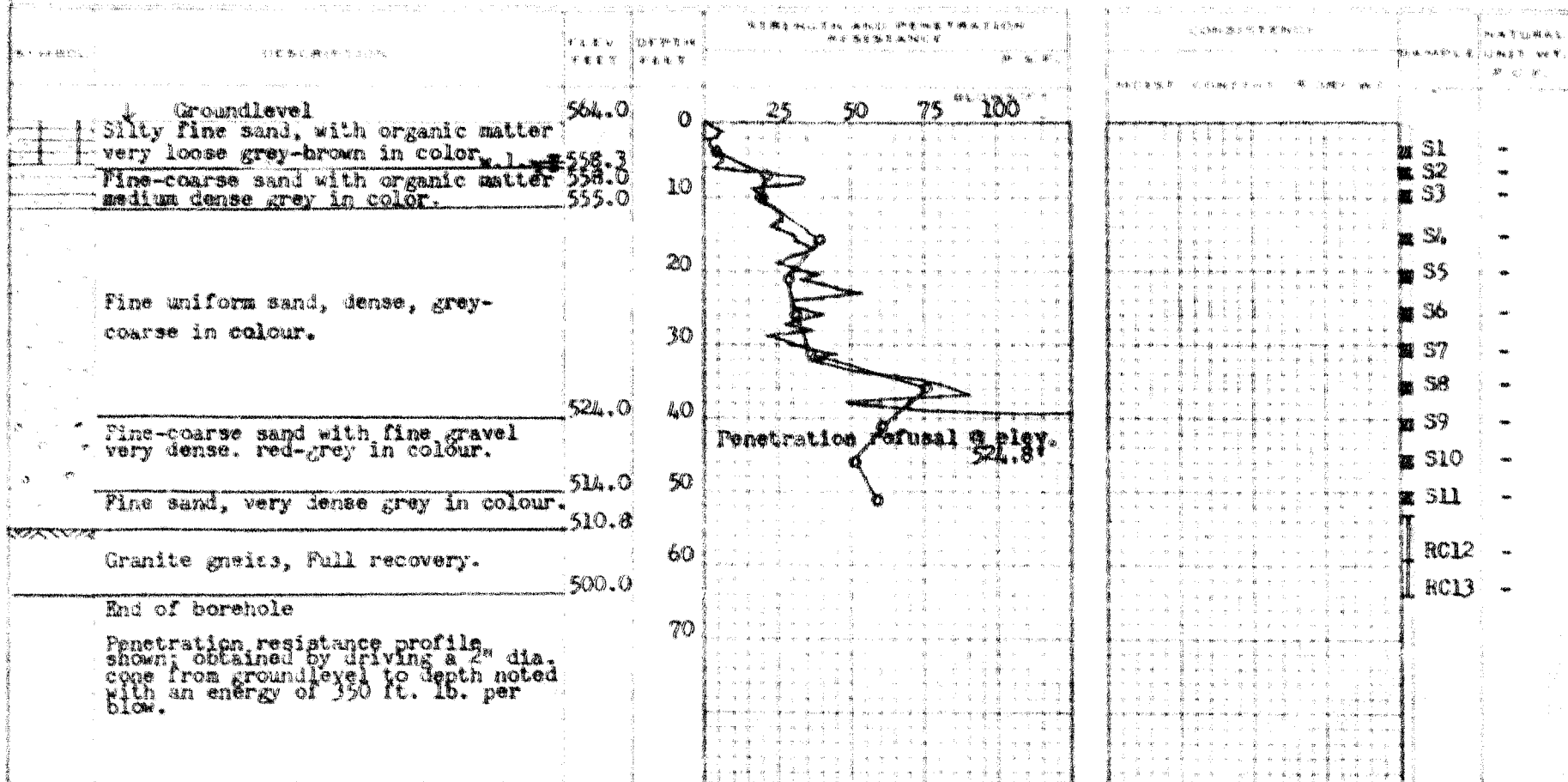
2" DIA CONE

2" SHELBY

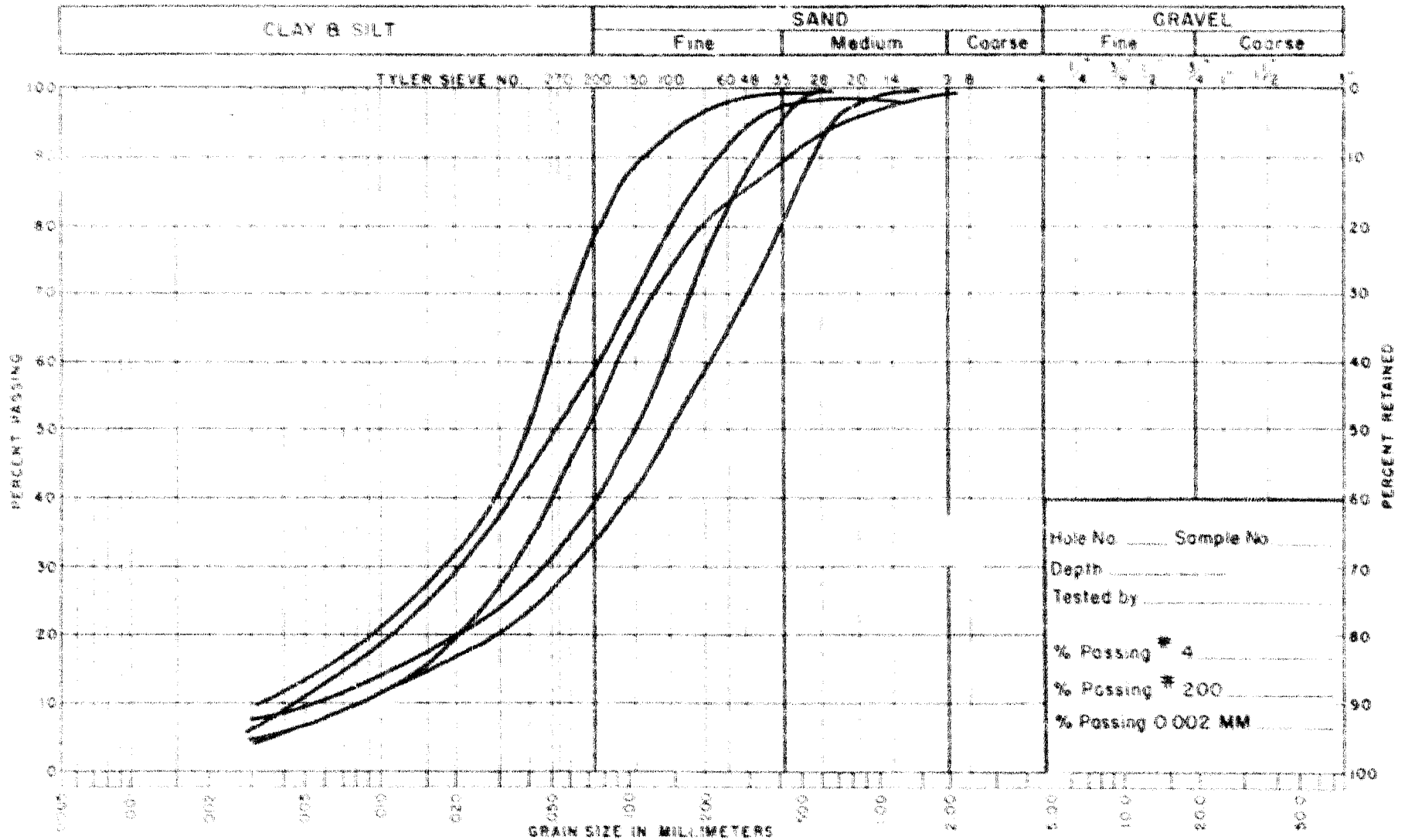
CASING

LEGEND

UNCONFINED COMPRESSION (Q_u) O
 VANE TEST (C) AND SENSITIVITY (S) +
 NATURAL MOISTURE AND LIQUIDITY INDEX LI
 LIQUID LIMIT L
 PLASTIC LIMIT P



UNIFIED SOIL CLASSIFICATION SYSTEM

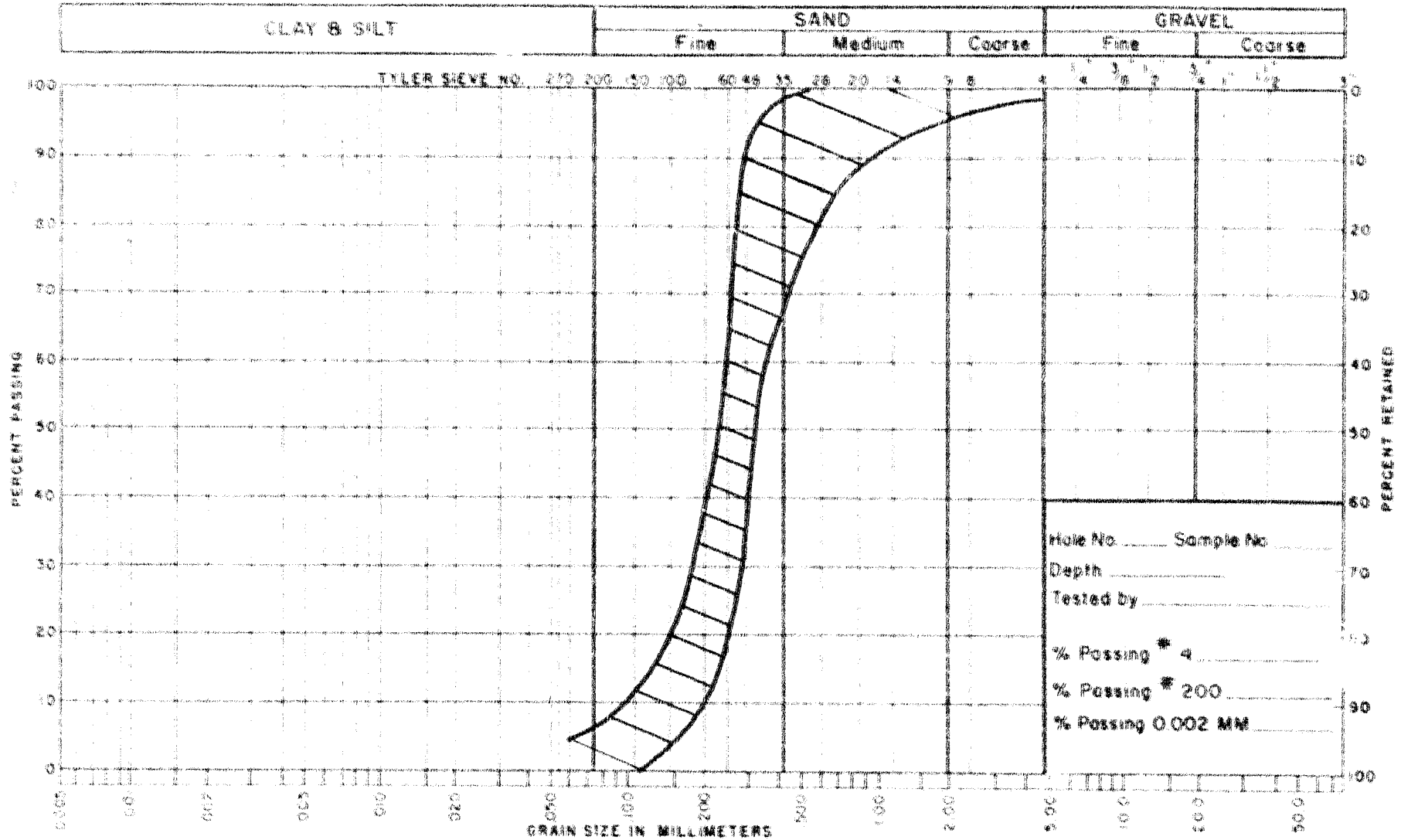


NOTES: SAMPLES TAKEN FROM "SANDY SILT WITH ORGANIC MATTER" LAYER

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
GRAIN SIZE DISTRIBUTION

Job No. 60-E-92 WP No. 34-60
Location PAULIS CREEK HWY No. 17

UNIFIED SOIL CLASSIFICATION SYSTEM



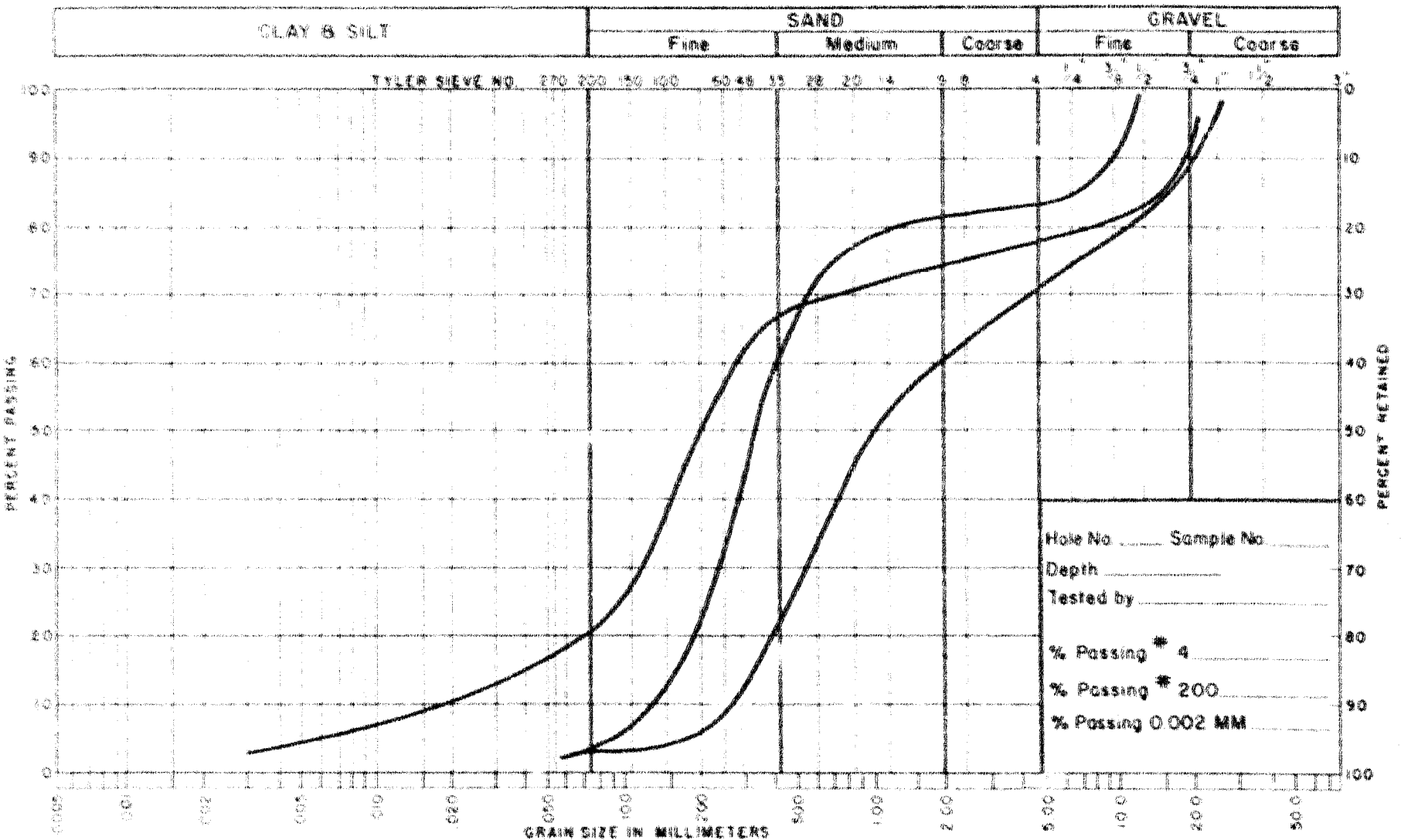
NOTES: SAMPLES TAKEN FROM "FINE UNIFORM SAND" LAYER

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH SECTION
GRAIN SIZE DISTRIBUTION

Job No. 60-F-98 WP No. 94-60

Location: PAULIS CREEK HWY. NO. 17

UNIFIED SOIL CLASSIFICATION SYSTEM



Mr. L. A. Sadie
Executive Director
Operations Division

J. W. MacDougall
Claims Engineer

February 11, 1972

PERSONAL & CONFIDENTIAL

Re: Claim Contract 65-23
Prime Contractor - Dibblee Construction Co. Ltd.
Sub-Contractor - Bailey Construction Ltd.

Attached herewith please find a copy of Mr. G. Martens' assessment of the three claims submitted by Bailey Construction Ltd. for difficulties encountered in the construction of Petois Creek Structure.

During the foundation investigation on this structure, there were no boulders encountered and therefore were not indicated in the report. However, during the construction, Bailey Construction Ltd. encountered some boulders in driving the steel sheet driving and had to change the method for anwatering structure footings. This also had other ramifications for which the contractor claimed a total of \$50,979.17.

JW m/er.
Attach.

J. W. MacDOUGALL
CLAIMS ENGINEER

C.C. A. Rozka ✓
G. E. French

Mr. H. L. Adcock
Assistant Deputy Minister
Engineering and Operations

C. Martens

September 15 1971

Re: Claim Contract 65-23
Dibble Construction Co. Ltd.
Bridge Sub-Contractor - Bailey Construction Ltd.

This contract for grading, drainage, granular base and structure was awarded to Dibble Construction Co. Ltd. on July, 1965 and the permission to start was dated August 6, 1965.

The work was to be completed in 115 working days beginning August 9, 1965 with a free time period from December 1, 1965 - May 15, 1966.

The contract had an interim completion date of November 30, 1965 for the Pantois Creek Structure which was to be opened to traffic at this time.

The application to sublet the structure work to Bailey Construction was approved by the Contract Control Engineer on August 9, 1965. The contract was accepted on September 9, 1966. Five letters to Claim were submitted on behalf of the sub-contractor four of which outlined problems encountered with the unwatering, pile driving, and structure construction due to inadequate or inaccurate soils information regarding the foundation material. Only the one respecting the structure construction problems was on time.

On April 14, 1967 the prime contractor, on behalf of his structure sub-contractor, submitted three claims totalling \$50,979.17.

On May 15, 1967 the contractor was advised that before considering the claims additional detailed information would be required.

The prime contractor's letter of June 21, 1967 authorized the Department to deal directly with the sub-contractor.

Following several requests for the additional information some was finally provided by the sub-contractor on May 6, 1969 and January 27, 1970.

The contractor states that based on the soils information in contract drawings he had anticipated driving steel sheet piles for unwatering.

When he tried to do this he encountered boulders not shown in the soils information making it impossible as well as impracticable to use this method and he was forced to adopt a different, more time consuming, costly and less efficient scheme using timber piles and timber sheeting. This also created additional costs in the pile driving operation. The contractor says he lost 19 days because of these problems. In addition the Department was two days late in supplying the Bailey bridge material and he lost an additional eight days trying to remove the old structure footings which, unknown to the Department or the contractor, were encased in timber sheeting. Thus a total of 19 days were lost.

Because of this mis-information and the resulting changes and delays his operation was extended into the winter season thus causing unanticipated, additional pile driving costs, additional structure costs for forming, insulating, placing concrete, heating and he should be paid these additional costs.

The District information indicates that the approaches for the Bailey bridge detour were ready August 30, 1965 and the bridge contractor didn't arrive on the site till September 7, 1965 thus losing five days. In addition 19 days were lost due to equipment breakdown and labour problems.

The District concurs that two days were lost due to the late delivery of Bailey bridge material and that the wooden sheeting around the old concrete footings delayed the contractor at least six days. However, it feels that the main reason for the five month delay in completing the structure is due to the contractor's inefficient operation.

It is extremely difficult to assess whether or not an operation is inefficient, however, in this instance it would be reasonable to conclude that part of it would of necessity be so since from past experience it is known that the severe winter conditions in this particular area do not lend themselves to an efficient operation.

The contractor's work schedule indicates starting the Bailey bridge during the last week in August (started Sept. 7, 1965) and completing the structure by the end of November, 1965 (completed May 1, 1966).

Mr. Tregaskes in his report indicates that in his opinion due to the considerable amount of concrete work the contractor couldn't complete by the end of November but possibly by the end of December, 1965. In view of this it would appear that the Department had given the contractor an impossible task.

The foundation information on the drawings and in the foundation report shows the soil to be perfectly fine to coarse sand with some gravel. The foundation report also indicates that sheet piling would be required for unwatering purposes. There

is no indication that boulders would be encountered. Even the existing road bed up to the pavement is shown to be all sand. Obviously the contractor would gear his operation to the site conditions shown. These conditions didn't prove out and the operation had to be changed and resulted in a more costly and less efficient unwatering operation, contributed to the delay in driving the footing piles and delayed the concrete structure work into the severe winter weather.

The three claims with recommendations follow:

CLAIM NO. 1 - Unwatering - \$17,510.00

The contractor states that after he had the west footing partially excavated he attempted to drive sheet piles around the footing area but encountered boulders which twisted the piles and tore off the flanges. He dug test holes and probed and encountered other boulders which indicated to him that it would be impracticable to drive sheet piles. Minor timber sheeting and extra pumping enabled him to unwater the west footing however he was required to place a considerable amount of timber piles and timber sheeting around the east footing particularly the north-east corner due to the proximity of the stream bypass. Not only was this work more costly but time was lost in getting the new materials.

The contractor's unwatering costs are \$35,525.60 and include labour and materials plus mark-ups, and equipment at 527 rates. From this he has deducted \$14,728.00 i. e. his revenue of \$16,200.00 less an estimated profit of \$1,472.00 leaving an extra cost of \$20,797.60.

He is claiming for that portion of the extra cost applicable to the work done after the submission of the Intent to Claim i. e. \$17,510.00.

Recommendation

The Intent to Claim was submitted November 23, 1965, approximately one month after the unwatering problem became apparent.

The foundation report shows the soil to be a fine to medium to coarse sand and gravel with no mention of boulders.

The District report indicates that numerous boulders were encountered in the east footing excavation and some were encountered in the west footing excavation. In its interpretation of the foundation report the District feels that the information for the four test holes is correct and therefore the Department has not given incorrect information. This coupled with its opinion that the contractor worked very inefficiently has led it to conclude that consideration of the claim is not

warranted. It also states that had the job been completed reasonably on time then possibly some consideration should be given to extra costs.

Engineering Audit in its review of the claim feels that the contractor didn't make sufficient effort to determine whether or not the sheet piles could be satisfactorily driven.

The District is undoubtedly right in stating that the parent material is accurately described at the four bore hole locations. In addition to this description the foundation report has expanded this graphically to include the area between the bore holes and has indicated as well that the road bed material is all a fine sand although this latter is not the case. In the light of this it is evident that the contractor has been misled as to the actual nature of the parent material which turned out to be very bouldery rather than sandy.

It is practically impossible to determine whether or not an operation is inefficient and in my mind such a statement is not a satisfactory argument to support the rejection of this claim for extra costs.

The contractor established to his own satisfaction that it was impracticable to drive the sheet piles and he wouldn't have rejected this scheme for any other reason since it assured him of the best possible working conditions.

Based on the foregoing it is the writer's opinion that the Department information did not properly describe the foundation conditions and in fact misled the contractor, and therefore the Department should accept the responsibility of the contractor's costs in excess of his revenue.

The Department auditor has examined the contractor's records and using 80% of the 527 rate for equipment with the applicable percentages charged against the contractor's labour and material charges has calculated the unwatering costs to be ~~\$24,406.77~~. The contractor's revenue was \$16,200.00.

\$2,521.24

It is recommended that the contractor be paid the difference i. e. \$6,321.24.

Since the Intent to Claim was not submitted within the prescribed time limit interest is not allowable.

CLAIM NO. 2 - Pile Driving - \$1,812.57

The contractor states that because he was unable to drive the sheet piles he was unable to bring his pile driving unit close enough to excavation to drive the

'H' bearing piles. When the attempt was made the sides of the excavation started to cave in under the machine. Consequently he had to obtain and drive two rows of his deck timber falsework piles at the inner edges of the footing excavations and thus provide a stable driving area.

The delay in providing a suitable pile driving area was compounded by the unwatering problem thus setting back the pile driving operation into the winter weather.

This in addition to encountering more difficult driving conditions due to unforeseen boulders made the operation more costly than anticipated and the Department should reimburse him for these extra costs.

The contractor's pile driving costs are \$8,917.22 and include labour and materials plus mark-ups and equipment at 527 rates. From this he has deducted \$5,951.21 i.e. his revenue of \$6,546.33 less an estimated profit of \$595.12 leaving an extra cost of \$2,966.01.

He is claiming for that portion of his extra costs applicable to the work done after the submission of the Intent to Claim i.e. \$1,812.57.

Recommendation

The Intent to Claim was dated December 20, 1965 while the first attempt to drive the 'H' bearing piles was made October 25, 1965.

The District reports substantiate the contractor's outline of his pile driving problems and his methods of overcoming these. It is also noted that of the 46 piles driven, only six twisted off line thus indicating that the foundation information was reasonably accurate. The analysis of the costs based on the District records, although partially estimated, shows that the contractor made a \$2,400.00 profit on this operation and consideration is not recommended by the District.

Engineering Audit feels that since the borings have not been proven to be inaccurate the claim doesn't deserve consideration.

The Department auditor has examined the contractor's record of costs. Using 80% of 527 rates with appropriate percentages for labour and materials the costs of the operation are \$5,988.63 against a revenue of \$6,546.33 i.e. a profit of \$557.70.

Since the 'H' pile driving operation was affected by the need to change the unwatering scheme the Department would have considered compensating the contractor for his extra costs. Therefore since the contractor has in effect asked that this operation be dealt with on a cost minus revenue basis and the costs are less than the revenue the Department should get the benefit of the amount of revenue in excess of the costs i.e. a credit of \$557.70.

CLAIM NO. 3 - Forming, placing and protection of concrete in structure,
Item 57, - \$31,656.60

The contractor states that because of delays in delivering Bailey bridge parts (2 days), removing timber sheeting from existing footings (8 days) changing dewatering scheme (21 days) and resulting difficulty in driving 'H' piles (8 days) he was forced to build the structure under severe winter conditions which made this work very costly.

He had hoped to be able to shut down the operation during the cold weather but was not permitted to do so by the Department.

The contractor's costs for forming, placing and protecting the concrete in structure are \$70,164.21 and include labour and materials plus mark-ups and equipment at 52% rates. From this he has deducted \$38,707.61 i.e. his revenue of \$42,578.37 less an estimated profit of \$11,870.76 leaving an extra cost of \$31,656.60.

Because of delays and changed site conditions he feels that the Department should accept responsibility for the extra costs of building and structure i.e. \$31,656.60.

Recommendation

The structure work started January 19, 1966 and the Intent to Claim was dated January 11, 1966.

The District reports confirm that the contractor encountered delays as claimed, that he had problems with the revised dewatering scheme, that the 'H' pile driving was delayed due to unstable ground conditions, that the forming, placing and protecting the structure concrete was more difficult during the winter conditions.

The reports point out as well that the contractor contributed to this costly operation by delaying his start of the Bailey bridge work for a week after the approaches were completed. In addition there were at least 15 days lost due to labour problems and equipment breakdown. The contractor concurs that these delays happened but they were a result of having to work in severe weather conditions which was the Department's responsibility because of changed site conditions.

The decision to continue to work in the winter was not the responsibility of the Department but rather that of the bridge contractor. At this time (January, 1966) the Department had issued an infraction report because the structure work was behind schedule. Any further delays in completing the structure could delay the prime contractor in the completion of the final grading work and therefore it was left to the sub and prime to determine whether or not to continue. If the sub had not continued and then delayed the prime the latter might have presented a claim as well. The sub chose to continue the work in the winter time, which is to the Department's advantage.

Since the Department has accepted responsibility for the additional unwatering costs, and the delays due to the Bailey bridge operation and the existing footing sheeting removal are the Department's responsibility and since these problems contributed directly to the delay in carrying out the structure concrete work the Department should accept some responsibility for the extra structure concrete costs.

Based on the information at hand the contractor also contributed to the delay however it would be impracticable to determine exactly to what extent either party is responsible.

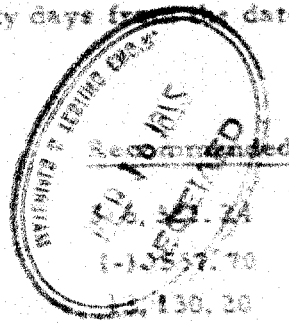
Assuming the contractor's claim of 39 days against the Department as being correct, and the District's 20 days against the contractor as being correct then the Department is responsible for two-thirds of the extra costs and the contractor for one-third. It is recommended that the extra costs be shared on this basis.

The Department's auditor has examined the contractor's records and based on 80% of \$27 rates for equipment and the normal percentages for labour and materials the cost of the forming placing and protecting the structure concrete is \$62,096.17 or \$19,695.31 in excess of his revenue. The Department's share of these costs is two-thirds of \$19,695.31 or \$13,130.20 and it is recommended that the sub-contractor be paid this amount.

The Intent to Claim was submitted on time and he is entitled to interest payment however only from the date of receipt of the claim (April 14, 1967) since it was not presented within the prescribed thirty days from the date of acceptance.

Summary

	<u>Claimed</u>	<u>Recommended</u>
Claim No. 1	\$17,510.00	\$11,673.33
Claim No. 2	1,612.57	1,075.05
Claim No. 3	31,656.60	21,100.20
	<u>\$50,779.17</u>	<u>\$33,848.58</u>



G.M./et.

G. MARTENS
for:
J. V. MacDONALD
CLAIMS ENGINEER

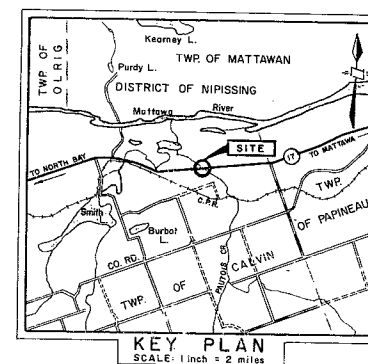
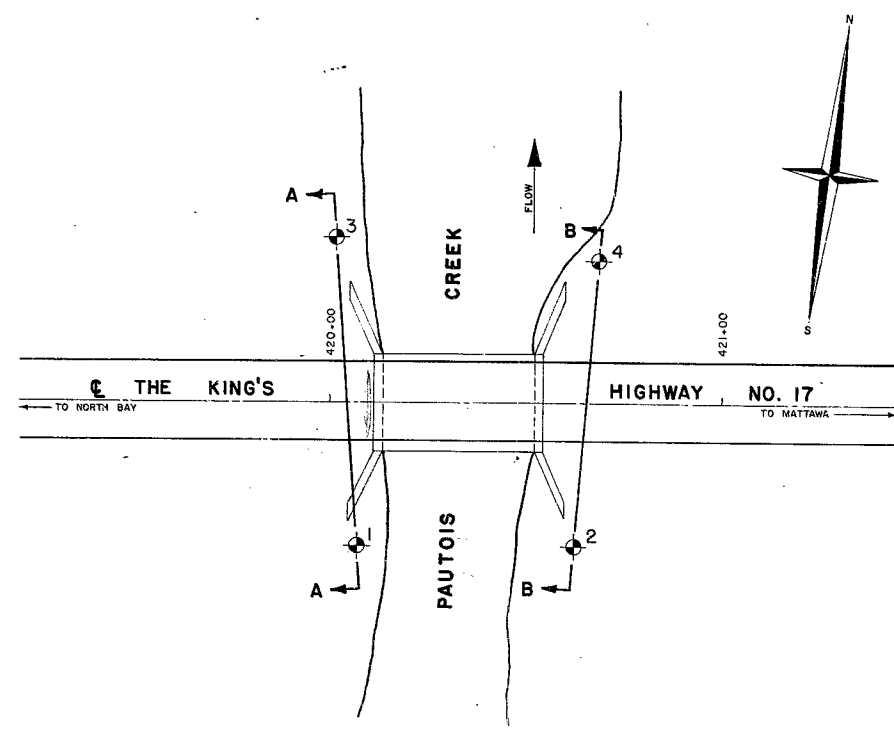
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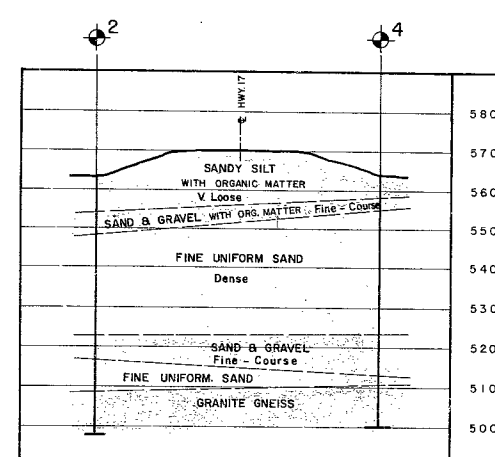
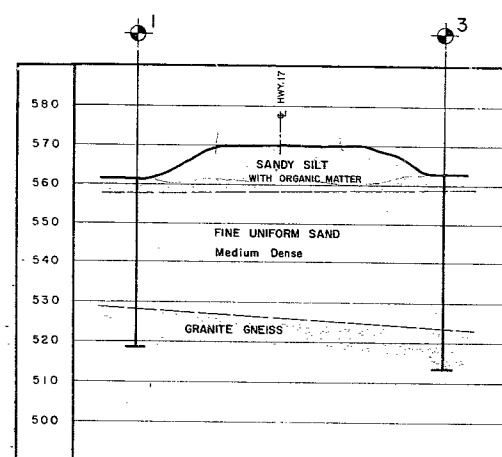
HWY. # 17

CROSSING

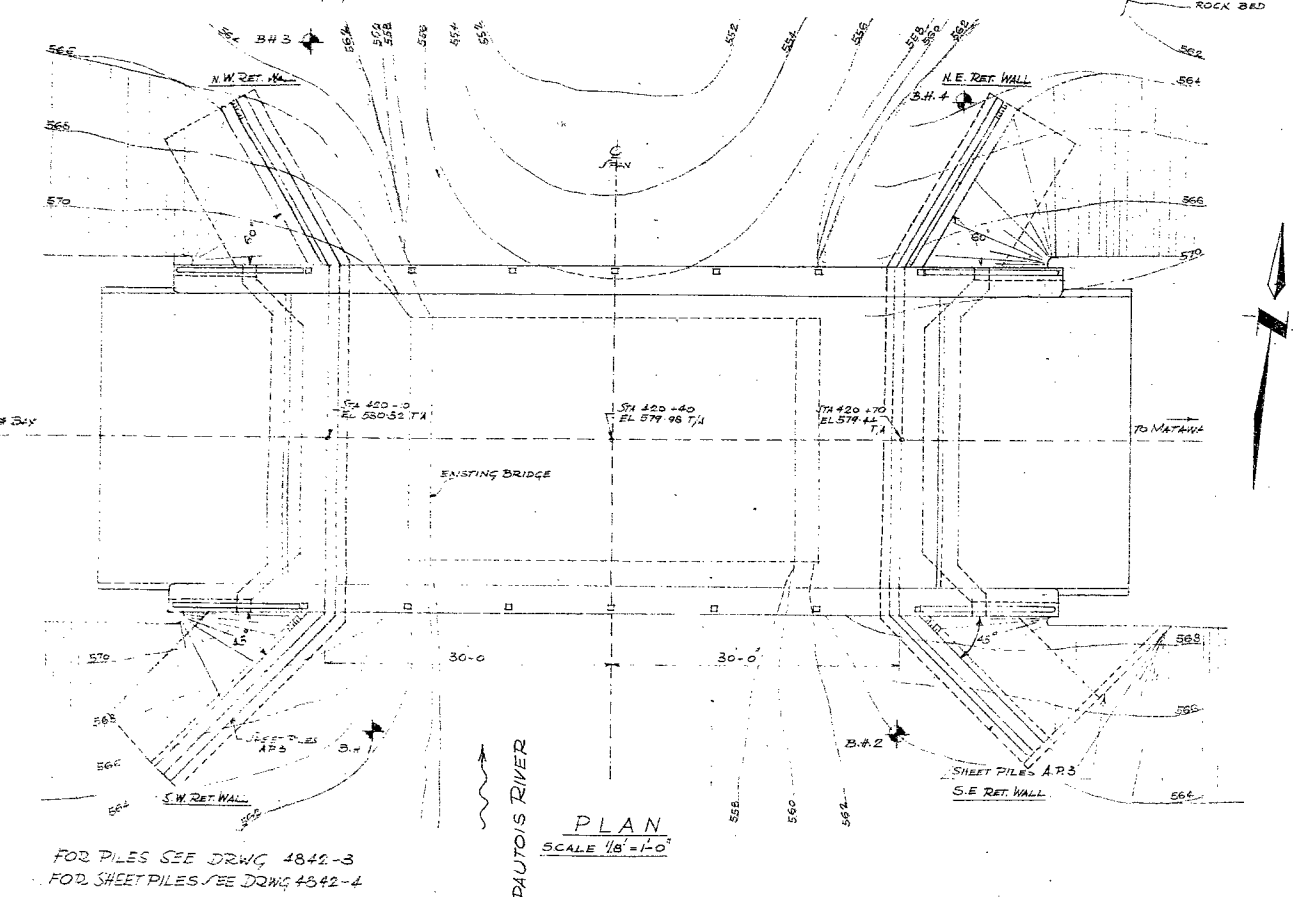
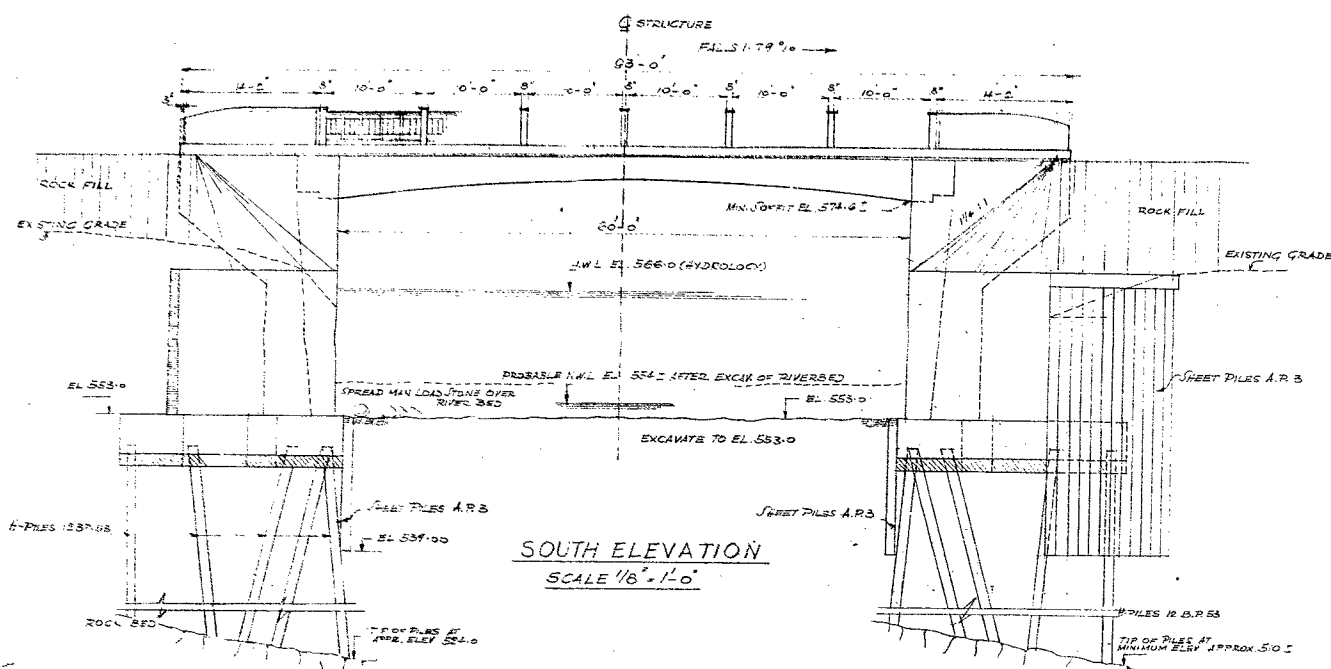
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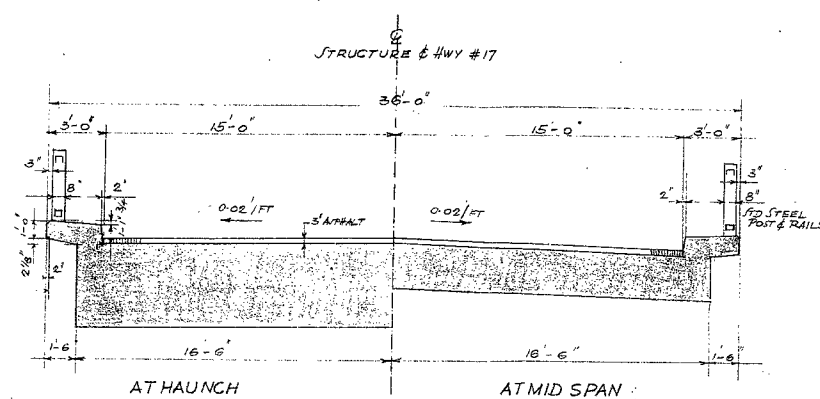
LEGEND			
BORE & PENETRATION HOLE			
HOLE	ELEVATION	STATION	DISTANCE FROM CL
1	561.0	420+07	36' RT.
2	563.0	420+62	36' RT.
3	563.0	420+01	42' LT.
4	564.0	420+68	36' LT.



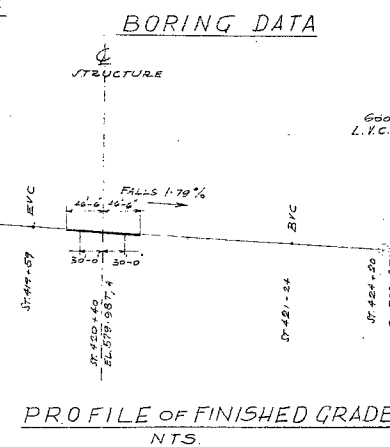
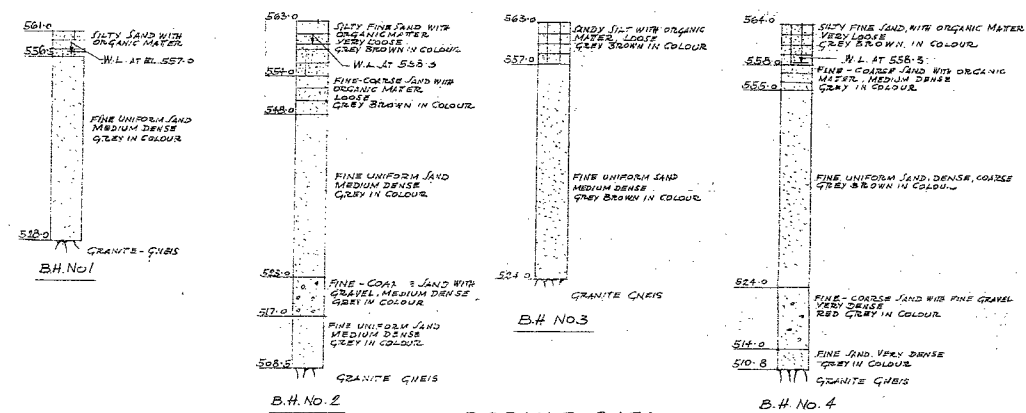
DEPARTMENT OF HIGHWAYS - ONTARIO		
MATERIALS & RESEARCH SECTION		
PLAN AND SECTIONS TO SHOW FOUNDATION CONDITIONS AT NEW BRIDGE OVER PAUTOIS CREEK & HIGHWAY 17		
ORIGINATED T. WIDDIS	DISTRICT NO. 13	DATE 23 JANUARY 1960
DRAWN D. MUMFORD	W.P. NO. 94-60	JOB NO. 60-F-98
CHECKED <i>[Signature]</i>	SCALE	DRAWING NO.
APPROVED <i>[Signature]</i>	1 inch = 20 feet	60-F-98A



FOR PILES SEE DRWG 4842-3
FOR SHEET PILES SEE DRWG 4842-4

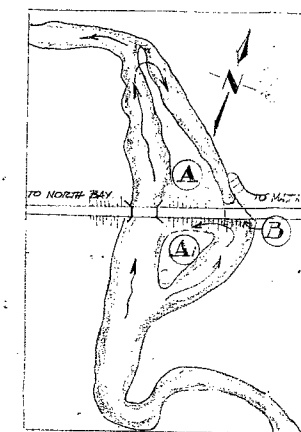


DECK SECTION
SCALE 1/4" = 1'-0"

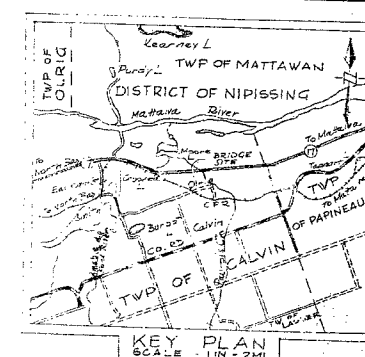


PROFILE OF FINISHED GRADE
NTS

NOTE: ALL ELEVATIONS GIVEN FOR FINISHED GRADE



LOCATION SKETCH NTS
A - AT INUNDATED IN FLOOD
B - CHANNEL BLOCKED OFF
A1 - ERODED SINCE BLOCKING OF CHANNEL



DEPARTMENT OF HIGHWAYS-ONTARIO
BRIDGE OFFICE-TORONTO

PAUTOIS RIVER BRIDGE

THE KING'S HIGHWAY No. 17 DIST. No. 13
CO. NIPISSING
TWP. CALVIN LOT 7 CON. VII

PRELIMINARY

APPROVED

BRIDGE ENGINEER DESIGN ENGINEER
DESIGN B.R. CHECK J.L.K.
DRAWING B.R. CHECK J.L.K.
LOADING H20
DATE April, 1961
DRAWING NUMBER D-4842-P1

REVISIONS	DATE	BY	DESCRIPTION
1	84 11/78		