

G.I.-30 SEPT. 1976

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 411-71

DIST. 17 REGION NORTHERN

W.P. No. 36-71-01

CONT. No. 73-120

W. O. No. 72-F-71

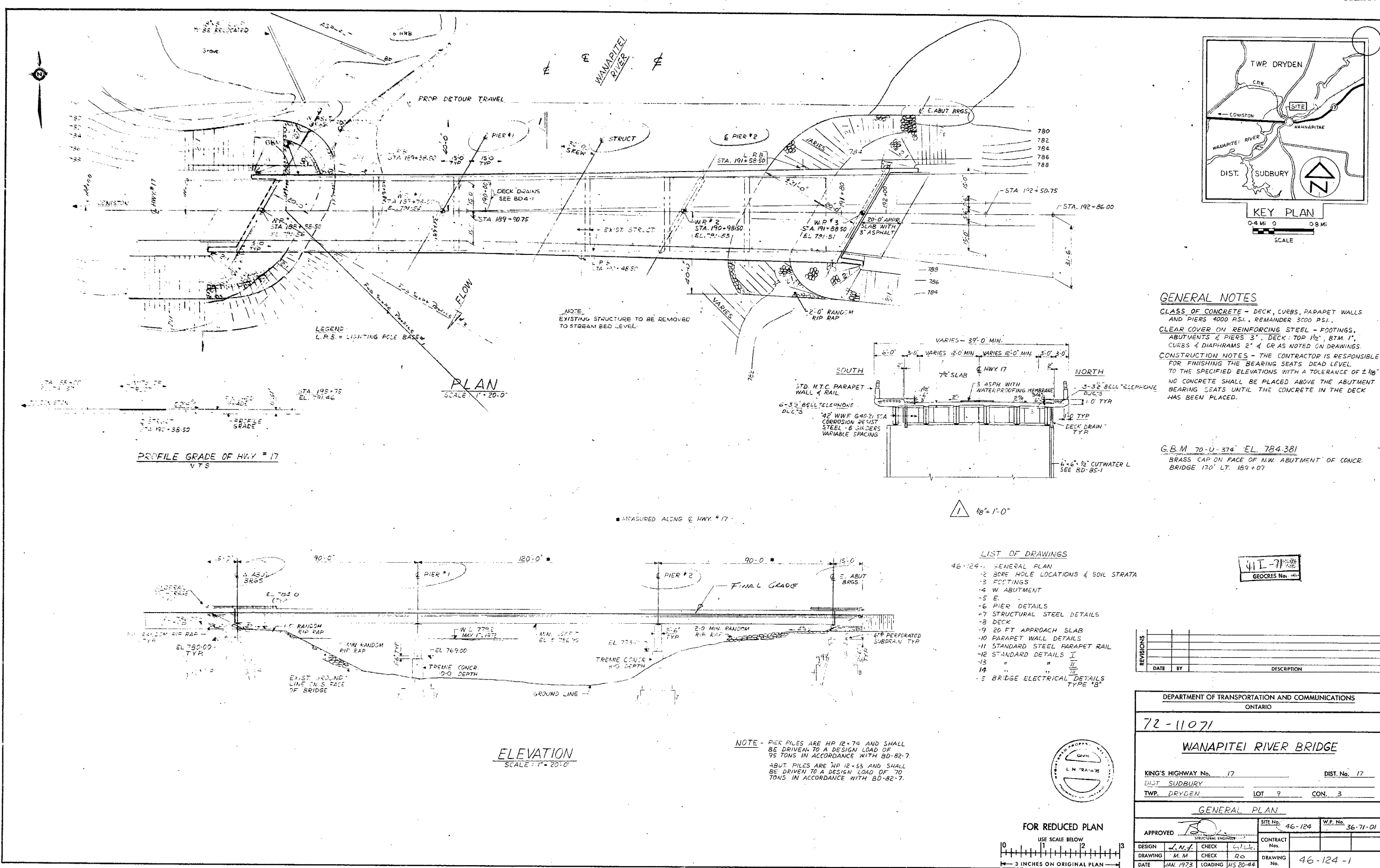
STR. SITE No. 46-124

HWY. No. 17

LOCATION HWY. 17 AND WANAPITEI
RIVER.

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 3

REMARKS: DOCUMENTS TO BE UNFOLDED
BEFORE MICROFILMED



GENERAL NOTES

CLASS OF CONCRETE - DECK, CURBS, PARAPET WALLS AND PIERS 4000 P.S.I., REMAINDER 3000 P.S.I.
CLEAR COVER ON REINFORCING STEEL - FOOTINGS, ABUTMENTS & PIERS 3", DECK: TOP 1 1/2", BTM. 1", CURBS & DIAPHRAGMS 2" & CR AS NOTED ON DRAWINGS.
CONSTRUCTION NOTES - THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF ± 1/8". NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED.

G.B.M. 70-U-374 EL. 784.381
BRASS CAP ON FACE OF N.W. ABUTMENT OF CONCR. BRIDGE 170' LT. 189+07

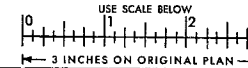
LIST OF DRAWINGS

- 46-124-1 GENERAL PLAN
- 2 BORE HOLE LOCATIONS & SOIL STRATA
- 3 FOOTINGS
- 4 W. ABUTMENT
- 5 E.
- 6 PIER DETAILS
- 7 STRUCTURAL STEEL DETAILS
- 8 DECK
- 9 20 FT APPROACH SLAB
- 10 PARAPET WALL DETAILS
- 11 STANDARD STEEL PARAPET RAIL
- 12 STANDARD DETAILS I
- 13 " " II
- 14 " " III
- 5 BRIDGE ELECTRICAL DETAILS TYPE 'B'

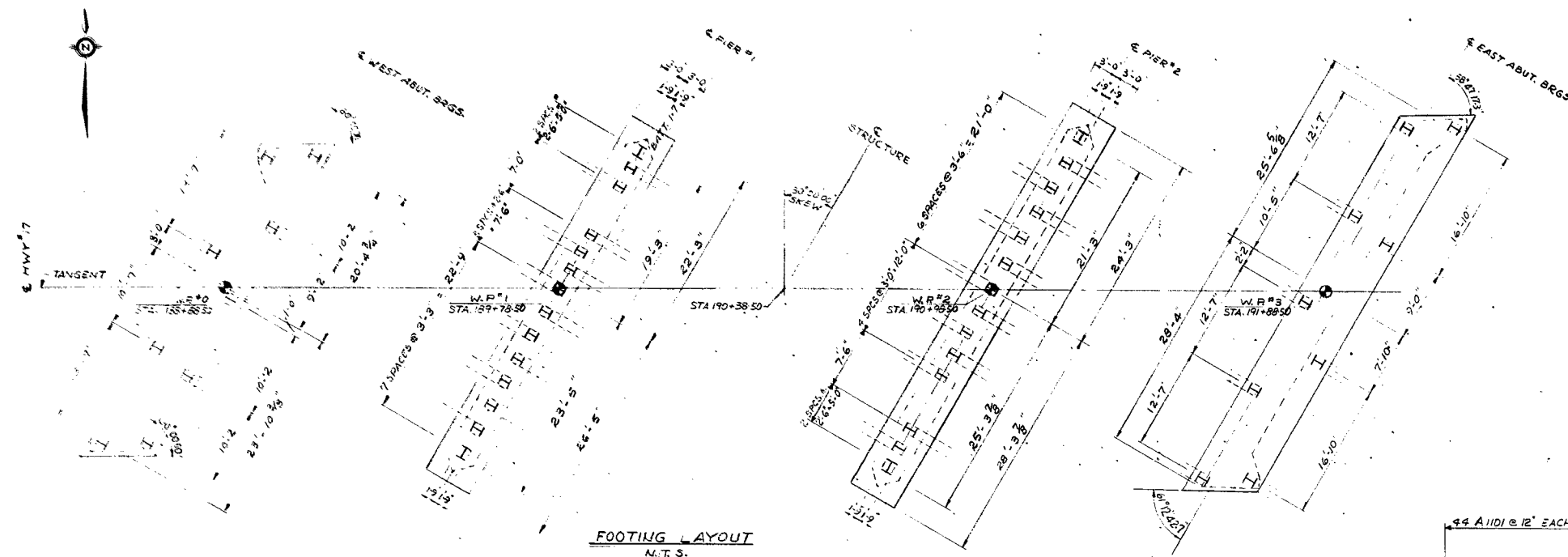
REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS ONTARIO	
72-11071	
WANAPITEI RIVER BRIDGE	
KING'S HIGHWAY No. 17	DIST. No. 17
DIST. SUDBURY	
TWP. DRYDEN	LOT 9 CON. 3
GENERAL PLAN	
APPROVED	SITE No. 46-124 W.P. No. 36-71-01
DESIGN	CONTRACT No.
DRAWING	DATE
DATE	LOADING

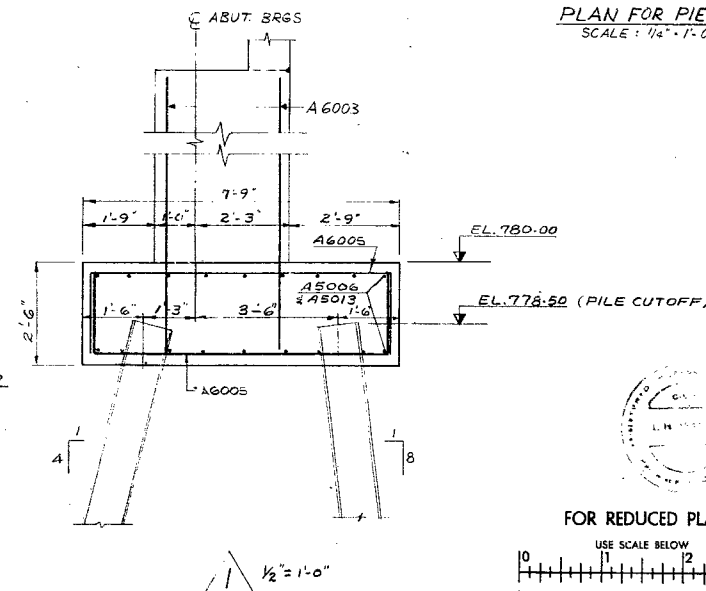
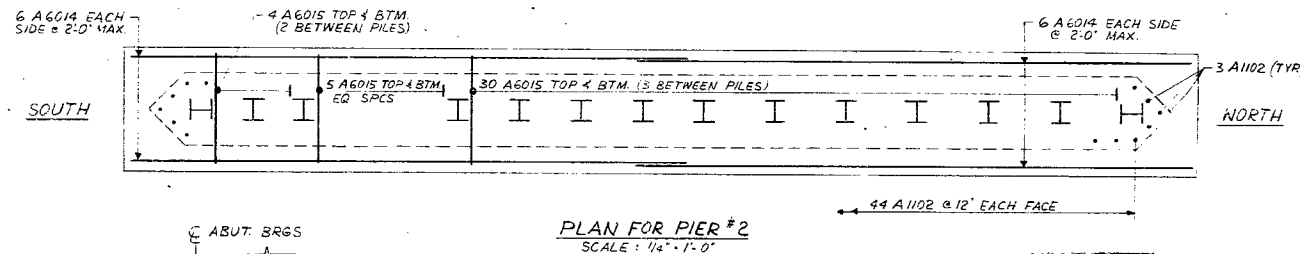
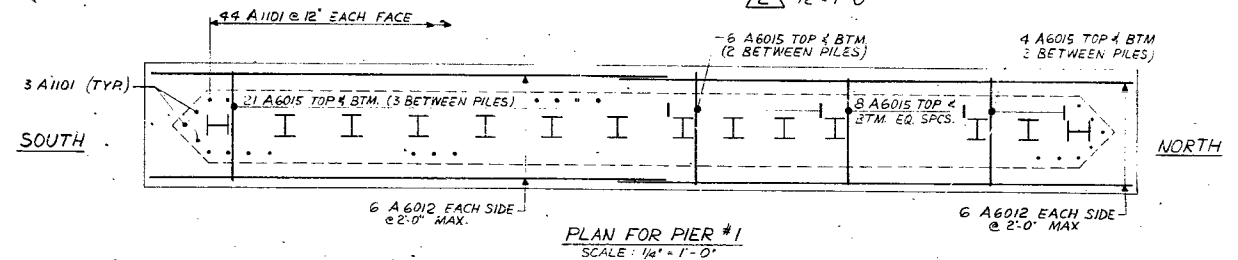
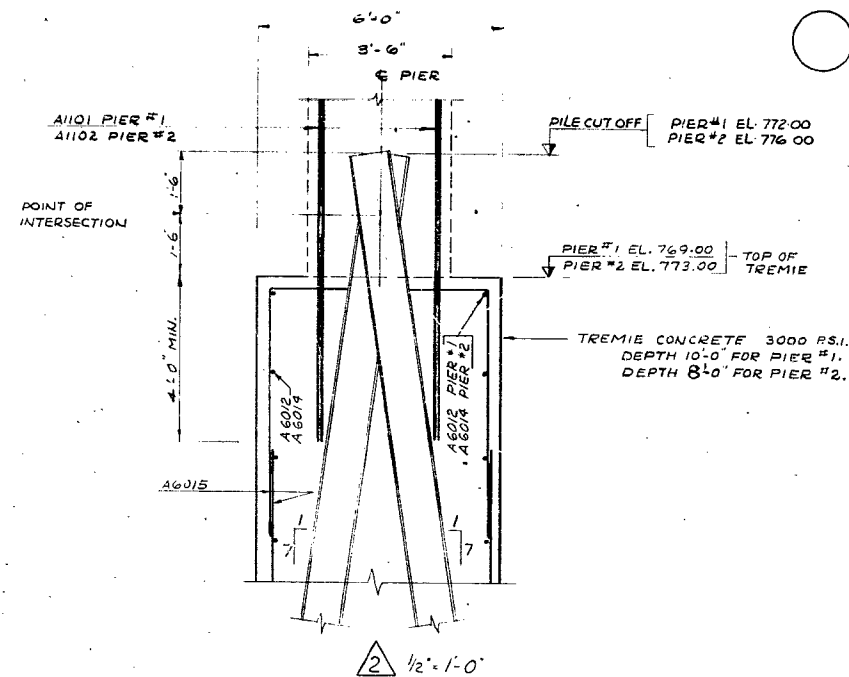
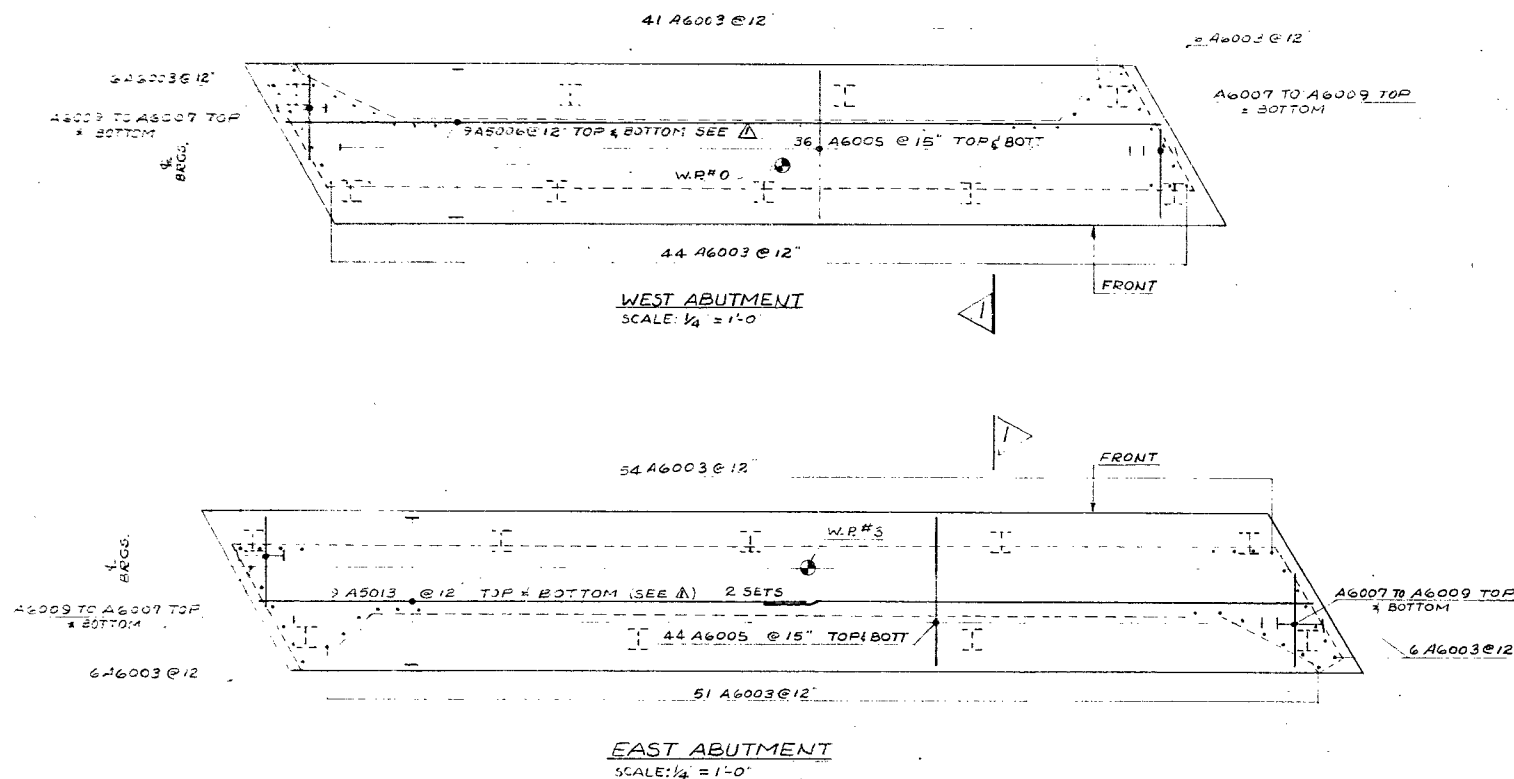
FOR REDUCED PLAN



CS OF ABUTMENTS AND PIERS ARE SKEWED 30° 00' 00" TO E HWY. 17

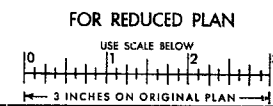


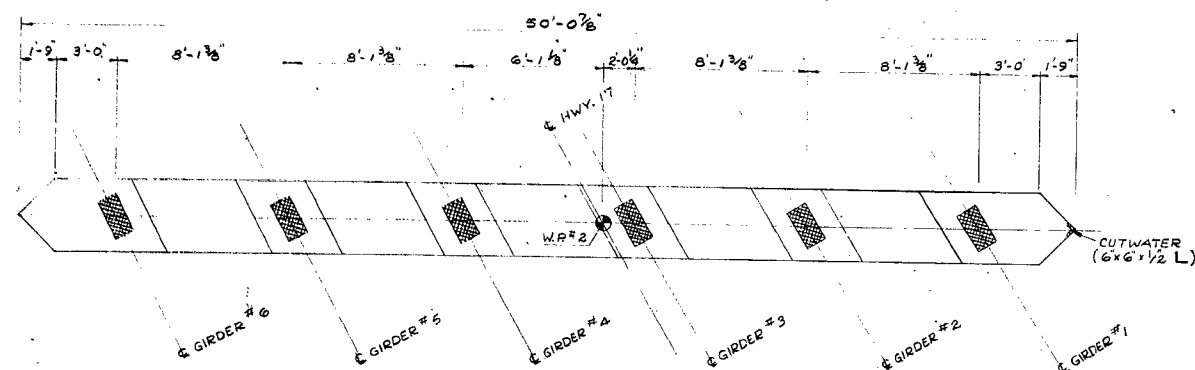
PILE LIST			
	PILES REQ'D	LENGTH	DESIGN LOAD
WEST ABUT.	9 - HP 12 x 33	132	70 TONS
PIER #1	4 - HP 12 x 74	178	95 TONS
PIER #2	4 - HP 12 x 74	127	95 TONS
EAST ABUT.	9 - HP 12 x 33	137	70 TONS



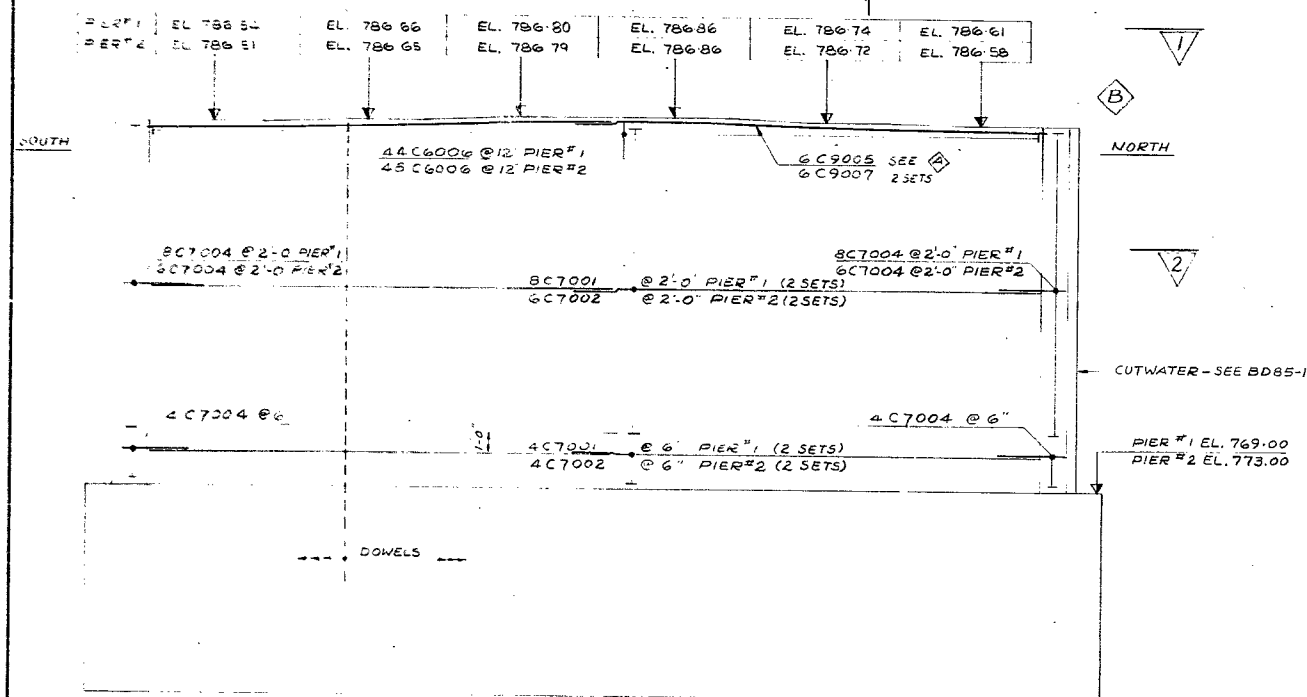
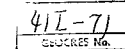
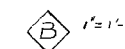
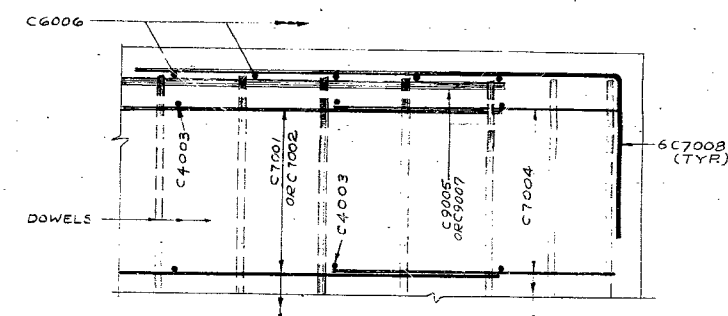
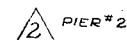
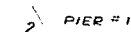
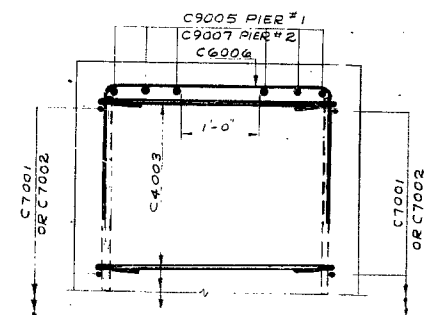
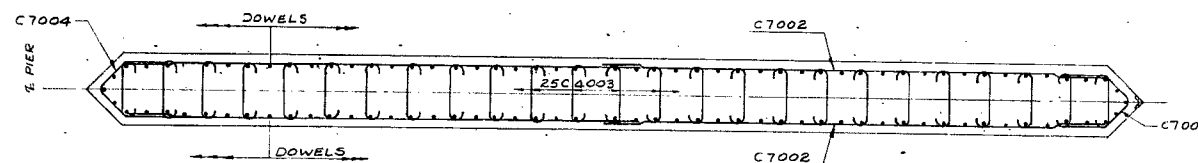
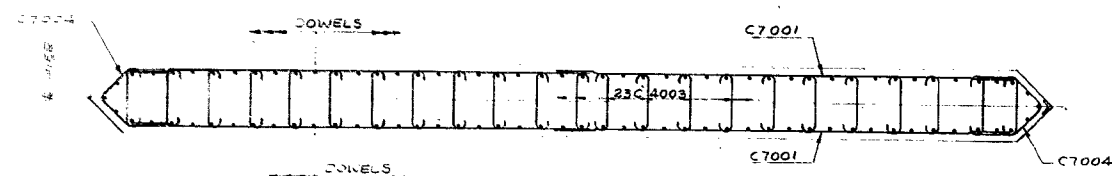
REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS	
ONTARIO	
72-11071	
WANAPITEI RIVER BRIDGE	
KING'S HIGHWAY No. 17	DIST. No. 17
DIST. SUDBURY	
TWP. DRYDEN	LOT 9 CON. 3
FOOTINGS	
APPROVED	SITE No. 46-124 W.P. No. 36-71-01
DESIGN	CONTRACT No.
DRAWING	DRAWING No. 46-124-3
DATE NOV. 72	LOADING HS-20-44

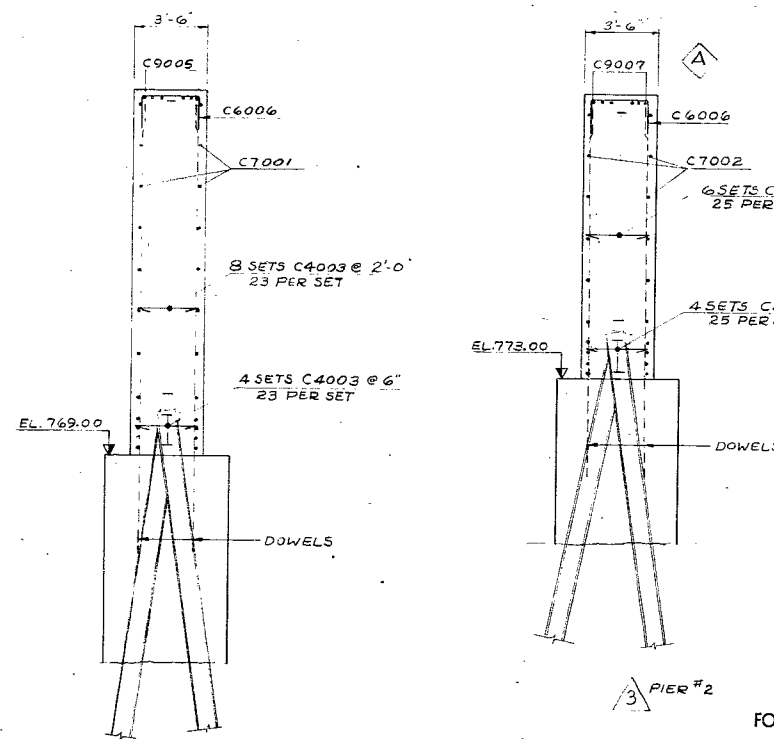




BAR MARK	NUMBER OF BARS	
	PIER #1	PIER #2
C 7001	48	
C 7002		40
C 4003	276	250
C 7004	24	20
C 9005	12	
C 6006	44	48
C 9007		12
C 7008	12	12

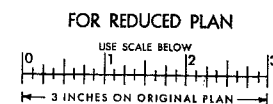


ELEVATION PIER #1



3 PIER #

SCALE: $\frac{1}{4}" = 1'-0"$ EXCEPT AS NOTED.



REVISIONS			
	DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

72-11071

WANAPITEI RIVER BRIDGE

KING'S HIGHWAY No. 17 DIST. No. 17
DIST. SUDBURY
TWP. DRYDEN LOT 9 CON. 3

PIER DETAILS

APPROVED <u>RO</u>				SITE No. <u>46-124</u>		W.P. No. <u>36-71-01</u>	
STRUCTURAL ENGINEER				CONTRACT			
DESIGN <u>LNZ</u>		CHECK <u>RO</u>		Nos.			
DRAWING <u>WMM</u>		CHECK <u>RO</u>					
DATE <u>JAN '73</u>		LOADING <u>HS 20-44</u>		DRAWING No.		<u>46-124-6</u>	

72-F-71	36-71-01	HWY. 17 & WANAPITSEI RIVER	411-71
W.O.	W.P.	LOCATION	GEOCRES NO.

• DATA ON FILE IN SOIL MECHANICS SECTION

REFER TO: CONTRACT FILE No. 73-120

REMARKS _____

GEOCRES INDEXING CARD FOR REPORTS NOT MICROFILMED
GI-20 AUG. 74

FIELD RECONNAISSANCE REPORT

FF-69
SEPT. 1968REQUIRED BY FOUNDATION SECTION
FOR

Not Available

W.P. NO. 36-70-01 HIGHWAY NO. 17 DISTRICT 17 SITE PLAN NO. Yet PROFILE NO. _____
RIVER CROSSING ☒ GRADE SEPERATION ☐ R.R.X. ☐ OTHER (SPECIFY) _____
ALTERNATE SCHEME (IF ANY) _____

EXISTING SITE CONDITIONS

DESCRIPTION:

TOPOGRAPHY: HILLY ☐ ROLLING ☐ VALLEY ☐ GULLIED ☐ FLAT ☒
VEGETATION: TREES ☐ BRUSH ☐ GRASS ☒ SWAMP ☐ FARM CROPS ☐ CLEARED ☐
SNOW COVER: 0"-6" ☐ 6"-12" ☐ >12" ☐
ROCK OUTCROP (SPECIFY LOCATIONS) _____

UNDERGROUND UTILITIES: UTILITY COMPANY TELEPHONE NO. FOR DEFINITE LOCATION

1 _____
2 _____
3 _____
4 _____
5 _____

EXISTING STRUCTURE(S):

FOUNDATIONS: SPREAD FOUNDATIONS ☐ SIZE _____ ELEVATION(S) _____
PILES ☒ TYPE _____ LENGTH(S) See Attached Dwg.
DESIGN LOAD _____ T.S.F. _____ TONS/PILE
CONDITION OF STRUCTURE Poor

APPROACHES: CUT ☐ FILL ☒ SIDE SLOPES Steeper than 2:1.
BERMS YES ☐ NO ☒

OTHER OBSERVATIONS (USE BACK OF SHEET TO DESCRIBE ANY FAILURES IN AREA, PAST PERFORMANCE OF EXISTING APPROACHES & STRUCTURE, ETC.)

ACCESSIBILITY

IS STRUCTURE LOCATED ON D.H.O. RIGHT OF WAY? YES ☒ NO ☐ IF NO,
HAS PERMISSION BEEN OBTAINED TO ENTER PROPERTY? YES ☐ NO ☐ IF NO,
PROPERTY OWNER(S):

NAME ADDRESS TELEPHONE NO.

1 _____
2 _____
3 _____
4 _____

WHO WILL OBTAIN NECESSARY PERMISSION? _____

HAS SITE BEEN SURVEYED & STAKED? YES ☐ NO ☒ IF YES, DATE OF MOST RECENT SURVEY _____

WILL CLEARING BE NECESSARY TO ENTER SITE AREA? YES ☐ NO ☒

IS SITE ACCESSIBLE TO WHEELED VEHICLES? YES ☒ NO ☐

IF RIVER CROSSING:

WILL A RAFT BE NECESSARY? YES ☒ NO ☐ IF YES, GIVE MAX. DEPTH OF WATER 25' FT.
CURRENT: SWIFT ☐ MODERATE ☐ SLOW ☒

DRILLING OPERATIONS

NEAREST SOURCE OF WATER (GIVE HAULING DISTANCE, IF KNOWN) _____

ADDITIONAL INVESTIGATION REQUIRED FOR THE FOLLOWING PURPOSES:

ALTERNATE SCHEME: YES ☐ NO ☒ IF YES, SPECIFY _____

HYDROLOGIC REASONS: YES ☐ NO ☐ IF YES, SPECIFY (SCOUR, ETC.) _____

REMARKS

NEAREST AVAILABLE ACCOMODATION: At Site

OTHER COMMENTS: _____

DATE 19th May 1972

REGIONAL BRIDGE LOCATION ENGINEER (J. C. McAllister)

72-11671
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

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

FROM: Structural Planning
North Bay

ATTENTION:

DATE: May 23, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT:

W.P. 36-70-01, Site 46-124
Wanapitei River Bridge,
Hwy. #17, District #17, Sudbury.

The reconstruction of the above bridge is scheduled for 1973. As a site plan is not yet available, I am attaching prints of the 100 ft. scale plan and profile of the crossing which should enable you to carry out the foundation investigation. Present scheduling calls for a completed foundation report by 26th July 1972.

The structure will be replaced on the existing alignment at a slightly higher grade as shown on the profile. I am also enclosing prints of Plans D/2609-1, -2, and -5, the last being a fairly extensive pile driving record of the existing structure. These should help you to determine the extent of the work required.

The proposed bridge will be slightly shorter than the existing and will probably utilize fewer piers.

Should you require further information, please call me.



J. C. McALLISTER
REG. STRUCTURAL PLANNING SUPERVISOR.
For J. E. GRUSPIER
MANAGER, ENGINEERING SERVICES.

JCMcA/les

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

411E-71
GEOCREC No.

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

FROM: Structural Planning,
North Bay, Ontario.

ATTENTION:

DATE: August 3, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT:

Re: W.P. 36-71-01 Site 46-124
Wanapitei River Bridge
Highway 17 District 17

Field work for the above is probably completed by now. As promised I am forwarding two copies of the site plan E-5031-1 for the crossing.

JCMcA:tp
Encl. two (2)
c.c. Mr. C.S. Grebski
Mr. R. Murphy

J.C. McAllister / for tp
J.C. McALLISTER,
REG. STRUCTURAL PLANNING
SUPERVISOR.

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

41 I -71

TO: Mr. J. C. McAllister, (2) FROM: Foundations Office,
Regional Structural Planning Supervisor, Design Services Branch,
Northern Region, West Bldg., Downsview.
North Bay, Ontario.

ATTENTION: DATE: August 31, 1972.

OUR FILE REF. IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
The Proposed Bridge Site 46-124
Wanapitei River Bridge and
Highway 17
District 17, Sudbury
W.O. 72-11071 -- W.P. 36-70-01

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: D. W. Farren
B. R. Davis
A. Rutka
H. McArthur
J. M. Childs
B. J. Giroux
R. P. Northwood
G. A. Wrong
B. A. Singh

Foundations Office
Documents

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

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-

FOUNDATION INVESTIGATION REPORT
For
The Proposed Bridge Site 46-124
Wanapitei River Bridge and
Highway 17
District 17, Sudbury
W.O. 72-11071 -- W.P. 36-74-01

1. INTRODUCTION:

In this report are the results of the foundation investigation for the proposed Hwy. 17 and Wanapitei River crossing. Upon receiving a request from Mr. J. C. McAllister, Regional Structural Planning Supervisor for the Northern Region dated May 23, 1972, a field and laboratory investigation was implemented by this section in order to determine the subsoil and groundwater conditions at the site. The recommendations for the structure foundation are presented in the following pages.

2. DESCRIPTION OF SITE:

The site is located in the Town of Wahnapiatae where Highway 17 crosses the Wanapitei River. There are residential dwellings within 200 feet of the existing bridge. The present bridge is a six span steel simple beam structure with a clear span of 266 feet. The approaches to the bridge have been built up approximately 9 ft. above the river banks. The river current was slow during the months of June and July when this investigation was carried out. The elevation of the river at this time varied between elevation 778 ft. and elevation 779 ft. The river is about 24 ft. deep in the center of the channel. It was noted that the abutments had settled and the expansion

joints had closed. The bridge site is in a river valley which follows the large rectangular jointing of the bedrock. The valley is surrounded by 50 to 75 foot high bedrock out crops of the Precambrian Age.

3. FIELD WORK AND LABORATORY INVESTIGATIONS:

The field investigation consisted of six boreholes and ten dynamic cone penetration tests. The boreholes and cone penetration tests were advanced by a diamond drill rig (BBS1) adapted for soil sampling. The drill was set up on a raft in order to place boreholes and cones in the river. Split-spoon samples were taken at regular intervals. Within the clayey silt layer 2" I.D. Shelby tube samples were taken by pushing the tube into the undisturbed soil manually. Where possible field vane tests were carried out in the cohesive layers. Standard penetration tests were conducted using conventional means and the penetration "N" values recorded. All the field and laboratory test results are recorded on the accompanying borelog sheets.

Soil samples were identified in the field and again upon arrival in the laboratory. Laboratory tests to determine moisture contents, grain size, and Atterberg limits were carried out on representative samples. Undisturbed samples were also subjected to triaxial and consolidation tests.

The locations and elevations of the boreholes as well as the stratigraphical profile along the centre-line are plotted on Drawing 72-11071A attached at the end of this report. The surveying of the site was carried out by personnel from the Northern Region Engineering Surveys Branch.

4. SUBSOIL CONDITIONS:

4.1) General:

The subsoil is a fluvial deposit and somewhat complex in nature. Six layers were identified. They are from ground

level, sand with some gravel and silt (approach fill material), sand with traces of silt, gravel, and organics, clayey silt to silt with some to traces of sand, silt with some sand and traces of clay and gravel, sand with some to traces of silt, clay and gravel, and gravel with sand to sand with gravel with traces of silt. A brief summary of each subsoil is given below.

4.2) Sand With Some Gravel and Silt:

This material was found only in B.H. #10. It extends from ground level to approximately 8 feet below the surface, between elevations 780.9 ft. and 772.9 ft. The material is the approach fill and consists of 24% gravel, 63% sand, and 13% clay and silt. The relative density may be described as loose and the moisture content was measured to be 12%.

4.3) Sand With Traces of Silt, Gravel, and Organics:

This layer was found to have a thickness of 8 to 9 ft. It appeared at the surface of the site and immediately below the river water. The deposit was encountered in B.H.'s #2, 4, and 10 but not in B.H.'s #5 and 8. In B.H. #10 it was overlain by approximately 8 feet of approach fill material. This layer was found to extend from elevation 776.2 ft. to 748.0 ft. in the different boreholes.

Moisture content of the material in this strata was measured to be 12% to 69.5%. Grain size analyses yield results varying from 0 to 3% gravel, 73 to 93% sand, and 6 to 24% clay and silt. The relative density may be described as very loose to compact. Layers and pockets of clayey sand and silty sand were encountered within this layer.

4.4) Clayey Silt to Silt With Some to Traces of Sand:

The next subsoil was identified as clayey silt to silt with some to traces of sand. As this is a fluvial deposit it is not of a uniform nature and occasional layers and pockets of clay, silt, and traces of gravel were encountered in the sampling.

This layer is beneath the sand but occasionally appears as the surface material. It is 18 to 49 feet in thickness and ranges between elevation 782.2 ft. and elevation 731.2 ft. The lowest depth that this material was sampled was in B.H. #4 at 47 feet below the river bottom. Standard penetration "N" values ranged between 0 and 19 blows per foot. Based on these values it is estimated that the relative density is very loose to compact.

Atterberg limits and moisture contents within this subsoil are as follows:

Liquid Limits %	22.5 to 42
Plastic Limit %	19 to 22
Moisture Content %	21 to 50.5

In order to determine the undrained shear strength of the soil, certain tests, as mentioned previously, were carried out in the field and in the laboratory. The results of these tests are summarized below:

Field Vane Test (p.s.f.)	340 to 1840
Triaxial Comp. Test (p.s.f.)	580 to 785
Sensitivity	2.1 to .7

4.5) Silt With Some Sand and Traces of Clay and Gravel:

This deposit was encountered in every borehole. It consists of silt with some sand and traces of clay and gravel. In thickness the layer varies from 15 feet to 35 feet extending between the elevations of 749.2 ft. and 695.2 ft. The maximum depth of this material was found to be some 78 feet below the river bottom in B.H. #4. In B.H. #8 at elevation 717.0 ft. a 5 foot layer of sand with some gravel and silt was encountered. Following this the silt with some sand reappeared for 5 feet. The "N" values within the silt was measured to be 9 blows per foot which corresponds to a loose relative density.

Mechanical grain size analyses indicate that the composition of the layer is 0 to 4% gravel, 13 to 20% sand and 76 to 87% clay and silt. Standard penetration "N" values

varied from 4 to 15 blows per foot, indicating a loose to compact relative density. The natural moisture content was calculated to be between 16.5 and 25.5%. A typical grain size envelope is included in the Appendix as Fig. 1.

4.6) Sand With Some to Traces of Silt, Clay and Gravel:

This deposit was encountered in all the boreholes. The depth of the deposit in B.H.'s #4, 5 and 8 is not known as the boreholes terminated within this material. In B.H.'s #2 and 10 this layer was found to be about 39' thick and extended between elevations 714 ft. and 672 ft.

The deepest penetration into this soil was in B.H. #5 which was wash bored to elevation 653.7 ft. some 128 ft. below ground surface. Standard penetration "N" values varied from 4 to greater than 100 blows per foot indicating a loose to very dense relative density. The material was found to consist of 0 to 16% gravel, 42 to 98% sand, and 1 to 58% silt and clay. A typical grain size envelope is included in the Appendix as Fig. 2. The natural moisture content was measured to be between 14 and 26%. Within this layer the sand boiled up into the casing in every borehole.

4.7) Gravel With Sand to Sand With Gravel With Traces of Silt:

In B.H.s #2 and 10 a deposit of gravel with sand to sand with gravel with traces of silt was sampled. B.H.'s #2 and 10 were terminated within this layer. This deposit was penetrated for a depth of 6 feet in B.H. #2 and 2.4 ft. in B.H. #10. The standard penetration "N" values vary between 26 and greater and 100 blows per foot indicating a compact to very dense relative density. Mechanical grain size analyses indicated that this deposit consists of 40 to 67% gravel, 28 to 53% sand and 5 to 7% clay and silt. The natural moisture content was calculated to be between 6.5 and 25.5%.

4.8) Groundwater:

The groundwater was observed in B.H. #10 to stabilize at elevation 778.7 ft. and in B.H. #5 at elevation 773.5 ft. In the other boreholes the water levels coincided with the river level which varied within a few inches of elevation 778.5 ft.

5. DISCUSSION AND RECOMMENDATIONS:

5.1) General:

As of the time of the writing of this report the number of spans for the proposed bridge had not been determined. Therefore, the recommendations for the piers can only be of a general nature. The proposed structure will be on the same centre line as the existing structure. The grade is proposed to be raised some 4 feet at the east and 3 feet at the west abutment. The Wanapitei River at this location is approximately 250 feet wide and 24 feet deep. The natural slope of the river banks is about 5 to 1. The subsoil consists of sand with traces of silt, gravel, and organics, followed by clayey silt to silt with some to traces of sand then silt with some sand and traces of clay and gravel, sand with some to traces of silt, clay, and gravel, and finally gravel with sand to sand with gravel with traces of silt.

5.2) Foundations:

The subsoil to approximate elevation 665 feet is of a loose to compact nature. These soils are believed to have insufficient strength to support the structure economically. Consequently, it is recommended that the structure be supported on long end bearing steel H piles. Elevations where refusal on piles might be reached are listed below with respect to boreholes.

B.H. #10 (West Pier	Elevation 665 ft.
B.H. #2	Elevation 655 to 660 ft.
B.H. #8	Elevation 655 to 660 ft.
B.H. #4	Elevation 650 ft.
B.H. #5 (East Pier)	Elevation 650 ft.

It is anticipated that piles driven to the suggested elevation will support loads equal to the full structural strength of the piles used. Sufficient bearing capacity might also be achieved on shorter piles, however, due to the heterogeneous nature of the subsoil full scale pile load tests would be recommended prior to adapting such a scheme. Economical considerations should govern in this decision.

The properties of the subsoil are such that it will boil if subjected to an unbalanced hydrostatic head. If the pile caps are desired to be constructed below the water level a dewatering scheme will be necessary.

It is proposed to raise the grade of the west abutment by 3 feet and the east abutment by 4 feet. A slope stability analysis based on total stress parameters with a shear strength of 400 p.s.f. indicates that the proposed grade raise would result in a failure of the embankment.

It is, therefore, recommended that the grade be not raised above the existing one. If, however, higher grades are inevitable for other reasons, the stability of the approach fills has to be maintained by constructing counterbalancing berms. For the design of berm lengths further stability analyses will have to be carried out, based on the new geometry. Berms will be necessary for the forward directions as well; thus the length of the structure will be increased.

Should higher approach fills be designed, this Office will carry out the necessary analyses to determine berm lengths.

6. MISCELLANEOUS:

The field work was carried out during the period of June 14 to July 14, 1972, by Mr. P. Korgemagi and Mr. E. A. Wood, Project Foundations Engineers.

The equipment used was owned and operated by Master Soils Ltd., Toronto.

This report was prepared by Mr. P. Korgemagi and reviewed by Mr. A. K. Barsvary, Senior Foundations Engineer.

P. Korgemagi

P. Korgemagi, P. Eng.



A. K. Barsvary

PK/ao

A. K. Barsvary, P. Eng.

August 30, 1972.

APPENDIX I

CHECKED BY AK

20
15 ϕ 5 % STRAIN AT FAILURE
10

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 2

JOB 72-11071

LOCATION Sta. 189+76 24' Rt. of R

ORIGINATED BY TW

W.P. 36-74-01

BORING DATE June 28, 1972

COMPILED BY TW

DATUM Geodetic

BOREHOLE TYPE Washboring and Cone Test

CHECKED BY *HL*

SOIL PROFILE		STRAT. PLT	SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100				LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w w_p — w — w_L			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION		NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE				WATER CONTENT % 20 40 60				
756.0	River Bottom														
0.0	Sand with trace of silt, gravel and organic.		1	SS	8	750									
748.0	Loose		2	SS	5										1 93 (6)
8.0	Silt with some sand and trace of clay and gravel.		3	SS	15	740									
			4	SS	5	730									
	Loose to Compact		5	SS	7	720									
714.0															
42.0	Sand with some silt, traces of clay and gravel		6	SS	7	710									
			7	SS	20	700									0 55 (45)
	Loose to Dense		8	WS		690									
			9	SS	31										
			10	SS	26	680									
675.0															
81.0	Sand with gravel, traces of silt.		11	SS	26	670									40 53 (7)
669.0	Compact														
87.0	End of Borehole														
661.9															
94.1	End of Cone Test														

20
15 5 % STRAIN AT FAILURE
10

RECORD OF BOREHOLE NO 3

JOB 72-11071

LOCATION Sta. 190 + 41 24' Rt. of \varnothing

ORIGINATED BY TW

W.P. 36-70-01

BORING DATE June 27, 1972

COMPILED BY T.J.

DATUM Geodetic

BOREHOLE TYPE Cone Test Only

CHECKED BY

[illegible]

20
15 ϕ 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 4

JOB 72-11071

LOCATION Sta. 190+94 23' Rt. of C

ORIGINATED BY TW

W.P. 36-74-01

BORING DATE July 6, 1972

COMPILED BY TW

DATUM Geodetic

BOREHOLE TYPE Washboring and Cone Test

CHECKED BY *TL*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — w_L		BULK DENSITY γ P.C.F. GR SA SI CL	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT		PLASTIC LIMIT — w_p			
							20 40 60 80 100		WATER CONTENT — w			
							SHEAR STRENGTH P.S.F.		w_p — w — w_L			

20
15 \div 5 % STRAIN AT FAILURE
10

(Cont'd)

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 4 (Cont'd)

JOB 72-11071

LOCATION Sta. 190 + 94 23' Rt. of Ø

ORIGINATED BY TW

W.P. 36-74-01

BORING DATE July 6, 1972

COMPILED BY TW

DATUM Geodetic

BOREHOLE TYPE Washboring and Cone Test

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT W_L PLASTIC LIMIT W_P WATER CONTENT W W_p — W — W_L	BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT					
664.7			14	SS	17	670				
111.5	End of Borehole					660				
651.6										
124.6	End of Cone Test									

RECORD OF BOREHOLE N^o 5

JOB 72-11071

LOCATION Sta. 191 + 66 27' Rt. of C

ORIGINATED BY TM

W.P. 36-70-71

BORING DATE June 14, 1972

COMPILED BY TH

DATUM Geodetic

BOREHOLE TYPE Washboring and 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	SHEAR STRENGTH P.S.F.		WATER CONTENT %				
							UNCONFINED ● QUICK TRIAXIAL 400 800 1200 1600 2000	+ FIELD VANE x LAB VANE	w_p			w	w_L
732.2	Ground Level												
0.0	Clayey silt to silty clay with some sand.		1	SS	18					119.5	$e_o=0.858$ $C_c=0.118$ $c'=229$ psf $\phi=30.6$		
			2	SS	15								
			3	TW	PM								
			4	SS	2								
	Soft to Very Stiff		5	TW	PM								
			6	SS	2								
749.2			7	TW	PM								118
33.0	Silt with some sand and traces of gravel.		8	SS	8					0 42 (58)			
			9	SS	11								
			10	SS	10								
			11	SS	10								
	Loose to Compact		12	SS	11								
			13	SS	7								
			14	SS	9								
			15	SS	16								
			16	SS	16								
			17	SS	11								
698.2		18	WS										
84.0	Sand with some silt, traces of clay and gravel.		19	SS	11					3 95 (2)			
			20	SS	100 3"								
			21	SS	34								
	Compact to Very Dense		22	WS									
			23	SS	27								
		24	WS										

20
15 ϕ 5 % STRAIN AT FAILURE
10

(Cont.'d)

3 95 (2)

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 5 (Cont'd)

JOB 72-11071

LOCATION Sta. 191 + 66 27' Rt. of C

ORIGINATED BY TW

W.P. 36-74-01

BORING DATE June 14, 1972

COMPILED BY TW

DATUM Geodetic

BOREHOLE TYPE Washboring and Cone Test

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT — W _L PLASTIC LIMIT — W _P WATER CONTENT — W W _P — W — W _L WATER CONTENT % 20 40 60	BULK DENSITY γ P.C.F. GR. SA. SI. CL.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT						
653.7		...	26	SS	19	670				0.99 (1)	
			27	WS							
			28	SS	19						
			29	SS	60						
			30	WS							
653.7			31	SS	22	660				1.76 (23)	
128.5	End of Borehole										

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 5A

JOB 72-11071

LOCATION Sta. 191 + 63 27' Rt. of Ø

ORIGINATED BY TH

W.P. 36-74-01

BORING DATE July 14, 1972

COMPILED BY TV

DATUM Geodetic

BOREHOLE TYPE Washboring and 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		20	40	60	80	100	SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE			
781.7	Ground Level													
0.0					780									
					770									
					760									
					720									
					710									
					700									
					690									
					680									
674.0														
107.7	End of Washboring				670									
					660									
653.7														
128.0	End of Cone Test													

20
15 — 5 % STRAIN AT FAILURE
10

RECORD OF BOREHOLE NO 6

JOB 72-11071

LOCATION Sta. 191 + 63 20' Lt. of \varnothing

ORIGINATED BY TW

W.P 36-70-01

BORING DATE June 19 1972

COMPILED BY

DATUM Geodetic

BOREHOLE TYPE Cone Test Only

CHECKED BY

[illegible]

20
15 ϕ 5 % STRAIN AT FAILURE
10

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 7

JOB 72-11071 LOCATION Sta. 191 + 01, 20' Lt. of Ø ORIGINATED BY TW
 W.P. 36-71-01 BORING DATE June 20, 1972 COMPILED BY TW
 DATUM Geodetic BOREHOLE TYPE Cone Test Only CHECKED BY _____

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w w_p — w — w_L WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE					
764.2	River Level 778.5 River Bottom								
760									
750									
740									
730									
720									
710									
700									
690									
687.2									
77.0	End of Cone Test								

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 8

JOB 72-11071

LOCATION Sta. 190 + 42 20' Lt. of R

ORIGINATED BY TW

W.P. 36-74-01

BORING DATE June 20, 1972

COMPILED BY TW

DATUM Geodetic

BOREHOLE TYPE Washboring and 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		20	40	60	80	100	w_p	w	w_L		
752.0	River Level 778.5 River Bottom															
0.0	Clayey silt to silt with some sand.		1	SS	6	750										
			2	SS	19											
	Loose to Compact		3	SS	16	740										
732.0			4	SS	13											
20.0	Silt with some sand and trace of clay and gravel.		5	SS	6	730										4 20 (76)
			6	SS	4											
	Loose to Compact		7	SS	12	720										
35.0	Sand with some gravel and silt.		8	SS	15											
712.0	Compact					710										16 63 (21)
40.0	Silt with some sand and trace of clay and gravel. Loose		9	SS	9											
707.0						700										
45.0	Sand with some silt and clay.		10	SS	14											
			11	SS	30											
			12	WS		690										0 72 (28)
	Compact to Very Dense		13	SS	18											
			14	WS												
			15	SS	19											
			16	WS		680										
			17	SS	14											
			18	SS	16											
			19	SS	13											
			20	SS	83	670										9 81 (10)
			21	WS												
650.2			22	SS	100	660										
92.8	End of Borehole															

20
15 \diamond 5 % STRAIN AT FAILURE
10

RECORD OF BOREHOLE № 9

JOB 72-11071

LOCATION Sta. 189 + 77 20' Lt. of \emptyset

ORIGINATED BY TV

W.P 36-71-01

BORING DATE June 21, 1972

COMPILED BY

DATUM Geodetic

BOREHOLE TYPE Cone Test

CHECKED BY

[illegible]

20
15 ϕ 5 % STRAIN AT FAILURE
10

OFFICE REPORT ON SOIL EXPLORATION

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 10

JOB 72-11071

LOCATION Sta. 189 + 12.5 20' Lt. of Ø

ORIGINATED BY TW

W.P. 36-74-01

BORING DATE July 11, 1972

COMPILED BY TW

DATUM Geodetic

BOREHOLE TYPE Washboring and Cone Test

CHECKED BY J.L.

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		20	40	60	80	100	w_p	w	w_L		
780.9	Ground Level														
0.0	Loose Sand with some gravel and silt		1	SS	9										24 63 (13)
772.9	Fill Material														
8.0	Sand with trace of clay, silt & organic.		2	SS	4										
	Loose to Compact		3	SS	13										0 81 (19)
760.9	Clayey silt to silt with some sand.		4	SS	3										
20.0	Very Loose		5	SS	3										
742.9															
38.0	Silt with some sand		6	SS	14										
			7	SS	6										
	Loose to Compact		8	SS	9										
710.9															
70.0	Sand with some silt		9	SS	6										0 79 (21)
			10	SS	8										
	Loose to Compact		11	WS											
			12	SS	10										
			13	WS											
			14	SS	15										0 98 (2)

20
15 ϕ 5 % STRAIN AT FAILURE
10

(Cont'd)

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 10 (Cont'd)

JOB 72-11071

LOCATION Sta.189 + 12.5 20' Lt. of Ø

ORIGINATED BY TW

W.P. 36-70-01

BORING DATE July 11, 1972

COMPILED BY TH

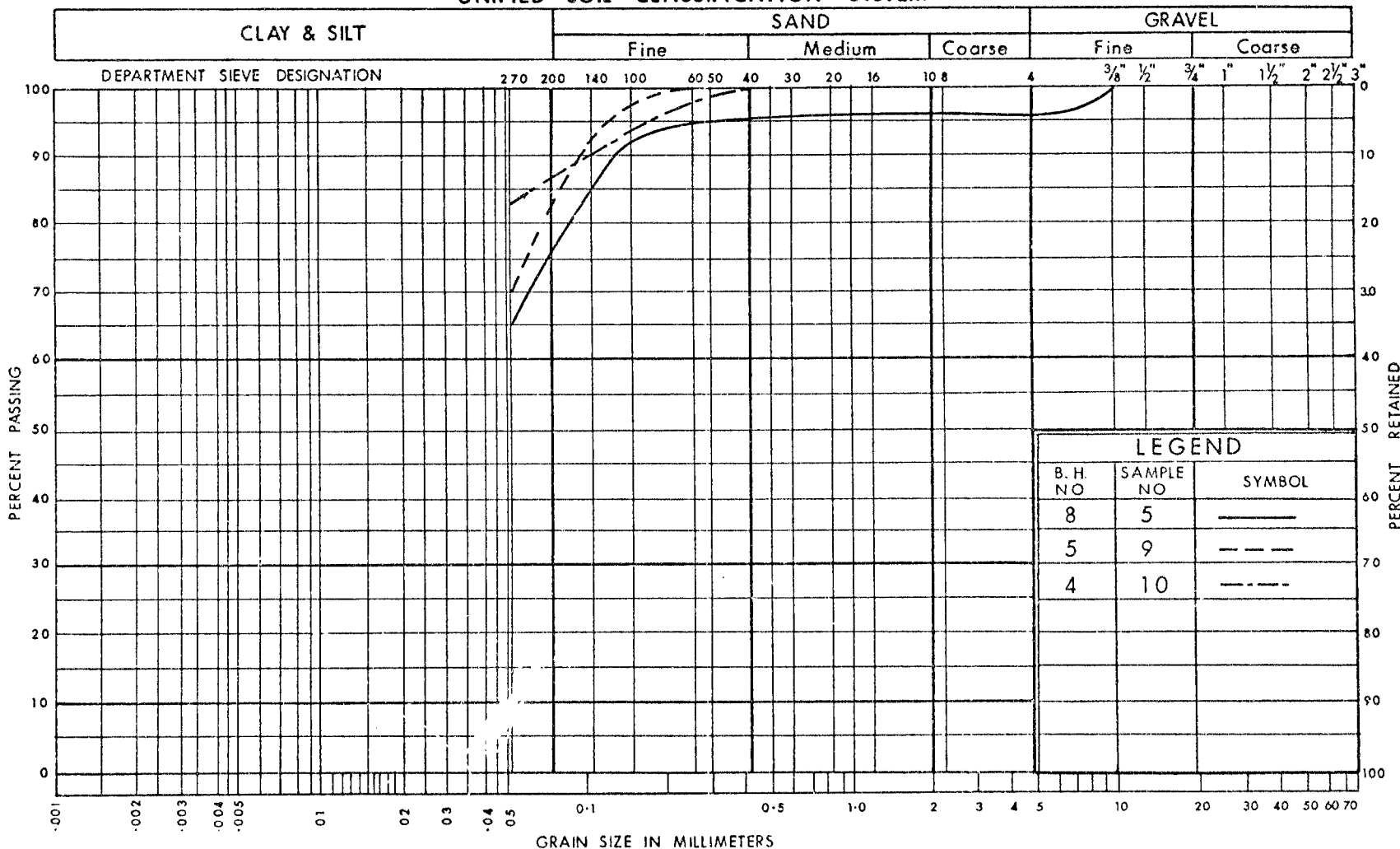
DATUM Geodetic

BOREHOLE TYPE Washboring and Cone Test

CHECKED BY SLP

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT					PLASTIC LIMIT				
						20	40	60	80	100	WATER CONTENT %					
						SHEAR STRENGTH P.S.F.					WATER CONTENT %					
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					W _p — W — W _L					
						400	800	1200	1600	2000	20 40 60					
672.4			15	WS												
108.5	Gravel with sand and		16	SS	193										67 28 (5)	
669.0	trace of silt.V.Dense															
111.9	End of Borehole															

UNIFIED SOIL CLASSIFICATION SYSTEM



UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT

SAND

GRAVEL

Fine

Medium

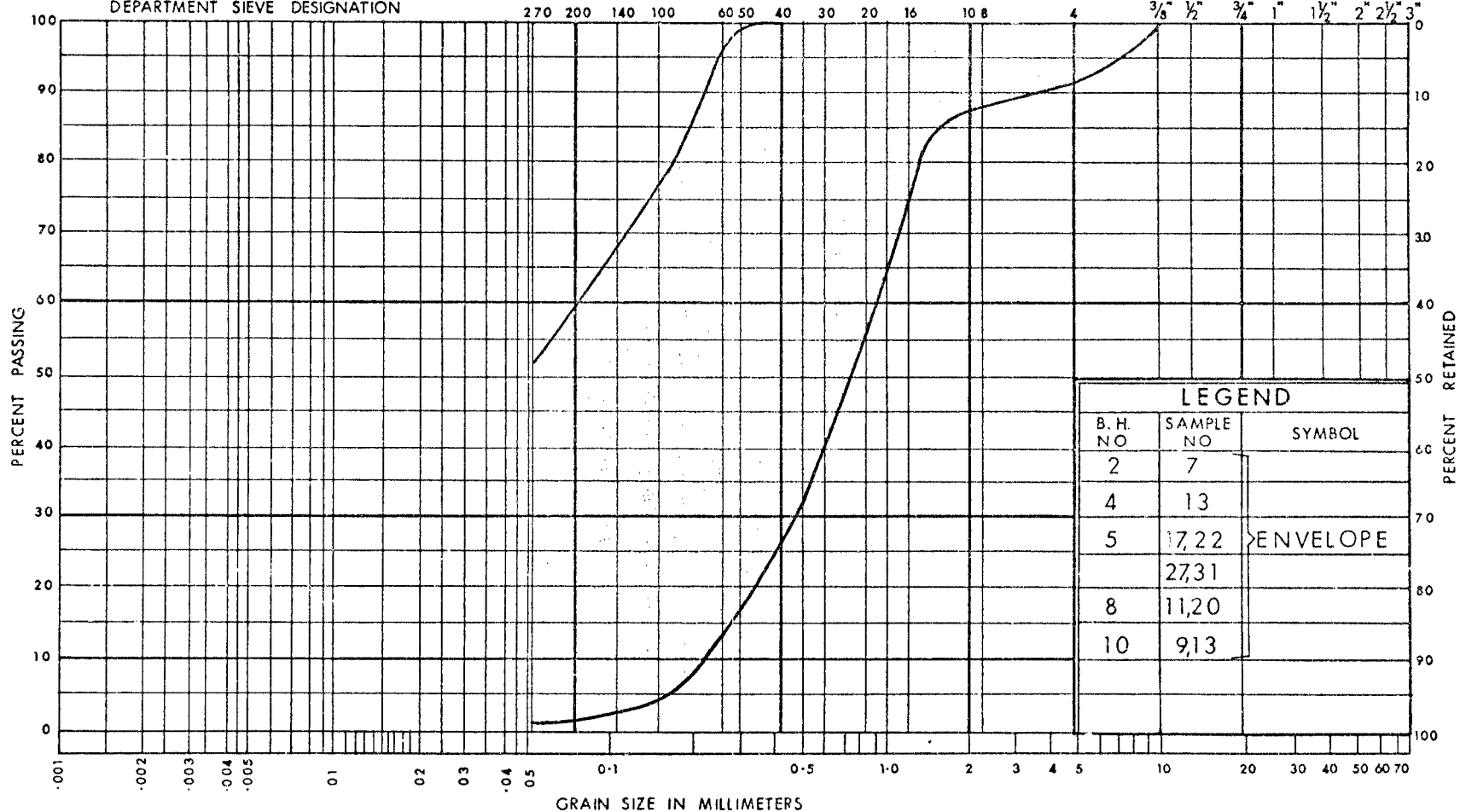
Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION

270 200 140 100 60 50 40 30 20 16 10 8 4 3/8 1/2 3/4 1 1 1/2 2 2 1/2 3"



LEGEND

B. H. NO	SAMPLE NO	SYMBOL
2	7	
4	13	
5	17,22	ENVELOPE
	27,31	
8	11,20	
10	9,13	

DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS



DESIGN SERVICES
BRANCH

GRAIN SIZE DISTRIBUTION

SAND WITH SOME SILT, TRACES
OF CLAY AND GRAVEL.

W.P. No. 36-70-01

JOB No. 72-11071

FIG. No. 2

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

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

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

DESCRIPTION OF SOIL

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

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

TYPE OF SAMPLE

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

SOIL TESTS

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

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

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

GENERAL

π	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
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

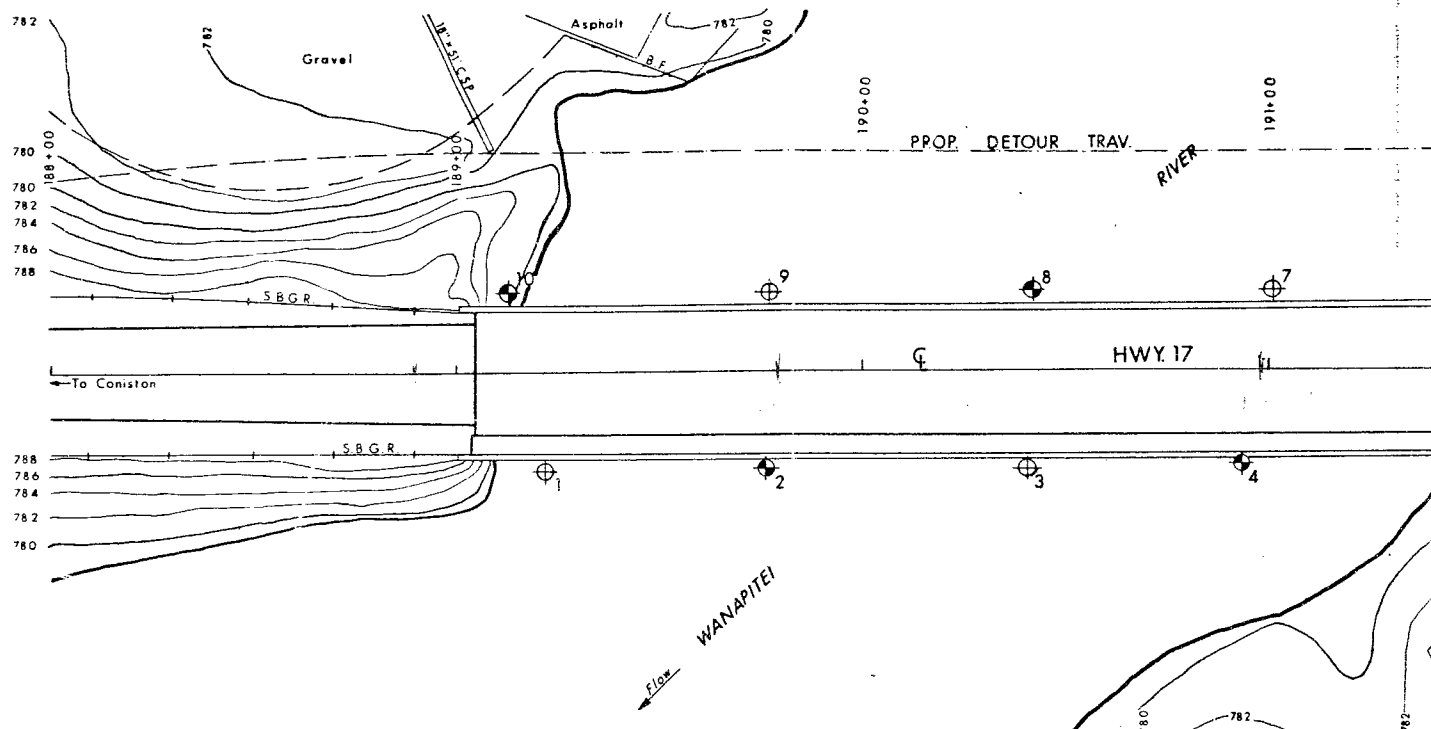
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

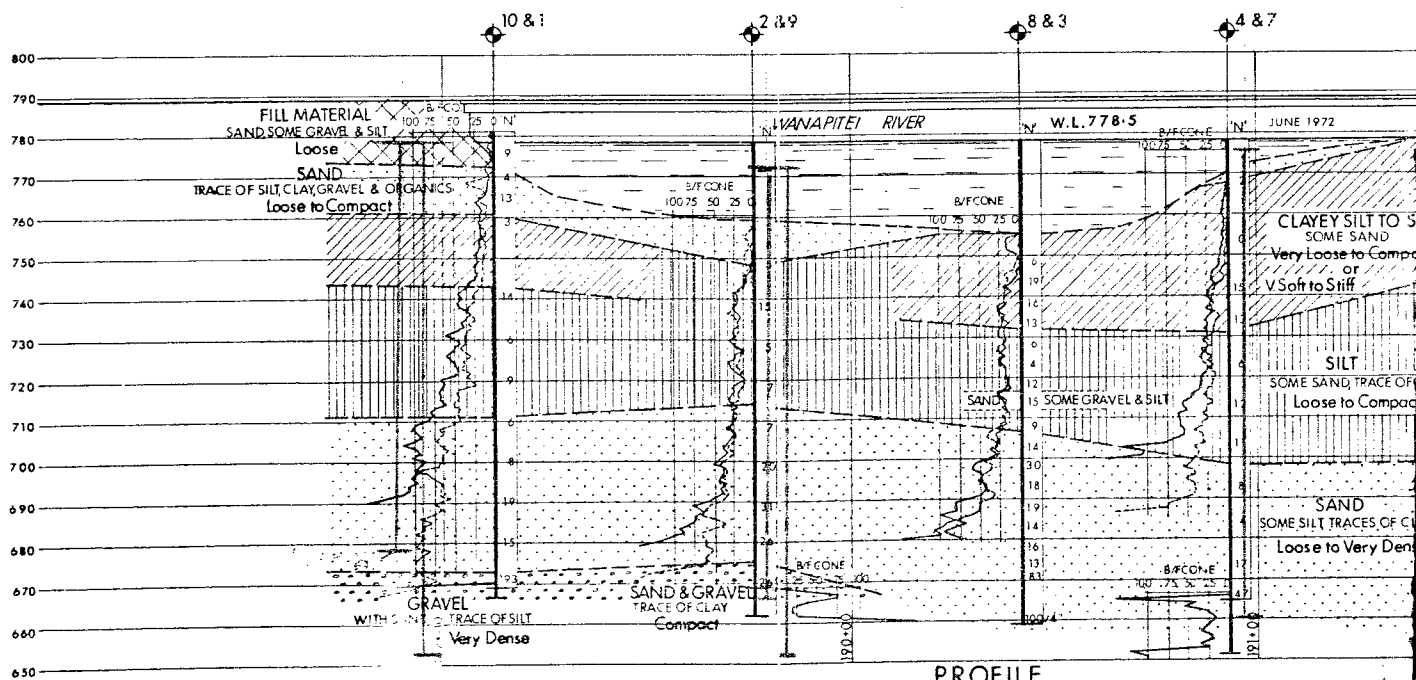
B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

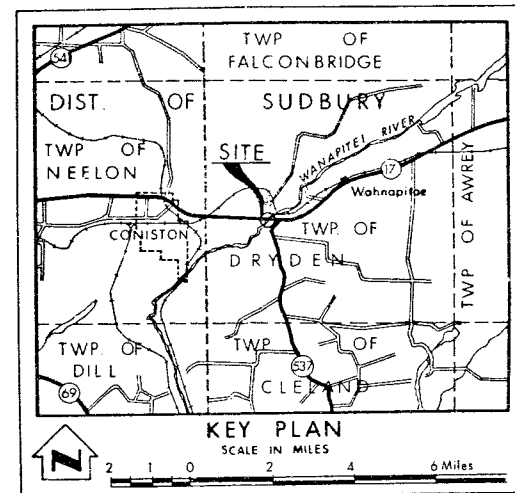
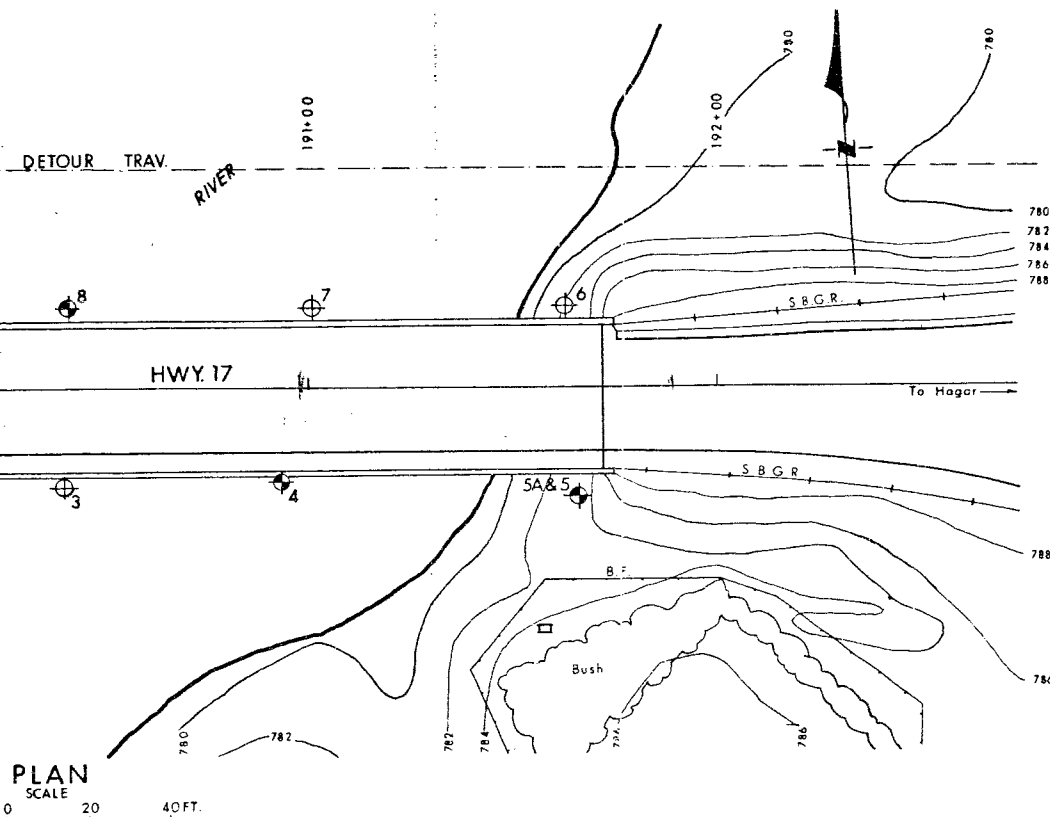
H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL



PLAN
SCALE
20 10 0 20 40 FT.



PROFILE
SCALE
20 10 0 20 40 FT.

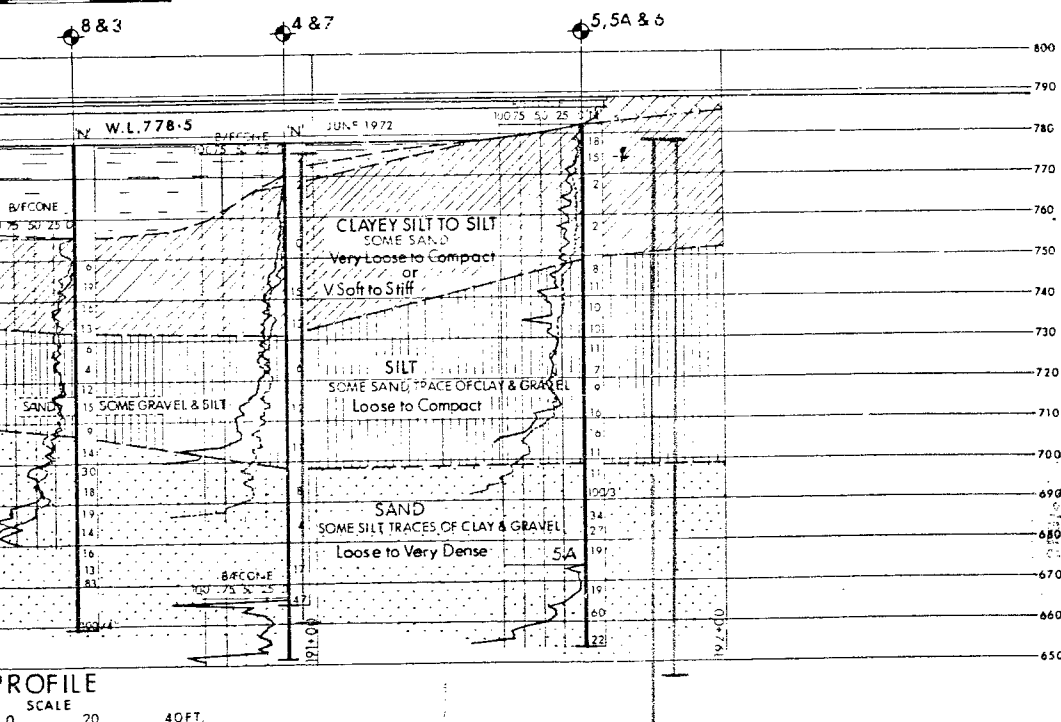


LEGEND			
	Bore Hole		
	Cone Penetration Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation, JUNE 1972		

NO.	ELEVATION	STATION	OFFSET
1	778.5	187+22	24'RT.
2	778.5	189+76	24'RT.
3	778.5	190+41	24'RT.
4	778.5	190+94	23'RT.
5	782.2	191+66	27'RT.
5A	781.7	191+63	27'RT.
6	780.3	191+63	20'LT.
7	778.5	191+01	20'LT.
8	778.5	190+42	20'LT.
9	778.5	189+77	20'LT.
10	780.9	189+12.5	20'LT.

NOTE

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.



REVISIONS	DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
DESIGN SERVICES BRANCH-FOUNDATIONS OFFICE

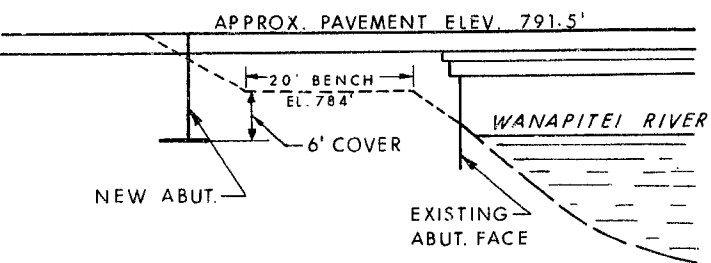
WANAPITEI RIVER

HIGHWAY NO. 17 DIST. NO. 17
Dist. of SUDBURY
TWP. DRYDEN LOT 9 CON. III

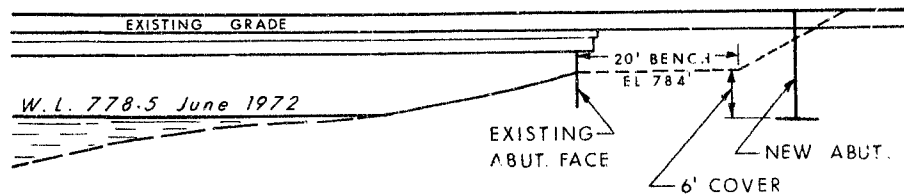
BORE HOLE LOCATIONS & SOIL STRATA

SUBMIT A.B.	CHECKED	W.P. NO. 36-71-01	DRAWING NO.
DRAWN F.L.	CHECKED	W.O. NO. 72-11071	72-11071A
DATE Aug 31, 1972	SITE NO.	BRIDGE DRAWING NO.	
APPROVED	CONT. NO.		

WEST



EAST



W.O. 72-11071

W.P. 36-71-01

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. J. C. McAllister, (2)
Regional Structural Planning Supervisor,
Northern Region,
North Bay, Ontario.

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

ATTENTION:

DATE: September 13, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
The Proposed Bridge Site 46-124
Wanapitei River Bridge and
Highway 17
District 17, Sudbury
W.P. 72-11071 -- W.P. 36-71-01

With reference to the above-mentioned report dated August 31, 1972, please correct the W.P. number from W.P. 36-70-01 to W.P. 36-71-01 on the covering letter, the first page of the report and the attached log sheets and graphs.



A. G. Stermac,
PRINCIPAL FOUNDATIONS ENGINEER.

AGS/ao

cc: D. W. Farren
E. R. Davis
A. Rutka
E. McArthur
J. M. Childs
B. J. Giroux
R. P. Northwood
G. A. Wrong
D. A. Singh

Foundations Files
Documents

MEMORANDUM

TO: Mr. A. C. Stermac,
Principal Foundation Engineer,
Downsview.

FROM: Structural Planning,
North Bay.

DATE: 25 September 1972

ATTENTION:

IN REPLY TO


OUR FILE REF.

SUBJECT:

W.P. 36-71-01, Site 46-124,
Wanapitei River Bridge,
Hwy. #17, District #17, Sudbury.

Attached is a print of the proposed grade over the
Wanapitei River. This is profile grade and will be about $5\frac{1}{2}$ "
below finished pavement.

The grade previously issued was preliminary and only
approximate.

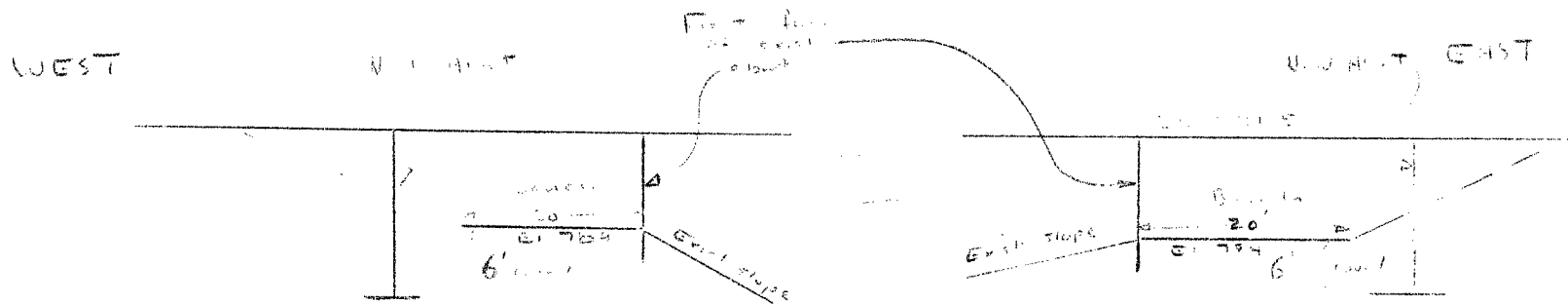


J. C. McALLISTER,
REG. STRUCTURAL PLANNING SUPVR.

JChcA/les
Att.

c.c. R. Northwood.





TO C. GARDNER

The above sketch shows what our final recommendation will be regarding the approach slopes for the Wapiti River Bridge.

The only is now to compute a bank over and we cannot predict exactly when we will be able to finalize this but will do it as fast as possible.

K. J. Bailey

Oct. 13th 1972 (11.50 AM)

Mr. C. S. Grebski,
Structural Design Engineer,
Structural Office,
West Bldg., Downsview.

Mr. A. Padkowski.

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

November 3, 1972.

Wanapitei River

W.O. 72-11071 - W.P. 36-71-01

Further to the sketch and informal note submitted to you on the 13th of October, 1972, we are sending you the final recommendation concerning the approach slopes for the above structure.

You will note that the suggested treatment, utilizing 20 ft. long benches at elevation 784 ft. is identical to the one submitted previously.

The stability analyses of this geometry have resulted in acceptable factors of safety and we believe that no further problems will be encountered if this design is adopted.

AKB/ao
Attach.

A. H. Barsvary
A. H. Barsvary,
SENIOR FOUNDATIONS ENGINEER.

cc: S. McCombie
J. E. Gruspier
G. A. French
A. Putka

Foundations Files
Documents

FOUNDATION OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P. 85-71-01
N.O. 72-11071

Foundation Report By: P. KORSEMACI
Review of Design Drawings By: A. L. B.
Design Drawing No.'s.: 46-124-P

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? N.A.
6. Are approaches designed in accordance with our report? Check slopes and berm lengths. YES
7. Do you anticipate any construction problems? i.e. dewatering, stability of temporary slopes or excavations. NO
8. Summarize your comments; on separate sheet if necessary.

NO COMMENTS

Drawings Received 7 N.O. 19.72.
Reviewed 2 N.O. 19.72.

Signed A. L. B.

FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P.

W.O.

Foundation Report By :

Review of Design Drawings By:

Design Drawing No.'s:

1. Does footing design comply with our report or subsequent memos? YES.
2. If answer to 1. is No, is present design acceptable? A/D
3. Has sufficient field work been done? YES
4. Are estimated pile lengths shown on Drawings correct? If not, make a new list. YES
5. If excavation of unsuitable soil is recommended, is this shown on Drawings? YES
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. YES
8. Summarize your comments; on separate sheet if necessary.

Drawings Received19.....

Reviewed19.....

Signed

72-11071
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

Copy for the information of Mr. K. Selby

~~Mr. S. McCombie,~~
~~Manager, Systems Design,~~
~~Northern Region.~~

Engineering Services,
Northern Region.

11 June 1973.

W.P. 36-71-01, Wanapitei River
Bridge, Highway #17, Dist. #17

Further to the pre-contract review meeting, I have discussed the need for berms at this structure site with Mr. K. Selby of the Foundations Office.

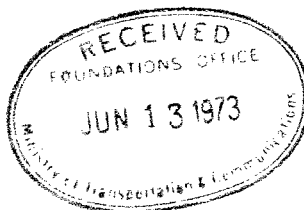
Cross-sections were submitted to his office Thursday. Based on these, Mr. Selby has stated that a bench is required on the southwest corner of the structure in addition to those shown at the ends of the approach fills. The bench of 20 ft. width shown on the drawings is to be extended to Station 188+50 and should be carried back to Station 188+00 where it is no longer required. The elevation of the bench should be 784.0 ft. and it should slope away from the approach fill for drainage purposes at a slope of 1:20.

Mr. Selby also stated that, after discussion with Mr. John Harris, it is in order to extend the fill 20 ft. into the river in order to construct the bench in the southwest corner.

JEG/les

J. E. GRUSPIER,
MANAGER, ENGINEERING SERVICES.

c.c. K. Selby
J. McAllister
W. Peck



NOTES

P/AT 10/74

PILE NO 2 WEST ABUTMENT FINISHED
DESIGN LOAD AFTER ONLY 100.7' OF PILE
WAS IN PLACE: THE FINISHED COUNT OF
63 BLOWES IN $\frac{3}{4}$ " PILE WAS LATER
CONFIRMED BY GRAVITY TAKEN $\frac{1}{2}$ " CALL
USING HILTI FORMULAE WHICH SHOWED
PILE TO BE ABLE TO CARRY A LOAD
OF 88 TON [DESIGN LOAD]

[Signature]

Mr. D.S. Cornell,
District Engineer,
District #17, Sudbury.

Soil Mechanics Section,
Geotechnical Office,
West Building, Downsview.

March 6th, 1974.

RE: Wanapitei River Bridge, Hwy. #17,
Contract 73-120,
W.O. 72-11071 W.P. 36-71-01.

The undersigned visited the above site on March 1st, 1974. On that day, Pile #2 of Pier #2 was being driven. The writer was advised by Messrs. Jim Hunter and Bill Wilson of your Office that piles #7, 9, 11 and 13 were driven to refusal. No further penetration of these piles was possible below Elev. 661+ 0.5 ft. The piles for Piers #1 and 2 are relatively heavy 12 HP 89 Sections up to 127 ft. long and weigh up to 6 tons each. The contractor was using Delmag D-12 Diesel Pile hammer to drive these piles.

We have reviewed the subsoil conditions existing at the site, as contained in our Report 72-11071. Borehole #4 was put down at the south end of Pier #2. In this Borehole the "N" values above approximate elevation 670 varied between 1 and 17 blows per ft. The sample taken at elevation 665 indicated an "N" value of 47 blows per ft. A dynamic cone penetration test was carried out at the bottom of this hole. The cone penetrated 13 ft. below the bottom of Borehole #4, i.e. down to elevation 651.6, before meeting refusal. The average number of blows required to drive the cone were 30 blows per ft. It is estimated from the above, that these piles should meet refusal at approximate elevation 550 and should be able to safely support the maximum design load.

It is our opinion that this hammer is too light to drive these relatively heavy piles to the required design load of 115 tons per pile. The only way to ensure that the piles already driven to practical refusal are capable of safely supporting the design load, is to carry out a pile load test. This would be an expensive and time consuming operation. Under these circumstances, it would be advisable to replace the present hammer with a heavier one which is capable of driving these piles to the required capacity. The pile driving should be controlled by the Hiley Formula.

This confirms the recommendations given to your Office on March 1, 1974. Should additional information be required, please contact this Section.

Anand Prakash
Anand Prakash,

Senior Engineer-Soil Mechanics.

AP/mj

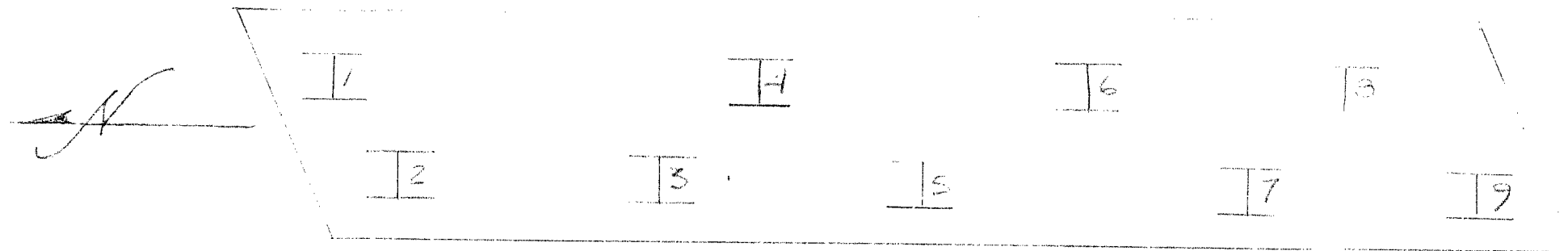
c.c. J.W. MacDougall,
C.A. Grebski,
A.E. McKim
J.M. Crannie

OVERSIZED DRAWINGS

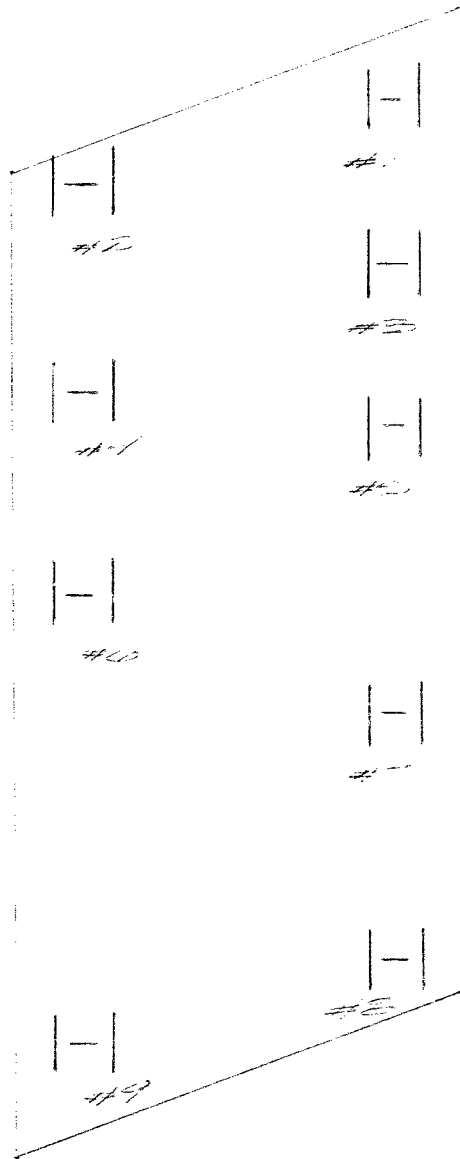
General Plan
Footings
Pier Details

1

EAST BRIDGE ABUTMENT 12" H PILE @ 53#/FT
PILE LOCATION.



↑
2
0
R
7
11



to about #17

to about #17

What does it mean to about #17?

What is the state of these records Henry?

Bring me please a .

FILE
CUTOFFS WEST ABUTMENT

FILE	LENGTHS CUTOFF	TOTALS
1	.6' & .5' & 43'	5.40'
2	.3' & 20.7' & 14'	22.40
3	.5' & .5' & 11.4'	12.4'
4	.4' & .3' & 1.6'	2.30'
5	.3' & 1.0' & 1.0'	3.50'
6	0.7' & 2.6'	9.30'
7	.3' & 15.6'	15.90'
8	.9' & 13.4'	14.3'
9	4.0'	4.0'

TOTAL CUTOFF

LENGTH =

89.50'