

PENNSYLVANIA TURNPIKE COMMISSION
In Depth Inspection Report
Bridge No. WB-206 - Milepost 12.6

PUBLIC UTILITY COMMISSION
Complaint Docket 18925
Order Dated August 23, 1971

DUPLICATE RECORD
ORIGINAL CERTIFIED
TO COMMONWEALTH COURT

PENNSYLVANIA TURNPIKE COMMISSION

BRIDGE INSPECTION REPORT

P. U. C. Complaint Docket 18925 - Order dated August 23, 1971

In compliance with Order of the Public Utility Commission of the Commonwealth of Pennsylvania issued August 23, 1971, at Complaint Docket No. 18925 an In-Depth Inspection was made on October 27, 1971 of that portion of the subject structure constructed in 1952 by the Pennsylvania Turnpike Commission and for which the Commission is charged with maintenance responsibilities. These responsibilities are as detailed by Public Utility Commission Order issued October 16, 1950 at Application Docket No. 76051 which same Order directed the Pennsylvania Department of Highways to maintain the paving across the additional length of viaduct as extended.

The inspection was made by G. Edward Swartz, a Professional Engineer registered with the Commonwealth of Pennsylvania and employed by the Turnpike Commission as Bridge Engineer.

PHOTOGRAPHS

Appended hereto are eleven (11) numbered photographs showing views of the structure and its various details to which reference will be made at several points in the report.

Specific features of the structure will be referred to the

photographs by number and by letter, as (5-A) which indicates reference to Photograph 5, Feature A.

DESCRIPTION OF STRUCTURE - Photographs 1 and 2

The Pennsylvania Turnpike Commission structure known as Bridge No. WB-206 comprises a substructure consisting of Pier "0" which is a modification of a pier of the original viaduct structure, new Piers "1" and "2", and an abutment, supported on cast in place concrete piles, which is the northern terminus of the viaduct, together with a superstructure consisting of three spans, Span "1" a slab span having a mean length of approximately 10', Span "2" a steel girder span with concrete deck slab having a mean length of approximately 83.7' and Span "3" a reinforced concrete T Beam span having a mean length of approximately 34.8'. All spans have a concrete parapet and protective curb on their easterly sides and a parapet and 5'-1" wide sidewalk on their westerly sides.

METHOD OF IN-DEPTH INSPECTION

The structure was examined in detail to determine the existing physical condition of each of its elements, and from this examination determinations were made as to their capability to function in conformity with the original engineering computations and design drawings.

PIER "O" - Photographs 3, 4, 5 and 6

Pier "O" is a modification of the northern most pier of the original structure. The modification, completed by the Pennsylvania Turnpike Commission in 1952, consists of a reinforced concrete facing, having an average thickness of 1'-0-1/4", resting upon and doweled into the footing and the pier face and is the only part of Pier "O" for which the Commission is responsible for maintenance.

The original portion of the pier structure reveals substantial surface deterioration, at various locations, with loss of concrete to depths of up to 6". (3-A, 4-A & 5-A) Several reinforcing bars are exposed and show corrosion, however, the corrosion affects a relatively small percentage of the total area of reinforcing steel. (3-A) This observed deterioration has not progressed to the point where Pier "O" is considered to be incapable of sustaining the lateral or longitudinal forces imposed by Span "1" of the Commission structure.

The concrete modification added at the time of Turnpike construction shows a small area of unpatched honeycomb (6-A) and a small area of superficial deterioration due to moisture leaching through a construction joint. (6-B) Neither of these deficiencies are deemed to adversely affect the capability of the modification

to safely support the reaction of the south end of Span "1".

PIER "1" - Photograph 7

Pier "1" and attached retaining walls are in excellent structural condition and conform to the original design drawings. Slight shrinkage cracks were noted at several locations along the curved retaining walls with no differential settlement in evidence at any of the shrinkage cracks. On the west side of the pier cap slight deterioration is noted at the joint between the pier cap and parapet post which forms part of the superstructure. (5-B) On the east side of pier a small section of cheek wall is missing. (4-B) The noted deterioration has no adverse affect on the structural adequacy of Pier "1".

PIER "2" - Photograph 8

Pier "2" and attached retaining walls are in excellent structural condition and conform in general to the original design drawings. The curved retaining walls reveal several shrinkage cracks which are not accompanied by differential settlement. A keyed construction joint between the pier structure and retaining wall located 10 feet ± east of the eastern pier column is slightly opened at the top and indicates slight differential settlement, toward the south, of the eastern section of the retaining wall in the order of 3/4". This settlement has cracked a small piece of the wall in front of the keyed joint, (8-A) however no damage

of structural significance has resulted.

NORTH ABUTMENT - (Not Photographed)

The north abutment is in excellent structural condition and conforms to the original design drawings. Slight seepage was noted at the joint between the abutment and the end diaphragm of the T Beam span, without evidence of deterioration.

SUPERSTRUCTURE - Photographs 9, 10 and 11

In Spans "1", "2" and "3" the underdeck inspection indicated that there was no leaching of moisture through the deck nor other evidence of deck deterioration. (9-A) The steel girders in Span "2" were found to be in excellent condition with no evidence of corrosion or other deterioration. (9-B)

Above deck inspection revealed that minor scattered spalling and exposure of reinforcing bars has occurred in the parapets. (10-A & 11-A) The curb along the east side of the bridge and the sidewalk along the west side of the bridge are in good condition. Concrete deck surface was not visible due to bituminous concrete surface course which had been placed, however, the good condition of the bituminous surface (10-B & 11-B) together with the lack of visible deterioration under the deck indicate that the deck is in satisfactory structural condition.

EXPANSION DAMS AND BEARINGS - (Not Photographed)

The expansion dam over Pier "1" and between Spans "1" and "2" is in satisfactory position to accommodate normal thermal movements.

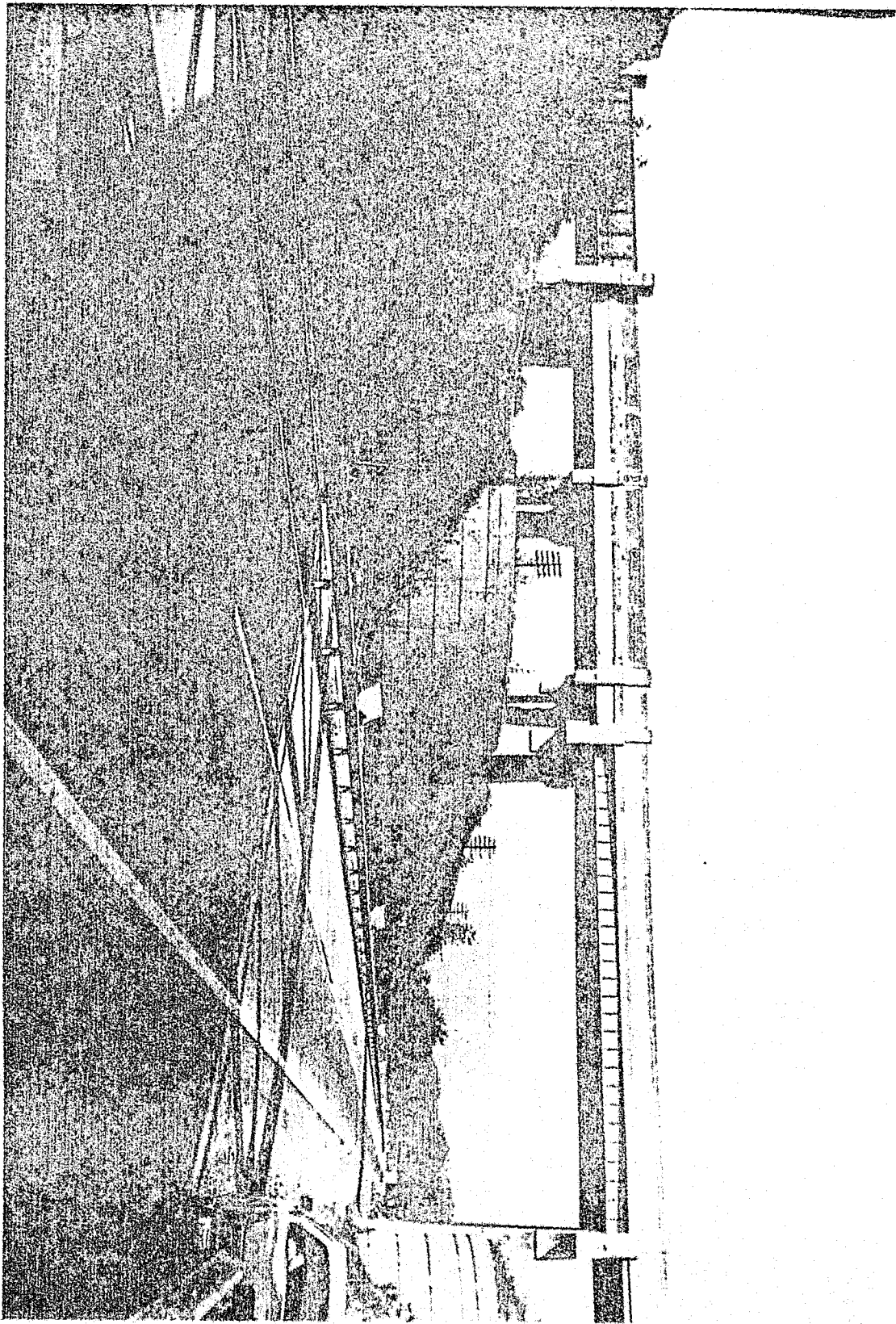
The expansion bearings at the north end of Span "2" were in an expanded position at a temperature of 70° F.

The expansion dam over Pier "2" and between Spans "2" and "3" is open approximately 3/4".

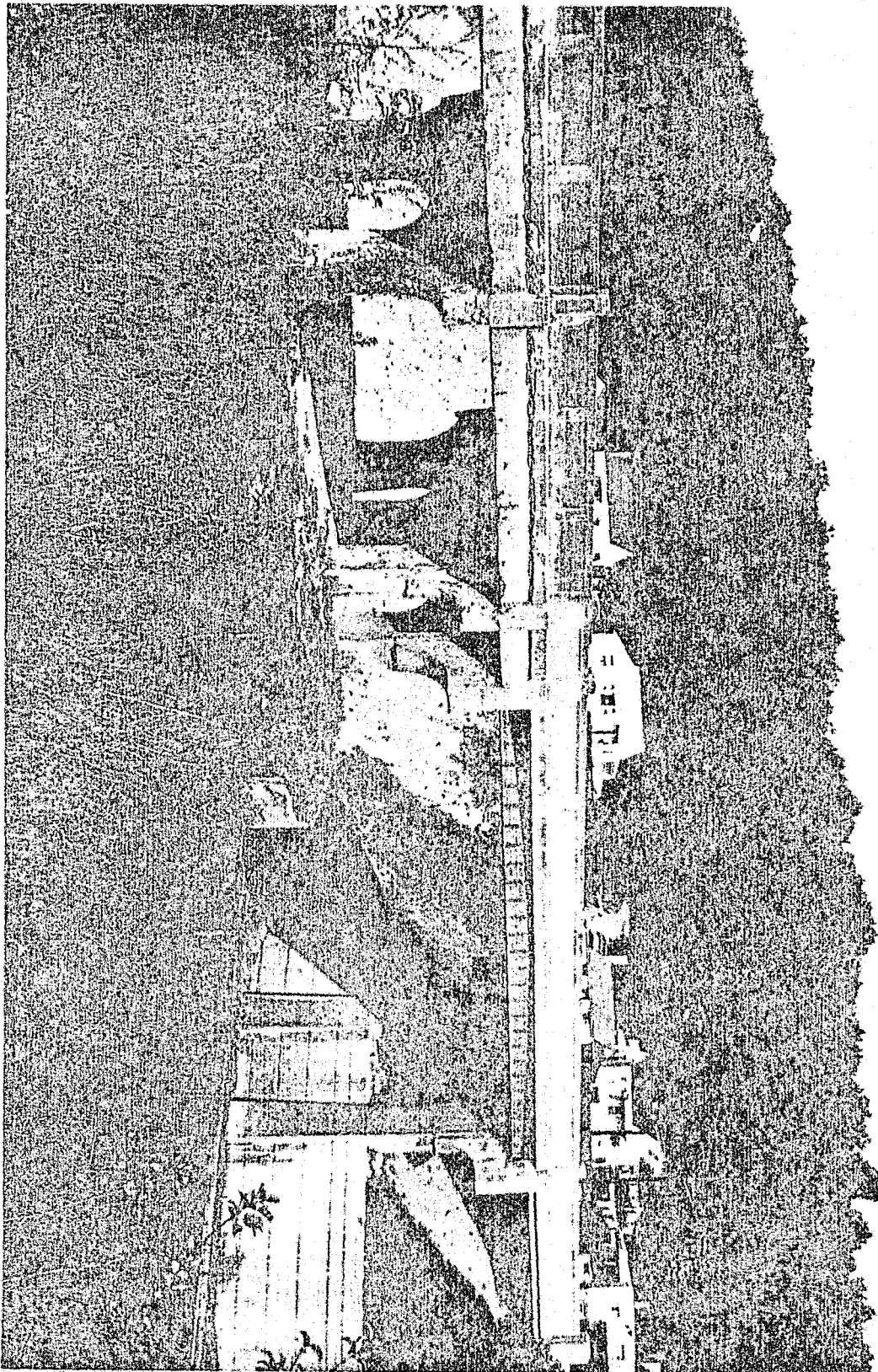
All expansion devices are in satisfactory positions to accommodate thermal movements throughout the normally anticipated range of temperatures.

CONCLUSION

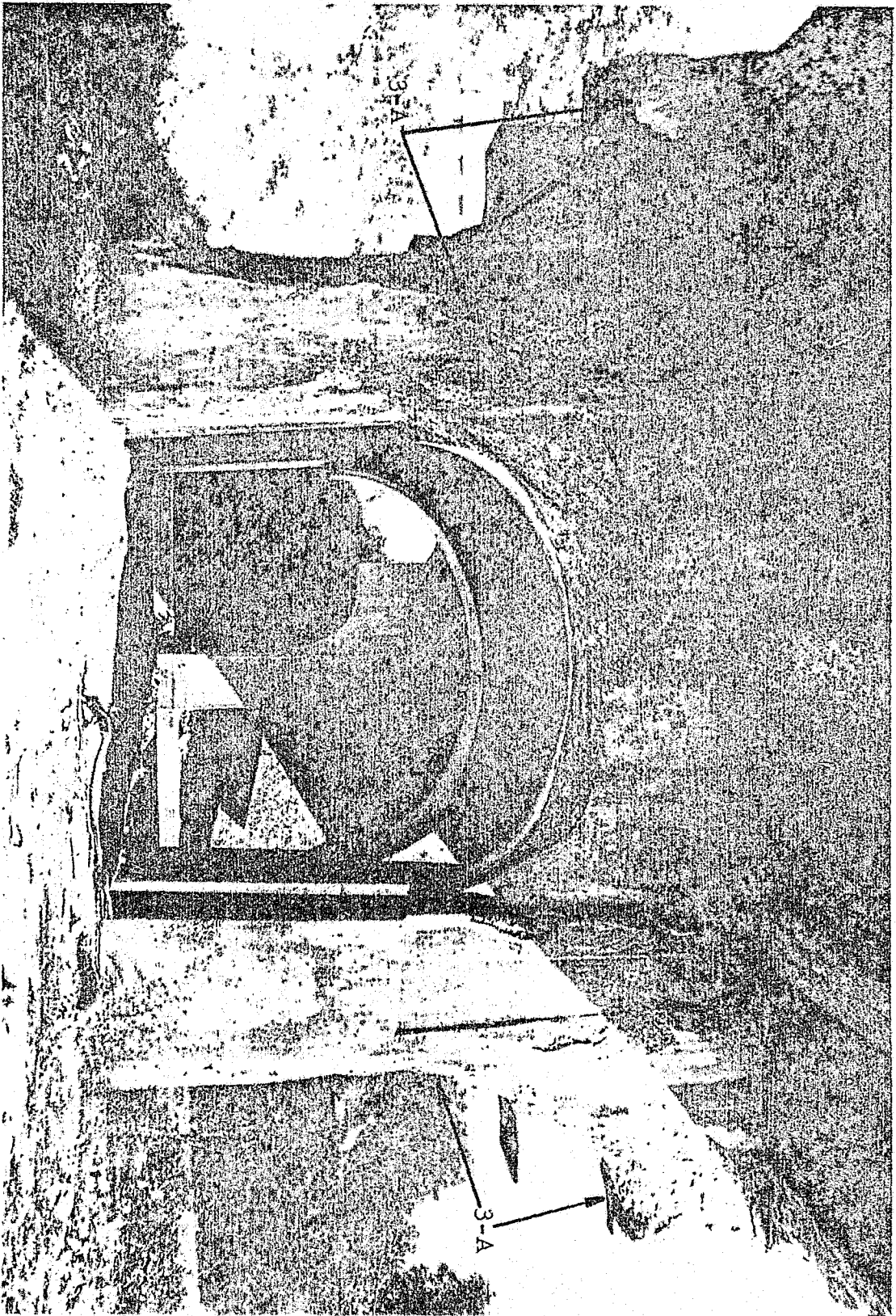
The portion of the structure built and maintained by the Pennsylvania Turnpike Commission is in good structural condition and is capable of accommodating the current A.A.S.H.O. HS20-44 loading which is identical to the A.A.S.H.O. H20-S16 loading used in the original design. No inspection or investigation has been made on any part of the adjacent structure other than as described for Pier "0".



View of Easterly Side of Bridge looking west from Turnpike



View of Easterly Side of Bridge looking northwest from tracks of Penn Central Railroad



South side of Pier "O", looking north



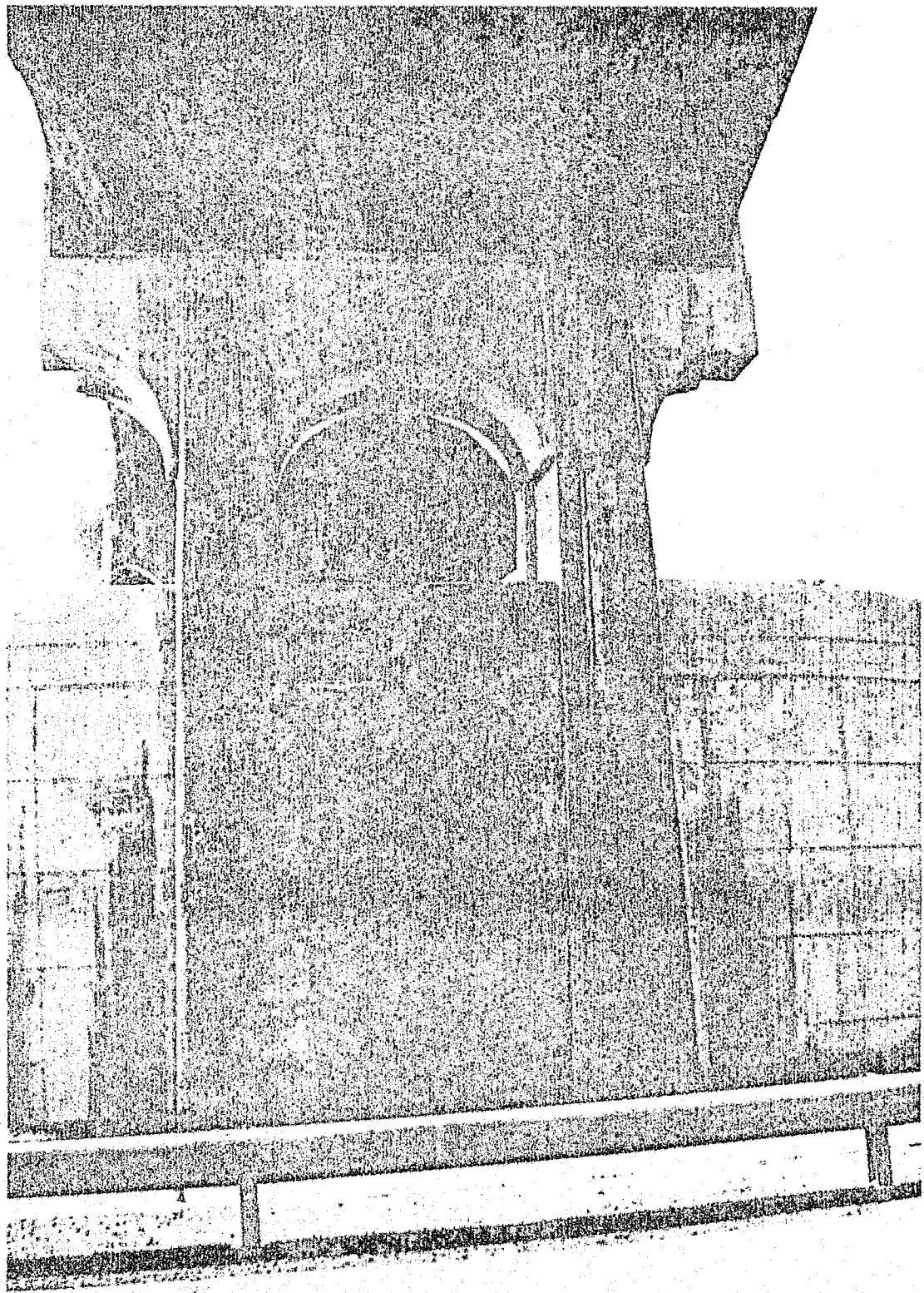
East sides of Pier "0" and Pier "1", looking northwest



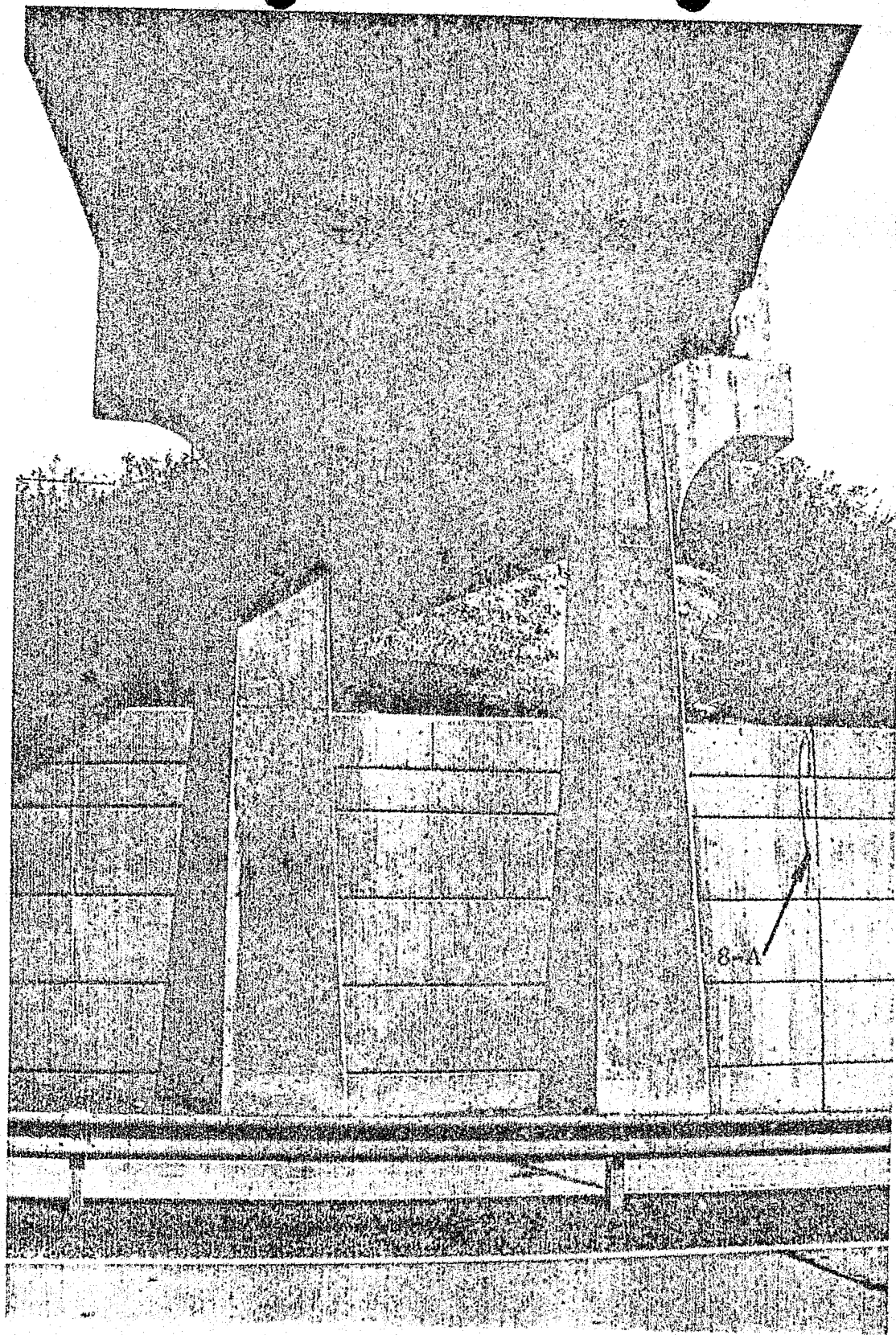
West sides of Pier "0" and Pier "1", looking northeast



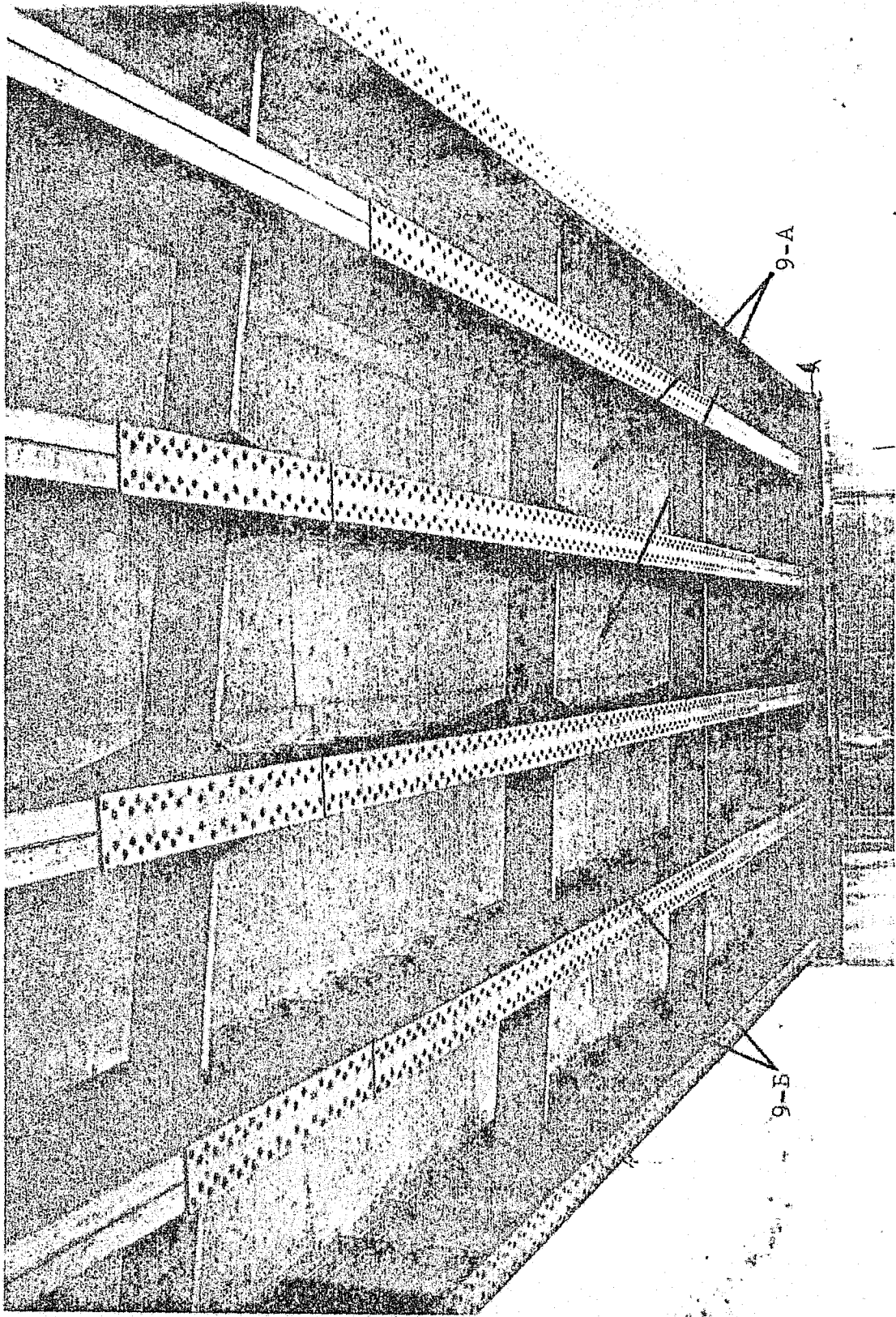
North face of westerly column of Pier "O"



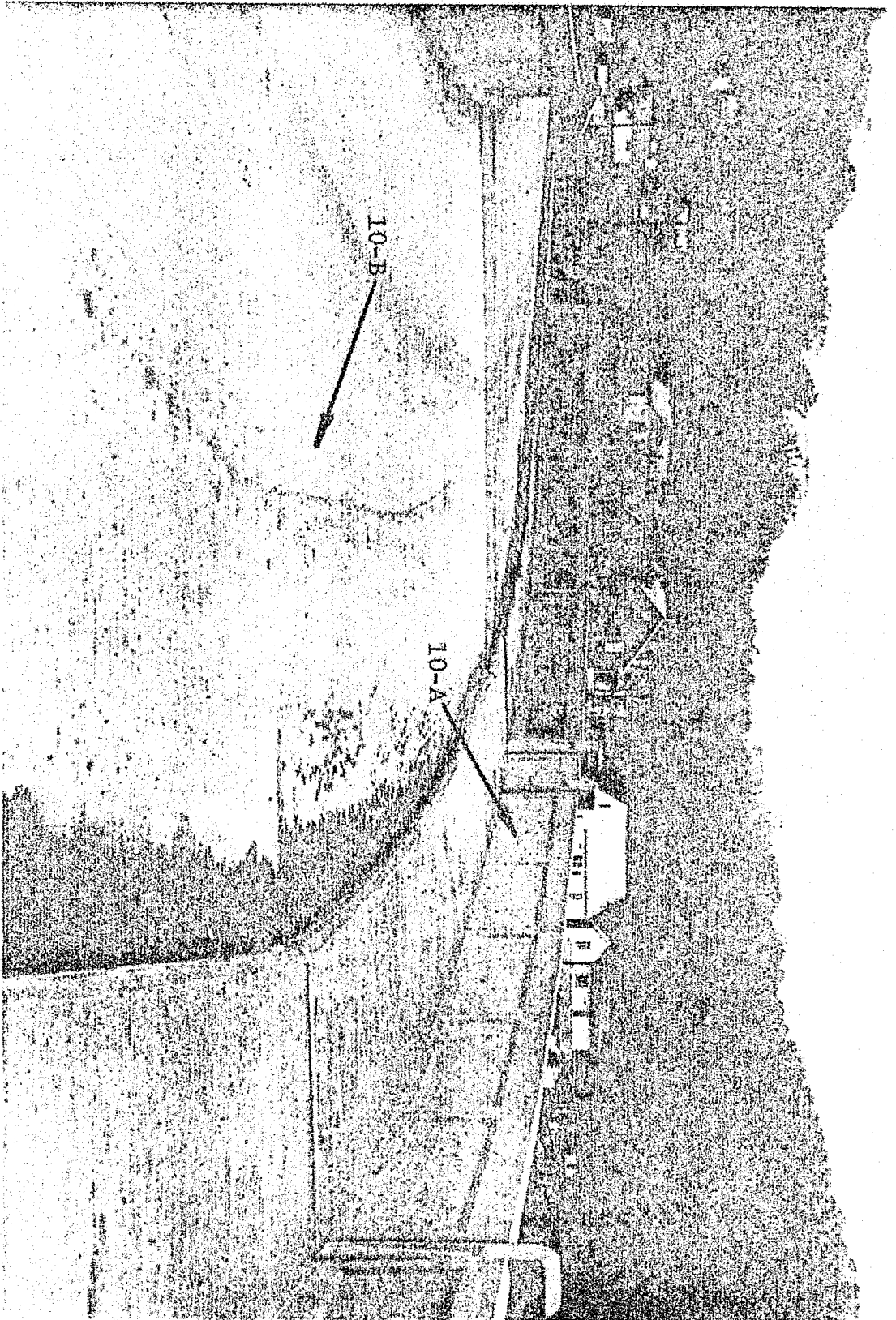
North side of Pier "1", looking south



South side of Pier "2", looking north

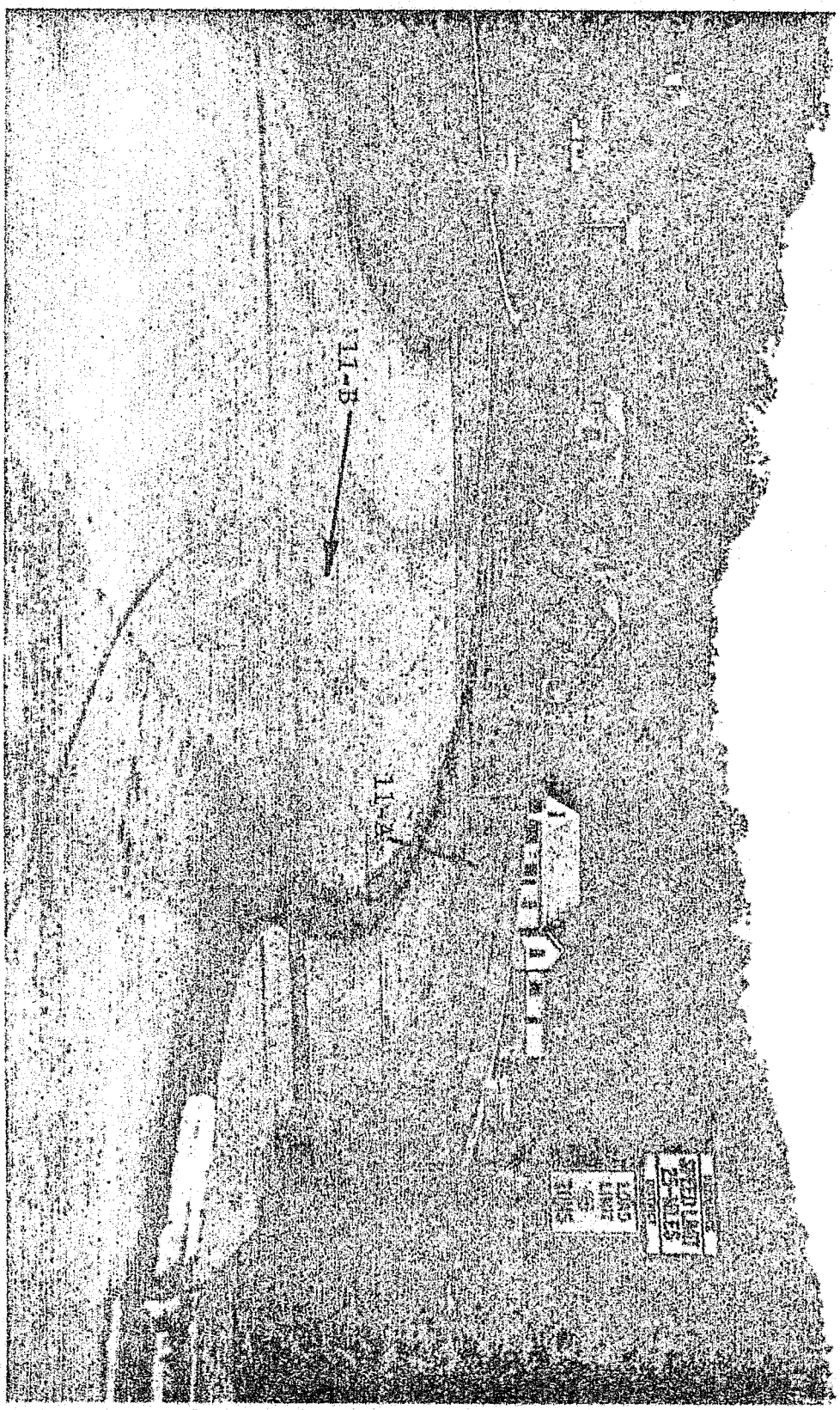


View of underside of deck, Span "2", looking north from Pier "1"



View of Roadway, Sidewalk and parapets, looking south from Span "3"

View of Roadway, Sidewalk and parapets, looking south from north of bridge



P H O T O G R A P H
11

In-Depth Inspection Report
of
Vehicular Wearing Surface, Expansion Dams
and Underlying Supporting Elements
of
HOMEWOOD BRIDGE
Homewood Borough, Pennsylvania

FILED IN RECORDS
ORIGINAL CERTIFIED
COMMONWEALTH ARCHIVE

ENGINEERING REPORT

OF

IN-DEPTH INSPECTION

OF

VEHICULAR WEARING SURFACE,

EXPANSION DAMS AND UNDERLYING

SUPPORTING ELEMENTS

FOR

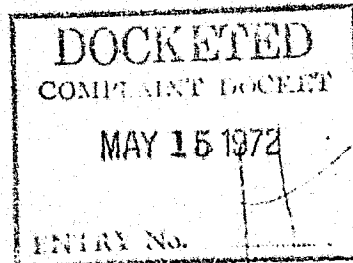
HOMEWOOD BRIDGE

AT

HOMEWOOD BOROUGH

APRIL 28, 1972

BY



PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

IN-DEPTH INSPECTION REPORT
OF
VEHICULAR WEARING SURFACE, EXPANSION DAMS
AND
UNDERLYING SUPPORTING ELEMENTS
HOMEWOOD BRIDGE
AT
HOMEWOOD BOROUGH, PENNSYLVANIA

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PENNSYLVANIA DEPARTMENT OF TRANSPORTATION

HOMEWOOD BRIDGE INSPECTION REPORT

In compliance with Order of the Public Utility Commission of the Commonwealth of Pennsylvania issued August 23, 1971, by Complaint Docket No. 18925, an in-depth inspection was conducted on October 22 through 29, 1971, of the vehicular roadway wearing surface, expansion dams and their underlying supporting elements across the entire length of the 16 span steel and reinforced concrete viaduct (exclusive of the station ramp), for purposes of determining the present state of condition, adequacy and integrity of the structure.

The inspection was made by Raymond R. Heberle, P.E., and Carl Angeloff, Bridge Inspection Engineers for the Pennsylvania Department of Transportation, utilizing a bridge inspection crane to gain access to the underside of all expansion dams and their supporting elements.

Inspection Report

A. Vehicular Roadway Wearing Surface

The original reinforced concrete deck has been paved with asphalt, which has deteriorated badly. All spans exhibit numerous potholes and a very irregular wearing surface. Refer to photo's 1 through 35 of appendix "A", for an illustrative view of the entire roadway wearing surface. The photo's start at the south approach and proceed, in order of spans, to the north end of the bridge. At many points, at the intersection of the roadway and side walk curb and east parapet wall, holes have formed around the expansion dams to the full depth of the deck. For instance, refer to photo's 13 and 29. In some cases, due to lack of sufficient bearing, the expansion dam is tilted and/or bent.

Refer to photo 14. In one particular case, the roadway wearing surface has deteriorated to such an extent, that a steel plate was welded to the dam so as to cover a large hole. Subsequent to the welding of that plate, a new hole has formed. Refer to photo 7.

B. Expansion Dams

All expansion dams at the roadway surface are covered by asphalt, therefore their physical condition is hard to determine.

Access to the underside of the expansion dams and their underlying supporting elements was more readily obtained, therefore their condition will be described in detail. Expansion dams exist at the following pier locations: 2, 4, 6, 8, 10, 11, 12, 14 and 15. It should be noted that the reference system used, begins at the south abutment numbered "0", and increases at each pier towards the north abutment. Also, five stringers are spaced across the top of each pier, with the area between stringers referred to as a bay; bays being numbered 1 through 4, west to east, respectively. Therefore, to refer to a problem area between the west fascia stringer and adjacent stringer at pier 2, the following designation applies - 2/1. The first digit having reference to pier 2 and the second indicating bay 1.

Photo's of expansion dams are contained within appendix "B".

Pier 2

The concrete around the expansion dam at bay 2/1 is badly deteriorated. Concrete has already spalled 3"-4", with additional concrete in loose condition. No concrete bearing exists at the west fascia stringer, resulting in the anchoring system being exposed and rusting, with approximately 50 percent of section remaining.

At bay 2/2, the form work from previous repairs is still in place. Water seepage is evident around the concrete repair.

The repair made at bay 2/3 is still in good condition, with minor water seepage occurring. The expansion dam is not exposed and wood is still wedged between the slabs of span 1 and 2.

The expansion dam at bay 2/4, is in very poor condition. Both vertical legs of the expansion dam support are exposed, as well as anchor bolts and deck rebars. Some support anchor bolts have deteriorated 90 percent. At the east fascia beam, there is a large hole in the deck.

Please refer to photo's 1 - 5 for an illustrative view of the underside of expansion dam 2.

Pier 4

At bay 4/1 the original concrete and new concrete repair, directly below the expansion dam, is deteriorated to a depth of 3"-4", with a section exposing approximately one and one-half feet of the underside of the expansion dam. Additional concrete can be chipped loose very easily.

The expansion dam at bays 4/2 and 4/3, exhibit similar deterioration, in that spalling of the original concrete has reached a depth of 3"-5", and a two (2) foot section of new concrete repair has broken out.

Very heavy deterioration exists at bay 4/4; in particular at the East fascia beam. The entire underside of the expansion dam is exposed for a length of two feet. Both horizontal and vertical legs of the expansion dam support, as well as anchor bolts, are exposed. Also, a large hole through the deck, exists around the dam.

Please refer to photo's 6 through 11, as a visual supplement.

Pier 6

The concrete at expansion dam 6/1 is extremely deteriorated, with the horizontal and vertical legs of the expansion dam support, as well as anchor bolts and deck rebars, exposed. Almost no bearing is provided for the dam at this location. As pictured in photo's 6/1, large holes exist through the deck around the expansion dam, Bays 6/2, 6/3 and 6/4, have concrete patches around the expansion dams that are in fairly good condition.

Please refer to photo's 12 through 19, as a visual supplement to the underside of expansion dam 6.

Pier 10

Bay 10/1 exhibits a lot of deterioration around the expansion dam. The expansion dam support is completely exposed, along with numerous deck rebars. The loose concrete is easily chipped away from depths of 3"-5".

Large holes exist through the deck.

At bays 10/2, 10/3, and 10/4, the original concrete has spalled 3"-4", with the vertical legs of the expansion dam support partially exposed.

Please refer to photo's 20 and 21.

Pier 11

The horizontal and vertical support angle legs of the expansion dam at bay 11/1, are exposed for three feet. One large hole through the deck exists at the center of the bay, approximately 1½' x 1' wide. One dam support anchor bolt is completely exposed. All concrete around the dam sounds hollow.

At bay 11/2, the concrete is in good condition. The underside of the expansion dam is not exposed.

Bays 11/3 and 11/4 still have form work, used in previous repairs, in place, therefore the dam is not visible. The fact that water seepage and concrete spalling is not evident indicates the concrete repairs are in good condition.

Please refer to photo's 22 through 25, as a visual supplement to the underside of expansion dam 11.

Pier 12

Bay 12/1 has heavy concrete deterioration around the expansion dam, approximately 3"-5" deep. Both vertical legs of the expansion dam supports are 25 percent exposed.

Bays 12/2 and 12/3, are similarly deteriorated around the vertical legs of the expansion dam support angles. Their concrete repairs are in fair condition.

Bay 12/4 is heavily deteriorated, exposing both vertical

legs of the dam support angles and 30 percent of the horizontal legs. Also, two (2) dam support anchor bolts are completely exposed, along with several deck rebars.

Please refer to photo's 26 through 31.

Pier 14 and Pier 15

The expansion dams at pier 14 and pier 15, are in good condition, as far as can be determined visually. Therefore, it will not be necessary to replace them. However, the expansion bearings over pier 15 were expanded to varying degrees across the length of the pier.

Recommendations

Based on the physical inspection of these elements of the structure, the Department was asked to inspect as detailed in Complaint Docket 18925; the following rehabilitation is necessary.

1 - Remove the existing bituminous wearing surface and replace it with a $1\frac{1}{2}$ " ID-2 binder course topped with a $1\frac{1}{2}$ " ID-2 wearing surface. Prior to these repairs, however, any repairs required to the concrete deck must be completed.

Item 1 - Removal of existing roadway wearing surface and placement of the new = \$10,200.00.

2 - Remove and replace the existing expansion dams (exclusive of the expansion dams over pier 14 and 15, of the Turnpike section). Also included in this work is the rebuilding of certain concrete stringers and portions of the underside of the deck as well as previous concrete patch repair,

as to provide the necessary bearing area for
the new expansion dams.

Removal of existing expansion dams and their
replacement = \$16,100.00

Rebuilding of expansion dam supporting
structure = \$ 5,900.00

Total Rehabilitation Costs = \$32,200.00.

APPENDIX A

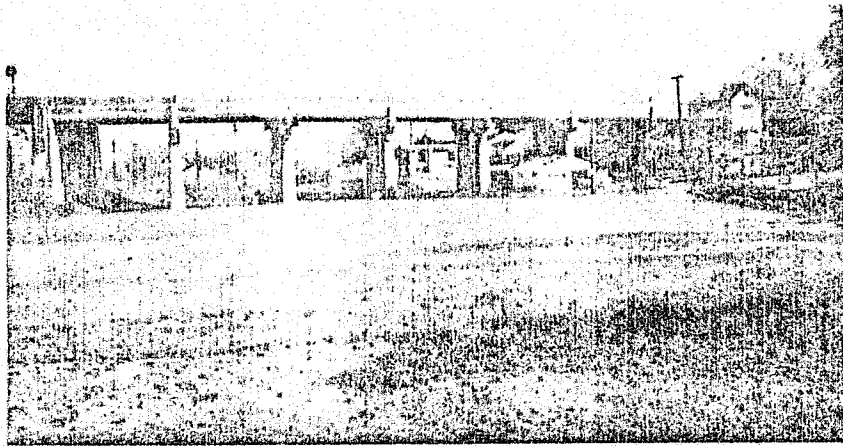


PHOTO 1

View from south abutment to Pier 8

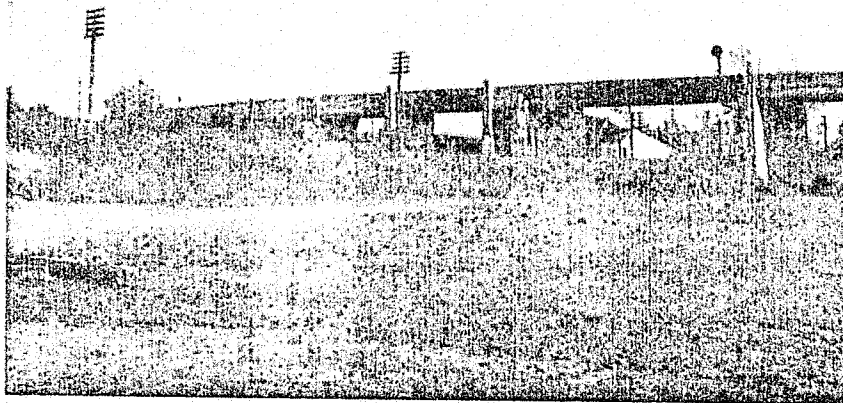


PHOTO 2

View from Pier 8 to north abutment

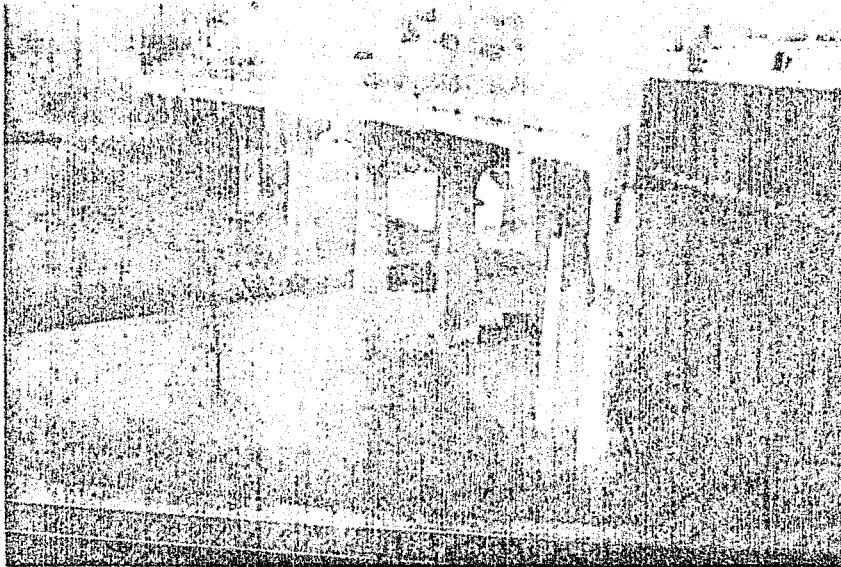


PHOTO 3

View from Pier 8 looking south

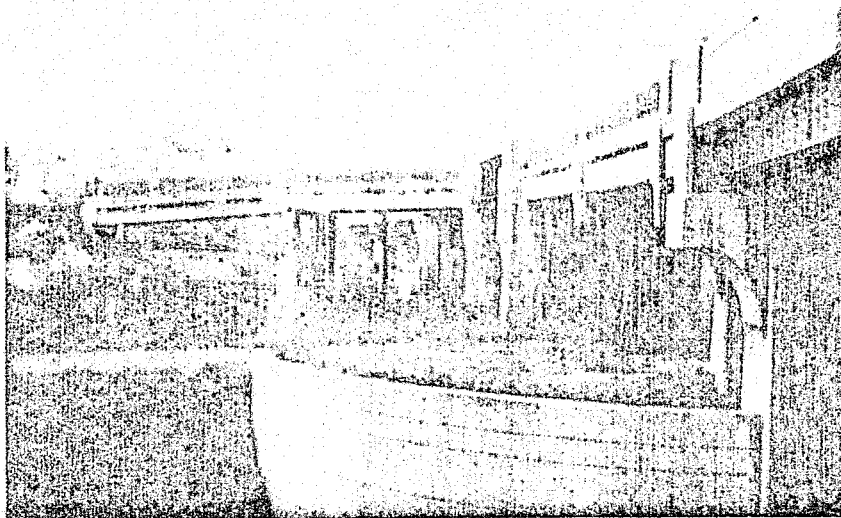


PHOTO 4

View from Pier 14 looking south

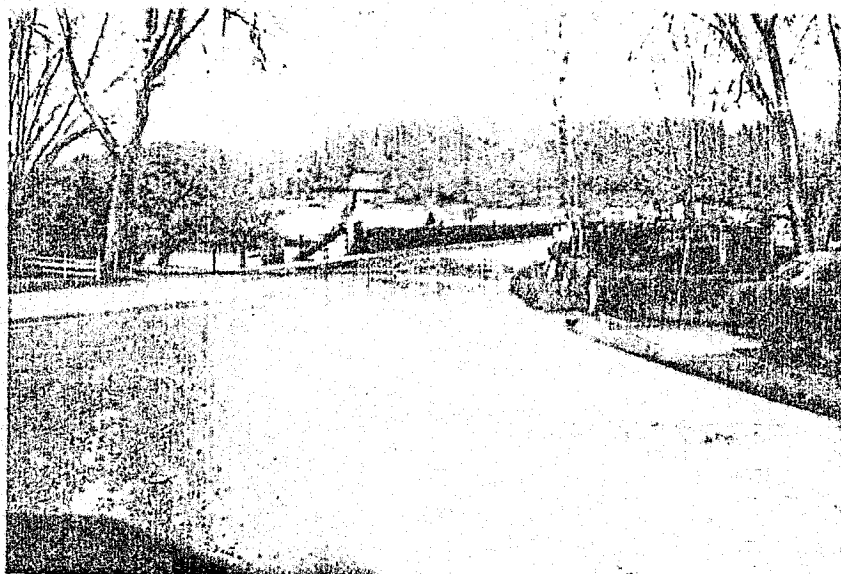


PHOTO 5

South approach

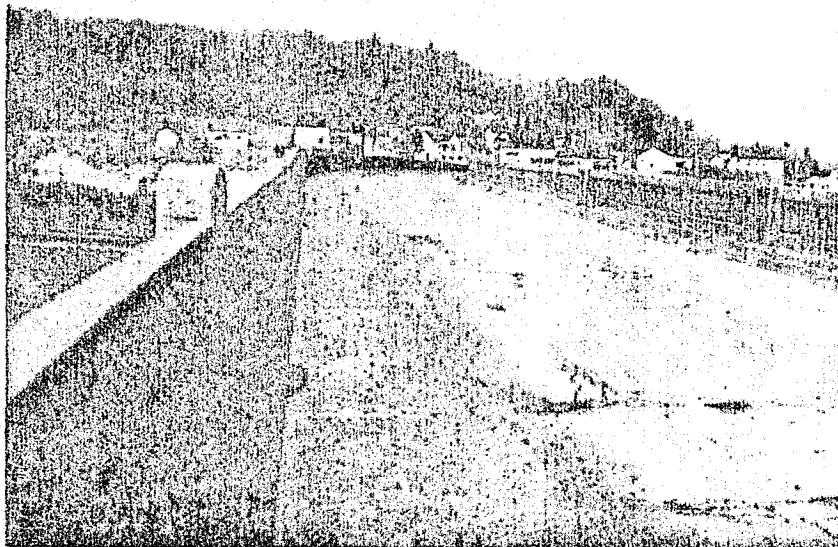


PHOTO 6

View looking north

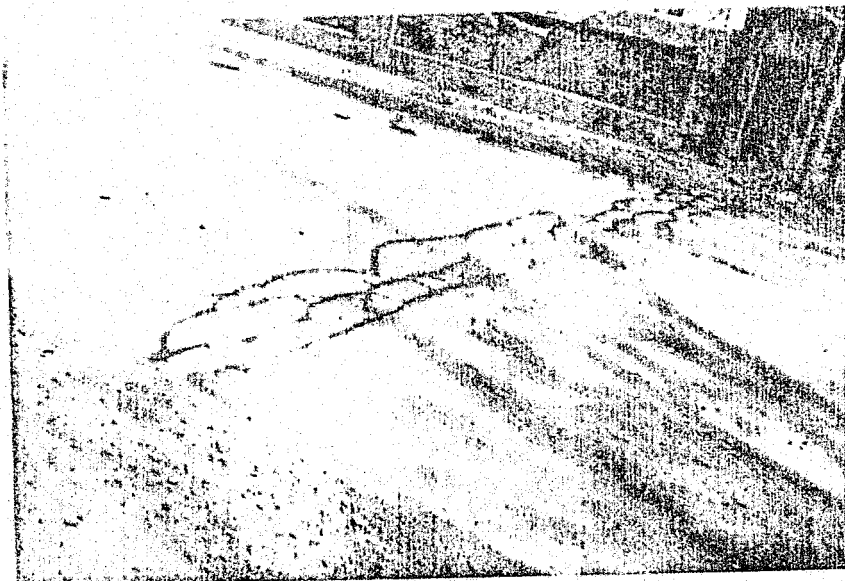


PHOTO 7

Roadway section at south abutment

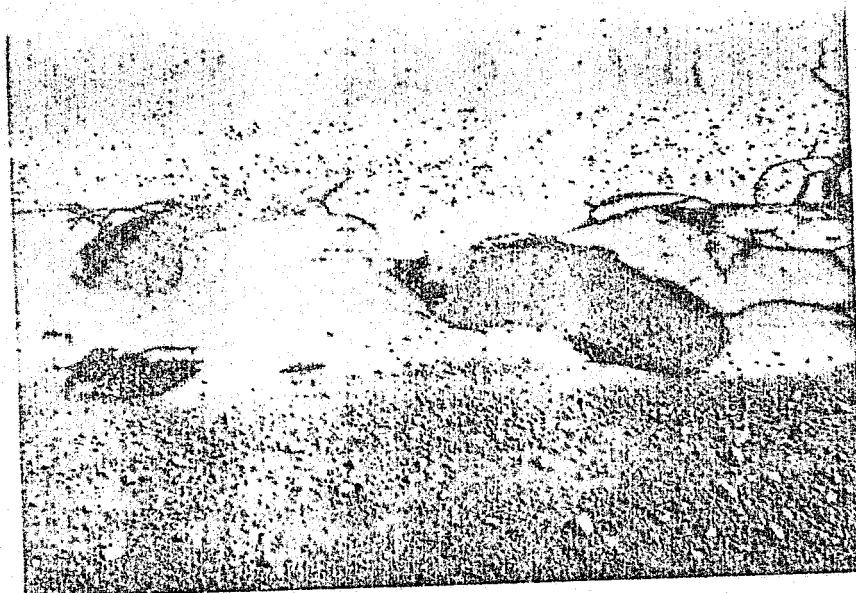


PHOTO 8

Potholes - Span 1

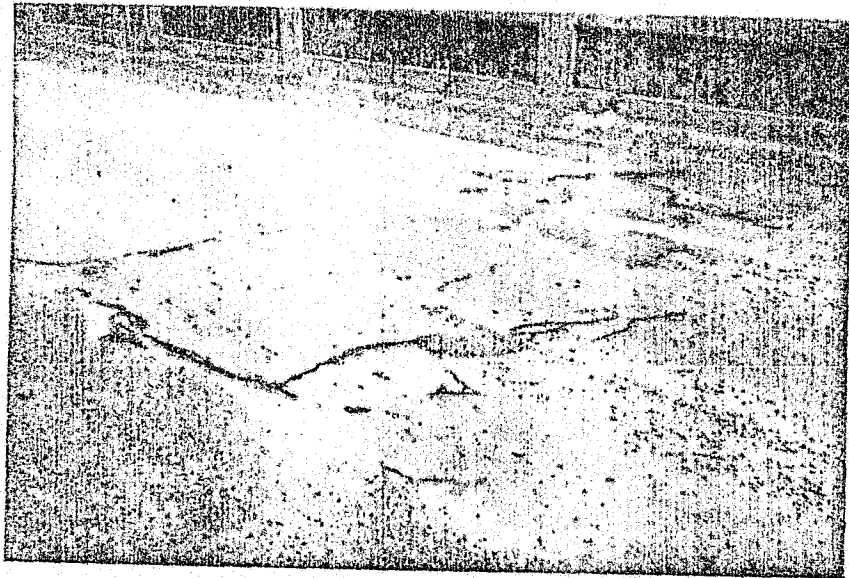
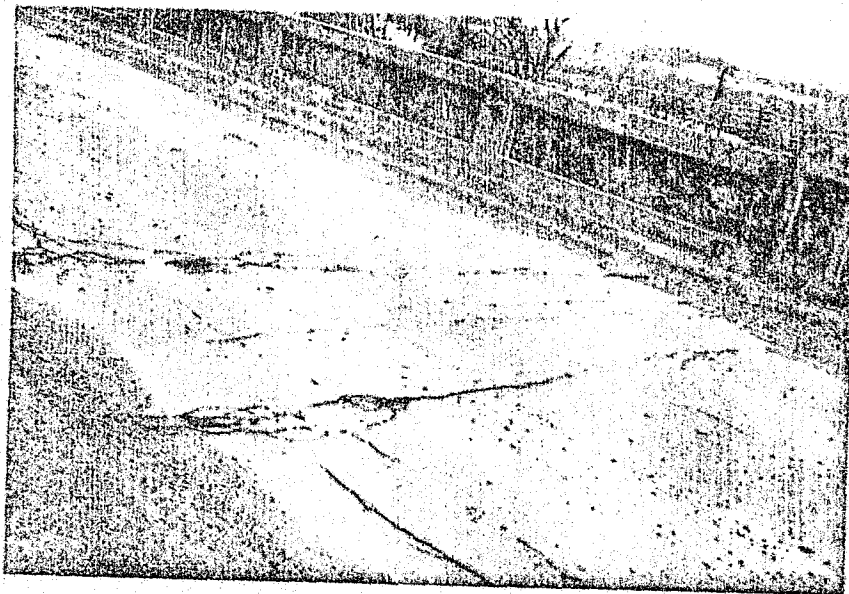


PHOTO 9

Roadway section - Span 1



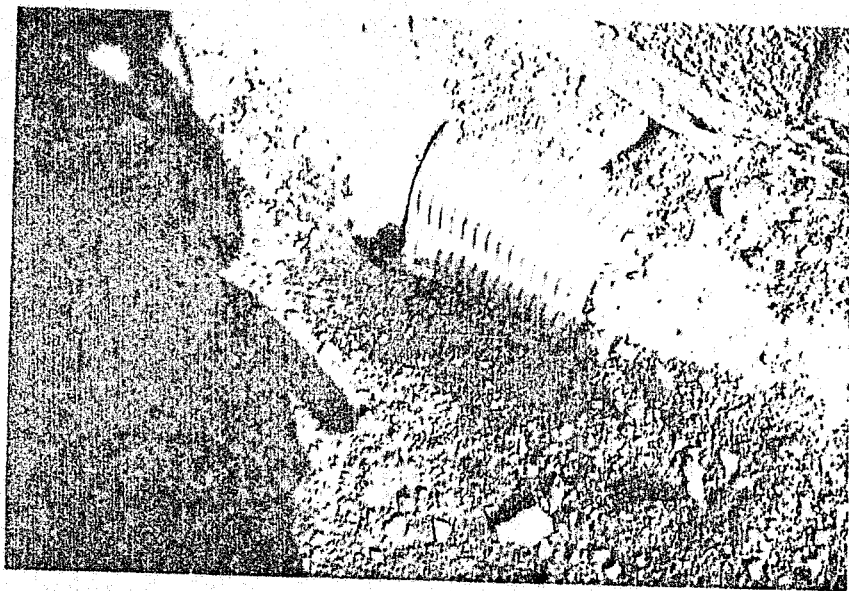


PHOTO 11

East curb of expansion dam over Pier 2

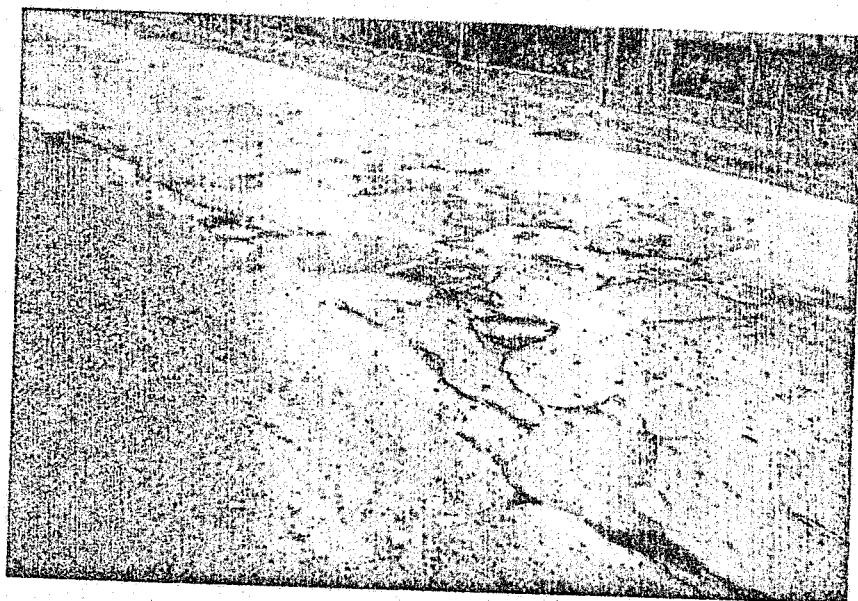


PHOTO 12

Roadway section - Span 2



PHOTO 13

West end of expansion dam over Pier 4
showing tilted dam

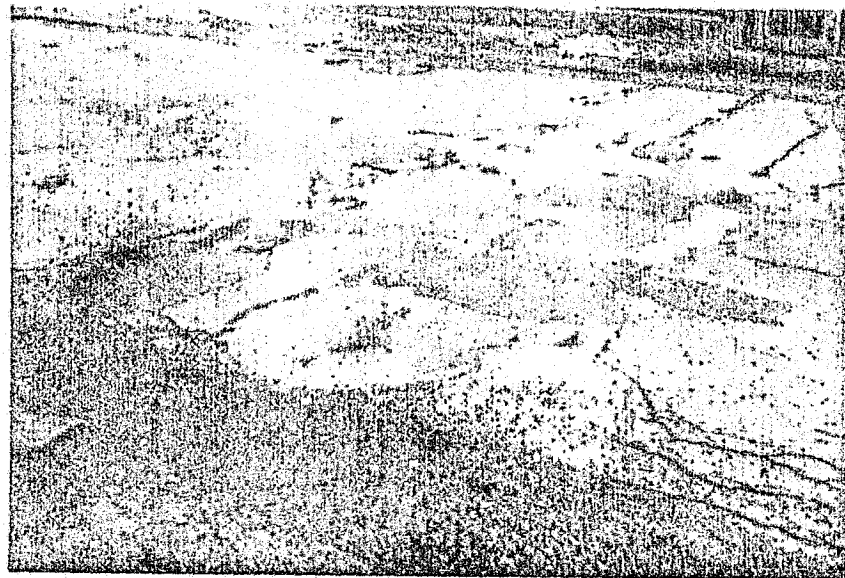


PHOTO 14

Roadway section of expansion dam at Pier 4

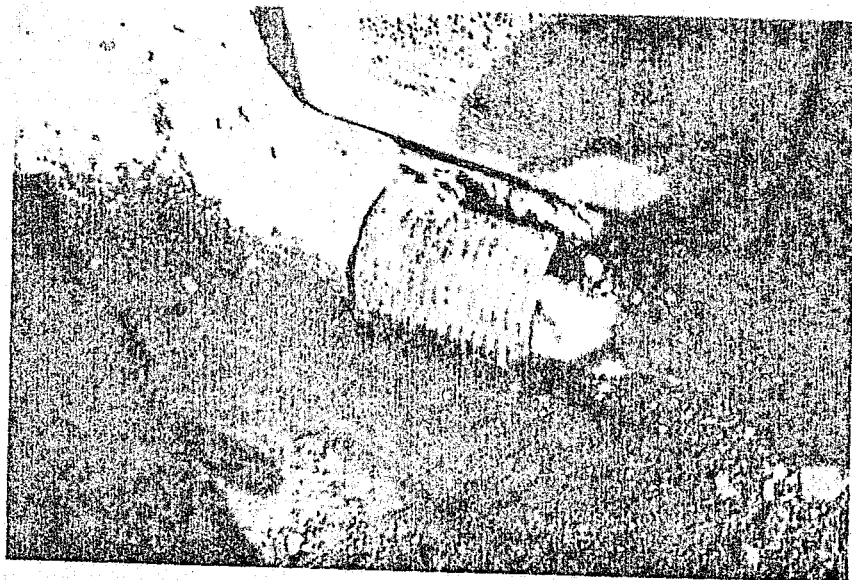


PHOTO 15

East curb line of expansion dam at Pier 4

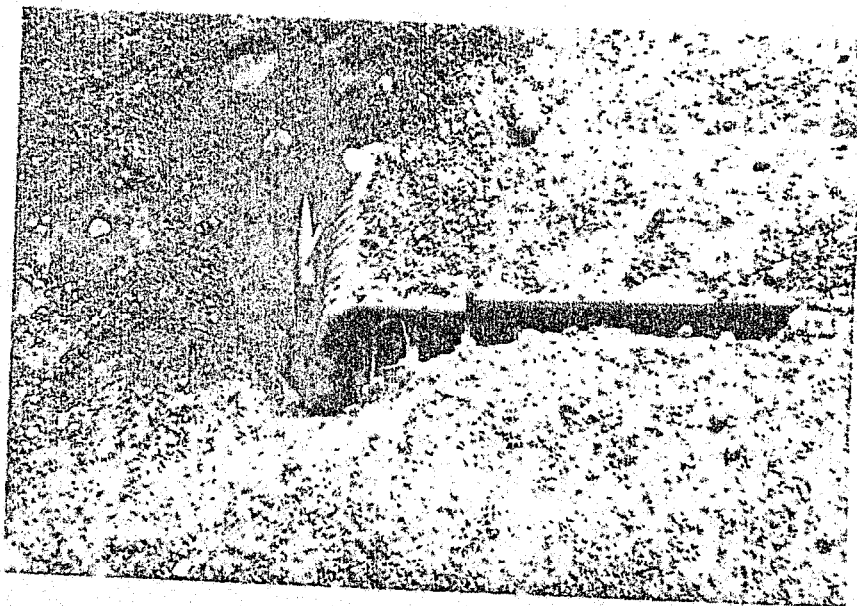


PHOTO 16

West curb over Pier 6

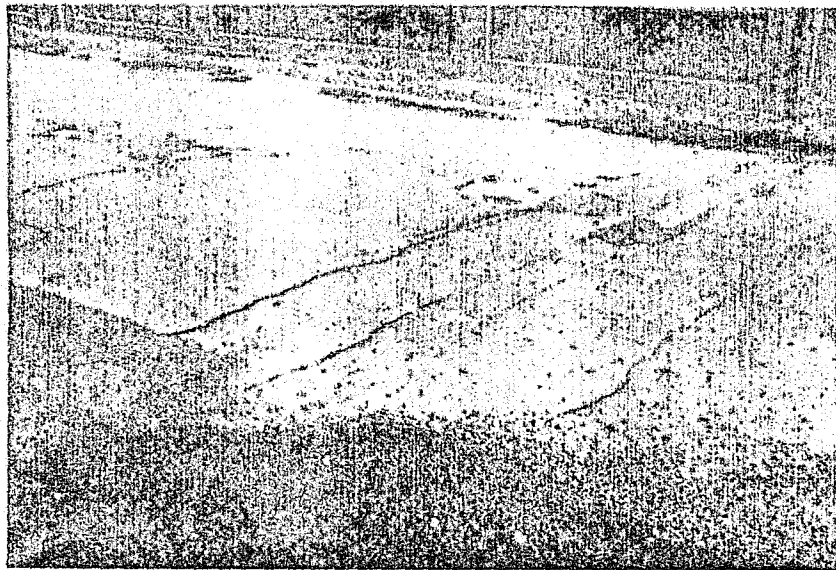


PHOTO 17

Roadway section over Pier 6

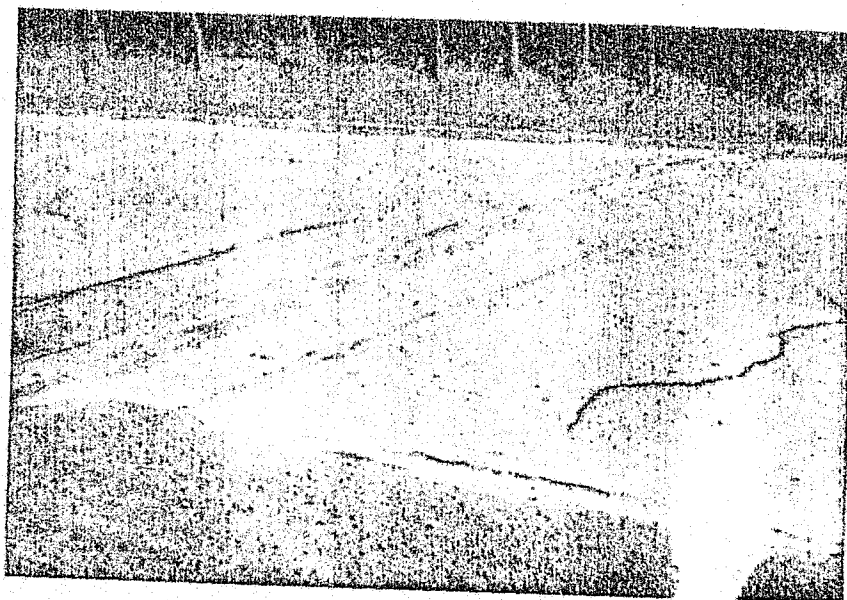


PHOTO 18

Roadway section over Pier 8

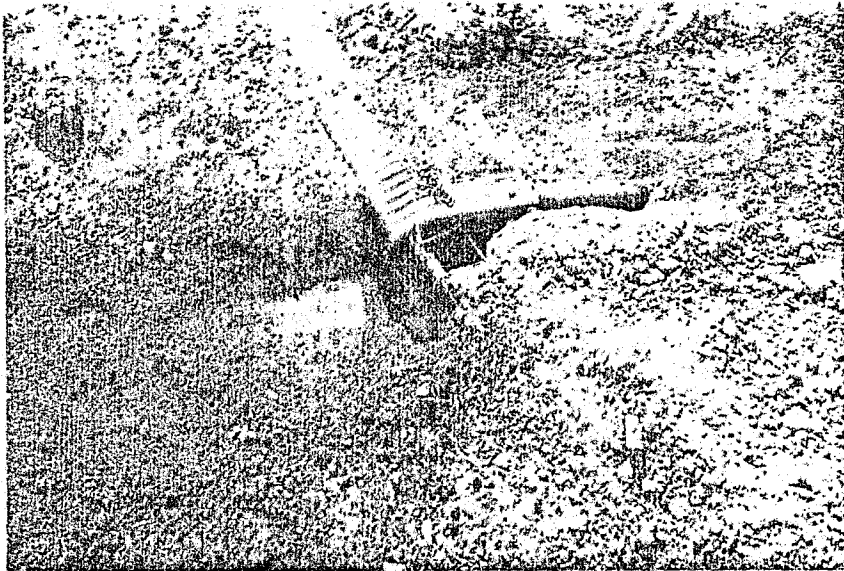


PHOTO 19

West curb at expansion dam over Pier 8

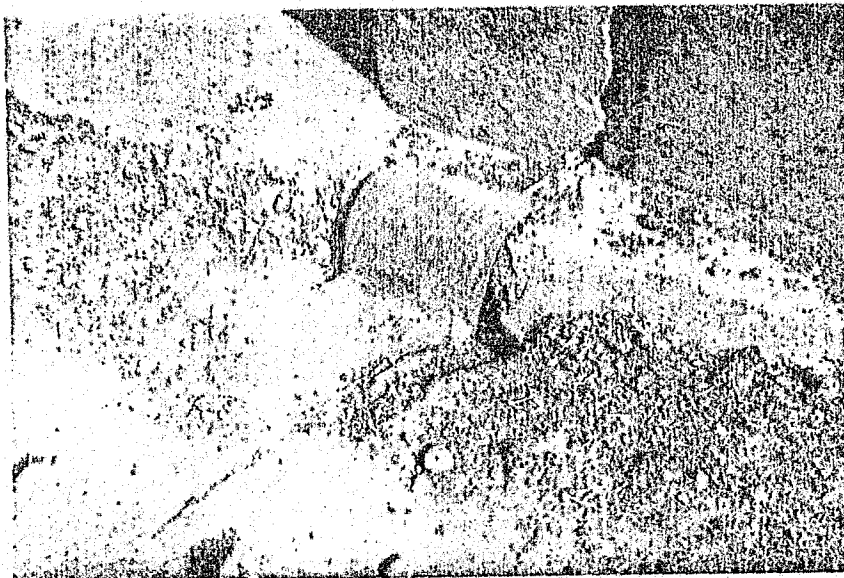


PHOTO 20

East curb of expansion dam over Pier 8

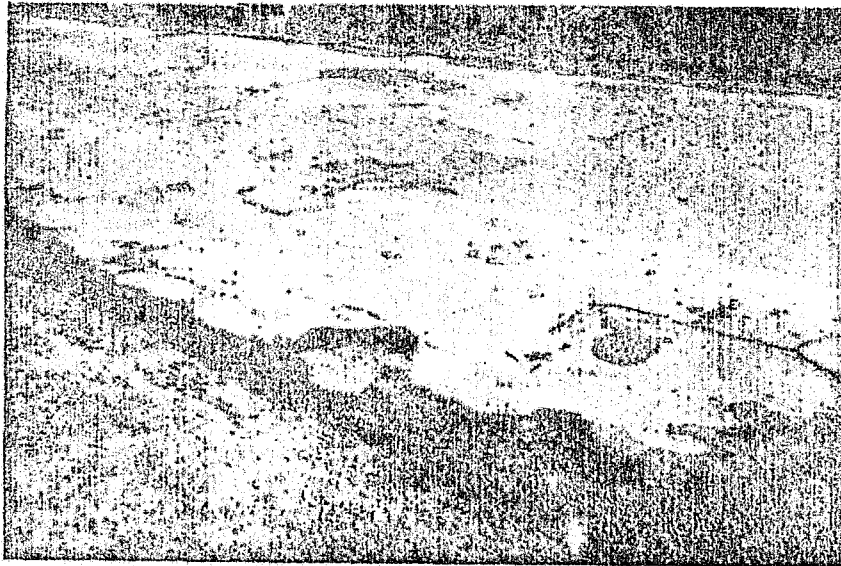


PHOTO 21

Roadway section of Span 9

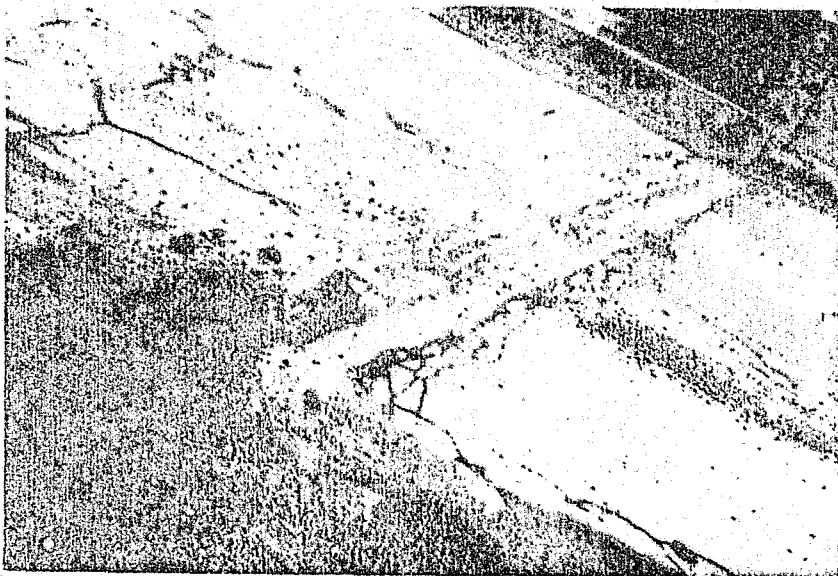


PHOTO 22

Roadway section over Pier 9



PHOTO 23

East curb over Pier 9

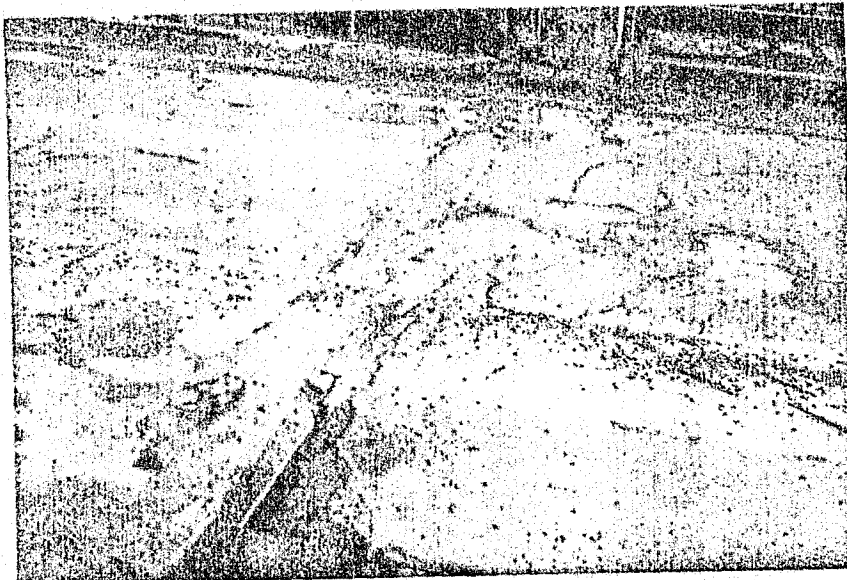


PHOTO 24

Expansion dam over Pier 10

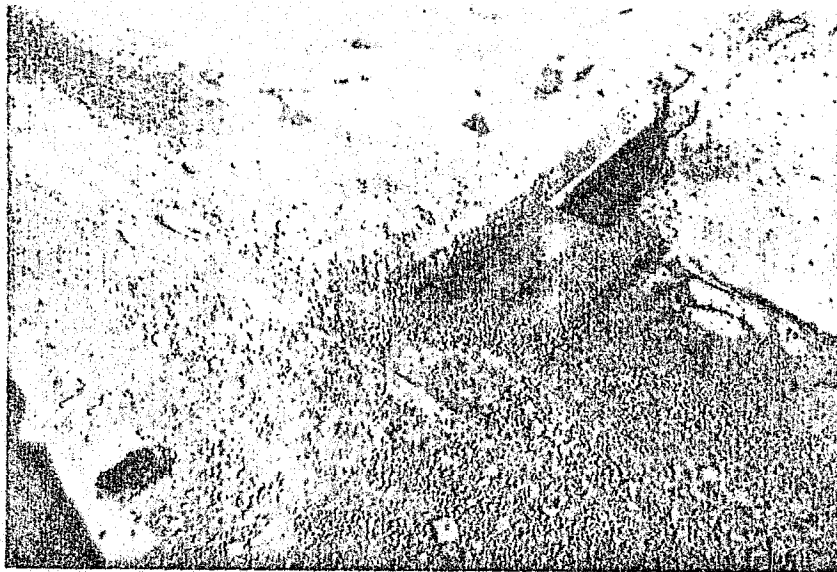


PHOTO 25

West curb area of expansion dam at Pier 10
Showing hole through deck and welded plate

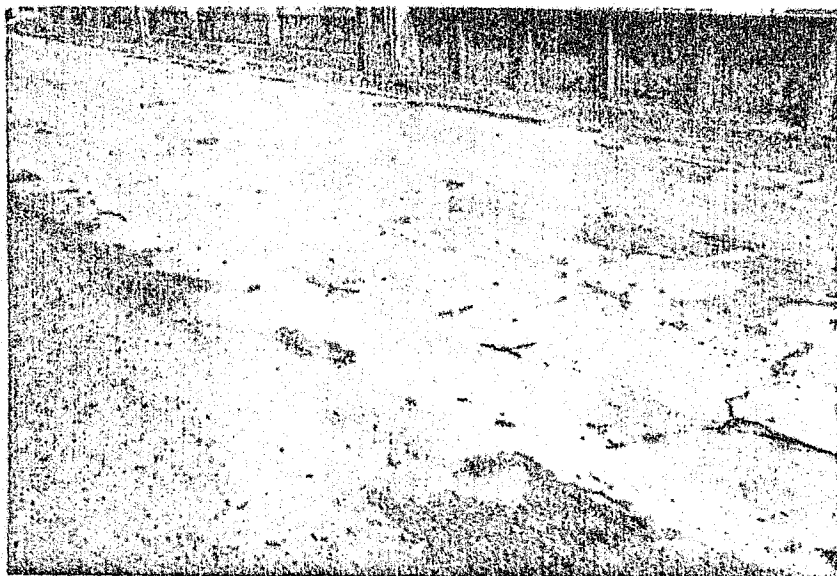


PHOTO 26

Roadway section - Span 11



PHOTO 27

Roadway section of expansion dam over Pier 11

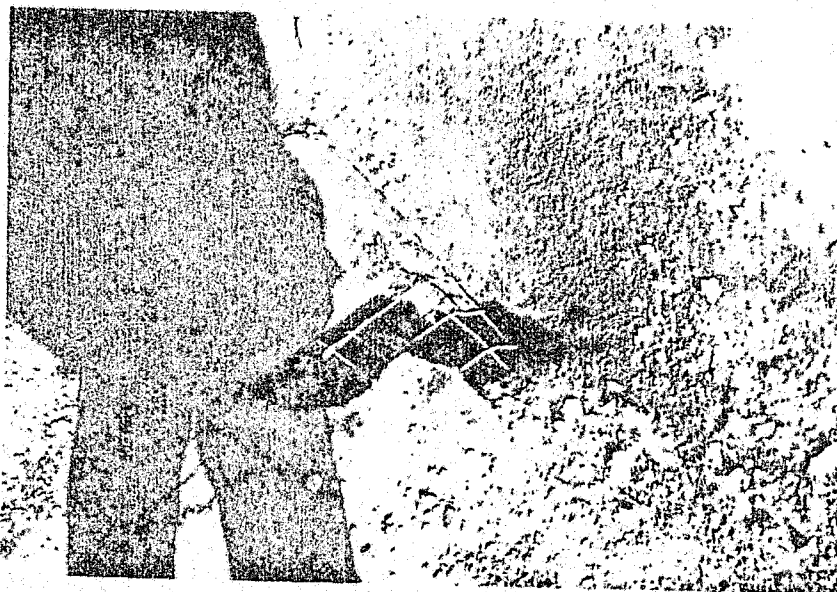


PHOTO 28

East curb over Pier 11

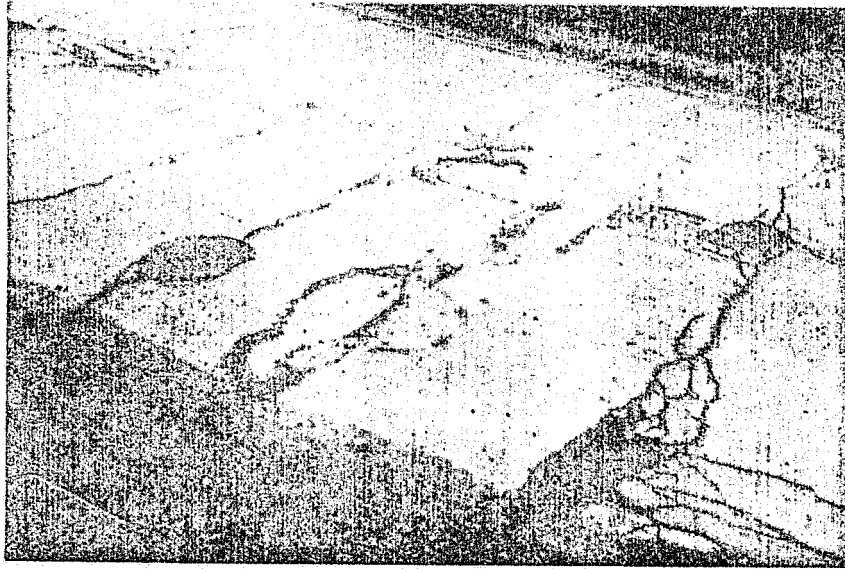


PHOTO 29

Roadway section of expansion dam over Pier 12



PHOTO 30

East curb of expansion dam over Pier 12

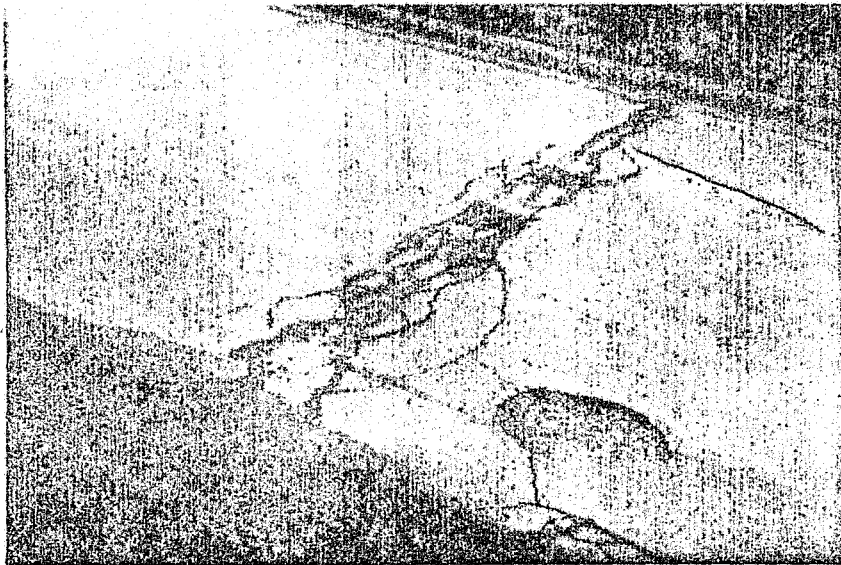


PHOTO 31

Roadway section of Pier 13

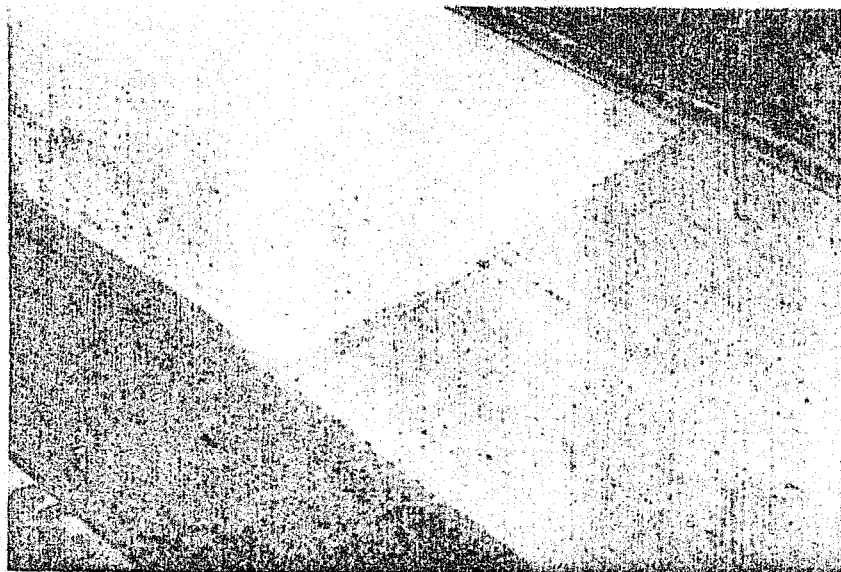


PHOTO 32

Roadway section of expansion dam over Pier 14

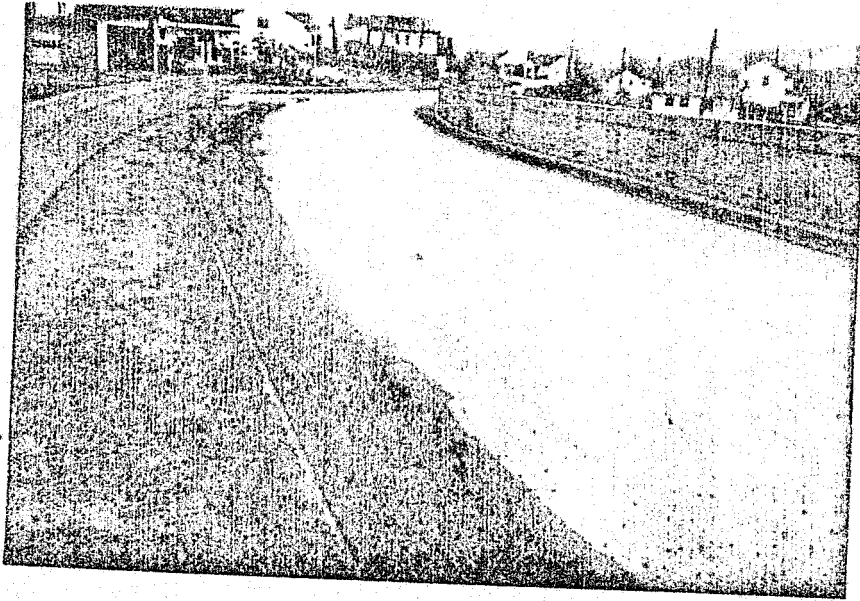


PHOTO 33

View of structure across Penna. Turnpike

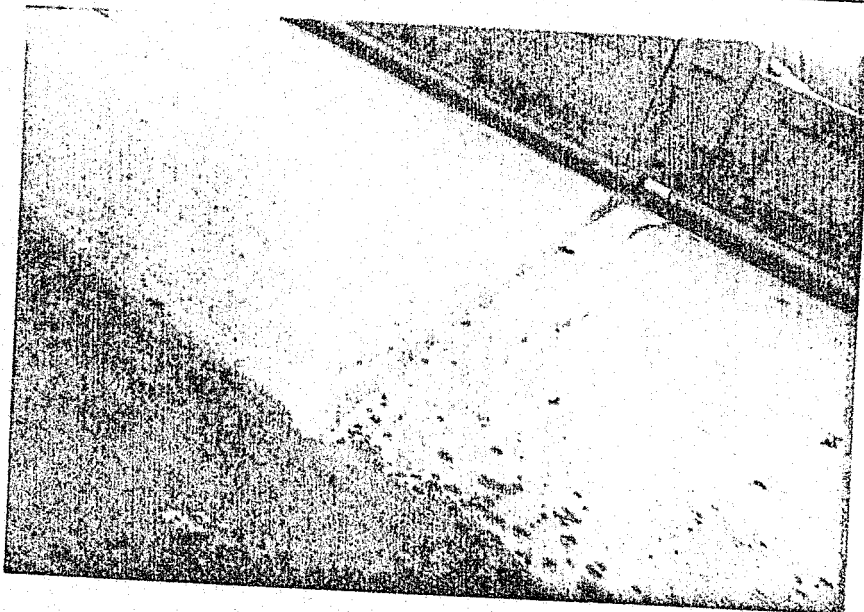


PHOTO 34

Roadway section across expansion
dam over Pier 15

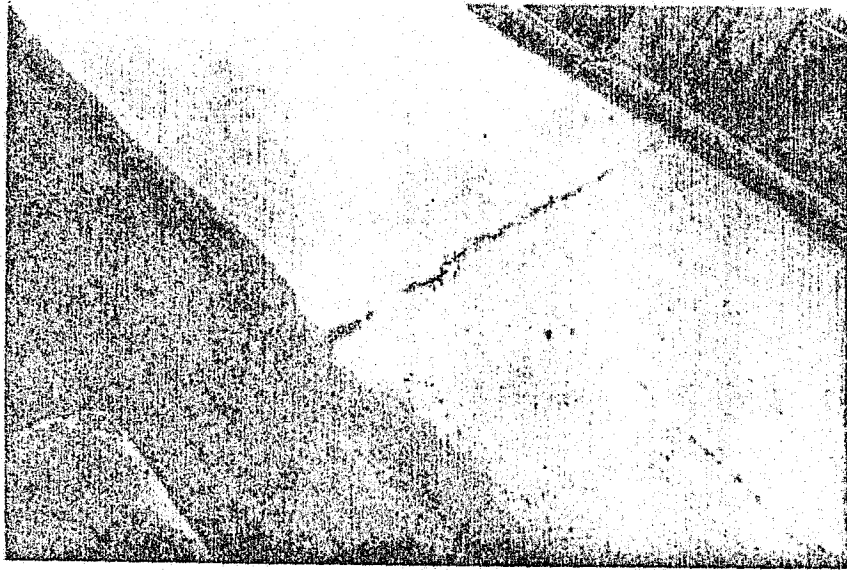
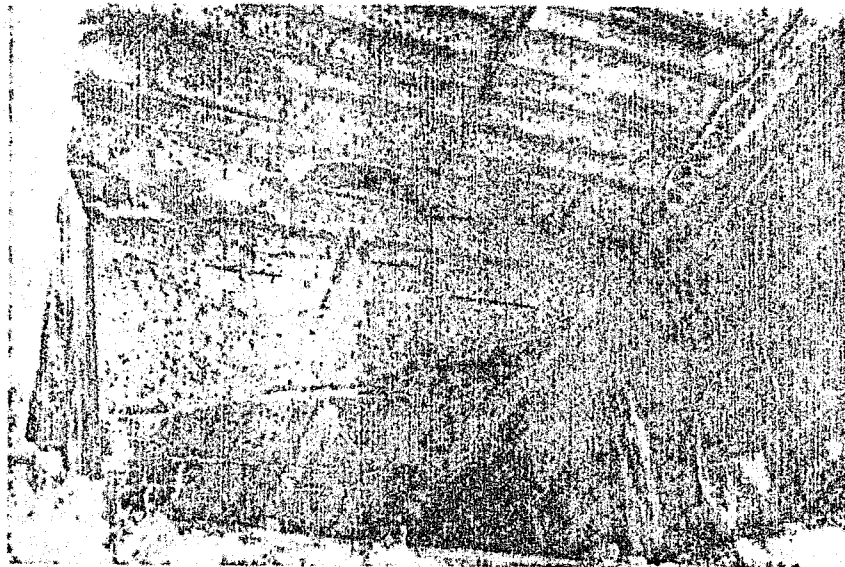


PHOTO 35

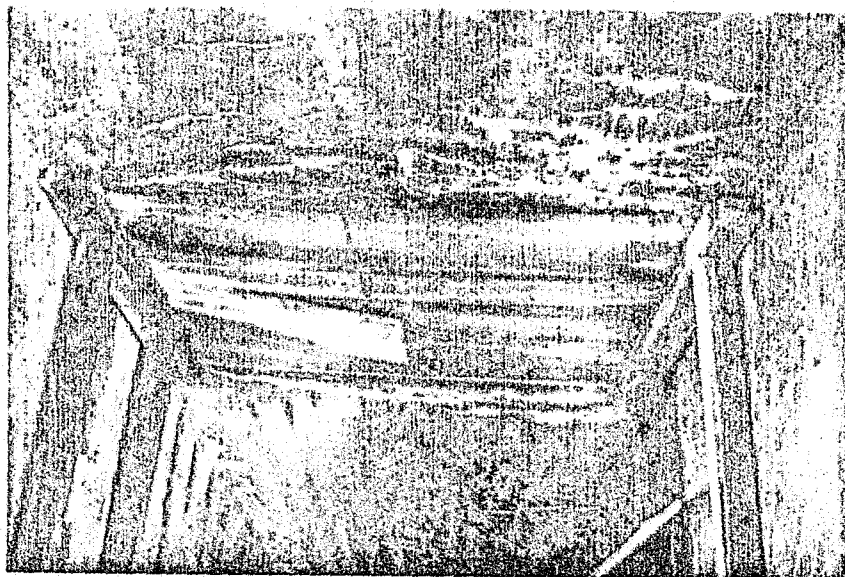
Roadway section at north abutment

APPENDIX B



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PHOTO 1 - BAY 2/1



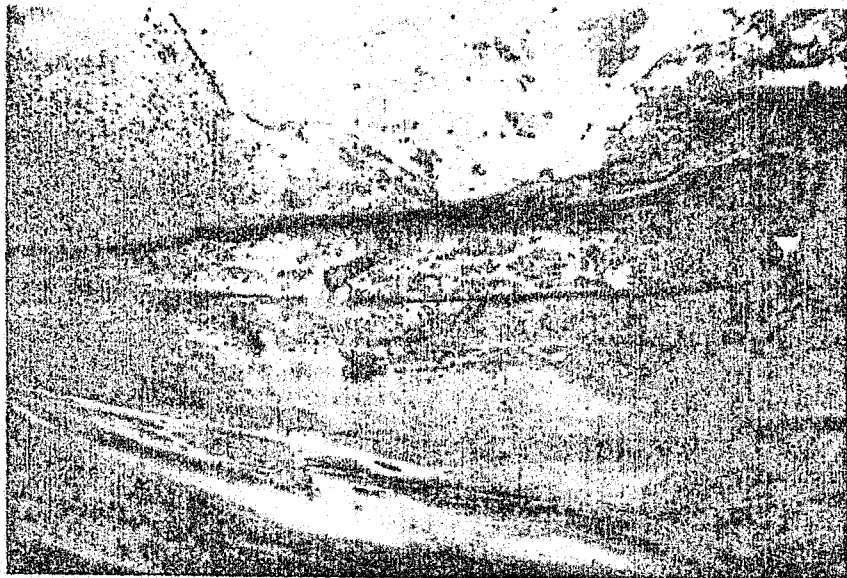
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PHOTO 2 - BAY 2/2



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PHOTO 3 - BAY 2/3



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PHOTO 4 - BAY 2/4



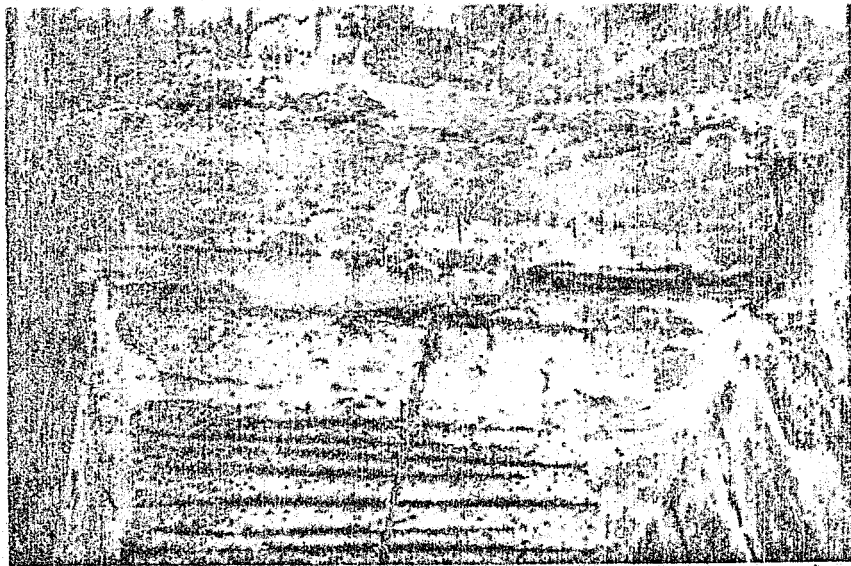
2/4

PHOTO 5 - BAY 2/4



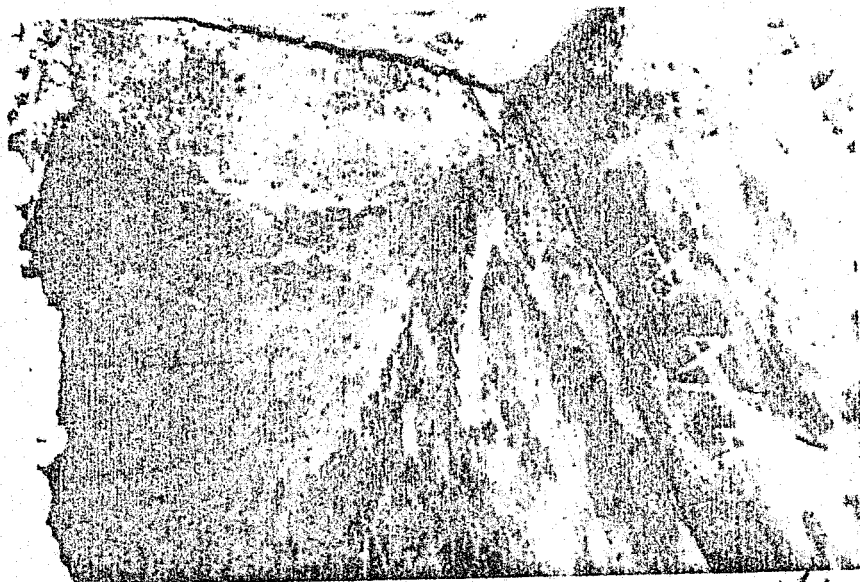
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PHOTO 6 - BAY 4/1



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PHOTO 7 - BAY 4/2



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PHOTO 8 - BAY 4/4



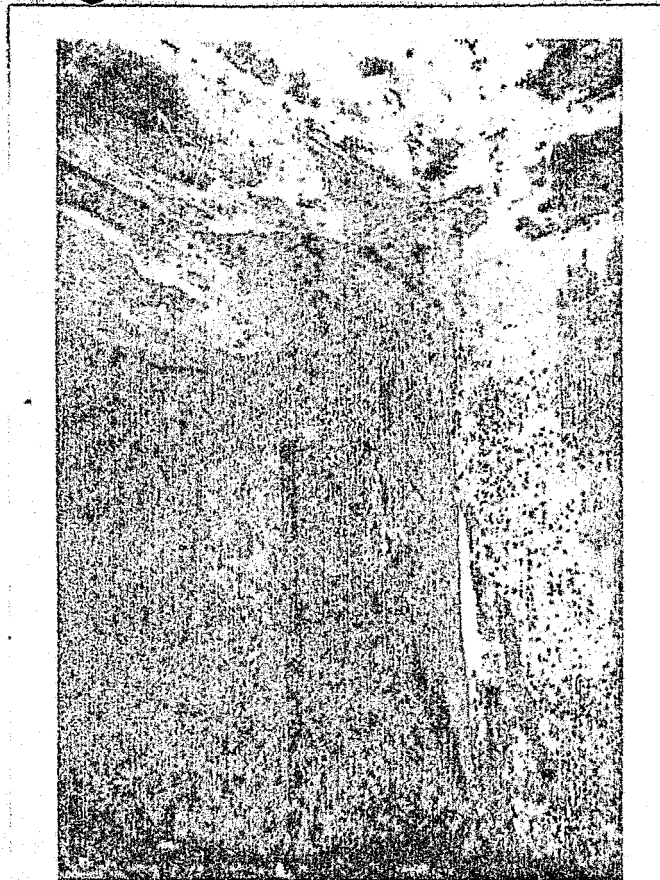
4/4

PHOTO 9 - BAY 4/4



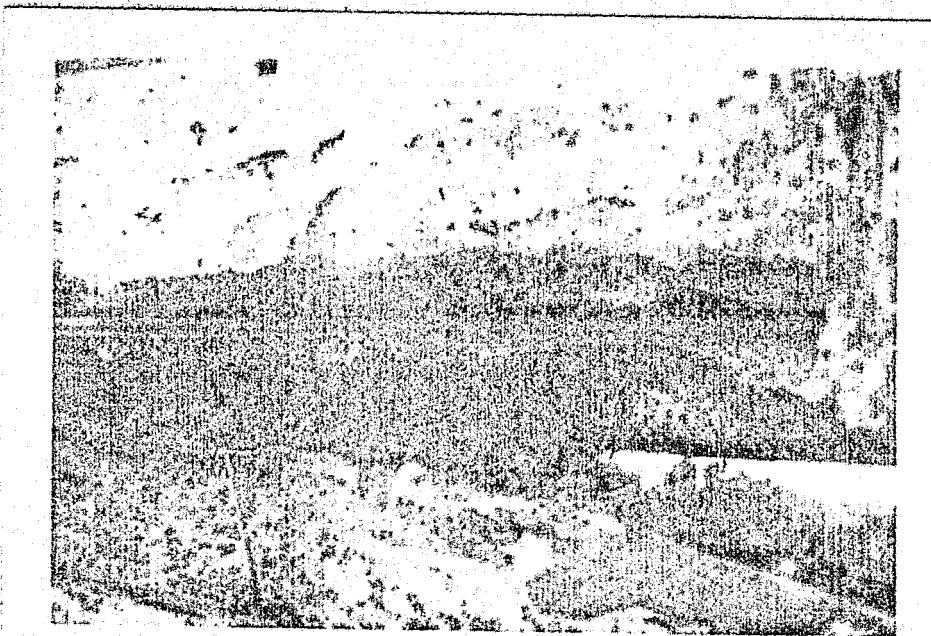
4/2

PHOTO 10 - BAY 4/4



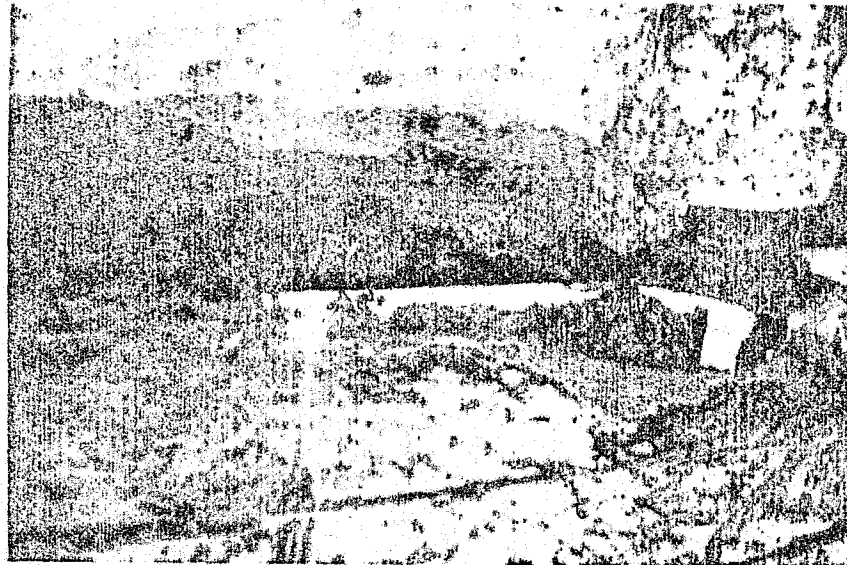
4/4

PHOTO 11 - BAY 4/4



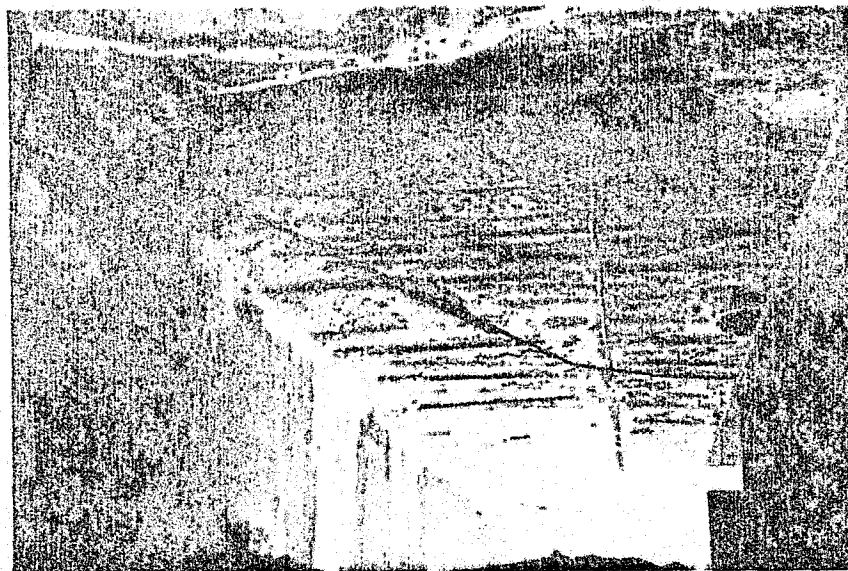
6/1

PHOTO 12 - BAY 6/1



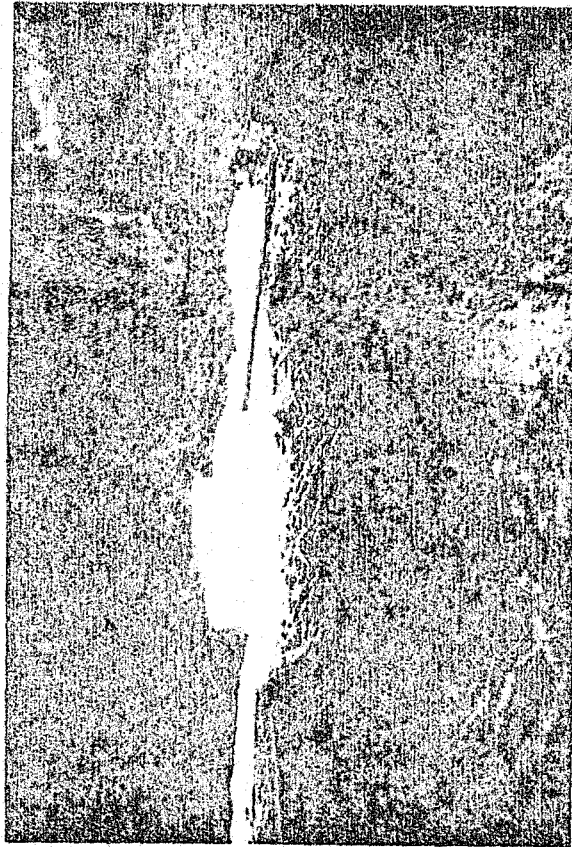
6/1

PHOTO 13 - BAY 6/1



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PHOTO 14 - BAY 6/1



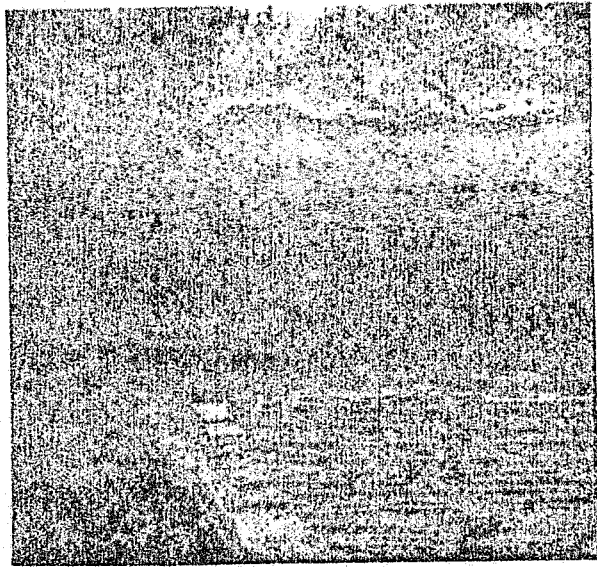
6/1

PHOTO 15 - BAY 6/1



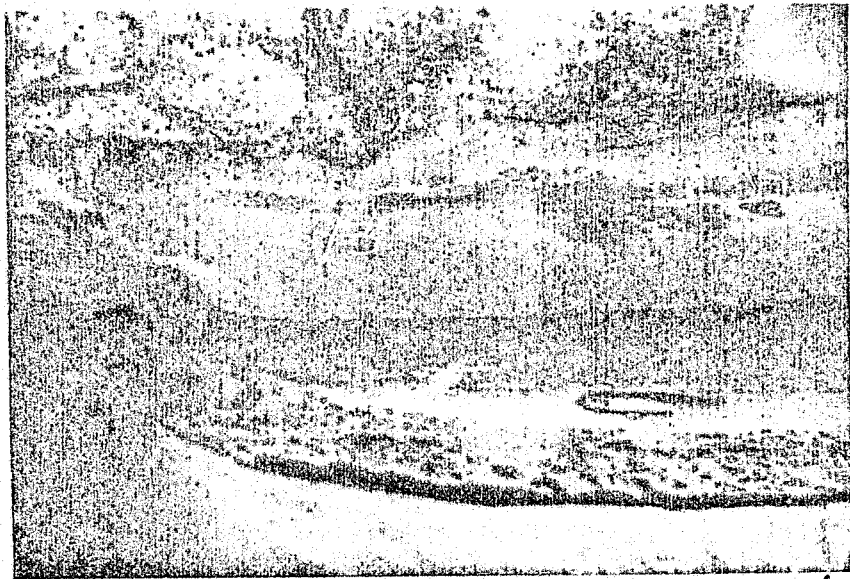
6/1

PHOTO 16 - BAY 6/1



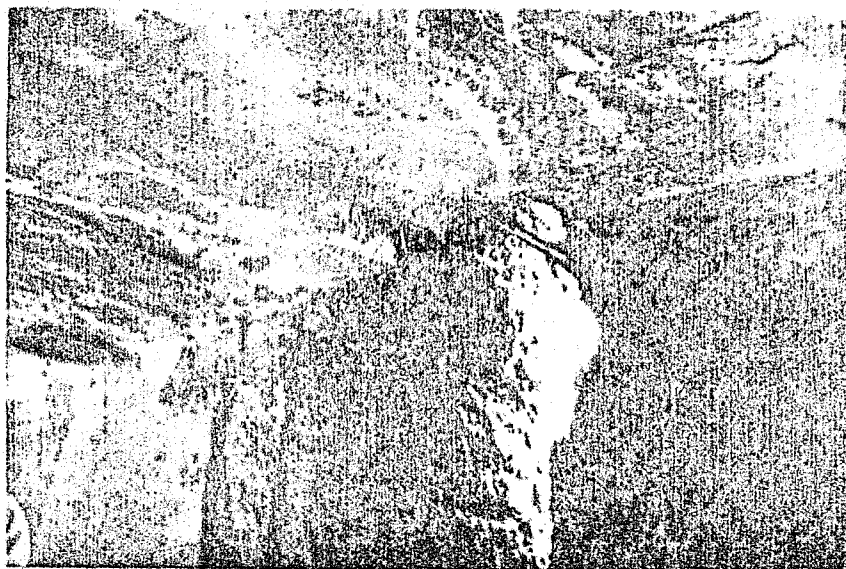
6/2

PHOTO 17 - BAY 6/2



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PHOTO 18 - BAY 6/3



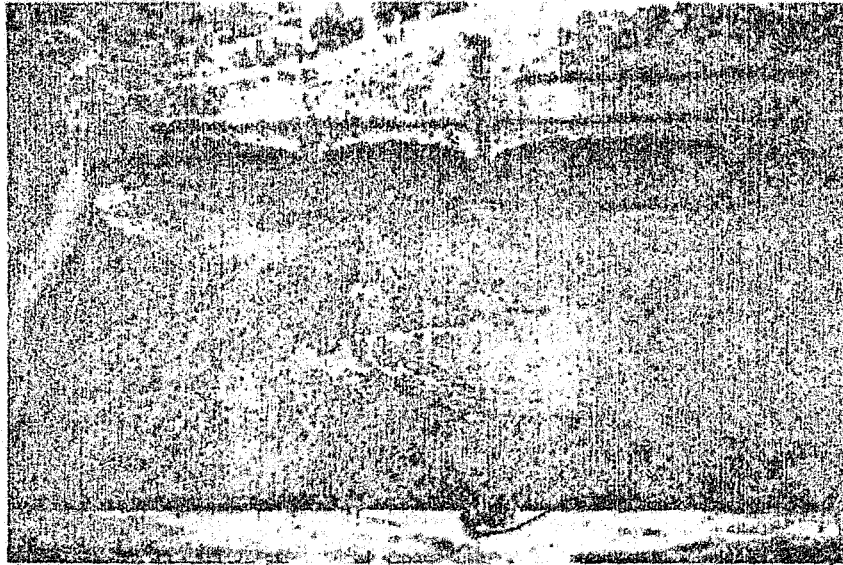
6/4

PHOTO 19 - BAY 6/4



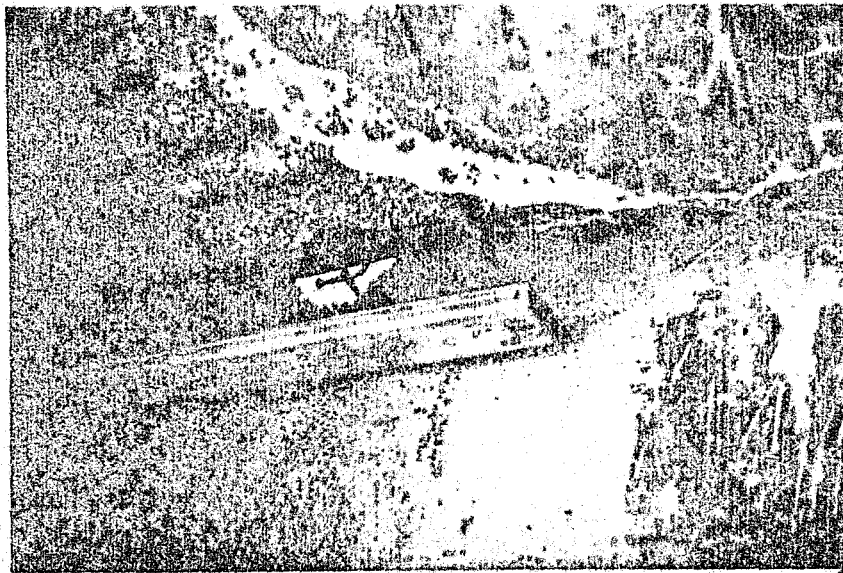
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PHOTO 20 - BAY 10/1



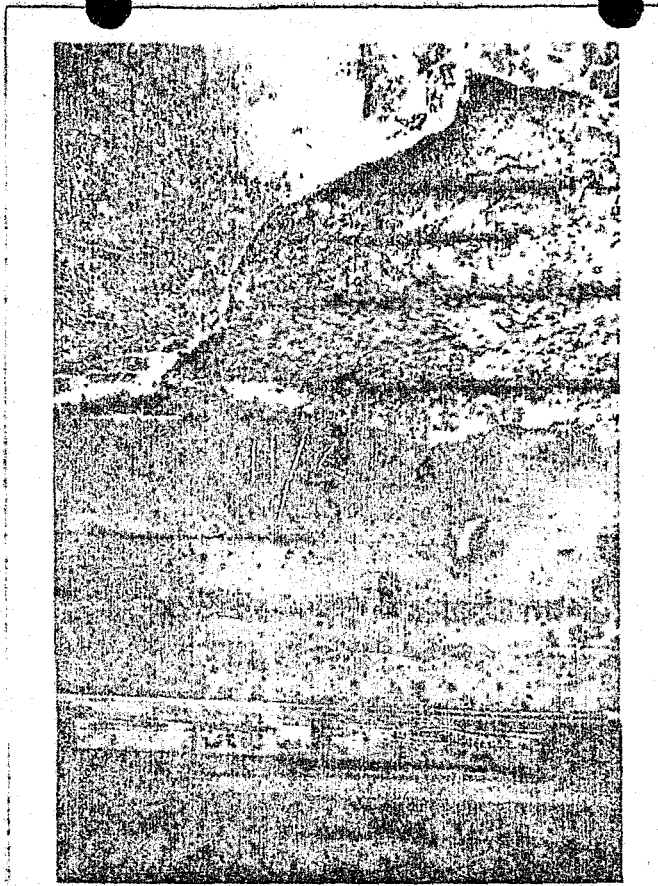
10/2

PHOTO 21 - BAY 10/2



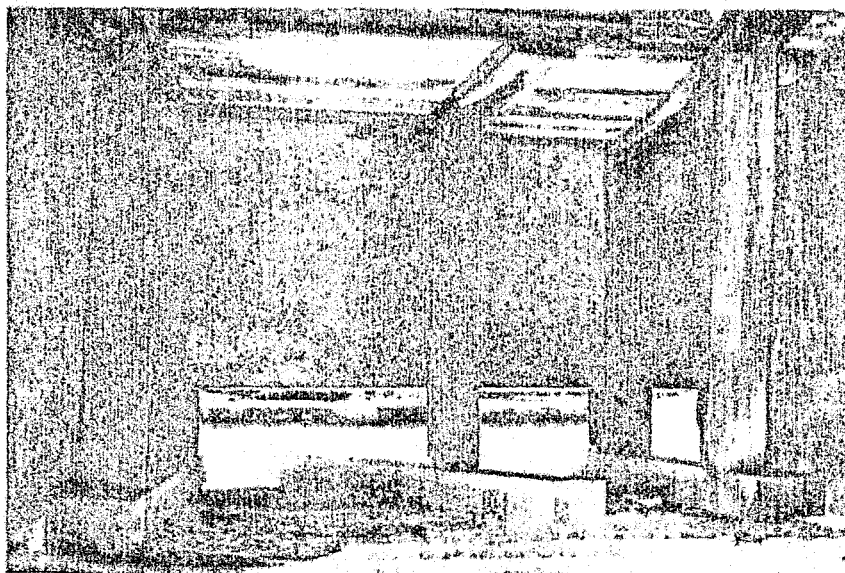
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PHOTO 22 - BAY 11/1



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PHOTO 23 - BAY 11/2



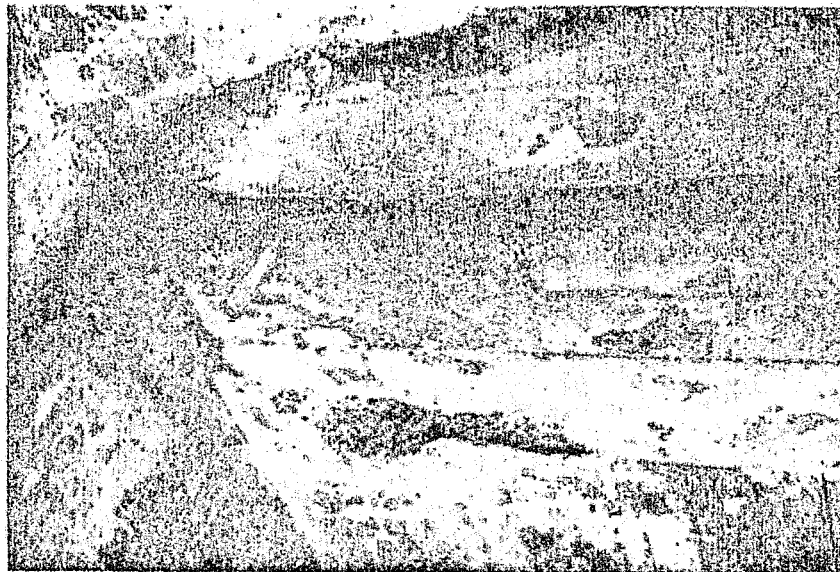
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PHOTO 24 - BAY 11/3



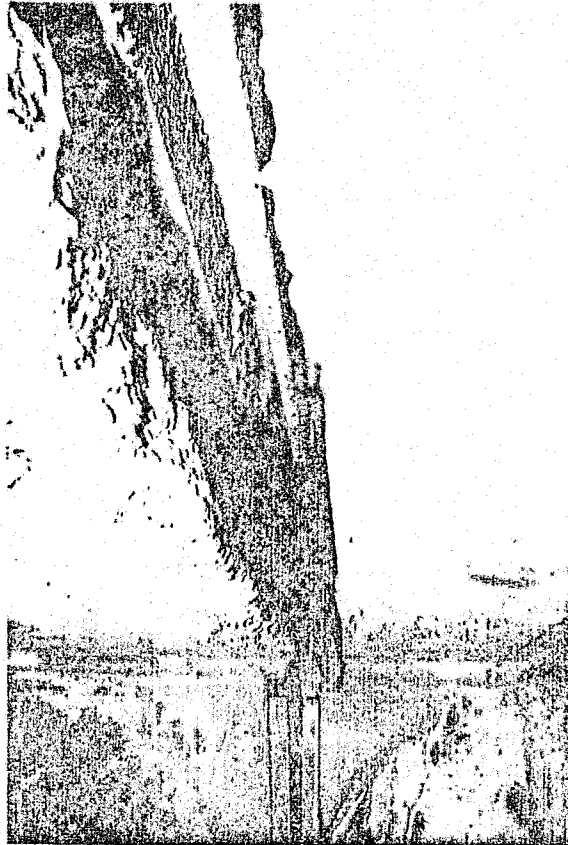
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PHOTO 27 - BAY 12/2



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PHOTO 28 - BAY 12/3



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PHOTO 29 - BAY 12/3



PHOTO 30 - BAY 12/4



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PHOTO 31 - BAY 12/4