

72-1-61

72-72

HWY. 17 & PETANAWA RIVER

31F-55

W.O.

W.P.

LOCATION

GEOGRES NO.

● DATA ON FILE IN SOIL MECHANICS SECTION

REFER TO: CONTR. FILE No. 72 197

REMARKS

GEOGRES

INDEXING CARD FOR REPORTS NOT MICROFILMED

GI-20

AUG 74

MEMORANDUM

To: Mr. J. E. Callaghan,
District Engineer,
OTTAWA, Ontario.

72-11061
FROM: Materials & Testing Office,
KINGSTON, Ontario.

ATTENTION:

DATE: May 12th, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT:

Proposed Hwy. 17 Detour, Locations for Temporary Petawawa
River Bridge Locations

As requested a soils investigation was carried out for proposed detour routes that may be required for a temporary Bailey Bridge crossing on either side of the existing structure.

Summary of our findings and associated detour construction comments is as follows.

West Side of River North of Existing Structure

Subsoils consist of acceptable fine sand, sandy gravel and sandy till materials. A wide terrace exists along the river bank approximately 5' to 7' below the existing highway level at the west end of the present structure. Approximately 24" to 30" clayey silt was encountered over the predominant acceptable granular soils on this terrace. Where the construction grade is less than 3' above the silt material, it should be excavated and backfilled with acceptable fill.

Construction with 2" asphalt and 6" to 9" Granular 'A' over the acceptable granular subsoils would probably be adequate for a 2 year period. The 6" Granular 'A' depth may be used on the well graded granular materials. The 9" depth should be placed where the subgrade materials consist of uniformly graded fine sand.

Algonquin St. East of the River on North Side of Existing Hwy. # 17

Test holes encountered 1½" asphalt over 3" loose crushed gravel over uniformly graded fine sand subgrade material. The subsoil mainly meets our Granular 'C' requirements. The roadway construction appears to have been carried out during the past year. The asphalt surface is in very good condition. Near the west end of the existing pavement a 2' to 3' layer of wet silt was encountered 12" below the surface of the existing pavement. It is assumed that this material is a local deposit as it wasn't encountered on any of the other test holes that were placed.

Cont'd.....

If Highway # 17 traffic is routed over this street, it may be anticipated that the asphalt pavement will undergo considerable deformation and break-up. Addition of a 2" asphalt pavement course would minimize traffic damage on this section. In addition, it may be assumed that some break-up patching and restoration work will be required. The existing asphalt surface is 22' wide. A 0.3 mile length of street is involved.

Victorian Street - 0.2 Miles from Algonquin St. to Hwy. # 17

Bore holes encountered 2" asphalt over sandy gravel subsoil that appears to meet our Granular 'B' gradation requirements. The asphalt surface (22' width is in fair to good condition). If this street is used as Highway # 17 detour, considerable break-up will occur. An additional 3" asphalt (2 - 1½" courses) would minimize break-up on this section of street.

Bert Street, from Algonquin to Hwy. # 17, 0.15 Miles

The asphalt pavement (20' width) is in good condition. Pavement consists of 1½" asphalt over uniformly graded fine sand subsoil. A mixture of topsoil was encountered in the upper 6 inches of the sand subsoil.

An additional 4" of asphalt should be placed if this street is used as detour.

Harry Street Alternative

The existing roadway west of Bert Street consists of 1" gravel over 6"+ fine sand and topsoil over uniformly graded fine sand. On the extension of the existing street the subsoils mainly consist of fine sand except along the east side of the river where a 1' to 2' depth of clayey silt was encountered over bedrock. A few very large boulders are present on the surface within the area where the detour roadway construction may be carried out.

The gradeline should be kept at least 3' above ground level on the low flat area adjacent to the river. Blasting would likely be required to remove the very large boulder formations. A 9" Granular 'A' base with 2" asphalt may be assumed if this alignment is adopted. Borrow fill and cut material would likely consist of fine sand.

In order to ensure good performance of the asphalt pavements, an additional 1½" asphalt surface course would be required on all of the sections previously discussed. However, it is anticipated that it would be more economical to patch local areas of deformation and cracking than it would be to carry the additional paving course throughout the full length of the proposed detour routes.

Visual examination along the south side of the existing structure indicates that it would be feasible to construct approaches to a Bailey Bridge without serious foundation problems. However, it is understood that a representative from the Foundation's Office will be on the site with Bridge Office representatives tomorrow.

Cont'd.....

In view of the cost of a detour route and the public inconvenience associated with it, serious consideration should be given to constructing a Bailey Bridge across the existing structure. The centre pier as it now rests appears to be stable. It may be possible to check it by core drilling through the pier footing. There is the possibility of re-inforcing the shoreline piers if necessary.

If we can be of any more assistance, please do not hesitate to call.

A. M. Batten

A. M. Batten,
Senior Soils Supervisor

AMB/sgp

c. c. - P. D. Billings
E. J. Orr
G. A. Wrong
A. G. Stermac

72-11061

Mr. I. B. Wilkes,
Executive Director,
Design Division.

J. A. Barr,
Program Engineer,
Program Office.

May 15, 1972.

Critical Path Pre-Engineering Schedule
S. P. 72-72-01
Petawawa River Bridge - Highway 17

As per your request, a Critical Path Schedule has been prepared for the pre-engineering of the above mentioned project. Based on the activity durations assigned on the enclosed network diagram, the following schedule is suggested.

- | | |
|---|---------------|
| 1. Design Criteria Issued. | - May 10/72 |
| 2. Eng. Surveys Issue Eng. Dws. | - June 7/72 |
| 3. <u>Materials & Testing Issue Foundation Report</u> | - July 18/72 |
| 4. Bridge Planning Report Issued. | - Aug. 1/72 |
| 5. Bridge Design Issue Preliminary Design | - Aug. 24/72 |
| 6. Bridge Planning Approves Prelim. Dws. For Design | - Sept. 13/72 |
| 7. Bridge Design Complete | - Nov. 17/72 |
| 8. Bridge Planning Receives Navigable Water Clearance | - Dec. 20/72 |
| 9. Bridge Control Submit Final D-4 and Dws. | - Jan. 3/73 |
| 10. Contract Documents in Scrutiny | - Jan. 11/73 |
| 11. Head Office Review | - Jan. 26/73 |
| 12. Advertise Contract | - Feb. 28/73 |
| 13. Tender Opening | - Mar. 21/73 |

The suggested activity durations have yet to be checked with the Regional Co-Ordinator, Mr. R. Forrest, and therefore the schedule could be subject to minor revisions.

With a Tender Opening date of March 21, 1973 the contract could be started by April 15, 1973 and result in possible completion in the fall of 1973.

D. A. Barr
D.A. BARR

J. A. Barr,
Program Engineer.

DAB/HWM/me
Encl.

c.c. P. Billings
B. Davis

A. Stermac
R. Forrest

M. Chye
J. Anderson
B. McGaffigan

72-11061

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

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

FROM: Structural Planning Office,
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: May 16, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT: Replacement of Petawawa River Bridge at Petawawa,
W.P. 72-72, Site 29-8,
Highway 17, District 9 - Ottawa

Further to my telephone conversation on May 15th with Mr. Devata, I confirm our request for a foundation investigation to be carried out at the above site for the replacement bridge on the line of the existing Highway 17 structure.

Span ratios for the new structure are being calculated by Mr. K. Bassi, Structural Office, and therefore at this stage reference should be made to him for location of bore holes relative to the existing structure.


T. C. Kingsland
Regional Structural Planning Engineer

TCK/hl

c.c. P. D. Billings
J. Percy - Att. C. E. Pritchard
B. R. Davis
C. S. Grebski - Att. K. Bassi
R. Forrest
J. K. Anderson
A. G. Boucher

XXXXXXXXXXXX

Gordon R. Carton, Q.C.

Design Services Branch,
Downsview 464, Ontario.
May 19, 1972.

Telephone: 248-3282.

Mr. D. G. Watt,
Engineer in Charge,
Ontario Hydro,
800 Kipling Ave.,
Toronto, Ontario.

Re: Petawawa River Bridge, Inspection of
Center Pier Foundation by Borehole T.V.
Camera, W.P. 72-72-01, W.O. 72-1106,
District #9, Ottawa. 72-11-061

Dear Mr. Watt:

Further to our conversation with Mr. Jacobson on May 18, 1972, by our Mr. M. Devata, Supervising Foundations Engineer, this is to confirm our request for the above-mentioned site visit by your personnel to assess whether the T.V. borehole camera can be used at this site. It is understood that charges for this work will be wages of personnel plus their travelling and living expenses.

Yours truly,



A. G. Stermac,
PRINCIPAL FOUNDATIONS ENGINEER.

AGS/ao

cc: W. W. Fry

Foundations Files ✓
Documents



DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MINISTER: HONOURABLE CHARLES McNAUGHTON

DEPUTY MINISTER: A. T. C. McNAB

Gordon R. Barton, O.C.

Design Services Branch,
Downsview, Ontario,
Telephone: 248-3281

May 19, 1972.

Johnston Drilling Co. Ltd.,
P.O. Box 4134,
Postal Station 'E',
Ottawa 1.

Dear Sirs:

This is to confirm our request of the 15th of May, 1972,
for the supply of a diamond drill together with all necessary
equipment, as specified under the terms of our Contract Agreement,
at Petawa, Ontario, on May 17th, 1972.

This project bears the Job Number 72-11061.

Mobilization to from Ottawa, Ontario.

Yours truly,

A handwritten signature in dark ink, appearing to read "M. Devata".

M. Devata,
Supervising Foundation Engineer.

For: A.G. Stermac,
Principal Foundation Engineer.

MD/mb

c.c. W.W. Fry,
(Attn. M. Andrews)

Foundation Files
Documents

Mr. P. D. Billings,
Regional Director,
Kingston.

J. B. Wilkes

May 29, 1972

W. P. 72-72-01
Petawawa Bridge

The Design Criteria Committee approved of the design criteria for the above project at its last meeting Friday.

Mr. H. Adcock instructed that the work schedule be reduced to the minimum time period possible with the objective to be in a position to advertise the award of the contract for the new bridge, so that at least some of the foundation work can be done before spring.

This memorandum is to request that you issue instructions to this effect to your staff. Mr. A. Argue, Director of Design Services, will co-ordinate this project and will instruct all Head Office units who are involved with the design to give it top priority.

JBW:ad

c. c. H. W. Adcock
A. E. Argue
D. W. Farren
L. R. Eadie
F. G. Allen
D. A. Barr

J. B. Wilkes,
Executive Director,
Design Division.

Mr. T. C. Kingsland,
Regional Structural Planning Eng.,
Eastern Region,
Kingston, Ontario.

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

June 2, 1972.

Replacement of Petawawa River Bridge at Petawawa,
N.P. 72-72, Site 29-8
Highway 17, District 9 - Ottawa

72-11-0 61

Attached please find the drawing on which a plan and profile of the Petawawa River bridge is shown. Also shown on the drawing are the locations of the six boreholes and one cone hole carried out by this Office during the past two weeks. Bedrock elevations, as established in the mentioned boreholes, are presented on the profile.

It is our opinion that assuming a straight line for the bedrock surface between the boreholes is reasonable.

A report containing the borelogs and all other pertinent data will be submitted within the next three weeks.

Should you wish to discuss this problem, please feel free to contact this Office.

ALB

AGS/so
Attn.

A. G. Sternac,
PRINCIPAL FOUNDATIONS ENGINEER.

cc: Structural Office
(Attn: K. G. Bassi)

Foundations Files ✓
Documents

72-11061
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: D. Barr
B. Davis
J. Harris
A. Stermac

ATTENTION:

FROM: Design services Branch

DATE: June 2, 1972.

OUR FILE REF.

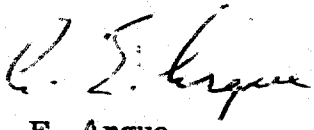
IN REPLY TO

SUBJECT: PETAWAWA BRIDGE

I am attaching a copy of a letter addressed to P. Billings from Mr. J. Wilkes dated May 29, 1972 relative to the above subject.

This project has been given top priority and all effort should be made to shorten the precontract engineering schedule. If any prior work can be done before receiving final and total information, it should be done. If interim field trips plus educated guesses would speed up the process these should be undertaken.

Please notify me of the date you receive your required input information and the date you complete your required work. Mr. Barr will have his staff expedite the work in the region and head office and report any difficulty immediately. Mr. Davis will review the ability of his own staff or a consultant to best complete the design.


A. E. Argue
Director
Design Services

AEA/pa
Attch.

c.c. J. B. Wilkes

Mr. J. B. Wilkes,
Executive Director,
Design Division.

12-11061
D. A. Barr,
Program Engineer,
Program Office.

June 6, 1972.

Critical Path Pre-Engineering Schedule
W. P. 72-72-01
Petawawa River Bridge - Hwy. 17.

The Pre-engineering Schedule for the above mentioned project has been accelerated, and the activity time periods have been reduced (Mr. H. Adcock's instructions) to accommodate a tender opening date of December 20, 1972. The following schedule is submitted for your reference.

1)	Design Criteria Issued	May 26, 1972
2)	Eng. Surveys Issue Eng. Dwgs.	June 15, 1972
3)	Foundation Report Issued (Verbal information June 2, 1972)	July 4, 1972
4)	Bridge Planning Report Issued	July 11, 1972
5)	Bridge Design Issue Prelim. Design	July 28, 1972
6)	Bridge Planning Approves Prelim. Dwgs. for Design	Aug. 8, 1972
7)	Bridge Design Complete	Sept. 12, 1972
8)	Bridge Planning Receives Navigable Water Clearance	Not Applicable
9)	Bridge Control Submit Final D-4 and Dwgs.	Oct. 5, 1972
10)	Contract Documents in Scrutiny	Oct. 13, 1972
11)	Head Office Review	Oct. 27, 1972
12)	Advertise Contract	Nov. 22, 1972
13)	Tender Opening	Dec. 20, 1972

The above schedule has been designed using the start date of May 26, 1972 and tender opening of December 20, 1972 and condensing the design of the project between these dates.

DAB/HM/me

D. A. Barr,
Program Engineer.

c. c. P. D. Billings
B. R. Davis
✓ A. Stermac
A. Argue

H. Chye
R. Forrest
J. Anderson
B. McGaffigan

Note: Advised D. Barr that on June 2nd/m are submitted a letter with a drawing containing all the information needed by the designer. Formal report to follow. H/S June 6/72

Mr. J. B. Wilkes,
Executive Director,
Design Division.

D. A. Barr,
Program Engineer,
Program Office.

June 8, 1972.

Critical Path Pre-Engineering Schedule
W. P. 72-72-01
Petawawa River Bridge - Hwy. 17

With reference to my letter of June 6, 1972 concerning the above
Work Project, please revise Item 3 to read.

3/	Preliminary Foundation Report Issued (Plan & Letter)	June 2/72
	Foundation Report Issued	July 4/72

DAB/HM/ck

D. A. Barr,
Program Engineer.

c. c. P. D. Billings
B. R. Davis
A. Stermac ✓
A. Argue
H. Chyc
R. Forrest
J. Anderson
B. McGaffigan

Mr. M. Devata,
Supervising Foundation Engineer.

K. Ingham

June 12, 1972

Foundation Investigation 72-11061;
Highway 17 at Petanawa River

A brief description is given below for rock core recovered from each of six boreholes drilled at the site, together with the appropriate bedrock elevation.

<u>Hole No. 1</u>	El. 417.6	Bedrock at 375.6
42.0 - 51.3	Coarse grained meta-granite, frequent horizontal joints, occasional joints at 80° and 45°, moderately fractured in the upper 3.0 ft.	
51.3 - 51.5	Open joint at approx. 45°, minor clay deposits.	
51.5 - 62.0	Medium grained feldspar biotite gneiss, generally massive, lineation approximately 45°, minor horizontal and inclined joints.	
62.0 - 63.6	Coarse grained meta-granite.	
63.6 - 65.4	Medium grained feldspar biotite gneiss.	
<u>Hole No. 2</u>	El. 417.6	Bedrock at 378.6
39.0 - 41.5	Coarse grained meta-granite, occasional horizontal and vertical joints, moderately fractured in the upper 1.0 ft.	
41.5 - 60.0	Medium grained feldspar biotite gneiss, occasional veins of granite pegmatite, lineation approx. 45°, occasional horizontal and vertical joints.	
60.0 - 62.5	Coarse grained meta-granite.	

Hole No. 3

El. 417.4

Bedrock at 410.4

37.0 - 50.5

Medium grained feldspar biotite gneiss, veins of coarse grained granite pegmatite, generally massive, lineation at approx. 45°.

Hole No. 5

El. 417.5

Bedrock at 407.0

40.5 - 44.0

Medium grained feldspar biotite gneiss with minor bands of coarse grained meta-granite.

Hole No. 6

El. 415.4

Bedrock at 392.6

52.8 - 54.3

Medium grained feldspar biotite gneiss.

54.3 - 60.4

Coarse grained meta-granite and thin bands of feldspar biotite gneiss, occasional to frequent horizontal and inclined fractures.

Hole No. 7

El. 415.0

Bedrock at 392.2

52.8 - 57.0

Medium grained feldspar biotite gneiss with bands of coarse grained meta-granite.



KI:mr

E. Ingham,
Geologist.

72-110601
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

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

FROM: Structural Planning Office,
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: June 16, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 72-72-01, Site 29-08,
Petawawa River Bridge at Petawawa,
Highway 17, District 9 - Ottawa

Please find enclosed one print of Bridge Site Plan
E-5233-1 for the above structure.

We have marked the proposed location of the new
structure and the proposed profile grade on the
drawing for your information.


A. Van Dalen

For: T. C. Kingsland
Regional Structural Planning Engineer



AV/TCK/hl
encl.

c.c. C. S. Grebski - Att. K. Bassi (encl.)
R. Forrest
J. Anderson

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. T. Kingsland
Regional Bridge Planning Engineer
Eastern Region
KINGSTON, Ontario

From: Structural Office
West Building
DOWNSVIEW, Ontario

ATTENTION: DATE: June 15, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT: Petawawa River Bridge
at Petawawa
W.P. 72-72-01 Site 29-8
Hwy. 17 District 9 - Ottawa


Attached herewith are prints of the Preliminary Bridge Plan Drawing D-29-8-P1 for the above mentioned structure.

The estimated cost of the proposed structure is \$275,000 which includes tender, materials, engineering and sundry construction.

Please note that this plan has been issued pending receipt of the E-Plan and the final profile. This has been done in order to meet our design completion date of September 12, 1972.

We are proceeding with the final design of this structure. It is requested that any comments or revisions you may have should be submitted to us as soon as possible.

CSG/hvh
Encl.


C.S. Grebski
Structural Design Engineer

cc A. Argue
J.B. Wilkes
J.E. Callaghan
A. McKim
B. Davis
✓ A. Stermac (2)
J. Anderson
P. Billings
R. Forrest
W. Birch
J. Harris

no comment

CSG
June 16/72

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

To: Mr. T.C. Kingsland, (4)
Regional Structural Planning Eng.,
Eastern Region,
Kingston, Ontario.

FROM: Foundations Office,
Design Services Branch,
Downsview, Ontario.

ATTENTION:

DATE: June 28, 1972

OUR FILE REF.

IN REPLY TO JUL 4 1972

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
Replacement of Existing Petawawa River Bridge
Hwy. #17 at Township of Petawawa
County of Renfrew, District 9 (Ottawa)
W.O. 72-11061 - W.P. 72-72

31 F-55

31 F-55
GEOCRES No.

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/ht

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

c.c. Messrs. D.W. Farren
B.R. Davis
A. Rutka
S.J. Markiewicz
J.E. Callaghan
B.J. Giroux
E.R. Saint
G.A. Wrong
B.A. Singh

Foundations Files ✓
Documents

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FOUNDATION INVESTIGATION REPORT
For
Replacement of Existing Petawawa River Bridge
Hwy. #17 at Township of Petawawa
County of Renfrew, District 9 (Ottawa)
W.O. 72-11061 - W.P. 72-72

1. INTRODUCTION:

The Foundations Office was requested to carry out a subsurface investigation for the aforementioned structure which will replace the existing structure where the settlement of the centre pier was up to 5 feet. The request was contained in a memo from Mr. T.C. Kingsland, Regional Structural Planning Engineer, of Structural Planning Office, Kingston, dated May 16, 1972. An investigation was subsequently carried out by this Office to determine the subsoil, bedrock and groundwater conditions at the proposed structure site.

A memo together with a drawing dated June 2, 1972, was submitted by this Office with all the preliminary subsoil data in order to facilitate the design of the proposed structure without any further delay.

This report contains the factual results obtained from the investigation, together with our recommendations pertaining to the design of foundations of the proposed structure (as well as the stability and settlement considerations associated with the approach fills).

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The area under investigation is located along the Petawawa River at a point immediately north-west of the Town of Petawawa in the County of Renfrew. The observations carried out at the time of the investigation revealed that the east flowing Petawawa River is located in a 160 feet wide channel and the depth of water is about 7 to 8 feet with the river water level at about elevation 418. The site and the existing structure are illustrated in various pictures contained in Appendix II of this report.

Physiographically the area under investigation is located in the region known as the "Petawawa Sand Plain". The granular overburden deposits encountered here were primarily laid down in a delta built in the Champlain Sea by the Petawawa, Barron, Indian and Ottawa Rivers during the Fossmill Stage of Lake Algonquin. In the vicinity of the site, the sand and gravel deposits range from about 4 to 20 feet in thickness. The overburden is underlain by gneiss bedrock of Precambrian Age.

3. FIELD AND LABORATORY WORK:

Six sampled boreholes, as well as one dynamic cone penetration test, were put down during the course of the field investigation. The borings were advanced by a BBS1 trailer-mounted diamond drill rig adapted for soil sampling purposes.

The drilling program was commenced on May 17, 1972. At that time the maximum settlement occurred at the centre pier location was of the order of 1.5 to 2 feet. While carrying out the boring in the vicinity of existing centre pier location from the deck, on May 19, 1972, further subsidence of the centre pier occurred. This resulted a total settlement of approximately 5 feet at the centre pier location. It was felt that it would be extremely dangerous to carry out any further borings in the vicinity of possible pier locations. As a result of this, borings are only confined in the areas of the proposed abutment locations. This Office will carry out additional borings at the proposed pier locations at a later date when the river water condition permits to use raft-mounted diamond drill.

Samples of the overburden were obtained in a 2" O.D. split-spoon sampler at required depths. The sampler was hammered into the soil with a driving energy of 350 ft. lb. per blow. Bedrock was proven in all boring locations by obtaining BX size rock cores.

Following the sampling and drilling operations, a detailed log was made for each of the borings. These borelogs contain a record of the sampling and drilling techniques used, and the soil and bedrock types encountered. The locations and elevations of all the boreholes were shown on Drawing No. 72-11061A, together with an inferred stratigraphical profile across the site. The surveying at the site was carried out by personnel from Eastern Region, Engineering Survey Section. The elevations in this report are referenced to a Geodetic datum.

All the samples were subjected to careful visual identification in the field and subsequently in the laboratory. Following this examination, laboratory tests were carried out on certain samples to determine the grain size distribution of the various soil types encountered.

The results of laboratory tests are plotted on the borelogs and summarized on Figure 1, all contained in Appendix I of this report.

4. SUBSOIL AND BEDROCK CONDITIONS:

4.1) General:

The predominant stratum across the site is a deltaic deposit of sand with some silt and gravel with boulders throughout. The thickness of this stratum ranges between 3.5 to 6 feet within the channel of Petawawa River and 27 feet near the banks. This deposit is directly underlain by gneiss bedrock of the Precambrian Age. Near the river banks the natural granular deposit is overlain by fill material of variable thickness.

The soil and bedrock sequence, encountered in the boring locations, are shown on the borelog sheets. The stratigraphical sections plotted on Drawing No. 72-11061A, have been inferred from this data. The subsoil and bedrock encountered from ground surface downward, are presented in the subsections to follow.

4.2) Fill Material (Sand and Gravel):

Fill was placed to form the approaches of the existing Hwy. #17 - Petawawa River structure. The thickness of the fill material encountered in boring locations ranges from 10 feet (B.H. #3) to 35 feet (B.H. #6). The fill is composed of a mixture of sand and gravel, with boulders up to 5" in size at the lower portion of this stratum.

Standard penetration testing carried out in this material gave 'N' values generally ranging from 1 to 10 blows per foot with exceptional high values at isolated locations where gravel and boulders are present.

Based on these results, it is estimated that only negligible compactive effort has been utilized for the fill construction.

4.3) Sand with Some Silt and Gravel:

Granular deposit is present immediately below the fill material, where it exists, or directly below the river bed. The deposit is composed

of a mixture of sand, with gravel and silt, and boulders up to 5 inches in size. The thickness of this stratum varies between 3.5 (B.H. #2) and 27 (B.H. #3) feet. Grain-size distribution testing was carried out for samples obtained in this stratum, using 2 inch O.D. sampling equipment. The results are plotted on Figure 1 in Appendix I of this report.

Standard penetration testing was carried out within the granular deposit. The results are plotted on the borelog sheets. The testing gave 'N' values which range from 70 blows per foot to 100 blows for 3 inches. Based on these results, it is estimated that the relative density of the granular deposit is generally very dense.

4.4) Gneiss Bedrock:

The granular deposit is directly underlain by metamorphic bedrock of Precambrian Age. The bedrock was proven in all boring locations by obtaining between 3.5 and 23.5 feet of BX size rock core samples.

The bedrock core samples were examined by Mr. K.W. Ingham, Geologist, Ministry of Transportation and Communications. Mr. Ingham presented the results of his bedrock description, as well as an interpretation of geologic conditions existing at this site, on a letter to this Office, dated June 12, 1972. A copy of this letter is appended to this report. The bedrock description presented in the paragraphs to follow is an excerpt from this letter.

The dominant type of bedrock encountered in the drilling is a medium grained feldspar biotite gneiss with minor horizontal and inclined joints. Bands of coarse grained meta-granite and granite pegmatite are subordinate types forming layers paralalled to the gneiss. These layers are often up to 9 feet in thickness.

The bedrock surface, from the centre of the river channel to the north bank, was found to be fairly flat at elevations between 404 and 407. The bedrock, however, would appear to dip in a southerly direction (lowest level recorded elevation 392 at B.H.'s #6 and #7). In general, the bedrock was found to be in a sound condition as evidenced by full core recovery. However, the upper 1 foot at B.H. #2 and 3 feet at B.H. #1 appear to be moderately fractured. In addition, an open joint at approximately 45° was found to exist at B.H. #1 at about elevation 395.

5. GROUNDWATER CONDITIONS:

Groundwater level observations were carried out during the period of the field investigation in the open boreholes. The observations are presented on the individual borelog sheets as well as on Drawing No. 72-11061A. The results indicate that the groundwater level varies between elevations 416 and 424, which corresponds to levels ranging from 23 feet to 30 feet below existing Hwy. #17 grades. During the course of field investigation, the water level of Petawawa River at the vicinity of the site was at about elevation 417. It would appear that the groundwater level at the river banks was influenced by the Petawawa River level. A high water level at elevation 421 was recorded during the month of May, 1972.

6. EXISTING STRUCTURE:

The existing structure, which carries the Hwy. #17 across the Petawawa River, was re-constructed during early 1930's. According to available information, the original structure was built in the early 1900's, and the details of this structure are not available. The present bridge is a 4-span concrete girder type structure about 26 feet wide and 250 feet long. It is understood that the old centre pier foundation was incorporated during the re-construction of this structure in the early 1930's. The Drawing No. B-1790B of September 15, 1933, indicates that the end piers are supported on spread footings, but the precise founding elevations were not given. No details with regard to centre pier founding elevation are available. The existing abutments appear to be perched within the approach fills. However, the foundation details of these abutments are not shown on the drawing. The river bed elevation in the vicinity of the existing centre pier established by the recent survey does not correspond to that shown on the Drawing No. B-1790B. It is believed that this discrepancy may be due to the scour action of the river.

As mentioned elsewhere, excessive settlement of the order of 1.5 to 2 feet was occurred during the high flood season (May, 1972). Further subsidence of the centre pier took place during the latter part of May, 1972. The settlement data obtained from the Maintenance Engineers Office of Ottawa District is presented in a tabular form as follows:

Centre Pier - Settlement Record

<u>Dates</u>	<u>Total Settlement (Ft.)</u>	
	<u>Upstream</u>	<u>Downstream</u>
May 6, 1972	1.43	2.07
May 19, 1972	3.01	3.19
May 22, 1972	5.24	5.18
May 26, 1972	5.24	5.18
June, 1972	5.24	5.18

The Foundations Office, during the course of the field investigation, initiated a program to carry out a boring from the deck through the existing centre pier into the foundation subsoil. The purpose of this is to study the subsoil and foundation conditions by means of a Borehole Camera. Due to the severe settlement at the centre pier location, this program was abandoned.

7. DISCUSSION AND RECOMMENDATIONS:

7.1) General:

It is proposed to demolish the existing structure and to replace it with a new bridge at the crossing of Hwy. #17 and Petawawa River, in the Township of Petawawa, County of Renfrew. It is understood that the new structure will be 42 feet wide and have three spans (75'-120'-75'). The proposed profile grade of Hwy. #17 in the vicinity of the crossing, is to remain the same, that is, between elevations 444 and 447. The Q of the Hwy. #17 will remain unchanged.

The predominant deposit across the site is composed of very dense sand with silt and gravel and numerous boulders up to 5" in size throughout. The thickness of this granular stratum ranges from 3.5 to 6 feet within the centre portion of the channel of Petawawa River, to as much as 27 feet near the north bank. This deposit is covered, at the river banks, by fill material composed of sand and gravel; the fill is up to 35 feet in thickness. Underlying the granular stratum is the gneiss bedrock.

Comments and discussions of the factor relating to the foundation design of the structure, as well as the stability and settlement considerations of the approach fill are presented in the sub-sections to follow:

7.2) Pier Foundations:

The information provided by the Structural Office indicates that the proposed piers are to be located within the confines of the channel of Petawawa River. Since it was not possible to carry out any borings at the precise locations of the proposed piers, inference was made based on the subsoil data obtained at the existing centre pier location. The overburden at the proposed pier locations is inferred to be of sand with gravel and silt of a limited thickness, underlain by gneiss bedrock.

The footings for the piers can be located within the granular overburden provided that this founding elevation will satisfy the hydrological requirements. During the flood time, the water velocity is such that the scouring of the overburden material may be a major problem at these locations. In view of this, it is recommended that the foundations be carried down to the sound bedrock. If spread footing foundations are used to support the piers, a positive dewatering scheme will be necessary in order to prevent inflow of the river water into the base of the excavations. It should be noted that the granular overburden contains numerous boulders, a dewatering scheme incorporating interlocking steel sheeting may create some difficult driving conditions. In such a case, it may be necessary to drive the sheeting as far as practically possible then remove the boulders under water from beneath the sheeting and continue driving the sheeting to the next obstruction, where this process will be repeated. Using this method it may be possible to reach the surface of bedrock.

The bedrock surface is sloping slightly in a southern direction. Further, the upper 1 to 3 feet is often moderately fractured and thus quite pervious. This being the case, it may be difficult to effect a satisfactory water-tight seal at the contact of the steel sheeting with the bedrock. Such a problem could be overcome by pouring a seal of tremie concrete under water. The thickness of this seal should be sufficient to counter-balance the hydrostatic water pressure head existing at the base of the excavation. Once the seal is in place the enclosure can be pumped out and construction can proceed in the dry.

Alternatively, the excavation could be carried out from within an earth dyke composed of relatively impervious cohesive material. In view of the pervious nature of the overburden, it is necessary to extend the earth

dyke to bedrock by sub-excavating the overburden material. Any minor seepage into the excavation can be handled by employing conventional techniques, such as pumping from sumps.

The footing founding on bedrock can be designed using an allowable bearing pressure of up to 20 t.s.f.

In computing the horizontal resistance of the footing, the passive resistance provided by the granular overburden should be neglected, since this material will likely be scoured. The horizontal resistance of the pier footing may be computed using a coefficient of friction of 1.0 between the concrete and the bedrock. In order to provide adequate lateral resistance, it may be necessary to key the footings into the bedrock.

Alternatively, the piers can be founded on drilled caissons socketed at least 5 feet into the bedrock. Caissons could be installed through the bouldery overburden down into bedrock using churn drilling operations. The allowable bearing pressure of the caissons will be dependent on the diameter adopted. For preliminary estimating purposes an allowable load of 500 and 900 tons per caisson can be used in designing a 3 and 4 feet diameter installation, respectively.

As mentioned elsewhere, the upper portion of the bedrock is moderately fractured. In such a case, the groundwater may come into the caisson liner. If this occurs, it may be necessary to tremie concrete under water in the lower portion of the caisson.

7.3) Abutment Foundations:

The perched abutments may be supported on end-bearing piles driven to practical refusal within the dense granular stratum. The natural overburden and existing fill are bouldery in nature. In order to ensure that the piles penetrate through such bouldery zones, it is recommended that they be equipped with reinforced tips. Piles driven to refusal could be designed for the ultimate capacity of the pile section chosen - e.g., 12BP74 steel H-Piles could be designed for 95 tons per pile. During construction, pile driving should be controlled by means of Hiley Formulae as per current Ministry Requirements to obtain the required capacity.

For the purpose of estimating the pile length required, the following tip elevations may be used.

<u>Abutment</u>	<u>Estimated Tip Elevation</u>	<u>Refer to</u>
North	417	B.H. #5
South	395 (East end) to 405 (West end)	B.H.'s #6 & #7

A minimum of 5 feet of earth cover should be provided to the underside of the pile cap for frost protection purposes. At this level the pile cap will be located well above the prevailing groundwater level. No major dewatering problem is anticipated for the construction of the abutment pile caps.

7.4) Approach Embankments:

It may be necessary to widen the existing south approach fill in order to construct the new widened structure. No stability problems are anticipated provided that, i) the fill is properly compacted and keyed into the existing fill

ii) Standard 2:1 slopes are employed.

The anticipated differential settlement between the widened portion and the existing embankment will be negligible. Any minor settlements will be of elastic nature and should take place during or shortly after the construction.

8. MISCELLANEOUS:

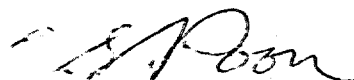
The field work performed during the period of May 17 to June 1, 1972, was carried out under the immediate supervision of Mr. C.S. Poon, Project Foundations Engineer, who also prepared this report.


The equipment used was owned and operated by F.E. Johnston Drilling Company Limited, Ottawa.

This project was under the overall supervision of Mr. M. Devata, Supervising Foundations Engineer, who reviewed this report.

CSP/ht

June 27, 1972


C.S. Poon, P. Eng.


M. Devata, P. Eng.



DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: Mr. M. Devata, FROM: K. Ingham
Supervising Foundation Engineer.

ATTENTION: DATE: June 12, 1972.

OUR FILE REF. IN REPLY TO

SUBJECT: Foundation Investigation 72-11061;
Highway 17 at Petawawa River

A brief description is given below for rock core recovered from each of six boreholes drilled at the site, together with the appropriate bedrock elevation.

<u>Hole No. 1</u>	El. 417.6	Bedrock at 403.9
13.7 - 23.0	Coarse grained meta-granite, frequent horizontal joints, occasional joints at 80° and 45°, moderately fractured in the upper 3.0 ft.	
23.0 - 23.2	Open joint at approx. 45°, minor clay deposits.	
23.2 - 33.7	Medium grained feldspar biotite gneiss, generally massive, lineation approximately 45°, minor horizontal and inclined joints.	
33.7 - 35.3	Coarse grained meta-granite.	
35.3 - 37.1	Medium grained feldspar biotite gneiss.	

<u>Hole No. 2</u>	El. 417.6	Bedrock at 405.3
12.3 - 14.8	Coarse grained meta-granite, occasional horizontal and vertical joints, moderately fractured in the upper 1.0 ft.	
14.8 - 23.3	Medium grained feldspar biotite gneiss, occasional veins of granite pegmatite, lineation approx. 45°, occasional horizontal and vertical joints.	
23.3 - 25.8	Coarse grained meta-granite.	

Hole No. 3

El. 447.4

Bedrock at 410.4

37.0 - 50.5

Medium grained feldspar biotite gneiss, veins of coarse grained granite pegmatite, generally massive, lineation at approx. 45°.

Hole No. 5

El. 447.5

Bedrock at 407.0

40.5 - 44.0

Medium grained feldspar biotite gneiss with minor bands of coarse grained meta-granite.

Hole No. 6

El. 445.4

Bedrock at 392.6

52.8 - 54.3

Medium grained feldspar biotite gneiss.

54.3 - 60.4

Coarse grained meta-granite and thin bands of feldspar biotite gneiss, occasional to frequent horizontal and inclined fractures.

Hole No. 7

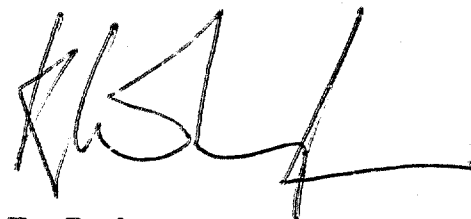
El. 445.0

Bedrock at 392.2

52.8 - 57.0

Medium grained feldspar biotite gneiss with bands of coarse grained meta-granite.

KI:nr



K. Ingham,
Geologist.

APPENDIX 1

OVERSIZES DRAWINGS

RECORD OF BOREHOLE #

1

2

3

4

5

6

7

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT

SAND

GRAVEL

Fine

Medium

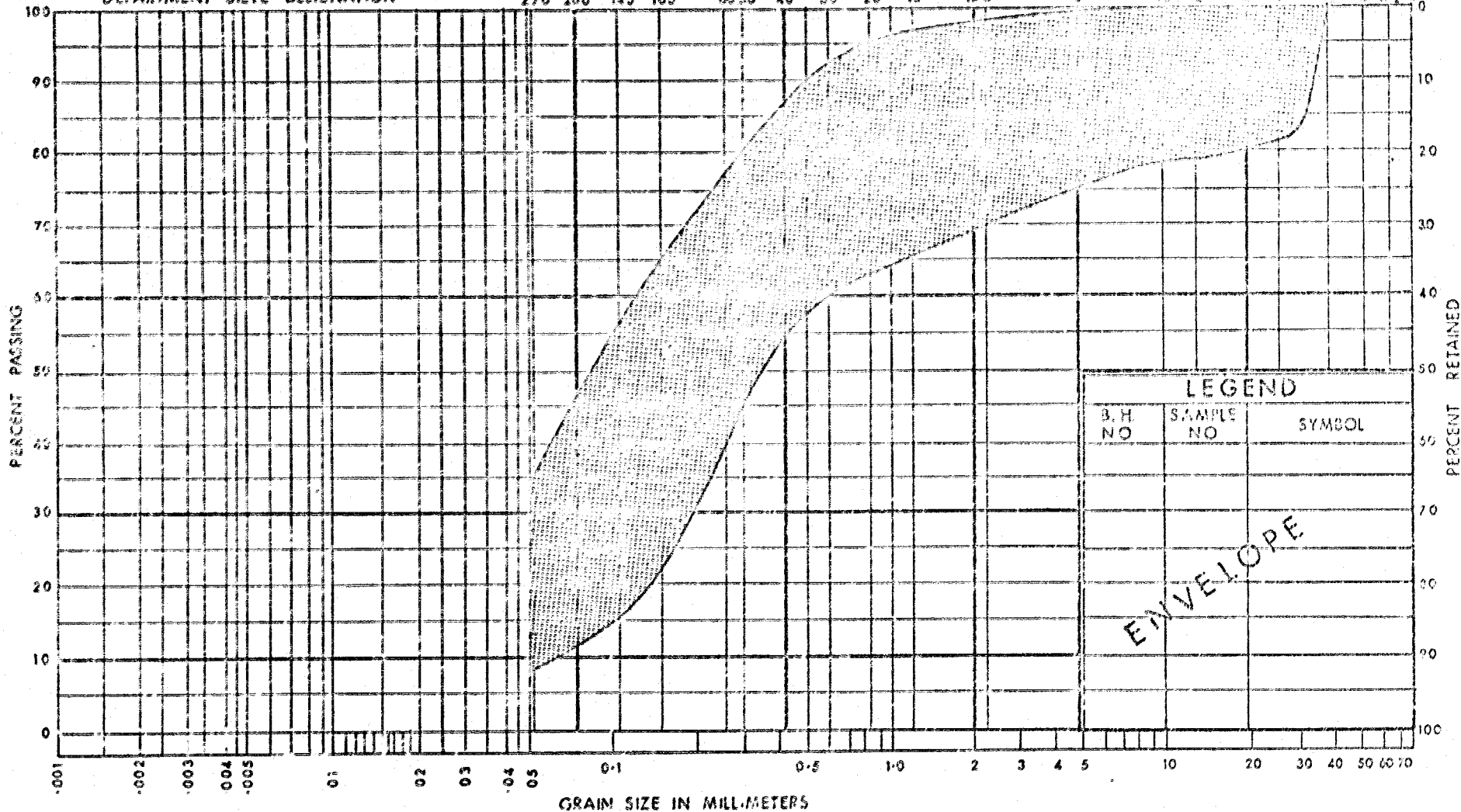
Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION

270 200 140 100 60 50 40 30 20 15 10 8 4 3/8" 1/2" 3/4" 1" 1 1/4" 2" 2 1/2" 3"



DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS



DESIGN SERVICES
BRANCH

GRAIN SIZE DISTRIBUTION
SAND
SOME SILT & GRAVEL

W.P. No. 72-72

JOB No. 72-11061

FIG. No. 1

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

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

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

DESCRIPTION OF SOIL

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

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

TYPE OF SAMPLE

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

SOIL TESTS

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

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

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

GENERAL

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

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
$\bar{\sigma}$	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

APPENDIX II

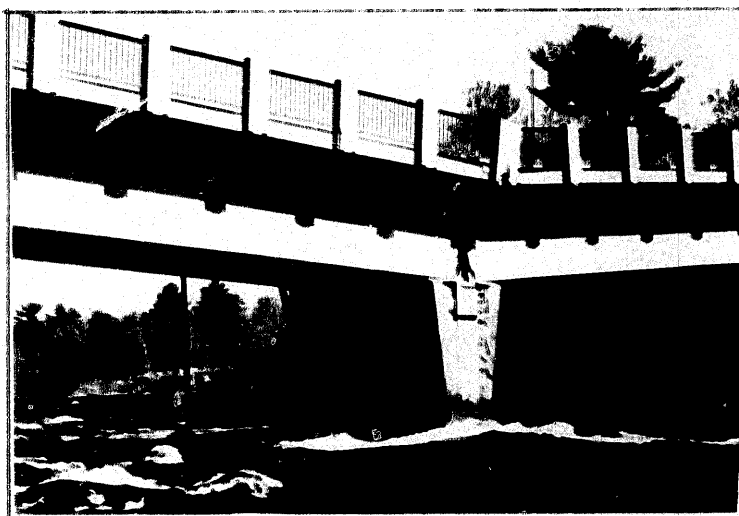
PETAWAWA RIVER BRIDGE

WO72-11061



Aerial View of the Site

Centre Pier Looking Downstream



Settlement of the Centre Pier and the Related Structure Looking Westerly

PETAWAWA RIVER BRIDGE

W.O.72-11061

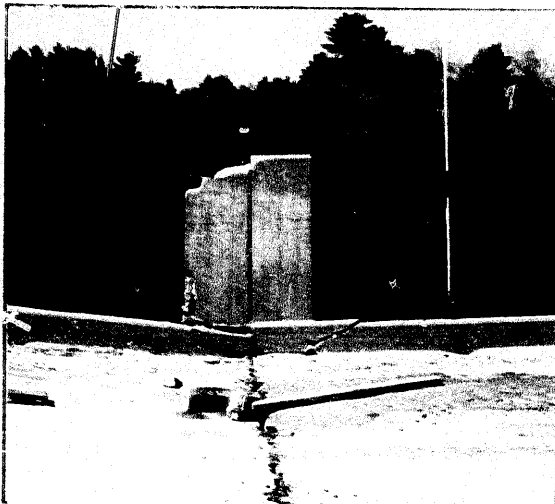
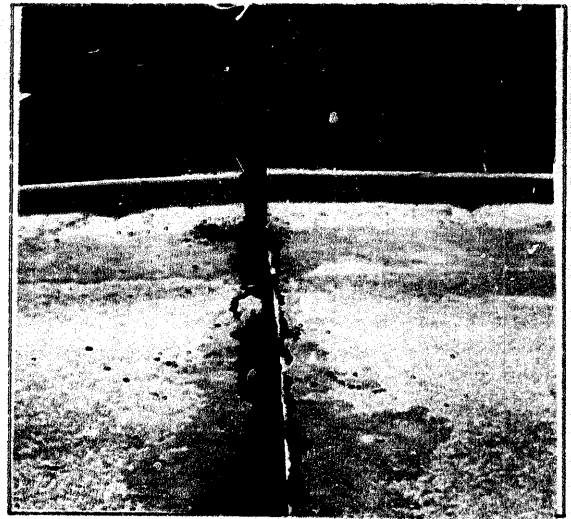


Damaged Superstructure
at the North Pier Location

4

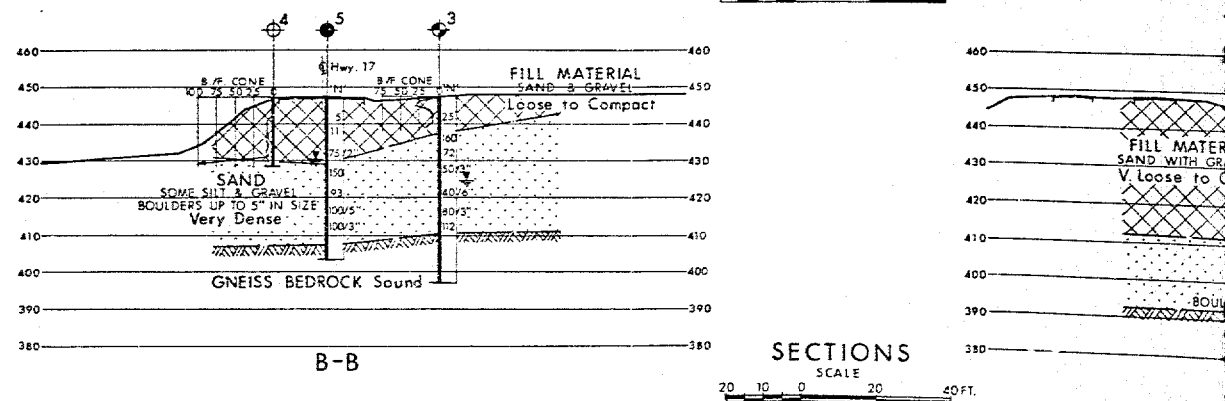
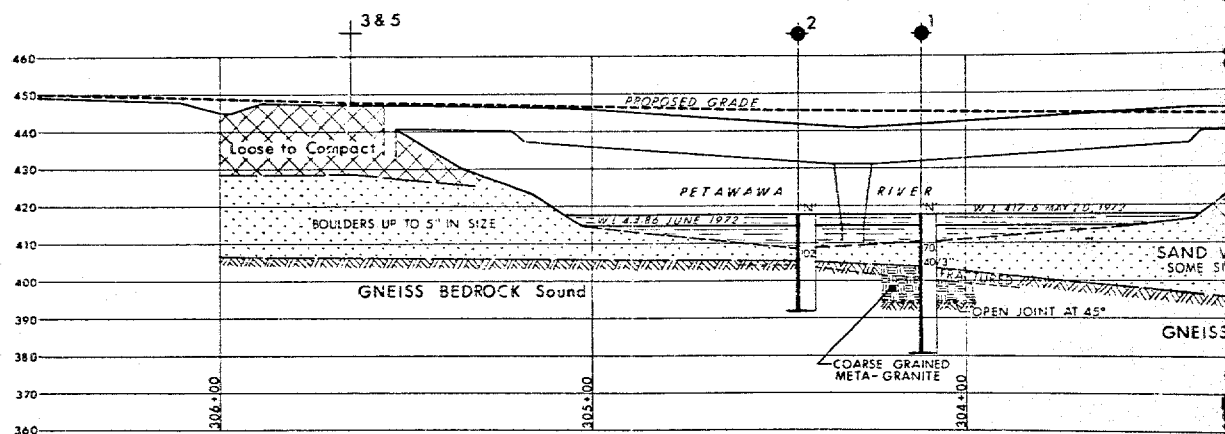
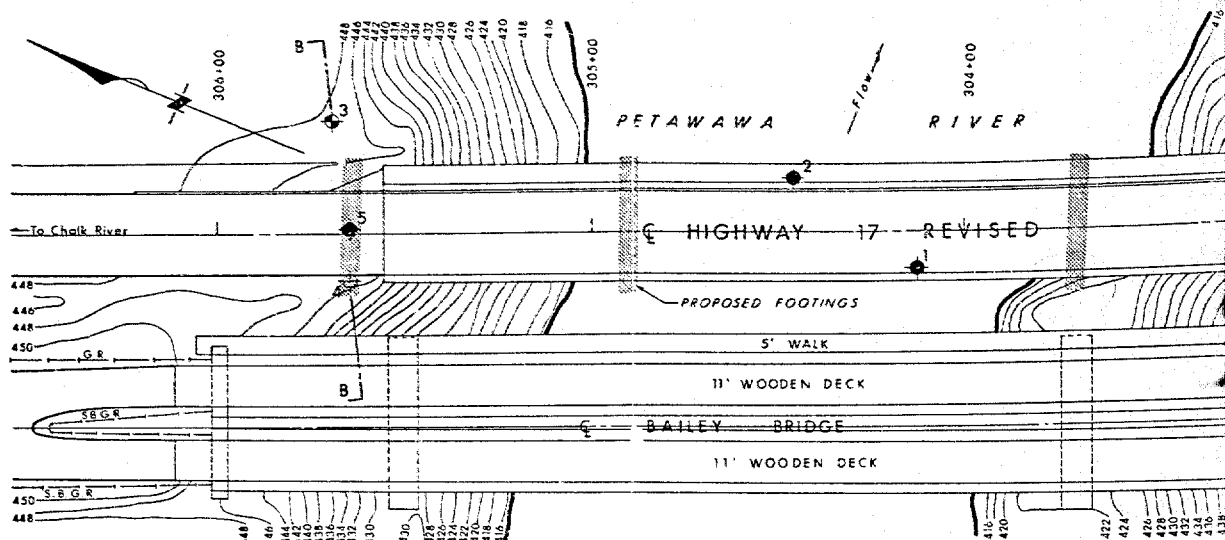
Cracks on Bridge Deck
at the South Pier
Location

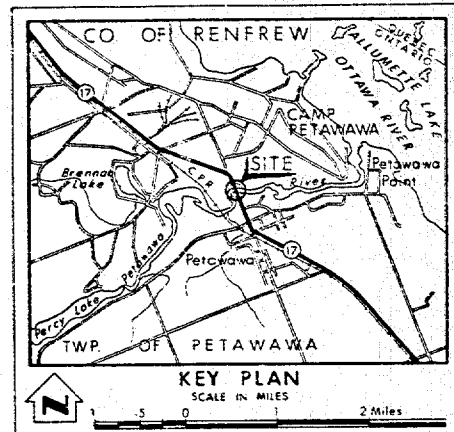
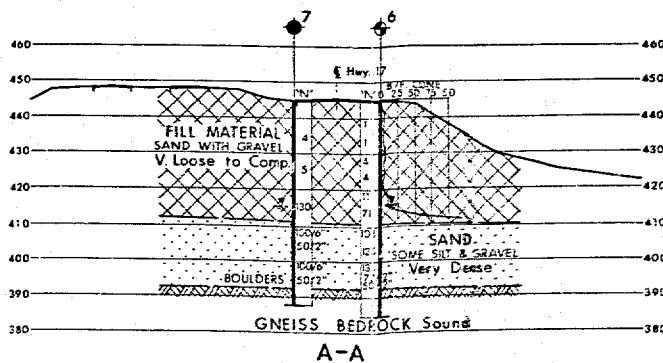
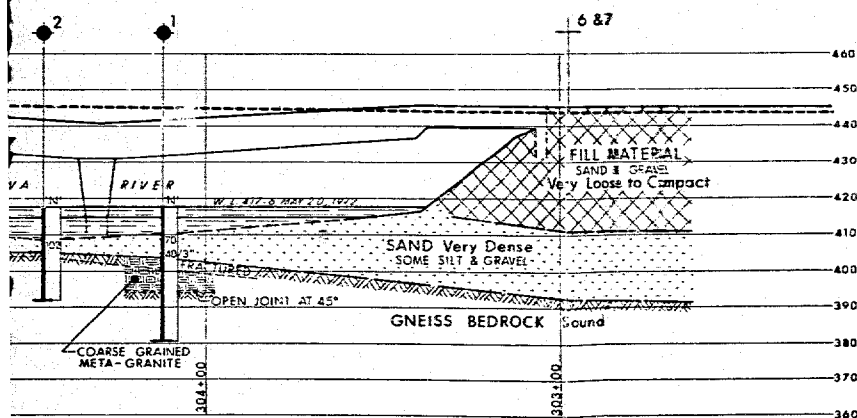
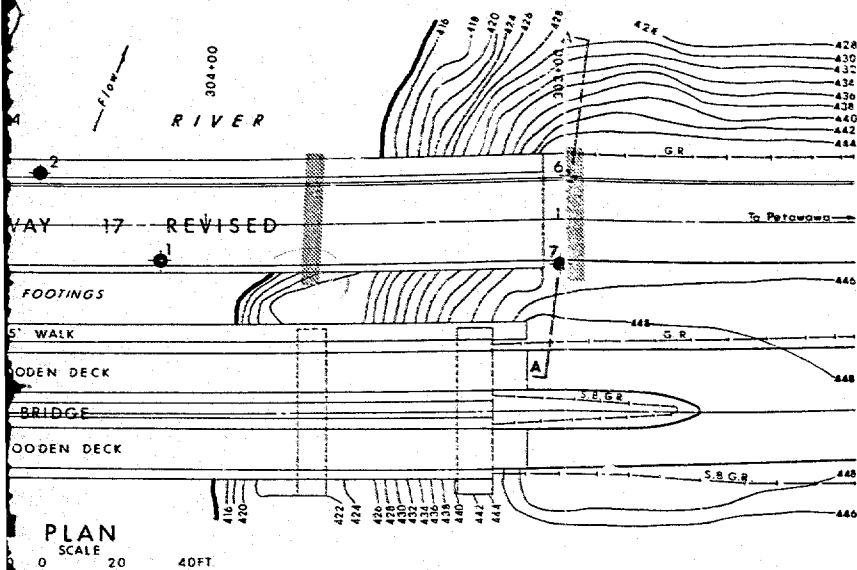
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Crushing of Bridge Decks at
the Centre Pier Location

6





LEGEND			
●	Bore Hole		
⊕	Cone Penetration Test		
⊕	Bore Hole & Cone Test		
⊕	Water Levels established at time of field investigation May 1972		
NO.	ELEVATION	STATION	OFFSET
1	417.6	304+12	10' LT.
2	417.6	304+45	15' RT.
3	447.4	305+69	30' RT.
4	447.0	305+65	12' LT.
5	447.5	305+65	1' RT.
6	445.4	302+96	12' RT.
7	445.0	302+99	12' LT.

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

DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION & COMMUNICATIONS
DESIGN SERVICES BRANCH—FOUNDATIONS OFFICE

PETAWAWA RIVER

HIGHWAY NO. 17 DIST. NO. 9
CO. RENFREW
TWP. PETAWAWA LOT CCN

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD. C.P.	CHECKED	WP. NO. 72-72	DRAWING NO.
DRAWN	CHECKED	JOB NO. 72-110 61	72-11061A
DATE June 27, 1972	SITE NO.	BRIDGE DRAWING NO.	
APPROVED	CONT. NO.		



72-11061 A23

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

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

FROM: Structural Planning Office,
Kingston, Ontario.

ATTENTION: Mr. M. Devata

DATE: July 14, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT: W. P. 72-72-03, Site 29-8,
Removal of Existing Petawawa River Bridge in Petawawa,
Highway 17, District 9 - Ottawa

Due to the proximity of the Bailey bridge detour fills to the existing structure, roadway protection will have to be installed at the above-mentioned site in order to protect the detour fills through the demolition of the existing structure. This will probably entail driving piles through the approach fills of the old bridge and the detour structures and in order that we can supply the contractor with details of the condition of these fills, it will be necessary to obtain further information.

I shall be glad if you will arrange to carry out a foundation investigation for this purpose along the line of the proposed roadway protection. Mr. K. Bassi, Structural Office, will supply you upon request with a plan showing the limits of the roadway protection with offsets from the centre line of the existing Highway 17.



T. C. Kingsland
Regional Structural Planning Engineer

TCK/hl

c.c. B. R. Davis
K. Bassi
W. D. Birch
M. Stoyanoff
J. E. Callaghan
C. S. Grebski
P. D. Billings
A. J. Percy
E. R. Saint

72-11061

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. J. B. Wilkes,
Executive Director,
Design Division.

FROM: D. A. Barr,
Program Engineer.

ATTENTION:

DATE: July 14, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT:

Pettawawa River Bridge - Highway 17
Ottawa - W.P. 72-72-01 & 72-72-03

Please be advised that a contract will be called for the demolition and removal of the existing Pettawawa River Bridge. The advertising date for this project is August 16, 1972 and the award date is September 20, 1972. This provides for a five week advertising period which will be reduced to three weeks with the approval of the Head Office Contract Review Committee. This work will be carried out under W.P. 72-72-03.

Replacement of the Pettawawa River Bridge will be carried out under W.P. 72-72-01. The present advertising and award dates are November 22, 1972 and December 20, 1972 respectively. This provides for a four week advertising period. This can be further reduced to a three week period with a "rush" award for both projects if approved by the Head Office Contract Review Committee.

The pre-contract engineering is presently on schedule.

DAB/HC/sv

c.c.

H. W. Adcock
A. E. Argue
P. D. Billings
J. A. Milne
E. A. Ingraham
✓ A. G. Stermac
J. E. Callaghan
L.R. Eadie
D.W. Farren
B.J. Giroux

D. A. Barr,
Program Engineer.

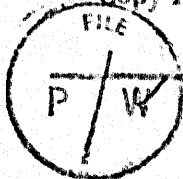
B. J. McGaffigan
J. M. Davidson
T. C. Muir
H. Chyc
R. J. Forrest
E. Cross

72-11061

Department of Highways Ontario

Copy for the information of

T. KINGSLAND



XXXXXXXXXXXXX

Cordon Carton

1201 Wilson Avenue
Structural Office
West Building
BOMISVITH, Ontario

July 14, 1972

Base Construction Engineering Office
CFB
PETAWAWA, Ontario

Attention: Capt. A.P. Cook

Subject: W.P. 72-72-31
Petawawa River Bridge Replacement

Dear Mr. Cook:

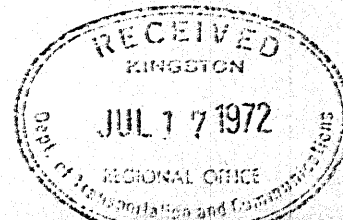
This will confirm the minutes of the meeting held at the Base Construction Engineering Office, CFB Petawawa, Ontario, on July 11, 1972 to review the provision of utilities on the proposed structure.

The following were present:

Capt. Fred James, BCBO
Capt. A.P. Cook, BCBO
Mr. L.C. Philips, Utilities Officer, BCBO
Mr. A. Ultecki, MTC
Mr. H.K. Jagasia, MTC

The following points were reviewed and discussed:

- (1) 16 inches diameter water main is required. This pipe is larger than used on the old bridge, but the increase in future requirements is expected, which justified the use of bigger pipe.
- (2) The location of the water main at 11'6" from the centre line of Hwy. #17 between steel girders near the East Sidewalk (as shown on MTC Eng. No. 29-8-1) is satisfactory and acceptable to BCBO.



To: A.P. Cook

- 2 -

13/7/72

- (3) The catwalk is not necessary and no provision to be made for the above item.
- (4) To coordinate the construction schedule, Department of National Defence shall arrange the supply of the pipe on the site as soon as the substructure is completed. The general contractor to undertake the installation of the pipe. This shall be shown on the contract drawings.
- (5) Concern was shown by BCDO personnel regarding the Bailey bridge protection during the dismantling of the old structure as well as during the construction of replacement of the bridge. The fill material is predominantly composed of a mixture of sand and gravel and in loose to compact state.

The driving of sheet piles for the protection purpose could easily cause the settlement of the Bailey bridge. The situation is particularly serious at the south side of the bridge. This shall be indicated clearly on the contract drawings and the provision for the adjustment of Bailey during the driving of the piles to be made.

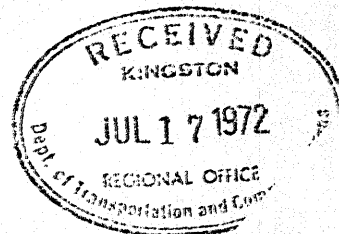
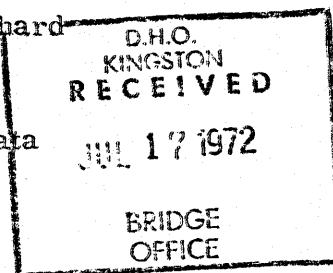
AAW/hvh

A. A. Witecki
A.A. Witecki
Structural Project Engineer

cc T. Kingsland
K. Bassi
C. Grebski

Copies made for: (TCK/hl: 18/7/72)

P. D. Billings
A. J. Percy - Att. C. E. Pritchard
W. D. Birch
M. Stoyanoff
A. G. Stermac - Att. M. Devata



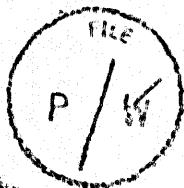
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

Copy for the information of

Mr. T. C. Kingsland

FILE

Systems Design Section
KINGSTON, Ontario



STRUCTURE SITE NO. 29-8
W.P. No 72-72-03

July 17th, 1972

W.P. 72-72 - Petawawa River Bridge
Highway #17 - District #3, Ottawa

REMOVAL OF EXISTING STRUCTURE



On Friday, July 14th, 1972, a brief meeting was held in the Kingston Regional Office to discuss the removal of the existing Highway #17 Petawawa River Bridge.

Those present were:

Mr. P. D. Billage
Mr. C. E. Pritchard
Mr. T. C. Kingsland
Mr. M. Stoyanoff
Mr. I. Williams

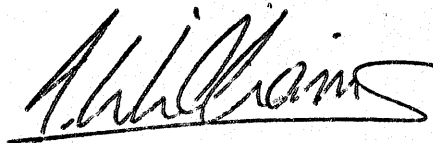
In order to facilitate the construction of a new structure at this crossing, a separate contract is to be called purely for the removal of the failed structure.

The following points were discussed at the meeting, and agreed to:-

1) The Bridge Office will be responsible for preparing the contract documents for the removal of the existing structure.

2) The Contract shall make provision for the Ministry's Foundation Section, during the course of the contract, to investigate the reasons for the failure of the pier.

3) Material from the existing bridge will be used to protect the easterly pier of the Bailey Bridge. This protection is considered necessary during the spring (1973) run-off.



I. Williams
Project Design Engineer

IW/dak

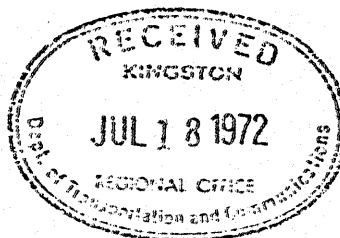
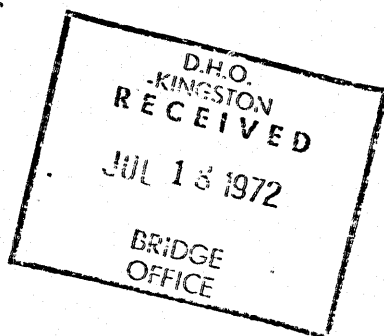
c.c. - P. D. Billings
M. Stoyanoff
T. C. Kingsland
J. E. Callaghan

Copies made for: (TCK/hl: 18/7/72)

B. R. Davis
K. Bassi
C. S. Grebski

Copy made for: (TCK/hl: 19/7/72)

✓ A.G. Stermac - Att. M. Devata



102 JUL 19 AM 11:44

72-11-061

MX KINR JULY 19/72 11.20 AM

OTTA 2 TO J E CALLAGHAN DIST ENGR

DOWN 4 COPIES TO:

B GIROUX ESTIMATING OFFICE

A E MCKIM CONST OFFICE

A G STERMAC FOUNDATIONS OFFICE

B MCGAFFIGAN PROGRAM OFFICE

TORD 1 COPY TO M STOYANOFF STRUCTURAL SVCS SECT

KINR COPIES TO:

P D BILLINGS REG DIRECTOR

R FORREST PROGRAM SECT

A J PERCY SYSTEMS DESIGN

E R SAINTM AND I

B MCKAY ENG AUDIT

J TREW TRAFFIC

RE WP 72-72-03, SITE 29-8, PETAWAWA RIVER BRIDGE,

REMOVAL OF EXISTING STRUCTURE,

HIGHWAY 17, DISTRICT 9

THE REGIONAL REVIEW FOR THE ABOVE PROJECT WILL BE HELD ON

WEDNESDAY, JULY 26, 1972 AT 10 A.M. AT THE OTTAWA DISTRICT OFFICES.

T C KINGSLAND REG STRUCTURAL PLANNING ENGR

JM



Discussed with Kingsland and agreed on presence
is not essential.

J.A.
July 19/72



MX KINR JUNE 20/72 8.30 AM

TORD I K BASSI STRUCTURAL DESIGN OFFICE

DOWN 1 COPY TO M DEVATA FOUNDATIONS OFFICE

RE WP 72-72-01 SITE 29-8 PETAWAWA RIVER BRIDGE IN PETAWAWA
HWY 17

VERTICAL CURVE DATA FOR THE 700 FT SAG V.C. AT THE ABOVE STRUCTURE IS
AS FOLLOWS:

V.P.I. STA 299 PLUS 65 ELEV 445.50

-1.215 PERCENT GRADE TO STA 305 PLUS 00

V.P.I. STA 305 PLUS 00 ELEV 439.00

PLUS 5.24 PERCENT GRADE TO STA 314 PLUS 55

V.P.I. STA 314 PLUS 55 ELEV 489.00

PLEASE DISREGARD CURVE INFORMATION AS SHOWN ON PLAN E-5233-1.

A VANDALEN STRUCTURAL PLANNING

JM

72-11061

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

To: Mr. A. G. Stermac,
Principal Foundations Engineer,
Foundations Office,
West Building.

FROM: Structural Services Section,
West Building.

ATTENTION:

DATE: July 21, 1972.

OUR FILE REF:

IN REPLY TO

SUBJECT: Petawawa River Bridge,
Removal of Existing Structure,
Highway 17, District 9,
Site 29-8, W.P. 72-72-03.

As discussed with yourself and Mr. Devata of your office we propose to include the attached special provision in the contract to deal with your proposed investigation of the existing centre pier which settled so drastically.

We have also been in touch with Mr. Harris, the Principal Hydrology Engineer who has expressed the desire to make a hydrological study at the same location and at the same time as you propose to carry out your foundation investigation.

We would desire that both you and Mr. Harris examine the proposed special provision and forward a reply to us with your comments and/or approval.

As this project is quite urgent your immediate reply would be appreciated.

MS/im
Attach.

M. Stoyanoff
M. Stoyanoff,
Structural Contract Engineer.

c.c. A. F. Argue
J. D. Harris
L. M. Peverett
T. C. Kingsland
K. Bassi
E. Pritchard

Staging of Construction

The contractor is advised that the Ministry will carry out an hydrological and foundation investigation at the centre pier of the existing structure prior to the removal of the pier.

The contractor shall so schedule his work that the centre pier will be the last portion of the existing structure to be removed.

It is expected that approximately one week will be required to carry out the investigation. During this time no work shall be done by the contractor in the vicinity of the pier.

12-11061
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

TO: A. G. Stermac,
Principal Foundations Engineer.

FROM: Hydrology Office.

ATTENTION:

DATE: July 24th, 1972.

OUR FILE REF.

IN REPLY TO

SUBJECT: Petawawa River Bridge, Removal of Existing Structure
Site No. 29-8, Hwy. 17, WP 72-72-03

Further to our discussion of the special provision proposed in Mr. Stoyanoff's memorandum to you, dated July 21st, 1972, the information we would like to obtain is the thickness of the old pier footing and the soundness of the concrete. We would also like to ascertain the thickness of the boulder layer in front of the Bailey bridge fill.

However, if the river flow continues at its present high level, thereby preventing your crew from further drilling, I feel that large expenditures to obtain the data would not be justified. I think we probably have enough information to be reasonably sure of the causes of the scour failure.

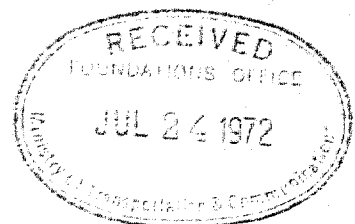
When the old bridge is demolished, care must be taken not to obstruct the river sufficiently to induce movement of the bouldery layer overlying the sand stratum. Removal of this protective layer could cause serious undermining of the toe of the Bailey bridge fill, thereby endangering the structure.

For your information, the Petawawa River usually has its lowest flow in January through March, and may also be low in September.


J. D. Harris,
Principal Hydrology Engineer.

JDH/am

cc: A. E. Argue, Director Design Services
M. Stoyanoff, Structural Contract Engineer
K. G. Bassi, Regional Structural Design Engineer
T. C. Kingsland, Regional Bridge Planning Engineer
L. M. Peverett, Construction Engineer.



Department of Highways Ontario

Copy for the information of

A. STERMAC

Mr. H.O. Winsland
Regional Bridge Planning Engineer
Peterborough, Ontario

Structural Office
West Building
Oshawa, Ontario

July 20, 1972

Petawawa River Bridge at Petawawa
R.F. 72-72-01 Site 200
Hwy. No. 17 District No. 9

72-4-061

Attached herewith are prints of the revised Preliminary Bridge Plan Drawing O-20-3-02 for the above mentioned structure.

The estimated cost of the proposed structure is \$275,000 which includes tender, materials, engineering and sundry construction.

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

CSH/LWH
Encls.

C.S. Grebski
Structural Design Engineer

cc A. McKim
B. Davis
A. Stermac
J. Anderson
R. Forreast

No comments.
M. Levata
27th July 1972

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

MEMORANDUM

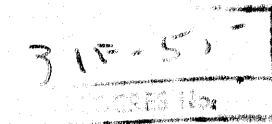
To: Mr. T. C. Kingsland, (2) FROM: Foundations Office,
Regional Structural Planning Eng., Design Services Branch,
Eastern Region, West Bldg., Downsview.
Kingston, Ontario.

ATTENTION: DATE: August 28, 1972.

OUR FILE REF. IN REPLY TO AUG 30 1972

SUBJECT:

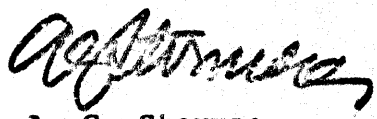
ADDENDUM TO
FOUNDATION INVESTIGATION REPORT
For
Replacement of Existing Petawawa River Bridge
Hwy. 17 at Township of Petawawa
County of Renfrew, District 9 (Ottawa)
W.O. 72-11061 -- W.P. 72-72



Attached we are forwarding to you our Addendum to Foundation Investigation Report W.O. 72-11061 at the above-mentioned location. This addendum contains all the factual data together with our recommendation pertaining to the design of roadway protection for the replacement of existing Petawawa River Bridge.

This report should be read in conjunction with our Foundation Report W.O. 72-11061 and should be appended to the original report. Should additional information be required, please do not hesitate to contact our Office.

AGS/ao
Attch.


A. G. Stermac,
PRINCIPAL FOUNDATIONS ENGINEER.

cc: D. W. Farren
B. R. Davis
A. Rutka
S. J. Markiewicz
J. E. Callaghan
B. J. Giroux
E. R. Saint
G. A. Wrong
B. A. Singh

Foundations Files
Documents

ADDENDUM TO
FOUNDATION INVESTIGATION REPORT
For
Replacement of Existing Petawawa River Bridge
Hwy. 17 at Township of Petawawa
County of Renfrew, District 9 (Ottawa)
W.O. 72-11061 -- W.P. 72-72

1. INTRODUCTION:

At the centre pier location of the existing Petawawa River Bridge, excessive settlement of the order of 1.5 to 2.0 feet occurred during the high flood season (beginning of May 1972). Further subsidence of the centre pier took place during the latter part of May, 1972. A foundation investigation was carried out by this Office during the period of May 17 to June 1, 1972. Our recommendations pertaining to the design of the foundations of the proposed structure were submitted in a detailed foundation report No. 72-11061 dated June 28, 1972.

A twin Bailey Bridge was built subsequently some 50 ft. upstream of the existing damaged structure to carry Hwy. 17 across the Petawawa River. At present, the design of the new bridge to replace the existing one is in progress. The pier and abutment foundations of the new structure will be in close proximity to the Bailey Bridge approach fills. Roadway protection will be required during the demolition of the existing bridge and the construction of the new structure in order to protect the Bailey Bridge approaches.

The Foundations Office was requested to carry out a subsurface investigation along the lines of the proposed roadway protection. The request was contained in a memo from Mr. T. C. Kingsland, Regional Structural Planning Engineer of the Structural Planning Office, Kingston, dated July 14, 1972. An investigation was carried out subsequently by this Office to determine the subsoil, bedrock and groundwater conditions at the proposed site.

Presented in this report are the factual results obtained from this investigation together with our recommendations pertaining to the design of the proposed roadway protection.

This report should be read in conjunction with our original Foundation Investigation Report No. 72-11061 and should be appended to the original report.

2. SUBSOIL AND BEDROCK CONDITIONS:

2.1) General:

The site is located along the Petawawa River at a point immediately north-west of the Town of Petawawa in the County of Renfrew.

In order to determine the subsurface conditions along the proposed roadway protection locations four sampled boreholes were put down using two diamond drill rigs adapted for soil sampling purposes. The soil, bedrock and groundwater conditions encountered are presented on the borelog sheets appended to this report. The borehole locations are shown in plan on Drawing No. 72-11061B together with stratigraphical profiles along the north and south walls. The elevations of the boreholes were estimated from the Drawing No. E-5233-1. The various soil types encountered will be discussed in the subsections to follow.

2.2) Fill Material (Gravelly Sand to Sand with Some Fine Gravel):

Fill material was placed to form the existing approaches of the Hwy. #17 - Petawawa River structure. In addition, new fill was placed recently to form the approaches of the Bailey Bridge adjacent to the existing old structure.

The old fill material is composed of a mixture of sand and fine gravel, with cobbles and boulders up to 14" in size within the lower portion of this stratum at the south approach location. Recent construction of the Bailey Bridge approaches resulted in additional fill up to 8 ft. of gravelly sand with cobbles (4" diameter maximum) in the area of the proposed roadway protection. The total thickness of the fill material encountered

in boring locations ranges from 8 feet (B.H.'s #9 and #10) to 32 feet (B.H. #8).

Standard penetration testing carried out in this material gave 'N' values generally ranging from 2 to 33 blows per foot with exceptionally high values at isolated locations where cobbles or boulders are present.

Based on these results, it is estimated that the fill material has been subjected to moderate compactive effort.

2.3) Sand with Silt, Trace of Gravel (Occasional Cobbles Up to 4" Diameter in Size):

This is the predominant stratum across the site which was encountered immediately below the fill material. This deposit is composed of a mixture of sand with silt and trace of gravel with occasional cobbles up to 4 inches in size. The thickness of this stratum is about 23 feet and 32 feet at the south and north approaches, respectively.

Standard penetration testing was carried out within this granular deposit. The results are plotted on the borelog sheets. The testing gave 'N' values which range from 64 blows/ft. to 100 blows for 5 inches. Based on these results, it is estimated that the relative density of the granular deposit is generally very dense.

2.4) Gneiss Bedrock:

The granular deposit is directly underlain by metamorphic bedrock of Precambrian Age. The bedrock was proven in three of the boring locations by obtaining between 1.5 feet and 3.6 feet of BX size rock core samples.

The dominant type of bedrock encountered in the drilling is a dark grey fine-grained biotite feldspar gneiss with bands of coarse grained feldspar biotite gneiss. The bedrock surface was found to be at elevations about 410 and 392 at the proposed north and south roadway protection walls, respectively.

3. GROUNDWATER CONDITIONS:

Groundwater level observations were carried out during the period of the field investigation in the open boreholes.

The observations are presented on the individual borelog sheets as well as on Drawing No. 72-11061B. The results indicate that the groundwater level varies between elevations 416 and 431, which corresponds to levels ranging from 15 feet to 30 feet below the existing ground surface.

4. DISCUSSION AND RECOMMENDATIONS:

It is proposed to demolish the existing structure and to replace it with a new bridge at the crossing of Hwy. #17 and Petawawa River, in the Township of Petawawa, County of Renfrew. The removal of the abutment footings of the existing structure will involve excavations up to 20 feet deep. In view of the proximity of the Bailey Bridge approach fills to the existing structure, adequate roadway protection will be required.

The predominant deposit along the proposed roadway protection walls is composed of a very dense sand with silt, and trace of gravel. This granular deposit is overlain by fill material up to 32 feet in thickness.

According to the Structural Design Office, the present scheme for the proposed roadway protection consists of:

- i) Driving steel H-piles to a sufficient depth, and
- ii) Driving steel sheeting interlocking piles behind the steel H-piles to an adequate depth in order to provide sufficient lateral support.

The sheet piles may, therefore, be required to be driven into the original subsoil and it should be noted that the bottom portion of the fill material at south bank, and the natural granular stratum contain numerous cobbles and boulders up to 14" in size. In view of this, it may be extremely difficult to penetrate the sheetings to the required depth.

It is, therefore, suggested that the excavation for the south abutment footing be carried out from within a properly braced sheeted cofferdam, constructed around the perimeter of the plan limits of the proposed south abutment footing. Since no major dewatering problems are anticipated, the sheeted

cofferdam for the abutment footing may be driven to some 1 to 2 feet below the founding elevation of the footing.

However, the type of roadway protection scheme should be decided upon by economical and other considerations.

Once the final scheme is chosen this Office will provide specific recommendations.

5. MISCELLANEOUS:

The field work performed between July 24 and July 27, 1972, was carried out under the supervision of Mr. C. S. Poon, Project Foundations Engineer, who also prepared this report.

The equipment used was owned and operated by F. E. Johnston Drilling Company Limited, Ottawa, Ontario.

This project was under the overall supervision of Mr. M. Devata, Supervising Foundations Engineer, who reviewed this report.

C. S. Poon
C. S. Poon, P. Eng.



M. Devata
M. Devata, P. Eng.

CSP/ao

August 17, 1972.

APPENDIX 1

RECORD OF BOREHOLE NO 8

JOB 72-11961

LOCATION Sta. 302 + 60 O/S 22' Lt. of Hwy. 17 Revised.

ORIGINATED BY C.S.F.

W.P. 72-72









BORING DATE July 24-26, 1972

COMPILED BY C.S.P.

DATUM Geodetic

BOREHOLE TYPE Wash Boring

CHECKED BY

SOIL PROFILE		SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT ——— w _L PLASTIC LIMIT ——— w _p WATER CONTENT ——— w		REMARKS	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE		BLOWS/FOOT	SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE		WATER CONTENT % w _p w w _L		
447.0	Ground level.										
0.0	Gravelly sand. (Max. size 4" dia.)		1	SS	17						
442.0			2	SS	3	440					
5.0	Sand with some gra.		3	SS	39						
	Fill Material.		4	SS	19						
			5	SS	9						
	Brown		6	SS	17	430					
			7	SS	18						
			8	SS	9						
			9	SS	12	420					
			10	SS	27						
415.0	Loose to compact. 14" dia. Boulder		11	SS	27						
			12	SS	20	410					
32.0	Sand with silt, trace of fine gravel.		13	SS	110	410					
	Grey. Very dense.		14	SS	110	400					
			15	SS	170						
			16	SS	120						
391.6											
55.4	Bedrock - Coarse grained Feldspar		17	BX	Rec.	390					
388.0	Stotite gneiss. Sound			RC	100%						
59.0	End of borehole.										
						380					

W.L. @ El.
415.7
July 26/72

OFFICE REPORT ON SOIL EXPLORATION

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 9

JOB 72-11061

LOCATION Sta. 205 + 95 O/S 22" Lt. E. Hwy. 17 Revised.

ORIGINATED BY C.S.P.

W.P. 72-72

BORING DATE July 24-25, 1972

COMPILED BY C.S.P.

DATUM Geodetic

BOREHOLE TYPE Wash Boring.

CHECKED BY

SOIL PROFILE			SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — W _L		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	PLASTIC LIMIT — W _p	WATER CONTENT — W _p		
449.0	Ground level.						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	W _p — W _L	W _p — W _L		
0.0	Fill Material - G -										
445.0	velly sand. (4" dia. max.)										
4.0	Sand, some gravel.		1	SS	21						
441.0	Brown Compact.										
8.0	Sand with silt,										
	trace of fine gravel										
	(Some clay below										
	416)										
	(Occ. cobbles up to										
	4" in size)										
	Grey.										
	Very dense.										
410.0											
39.0	Bedrock - fine grained										
407.0	biotite gneiss with		12	EXRC	100%						
	bands of coarse grained										
	Feldspar biotite gneiss										
	Sound.										
42.0	End of borehole.										

 W.L. @ El.
434.
July 26/72

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 10

JOB 72-11061

LOCATION Sta. 305 + 72 O/S 22' Lt. C Hwy. 17 Revised.

ORIGINATED BY C.S.P.

W.P. 72-72

BORING DATE July 26-27, 1972

COMPILED BY C.S.P.

DATUM Geodetic

BOREHOLE TYPE Wash Boring.

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. PLT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F. O UNCONFINED * FIELD VANE ● QUICK TRIAXIAL * LAB VANE		WATER CONTENT %			
446.0	Ground level.											GR SA SL CL
0.0	Fill Material - clayey silt to sand with gravel, trace of organics. Loose.		1	CS	---							
438.0			2	SS	9	440						
8.0	Sand with silt, trace of gravel.		3	SS	28							
	Occ. cobbles up to 4" in size.		4	SS	136							
	Grey. Very dense.		5	SS	142	430						
			6	SS	96							
			7	SS	66							
			8	SS	64	420						
			9	SS	132	"						
			10	EXRC	42	"						
			11	SS	166	"						
408.0	Bedrock - fine grained		12	EXRC	1007	410						
39.5	End of borehole.					400						

W.L. EL.

430.7

July 27/72

OFFICE REPORT SOIL EXPLORATION

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 11

JOB 72-11061

LOCATION Sta. 303 + 17 O/S 20' 11' & Hwy. 17 Revised

ORIGINATED BY C.S.P.

W.P. 72-72

BORING DATE July 26-27, 1972

COMPILED BY C.S.P.

DATUM Geodetic

BOREHOLE TYPE Wash Boring

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		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	TRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE		WATER CONTENT %			
442.0	Ground level.											GR SA SI CL
0.0	Fill Material.					440						W.L. not stabilized during field investigation.
	Gravelly sand.		1	SS	5							
434.0	(max. size 4" dia.)											
8.0	Sand with some gravel.		2	SS	2	430						
	Very loose to compact		3	SS	10							
			4	SS	12	420						
			5	SS	17							
412.0	4" dia. cobbles, trace		6	MXRC	633	Rec.						
30.0	Sand with silt, trace of fine gravel. Occ. Cobbles up to 4" dia. in size.		7	SS	150	410						
			8	SS	124							
402.0	Grey. Very dense.		9	MXRC	507							
40.0	End of borehole.		10	SS	140	400						

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_r	SENSITIVITY

GENERAL

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

STRESS AND STRAIN

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

EARTH PRESSURE

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

FOUNDATIONS

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

SLOPES

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

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

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

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

DESCRIPTION OF SOIL

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

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

TYPE OF SAMPLE

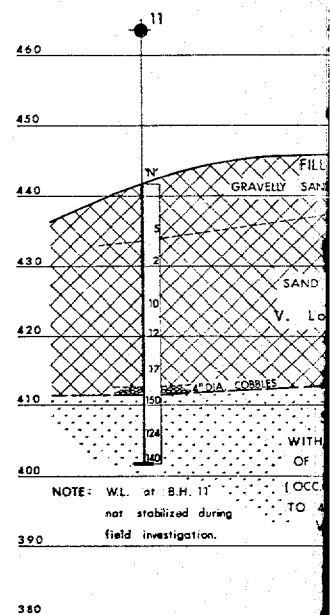
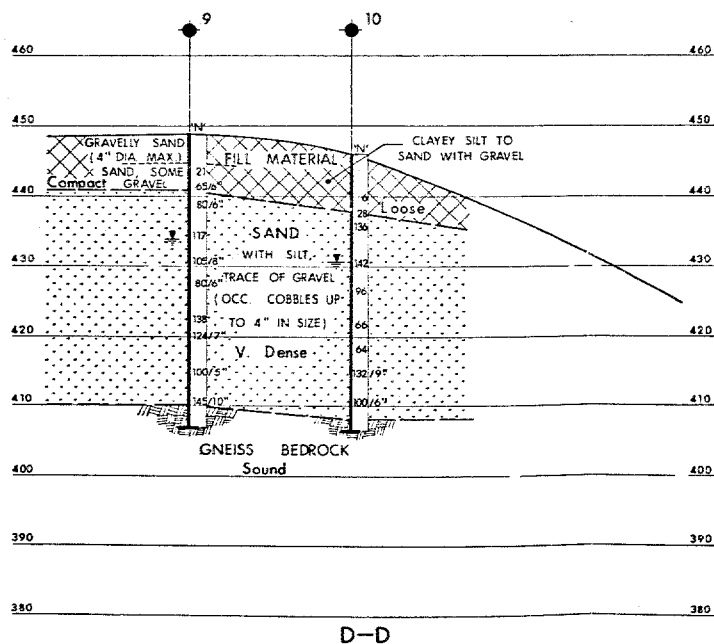
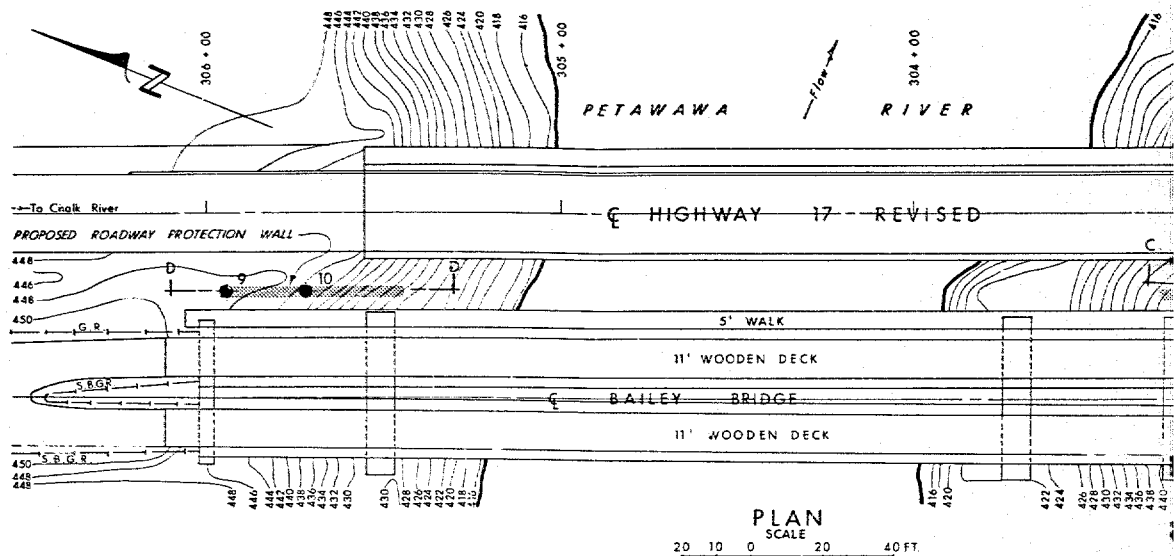
S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		

P.H. SAMPLE ADVANCED HYDRAULICALLY

P.M. SAMPLE ADVANCED MANUALLY

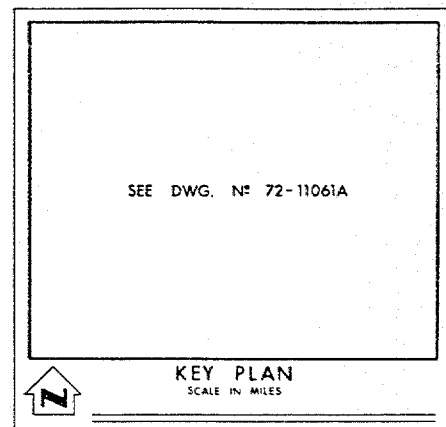
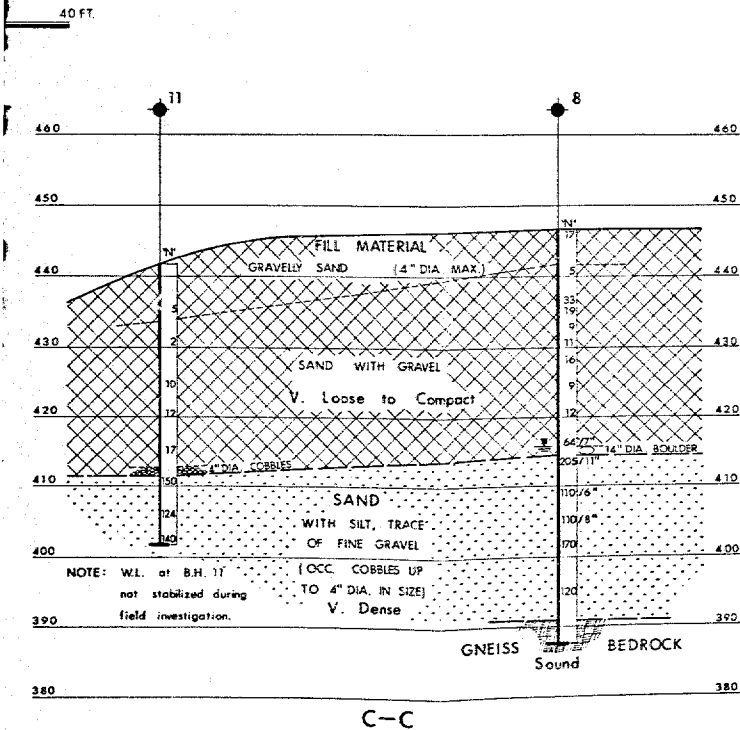
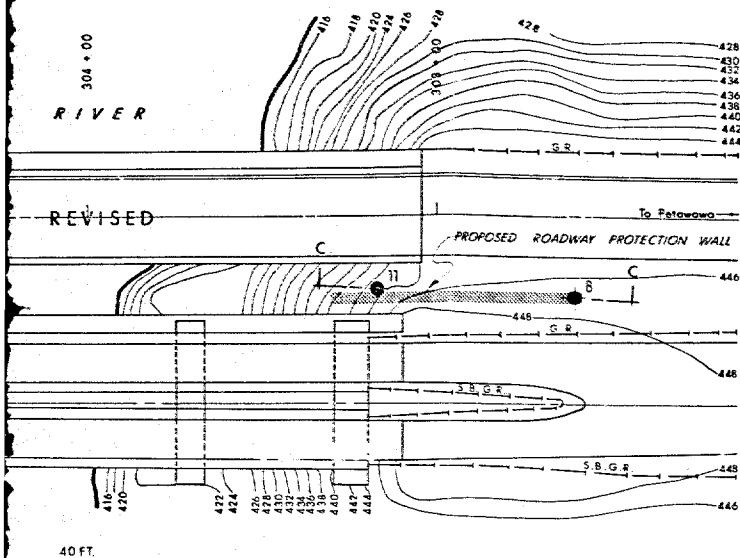
SOIL TESTS

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



SECTIONS
SCALE

10 5 0 10 20 FT.



LEGEND			
	Bore Hole		
	Cone Penetration Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation	JULY, 1972.	
NO.	ELEVATION	STATION	OFFSET
8	447.0	302 + 60	22' LT.
9	449.0	305 + 95	22' LT.
10	446.0	305 + 72	22' LT.
11	442.0	303 + 17	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 DESIGN SERVICES BRANCH — FOUNDATIONS OFFICE			
PETAWAWA RIVER PROPOSED ROADWAY PROTECTION WALLS			
HIGHWAY NO. 17	REVISED	DIST. NO. 9	
CO. RENFREW		TWP. PETAWAWA	
LOT 20 & 21		CON. 8 & 9	
BORE HOLE LOCATIONS & SOIL STRATA			
SUBWD C.S.P. CHECKED	WP NO. 72-72	DRAWING NO. 72-11061B	
DRAWN O.E. CHECKED	JOB NO. 72-11061	BRIDGE DRAWING NO.	
DATE AUG 2, 1972	SITE NO.	CONT. NO.	
APPROVED: <i>[Signature]</i>			

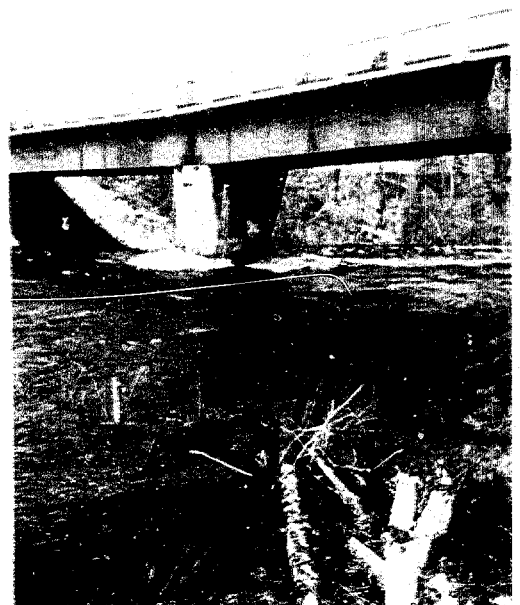
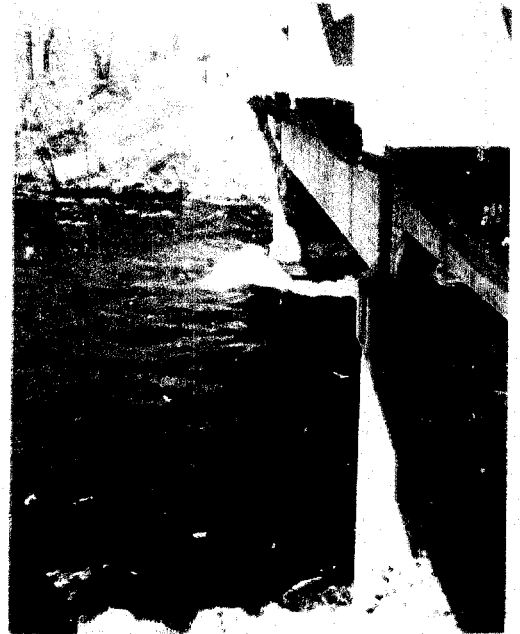
PETAWAWA RIVER BRIDGE

72--11061



PETAWAWA RIVER BRIDGE

72-11061



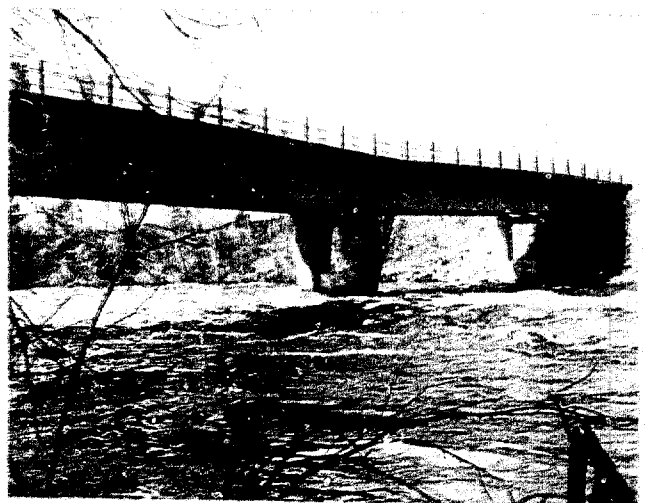
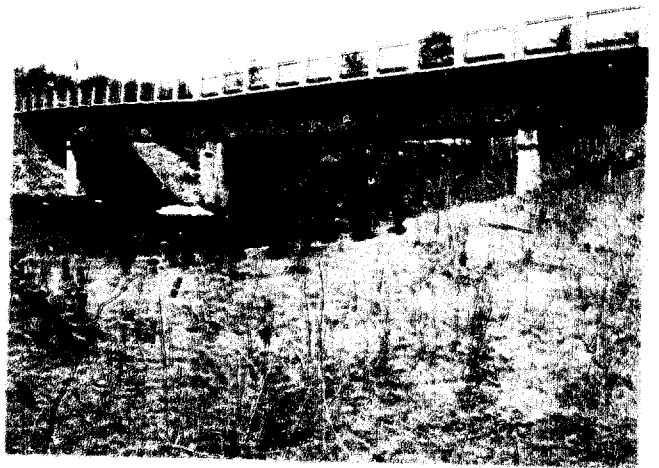
PETAWAWA RIVER BRIDGE

72-11061



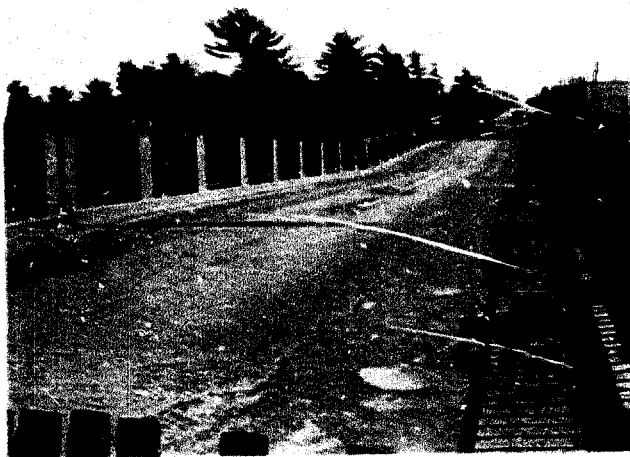
PETAWAWA RIVER BRIDGE

72-11061



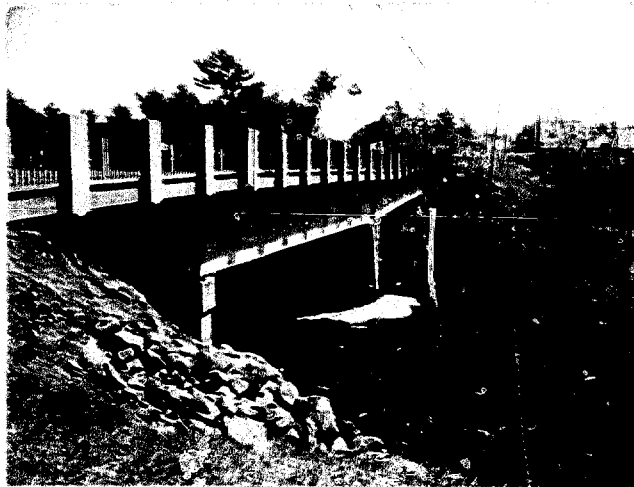
PETAWAWA RIVER BRIDGE

72-11061



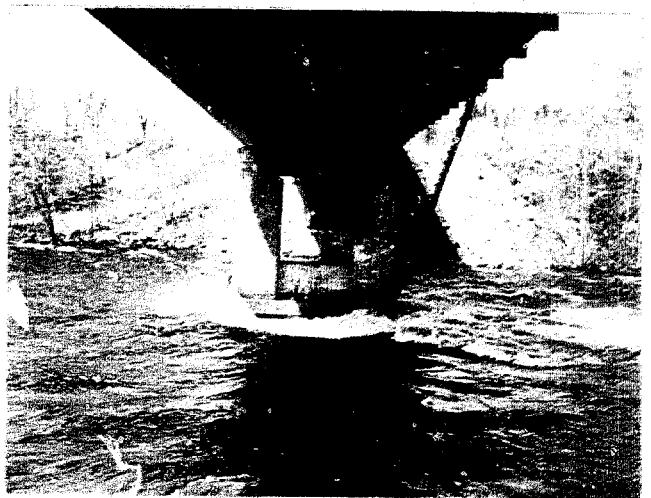
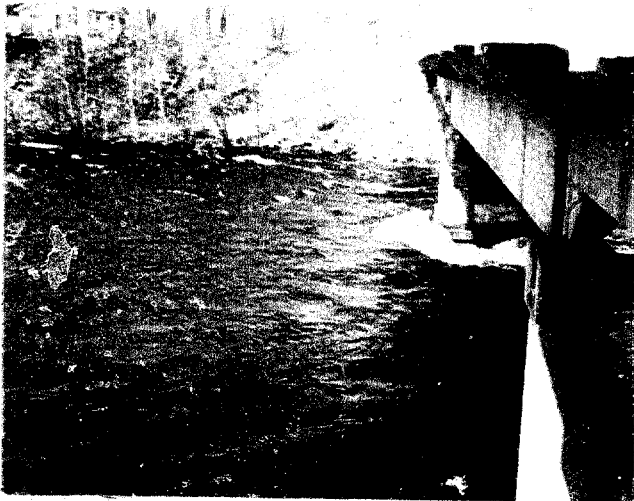
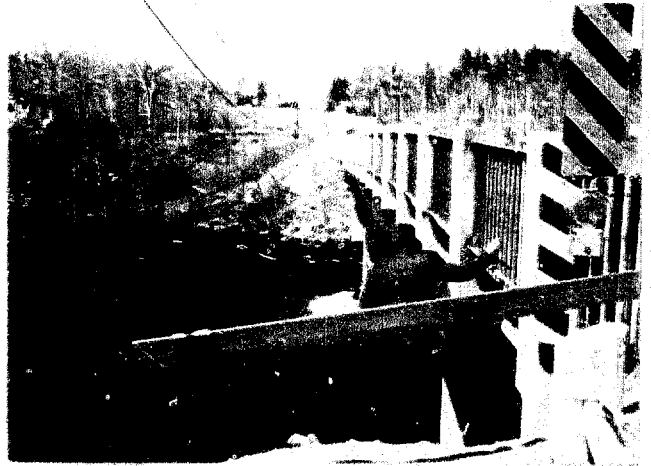
PETAWAWA RIVER BRIDGE

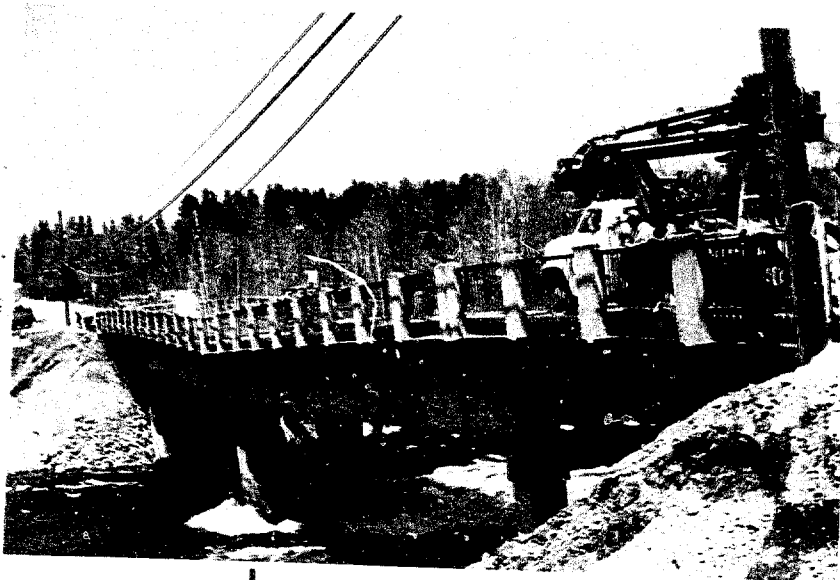
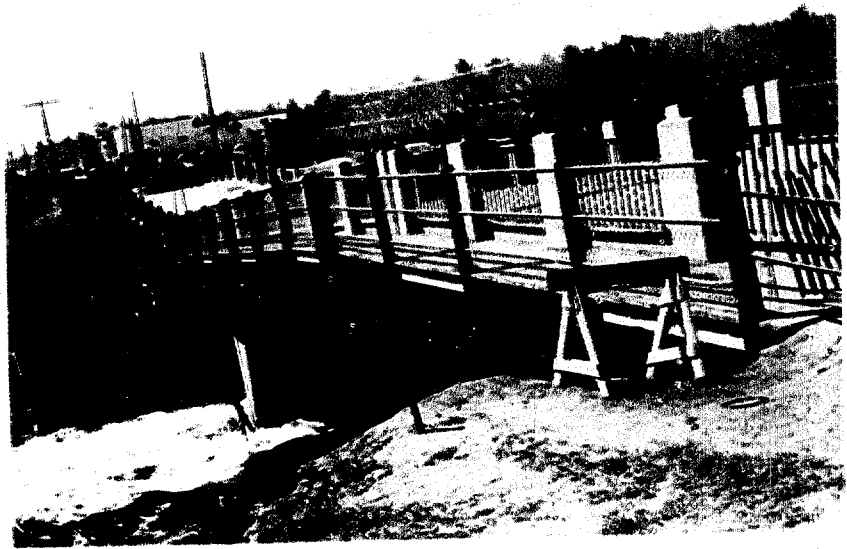
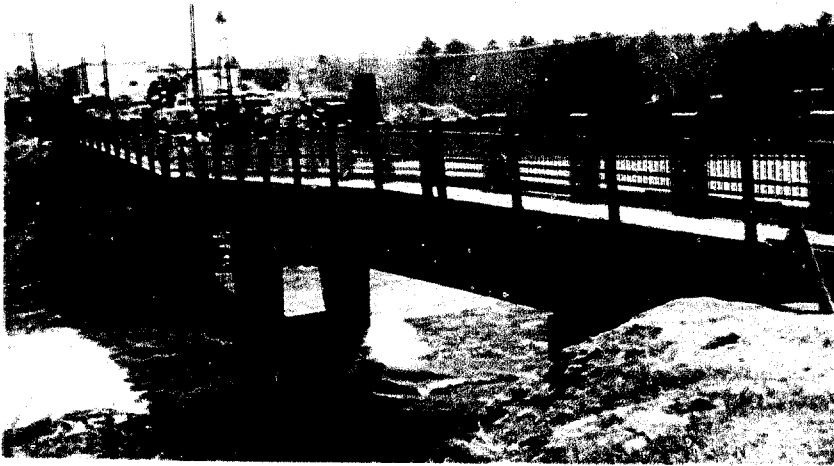
72-11061

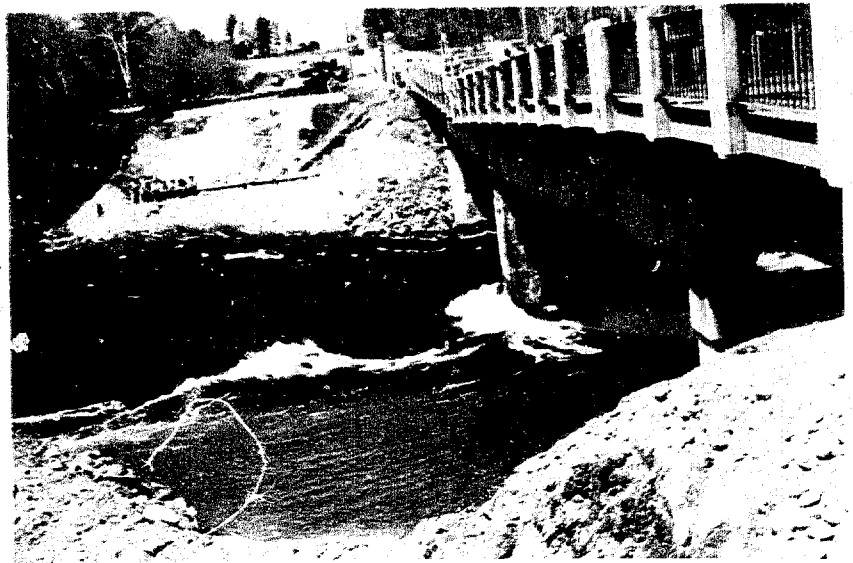
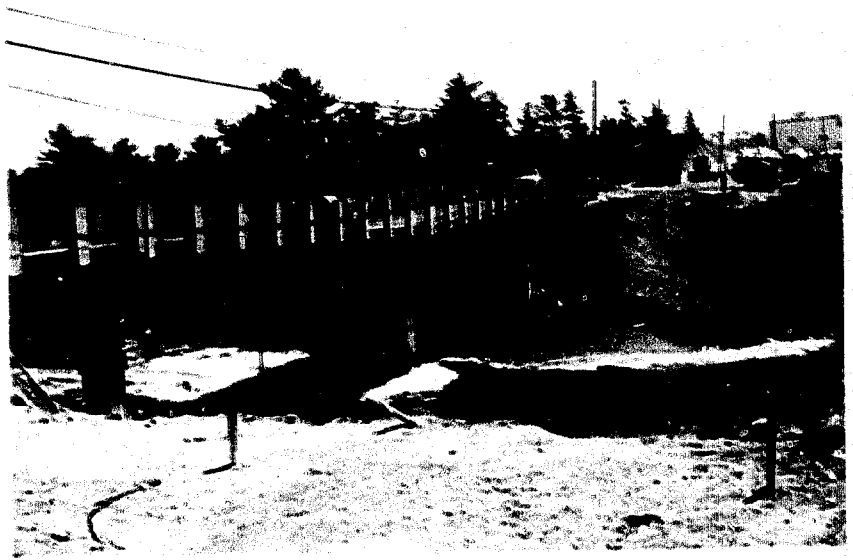


PETAWAWA RIVER BRIDGE

72 - 11061







Department of Highways Ontario
Copy for the information of

FOUNDATION OFFICE

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

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

September 13, 1972

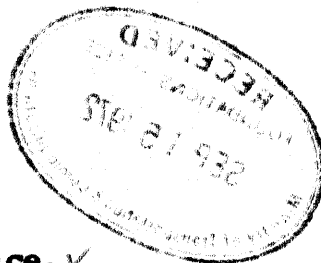
Petawawa River Bridge,
(at Petawawa),
W.P. #72-72-01, Site #29-8,
Hwy. #17, District #9.

72-11-061

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

Kindly give us your comments at your earliest convenience.

CSG:dp
Attach.



C. S. Grebski,
Structural Design Engineer.

cc. Foundation Office. ✓

no comments.
M. Levata

to B.O.
21 Aug 72
dlk
11/13/72

FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P. 72-72

W.O. 72-11061

Foundation Report By:

Review of Design Drawings By:

Design Drawing No.'s:

..... C.S. Poon

..... C.S. Poon

..... 29-8-63

..... 136

..... 205

1. Does footing design comply with our report or subsequent memos? Yes
2. If answer to 1. is No, is present design acceptable? N/A
3. Has sufficient field work been done? YES
4. Are estimated pile lengths shown on Drawings correct? YES
If not, make a new list.
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 Received19.....

Reviewed19.....

Signed C.S. Poon

Copy for the information of

Mr. A. T. Perry
Regional Manager, Systems Design,
EASTERN REGION, Kingston

Structural Office,
West Building, DOWNSVIEW.

October 6, 1972

Mr. I. Williams, Project Design Engineer.

Petawawa River Bridge at Petawawa,
W.P. #72-72-01, Site #29-8,
Hwy. #17, District #9, Ottawa.

72-11-061

Subsequent to the Regional Precontract Review Meeting held at the Kingston Regional Office on October 4, 1972, I have looked into the various points raised at that meeting. My comments are as follows:

1. Rip-rap Items 24 & 25

I have discussed this point with Mr. J. W. Carter, Hydrology Office. Mr. Carter has a strong preference for using random rip-rap (1 cu. ft. Min. size) for backfilling the pier footing excavations. He feels that the 4 cu. ft. Min. size random rap in Item 25 will leave large voids which is not desirable. The two items should therefore be left as they are.

2. Roadway Protection Item 3

Mr. Stoyanoff has no objections to splitting this item into two items, i.e., Roadway Protection - North Abutment and Roadway Protection - South Abutment. However, he feels that this should be discussed at the Head Office Review Meeting.

3. Plan of Roadway Protection

We have looked into the costs of Roadway Protection as shown on the Bridge Drawings vs. Roadway Protection 45' x 45' square in plan and we find that the cost of the Roadway Protection as detailed on the Bridge Drawings is about \$2,000.00 less than the square alternative.

4. Steel Armouring at Pier #2 S.P. #13

Mr. Stoyanoff has agreed to include a separate item for supply and place steel armouring at Pier #2 Footing, and Systems Design will be advised by him in due course.

October 6, 1972

5. Bell Canada - Embedded Work - Item 20

The following note will be added on bridge drawing 29-8-1B :
"The limits of Bell Canada Embedded Work in structure to be from end of South Approach slab to end of North Approach slab". The Duct Encasement under the sidewalk slab between the wingwall and the approach slab curb should be taken care of by Systems Design.


6. Designated Structural Steel Fabricators

This clause is inserted in the tender documents by the Contract Control Office.

7. Removal of Existing Abutments Items 1 & 2

I have checked the question of blasting with Mr. Devata, Foundations Office. He feels that the use of explosives to remove the existing abutment footings could affect the bailey bridge abutment footings. This point should therefore be discussed at the Head Office Review Meeting.

KGB:dp


K. G. Bassi,
Regional Structural
Design Engineer.

cc. T. C. Kingsland,
J. E. Callaghan - Auth. L. M. Peverett,
A. Stoyanoff,
M. Devata, ✓
J. W. Carter,
J. Wear.

72-11061

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

Copy for the information of

~~A. E. Nolin,~~
Assistant Construction Engineer,
Structures,
Construction Office, Central Bldg.

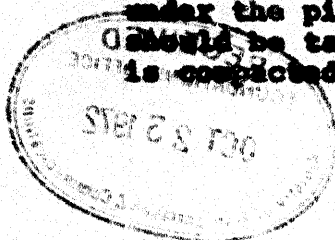
Structural Office,
West Building, DOWNSVIEW.

October 20th, 1972

Petawawa River Bridge at Petawawa,
W.P. #72-72-01, Site #29-8,
Hwy. #17, District #9, Ottawa.

A 13.2" o/d watermain is to be suspended from the deck of this structure. The pipe will be carried through steel enclosure sleeves in the ballast walls. Beyond the ballast walls, it will be buried in the granular backfill.

We have been advised by the Department of National Defence that the pipe can tolerate some differential settlements, but it would be desirable to have no settlement of the backfill under the pipe behind the ballast walls. Therefore, extra care should be taken to ensure that the backfill behind the abutments is compacted thoroughly.



RGB:dp

cc. J. E. Callaghan,
T. C. Kingland,
M. Devata. ✓

Rs.
K. G. Bassi,
Regional Structural Design Engineer.

Mr. A. E. McKim,
Assistant Construction Engineer,
Construction Branch,
Central Bldg., Downsview.

Mr. W. T. Hashizume.

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

April 5, 1973.

Sheet Piled Cofferdam for South Pier,
Petawawa River Bridge, Hwy. 17, Site No. 22-2
Contract No. 72-197, District #8 (Ottawa)
W.O. 72-11061 -- W.P. 72-72

On March 23, 1973, we were informed by your Office that the contractor was unable to drive the sheet piles to the bedrock surface, at the west portion of the south pier cofferdam. According to your observations, the difficulty in driving these piles was possibly due to the presence of old timber crib remaining from the old bridge.

This Office immediately reviewed the available subsoil information together with other pertinent data. Based on this information, we were of the opinion that the obstacles encountered during the driving of the sheet piles at the west portion of the south pier cofferdam are boulders in the fill material which was used in the construction of the detour Bailey Bridge. However, we were requested that borings should be carried out in the problem area in order to determine the type of obstacles.

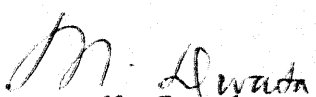
As a result of this, an investigation consisting of two sampled boreholes and one dynamic cone penetration test was carried out at the site during March 27 - 28, 1973. These borings revealed the presence of numerous boulders up to 9 inches in size from present ground surface (approximate elevation 417) to elevation 409. The borehole locations together with the subsoil details are shown on the enclosed sketch. Recommendations regarding the driving of sheet piling through bouldery material, given in our Foundation Report (page 8 under 7.2) Pier Foundations, W.O. 72-11061), will be still applicable in this case. The aforementioned details were verbally given to your Office immediately after the completion of the field work.

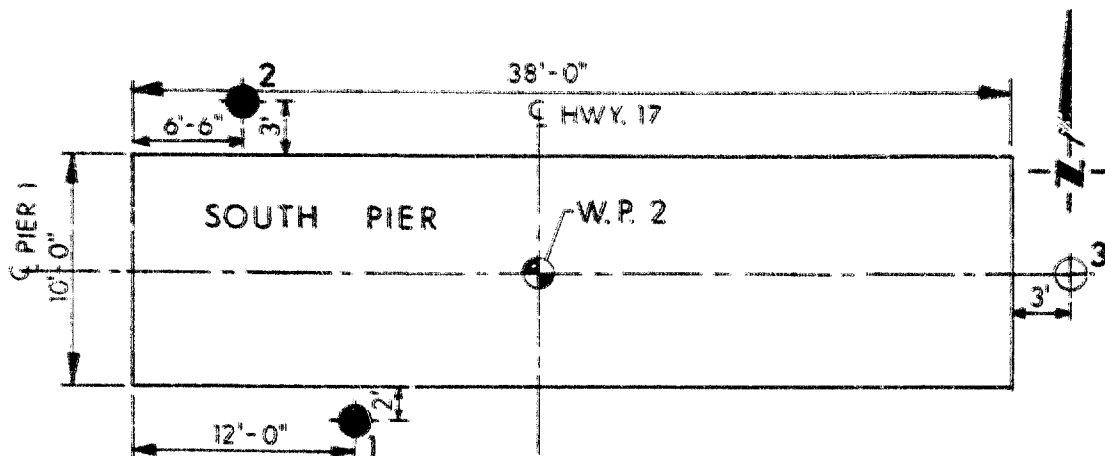
Should you have further queries with regard to this project, please contact this Office.

CSP/ao

C.C. B. R. Davis
J. A. Cruickshank
D. M. Hopper

Foundations Files
Documents


M. Devata,
SUPERVISING FOUNDATIONS ENGINEER.



B.H. #1

Ground elevation 416.0

- 0' - 6.8' Fill material - brown sand and gravel, with boulders up to 6" in size.
- 6.8' - 18.2' Very dense grey silty sand with some gravel.
- 18.2' - 23.0' Bedrock

B.H. #2

Ground elevation 417.0

- 0' - 7.7' Fill material - brown sand, gravel, concrete pieces and boulders up to 9" in size.
- 7.7' - 18.2' Very dense grey silty sand with some gravel.
- 18.2' Probable bedrock

B.H. #3 (Dynamic Cone Penetration only)

Probable bedrock elevation 402.5



PRIORITY

72-11061
1973 FEB 8 AM 11:04

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Kings 613
607-4381
DOWN OTTA 2 FEB 8/73 10:55 A PRIORITY

M DEVAITA SUPERVISING FOUNDATIONS ENGINEER

RE: CONTRACT 72-197 HWY 17 REMOVAL OF EXISTING BRIDGE AND

ERECTION OF NEW BRIDGE & APPROACHES IN VILLAGE OF PETAWAWA

WITH REFERENCE TO SPECIAL PROVISION "STRUCTURE INVESTIGATION".

THE CONTRACT WILL BE COMMENCING DEMOLITION OF THE OLD STRUCTURE ON
FEB 12/73. THE CONTRACTOR HAS INDICATED THAT HE DOES NOT INTEND TO
BUILD A ROADWAY FROM RIVER BANK TO CENTRE PIER. DO YOU WISH TO
VISIT THE SITE TO DETERMINE HOW YOU CAN GAIN ACCESS TO THE CENTRE
PIER TO CARRY OUT FOUNDATION INVESTIGATION.

E. M. MCPHAIL CONSTRUCTION

(Bob Ridgway -



CLAIM

Contract No. 72 - 197

Petawawa River Bridge
Petawawa, Ontario

DINEEN ROADS & BRIDGES LIMITED

70 DISCO ROAD · REXDALE, ONTARIO M9W 1L9 · 677-7220

December 20, 1974

Ministry of Transportation & Communications
530 Tremblay Road
Ottawa, Ontario

Attention: Mr. J. M. Childs
District Engineer

Re: Contract No. 72-197
Petawawa River Bridge

Dear Sirs:

We present herewith for your consideration, three copies of our claim for additional remuneration on this Contract.

This claim is divided into three separate sections.

Section I concerns the fact that boulders of large sizes were encountered during construction of foundations for Pier # 1 and Pier # 2, which were not anticipated at time of tendering.

Section II relates to the fact asphalt had to be hauled from Renfrew instead of the plant at Petawawa, which had closed for the season, resulting in additional costs which were not anticipated at time of tendering.

Section III is in reference to changes made on contract item # 33, "Supply and Place 12" dia. Watermain including related works", and covered on "Instruction Notice to Contractors" issued by the Ministry of Transportation & Communications.

Your consideration of these claim sections is requested.

Yours truly,

DINEEN ROADS & BRIDGES LIMITED


R. A. Ridgway, P. Eng.
Manager, Engineering Construction

RAR:mb
encl:

INDEX

<u>SECTION</u>	<u>DESCRIPTION</u>	<u>VALUE</u>
I	Installation of Cofferdams Pier # 1 and Pier # 2	\$43,052.86
II	Supply of Asphalt from Renfrew Pit	1,664.64
III	Amendments and Additions to Contract Item # 33 "Supply and Place 12" dia. Watermain including related Works"	6,864.73
		<hr/>
	Total Amount Claimed	\$51,586.23
		<hr/> <hr/>

WS:mb

SECTION I

Installation of Cofferdams - Pier # 1 and Pier # 2

This claim is based on the fact that boulders up to 3' 0" and 4' 0" diameter, none of which were anticipated at time of tendering, were encountered during the placing of cofferdams for the pier foundations, resulting in additional costs and loss of time.

The soils reports, forming part of the contract drawings, indicate that cobbles and boulders up to 5" in size may be encountered, and our cofferdams and methods of installation were designed to penetrate such soil conditions. During the last week of March, the M.T.C. drilled test holes at Pier # 1 and ~~re~~stated the fact that no boulders existed.

Our planned sequence of activities for the pier foundations were as follows:

1. Commence work in early part of year (1st week in March) on Pier # 1, and have pier completed before the spring run-off.
2. If time permitted, before the start of spring run-off, construct foundation for Pier # 2, using the cofferdam material from Pier # 1.
(Letter dated March 8, 1973)
3. If spring run-off would not allow commencement of Pier # 2 foundation, then the north and south abutments were to be constructed before Pier # 2.

In actuality, we commenced work for Pier # 1 in early March, and began installation of the sheet piles on March 13. If boulders had not been encountered, Pier # 1 could have been completed before the spring run-off and the sheet piles made available for Pier # 2. Because boulders were encountered at Pier # 1, the sheet piles were not in reusable condition, and new sheet piling was purchased for Pier # 2.

As a result of the difficulties encountered in placing the cofferdam for Pier # 1, and having concern for the safety of the bailey bridge footings, the M.T.C. redesigned the foundation for Pier # 1 and we proceeded accordingly.

The result of the delays encountered at Piers # 1 and # 2, was that erection of the structural steel commenced on September 7 instead of the intended date of July 6, resulting in a loss of 36 working days.

Our Claim therefore is as follows:

1. Installation of Cofferdam, Unwatering, Excavation - Pier # 1

Labour:

Labourers & Welders	685½ hrs. for sum of	\$2,398.70 (Exhibit # 1)
Operators	617½ hrs. for sum of	2,818.46 (Exhibit #1)
		5,217.16
Payroll Burdens 22%		1,147.77
		6,364.93
Working Foreman		4,760.00 (Exhibit # 1)

\$11,124.93

(continued)

Equipment:

Crane LS 98	376 hrs. @ 25.10 =	\$9,437.60 (Exhibit # 2)	
Loader 977K	26½ hrs. @ 25.25 =	<u>669.12</u> (Exhibit # 2)	
			\$10,106.72
Other Rentals		2,796.05 (Exhibit # 2)	
Plus 20%		<u>559.21</u>	
			3,355.26

Material: (not recoverable)

Sheet Piling (Exhibit # 2)	4,522.14
----------------------------	----------

Sub Total	\$29,109.05
-----------	-------------

2. Installation of Cofferdam, Unwatering, Excavation - Pier # 2

Labour:

Labourers & Welders	85 hrs. for sum of	\$ 289.50 (Exhibit # 3)	
Operators	65 hrs. for sum of	<u>302.25</u> (Exhibit # 3)	
		591.75	
Payroll Burdens 22%		<u>130.18</u>	
		721.93	
Working Foreman		<u>208.00</u> (Exhibit # 3)	
			929.93

Equipment:

Crane LS98	34½ hrs. @ 25.10 =	865.95 (Exhibit # 3)	
Loader 955	20½ hrs. @ 17.00 =	<u>348.50</u> (Exhibit # 3)	
			1,214.45
Other Rentals		417.00 (Exhibit # 3)	
Plus 20%		<u>83.40</u>	
			500.40

Material:

Sheet Piling (Exhibit # 3)	3,244.50
Recoverable on Piling = 40% (3,244.50) =	<u>(1,297.80)</u>
Sub Total	\$ 4,591.48

(continued)

3. Original Estimate for Installation of Cofferdam, Unwatering & Excavation at Piers # 1 & # 2.

	<u>Labour</u>	<u>Material & Equipment</u>
Supply Sheetpiling & Bracing		1,615.00
Install & Remove Cofferdams # 1 & 2	808.00	1,807.00
Excavation of Pier Footings		
Cost Price at Time of Tendering 7.38/c.y.		
Progress Payment #20 Item #37.78 c.y.		
78 c.y. @ 7.38 =		575.64
	<u>808.00</u>	
Payroll Burdens 20%	<u>161.60</u>	
	969.60	<u>3,997.64</u>
Sub Total		\$4,967.24

4. Additional Cost Incurred on Installation of Cofferdams for Piers # 1 & # 2 (not including job overhead)

Pier # 1 (see sub-section 1)	29,109.05
Pier # 2 (see sub-section 2)	4,591.48
Original Estimate (see sub-section 3)	(4,967.24)
Additional Costs	\$28,733.29

5. Additional Costs incurred on job overhead as a result of above delays.

Delay

The sub-structure was to be ready to receive structural steel on July 6th, or 58th working day charged, however, actual commencement of the structural steel erection was September 7th, or the 94th working day charged. This was a delay of 36 working days or 2 months calendar days.

Project Overhead:

a. Supervision: 1 Superintendent 2 months @ 1,850.00 = 3,700.00	
1 Office Manager & Surveyor	
2 months @ 630.00 = 1,260.00	
Sub Total	\$4,960.00
b. Travel Expense:	
Room & Board - 2 men x 2 mo. @ 275.00 each/month	1,100.00
Travelling - 2 men x 2 mo. @ 250.00 each/month	1,000.00
c. Office Facilities: 2 trailers x 2 mo. @ 150.00 each/month	600.00
d. Service vehicles: 2 Pickup trucks x 2 mo. @ 150.00 each/mo.	600.00
e. Telephones: 2 months @ 200.00/month	400.00
f. Small Tools & Equipment: 2 mo. @ 500.00/month	1,000.00
g. Insurance: Quarterly Premium	<u>300.00</u>
Sub Total	\$9,960.00

Total Claimed under Section 1:

Sub-Section 4	28,733.29
Sub-Section 5	9,960.00
20% (overhead, supervision & profit) on labour & materials for sections 1, 2, 3, & 5	
20% (11,124.93 + 4,522.14 + 929.93 + 3,244.50 - 7,983.64 + 9,960.00)	
20% x 21,797.86 =	4,359.57
TOTAL	\$43,052.86

SECTION I

LIST OF EXHIBITS

1. Actual labour costs - Pier # 1
2. Actual material; equipment cost (including invoices) - Pier # 1
3. Actual labour, material and equipment costs (including invoices) - Pier # 2
4. Notification of Intent to Claim - June 4/73
5. Letter from Dineen Roads & Bridges Ltd. to M.T.C. dated March 8/73
6. PHOTOGRAPHS
7. Letter from Dineen Roads & Bridges Ltd. to M.T.C. dated Dec. 12/73
8. Letter from M.T.C. to Dineen Roads & Bridges Ltd. dated Dec. 18/73
9. Application for Extension of Time

RAR:mb

1201 Wilson Avenue,
Downsview, Ontario.
M3M 1J8

January 20, 1975.

Dineen Roads & Bridges Limited,
70 Disco Road,
Rexdale, Ontario.
M9W 1L9

Attention: Mr. R.A. Ridgway, P. Eng.,
Manager, Engineering Construction.

Dear Sir: Re: Contract 72-197
 Petawawa River Bridge

This is to advise that Mr. J. M. Childs, Ottawa District Engineer, has forwarded your request for additional payment of \$48,569.83, dated December 20, 1974 to the undersigned for consideration.

This Ministry would require three additional copies of your claim and it would be appreciated if you could forward these to us in the near future.

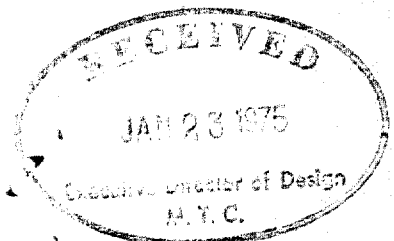
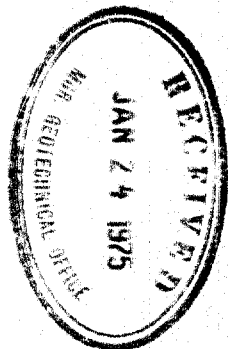
In the meantime, I am forwarding your claim to the Operations Division, Head Office, for their consideration as this is the usual procedure and the Operations Division will investigate this. Undoubtedly you will be hearing from them in due course when they have had a chance to assess the matter.

Yours truly,

J. W. MacDougall, P. Eng.,
Claims Engineer.

JWM:dk

c. c. - J. B. Wilkes ✓ - Claim attached.
F. G. Allen
A. C. Lennox
P. D. Billings
J. M. Childs



MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

ACTION SLIP

DATE Dec 20/75

TO W. Wigle

FROM J. B. WILKES

☐ NOTE AND
FILE

☐ NOTE AND
RETURN TO ME

☐ RETURN WITH MORE
DETAILS

☐ NOTE
AND SEE ME

☐ PLEASE
ANSWER

☐ FOR YOUR
APPROVAL

☐ RETURN WITH YOUR
COMMENTS

☐ PREPARE REPLY FOR
MY SIGNATURE

☒ TAKE APPROPRIATE
ACTION

☐ PER YOUR
REQUEST

☐ FOR YOUR
SIGNATURE

☐ FOR YOUR
INFORMATION

☐ INVESTIGATE AND
REPORT

☐ _____

COMMENTS

I expect that
the Soil Mechanics Section
will be asked to
report on Section I

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

ACTION SLIP

DATE Jan 24/75

TO A. Rella

FROM **W.G. WIGLE**

DIRECTOR, ENGINEERING SERVICES BRANCH

- | | |
|---|--|
| <input type="checkbox"/> NOTE AND
FILE | <input type="checkbox"/> PREPARE REPLY FOR
MY SIGNATURE |
| <input type="checkbox"/> NOTE AND
RETURN TO ME | <input checked="" type="checkbox"/> TAKE APPROPRIATE
ACTION |
| <input type="checkbox"/> RETURN WITH MORE
DETAILS | <input type="checkbox"/> PER YOUR
REQUEST |
| <input type="checkbox"/> NOTE
AND SEE ME | <input type="checkbox"/> FOR YOUR
SIGNATURE |
| <input type="checkbox"/> PLEASE
ANSWER | <input type="checkbox"/> FOR YOUR
INFORMATION |
| <input type="checkbox"/> FOR YOUR
APPROVAL | <input type="checkbox"/> INVESTIGATE AND
REPORT |
| <input type="checkbox"/> RETURN WITH YOUR
COMMENTS | <input type="checkbox"/> _____ |

COMMENTS Please review &

have report prepared on

Section I of Claim



ACTION REQUEST

YBRD-1017 (2-72)

DATE

Jan 27/75

TO

Mr. C. Miza.

FROM

A. RUTKA

TELEPHONE NO.

☐ -- PLEASE CALL

☐ -- WISHES APPOINTMENT

☐ -- RETURNED YOUR CALL

☐ -- WILL CALL BACK

☐ -- NOTE AND FILE

☐ -- PROVIDE INFORMATION

☐ -- PLEASE ANSWER

☐ -- NOTE AND FORWARD

☐ -- FOR YOUR INFORMATION

☐ -- DRAFT REPLY FOR SIGNATURE

☐ -- NOTE AND RETURN

☐ -- FOR YOUR APPROVAL

☐ -- INVESTIGATE AND REPORT

☐ -- NOTE AND SEE ME

☐ -- SIGNATURE

☐ -- TAKE APPROPRIATE ACTION

☐ -- RETURN WITH COMMENTS

☐ -- PER YOUR REQUEST

☐

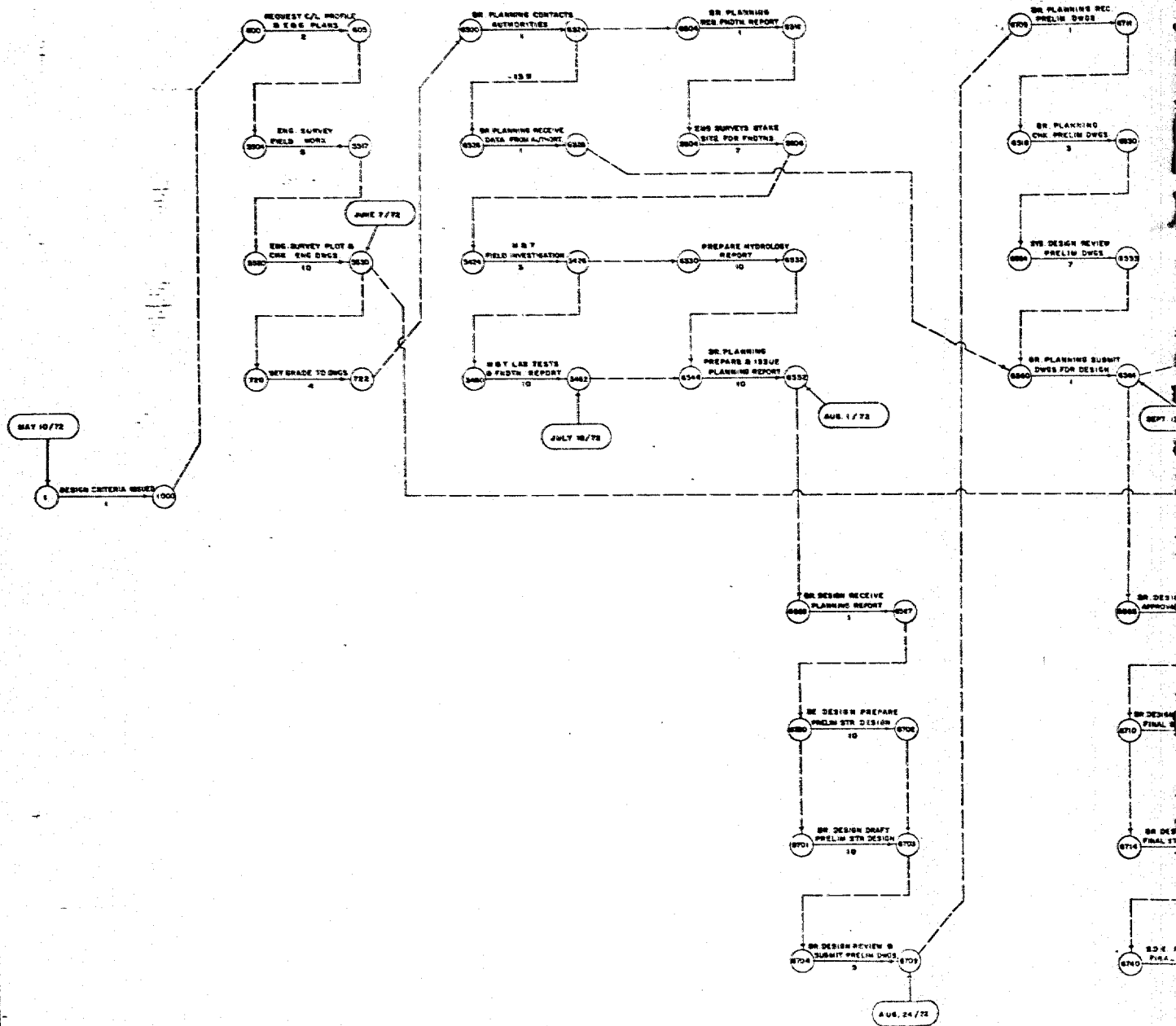
COMMENTS:

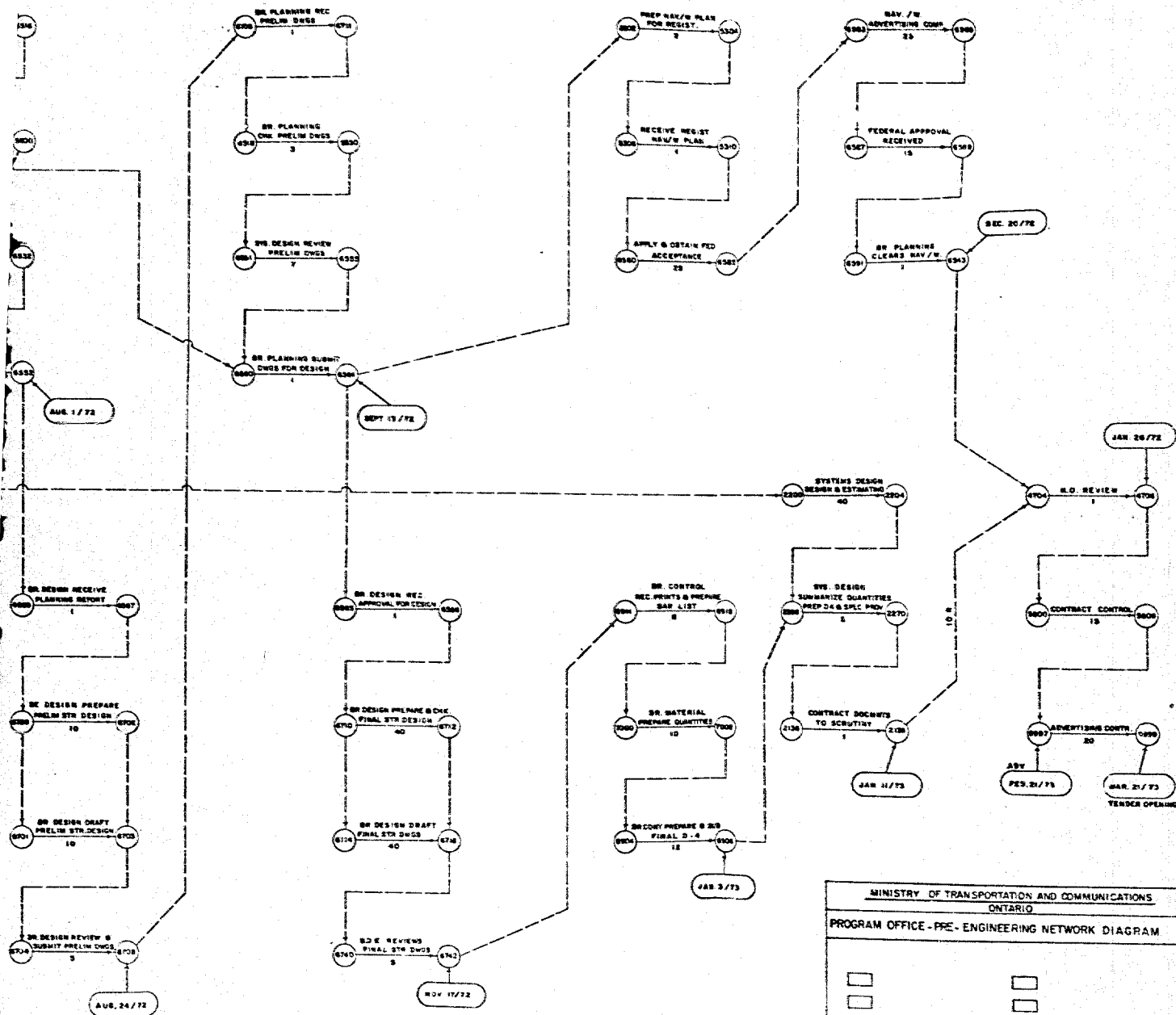
Could you prepare comments on Section I of the claim please

OR

CALL TAKEN BY:

TIME





MINISTRY OF TRANSPORTATION AND COMMUNICATIONS	
ONTARIO	
PROGRAM OFFICE - PRE-ENGINEERING NETWORK DIAGRAM	
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
W.P.N ^o 72-72-01 CONT.N ^o	
PETAWAWA RIVER BRIDGE - HWY. 17	

OVERSIZED DRAWINGS

C.H. Locations - soil strata
Roadway Protection details
General Layout
Foundation " < piers

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 31B-56

DIST. 9 REGION EASTERN

W.P. No. 72-72

CONT. No. 72-197

W. O. No. 72-F-61

STR. SITE No. 29-8

HWY. No. 17

LOCATION HWY 17 AND PETAWANA
RIVER

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. II

REMARKS: DOCUMENTS TO BE UNFOLDED
BEFORE MICROFILMED

31F-55
 GEOCREP No.

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS DESIGN SERVICES BRANCH										RECORD OF BOREHOLE No. 1										FOUNDATION SECTION									
JOB 72-11001					LOCATION Sta. 304 + 12 O/S 10' Lt. g. Hwy. 17 Revised					ORIGINATED BY C.S.P.																			
W.P. 72-72					BORING DATE May 19-20, 1972					COMPILED BY C.S.P.																			
DATUM Geodetic					BOREHOLE TYPE Wash Boring					CHECKED BY <i>AK</i>																			
SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE			LIQUID LIMIT — w _L			PLASTIC LIMIT — w _p			WATER CONTENT — w			BULK DENSITY			REMARKS								
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F.			WATER CONTENT %																			
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE			w _p — w — w _L																			
417.8	River level.																												
0.0	Water																												
410.4																													
7.2	Sand with some silt & gravel.		1	SS	70	410														23 65 (12)									
403.6	Very dense. Grey.		2	SS	40															7 74 (19)									
13.7	MODERATELY FRACTURED		3	BX-RC	100%																								
	BEDROCK		5	BX-RC	100%																								
364.6	Coarse-grained meta-granite. Sound.		6	BX RC	100%	400																							
359.8	Open joint at 45°		7	BX RC	100%																								
	Gneiss with bands of meta-granite.		8	BX RC	100%	390																							
380.9	Sound.		9	BX RC	100%																								
37.1	End of hole.					380																							

20
15 — 5 % STRAIN AT FAILURE
10

317-55

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS									
DESIGN SERVICES BRANCH				RECORD OF BOREHOLE No.3					
JOB 72-11061		LOCATION Sta. 305 + 69 O/S 30' Rt. # Hwy. 17 Revised				ORIGINATED BY C.S.P.			
W.P. 72-72		BORING DATE May 23-25, 1972				COMPILED BY C.S.P.			
DATUM Geodetic		BOREHOLE TYPE Washboring and Cone Test				CHECKED BY <i>JK</i>			

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT		PLASTIC LIMIT		WATER CONTENT		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER TYPE	BLOWS/FOOT	SCALE	W _L	W _P	W _P	W _L	W _P	W _L		
447.4	Ground level.												
0.0	Fill material - sand with some gravel. Loose to compact.		1 SS 23		440								
437.4			2 SS 160										4 67 (29)
10.0	Sand with some silt & gravel. (With boulders up to 4" in size)		3 SS 72		430								5 69 (26)
			4 SS 60										
			5 SS 207										
			6 SS 302		420								W.L. @ El. 424.7
	Very dense. Grey.		7 BX-RC 75										
			8 SS 507										
410.4			9 BX-RC 47		410								26 58 (16)
			10 SS 112										
37.0	Bedrock - gneiss with veins of granite pegmatite.		11 BX 100%										
			12 BX-RC 100%										
			13 BX-RC 100%										
			14 BX RC 100%		400								
397.0													
50.4	End of hole.				390								

20
 15-5 % STRAIN AT FAILURE
 10

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS										RECORD OF BOREHOLE No. 4										FOUNDATION SECTION														
DESIGN SERVICES BRANCH																																		
JOB 72-11061					LOCATION Sta. 305 + 65 O/S 12' Lt. 2 Hwy. 17 Revised					ORIGINATED BY C.S.P.																								
W.P. 72-72					BORING DATE May 25, 1972					COMPILED BY C.S.P.																								
DATUM Geodetic					BOREHOLE TYPE Dynamic Cone Penetration Test					CHECKED BY <i>ML</i>																								
SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L					PLASTIC LIMIT — w_p					WATER CONTENT — w					BULK DENSITY					REMARKS				
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	FLOWS / FOOT					SHEAR STRENGTH P.S.F.					WATER CONTENT %					P.C.F. GR. SA. SI. CL.												
447.0	Ground level.						20	40	60	80	100	<input type="radio"/> UNCONFINED <input type="radio"/> FIELD VANE <input checked="" type="radio"/> QUICK TRIAXIAL <input type="radio"/> LAB. VANE					w_p — w — w_L																	
0.0																																		
428.2	End of cone test.						440																											
18.8							430																											
							420																											

20
15 — 5 % STRAIN AT FAILURE
10

31F55

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS										RECORD OF BOREHOLE No. 5		FOUNDATION SECTION			
DESIGN SERVICES BRANCH										GEOLOGIST No.					
JOB 72-11061			LOCATION Sta. 305 + 65 O/S 1 st Rt. & Hwy. 17 Revised				ORIGINATED BY C.S.P.								
W.P. 72-72			BORING DATE May 25-26, 1972				COMPILED BY C.S.P.								
DATUM Geodetic			BOREHOLE TYPE Washboring				CHECKED BY <i>JK</i>								
SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT		PLASTIC LIMIT		WATER CONTENT		BULK DENSITY		REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F.		WATER CONTENT %		BULK DENSITY		REMARKS		
447.5	Ground level.						<input type="radio"/> UNCONFINED + FIELD VANE <input checked="" type="radio"/> QUICK TRIAXIAL x LAB. VANE		W _p ——— W _L PLASTIC LIMIT ——— WATER CONTENT ———		W _p ——— W _L PLASTIC LIMIT ——— WATER CONTENT ———		P.C.F. GR. SA. SI. CL.		
0.0	Fill material - sand and gravel.		1	SS	5	440							W.L. @ El. 430.3 May 26/72 (hole caved in at El. 426.0 May 27/72)		
	Loose to compact.		2	SS	11										
429.0	Boulders		3	SS	75/2"	430									
18.5	Sand with silt, trace of gravel.		4	SS	150										
	(With boulders up to 5" in size)		5	SS	93	420							0 56 35 9 9 52 35 4		
	Very dense.		6	SS	100/5"										
406.9	Grey.		7	SS	100/3"	410									
40.8	Bedrock-gneiss with minor bands of meta-granite - sound.		8	SS	100/5"										
403.9			9	SS	100/3"										
44.0	End of hole.		10	SS	100/3"										
			11	SS	100/3"										
			12	SS	100/3"										
			13	SS	100/3"										
			14	SS	100/3"										

20
15-5 % STRAIN AT FAILURE
10

31P-55

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS		RECORD OF BOREHOLE No. 6		FOUNDATION SECTION	
DESIGN SERVICES BRANCH					
JOB	72-11061	LOCATION	Sta. 302 + 96 O/S 12' Rt. 2 Hwy. 17 Revised	ORIGINATED BY	C.S.P.
W.P.	72-72	BORING DATE	May 29-31-, 1972	COMPILED BY	C.S.P.
DATUM	Geodetic	BOREHOLE TYPE	Washboring and Cone Test,	CHECKED BY	

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. LOT	NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	BLOWS/FOOT	20 40 60 80 100	W _L	W _P		
445.4	Ground level.											
0.0												
	Fill material - sand with gravel, occasional lenses of clay.		1	SS	1	440						
			2	SS	1							
	Very loose to compact		3	SS	4	430						
			4	SS	4							
			5	SS	11	420						
			6	SS	71							
410.4			7	SS	103	410						
35.0	Sand with some silt and gravel.		8	SS	125							
	Very dense. Grey.		9	SS	135	400						
			10	SS	70/2'							
392.6			11	SS	50/2'							
52.8	Bedrock- meta-granite and thin bands of gneiss. Sound.		12	BXRC	100%	390						
			13	BX RC	100%							
385.1			14	BXRC	100%							
60.3	End of hole.					380						

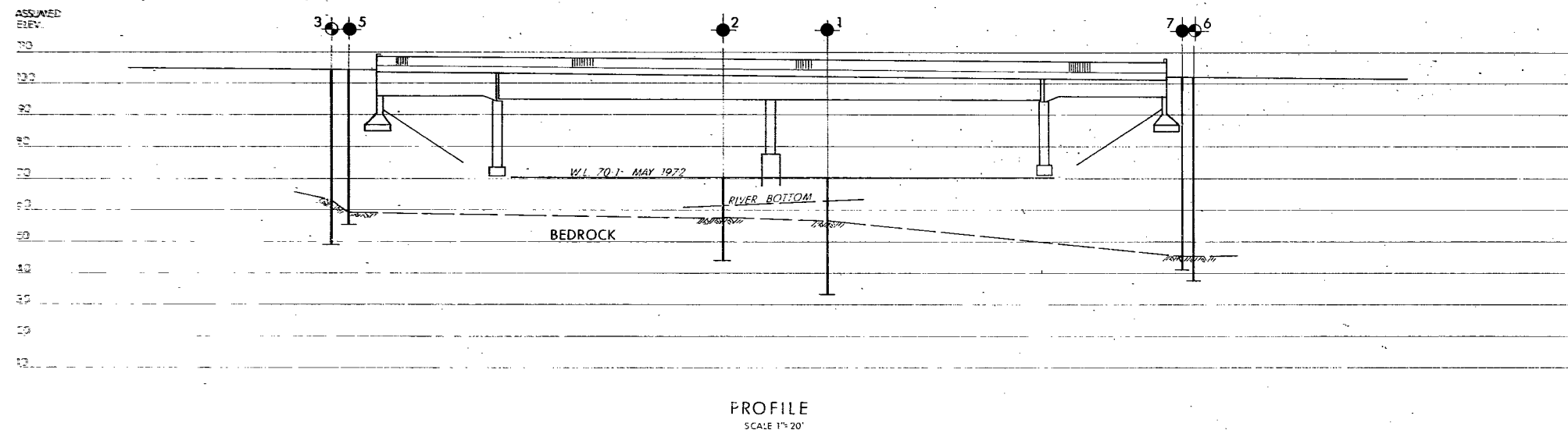
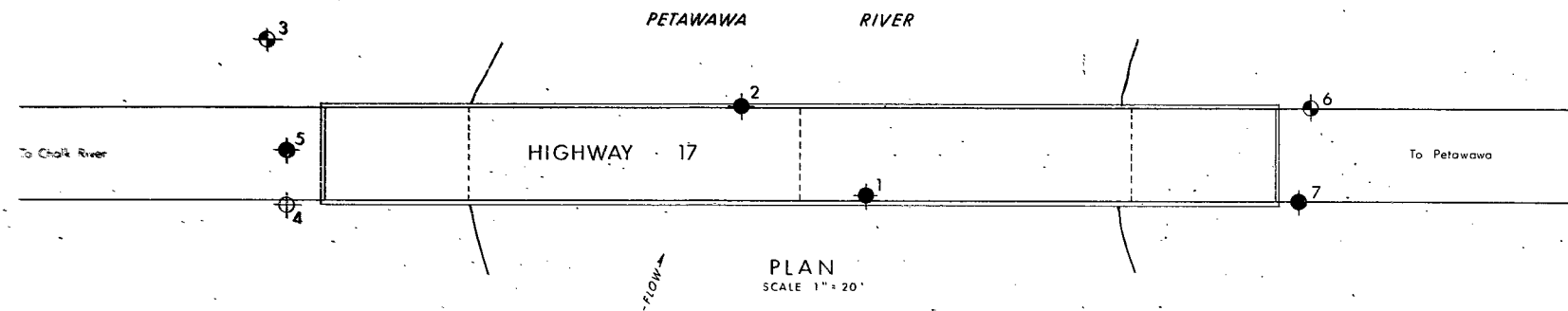
20
15-5 % STRAIN AT FAILURE
10

314-55

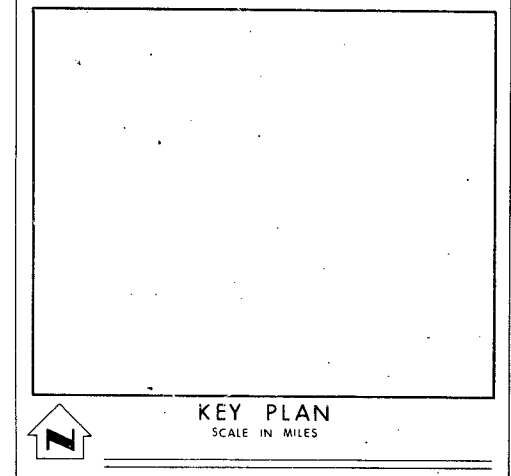
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS DESIGN SERVICES BRANCH										RECORD OF BOREHOLE No. 7										FOUNDATION SECTION									
JOB 72-11061					LOCATION Sta. 302 + 99 O/S 12' Lt. # Hwy. 17 Revision					ORIGINATED BY C.S.P.																			
W.P. 72-72					BORING DATE May 31 - June 1, 1972					COMPILED BY C.S.P.																			
DATUM Geodetic					BOREHOLE TYPE Washboring					CHECKED BY <i>[Signature]</i>																			

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE		WATER CONTENT %		BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE							
445.0	Ground level.												
0.0	Fill material - sand with gravel.	X											
	Loose.		1	SS	4								
			2	SS	5								
			3	SS	130								
411.0			4	SS	100/4	410							W.L. @ EL. 415.7
34.0	Sand with some silt and gravel.		5	SS	50/2								0.87 (13)
	Very dense.		6	SS	100/4	400							1.84 (15)
	(Boulders below El. 394) Grey.		7	SS	50/2								
392.3			8	BXRC	48%								
52.7	Bedrock-gneiss with bands of meta-granite		9	BXRC	100%	390							
388.0	Sound.		10	BXRC	100%								
57.0	End of hole.												
						380							

20
 15-5 % STRAIN AT FAILURE
 10



PRELIMINARY

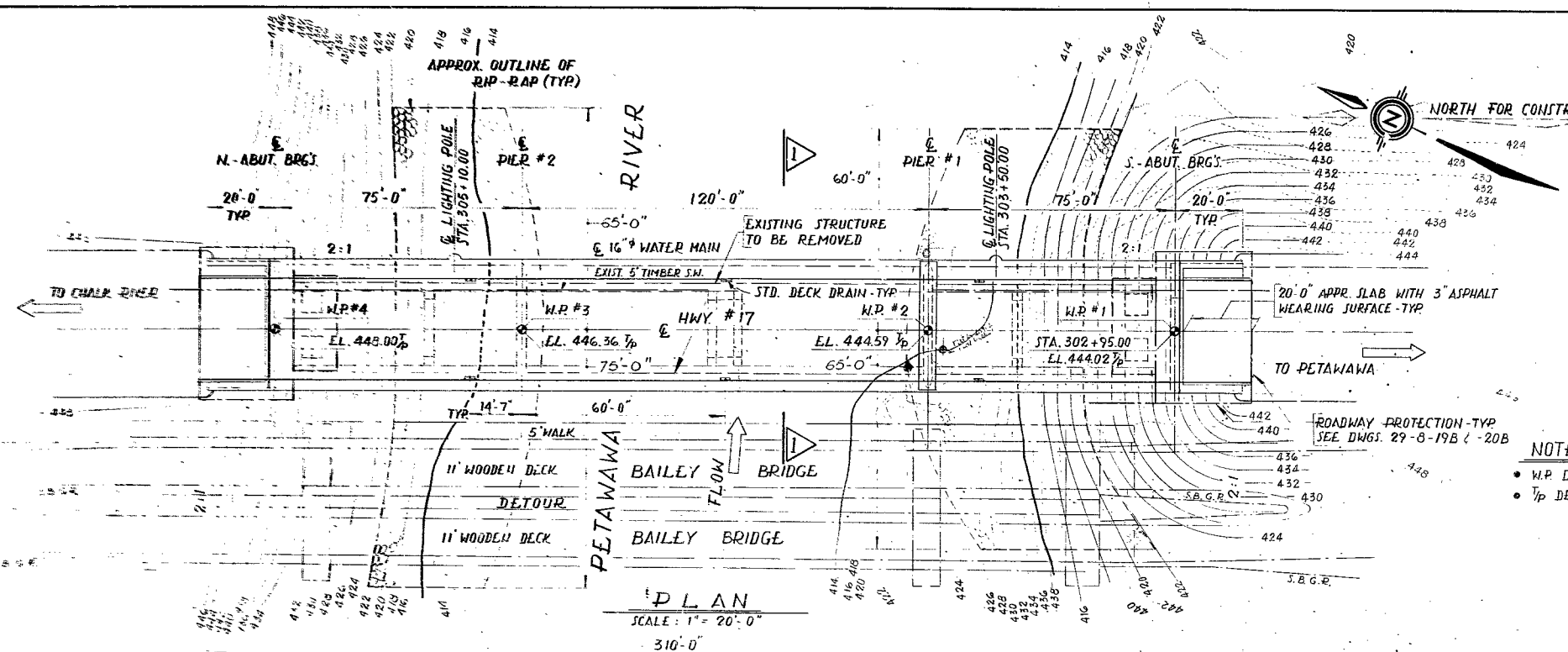


LEGEND			
	Bore Hole		
	Cone Penetration Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation		
NO.	ELEVATION	STATION	OFFSET

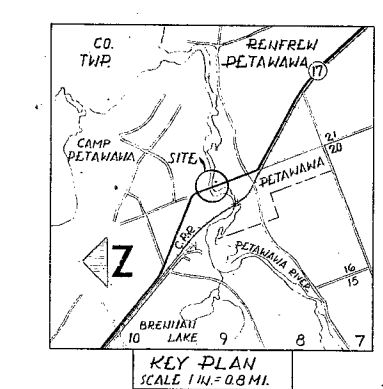
NOTE
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS-ONTARIO MATERIALS & TESTING OFFICE-FOUNDATION SECTION			
PETAWAWA RIVER		GEOCREP No. <u>81F-55</u>	
HIGHWAY NO. <u>17</u>	CO. <u>RENFREW</u>		DIST. NO. <u>9</u>
TWP. <u> </u>	LOT <u> </u>	CON. <u> </u>	
BORE HOLE LOCATIONS & SOIL STRATA			
SURMD.	CHECKED	W.P. NO. <u> </u>	M.T. DRAWING NO. <u>72-11061</u>
DRAWN	CHECKED	JOB NO. <u> </u>	BRIDGE DRAWING NO. <u> </u>
DATE <u>2 JUNE 1972</u>	SITE NO. <u> </u>		
APPROVED <u>[Signature]</u>	PRINCIPAL FOUNDATION ENGINEER	CONT. NO. <u> </u>	



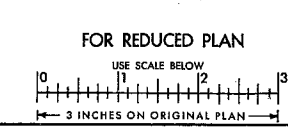
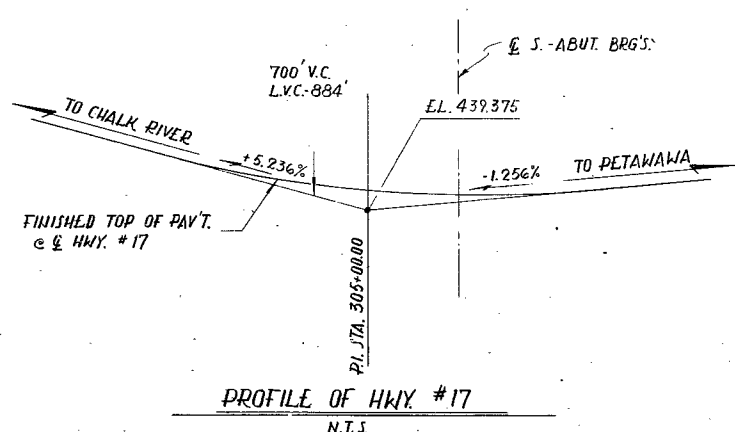
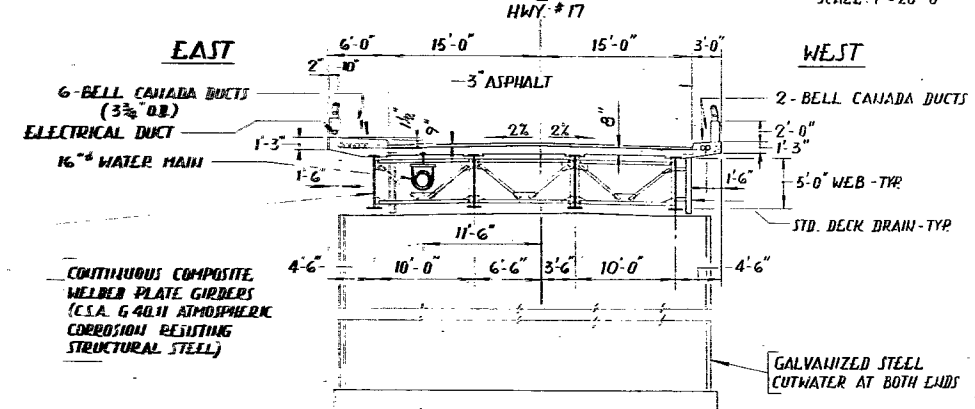
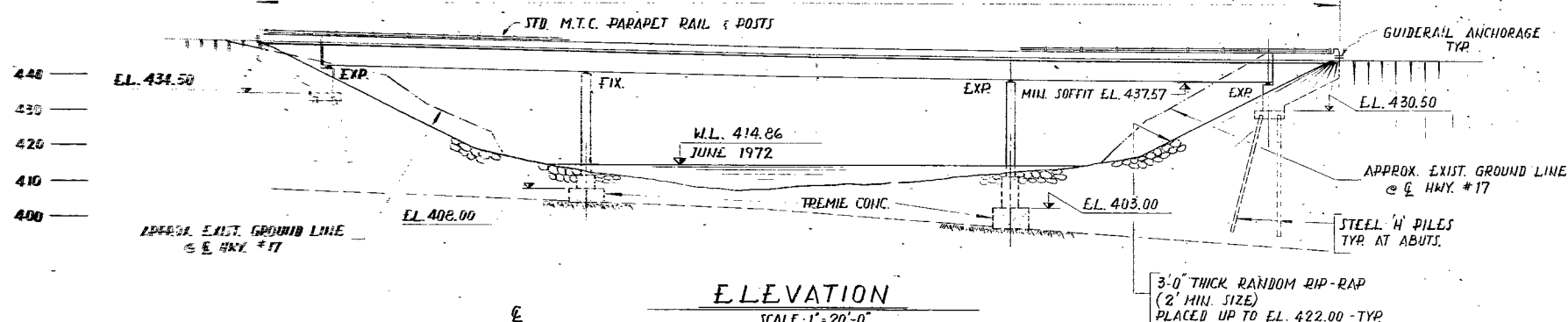
REFERENCE BENCH MARK
 B.M. 447.01
 GEODETIC DATUM
 N & W IN S.W. CORNER OF 3.0 PINE ST.
 46.0 RT. OF 305+71.00



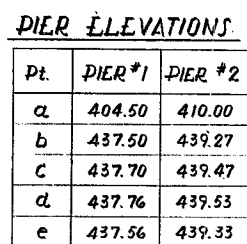
NOTES
 • W.P. DENOTES WORKING POINT
 • T.P. DENOTES TOP OF PAVEMENT

NOTES
CLASS OF CONCRETE
 DECK, CURBS - 4000 P.S.I.
 PARAPET WALLS - 3000 P.S.I.
 REMAINDER - 3000 P.S.I.
CLEAR COVER ON REINF. STEEL
 FOOTINGS & ABUTMENTS - 3"
 CURBS, PIERS & APPROACH SLABS - 2"
 TOP OF DECK 1 1/2", BOT. 1"
 PARAPET WALLS 1 1/2"
CONSTRUCTION NOTES
 THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS 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.

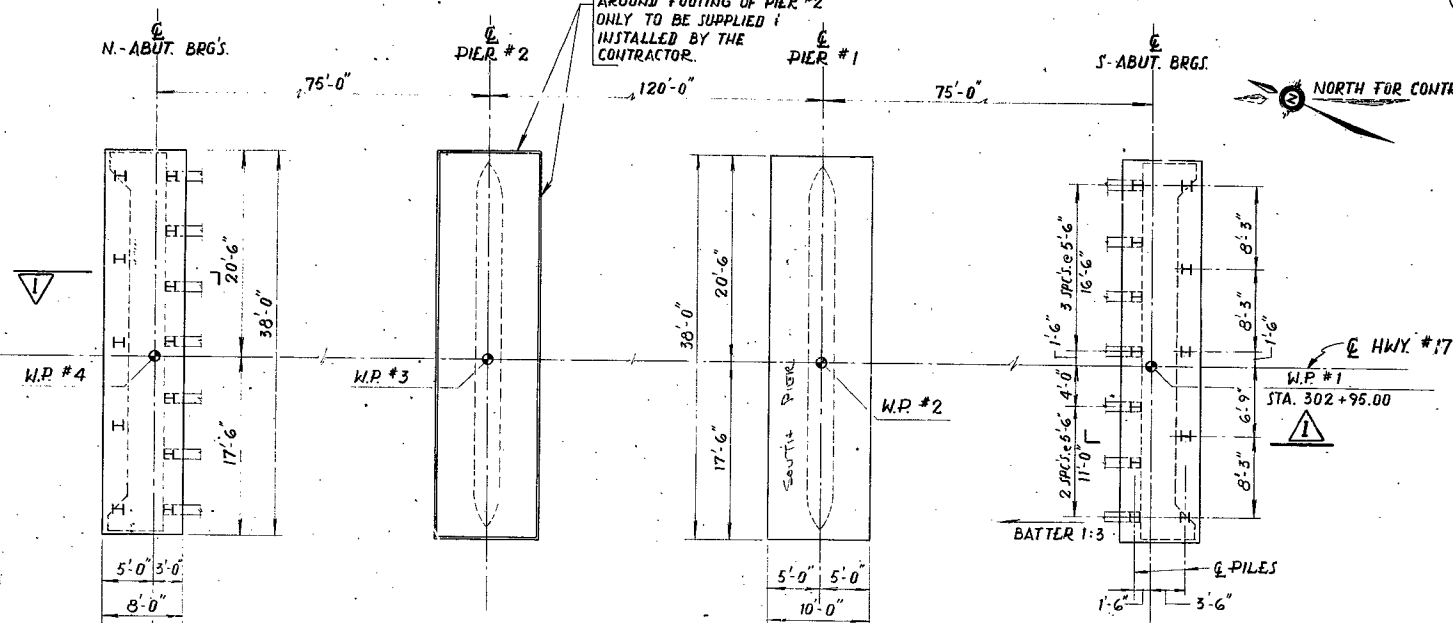
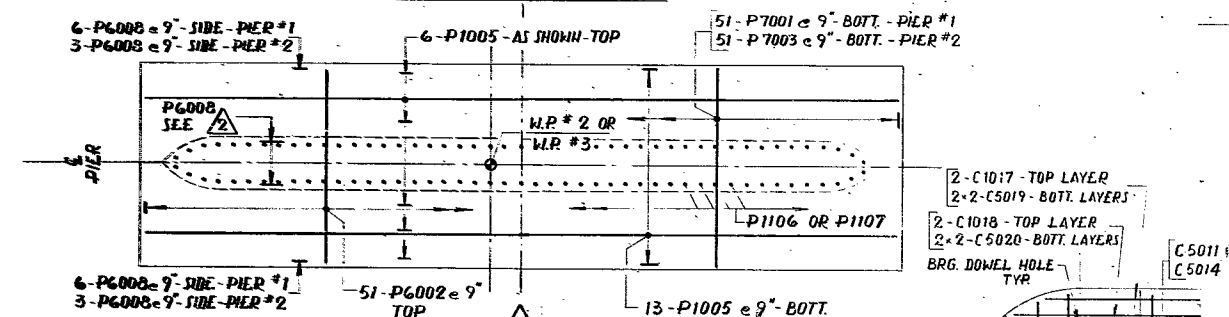
- LIST OF DRAWINGS**
- 29-8-1B GENERAL LAYOUT
 - 2B BORE HOLE LOCATIONS (SOIL STRATA)
 - 3B FOUNDATION LAYOUT (PIERS)
 - 4B NORTH ABUTMENT
 - 5B SOUTH ABUTMENT
 - 6B STRUCTURAL STEEL I
 - 7B STRUCTURAL STEEL II
 - 8B STRUCTURAL STEEL III
 - 9B BEARINGS
 - 10B DECK DETAILS
 - 11B DECK REINFORCEMENT
 - 12B PARAPET WALL DETAILS
 - 13B STANDARD STEEL PARAPET RAIL
 - 14B 20' APPROACH SLAB
 - 15B BRIDGE ELECTRICAL DETAILS
 - 16B STANDARD DETAILS I
 - 17B STANDARD DETAILS II
 - 18B STANDARD DETAILS III
 - 19B ROADWAY PROTECTION LAYOUT
 - 29-8-20B ROADWAY PROTECTION DETAILS



DATE		BY	DESCRIPTION
			31F-65
GEOGRAPHIC			
DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS			
ONTARIO			
72-11-061			
PETAWAWA RIVER BRIDGE AT PETAWAWA			
KING'S HIGHWAY No. 17		DIST. No. 9	
CO. RENFREW		TWP. PETAWAWA	
LOT 20 & 21		CON. VIII	
- GENERAL LAYOUT -			
APPROVED		SITE No. 29-8	
STRUCTURAL ENGINEER		W.P. No. 72-72-01	
DESIGN	A.A.	CHECK	A.K.J.
DRAWING	A.A.	CHECK	A.K.J.
DATE	SEPT/72	LOADING	11/20-44
		DRAWING No. 29-8-1B	



PLAN OF PIER



FOUNDATION LAYOUT

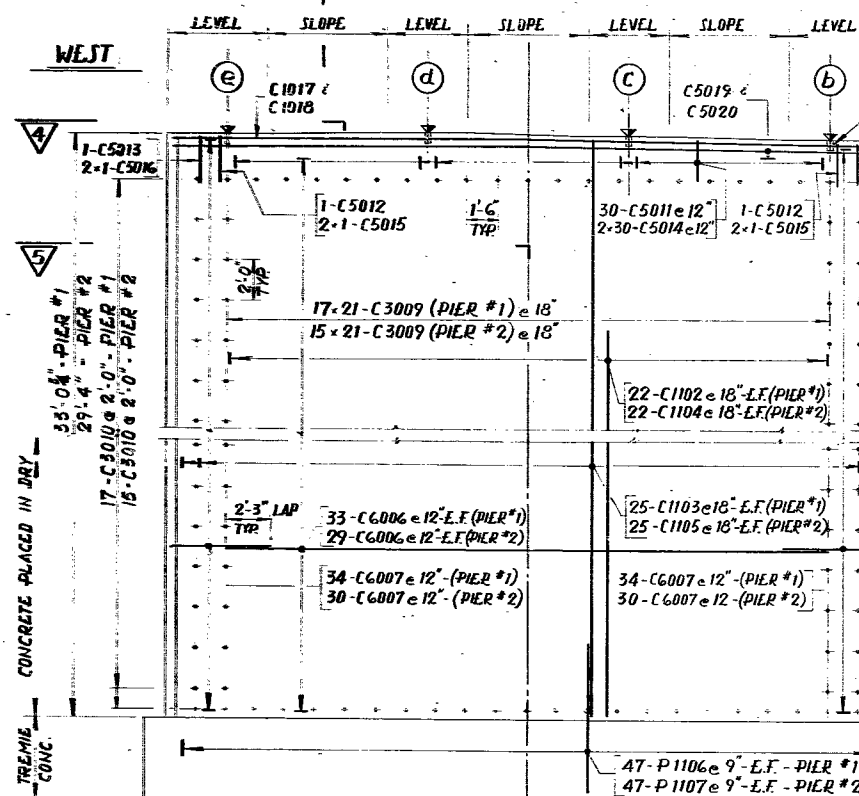
SCALE: $\frac{1}{2}'' = 1'-0''$

PILE DATA

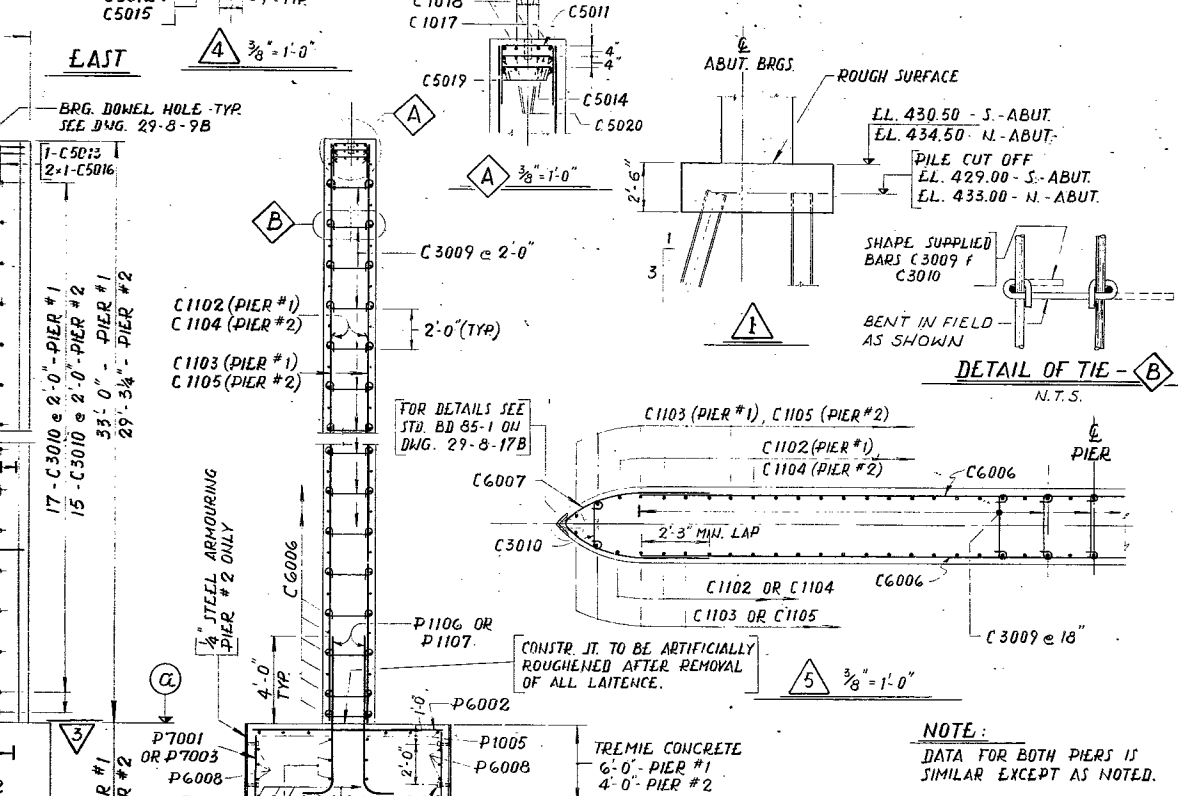
LOCATION	N ₂ RECD.	BATTER	TYPE	LENGTH	DESIGN LOAD
S. - ABUT.	7	1:3	HP10 x 42	34'-0"	55 T/PILE
	5	—		32'-0"	
N. - ABUT.	7	1:3		19'-0"	
	5	—		18'-0"	

NOTES

- PILE SPACINGS TO BE MEASURED AT UNDERSIDE OF FOOTINGS.
- PILES TO BE DRIVEN IN ACCORDANCE WITH STD. BD 82-7 USING DESIGN LOAD OF 55 PILE.
- PILE LAYOUT AND FOOTING DIMENSIONS FOR BOTH ABUTMENTS AND PIERS ARE SIMILAR EXCEPT AS NOTED.
- EXCAVATION FOR PIER #1 TO BE CARRIED OUT WITHIN BRACED TEMPORARY SHEETING TO PROTECT EAST PIER OF EXISTING BAILEY BRIDGE.
- ANY TEMPORARY SHEETING USED FOR PLACING TREMIE CONCRETE IN PIER FOOTINGS MUST NOT BE LEFT IN ABOVE TREMIE ELEVATIONS.
- TOP LAYER OF FOOTING BARS TO BE PLACED AFTER TREMIE HAS BEEN POURED.



ELEVATION



NOTE:
DATA FOR BOTH PIERS IS
SIMILAR EXCEPT AS NOTED

ALL FRACTURED ROCK IN THE VICINITY OF
PIER FOOTINGS TO BE REMOVED AND
FOOTINGS PLACED ON SOUND BEDROCK.
FOOTINGS MAY BE PLACED ON SLOPING ROCK
PROVIDED THE SLOPE IN ANY DIRECTION
DOES NOT EXCEED 5°.

3 - P6008 - EACH SIDE - PIER #2
6 - P6008 - EACH SIDE - PIER #1

[illegible]

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO


75-11-061 .

PETAWAWA RIVER BRIDGE AT PETAWAWA

KING'S HIGHWAY No. 17 DIST. No. 9
CO. RENFREW
TWP. PETAWAWA LOT 20 & 21 CON. viii

FOUNDATION LAYOUT & PIERS

30	SITE No. 29-8	W.P. No. 72
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APPROVED 	CONTRACT	
STRUCTURAL ENGINEER		

DESIGN	A. W.	CHECK	H. K. J.	NOS.		
DRAWING	A. A.	CHECK	H. K. J.	DRAWING	29 8 - 3 B	

DATE	SEPT/72	LOADING	HS 20-44	No.	27-0-5D
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[illegible]

Age Group	2006	2007	2008
18-29	~85%	~88%	~90%
30-49	~75%	~78%	~80%
50-69	~65%	~68%	~70%
70+	~55%	~58%	~60%

