

#69-F-72

T.W.P. ROAD

SITE INDEX 47-96

BLANCHE RIVER

BRIDGE

1969 SEP 23 AM 11:02

69-F-72

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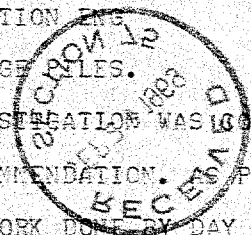
DOWN LINK 3, SEPT 23/69 10:55 AM PRIORITY

A STERMAC FOUNDATION ENG
PACAUD TWP. BRIDGE PILES.

AS THE SITE INVESTIGATION WAS COMPLETED SEVERAL WEEKS AGO WHEN CAN WE
EXPECT YOUR RECOMMENDATION. AS PILING WILL HAVE TO BE DRIVEN BY LOCAL
EQUIPMENT WITH WORK DONE BY DAY LABOUR AND TRUCK ACCESS IS ONLY FROM
ONE SIDE, ONLY TIMBER PILES CAN BE USED.

D A O WHITE DIST ENG

TC



1023 AUG 22 AM 9:50

61042

DOWN LISK 1, AUG 22/69 9:30 AM PRIORITY

A STERMAC FOUNDATION ENG MAT AND TESTING

BLANCH RIVER BRIDGE ON TWP. ROAD SITE INDEX 47-96

PACAUD TWP LOT 11, CON 2 AND 3.

BRIDGE IS LOCATED 1 MILE EAST OF HWY 11 ON TWP ROAD WHICH IS APPROX.

1 MILE SOUTH OF INTERSECTION OF HWYS 11 AND 112.

MAIN SPAN IS A 65 FT. STEEL LOW TRUSS WITH 5-15 FT. TIMBER BEAM APPROACH

SPANS. ALL PILES IN THE EAST END APPROACH PIER HAVE BROKEN OFF AND

SHIFTED STREAMWARD AND DOWNWARD BROKEN PILES WERE SUBSTANTITALLY ROTTED.

AS ALL REMAINING PILFS SHOW SIGNS OF EXTENSIVE ROT AND DECAY, WE INTEND

TO REPLACE WHOLE SUBSTRUCTURE. 3 FAMILIES LIVE ON THIS STATUTE LABOUR

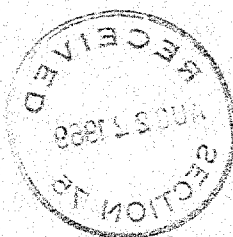
BOARD ROAD AND WE HAVE NO ALTERNATIVE BUT TO REPAIRS THE BRIDGE.

AS WE ARE UNABLE TO DETERMINE LENGTH OF PILING REQUIRED, YOUR

ASSISTANCE IS REQUESTED. DECK IS 28 FT. ABOVE WATER LEVEL

D A O WHITE DIST ENG

TC



09-F-72(R)

motel - Halfway House - Hwy

MEMORANDUM

TO: Mr. D. A. O. White,
District Engineer,
District #14,
NEW LISKEARD, Ont.

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

ATTENTION:

DATE: September 24, 1969

OUR FILE REF.

IN REPLY TO

SUBJECT:

Blanche River Bridge --
Twp. Road, Site Index 47-96
Pacaud Twp., Lot 11, Conc. II & III
W.J. 69-F-72, Dist. #14 (New Liskeard)

As requested by you, the Foundation Section has carried out a field investigation at the location of the above mentioned structure where timber piles, supporting the east end pier, have failed by shearing at the ground surface. Our report is as follows:

The site is located about one mile south-east of the junction of Hwys. #11 and #112. At this location the existing 6-span steel-truss and timber bridge over the Blanche River provides access to the settlement of South Mindoka. The Blanche River in this area, flows southerly through a deep valley, and the water level in the river at the time of investigation, was about 19 ft. below the bridge deck.

According to available information, the existing structure was constructed on timber piles during 1947. It was first observed by the District in late May 1969, that the timber piles had failed by shearing off at the ground surface at the end pier of the east bank of the Blanche River crossing. This fact was further confirmed by Mr. C. Mirza, Project Foundation Engineer, who visited the site. From his observations, it was concluded that the failure of these untreated timber piles was primarily due to the decay of timber above the river water level. It was also observed that the timber piles at other locations are decayed, but not to the same extent as at the location of the east end pier. Photographs, showing the various details of the existing structure, etc., are included with this report.

The field investigation consisted of two sampled boreholes, one at each end of the structure. These borings revealed the following stratigraphy:

At the east bank, fill up to 10 ft. has been placed over the original river bank. This fill is underlain by 25 ft. of firm to stiff varved clay and organic silt followed by 32 ft. of very

September 24, 1969

Re: Blanche River Bridge.-- Site Index 47-96, W.J. 69-F-72

loose to loose silt. The silt deposit is underlain by a compact to very dense sand and gravel stratum extending at least 6 ft. below the silt stratum.

At the west end of the structure, the soil consists of 30 ft. of firm to stiff varved clay (undrained shear strength 900 p.s.f. to 2000 p.s.f.) followed by 34 ft. of very loose to loose silt, which is underlain by at least 4 ft. of dense sand and gravel.

The locations and elevations of borings are shown on the attached Drawing No. 69-F-72A, together with the inferred stratigraphical profile.

Recommendations:

Based on the foregoing, it is our opinion that the failure of piles is not due to the instability of the river bank, but mainly due to the decay of untreated timber above ground or river water level. In order to restore the structure, foundations for the east end pier should be reconstructed. In addition, since existing timber piles elsewhere may further decay with time, it is advisable to replace these untreated timber piles also.

In view of the subsoil conditions at this site, it appears that there are two possible alternative pile schemes for restoring the foundations at a reasonable cost.

i) The existing timber-steel structure can be supported on friction piles driven to tip elev. 55. Such piles should be treated timber piles, and each pile can be loaded up to 10 tons.

ii) Alternatively, the existing structure can be supported on new foundations composed of steel 'H' or steel tube piles driven to end bearing in the sand and gravel stratum. These piles should meet refusal at approximate elev. 35 or below. Pile capacities will be dependent upon the pile section chosen and may be 90 tons per pile in the case of 12 BP 74 steel 'H' piles.

It is suggested that the minor bank failures which have taken place on the north of the west approach, be reconstructed. This can be achieved by removing all softened material in this local area and bringing up to grade with locally available granular material. In addition, adequate rip-rap, up to the high water level for the river banks within structure limits, would be advisable.

Mr. D. A. O. White,
District Engineer,
District #14 (New Liskeard)

3

September 24, 1969

Re: Blanche River Bridge -- Site Index 47-96, W.J. 69-F-72

We believe the aforementioned data, together with our recommendations, will be adequate for your immediate requirements. Should additional information be required, please feel free to contact this office.

MD/MdeF
Encls.

M. Devata

M. Devata,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. D. A. O. White (2)
K. L. Kleinsteinber
C. R. Wilmot
J. C. McAllister
E. R. Saint
B. A. Singh

Foundations Files
Gen. Files

APPENDIX I.

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 69-F-72 LOCATION 16 Ft. Northwest of West Edge of Deck

ORIGINATED BY CM

W.P. W.O. 69-50126 BORING DATE September 2-3, 1969

COMPILED BY CM

DATUM Assumed 100.0 @ Top of BOREHOLE TYPE Washboring-NK Casing; Cone
Deck, Mid-pt. of structure

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. GR. SA. SI. CL. | REMARKS |
|--------------|--|-------------|---------|------|-------------|--|----|----|----|-----|--|-----|-------|--|--------------------------------|
| ELEV. DEPTH | DESCRIPTION | STRAT. PLOT | NUMBER | TYPE | | 20 | 40 | 60 | 80 | 100 | w_p | w | w_L | | |
| 100.0 | Ground Level | | | | | | | | | | | | | | |
| 0.0 | Desiccated Stiff | | 1 | SS | | | | | | | | | | | |
| | Mottled Grey | | 2 | TW | | | | | | | | | | | |
| 90.0 | | | 3 | SS | | | | | | | | | | | |
| 10.0 | Varved Clay Firm to Stiff | | 4 | TW | | | | | | | | | | | |
| | Grey | | 5 | TW | | | | | | | | | | | |
| | | | 6 | TW | | | | | | | | | | | |
| | | | 7 | TW | | | | | | | | | | | |
| 69.0 | | | 8 | TW | | | | | | | | | | | |
| 31.0 | Silt Very loose to loose with occ. clay seams Firm to stiff Grey | | 9 | SS | | | | | | | | | | | |
| | | | 10 | TW | | | | | | | | | | | |
| | | | 11 | SS | | | | | | | | | | | |
| | | | 12 | SS | | | | | | | | | | | |
| | | | 13 | TW | | | | | | | | | | | |
| | | | 14 | SS | | | | | | | | | | | |
| | | | 15 | TW | | | | | | | | | | | |
| | | | 16 | TW | | | | | | | | | | | |
| 36.0 | Silty sand with gravel trace clay. Very dense. | | 17 | SS | | | | | | | | | | | |
| 65.8 | End of Borehole | | | | | | | | | | | | | | Practical refusal to cone test |

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 69-F-72 LOCATION 1/2 Roadway, 10 ft. East of East Edge of Deck

ORIGINATED BY CM

W.O. 69-50126 BORING DATE September 3-4, 1969

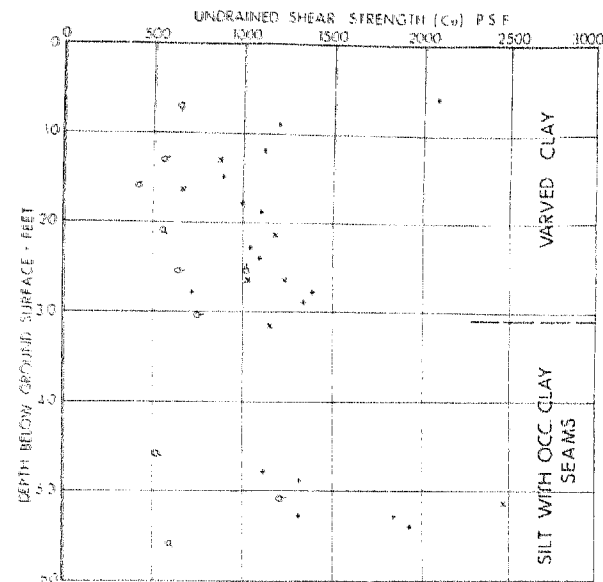
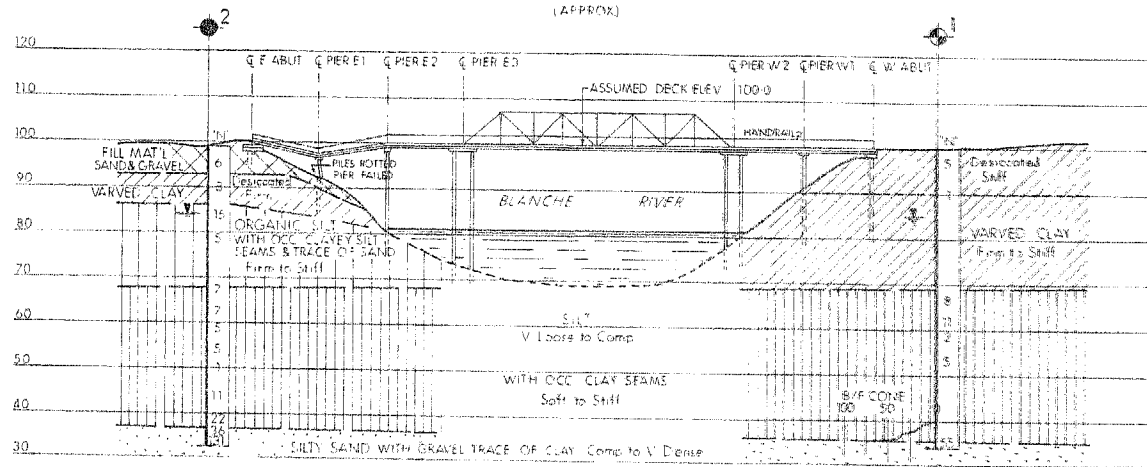
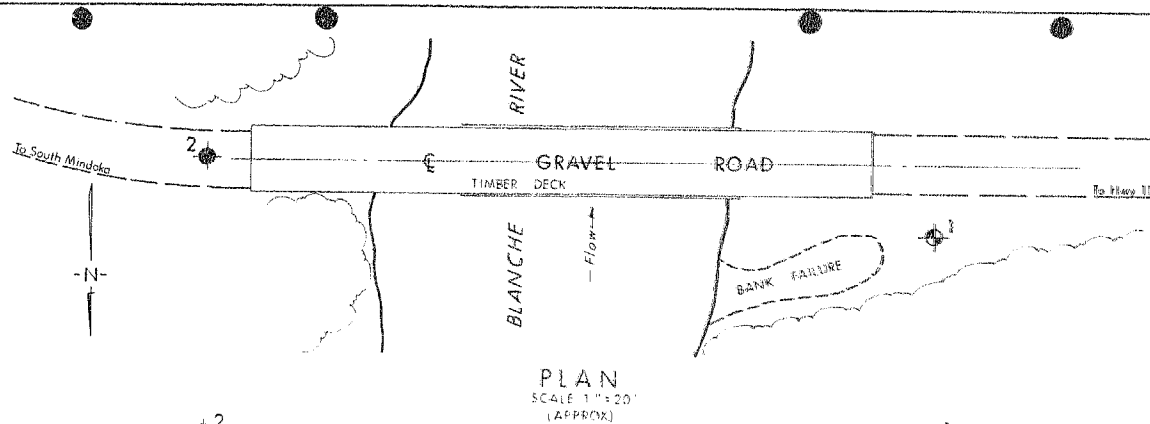
COMPILED BY CM

DATUM Assumed 100.0 @ Top of BOREHOLE TYPE Washboring-NX Casing

CHECKED BY

Deck, Mid-Pt. of Structure

| SOIL PROFILE | | | SAMPLES | | | ELEV. SCALE | DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT | | | | | LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w | | | BULK DENSITY γ | REMARKS |
|--------------|--|-------------|---------|-----------|--------------|-------------|--|--|--|--|--|--|--|--|--------------------------|---------|
| ELEV. DEPTH | DESCRIPTION | STRAT. PLOT | NUMBER | TYPE | BLOWS / FOOT | | SHEAR STRENGTH P.S.F. | | | | | WATER CONTENT % | | | | |
| 99.4 | Ground Level | | | | | | | | | | | | | | | |
| 0.0 | Fill Material (Sand & gravel with occ. clayey silt seams) | | 1 | C.S. Csg. | NX | | | | | | | | | | | |
| 93.4 | | | 2 | SS | 6 | | | | | | | | | | | |
| 6.0 | Varved clay (Desiccated) | | | | | | | | | | | | | | | |
| 86.4 | Firm | | 3 | SS | 3 | | | | | | | | | | | |
| 13.0 | Organic silt with occ. clayey silt seams and trace of sand. | | 4 | SS | 15 | | | | | | | | | | | |
| | | | 5 | TW | PM | | | | | | | | | | | |
| | | | 6 | SS | 5 | | | | | | | | | | | |
| | | | 7 | TW | PM | | | | | | | | | | | |
| | Firm to stiff | | | | | | | | | | | | | | | |
| 68.4 | | | 8 | SS | 7 | | | | | | | | | | | |
| 31.0 | Silt Very loose to compact | | 9 | SS | 7 | | | | | | | | | | | |
| | | | 10 | SS | 5 | | | | | | | | | | | |
| | | | 11 | SS | 5 | | | | | | | | | | | |
| | occ. clay seams soft to firm | | 12 | SS | 1 | | | | | | | | | | | |
| | | | 13 | TW | PM | | | | | | | | | | | |
| | | | 14 | SS | 11 | | | | | | | | | | | |
| 37.4 | | | | | | | | | | | | | | | | |
| 62.0 | Silty sand & gravel with tr. clay | | 15 | SS | 22 | | | | | | | | | | | |
| 33.0 | Compact to very dense | | 16 | SS | 36 | | | | | | | | | | | |
| | | | 17 | SS | 131 | | | | | | | | | | | |
| 66.4 | End of Borehole | | | | | | | | | | | | | | | |



VARIATION OF UNDRAINED SHEAR STRENGTH WITH DEPTH



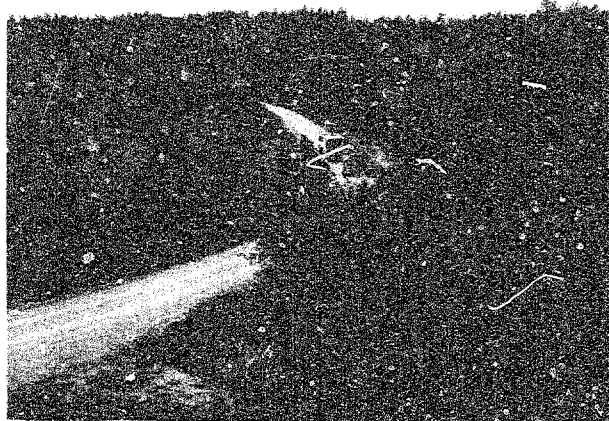
TWP ROAD SITE INDEX NO 47-96
BLANCHE RIVER BRIDGE

TWP OF FACAUD LOT 11 CON 2 & 3 DIST OF TIMISKAMING

DATE 10 SEPT. 1969

APPROVED

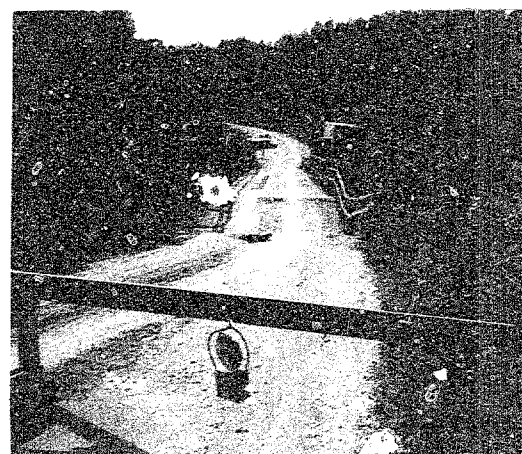
DRAWING NO 69-F-72A



GENERAL VIEW OF SITE LOOKING WESTERLY
AT THE STRUCTURE ACROSS THE BLANCHE RIVER

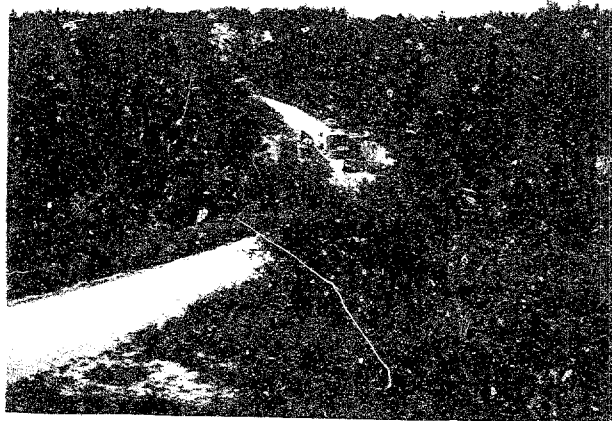


VIEW LOOKING EASTERLY ALONG
STRUCTURE AUTOMOBILES ARE STILL
ABLE TO NEGOTIATE V-SHAPED
DEPRESSION IN DECK AT THE EAST END.



VIEW LOOKING WESTERLY ALONG
STRUCTURE SHOWING DEPRESSION IN
THE DECK. EROSION OF GRANULAR
FILL BEHIND ABUTMENT HAS CREATED
CAVITY ALONG ROADWAY CENTRELINE

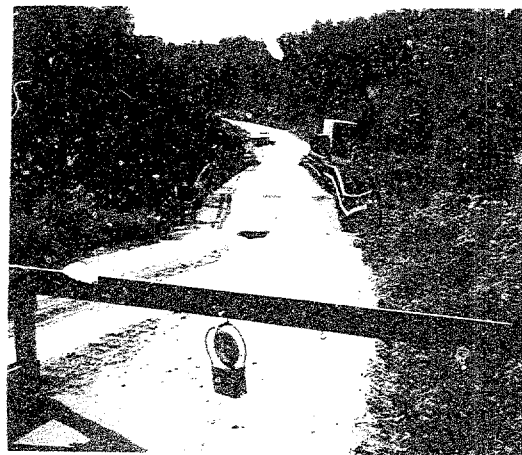
SUPERIMPOSED DOCUMENT MAY
APPEAR AS MULTIPLE ON FILM.



GENERAL VIEW OF SITE LOOKING WESTERLY
AT THE STRUCTURE ACROSS THE BLANCHE RIVER



VIEW LOOKING EASTERLY ALONG
STRUCTURE AUTOMOBILES ARE STILL
ABLE TO NEGOTIATE V-SHAPED
DEPRESSION IN DECK AT THE EAST END



VIEW LOOKING WESTERLY ALONG
STRUCTURE SHOWING DEPRESSION IN
THE DECK EROSION OF GRANULAR
FILL BEHIND ABUTMENT HAS CREATED
CAVITY ALONG ROADWAY CENTRELINE

SHARP TURNED OFF TO THE
LEFT AND WENT TO THE
LEFT

PLATE 2



INTERIOR DETAIL OF EAST ABUTMENT
SHOWING CRIB TYPE FOOTING. CRIB IS
FILLED WITH COARSE GRANULAR MAT'L.



INTERIOR VIEW OF WEST ABUTMENT.
ABUTMENT SILL BEAM RESTS ON 8 TO 12
INCH DIA. TIMBER PILES



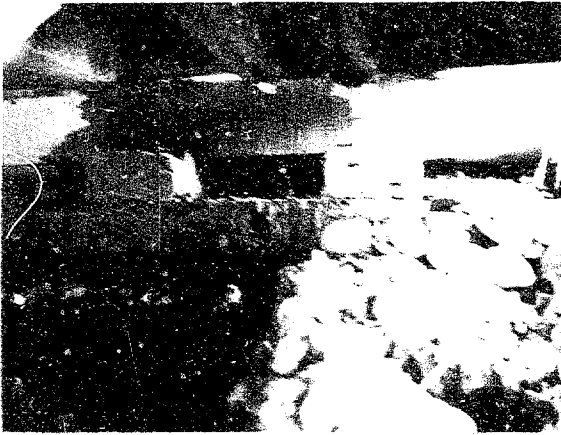
WEST APPROACH OF STRUCTURE
LOOKING DOWNSTREAM (SOUTHERLY)
SLOPE FAILURE IN FOREGROUND.



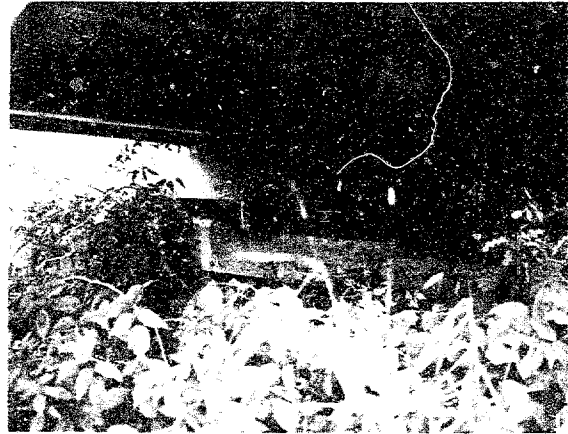
VIEW OF SLOPE FAILURE JUST NORTH
OF WEST APPROACH. SOIL IS FISSURED
VARVED CLAY. FAILURE IS ATTRIBUTED TO
EROSION & UNDERCUTTING OF
NATURAL SLOPE

SUPER IMPOSED DOCUMENT MAY
APPEAR AS MULTI-FEED ON FILM.

PLATE 2



INTERIOR DETAIL OF EAST ABUTMENT
SHOWING CRIB TYPE FOOTING CRIB IS
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INTERIOR VIEW OF WEST ABUTMENT
ABUTMENT SILL BEAM RESTS ON 8 TO 12
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WEST APPROACH OF STRUCTURE
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SLOPE FAILURE IN FOREGROUND

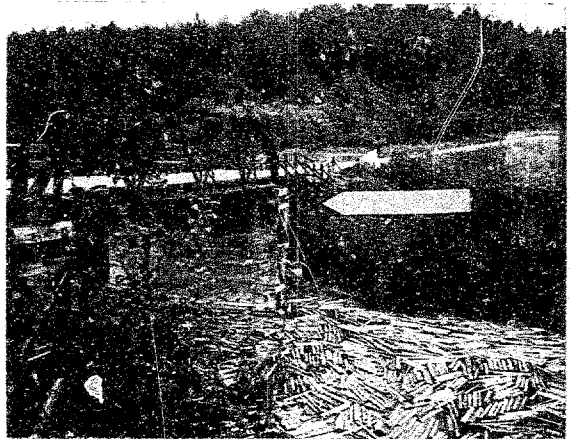


VIEW OF SLOPE FAILURE JUST NORTH
OF WEST APPROACH SOIL IS FISSURED
VARVED CLAY FAILURE IS ATTRIBUTED TO
EROSION & UNDERCUTTING OF
NATURAL SLOPE

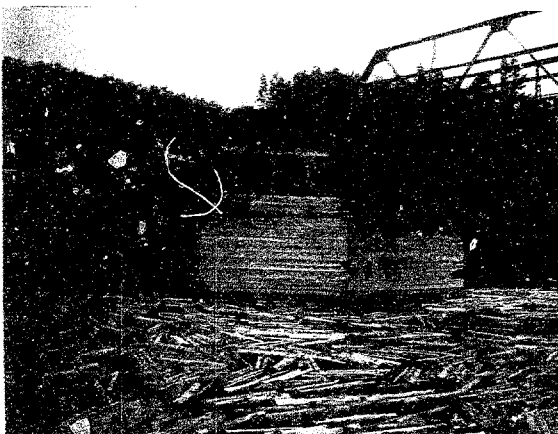
SUPER IMPOSED LOADS MAY
APPEAR AS SLOTTING OR FLAKING



WEST PIERS OF STRUCTURE
SECOND PIER SUPPORTS
STEEL TRUSS



STEEL TRUSS SPAN IS 60 FT IN LENGTH
ARROW POINTS TO 1st. PIER AT EAST
END WHICH HAS FAILED



THE TIMBER SHEETED WALLS ARE MEANT
TO PROTECT PIER AGAINST IMPACT
FROM LOGS & ICE

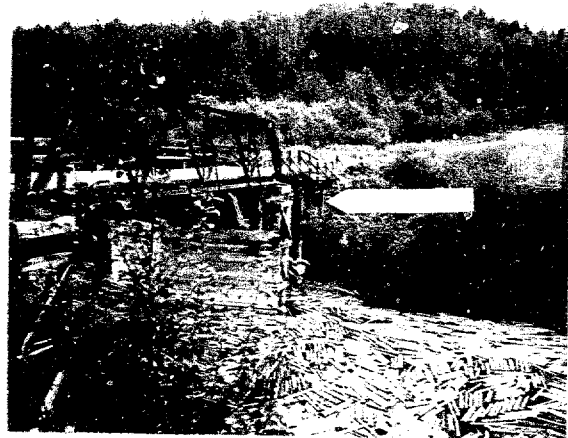


CLOSER VIEW OF EASTERN HALF OF
STRUCTURE. ARROW POINTS TO PIER
WHICH HAS FAILED

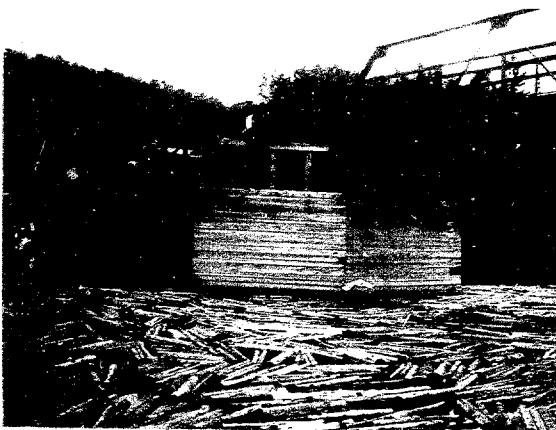
SUPER IMPOSED DOCUMENT MAY
APPEAR AS MULTI-FEED ON FILM.



WEST PIERS OF STRUCTURE
SECOND PIER SUPPORTS
STEEL TRUSS



STEEL TRUSS SPAN IS 60 FT IN LENGTH
ARROW POINTS TO 1st PIER AT EAST
END WHICH HAS FAILED



THE TIMBER SHEETED WALLS ARE MEANT
TO PROTECT PIER AGAINST IMPACT
FROM LOGS & ICE

SUPERIMPOSED LOCATION MAY
APPEAR AS NOTIFIED ON FILM.

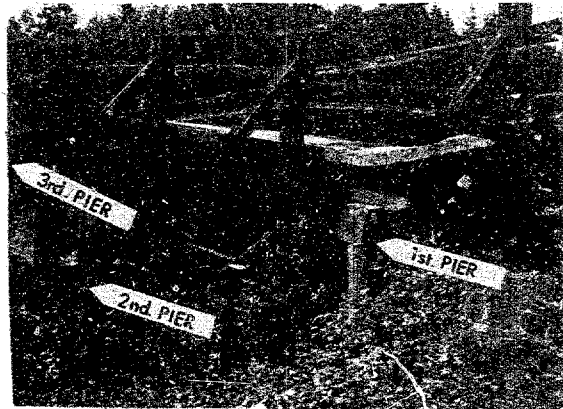


CLOSER VIEW OF EASTERN HALF OF
STRUCTURE. ARROW POINTS TO PIER
WHICH HAS FAILED

PLATE 4



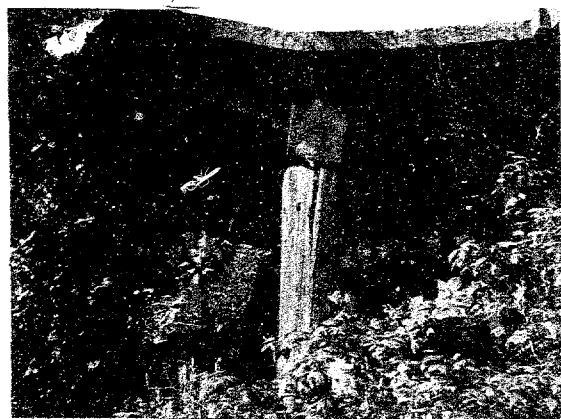
FAILURE OF FIRST PIER AT EAST END
HAS RESULTED IN THE DECK DROPPING
DOWN 3 FT. DRILL RIG IS LOCATED
JUST EAST OF EAST ABUTMENT



EASTERN HALF OF THE STRUCTURE
ONLY THE THIRD PIER SUPPORTS THE
STEEL TRUSS



VIEW OF PILES COMPRISING THE
1st. PIER. PILES HAVE SHIFTED
DOWNSLOPE TOWARDS RIVER

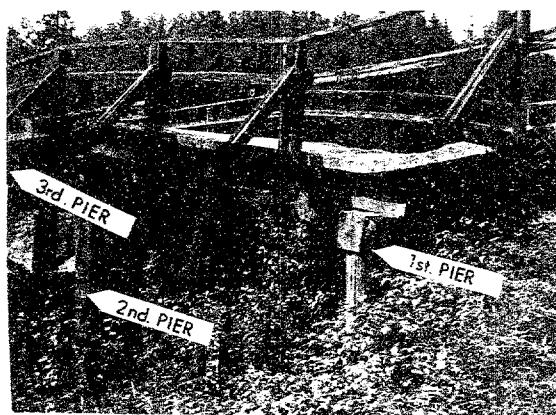


EAST ABUTMENT IS TO THE RIGHT OF
THE PHOTOGRAPH. THE 1st. PIER PILES
ARE TILTED TOWARDS THE WEST
(i.e. TOWARDS THE RIVER)

PLATE 4



FAILURE OF FIRST PIER AT EAST END
HAS RESULTED IN THE DECK DROPPING
DOWN 3 FT. DRILL RIG IS LOCATED
JUST EAST OF EAST ABUTMENT



EASTERN HALF OF THE STRUCTURE
ONLY THE THIRD PIER SUPPORTS THE
STEEL TRUSS

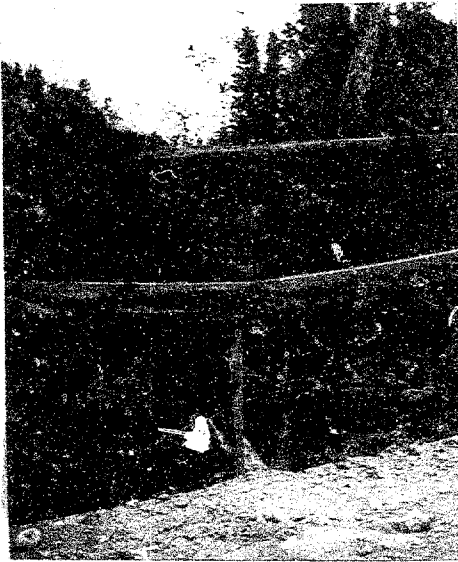


VIEW OF PILES COMPRISING THE
1st PIER. PILES HAVE SHIFTED
DOWNSLOPE TOWARDS RIVER

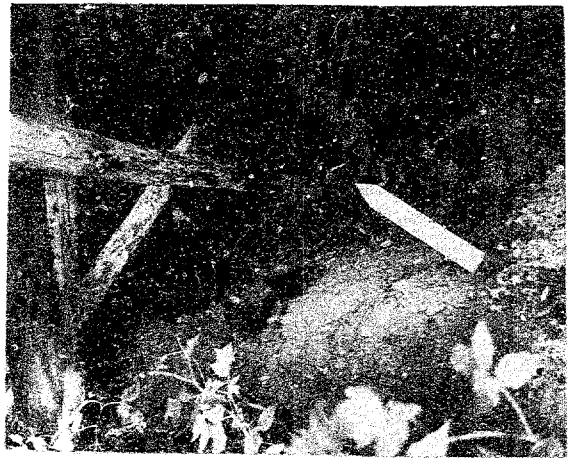


EAST ABUTMENT IS TO THE RIGHT OF
THE PHOTOGRAPH. THE 1st PIER PILES
ARE TILTED TOWARDS THE WEST
(i.e. TOWARDS THE RIVER)

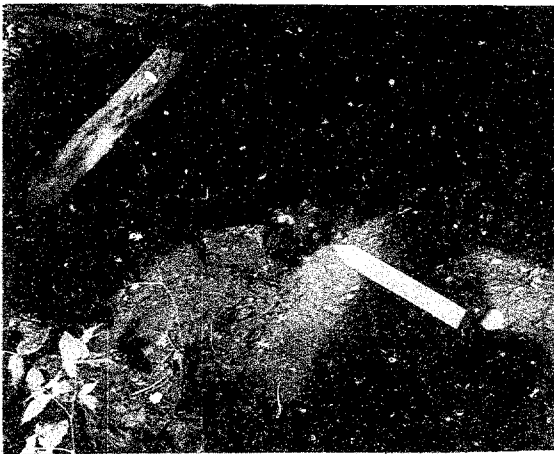
PLATE 5



FAILURE OF PIER RESULTED IN
SHEARING OF HANDRAILS



PILES SHEARED OFF. ARROW POINTS TO
BREAK IN CROSS MEMBER. PILE REMNANT
IN FOREGROUND

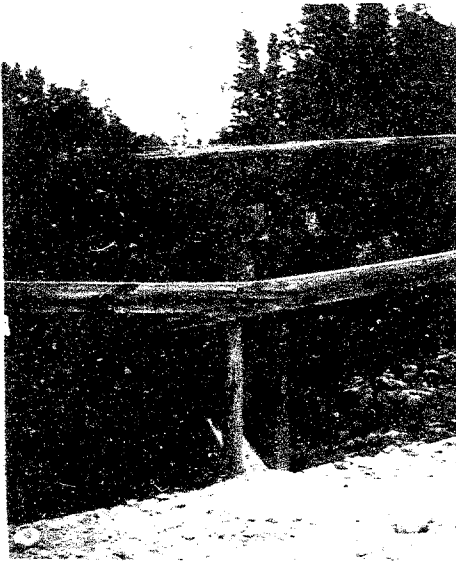


ARROW POINTS TO PILE REMAINING IN
GROUND. THE UPPER PORTION OF THE
PILE IS BURIED FORWARD OF ITS
ORIGINAL LOCATION WITHIN THE
GRANULAR BACKFILL



CAUSE OF PILE FAILURE APPEARS TO
BE DUE TO TIMBER ROT. CLOSE-UP
VIEW OF ONE PILE REMNANT

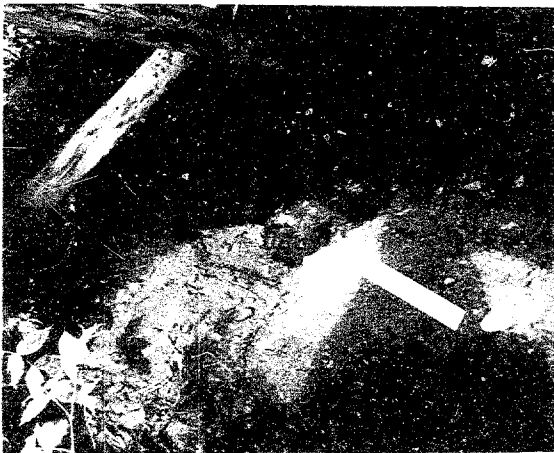
PLATE 5



FAILURE OF PIER RESULTED IN
SHEARING OF HANDRAILS



PILES SHEARED OFF. ARROW POINTS TO
BREAK IN CROSS MEMBER. PILE REMNANT
IN FOREGROUND



ARROW POINTS TO PILE REMAINING IN
GROUND. THE UPPER PORTION OF THE
PILE IS BURIED FORWARD OF ITS
ORIGINAL LOCATION WITHIN THE

GRANULAR BACKFILL



CAUSE OF PILE FAILURE APPEARS TO
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VIEW OF ONE PILE REMNANT